

BOEM OCS PERMIT L25-014 CHEVRON ST MALO (4D OBN) SURVEY PROTECTED SPECIES OBSERVER REPORT

Final



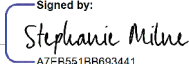
Final
09 April 2026

REPORT

BOEM OCS PERMIT L25-014
CHEVRON ST MALO (4D OBN) SURVEY
PROTECTED SPECIES OBSERVER REPORT

Final

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This deliverable was prepared by RPS in accordance with generally accepted professional practices that are typically utilized for scientific work products. The work was performed within the limitations and assumptions of our approved scope of work, and the descriptive documentation associated with this deliverable. Unless explicitly included in our approved scope of work, information provided in this deliverable has not been prepared to meet industry standards for engineering and should not be used for construction.

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Acronyms and Abbreviations

ADC	Analog Digital Converter
BO	2025 Biological and Conference Opinion on the Federally Regulated Oil and Gas Program in the Gulf of America
BOEM	Bureau for Ocean Energy Management
BSEE	Bureau of Safety and Environmental Enforcement
BZ	Buffer Zone
CPA	Closest Point of Approach
DAQ	Data Acquisition Unit
dB	Decibel
dB re 1 μ Pa (rms)	Decibel related to 1 micropascal (root mean square)
DSLR	Digital Single Lens Reflex
EOW	End of Watch
EMP	Environmental Management Plan
EPU	Electronic Processing Unit
ESA	Endangered Species Act
FFT	Engine Noise Fast Fourier Transform
GOA	Gulf of America
GPS	Global Positioning System
HF	High Frequency
Hz	hertz
kHz	Kilohertz
km	Kilometer
LA	Louisiana
LF	Low Frequency
LOA	Letter of Authorization
m	Meters
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
OBN	Ocean Bottom Node
OPR	Office of Protected Resources
PAM	Passive Acoustic Monitoring
PSO	Protected Species Observer
SZ	Shutdown Zone
SOW	Start of Watch
R/V	Research Vessel
TOAD	Time-of-Arrival-Distance
TX	Texas
USB	Universal Serial Bus
USFWS	United States Fish and Wildlife Service
UTC	Coordinated Universal Time

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1 EXECUTIVE SUMMARY

The Chevron, St Malo 4D Ocean Bottom Node (OBN) survey was conducted by TGS in federal waters of the Gulf of America (GOA) off the coast of Galveston, Texas and Port Fourchon, Louisiana. The St Malo 4D OBN survey comprised the Walker Ridge area with the southern portion extending into the Amery Terrace, operating under survey permits. This report is the Final Protected Species Report for the St Malo 4D OBN survey, conducted under Bureau for Ocean Energy Management (BOEM) Permit L25-014 and covers the protected species monitoring and mitigation effort on the one source vessel utilized by Chevron and TGS for this survey.

The source vessel *Research vessel (R/V) Sanco Sword* towed a seismic source array and conducted operations under Permit L25-014, from 17 October 2025 to 22 February 2026.

Protected Species Observers (PSOs) and Passive Acoustic Monitoring (PAM) Operators, provided through RPS, were assigned to each vessel conducting 24-hour source operations to undertake visual and acoustic observations and implement mitigation protocols, in accordance with the BOEM survey permit, the National Marine Fisheries Service (NMFS) Letter of Authorization (LOA), and NMFS Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico (BO). Mitigation protocols for this survey included the establishment of buffer zones (BZs) and shutdown zones (SZs) for marine mammals and other protected species including sea turtles, visual and acoustic monitoring, and strike avoidance mitigation measures. The R/V *Sanco Sword* had three PSOs and three PAM Operators onboard the vessel.

For the portion of the survey conducted under Permit L25-014, the R/V *Sanco Sword* seismic sources were active for a total of 1578 hours and 59 minutes, of which 1324 hours and 20 minutes were at full volume production. PSOs conducted visual observations for a total of 1207 hours and 18 minutes, and PAM operators monitored for a total of 1898 hours and 28 minutes.

A total of 20 detection events of protected species occurred during the survey, 17 of which were marine mammal detections and three sea turtle detections.

Marine mammal detections consisted of seven visual-only sightings and 10 acoustic-only detections. There were no correlated visual and acoustic detections. Visual detections consisted of one identified delphinid species: bottlenose dolphin (*Tursiops truncatus*), and one identified whale species: Sperm whale (*Physeter macrocephalus*), and an unidentified whale. Additionally, there were visual detections of unidentified delphinid. Acoustic detections consisted entirely of delphinids identified at the family level.

Sea turtle detections consisted of three sightings of two identified species: green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricata*), and one unidentified shelled sea turtle.

There were no observations of dead/injured protected species during the survey.

In accordance with stipulations set forth under Permit L25-014, LOA, and the BO, a total of seven mitigation actions were implemented for the sound sources, including five delays to activation of the source, one shutdown of the active source, and one turtle pause. There were seven strike avoidance maneuvers for protected species necessary during the survey.

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2 INTRODUCTION

The Chevron, St Malo 4D OBN survey was conducted by TGS in federal waters of the US Gulf off the coast of Galveston, TX and Port Fourchon, LA. The St Malo 4D OBN survey comprises the Walker Ridge area with the southern portion extending into the Amery Terrace, operating under survey permits. This report is the Final Protected Species Report for the St Malo 4D OBN survey, conducted under BOEM Permit L25-014 and covers the protected species monitoring and mitigation efforts on the source vessel utilized by Chevron and TGS for this survey.

NMFS and BOEM have advised that sound-producing survey equipment operating in the hearing range of marine species has the potential to cause acoustic harassment, particularly to marine mammals. Protected species monitoring for the survey was conducted in accordance with BOEM and NMFS standards outlined in the BO.

Chevron was responsible for contracting PSOs through a provider to conduct monitoring and mitigation for protected species, including marine mammals, sea turtles, and Endangered Species Act (ESA-listed) fish species such as Gulf sturgeon, oceanic whitetip shark, and giant manta ray, during their activities. Monitoring and mitigation procedures that were implemented during the survey are described in Section 4 of this report.

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2.1 BOEM and NMFS Reporting Requirements

This report summarizes the information required by the BOEM Permit L25-014, the BO, and the LOA, identified in Table 1. A copy of these documents is provided in Appendix A and an Environmental Management Plan (EMP) in Appendix B, which documents reporting requirements from each of those documents.

Table 1: BOEM and NMFS reporting requirements and location within this technical report

Required Content	Source Reference	Location Addressed in Technical Report
PSOs must use a standardized data collection form, whether hard copy or electronic. PSOs shall record detailed information about any implementation of mitigation requirements, including the distance of animals to the acoustic source and description of specific actions that ensued, the behavior of the animal(s), any observed changes in behavior before and after implementation of mitigation, and if shutdown was implemented, the length of time before any subsequent ramp-up of the acoustic source. If required mitigation was not implemented, PSOs should record a description of the circumstances.	NMFS BO Appendix A	Appendix I : Excel Data Sheets of Monitoring Effort, Source Operations and Detections of Protected Species During the Survey
The Marine Mammal Protection Act (MMPA) authorization (as applicable) and BOEM Permit/Plan holder shall submit a draft comprehensive report to BOEM/BSEE (protectedspecies@boem.gov and protectedspecies@bsee.gov) and NMFS (nmfs.psoreview@noaa.gov) on all activities and monitoring results within 90 days of the completion of the survey or expiration of the MMPA authorization (as applicable) or BOEM Permit/Plan, whichever comes sooner, or if an issued MMPA authorization is valid for greater than one year, the summary report must be submitted on an annual basis,. The report must describe all activities conducted and sightings of protected species near the activities, must provide full documentation of methods, results, and interpretation pertaining to all monitoring, and must summarize the dates and locations of survey operations and all protected species sightings (dates, times, locations, activities, associated survey activities, and information regarding locations where the acoustic source was used). A final report must be submitted within 30 days following resolution of any comments on the draft report.	NMFS BO Appendix A	This Technical Report
The MMPA authorization (as applicable) and BOEM Permit/Plan holder must report sightings of any injured or dead aquatic protected species immediately, regardless of the cause of injury or death. For injured or dead non-marine mammal aquatic protected species, report incidents to the	NMFS BO Appendix A	7.3 Protected Species Incident Reporting

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Required Content	Source Reference	Location Addressed in Technical Report
hotlines listed at https://www.fisheries.noaa.gov/report (phone numbers vary by state). For reporting dead or injured marine mammals, refer to the reporting requirements specified in the MMPA authorization (as applicable) associated with the activity being conducted.		
SEISMIC SURVEY OPERATION, MONITORING, AND REPORTING GUIDELINES: The applicant will follow the guidance provided under Attachment 1. Seismic Survey Mitigation and PSO Protocols found in the BO issued by NMFS on 20 May 2025. The guidance can be accessed on NOAA Fisheries internet website at https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion.	BOEM Survey L25-014	This Technical Report
VESSEL-STRIKE AVOIDANCE/REPORTING: The applicant will follow the guidance provided under Attachment 3. GOA Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols found in the BO issued by NMFS on 20 May 2025. The Appendix can be accessed on the NOAA Fisheries internet site at https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion.	BOEM Survey L25-014	7.3 Protected Species Incident Reporting 7.5.1 Mitigation for Strike Avoidance
NMFS and BSEE must be notified via email (nmfs.psoreview@noaa.gov and protectedspecies@bsee.gov, respectively) as soon as practicable with the time and location of any operations conducted without an active PAM system exceeding 30 minutes. The notification will include the vessel name, the time, and the location (GIS position) in which the PAM system ceased functioning, where seismic operations continued.	NMFS BO Attachment 1	4.6.2 Non-functioning PAM System During Source Activity
PSOs must use standardized electronic data forms. PSOs must record detailed information about any implementation of mitigation requirements, including the distance of marine mammals to the acoustic source and description of specific actions that ensued, the behavior of the animal(s), any observed changes in behavior before and after implementation of mitigation, and if shutdown was implemented, the length of time before any subsequent ramp-up or activation of the acoustic source. If required mitigation was not implemented, PSOs must record a description of the circumstances.	NMFS LOA, Section 5 (c)	Appendix I: Excel Data Sheets of Monitoring Effort, Source Operations and Detections of Protected Species During the Survey

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Required Content	Source Reference	Location Addressed in Technical Report
The Holder must submit a summary report to NMFS on all activities and monitoring results within 90 days of the completion of the survey or expiration of the LOA, whichever comes sooner, and must include all information described above under section 5(c) of this LOA. If an issued LOA is valid for greater than one year, the summary report must be submitted on an annual basis. The report must describe activities conducted and sightings of marine mammals, must provide full documentation of methods, results, and interpretation pertaining to all monitoring, and must summarize the dates and locations of survey operations and all marine mammal sightings (dates, times, locations, activities, associated survey activities, and information regarding locations where the acoustic source was used). In addition to the report, all raw observational data must be made available to NMFS.	NMFS LOA, Section 6 (a) i-ii	This technical report
The Holder must provide geo-referenced time-stamped vessel track lines for all time periods in which airguns (full array or single) were operating. Track lines must include points recording of any change in airgun status (e.g., when the airguns began operating, when they were turned off). GIS files must be provided in ESRI shapefile format and include the Coordinated Universal Time (UTC) date and time, latitude in decimal degrees, and longitude in decimal degrees. All coordinates must be referenced to the WGS84 geographic coordinate system.	NMFS LOA, Section 6 (a) iv	GIS files are provided as a separate shapefile
The draft report must be accompanied by a certification from the lead PSO as to the accuracy of the report, and the lead PSO may submit directly to NMFS a statement concerning implementation and effectiveness of the required mitigation and monitoring	NMFS LOA, Section 6 (a) v	Appendix J: Letters of Data Certification
In the event that personnel involved in the survey activities discover an injured or dead marine mammal, the Holder must report the incident to the Office of Protected Resources (OPR), NMFS and to the Southeast Regional Stranding Network as soon as feasible.	NMFS LOA, Section 6 (c) i	7.3 Protected Species Incident Reporting

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3 PROJECT OVERVIEW

The objectives of this survey were to collect data to support: site characterization, development of a ground model, ensure the seabed is clear of obstructions, identify buried archaeological features and to acquire high-quality seismic data for reservoir monitoring and improved imaging in compliance with BOEM regulations and guidelines.

The Chevron St Malo 4D OBN area is located 356 kilometers (km) (192.2 nautical miles) south southeast of Port Fourchon, LA, and 475 kilometers (256.5 nautical miles) southeast of Galveston, TX in the Walker Ridge area with the southern portion extending into the Amery Terrace in the US GOA (Appendix C). Water depths in this portion of the survey area ranged from 2000 to 3000 meters (m). The working prospect covers approximately 1,046 square kilometers, with the node patch covering approximately 190 square kilometers in the center of the survey area (Table 2).

Table 2: General survey parameters

Area Parameters	
General Location	US Gulf
Prospect Size (km²)	1046
Water Depth (m)	2000-3000
Port Location	Port Fourchon, LA
Source Vessels	R/V Sanco Sword
Other Vessels Involved	Olympic Artemis, Captain Woodrow, Kolt Levi

Table 3 outlines the dates the vessel was in the portion of the survey area covered in this permit and Table 4 outlines the key survey event dates.

Table 3: Summary of dates in areas of operation by R/V Sanco Sword

Vessel Name	Dates on Project	Area of Operation
R/V Sanco Sword	18 October 2025 to 22 February 2026	Walker Ridge, Gulf of America

REPORT**Table 4: Summary of key survey events by vessel**

Event	<i>Sanco Sword</i>
PSO Team Mobilizes	15 October 2025
Kick-off Meetings	16 October 2025, 10 November 2025, 29 November 2025, 11 January 2026
Vessel Departs Dock - PSO Effort Begins	17 October 2025
Array Testing Begins	18 October 2025
Data Acquisition Commences	18 October 2025
Extended Breaks in Source Acquisition	19 October 2025 – 14 November 2025
	15 November 2025 – 17 November 2025
	26 November 2025 – 30 November 2025
	14 December 2025 – 16 December 2025
	29 December 2025 – 31 December 2025
	9 January 2026 – 12 January 2026
	15 January 2026
	25 January 2026 – 27 January 2026
	30 January 2026 – 02 February 2026
Data Acquisition Complete	22 February 2026
Vessel Reaches Dock - PSO Effort Complete	23 February 2026

3.1 Vessel Summary

The Chevron St Malo 4D OBN survey was undertaken by the source vessel *R/V Sanco Sword*, towing a seismic source array.

The *R/V Sanco Sword* conducted data acquisition for the survey from 18 October 2025 to 22 February 2026. All project vessels mobilized out of Port Fourchon, LA, which, along with Galveston, TX, and Port Arthur, TX, were the ports of call during this project.

Specifications of each vessel are provided in Table 5 and photos of each vessel are included in Appendix D.

REPORT**Table 5: Summary of project vessel specifications**

Vessel Name	Vessel Operator	Length (m)	Width (m)	Production Speed knots (kts)	Max Speed (kts)
<i>R/V Sanco Sword</i>	Sanco Holding AS	96.15	23.00	4.5	17
<i>Olympic Artemis</i>	Olympic Subsea	87.75	19	4.5	17
<i>Captain Woodrow</i>	Marlin Oilfield Divers	64.01	14.60	9	9
<i>Kolt Levi</i>	Sea Support Ventures	62.5	14	-	10

3.2 Summary of Survey Equipment Used

The *R/V Sanco Sword* towed a seismic source array comprised of staggered dual airgun arrays; the configuration is described in Table 6. Each array was activated in succession, with the total operating source volume on the vessel of 5220 cubic inches. The design, while in acquisition, was a “flip flop” pattern for the dual source. The port/starboard source arrays staggered so the source spatial interval was 40m, but the vessel travelled 20m between firing the sources at a survey speed of no more than 4.9 knots over ground.

Table 6: Survey equipment operated by *R/V Sanco Sword*

<i>R/V Fulmar Explorer and R/V Sanco Atlantic</i>	
Energy Source for Acquisition	Frequency/Energy Specifications
Bolt 1900 LLX-T airguns	Volume: 5,220 cu in
Two towed source arrays	Frequency: 6 to 70 hertz (Hz)
Six strings per array	Intensity: 241 dB re 1 µPa m
Total of 84 airguns	

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4 MONITORING AND MITIGATION PROGRAM

This section describes the protected species monitoring and mitigation measures established to meet the requirements of BOEM permit and NMFS BO. Survey mitigation measures were designed to minimize potential impacts of the survey activities on marine mammals, sea turtles, and other protected species of interest.

The following monitoring protocols were implemented to meet these objectives, and each is described in detail in a sub-section below:

R/V Sanco Sword

- Visual observations were required to be conducted from port to port during daytime hours, to provide real-time sighting data, allowing for the implementation of mitigation procedures as necessary.
- A PAM system was deployed with PAM operators onboard to conduct continuous acoustic monitoring, day and night, during source activity or when source activity was anticipated, to augment visual observations, implement mitigation measures, and provide additional marine mammal detection data.
 - In recognition of brief periods of PAM malfunction/downtime, the NMFS BO allowed for the sound source to remain active for 30 minutes without acoustic monitoring, both day and night. It also allowed for an additional 2 hours of no acoustic monitoring during the day if visual observations were continuous, sea state was at B4 or less, and there had been no acoustic-only detections other than delphinids in the previous 2 hours.
 - Outages over 30 minutes were reported to NMFS directly, describing the date, time, duration, location, source activity, reason for outage, resolution, and follow-up.
- Protected species buffer zones (BZs) and shutdown zones (SZs) were established around the regulated sound source, with delays to initiation and shutdowns of the active source, as well as turtle pauses, implemented when protected species were detected within these zones.

4.1 Monitoring: PSOs and PAM Operators

Trained and experienced PSOs and PAM Operators were assigned to the *R/V Sanco Sword* during survey activities to conduct monitoring for protected species, record and report detections, and request mitigation actions in accordance with the established regulatory requirements and monitoring plan.

RPS was responsible for ensuring that each PSO and PAM Operator met the minimum requirements set forth by BOEM in Permit Area stipulations and by NMFS. BOEM and NMFS PSO requirements include training in protected species identification and behavior, in addition to field experience in protected species observation in the Atlantic Ocean or the Gulf of America.

RPS was responsible for the provision of training certifications and resumes to be reviewed and approved by BOEM prior to deployment on the vessel.

RPS was responsible for providing the PSOs and PAM Operators with vessel-specific and survey contractor-specific training, and Environmental Project Inductions were provided by RPS and Chevron during project kick-off meetings conducted prior to the start of survey operations and prior to scheduled crew changes.

All certified PSOs and PAM Operators who were deployed during the survey operations are listed in Appendix E.

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4.2 Visual Monitoring: Protocols and Methods

A team of PSOs was deployed on the *R/V Sanco Sword* in sufficient numbers to meet the monitoring requirements of that vessel, as outlined in Table 7. PSOs monitored while the vessel was in transit and prior to and during all sound source operations conducted by the vessel. Visual monitoring was also conducted during all periods between sound source activities to collect additional protected species data. One or two PSO monitored at a time, and PSOs rotated monitoring shifts as needed to maximize concentration and to meet the watch requirements of the Permit Area (watch periods not to exceed two hours without a minimum one-hour break, and a maximum duration of 12 hours in a 24-hour period).

Visual monitoring locations on each vessel were selected in consideration of the following factors:

- 1. To afford PSOs a 360-degree viewpoint around the vessel and acoustic source, such that the shut-down zones (SZ) and buffer zones (BZ) around the sound source and the strike avoidance separation distances could be simultaneously monitored,
- 2. Provide the highest vantage point possible to allow for monitoring out to the greatest distances ahead of, and around, the vessel,
- 3. Provide shelter from inclement weather, as needed,
- 4. Provide real-time communication with vessel, equipment operators, and PAM operators.

PSOs conducted their visual monitoring by actively scanning with the naked eye out to the furthest observation points visible, methodically sweeping areas closer to the vessel, and focusing on the SZs and ahead of the vessel. PSOs conducted regular sweeps of the surrounding areas using magnification devices as described below in Table 7. PSOs monitored for cues that might indicate the presence of protected species including but not limited to splashing, footprints, blows, and presence of other marine species (diving seabirds, fish feeding activity, etc.).

Table 7: Visual monitoring methodology on each survey vessel

	<i>R/V Sanco Sword</i>
Total Number of PSOs	3
Number of PSOs on Watch - Day	2
Visual Monitoring Equipment- Day	Hand-held reticle binoculars (7 x 50, 8 x 50, 10 x 50) Big Eyes binoculars (25 x 150) Digital Single Lens Reflex (DSLR) cameras with 300-mm zoom
Visual Monitoring Conducted at Night	N/A
Visual Monitoring Equipment (Night)	N/A
Range Estimation	Reticle Calibrations
Primary Monitoring Location	Bridge wings

Displays inside the bridge showed current information about the vessel (e.g., position, speed, heading, etc.), sea conditions (e.g., water depth, sea temperature, etc.), and weather (e.g., wind speed and direction, air temperature, etc.). Environmental conditions, along with vessel and acoustic source activity, were recorded at least once an hour, or every time there was a change of one or more of the variables (for example, visibility, sea state, etc.).

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4.2.1 Daylight Visual

The PSOs on board were equipped with hand-held reticle binoculars (e.g., 7 x 50), Big Eyes binoculars (e.g., 25 x 150; 2.7 view angle; individual ocular focus; height control), and DSLR cameras with a zoom lens of 300-mm to aid in visual watches conducted during the day. PSO teams used field notebooks to record data while on watch, and laptops were used to enter data.

Range estimates were made by comparison to objects of known distance, as well as with reticle binoculars. Reticle binoculars were calibrated whenever possible to ensure the accuracy of distance data. These reticle calibration tables are provided in Appendix F.

4.3 Monitoring: PAM Protocols and Methods

4.3.1 Onboard PAM

Acoustic monitoring was used to augment visual monitoring efforts in the detection, identification, and localization of marine mammals. Acoustic monitoring was required to be conducted continuously, day and night, during all source operations and on any day that production was expected.

Acoustic monitoring was undertaken by trained and experienced PAM Operators, each of whom had completed a BOEM-accepted PSO training course and an RPS in-house PAM training course, which includes the use of the PAM systems on board a vessel. PAM monitoring shifts were no longer than four hours in duration, followed by at least a two-hour break, and totaled no more than 12 hours within a 24-hour period.

The PAM system was installed on the *R/V Sanco Sword* in a location that provided space for the system and allowed for quick communication with the navigation team and source operators. Information about the vessel (including position, heading, and speed), water depth, source activity, and PAM system status (including cable deployments/retrievals, changes to the system) was recorded at least once every hour, or whenever any of the parameters changed.

Acoustic monitoring for marine mammals was conducted aurally and visually, utilizing PAMGuard software installed on the PAM system. Low to mid-frequency delphinid whistles, clicks, and burst pulses, as well as sperm whale clicks and baleen whale vocalizations, could be visualized in PAMGuard's spectrogram modules. Odontocete clicks could also be visualized in low-frequency (LF) and high-frequency (HF) click detector modules. Settings adjustments to amplitude range, amplitude triggers, and spectral content filters, among others, could be made in PAMGuard's spectrogram. Click detector modules were utilized to maximize the distinction between cetacean vocalizations and ambient signals. The map module within PAMGuard could be utilized to attempt to localize the position and range of vocalizing marine mammals. Sound recordings could be made using the HF and LF sound recording modules when potential marine mammal vocalizations were detected, or when the operator noted unknown or unusual sound sources.

4.3.2 PAM Parameters

A passive acoustic monitoring system, designed to detect most species of marine mammals, was installed on the *R/V Sanco Sword*. The system was developed by Seiche Measurements Limited and consisted of the following main components: a tow cable with a hydrophone array attachment, a deck cable, sound cards, a computer, and a suite of analysis software. Spare systems were also present onboard, in the event that the main system components became damaged or inoperable. The diagram in Figure 1 is a simplified depiction of the PAM system installed on each source vessel. Further PAM system specifications can be found in Appendix G.

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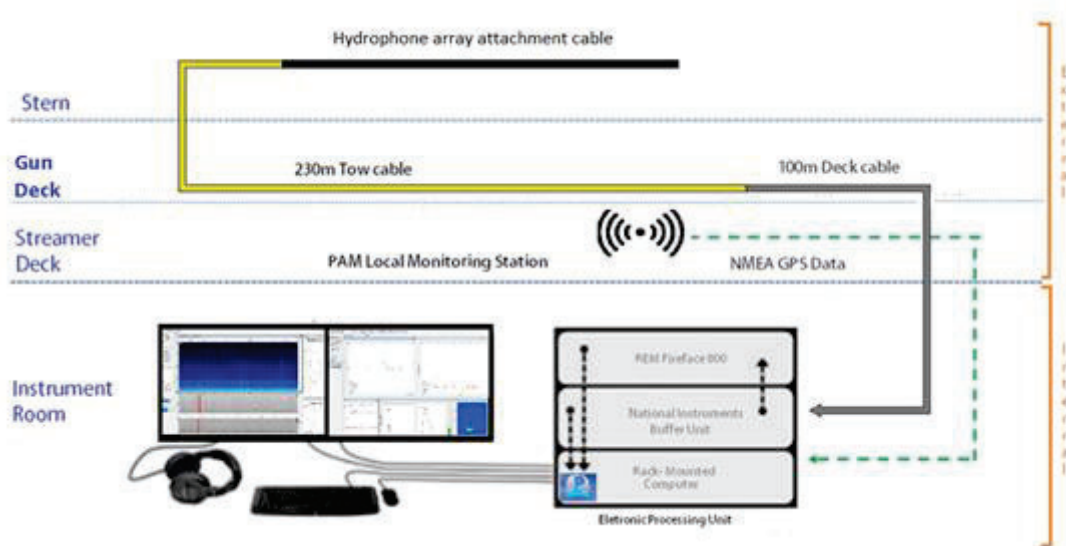


Figure 1: Simplified pathway of data through the PAM system onboard *R/V Sanco Sword*

The linear hydrophone array attachment cable on the *R/V Sanco Sword* contained six individual hydrophone elements and a depth transducer, with spacing as shown in Figure 2. The forward hydrophone pair (H1, H2) was used to analyze and record LF sound (10 through 24,000 Hz); the middle hydrophone pair (H3, H4) was used to analyze and record middle frequencies (200 through 200,000 Hz), and the trailing hydrophone pair (H5, H6) was used to analyze and record HF sound (2,000 through 200,000 Hz).

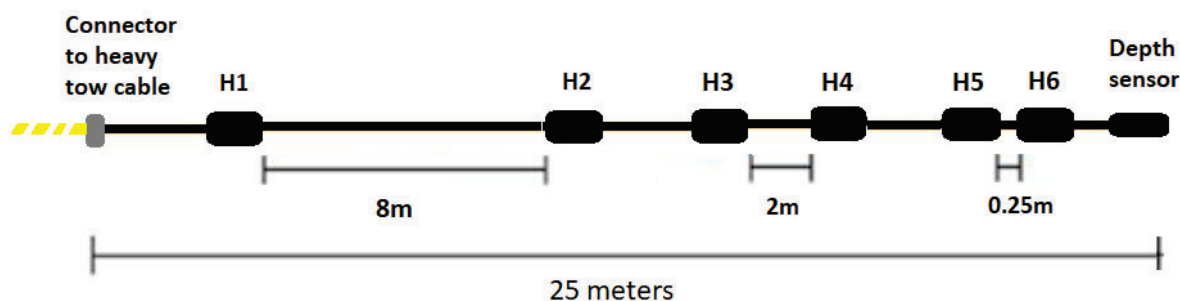


Figure 2: Diagram of 6-hydrophone element separation on *R/V Sanco Sword* 25m hydrophone array cables

The hydrophone array section was attached to a 230-meter heavy-duty tow cable installed on the aft streamer deck of the vessel. The deck cable interfaced between the tow cable and the electronics processing unit (EPU) located at the monitoring station. The EPU contained a buffer unit with Universal Serial Bus (USB) output, an RME Fireface 802 Analog Digital Converter (ADC) unit with firewire output, and a rack-mounted computer. A Global Positioning System (GPS) feed was supplied by the vessel's navigation system and connected to the PAM system using a USB port. Data from the hydrophone cable's depth transducer was routed through the buffer unit to the computer via USB connection. The acoustic monitoring software PAMGuard was utilized for monitoring during the survey.

Raw feed from the two designated HF hydrophone elements was digitized in the buffer unit using an analogue-digital National Instruments data acquisition (DAQ) soundcard at a sampling rate of 500 kilohertz (kHz). The output was filtered for HF content and visualized using the PAMGuard software. PAM Operators configured settings for digital pre-filter and trigger filters to optimize the detection capabilities of their vessels' system. PAMGuard

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used the difference between the time that a signal arrived at each of the two hydrophones to calculate and display the bearing to the source of the signal. A scrolling bearing/time module displayed the filtered data in real time, allowing for the detection and directional mapping of click trains. Additional components of the HF click detector system in PAMGuard were an amplitude/time display that registered click intensity data in real time, as well as click waveform, click spectrum, and Wigner plot displays, providing the PAM Operator with immediate review of individual click characteristics in the identification process.

Raw feed from the designated LF hydrophone elements was routed from the buffer unit to the RME Fireface 802 unit, where it was digitized at a sampling rate of 48 kHz. The relatively LF output was further processed within PAMGuard by applying Engine Noise Fast Fourier Transform (FFT) filters, including click suppression and spectral noise removal filters (e.g., median filter, average subtraction, Gaussian kernel smoothing, and thresholding). Filtered LF content was visualized in two spectrograms, one displaying two-channel feeds at frequency ranges of 1 to 24 kHz, and another displaying one channel feed at a frequency range of 0 to 1 kHz. LF click detector modules allowed for review of individual click characteristics as well as the detection and tracking of click trains.

A map module on the LF system interfaced with GPS data provided by the vessel to display the vessel location and could be used to determine range and bearing estimates based on clicks tracked in the click detector module. PAMGuard contains a function for calculating the range to vocalizing marine mammals based on the least squares fit test. This method is most effective with animals that are relatively stationary in comparison to the moving vessel, such as large whales. The mathematical function estimates the range to vocalizing marine mammals by calculating the most likely crossing of a series of bearing lines generated from tracked clicks or whistles and plotted on a map display. Additionally, the bearings of detected whistles and moans were calculated using a Time-of-Arrival-Distance (TOAD) method (the signal time delay between the arrival of a signal on each hydrophone is compared), and presented on a radar display, along with amplitude information for the detected signal as a proxy for range.

4.3.3 Hydrophone Deployment

On the *R/V Sanco Sword*, the hydrophone cable was deployed from a winch on the streamer deck. Initial deployment of the cable was from the port or starboard side stern of the vessel to the side of either of the source arrays. The deployment was adjusted on 05 January 2026 to a deployment from the center stern of the vessel to reduce the potential for entanglement with. When fully deployed, the trailing end of the PAM cable was 85 meters astern of the vessel, the trailing pair of hydrophones were 95 meters from the port side source and 115 meters from the starboard side source, and tow depths ranged between 3 and 26 meters, averaging 12 meters. The cable depth was largely affected by the strong currents within the survey area, along with the vessel speed.

A more detailed description of the hydrophone deployment methods for the vessel can be found in Appendix H.

4.4 Monitoring: Data Collection

During or immediately after each detection event, the PSOs and PAM Operators recorded the detection details in a standardized datasheet provided to them by RPS. Excel data forms included tabs for project data, monitoring effort data, source operations data, and protected species detection data. RPS supplied a set of standardized variables for specific data fields that were on the data form provided to their PSOs.

Each detection event was linked to an entry on an effort datasheet where specific environmental conditions and vessel activity were logged.

Species identifications were made for visual detections whenever the distance of the animal(s), length of the sighting, and visual observation conditions allowed. Whenever possible during detections, photographs were taken with DSLR cameras that had telephoto lenses. Marine mammal identification manuals were consulted, and photos were examined during observation breaks to confirm identifications.

While acoustic monitoring does not allow assessment of group size with the same level of precision as by visual observation, the LF and HF click detector modules in PAMGuard allow PAM Operators to identify when multiple animals are vocalizing simultaneously or in very close succession. Click detectors present cetacean click trains on

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computer displays, spatially differentiated by relative bearings to the hydrophone array, so when multiple click trains occur simultaneously or in close succession, and the click trains come from different bearings, the PAM Operator knows the click trains originate from different animals. While this does not allow the PAM Operator to estimate a total group size, it does provide the PAM Operator with an estimate for the minimum group size.

4.4.1 Data Collection Requirements & Methods

Data was collected to meet the requirements of BOEM and NMFS, as summarized in Table 1 of this report.

PSOs and PAM Operators collected data in handwritten notepads and/or on portable tablet devices during watches. During watch breaks and at the end of daylight hours, data was compiled in proprietary data forms on laptop computers and backed up on portable hard drives.

4.5 Mitigation Measures

The following mitigation actions were required for visual and acoustic detections of marine mammals and sea turtles on the survey:

- Establishment of BZ around the seismic source arrays
 - 1500-meter BZ for Rice's whales, Sperm whales, Kogia species, all beaked whales, large whales with a calf, and groups of six or more large whales
 - 1000-meter BZ for all other marine mammals and
 - 150 -meter BZ for sea turtles
- Establishment of SZ around the seismic source arrays
 - 1500-meter SZ for Rice's whales, Sperm whales, Kogia species, all beaked whales, large whales with a calf, and groups of six or more large whales
 - 500-meter SZ for all other marine mammals and
 - 150-meter SZ for sea turtles (only during ramp-ups)
- Mitigation measures for the survey included a turtle pause implemented for any turtles within 150 meters of the active source (other than a ramp-up), such that the turtle is greater than 150 meters from the array upon resumption of source activity.
- Search periods of 30 minutes, conducted visually and acoustically (daytime) or acoustically (all periods of reduced visibility, including night) prior to the initiation of the acoustic array from silence.
- If marine mammals or sea turtles were detected inside their respective BZ during the search period prior to the initiation of the source, delays to the initiation of the sound source were implemented until all animals had been observed exiting the BZ. If the animals were not observed exiting the BZ, clearance would not be given until a specific time following the last detection of the animals within the BZ - 15 minutes for small odontocetes and 30 minutes for all other marine mammals and sea turtles. All delays for acoustic-only detections were for 30 minutes. Both the required 30-minute search period and delays had to be completed before clearance could be given, whichever was the longer time.
- Shutdown of the active source upon detection of marine mammals inside their respective SZ. Shutdown was not required for dolphins of the genera *Steno*, *Tursiops*, *Stenella*, and *Lagenodelphis* (for source activities other than ramp-ups). In the event of an acoustic detection of dolphins inside the SZ, unless a visual observer or PAM Operator could confirm that the animals detected were not of one of the four shutdown-exempted genera listed above, the detection was assumed to have been of one of those genera, and no shutdown was required.

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- Once the sound source had been shut down for a protected species detection (both visual and acoustic), operations would resume with ramp-up after all animals were observed exiting the SZ, or when they were not observed exiting, 30 minutes had passed since the last detection.

4.5.1 Strike Avoidance and Vessel Separation Distances

The following strike avoidance procedures were implemented for visual detections of protected species:

- Vessel operators must maintain a vigilant watch for all aquatic protected species. Vessels must slow down, stop their vessel, or alter course, as appropriate and regardless of vessel size, to avoid striking any protected species, including marine mammals, sea turtles, and ESA-listed fish species.
- When protected species are sighted while a vessel is underway, the vessel should take action to avoid violating the relevant minimum separation distances listed below. If protected species are sighted within their relevant separation distance, the vessel should reduce speed and/or shift the engine to neutral, not engaging the engines until animals are clear of the area. Vessels were not required to shift into neutral for animals that voluntarily approached. For vessels limited in maneuverability, maintaining separation distances was not required if doing so would put the safety of crew or vessel at risk. The minimum separation distances are:
 - 500 m: Rice's whales, Kogia species, all beaked whales, large whales with a calf, and groups of six or more large whales
 - 100 m: Sperm whales
 - 50 m: All other marine mammals (including manatees), sea turtles, and the ESA-listed fish species (Gulf sturgeon, oceanic whitetip shark, giant manta ray).
- Vessel speeds must be reduced to 10 knots or less when mother/calf pairs, pods, or large assemblages (three or more) of any marine mammal are observed near a vessel.

4.6 Reporting

Reporting requirements of the BOEM Permit Area are outlined in Table 1. Both BOEM and NMFS require that monthly interim reports and a final survey report be prepared, detailing source operations, PSO/PAM effort, detection of protected species, and any mitigation measures taken.

4.6.1 Injured or Dead Protected Species

Any injured or dead marine mammal or sea turtle observed either by a PSO on watch or by a crew member was required to be reported to BOEM and NMFS as described in Table 1.

Reporting requirements included a phone notification to the NMFS Regional Stranding hotline as soon as practically possible, made by either the Lead PSO or shore-based PSO Provider, as communications permitted from the vessel.

In the event of an injured or dead protected species detection, the Lead PSO would also prepare a written report in accordance with NMFS standard reporting guidelines, using the template provided by BOEM in the permit, which would be submitted to the agencies.

4.6.2 Non-functioning PAM System During Source Activity

RPS has prepared reports for each PAM outage event during source activity to meet the report requirements outlined in Table 1 of this report.

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4.6.3 Monthly Interim Reports

RPS has prepared monthly interim reports to meet the BOEM permit and NMFS Biological Opinion report requirements outlined in Table 1 of this report. Interim reports for the *R/V Sanco Sword* were submitted on 29 October 2025, 01 December 2025, 02 January 2025, 02 February 2025 and 25 February 2025.

4.6.4 Final Report

RPS has prepared this technical report to meet the BOEM permit and NMFS Biological Opinion final report requirements outlined in Table 1 of this report. Each of the elements of the required final PSO report is provided in Table 1, referencing the section in this technical report where the element is addressed.

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5 DATA RECORDS AND ANALYSIS METHODS

5.1 Operation Activity

PSOs and PAM Operators collected the operational status of regulated equipment each day that it was deployed on the *R/V Sanco Sword*.

The *R/V Sanco Sword* recorded the start of line times and the end of line times for the equipment during acquisition. The vessel also recorded the status of the equipment while acquisition occurred by noting full power or shut-downs due to mitigation actions.

5.2 Monitoring Effort

PSOs and PAM Operators recorded monitoring effort by entering start of watch (SOW) and end of watch (EOW) times into data sheets, where the vessel position and environmental data were also documented for that duration.

Total monitoring effort was calculated by summing the durations of each watch period. Where the monitoring effort entry did not also indicate the source status for that monitoring period, source data was cross-referenced during analysis to calculate the duration of monitoring conducted while regulated source were on and off.

Acoustic monitoring while the acoustic source was silent included monitoring during transit between survey lines and other recorded silent periods in which the PAM cable could remain deployed without interfering with operations.

Visual monitoring while the acoustic source was silent included monitoring conducted during transit to/from survey sites and any other recorded silent periods (extended line changes, brief sequence changes, mitigation action, equipment downtime, or weather standby time).

5.2.1 Summary of Environmental Conditions

Each PSO monitoring effort data form included the environmental conditions present during that watch period. Environmental variables were recorded every 60 minutes or when conditions changed. Beaufort Sea State was recorded for each monitoring period using the accepted scale in

Table 8.

Table 8: Beaufort Sea State scale

Beaufort Number	Description	Wave Height	Sea Conditions
0	Calm	0 m	Sea like a mirror
1	Light air	0–0.3 m	Ripples with the appearance of scales are formed, without foam crests
2	Light breeze	0.3–0.6 m	Small wavelets are still short but more pronounced; crests have a glassy appearance but do not break
3	Gentle breeze	0.6–1.2 m	Large wavelets; crests begin to break; foam of glassy appearance; perhaps scattered white horses
4	Moderate breeze	1–2 m	Small waves becoming longer; fairly frequent white horses
5	Fresh breeze	2–3 m	Moderate waves taking a more pronounced long form; many white horses are formed; chance of some spray
6	Strong breeze	3–4 m	Large waves begin to form; the white foam crests are more extensive everywhere; probably some spray

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Beaufort Number	Description	Wave Height	Sea Conditions
7	High wind	4–5.5 m	Sea heaps up, and white foam from breaking waves begins to be blown in streaks along the direction of the wind; spindrift begins to be seen
8	Gale	5.5–7.5 m	Moderately high waves of greater length; edges of crests break into spindrift; foam is blown in well-marked streaks along the direction of the wind
9	Severe gale	7–10 m	High waves; dense streaks of foam along the direction of the wind; sea begins to roll; spray affects visibility
10	Storm	9–12.5 m	Very high waves with long overhanging crests; resulting foam in great patches is blown in dense white streaks along the direction of the wind; on the whole, the surface of the sea takes on a white appearance; rolling of the sea becomes heavy; visibility is affected
11	Violent storm	11.5–16 m	Exceptionally high waves; small- and medium-sized ships might be for a long time lost to view behind the waves; sea is covered with long white patches of foam; everywhere the edges of the wave crests are blown into foam; visibility is affected
12	Hurricane force	>14 m	The air is filled with foam and spray; sea is completely white with driving spray; visibility very seriously affected

Sea swell heights observed during visual monitoring were gauged by PSOs in meters, assigned to one of three swell height categories (<2, 2-4, >4) and recorded for the *R/V Sanco Sword*. PSOs also recorded visibility during monitoring effort, in kilometers, where recorded values were selected from categories (>5, 2-5, 1-2, 0.5-1, 0.3-0.5, 0.1-0.3, 0.05-0.1, <0.05). Wind speed, wind direction, percentage of cloud cover, glare intensity, and presence of/type of precipitation were other environmental conditions recorded during visual monitoring effort.

5.3 Visual Sightings of Protected Species

PSOs used standardized reporting forms provided by RPS to record all detections of marine mammals and sea turtles made during survey operations. These records were completed any time a sighting was made, regardless of distance, not just for detections where mitigation was implemented.

Sighting identification or detection event numbers were assigned chronologically for all protected species observed on the *R/V Sanco Sword* throughout the vessel's survey activity. A new detection number was assigned for a new species sighting or when enough time had passed between observations of animals of the same species, such that PSOs could not be certain that they were observing the same animals previously documented. A standard duration of time was to be applied between observations: 15 minutes for delphinid and pinniped detections and 30 minutes for large whales and sea turtles. If there were multiple species in a single detection, the same sighting identification or detection event was used.

Protected species movement relative to the vessel and pace, as well as initial and subsequent behavior states, were recorded for each protected species sighting, where standardized categories for each were provided as controlled fields in the provided data form.

5.3.1 Closest Point of Approach

All PSOs recorded the closest point of approach (CPA) and the source status at the CPA.

5.3.2 Detection Rate

Detection rate was calculated using the number of protected species events per hour of monitoring effort, both visual and acoustic. On the *R/V Sanco Sword*, when more than one PSO was on watch simultaneously, effort was

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not duplicated: one hour of monitoring effort by two PSOs consisted of one hour of effort for the purpose of detection rate calculations.

5.3.3 Behavior and Behavior Change

The PSO protected species detection template included an initial behavior and an initial pace field for the detection. It included the direction of travel relative to the vessel at initial detection, pace, and direction of travel at final detection, and other behaviors documented throughout the event. Where these data points were not included as specific entries in the data form, the information was sometimes available in a detection summary.

Protected species detection events were reviewed and categorized as having exhibited a change in behavior state or no observed change in behavior state.

The variables utilized to analyze a change in the behavioral state are provided in Table 9.

Table 9: Change in behavior state analysis variables

Data Field	Variables	Analysis Method
Change in Behavior	Yes	- A detection narrative was provided that described a change - Initial and final pace were provided and were different - Initial and final direction of travel relative to the vessel were provided and were different
	No	If any of the above criteria for an observed behavior change were satisfied, 'No change' was selected, and detection data was then evaluated to determine whether no change was in fact observed or whether there was insufficient data provided to indicate whether a behavior change had been observed
Behavior Change Description	Insufficient Data	- Initial and final pace data fields were empty - Initial and final direction of travel fields were empty - No detection narrative was provided - No subsequent behaviors after the initial behavior state were provided - Detection duration (difference between initial and final detection time) suggested that observations may have occurred that were not documented in the data form
	Other Direction Change	Any direction change that could not be classified as moving away or approaching
	Pace Change	Any change in pace

5.4 Monitoring Tools Efficacy and Comparisons Assessment

Visual monitoring was mostly conducted by unaided eye, where handheld reticle binoculars, big eye binoculars, and DSLR cameras with zoom lenses were also used to confirm a sighting or assist in making a species identification. The comparison of the monitoring tools efficacy will be limited to the vessel that conducted monitoring of the sound source utilized during the survey.

5.5 Mitigation Measures Implemented

Mitigation measures were implemented on the *R/V Sanco Sword* as previously described. The onboard PSO team communicated requested mitigation in real time to survey operators that controlled the operation of the regulated sound source or to the vessel crew operating the vessel, depending on the type of action required. Communications were conducted over handheld radios or in person.

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Implemented mitigation actions were recorded on PSO data sheets in the detection data form and in the operations activity logs.

For each mitigation action, the mitigation downtime associated with that action was calculated. Mitigation downtime was the duration of the break in regulated source operations as required by the regulatory protocols: the duration of time that an animal was observed inside an SZ and any additional clearance time required before regulated source could be activated. Mitigation downtime did not include any additional downtime that a survey operator needed to resume acquisition: additional vessel maneuvering time, time to deploy or calibrate equipment, etc.

5.6 Data Quality Control

The RPS data analysts reviewed all of the PSO data sets received from the *R/V Sanco Sword* and conducted quality control as described in Table 10.

Table 10: Quality control editing performed by Tetra Tech RPS Energy on PSO datasets by data field

Data Type	Data Field	Corrections Made
Monitoring Effort	SOW / EOW	• Times were corrected or added where error was evident, typically by inconsistency with adjacent times
	Daytime vs. Nighttime	• Failures to adjust time to UTC were corrected. • Times were corrected when end of effort overlapped with start of subsequent effort
Source Operations	Testing	• Testing status was not used as a separate category. Based on the survey days and monitoring effort times, testing was either added to the “on” status or not added to operations totals at all.
Protected Species Detections	Position	• Positions that plotted out of place were corrected using effort positions of corresponding times, where available • When positions could not be corrected and position was on land, detection was removed from detection plots

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6 RESULTS

This section of the report details sound source operations, protected species monitoring effort, environmental conditions during monitoring effort, detection data and distribution inside and outside the Permit Area during source operation and source silence.

The monitoring effort, source operations and protected species detections for each vessel are also provided in excel datasets in provided in excel datasets in Appendix I and letters of data certifications are provided in Appendix J.

6.1 Operation Activity

The survey operations began with the vessel conducting source calibrations in the survey area before proceeding to acquisition, according to the survey plan. Survey operations were briefly suspended when necessary for weather, equipment maintenance, vessel-to-vessel transfer operations, or port calls for provisions and crew change.

The dates of operation, total days of regulated source activity, and hours of regulated source operations (shown in decimal hours [hh.hh]) by the *Vessel* are provided in Table 11.

Table 11: Summary of regulated sound source operations on the *R/V Sanco Sword*

Vessel	Dates of Operation	Total Days of Regu- lated Source Activ- ity	Total Hours of Reg- ulated Source Op- erations (hh.hh)
<i>R/V Sanco Sword</i>	18 October 2025 to 22 February 2026	90	1578.97

The breakdown of source operations (shown in decimal hours [hh.hh]) by source status are provided in Table 12.

Table 12: Summary of seismic source operations broken down by source status on the *R/V Sanco Sword*

<i>R/V Sanco Sword</i>	
Source Status	Duration (hh.hh)
Single Gun Testing	10.20
Full Volume Testing	7.95
Reduce Volume Testing	0.08
Ramp-up	160.93
Full Volume while not Acquiring Production Data	75.48
Full Volume while Acquiring Production Data	1324.33
Reduced Volume while Acquiring Production Data	0.00
Total Source Activity	1578.97

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On 31 December 2025 the PAM Operator on shift provided clearance to the seismic operator to ramp up the source 15 minutes from the last acoustic detection of unidentified dolphins. Additional mitigation procedures were implemented to minimize the likelihood of a PSO or PAM Operator providing clearance to initiate the source before the regulatory required period of time had elapsed following any future detection events.

6.2 Monitoring Effort

Visual and acoustic monitoring effort for the *R/V Sanco Sword* during the survey is summarized in Table 13, shown by activity of the seismic source and by the type of source utilized.

Table 13: Summary of monitoring effort, visual and acoustic, by vessel and by source activity status

Vessel and Type of Source Utilized	Source Equipment Active		Source Equipment Inactive	
	Duration (hh.hh)		Duration (hh.hh)	
	Visual	PAM	Visual	PAM
<i>R/V Sanco Sword</i>	773.18	1578.98	434.12	319.48

The combined total breakdown for visual-only monitoring effort and concurrent visual and acoustic monitoring effort undertaken during day and night, according to source activity status, is provided for the *R/V Sanco Sword* in Table 14.

Table 14: Total monitoring effort, visual and acoustic, during day and night by airgun source activity status on the *R/V Sanco Sword*

Monitoring Effort	Day (hh.hh)			Night (hh.hh)		
	Total	Source Active	Source Inactive	Total	Source Active	Source Inactive
Visual Monitoring Only	275.67	0.00	275.67	0.00	0.00	0.00
Visual and Acoustic Monitoring	931.63	773.18	158.45	0.00	0.00	0.00
Acoustic Monitoring Only	0.00	0.00	0.00	966.83	805.80	161.03
Total	1207.30	773.18	434.12	966.83	805.80	161.03

On no occasion were the *R/V Sanco Sword* sound source active while no acoustic monitoring was conducted. Table 15 summarizes the recorded duration of sound source activity, day and night, when no acoustic monitoring was conducted.

REPORT**Table 15: Total recorded duration of no acoustic monitoring during source activity on *R/V Sanco Sword***

Duration of No Acoustic Monitoring During Source Activity	Day (hh.hh)	Night (hh.hh)	Total (hh.hh)
<i>R/V Sanco Sword</i>	0.00	0.00	0.00
Total	0.00	0.00	0.00

6.3 Environmental Conditions

Environmental conditions can have an impact on the probability of detecting protected species in a survey area. The environmental conditions present during visual observations undertaken during the survey were favorable to moderate.

Visibility was indicated in kilometers and recorded in one of eight categories (>5, 2-5, 1-2, 0.5-1, 0.3-0.5, 0.1-0.3, 0.05 to 0.1, and <0.05). The majority of monitoring efforts 82% was conducted in conditions where visibility extended to greater than 5 kilometers, 15% of monitoring effort occurred while visibility was between 0.5 and 5 kilometers, and only 3% of monitoring effort was conducted while visibility extended to less than 0.5 kilometers. The duration of monitoring conducted at each visibility classification is provided in Table 16.

Table 16: Summary of visibility during visual monitoring effort on the *R/V Sanco Sword*

Visibility	Total	Percent of Total Project
	Duration (hh.hh)	%
>5 km	992.25	82
2 to 5 km	128.35	11
1 to 2 km	31.58	3
0.5 to 1 km	17.13	1
0.3 to 0.5 km	17.10	1
0.1 to 0.3 km	16.27	1
0.05 to 0.1 km	4.35	<1
<0.05 km	0.27	<1
Total	1207.30	100

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Monitoring effort for the *R/V Sanco Sword* was conducted in Beaufort Sea States ranging from Level 1 to Level 8, however, a majority of the monitoring effort 55% accumulated in sea states at or below Level 3, which is considered favorable conditions for most protected species monitoring Table 17. Visual observations at Level 4 Beaufort Sea states or higher accounted for 45% of the total visual monitoring effort.

Table 17. Summary of Beaufort Sea State during visual monitoring during the survey

Beaufort Sea State	Total	Percent of Total Project
	Duration (hh.hh)	%
B1	79.15	7
B2	238.13	20
B3	344.37	28
B3 or Less	661.65	55
B4	263.13	22
B5	161.38	13
B6	91.55	8
Greater than B6	29.58	2
Total	1207.30	100

Monitoring effort was conducted in swell heights up to 6 meters. However, most of the effort was conducted at swell heights below 2 meters, which accounted for 83% of the total monitoring effort Table 18.

Table 18. Summary of swell height during visual monitoring during the survey

Swell Height	Total	Percent of Total Project
	Duration (hh.hh)	%
< 2 m	1002.45	83
2 – 4 m	164.08	14
> 4 m	40.77	3
Total	1207.30	100

Precipitation may also obscure visibility and the sea surface. However, light rain, heavy rain, haze, and thin fog only attributed to 12% of the total visual effort Table 19. These conditions did not affect visibility to a point where operations had to be suspended.

REPORT**Table 19. Summary of precipitation during visual monitoring during the survey**

Precipitation	Total	Percent of Total Project
	Duration (hh.hh)	%
Clear	1070.24	88
Light Rain	35.47	3
Heavy Rain	4.02	<1
Thin Fog	1.52	<1
Heavy Fog	0.00	0
Haze	96.05	8
Total	1207.30	100

Glare may also obscure visibility and the sea surface. For the majority of the survey, 62%, visibility was affected by severe glare Table 21. These conditions did not affect visibility to a point where operations had to be suspended.

Table 20. Summary of glare during visual monitoring during the survey

Glare	Total	Percent of Total Project
	Duration (hh.hh)	%
None	260.65	22
Mild	109.40	9
Moderate	87.98	7
Severe	749.27	62
Total	1207.30	100

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7 PROTECTED SPECIES OBSERVATION RESULTS

7.1 Visual Sightings

This section of the report summarizes visual sightings of protected species made during the survey in the Walker Ridge area. There were 10 protected species detections, both inside and outside the permit area (n=2 whale detections, n=5 delphinid detections, n=3 sea turtle detections). Detections consisted of two species of marine mammals, two species of sea turtles, as well as unidentified dolphins and whales.

Of the 10 visual detections, eight detection events (80%) were identified to the species level, while the remaining two detection events were identified to family level or a higher taxonomic level (classified as unidentified delphinids and unidentified whale).

A table of all protected species sightings is provided as part of an excel datasheet attachment in Appendix I. Photographs of the identified protected species visually detected during the survey are provided in Appendix K. The distribution of protected species detections both inside and outside the permit area is provided in Appendix L.

Table 21 shows the total number of detection records and the number of individuals detected for each protected species during the survey. The locations of these detections, by group, can be found in Appendix L.

Table 21: Detection records collected for each protected species visually detected during the survey

Species	Total Number of Visual Detection Records	Total Number of Animals
Sperm whale	1	1
Unidentified whale	1	1
Total Whales	2	2
Bottlenose dolphin	4	23
Unidentified dolphin	1	2
Total Dolphins	5	25
Green sea turtle	2	2
Hawksbill sea turtle	1	1
Total Sea Turtles	3	3
Total Protected Species	10	30

REPORT**7.1.1 Detection and Distance Summaries**

The most commonly detected species was the bottlenose dolphins (four detections of 23 estimated individuals), followed by green sea turtle (two detections of two estimated individuals). The number of detection events, approximate number of animals observed, mean group sizes, mean distances from vessel at first detection, and detection rate for each protected species detected over the course of the survey are provided whales in Table 22, for dolphins in

Table 23, and for sea turtles in

Table 24.

There was one visual sighting of sperm whale whales, the only identified whale species. The mean observed group size was one as shown in Table 22.

Table 22: Detection summary of whales observed during the survey

Whales	Sperm whale	Unidentified whale
# of Detection Records	1	1
Estimated # of Individuals Detected	1	1
Mean Group Size	1	1
Mean Distance (m) at First Detection	1600	3000
Detection Rate	0.00083	0.00083

There was one identified species of delphinids detected, as well as unidentified delphinids. Bottlenose dolphins accounted for the largest mean group size of 5.75 (

Table 23).

Table 23: Detection summary of dolphins observed during the survey

Dolphins	Bottlenose dolphin	Unidentified dolphin
# of Detection Records	4	1
Estimated # of Individuals Detected	23	2
Mean Group Size	5.75	2
Mean Distance (m) at First Detection	41.25	1260
Detection Rate	0.00331	0.00083

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There were two species of shelled sea turtles detected. Of the turtle detections, green sea turtles were detected the most frequently (two detections of an estimated two individuals). The mean observed green sea turtle group size was one as shown in

Table 24.

Table 24: Detection summary of sea turtles observed during the survey

Sea Turtles	Green sea turtle	Hawksbill sea turtle
# of Detection Records	2	1
Estimated # of Individuals Detected	2	1
Mean Group Size	1	1
Mean Distance (m) at First Detection	27.5	10
Detection Rate	0.00166	0.00083

The difference between the closest observed approach of marine mammals to active source, versus inactive source were small, with distances generally closer for detections when the source were inactive (Table 25).

If source activity changed during a detection, such as due to a mitigation action being implemented, both CPA to active and inactive source was included as applicable in Table 25.

Table 25: Average CPA of protected species to seismic source or vessel, while active and inactive

Species Detected	Source Deployed - Active		Source Deployed - Inactive		Source Not Deployed	
	Number of Detections	Mean Closest Observed Approach to Source (m)	Number of Detections	Mean Closest Observed Approach to Source (m)	Number of Detections	Mean Closest Observed Approach to Vessel (m)
Sperm whale	1	1884	1	2672	-	-
Unidentified whale	-	-	-	-	1	2528
Total Whales	1	1884	1	2672	1	2528
Bottlenose dolphin	-	-	-	-	4	32
Unidentified dolphin	-	-	-	-	1	1258

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Species Detected	Source Deployed - Active		Source Deployed - Inactive		Source Not Deployed	
	Number of Detections	Mean Closest Observed Approach to Source (m)	Number of Detections	Mean Closest Observed Approach to Source (m)	Number of Detections	Mean Closest Observed Approach to Vessel (m)
Total Dolphins	-	-	-	-	5	277.20
Green sea turtle	1	193	2	66.5	-	-
Hawksbill sea turtle	-	-	1	160	-	-
Total Sea Turtles	1	193	3	97.67	-	-
Total Protected Species	2	1038.5	4	741.25	6	652.33

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Marine mammal visual sightings that occurred while the seismic source were active can be found in Table 26.

Table 26: Detections that occurred while the source was active

Species	Vessel	Visual De- tection Number	Group Size	CPA to Active Source (m)	Behavior at Ini- tial Detection	Animal(s) Pace at Ini- tial Detec- tion	Subsequent Be- haviors Ob- served	Behavior at Fi- nal Detection	Animal(s) Pace at Fi- nal Detec- tion
Green sea turtle	Sanco Sword	4	1	193	Swimming be- low the surface	Moderate	Swimming be- low the surface	Swimming be- low the surface	Moderate
Sperm whale	Sanco Sword	9	1	1884	Blowing	Stationary	Blowing, Div- ing with flukes / Fluking	Diving with flukes / Fluking	Moderate

* Full detection narratives are provided in Excel data sheet

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7.2 Acoustic Detection Summary

There were 10 acoustic detections of marine mammals associated with the survey. All acoustic detections were of dolphins identified at the family level. There were no correlated visual and acoustic detections.

Screenshots of acoustically detected protected species during the survey are provided in Appendix M.

For all acoustic detections, the initial indication of detection was by visual detection by the operator on a click detector.

Of the 10 acoustic detections for the survey, seven occurred when the source was active and three occurred while the source was inactive (Table 27). All acoustic detections were made on *R/V Sanco Sword*.

Table 27: Acoustic detections and source activity during the survey

	<i>R/V Sanco Sword</i>
# of Detection Records	10
Number of Detections while Source was Active	7
Number of Detections while Source was Inactive	3
Detection Rate	0.00527

7.3 Protected Species Incident Reporting

There were no observations of dead or injured protected species during the survey.

7.4 Summary of Mitigation Measures Implemented

7.4.1 Mitigation for Sound Exposure from Survey Equipment

Requisite mitigation actions for protected species detected during the survey were requested by PSOs/PAM Operators and implemented by source operators. For the *R/V Sanco Sword*, there were five delays to source activity for protected species detections, there was one turtle pause implemented, and there was one shutdown see Table 28. Mitigation actions were from both visual and acoustic detections.

7.5 PAM Validation

Overall, the PAM system met all the parameters of the project PAM plan, suited to the needs of the project, and met the required mitigation standards. Noise validation diagrams (NVD) are provided in Appendix N.

REPORT**Table 28: Summary of mitigation actions implemented on the *R/V Sanco Sword***

Mitigation Action	Whales		Dolphins		Sea Turtles		All Species	
	No.	Mitigation Downtime (hh.hh)	No.	Mitigation Downtime (hh.hh)	No.	Mitigation Downtime (hh.hh)	No.	Mitigation Downtime (hh.hh)
Delay to Initiation of Source	0	0.00	3	4.40	2	0.92	5	5.32
Turtle Pause	0	0.00	0	0.00	1	0.07	1	0.07
Shutdown of Active Source	0	0.00	1	0.55	0	0.00	1	0.55
All Mitigation Actions	0	0.00	4	4.95	3	0.99	7	5.94

7.5.1 Mitigation for Strike Avoidance

There were seven strike avoidance mitigations for vessel or towed equipment interactions with protected species required during this survey. The mitigation actions are summarized in Table 29.

Table 29: Summary of protected species detections occurring inside the species/species group specific separation distances

Date	Vessel	Detection Number	Species	Number of Animals	CPA to Vessel (m)	Strike Avoidance Maneuver
2025-10-17	<i>R/V Sanco Sword</i>	01	Bottlenose dolphin	03	50	Maintain speed
2025-11-11	<i>R/V Sanco Sword</i>	02	Bottlenose dolphin	09	8	Maintain speed
2025-11-22	<i>R/V Sanco Sword</i>	04	Green sea turtle	01	15	Maintain speed, kept course
2025-11-22	<i>R/V Sanco Sword</i>	05	Green sea turtle	01	40	Maintain speed, kept course
2025-11-22	<i>R/V Sanco Sword</i>	06	Hawksbill sea turtle	01	10	Maintain speed, kept course
2025-11-28	<i>R/V Sanco Sword</i>	07	Bottlenose dolphin	06	20	Maintain speed
2026-01-11	<i>R/V Sanco Sword</i>	10	Bottlenose dolphin	05	50	Maintain speed, kept course

8 SUMMARY

8.1 Interpretation of the Results

Most of the marine mammal and sea turtle species that were detected during the survey were species that occur commonly in the Gulf of America and that are regularly observed by PSOs and PAM Operators during survey activities. Each species detected was observed within its predicted range, with no species encounters occurring outside of that species' normal range.

For the two detections that occurred while the regulated sound source was on, the green sea turtle had a closer approach than the sperm whale, but the sample sizes were too small to be statistically significant. No behaviors were documented that suggested adverse impacts had occurred to any protected species encountered as a result of the survey activities undertaken.

8.2 Monitoring Efficacy and Comparison Assessment

During the survey, two different monitoring methods were used to detect protected species. Each method is discussed in Section 4.

- 1. Daytime unaided eye where PSOs made regular and frequent sweeps of the surrounding area with reticle binoculars and/or big-eye reticle binoculars.
- 2. PAM, which was used both day and night.

Table 30 breaks down monitoring effort by protected species detections and the detection rate for each monitoring method.

Table 30: Monitoring effort, protected species detections and detection rate for each monitoring method

	Visual Monitoring	PAM
Monitoring Effort (hh.hh)	1207.30	1898.47
Number of Marine Mammal Detections	7	10
Detection Rate	0.00580	0.00527
Number of Sea Turtle Detections	3	0
Detection Rate	0.00248	0.00000

8.2.1 Effectiveness of PAM

PAM had lower detection rate compared to visual monitoring, which is not (un)usual for PAM systems deployed on industry vessels where many factors can limit the efficacy of the system.

- The deployment configuration of a towed hydrophone cable is limited by vessel specific features such as the presence of thrusters and propeller because the PAM Operator must identify a safe location for deployment of the cable where entanglement risk for the cable is low.

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- Vessel noise from the propellers occurs in the low-frequency range and at high decibel levels and has the potential to mask marine mammal vocalizations, especially those of large mysticete whales that produce calls that overlap in frequency with this vessel noise. Additional masking may occur from the vessel itself, especially for animals like dolphins that will frequently approach the front of the vessel and ride at the surface, where their highly directional vocalizations can be blocked by the hull.

Additionally, PAM detections are limited to vocalizing marine mammals where many species exhibit highly variable vocalizing behavior that changes depending on behavior state, social structure factors and age and gender. Environmental conditions can also limit the efficacy of PAM where increased background noise could result in masking of vocalizations that overlap in frequency with the noise.

Despite the limitations that exist with PAM systems, there was one daytime acoustic detection made during the survey that was not accompanied by a visual sighting of the marine mammals, so this monitoring method enabled the detection of marine mammals that would otherwise not have been detected visually.

8.3 Effectiveness of Monitoring and Mitigation

In order to minimize the potential impacts to marine mammals and sea turtles, PSOs and PAM Operators assigned to the survey vessel were prepared to implement mitigation measures whenever protected species were detected approaching, entering, or within the designated shutdown/buffer zones. Mitigation actions for seismic airgun source was implemented successfully during seven detection events. PSOs and PAM Operators searched the BZs prior to activation of sound source, and confirmed that the BZs were clear prior to initiating operations. Airgun source was initiated gradually, in a ramp-up format whenever multiple airguns would be active simultaneously.

There were no sightings of injured or dead protected at any point during the survey.

Visual and acoustic observations yielded a total 20 protected species detections and included marine mammals and sea turtles. PSOs and PAM Operators likely did not detect all animals present; however, it is highly unlikely that protected species were not detected inside the shutdown and buffer zones while the source was active, especially since zones were relatively small and PSOs were equipped with multiple tools to augment visual monitoring. The environmental conditions present during monitoring were generally good for detecting protected species, especially inside the shutdown and buffer zones.

The monitoring and mitigation measures required by the GOA Biological Opinion and the survey permit appear to have been an effective means to protect the marine species encountered during survey operations.

REPORT

9 LITERATURE CITED

Bureau of Ocean Energy Management (BOEM) Permit

United States Fish and Wildlife Service (USFWS). 2019. Marine Mammal Protection Act (MMPA). 16 U.S.C.

National Marine Fisheries Service (NMFS) Endangered Species Act Section 7 Biological Opinion. Biological Opinion of the Federally Regulated Oil and Gas Survey Activities in the Gulf of Mexico. 2020. Appendix A & C.

REPORT

Appendix A: BOEM Permit, NMFS LOA and BO



United States Department of the Interior

BUREAU OF OCEAN ENERGY MANAGEMENT

Gulf of America OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

ELECTRONIC MAIL – RETURN RECEIPT REQUESTED

Chevron U.S.A. Inc.
Attention: Mr. Scott Baker
1500 Louisiana Street
Houston, TX 77002

9/3/25

Dear Mr. Baker:

Your application received June 25, 2025, requests a Federal permit to conduct geophysical operations in the area shown on the map accompanying the application. TGS will conduct exclusive operations for Chevron U.S.A. Inc. The proposed program is a 4D OBN ROV seismic survey.

A permit designated OCS Permit L25-014 is hereby granted to conduct geophysical operations on the OCS in the area and manner described in the application subject to the enclosed Permit for Geophysical Exploration for Mineral Resources on the OCS and Attachment A that follow. Furthermore, any conditions stated in the applicable Letter of Authorization issued by the National Marine Fisheries Service must also be followed. **Before starting acquisition, you are required to notify BOEM of your survey start date. BOEM must also be advised of the end date immediately upon survey completion.**

Our National Environmental Policy Act (NEPA) review of the subject action is complete and results in a Finding of No Significant Impact (FONSI). This FONSI is conditioned on adherence to the conditions of approval that ensure environmental protection, consistent environmental policy, and safety as required by NEPA, as amended, and is valid only insofar as the conditions are met in Attachment A.

If you have any questions, please call Goh Sakulpitakphon at (504) 736-5731 (tanaporn.sakulpitakphon@boem.gov) or the Office of Resource Evaluation, Data Acquisition and Special Projects Unit at (504) 736-3231 (GGPermitsGulf@boem.gov).

Sincerely,

**MATTHEW
WILSON**

Digitally signed by
MATTHEW WILSON
Date: 2025.09.03
19:30:14 -05'00'

Matthew G. Wilson
Regional Supervisor
Gulf of America Regional Office
Office of Resource Evaluation

ATTACHMENT A.

September 03, 2025

Conditions of Approval

- **COMPLIANCE WITH BIOLOGICAL OPINION TERMS AND CONDITIONS AND REASONABLE AND PRUDENT MEASURES:** This approval is conditioned upon compliance with the Reasonable and Prudent Measures and implementing Terms and Conditions of the Biological Opinion (BiOp) issued by the National Marine Fisheries Service (NMFS) on May 20, 2025 (2025 NMFS BiOp). This compliance includes mitigation, particularly any Terms and Conditions applicable to the plan, as well as record-keeping and reporting sufficient to allow BOEM and the Bureau of Safety and Environmental Enforcement (BSEE) to comply with reporting and monitoring requirements under the BiOp, and any additional reporting required by BOEM or BSEE developed as a result of BiOp implementation. The 2025 NMFS BiOp may be found here: <https://www.fisheries.noaa.gov/resource/document/biological-and-conference-opinion-bureau-ocean-energy-management-and-bureau>. The BiOp Attachments and Appendices may be found here: <https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion>.
- **OPERATIONAL NATIONAL MITIGATION PROTOCOLS FOR GEOPHYSICAL SURVEYS:** The applicant will follow the protocols provided under Attachment 1: Operational National Mitigation Protocols for Geophysical Surveys found in the 2025 NMFS BiOp. The protocols can be accessed on the National Oceanic and Atmospheric Administration (NOAA) Fisheries internet website at <https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion>.
- **MARINE DEBRIS PROTOCOL:** The applicant will follow the protocols provided under Attachment 2: Marine Debris Protocol found in the 2025 NMFS BiOp. The protocols can be accessed on NOAA Fisheries internet website at <https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion>.
- **VESSEL-STRIKE AVOIDANCE AND INJURED AND/OR DEAD AQUATIC PROTECTED SPECIES REPORTING PROTOCOLS:** The applicant will follow the protocols provided under Attachment 3: Vessel Strike Avoidance and Injured and/or Dead Aquatic Protected Species Reporting Protocols found in the 2025 NMFS BiOp. The protocols can be accessed on NOAA Fisheries internet website at <https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion>.
- **VESSEL TRANSIT WITHIN THE RICE'S WHALE AREA AS IDENTIFIED IN THE 2020 BIOLOGICAL OPINION'S REASONABLE AND PRUDENT ALTERNATIVE:** The applicant will follow the protocols provided under Attachment 4: Vessel Transit within the Rice's Whale Area as identified in the 2020 BiOp Reasonable and Prudent Alternative (2020 RWA) found in the 2025 NMFS BiOp. The protocols can be accessed on NOAA Fisheries internet website at <https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion>.
- **IN-WATER LINE PRECAUTION PROTOCOL:** The applicant will follow the protocols provided under Attachment 5: In-water Line Precaution Protocol found in the 2025 NMFS BiOp. The protocols can be accessed on NOAA Fisheries internet website at <https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion>.
- **MOON POOL MONITORING PROTOCOL:** The applicant will follow the protocols provided under Attachment 6: Moon Pool Monitoring Protocol found in the 2025 NMFS BiOp. The protocols can be accessed on NOAA Fisheries internet website at <https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion>.
- **SEA TURTLE RESUSCITATION GUIDELINES PROTOCOL:** The applicant will follow the protocols provided under Attachment 10: Sea Turtle Resuscitation Guidelines Protocol found in the 2025 NMFS BiOp. The protocols can be accessed on NOAA Fisheries internet website at

<https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion>.

- **NON-RECURRING MITIGATION FOR THE PROTECTION OF POTENTIAL ARCHAEOLOGICAL RESOURCES:** This review indicates that there may be significant archaeological targets existing within the area of proposed 4D seismic ROV survey with OBN and PIES operations within the Federal waters of the OCS. Significant portions of the project area within the OCS have received either limited or no previous archaeological survey. These areas could contain additional archaeological materials that may be impacted by the proposed operations.

If the applicant discovers human-made debris that appears to indicate the presence of a shipwreck, aircraft, or other human-made structure (e.g., a sonar image or visual confirmation of an iron, steel or wooden hull, wooden timbers, anchors, concentrations of human-made objects such as lithics, bottles, ceramics, piles of ballast rock, or aircraft wreckage or remains) within or adjacent to the area during the proposed survey operations, the applicant will be required to immediately halt operations, take steps to ensure that the site is not disturbed in any way, and contact the BOEM Regional Supervisor of the Office of Environment within 48-hours of its discovery. The applicant must cease all operations within 1,000 feet (305 meters) of the site until the Regional Supervisor instructs them on what steps must be taken to assess the site's potential historic significance and what steps must be taken to protect it. The applicant must report coordinates of the impact (to DGPS accuracy), a description of the submerged object, any damage that may have resulted from the operations, and provide copies of any photographic and/or video imagery that is collected. The applicant must also submit a copy of any data collected as a result of these investigations.

Following the completion of fieldwork, the applicant must submit as-placed plats, at a scale of 1-inch = 1,000 ft, of all cores relative to the listed target and the avoidance boundary. If remote-sensing survey data is collected for any reason during the course of this project (i.e., side-scan sonar, sector-scan sonar, multi-beam bathymetry, or magnetometer), the applicant must submit copies of these data to BOEM.

Please direct any questions or correspondence pertaining to these requirements to Mr. Scott Sorset at (504) 736-2999 or by emailing archaeology@boem.gov.

- **NON-RECURRING MITIGATION BENTHIC COMMUNITIES:** BOEM review of geophysical activities proposed in L25-014 identified potential sensitive sessile benthic resources within the proposed node area. According to Notice to Lessees (NTL) 2009-G40, the minimum separation distance for bottom disturbing activities is 76 m (250 ft) from any sensitive sessile benthic community (e.g., deepwater coral, chemosynthetic tube worms). Based on the methods described in the application, BOEM authorizes the applicant to deploy nodes with less than 76 m (250 ft) avoidance of deepwater benthic communities contingent upon the applicant adhering to the mitigations described below:
 1. All seafloor disturbances, including nodes, cables, and ROV, must remain a minimum of 5 m (16 ft) from all sensitive sessile benthic communities.
 2. The operator must photograph the seabed within a 10 m (33 ft) radius of any node placed within 76 m (250 ft) of sensitive sessile benthic communities or a BOEM anomaly (June 2019 dataset, see link below). Photographs of each such location shall be taken pre-node deployment, post-node deployment, and post-node retrieval. The photos shall clearly show the geographic location of each node.
 3. If any sessile benthic communities are present at a proposed node location, a new site that allows compliance with the above requirements shall be selected.
 4. The operator must provide an as-placed GIS shapefile of actual OBN locations to demonstrate compliance. Submit the required photographs and shapefile to the BOEM Regional Supervisor, Office of Resource Evaluation, Data Acquisition and Special Projects Unit, within 90 calendar days after you complete the G&G activity.

Refer to the following BOEM site for GIS data layers of known 3D seismic water bottom anomalies: <https://www.boem.gov/Seismic-Water-Bottom-Anomalies-Map-Gallery/>

The following feature classes have a high probability of supporting sensitive sessile benthic organisms and shall be avoided unless visual inspection and photographic data confirm an absence of high-density deepwater benthic communities:

1. Anomaly_patchreefs (Shallow Water)
2. Anomaly_confirmed_patchreefs (Shallow Water)
3. Seep_anomaly_positives
4. Seep_anomaly_positives_possible_oil
5. Seep_anomaly_positives_confirmed_oil
6. Seep_anomaly_positives_confirmed_gas
7. Seep_anomaly_confirmed_corals
8. Seep_anomaly_confirmed_organisms
9. Seep_anomaly_confirmed_hydrate
10. Seep_anomaly_confirmed_carbonate
11. Anomaly_Cretaceous
12. Anomaly_Cretaceous_talus

If you have any question regarding this mitigation, please contact Dr. Alicia Caporaso – Benthic Ecology Lead at Alicia.Caporaso@BOEM.gov.

Additional Conditions of Approval:

1. Man-made structure(s) such as pipeline(s) or other potential hazard(s) may be located in the permitted work area; therefore, prior to performing operations that involve seafloor disturbance (e.g., coring), take precautions in accordance with Notice to Lessees and Operators No. 2008-G05, Section VI.B, Shallow Hazards Program (see the BOEM website at: <http://www.boem.gov/Regulations/Notices-To-Lessees/2008/08-g05.aspx>).
2. If you conduct activities that could disturb the seafloor in an Ordnance Dumping Area (see the BOEM website at: <https://www.boem.gov/Ordnance-Dumping-Areas/> for a map), exercise caution, since this area might contain old ordnance, including unexploded shells and depth charges, dumped before 1970. In addition, the U.S. Air Force has released an undeterminable amount of unexploded ordnance in Water Test Areas 1 through 5 (most of the Eastern Planning Area of the GOM).
3. If you discover any site, structure, or object of potential archaeological significance (i.e., cannot be definitively identified as modern debris or refuse) while conducting operations, the provisions of 30 CFR 250.194(c) and NTL 2005-G07, (Archaeological Resource Surveys and Reports) require you to immediately halt operations within 1,000 feet of the area of discovery and report this discovery to the Regional Supervisor (RS) of the Office of Environment (OE) within 48 hours. Every reasonable effort must be taken to preserve the archaeological resource from damage until the RS of OE has told you how to protect it.
4. Comply with the provisions of NTL 2009-G39, Biologically-Sensitive Underwater Features

and Areas, effective January 27, 2010, (see the BOEM website at: <https://www.boem.gov/Regulations/Notices-To-Lessees/2009/09-G39.aspx>). If you conduct activities near an identified biologically sensitive topographic features (see the specific list at <https://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/topoblocks-pdf.aspx>), in the Live Bottom "Pinnacle Trend" Area, or Live Bottom "Low Relief" Area (see the BOEM website at <https://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/topomap-pdf.aspx> for a map of all three features), the following measures apply:

- a. Ensure you do not anchor or otherwise disturb the seafloor within 152 meters (500 feet) of a designated "No Activity Zone." Information on the activities that disturbed the seafloor within 305 meters (1,000 feet) of the "No Activity Zone" of a biologically sensitive topographic feature shall be submitted to BOEM (see "d" below.)
 - b. Do not anchor or otherwise disturb the seafloor within 30 meters (100 feet) of any identified pinnacles or other hard bottoms that have a vertical relief of eight feet or more. Information on the activities that disturbed the seafloor within 61 meters (200 feet) of pinnacles in the "Pinnacle Trend" Area shall be submitted to BOEM (see "d" below.)
 - c. Do not anchor or otherwise disturb the seafloor near any identified live bottom low relief features. Information on the activities that disturbed the seafloor within 30 meters (100 feet) of live bottom low relief features in the Live Bottom "Low Relief" Area shall be submitted to BOEM (see "d" below.)
 - d. Within 90 calendar days of completing activities, submit information regarding seafloor disturbances to BOEM New Orleans Office Data Acquisition and Special Project Unit (see page 5 of these "Protective Measures" for the address) a PDF map and the appropriate shape files to reproduce the map, showing the location of the seafloor disturbance relative to these features.
5. If you conduct activities in water depths 300 meters (984 feet) or greater, make sure that you do not anchor, use anchor chains, wire, ropes, or cables, or otherwise disturb the seafloor within 76 meters (250 feet) of any features or areas that could support deep water sessile benthic communities. Refer to NTL No. 2009-G40, Deepwater Chemosynthetic Communities, effective January 27, 2010 (see the BOEM website at: <http://www.boem.gov/Regulations/Notices-To-Lessees/2009/09-G40.aspx>). Also, refer to the BOEM website for GIS data layers of known 3D seismic water bottom anomalies at <https://www.boem.gov/Seismic-Water-Bottom-Anomalies-Map-Gallery/>.

The following feature classes have a high probability of supporting sensitive sessile benthic organisms and shall be avoided unless visual inspection and photographic data confirm an absence of high-density deepwater benthic communities:

13. Anomaly_patchreefs (Shallow Water)
14. Anomaly_confirmed_patchreefs (Shallow Water)
15. Seep_anomaly_positives
16. Seep_anomaly_positives_possible_oil
17. Seep_anomaly_positives_confirmed_oil

- 18. Seep_anomaly_positives_confirmed_gas
- 19. Seep_anomaly_confirmed_corals
- 20. Seep_anomaly_confirmed_organisms
- 21. Seep_anomaly_confirmed_hydrate
- 22. Seep_anomaly_confirmed_carbonate
- 23. Anomaly_Cretaceous
- 24. Anomaly_Cretaceous_talus

Within 90 calendar days after completing activities that disturbed the seafloor within 152 meters (500 feet) of features or areas that could support high-density chemosynthetic communities, submit to the BOEM New Orleans Office Data Acquisition and Special Project Unit (see page 5 of these “Protective Measures” for the address) a PDF map and the appropriate shape files to reproduce the map, showing the location of the seafloor disturbance relative to these features

6. Comply with the provisions of NTL 2009-G39, Biologically-Sensitive Underwater Features and Areas of the Gulf of Mexico, effective January 27, 2010, (see the BOEM website at: <http://www.boem.gov/Regulations/Notices-To-Lessees/2009/09-G39.aspx>). If you discover any high-relief topographic feature with a relief greater than eight (8) feet while conducting activities, report the discovery to the BOEM New Orleans Office Regional Director. Make sure you do not anchor on or otherwise disturb such a feature. Within 90 calendar days after completing an activity that disturbed the seafloor within 30 meters (100 feet) of such a feature, submit to the BOEM New Orleans Office Data Acquisition and Special Project Unit (see page 5 of these “Protective Measures” for the address) a map at a scale of 1 inch = 1,000 feet with DGPS accuracy, showing the location of the seafloor disturbance relative to the feature.
7. Before you conduct activities that could disturb the seafloor within 254 meters (1,000 feet) of a Texas artificial reef site or artificial reef permit area, within 152 meters (500 feet) of a Louisiana artificial reef site or artificial reef permit area, or could disturb the seafloor within a General Permit Area established by the States of Texas, Alabama or Florida for the placement of artificial reef material, contact the appropriate State reef management agency. See the BOEM websites at: <http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/artreefmap.aspx> for a map and <http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/artreefcontacts-pdf.aspx> for State contacts.
8. If you conduct activities within the boundaries of the Flower Gardens National Marine Sanctuary (Flower Gardens Banks and Stetson Bank), exercise caution to ensure that such activities do not endanger any other users of the Sanctuary. See the BOEM website at: <http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/FGNMSmap-pdf.aspx> for map. Additionally, activities involve moving the marker buoys at the Sanctuary, contact Mr. G. P. Schmahl, the current Sanctuary Manager, for instructions. See the BOEM website at: <http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/FGNMScontacts-pdf.aspx> for Mr. Schmahl’s contact information. See the BOEM website at: <http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/FGNMScontacts-pdf.aspx>

[of-Mexico-Region/FGNMSbuoys-pdf.aspx](#) for the locations of the Flower Gardens' marker buoys.

9. If your proposed activities will involve using boats from a port located south of the Suwannee River mouth in Florida, make sure that you adhere to the following manatee protection plan:
 - a. Advise your personnel of the possibility of the presence of manatees in the inland and coastal waters of Florida in the Eastern Gulf of Mexico.
 - b. Advise your personnel that there are civil and criminal penalties for harming, harassing, or killing manatees, which are protected under the Endangered Species Act, the Marine Mammal Protection Act, and the Florida Manatee Sanctuary Act of 1978.
 - c. Advise your vessel operators to (1) use the deeper ship channels to the maximum extent possible; (2) avoid collisions with manatees and to stay within the existing channels; and (3) obey all speed restrictions and travel at "no wake/idle" speeds at all times while operating in shallow water or in channels where the draft of the vessel provides less than four (4) feet of clearance. (Areas of manatee concentrations have been identified and speed limit signs have been erected in accordance with Federal, State, and local regulations.)
 - d. While vessels are berthed in port, advise your vessel operators to use fenders between the dock and the vessel and/or between adjacent vessels berthed side-by-side. Make sure that the fenders have a minimum clearance of three feet when compressed between the dock and the vessel
 - e. Ensure that your vessel operators keep logs detailing any sighting of, collision with, damage to, or death of manatees that occur while you conduct an ancillary activity. If a mishap involving a manatee should occur, make sure that the vessel operator immediately calls the "Manatee Hotline" ((888) 404-3922), and the U.S. Fish and Wildlife Service, Jacksonville Field Office ((904) 232-2580) for north Florida or the U.S. Fish and Wildlife Service, Vero Beach Ecosystem Office ((772) 562-3909) for South Florida.
 - f. Within 60 calendar days after completing the activity, submit a report summarizing all manatee incidents and sightings to the Florida Marine Research Institute, Florida Fish and Wildlife Conservation Commission, 100 Eighth Avenue SE, St. Petersburg, FL 33701-5095; and to the U.S. Fish and Wildlife Service, 6620 Southpoint Drive South, Suite 310, Jacksonville, FL 32216-0958, for north Florida, or to the U.S. Fish and Wildlife Service, 1339 20th Street, Vero Beach, Florida 32960-3559, for south Florida.
10. The Magnuson-Stevens Fisheries Conservation and Management Act (see 50 CFR 600.725) prohibits the use of explosives to take reef fish in the Exclusive Economic Zone. Therefore, if your activities involve the use of explosives, and the explosions result in stunned or killed fish, do not take such fish on board your vessels. If you do, you could be charged by the National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries Service) with a violation of the aforementioned Act. If you have any questions, contact NOAA Fisheries Service, Office for Law Enforcement, Southeast Division, at (727) 824-5344.

11. When operations extend south of approximately 26 degrees north latitude in the Western Gulf of Mexico or 24 degrees to 25 degrees north latitude in the Eastern Gulf of Mexico (the 200-nautical mile provisional maritime also called the Exclusive Economic Zone Conservation Zone Limit), notify the Department of State: Ms. Roberta Barnes, Room 2665, OES/OPA, Department of State, Director, Office of Ocean and Polar Affairs, Washington, D.C., 20520, at (202) 647-0240 or barnesrm@state.gov.
12. As part of the requirements of 30 CFR 551.6(a), if any operation under this Permit and Agreement is to be conducted in a leased area, the Permittee shall take all necessary precautions to avoid interference with operations on the lease and damage of existing structures and facilities. The lessee (or operator) of the leased area will be notified, in writing, before the Permittee enters the leased area, or commences operations, and a copy of the notification will be sent to the Regional Supervisor executing this Permit Agreement.
13. (a) Solid or liquid explosives shall not be used, except pursuant to written authorization from the Regional Supervisor. Requests of the use of such explosives must be in writing, giving the size of charges to be used, the depth at which they are to be detonated, and the specific precautionary methods proposed for the protection of fish, oysters, shrimp, and other natural resources. The use of explosives represents a may affect situation under Section 7 of the Endangered Species Act of 1973, as amended.

(b) The following provisions are made applicable when geophysical exploration on the Outer Continental Shelf using explosives is approved:
 - i. Each explosive charge will be permanently identified by markings so that unexploded charges may be positively traced to the Permittee and to the specific field party of the Permittee responsible for the explosive charge
 - ii. The placing of explosive charges on the seafloor is prohibited. No explosive charges shall be detonated nearer to the seafloor than five (5) feet (1.52 meters).
 - iii. No explosive shall be discharged within 1,000 feet (304.8 meters) of any boat not involved in the survey.
14. Any serious accident, personal injury, or loss of property shall be immediately reported to the Regional Supervisor of Resource Evaluation.
15. All pipes, buoys, and other markers used in connection with seismic work shall be properly flagged and lighted according to the navigation rules of the U.S. Corps of Engineers and the U.S. Coast Guard.

**UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF OCEAN ENERGY MANAGEMENT**

Gulf of America Region

**PERMIT FOR GEOPHYSICAL EXPLORATION
FOR MINERAL RESOURCES OR SCIENTIFIC RESEARCH
ON THE OUTER CONTINENTAL SHELF**

In consideration of the terms and conditions contained herein and the authorization granted hereby, this permit is entered into by and between the United States of America (the Government), acting through the Bureau of Ocean Energy Management (BOEM) of the Department of the Interior, and

Chevron U.S.A. Inc.

(Name of Permittee)

1500 Louisiana Street 33rd Floor

(Number and Street)

Houston, TX 77002

(City, State, and Zip Code)

PERMIT NUMBER: L25-014

DATE: 02-September-2025

This permit is issued pursuant to the authority of the Outer Continental Shelf Lands Act, as amended (43 U.S.C. 1331 *et seq.*), hereinafter called the "Act," and Title 30 Code of Federal Regulations Parts 551 (Geological and Geophysical (G&G) Explorations of the Outer Continental Shelf). The permittee must conduct all activities in compliance with the terms and conditions of this permit, including the "Stipulations," "Environmental Protective Provisions," and the approved "Application for Permit," which are attached to and incorporated into this permit. The permittee must conduct all geophysical exploration or scientific research activities in compliance with the Act, the regulations in 30 CFR Parts 551 and 251, and other applicable statutes and regulations whether such statutes and regulations are enacted, promulgated, issued, or amended before or after this permit is issued. Some of the provisions of 30 CFR Parts 551 and 251 are restated in this permit for emphasis. However, all of the provisions of 30 CFR Parts 551 and 251 apply to this permit. The permittee should note particularly that G&G activities may cause incidental "taking" of animals under the Marine Mammal Protection Act (16 U.S.C. 1361 *et seq.*) or the Endangered Species Act (16 U.S.C. § 1531 *et seq.*). Any such incidental taking is not authorized by this permit, and it may only be authorized by the National Marine Fisheries Service or the U.S. Fish and Wildlife Service. The permittee should contact these two agencies to address any questions about these laws or requirements.

Paperwork Reduction Act of 1995 (PRA) Statement: This permit refers to information collection requirements contained in 30 CFR Parts 551 and 251 regulations. The Office of Management and Budget (OMB) has approved those reporting requirements under OMB Control Number 1010-0048.

Section I. Authorization

The Government authorizes the permittee to conduct:

✓ Geophysical exploration for mineral resources as defined in 30 CFR 551.1.

Geophysical scientific research as defined in 30 CFR 551.1. A permit is required for any geophysical investigation that involves the use of solid or liquid explosives or developing data and information for proprietary use or sale.

This permit authorizes the permittee to conduct the above geophysical activity during the period from 03-September-2025 to 03-September-2026 in the following area(s):

see attached map

The permittee shall not conduct any geophysical operation (i.e., active sound source(s)) outside of the permitted area specified herein even if no data is collected or obtained from such operations. Geophysical operations shall not be conducted "in-transit" to the permitted area and may only proceed once the survey vessel enters the permitted area. (This restriction does not apply to Alaska.)

Extensions of the time period specified above must be requested in writing. A permit plus extensions for activities will be limited to a period of not more than 1 year from the original issuance date of the permit. Inspection and reporting of geophysical exploration activities, suspension and cancellation of authority to conduct exploration or scientific research activities under permit, and penalties and appeals will be carried out in accordance with 30 CFR 551.8, 551.9, and 551.10.

The authority of the Regional Director may be delegated to the Regional Supervisor for Resource Evaluation for the purposes of this permit.

Section II. Type(s) of Operations and Technique(s)

The permittee will employ the following type(s) of operations:
3D Seismic, 4D Seismic

and will utilize the following instruments and/or technique(s) in such operations:
Air Gun Array(s)

Section III. Reports on Operations

A. Status Reports

1. In the Gulf of America and Atlantic OCS Regions:

The permittee must submit status reports every **two months** in a manner approved or prescribed by the Regional Supervisor, Resource Evaluation (here after referred to as Supervisor). The report must include a map of appropriate scale showing traverse lines, protraction areas, blocks, and block numbers (if map scale permits). The map should be a cumulative update for each status report and clearly illustrate the planned traverse lines (one color) and the portion of those traverse lines in which data acquisition has been completed to date (a second color). Please indicate the cumulative total line miles (2D) or blocks (3D) of

data acquired. The map should be submitted in digital format preferably as a GeoPDF.

2. In the Alaska and Pacific OCS Regions:

The permittee must submit status reports **weekly** in a manner approved or prescribed by the Regional Supervisor, Resource Evaluation (here after referred to as Supervisor). The report must include a map of appropriate scale showing the location and extent of acquired lines of 2D data or traverse lines for 3D data and the 3-mile limit when data collection is adjacent to the OCS boundary or other important boundaries as specified by BOEM. The map should be a cumulative update for each status report and clearly illustrate the planned lines (one color) and the portion of those lines in which data acquisition has been completed to date (a second color). The report must show the activity of the source vessel (i.e., no seismic activity, time and location when a mitigation gun is on, ramp-up, and full acquisition mode). Protected Species Observer (PSO) reports must also be included. Please indicate the cumulative total line miles (2D) or square miles (3D) of data acquired. The map should be submitted in digital format as a PDF and ESRI file – gdb-feature class(s) or shape files.

B. The permittee must submit to the Supervisor a Final Report within 30 days after the completion of operations. The final report must contain the following:

1. In the Gulf of America and Atlantic OCS Regions:

- i. The total number of 2D line miles or OCS blocks of geophysical data acquired as well as the "typical" or average sail miles per block for the survey;
- ii. A *brief* daily log of operations. A suggested format for the daily log of operations would include, but is not limited to, a table that provides the name of the survey, a date column, a column for number of line miles or blocks collected each day, and an operations column. Preferably, the date column would commence on the date in which the vessel begins to transit to the permitted area and end on the date in which the vessel either transits away from the permitted area or when operations pertinent to the permitted activity are completed. The corresponding operations column would contain a *brief* description of the operations for each day listed in the date column noting activities such as the major work stoppages, no data acquired, and other pertinent activities. This may be submitted as a digital Word document or as an Excel spreadsheet;
- iii. A PDF or, preferably, a GeoPDF or shape file indicating the areal extent of the data *actually acquired*;
- iv. The start and finish dates on which the actual geophysical exploration or scientific research activities were performed;
- v. A narrative summary of any: (a) hydrocarbon slicks or environmental hazards observed and
(b) adverse effects of the geophysical exploration or scientific research activities on the environment, aquatic life, archaeological resources, or other uses of the area in which the activities were conducted;
- vi. The estimated date on which the processed or interpreted data or information

will be available for inspection by BOEM;

- vii. A CD or DVD containing a *single*, final edited navigational data file. Shot point locations should be provided in both latitude/longitude degrees and in x, y coordinates. The single navigational file should be in either SEG-P1 or UKOOA P190 format for either two- dimensional or three-dimensional geophysical data. Two-dimensional data should be decimated to the first, last, and every tenth shot point. Three-dimensional data should be decimated at every line and first and last CDP. A single ESRI shape file containing navigational data and one shape file with post-plot locations of any geophysical equipment on the seafloor (i.e., ocean bottom nodes, CSEM, etc.) should also be submitted if applicable;
- viii. Identification of geocentric ellipsoid (NAD 27 or NAD 83) used as a reference for the data or sample locations; and
- ix. Such other descriptions of the activities conducted as may be specified by the Supervisor.

2. In the Alaska and Pacific OCS Regions:

- i. The total number of 2D line miles or square miles for 3D surveys and the number of OCS blocks of geophysical data acquired, as well as total number of traverse miles for the survey;
- ii. A *weekly report*.
- iii. Chart(s), map(s), or plat(s) depicting the areas in which any exploration or scientific research activities were conducted. These graphics must clearly indicate the location of the activities so that the data produced from the activities can be accurately located and identified;
- iv. The start and finish dates on which the actual geophysical exploration or scientific research activities were performed;
- v. A narrative summary of any: (a) hydrocarbon slicks or environmental hazards observed, (b) adverse effects of the geophysical exploration or scientific research activities on the environment, aquatic life, archaeological resources, or other uses of the area in which the activities were conducted, and (c) safety incidents;
- vi. The estimated date on which the processed or interpreted data or information will be available for inspection by BOEM;
- vii. A final edited navigation file on suitable storage medium of all data or sample locations in latitude/longitude degrees including datum used. The navigation for 2D lines should include line name and location for the first, last, and every tenth SP. For 3D surveys, please submit an avigation file for the acquired track lines that includes the location of the first and last SP and/or the corner locations for the area acquired. Contact the G&G permitting office for the specific navigation required for this permitted activity. The digital file is to be formatted in standard SEG-P1, UKOOA P1-90 or other current, standard industry format, coded in ASCII. A printed data listing and a format statement are to be included;

viii Identification of geocentric ellipsoid (NAD 83) used as a reference for the data or sample locations; and

ix. Such other descriptions of the activities conducted as may be specified by the Supervisor.

C. The Final Report is a stand-alone document containing all the pertinent information regarding the permit.

Section IV. Submission, Inspection, and Selection of Geophysical Data and Information

A. The permittee must notify the Supervisor, in writing, when the permittee has completed the initial processing and interpretation of any geophysical data and information collected under an exploration permit or a scientific research permit that involves developing data and information for proprietary use or sale. If the Supervisor asks if the permittee has further processed or interpreted any geophysical data and information collected under a permit, the permittee must respond within 30 days. If further processing of the data and information is conducted, it is the responsibility of the permittee to keep the most current resulting products available in the event the Supervisor requests the current status of data processing. At any time within 10 years after receiving notification of the completion of the acquisition activities conducted under the permit, the Supervisor may request that the permittee submit for inspection and possible retention all or part of the geophysical data, processed geophysical information, and interpreted geophysical information.

After a period of 10 years from the issuance of the permit, the permittee must notify the Supervisor in writing if their intention is to no longer maintain all or part of the geophysical data, processed geophysical information, and interpreted geophysical information, and provide the Supervisor 30 days to request that the permittee submit for inspection and possible retention all or part of the geophysical data, processed geophysical information, and interpreted geophysical information.

B. The Supervisor will have the right to inspect and select the geophysical data, processed geophysical information, or interpreted geophysical information. This inspection will be performed on the permittee's premises unless the Supervisor requests that the permittee submit the data or information to the Supervisor for inspection. Such submission must be within 30 days following the receipt of the Supervisor's request unless the Supervisor authorizes a later delivery date. If the inspection is done on the permittee's premises, the permittee must submit the geophysical data or information selected within 30 days following receipt of the Supervisor's request, unless the Supervisor authorizes a longer period of time for delivery. The data or information requested for inspection or selected by the Supervisor must be submitted regardless of whether the permittee and the Government have or have not concluded an agreement for reimbursement. If the Supervisor decides to retain all or a portion of the geophysical data or information, the Supervisor will notify the permittee, in writing, of this decision.

C. In the event that a third party obtains geophysical data, processed geophysical information, or interpreted geophysical information from a permittee, or from another third party, by sale, trade, license agreement, or other means:

1. The third party recipient of the data and information assumes the obligations under this section except for notification of initial processing and interpretation of the data and information and is subject to the penalty provisions of 30 CFR Part 550, Subpart N; and
2. A permittee or third party that sells, trades, licenses, or otherwise provides the data

and information to a third party must advise the recipient, in writing, that accepting these obligations is a condition precedent of the sale, trade, license, or other agreement; and

3. Except for license agreements, a permittee or third party that sells, trades, or otherwise provides data and information to a third party must advise the Supervisor in writing within 30 days of the sale, trade, or other agreement, including the identity of the recipient of the data and information; or
 4. With regard to license agreements, a permittee or third party that licenses data and information to a third party, within 30 days of a request by the Supervisor, must advise the Supervisor, in writing, of the license agreement, including the identity of the recipient of the data and information.
- D. Each submission of geophysical data, processed geophysical information, and interpreted geophysical information must contain, unless otherwise specified by the Supervisor, the following:
1. An accurate and complete record of each geophysical survey conducted under the permit, including digital navigational data and final location maps of all surveys;
 2. All seismic data developed under a permit presented in a format and of a quality suitable for processing;
 3. Processed geophysical information derived from seismic data with extraneous signals and interference removed, presented in a format and of a quality suitable for interpretive evaluation, reflecting state-of-the-art processing techniques; and
 4. Other geophysical data, processed geophysical information, and interpreted geophysical information obtained from, but not limited to, shallow and deep subbottom profiles, bathymetry, side-scan sonar, gravity, magnetic, and electrical surveys, and special studies such as refraction, shear wave, and velocity surveys.

Section V. Reimbursement to Permittees

- A. After the delivery of geophysical data, processed geophysical information, and interpreted geophysical information requested by the Supervisor in accordance with subsection IV of this permit, and upon receipt of a request for reimbursement and a determination by BOEM that the requested reimbursement is proper, BOEM will reimburse the permittee or third party for the reasonable costs of reproducing the submitted data and information at the permittee's or third party's lowest rate or at the lowest commercial rate established in the area, whichever is less.
- B. If the processing was in a form and manner other than that used in the normal conduct of the permittee's business at BOEM's request, BOEM will reimburse the permittee or third party for the reasonable costs of processing or reprocessing such data. Requests for reimbursement must identify processing costs separate from acquisition costs.
- C. The permittee or third party will not be reimbursed for the costs of acquiring or interpreting geophysical information.
- D. Data and information required under section IV.D.1. of this permit are not considered to be geophysical data or processed geophysical information and must be provided by the permittee at no cost to the Government.

Section VI. Disclosure of Data and Information to the Public

- A. BOEM will make data and information submitted by a permittee available in accordance with the requirements and subject to the limitations of the Freedom of Information Act (5 U.S.C. 552) and the implementing regulations (43 CFR Part 2), the requirements of the Act, and the regulations contained in 30 CFR Parts 550 and 250 (Oil and Gas and Sulphur Operations in the Outer Continental Shelf), 30 CFR Parts 551 and 251, and 30 CFR Parts 552 and 252 (Outer Continental Shelf (OCS) Oil and Gas Information Program).
- B. Except as specified in this section, or Section VIII, or in 30 CFR Parts 550, 552, 250, and 252, no data or information determined by BOEM or the Bureau of Safety and Environmental Enforcement to be exempt from public disclosure under subsection A of this section will be provided to any affected State or be made available to the executive of any affected local government or to the public, unless the permittee or third party and all persons to whom such permittee has sold, traded, or licensed the data or information under promise of confidentiality agree to such an action.
- C. Geophysical data and processed or interpreted geophysical information submitted under a permit, and retained by BOEM, will be disclosed as follows:
 - 1. Except for deep stratigraphic tests, BOEM will make available to the public geophysical data 50 years after the date of issuance of the permit under which the data were collected (see 30 CFR 551.14).
 - 2. Except for deep stratigraphic tests, BOEM will make available to the public processed geophysical information and interpreted geophysical information 25 years after the date of issuance of the permit under which the original data were collected (see 30 CFR 551.14).
 - 3. BOEM will make available to the public all geophysical data and information and geophysical interpretations related to a deep stratigraphic test, at the earlier of the following times: (a) 25 years after the completion of the test, or (b) for a lease sale held after the test well is completed, 60 calendar days after the Department of the Interior executes the first lease for a block, any part of which is within 50 geographic miles (92.6 kilometers) of the site of the completed test.
- D. All line-specific preplot or postplot plat(s), and navigation tapes, including but not limited to seismic survey traverses and shotpoint locations, submitted as a requirement of 30 CFR 551.7, 551.12, or 251.7, will be considered as "PROPRIETARY INFORMATION." Such information will not be made available to the public without the consent of the permittee for a period of 25 years from the date of issuance of the permit, unless the Director, BOEM, determines that earlier release is necessary for the proper development of the area permitted.
- E. All other information submitted as a requirement of 30 CFR 551.8 and determined by BOEM to be exempt from public disclosure will be considered as "PROPRIETARY." Such data and information will not be made available to the public without the consent of the permittee for a period of up to 25 years from the date of issuance of the permit as addressed in 30 CFR 551.14, unless the Director, BOEM, determines that earlier release is necessary for the proper development of the area permitted. The executed permit will be considered as "PROPRIETARY" except the public information copy, which will be available to the public upon request and on BOEM's website.

- F. The identities of third party recipients of data and information collected under a permit will be kept confidential. The identities will not be released unless the permittee and the third parties agree to the disclosure.

Section VII. Disclosure to Independent Contractors

BOEM reserves the right to disclose any data or information acquired from a permittee to an independent contractor or agent for the purpose of reproducing, processing, reprocessing, or interpreting such data or information. When practicable, BOEM will advise the permittee who provided the data or information of intent to disclose the data or information to an independent contractor or agent. BOEM's notice of intent will afford the permittee a period of not less than 5 working days within which to comment on the intended action. When BOEM so advises a permittee of the intent to disclose data or information to an independent contractor or agent, all other owners of such data or information will be deemed to have been notified of BOEM's intent. Prior to any such disclosure, the contractor or agent will be required to execute a written commitment not to sell, trade, license, or disclose any data or information to anyone without the express consent of BOEM.

Section VIII. Sharing of Information with Affected States

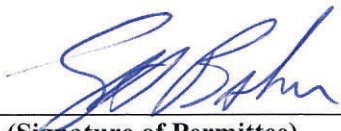
- A. At the time of soliciting nominations for the leasing of lands within 3 geographic miles of the seaward boundary of any coastal State, BOEM, pursuant to the provisions of 30 CFR Parts 552.7 and subsections 8(g) and 26(e) (43 U.S.C. 1337(g) and 1352(e)) of the Act, will provide the Governor of the State (or the Governor's designated representative) the following information that has been acquired by BOEM on such lands proposed to be offered for leasing:
 1. All information on the geographical, geological, and ecological characteristics of the areas and regions proposed to be offered for leasing;
 2. An estimate of the oil and gas reserves in the area proposed for leasing; and
 3. An identification of any field, geological structure, or trap located within 3 miles of the seaward boundary of the State.
- B. After the time of receipt of nominations for any area of the OCS within 3 geographic miles of the seaward boundary of any coastal State and Area Identification in accordance with the provisions of Subparts D and E of 30 CFR Part 556, BOEM, in consultation with the Governor of the State (or the Governor's designated representative), will determine whether any tracts being given further consideration for leasing may contain one or more oil or gas reservoirs underlying both the OCS and lands subject to the jurisdiction of the State.
- C. At any time prior to a sale, information acquired by BOEM that pertains to the identification of potential and/or proven common hydrocarbon-bearing areas within 3 geographic miles of the seaward boundary of any such State will be shared, upon request by the Governor and pursuant to the provisions of 30 CFR Parts 552.7 and 252.7 and subsections 8(g) and 26(e) of the Act, with the Governor of such State (or the Governor's designated representative).
- D. Knowledge obtained by a State official who receives information under subsections A, B, and C of this section will be subject to the requirements and limitations of the Act and the regulations contained in 30 CFR Parts 550, 551, 552, 250, 251, and 252.

Section IX. Permit Modifications

The Department will have the right at any time to modify or amend any provisions of this permit, except that the Department will not have such right with respect to the provisions of Sections VI, VII, and VIII hereof, unless required by an Act of Congress.

IN WITNESS WHEREOF the parties have executed this permit and it will be effective as of the date of signature by the Supervisor.

PERMITTEE:



(Signature of Permittee)

Scott Baker

(Type or Print Name of Permittee)

Manager

(Title)

9/2/25

(Date)

THE UNITED STATES OF AMERICA:

**MATTHEW
WILSON**

Digitally signed by
MATTHEW WILSON
Date: 2025.09.03
19:28:08 -05'00'

(Signature of Regional Supervisor)

Matthew G. Wilson

(Type or Print Name of Regional Supervisor)

9/3/25

(Date)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF OCEAN ENERGY MANAGEMENT

Gulf of America Region

APPLICATION FOR PERMIT TO CONDUCT GEOLOGICAL OR
GEOPHYSICAL EXPLORATION FOR MINERAL RESOURCES OR
SCIENTIFIC RESEARCH ON THE OUTER CONTINENTAL SHELF

(Section 11, Outer Continental Shelf Lands Act of August 7, 1953, as amended on September 18, 1978, by Public Law 95-372, 92 Statute 629, 43 U.S.C. 1340; and 30 CFR Parts 551 and 251)

Chevron U.S.A. Inc.

Name of Applicant

1500 Louisiana Street 33rd Floor

Number and Street

Houston, TX 77002

City, State, and Zip Code

Application is made for the following activity: (check one)

Geological exploration for mineral resources

Geological scientific research

√

Geophysical exploration for mineral resources

Geophysical scientific research

Submit: Original plus three copies, totaling four copies, which include one copy of the original, one digital copy, and one public copy (all with original signatures). For Gulf of America and Atlantic OCS Regions, an online digital application portal is also available.

=====

To be completed by BOEM

Permit Number: L25-014

Date: 25-June-2025

A. General Information

1. The activity will be conducted by:

<u>TGS</u>	For	<u>Chevron U.S.A. Inc.</u>
<u>Service Company Name</u>		<u>Purchaser(s) of the Data</u>
<u>Steve McIntosh</u>		<u>Scott Baker</u>
<u>Contact Name</u>		<u>Contact Name</u>
<u>10451 Clay Road</u>		<u>1500 Louisiana Street 33rd Floor</u>
<u>Address</u>		<u>Address</u>
<u>Houston, TX 77041</u>		<u>Houston, TX 77002</u>
<u>City, State, Zip</u>		<u>City, State, Zip</u>
<u>713 860 2100</u>		<u>(713)392-4914</u>
<u>Telephone/FAX Numbers</u>		<u>Telephone/FAX Numbers</u>
<u>steve.mcintosh@tgs.com</u>		<u>sbaker@chevron.com</u>
<u>E-Mail Address</u>		<u>E-Mail Address</u>

2. The purpose of the activity is:

√ Mineral exploration
Scientific research

3. Describe your proposed survey activities (i.e., vessel use, benthic impacts, acoustic sources, etc.) and describe the environmental effects of the proposed activity, including potential adverse effects on marine life. Describe what steps are planned to minimize these adverse effects (mitigation measures). For example: 1) Potential Effect: Excessive sound level Mitigation; Soft Start, Protected Species Observers (PSO's), mammal exclusion zone or 2) Potential Effect: Bottom disturbance; Mitigation: ROV deployment/retrieval of bottom nodes) (use continuation sheets as necessary or provide a separate attachment. Label as **BOEM-0327 Section A General Information.**):

See submittals:

- BOEM-0327 3 - Section A General Information Attachment 2.pdf

- BOEM-0327 2 - Public Information Statements Attachment 1.pdf

4. The expected commencement date is:
- DECEMBER 01, 2025

The expected completion date is: NOVEMBER 30, 2026

5. The name of the individual(s) in charge of the field operation is:

May be contacted at:

Telephone (Local): 713 860 2100

(Marine): 281 433 5616

E mail Address:

6. The vessel(s) to be used in the operation is (are):

Vessel Name (s)	Vessel Model	Registry Number(s)	Radio Call Sign(s)	Registered Owner(s)
Fulmar Explorer	Source	9418860	5BKQ5	SeaBird Explorations Vessels Limited
Olympic Artemis	Nodal	9726217	LAFV8	Olympic Artemis AS
REM Saltire	Nodal	9377016	5BYV4	REM Saltire AS
Sanco Sword	Source	9662100	ZDNE7	Sanco Holdings AS

7. Port from which the vessel(s) will operate is:

Port Fourchon, LA;

8. Briefly describe the navigation system (vessel navigation only):

Differential Global Positioning System (DGPS);

B. Complete for Geological Exploration for Mineral Resources or Geological Scientific Research

1. The type of operation(s) to be employed is: (check one)

- a. Deep stratigraphic test, or
- b. Shallow stratigraphic test with proposed total depth of ft, or
- c. Other:

2. Attach a page-size plat showing: 1) The generalized proposed location for each test, where appropriate, a polygon enclosing the test sites may be used; 2) BOEM protraction areas, coastline, point of reference, OCS boundary/3-mile limit; 3) Distance and direction from a point of reference to area of Activity; and 4) Label as "**Public Information**".

C. Complete for Geophysical Exploration for Mineral Resources or Geophysical Scientific Research

1. The proposed operation: Mineral Exploration

a. Acquisition method (OBN, OBC, Streamer):

Ocean Bottom Node (OBN)(Remotely Operated Vehicle (ROV));

b. Type of acquisition: (High Resolution Seismic, 2D Seismic, 3D Seismic, gravity,

magnetic, CSEM, etc.)

3D Seismic:

4D Seismic:

2. Attach a page-size plat showing:
 - a. The generalized proposed location of the activity with a representative polygon;
 - b. BOEM protraction areas, coastline, point of reference, OCS boundary/3- mile limit;
 - c. Distance and direction from a point of reference to area of activity;
 - d. Label as "**Public Information**"; and
 - e. Submit relevant shape files needed to recreate the map as part of the required digital copy.
3. List all energy source types to be used in the operation(s): (Air gun, air gun array(s), sub-bottom profiler, sparker, towed dipole, side scan sonar, etc.).

Air Gun Array(s):

4. Explosive charges will not be used. If applicable, indicate the type of Explosive and maximum charge size (in pounds) to be used:

Type:

Pounds:

Equivalent Pounds of TNT:

D. Proprietary Information Attachments

Use the appropriate form on page 9 for a "geological" permit application or the form on page 11 for a "geophysical" permit application. You must submit a separate Form BOEM-0327 to apply for each geological or geophysical permit.

E. Certification

I hereby certify that foregoing and attached information are true and correct.

Print Name: Scott Baker

SIGNED: 

DATE: June 17, 2025

TITLE: Manager

COMPANY NAME: Chevron U.S.A. Inc.

=====

TO BE COMPLETED BY BOEM

Permit No. L25-014

Assigned by Tanaporn Sakulpitakphon
of BOEM

Date 25-June-2025

This application is hereby:

- a. X Accepted
- b. Returned for reasons in the attached

SIGNED

MATTHEW
WILSON

Digitally signed by
MATTHEW WILSON
Date: 2025.06.26
19:55:02 -05'00'

TITLE

Regional Supervisor

DATE

6/26/25

Section D Proprietary Information Attachment
Required for an Application for Geophysical Permit

Please provide the information in an attached document labeled **BOEM-0327 Section D Proprietary Information Attachment**.

- 1. Attach detailed narrative and description of the energy source(s) and receiving array.
- 2. Attach a map view diagram/schematic that illustrates vessel(s) source and receiver(s) configuration. Label each vessel indicating its function and include the dimensions of streamer(s), tow fish, etc. Indicate the number of chase and alternate vessels to be used.

Remarks: See submittal:
BOEM-0327 5 - Section D Proprietary Attachment 4.pdf

- 3. List each energy source to be used (e.g., airgun, airgun array(s), sparker, towed dipole, side scan sonar, sub bottom profiler, etc.). Indicate the source's manufacturer, model, Source Level (SL) in dB re 1µPa @1m in water (RMS) and if applicable, Source Level (SL) in dB re 1µPa @1m in water (Peak to Peak) and ping rate. If the manufacturer does not provide a peak to peak level (many side scan sonars, etc.), please enter N/A. Additionally, provide the operational frequency ranges.

Energy Source	Manufacturer	Model	Array or Airgun Size (cu. in.)	Source Level (SL) in dB re 1µPa@1m in water (RMS)	Source Level (SL) in dB re 1µPa@1m in water (Peak to Peak)	Frequency (Hz, kHz range)	Ping Duration/ Cycle	Ping Rate
Air Gun Array	Bolt	1900 LLX	5220	241	267	2-70 Hz	0.2s	40m
Pies	Sonardyne	8302-3116	NA	190-202	80-120	14-20 kHz	NA	1 per 30s

For air guns/air gun arrays (excludes multibeam bathymetry, high frequency subbottom profilers, and side scan sonar systems), provide the maximum distance from the sound source to the 190, 180, and 160 dB in RMS dB levels: (Required for Alaska region, GOM region only requires this information for surveys in the GOM that will use simsources during acquisition; Not required for Atlantic permits).

dB level	Maximum Distance from Source
190 dB	
180 dB	
160 dB	

4. State the shot frequency of the source array(s) as shots per minute or shots per linear mile (statute):
7 shots per minute; Remarks: 7 shots/min for flip-flop sources at 4.5knots.
5. List the towing depth (ft/m) of the source array(s):
39.4 ft (12 m)
6. If applicable, list the towing depth (ft/m) of the receiver(s):
7. CSEM, OBN, Magnetotelluric, and OBC surveys: Describe the receiver deployment and retrieval procedures. Indicate the number and spacing of any ocean bottom receivers, cables, and anchors. If anchors will not be retrieved, provide their physical composition and rate of decomposition.
See submittal:
BOEM-0327 5 - Section D Proprietary Attachment 4.pdf. There are receivers of type " Set out all nodes first".
8. List the navigation/positioning system or method used to position shotpoint locations and/or ocean bottom receivers:
DGP, radar, direction finders, LoranC, gyro, autopilot, echo-sounder, INS, etc.
9. Proposed areal extent (in OCS blocks) for 3D surveys or total number of statute line miles for 2D surveys:
9 OCS blocks
10. Provide the company identification name of the proposed survey (e.g., Deep Six Survey) and list all proposed initial and final processed data sets that will result from survey acquisition.
St Malo OBN 2026. Fast track July 1, 2026
Full processing including migration July 1, 2027.
11. State the estimated date (month and year) on which initial and final processing will be available for all proposed processed data sets:
JULY , 2027
12. Attach map(s), plat(s), and chart(s) (preferably at a scale of 1:250,000) and an electronic version of same showing latitude and longitude, scale, specific protraction areas, OCS boundary/3-mile limit, block numbers. The map, plat or chart should be submitted at a sufficient size and scale to make out all details of the activities shown. The map should be labeled "**Proprietary**." For 2D data acquisition provide specific track lines with line identifications with the total number of line miles proposed or a representative polygon and total number of blocks for 3D surveys. Along with the hardcopy map, submit on CD or other digital storage media (subject to security screening), the necessary ArcGIS shape files to reproduce the map for 2D track lines including individual line names in the attribute table. For 3D surveys provide a representative polygon as an ArcGIS shape file. You must provide a shapefile data set of the latitude/longitude location for all track lines, shot lines, and node placements. This can be submitted at a later time but must be received before activities can take place.



BOEM-0327 ATTACHMENT 1

PUBLIC INFORMATION STATEMENTS

Chevron U.S.A., Inc

St Malo OBN 2026

The St Malo OBN 2026 survey is designed to provide detailed characterization of the subsurface to depths more than 30,000 ft below the water surface under a complex salt overburden. Previous surveys over the St Malo area have all been acquired using OBN and towed streamer technology. The St Malo OBN 2026 survey is fundamentally different due to expected 4D effects in the reservoir. The survey geometry and technology has been carefully planned to facilitate detecting the 4D effects. The St Malo OBN 2026 data will record 4D seismic data attributes such as fluid movements. These data attributes are critical to efficiently producing at St Malo.

The seismic source array has been designed to have the lowest sound level intensity necessary to achieve the program's goals. The source design considers Chevron's knowledge of the frequency content of the seismic targets, the geometry and acoustic properties of subsurface salt bodies, the horizontal propagation of environmental noise in the water column, and our experience with OBN data recording. Mitigation measures, including those detailed in applicable NTLs, the 2020 Biological Opinion, and the 2021 Amended Incidental Take Regulation will be implemented to ensure no impact to protected species occurs in excess of the incidental take authorized by NMFS under the Incidental Take Regulation.

BOEM-0327 ATTACHMENT 4

SECTION D PROPRIETARY INFORMATION ATTACHMENT

Chevron U.S.A., Inc

St Malo OBN 2026

1. Attach detailed narrative and description of the energy sources and receiving array

Receivers

The 3D seismic data will be acquired using Ocean Bottom Node receivers typically similar to MagSeis Fairfield. The ZXPLR unit dimensions (length x width x height) are 386mm diameter by 152 mm. The units weigh 23.5 kg in air, and 11.8 kg in water. The ZXPLR units record 4 component seismic data including a hydrophone and 3 geophones.

All OBN units will be carefully deployed and retrieved by ROV aboard a single OBN handling vessel, mitigating any potential disturbance of the sea bottom. No equipment is dropped from the surface. The positions of the OBN units will be determined at the time of deployment/retrieval using a combination of inertial location on the ROV and USBL acoustic positioning to achieve high accuracy.

There are planned to be up to 1850 OBN units placed on the seabed within the OBN station area at 346m x 346m spacing. The OBN station area is approximately 8 OCS blocks.

No ballasts or anchors will be left behind at the seabed after retrieval of the OBN units.

Sources

The 3D OBN seismic data will be acquired using air gun sources. The source points will be acquired using 1 or 2 source vessel with 2 source arrays. The arrays on each vessel likely be actuated in an alternating “flip-flop” sequence between port and starboard arrays. If two vessels were used, they would operate independently with the largest separation possible within the operational constraints.

Source point spacing is 40m x 50m. With dual-source flip-flop the sail line interval will be 100m.

The total area of the source points is approximately 47 OCS blocks. The volume of each source array will be 5,220 cubic inches. Each source array will be composed of 3 sub-arrays.

All the mitigation measures required by BOEM will be followed.

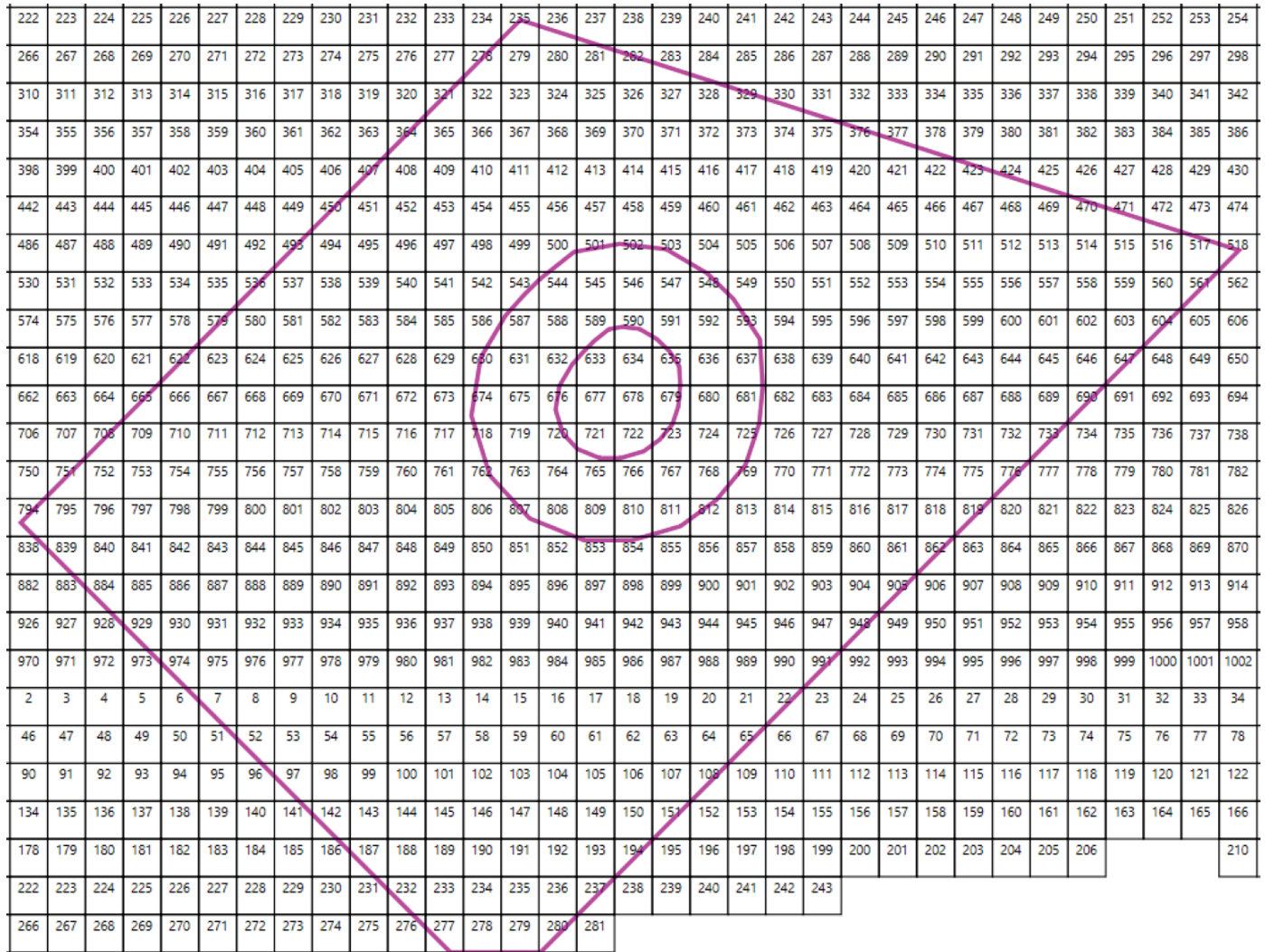


Figure 1: Inner polygon is the receiver area. Middle polygon is source area. Outer polygon is Area of Safe Operations for maneuverability. The survey area is within Walker Ridge and the operational area slightly goes over the Amery Terrace area in the south.

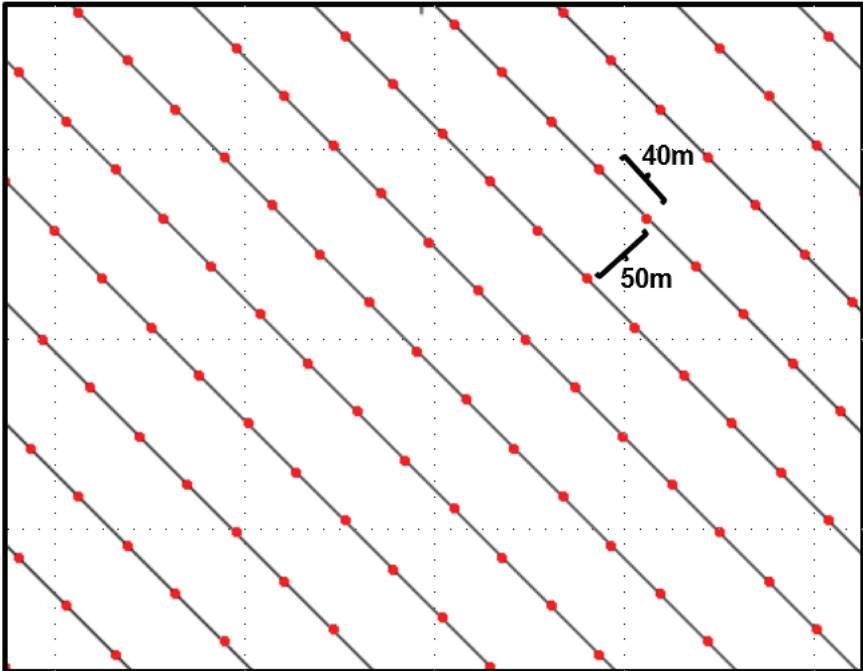


Figure 2 Zoom in of 40m x 50m source grid.

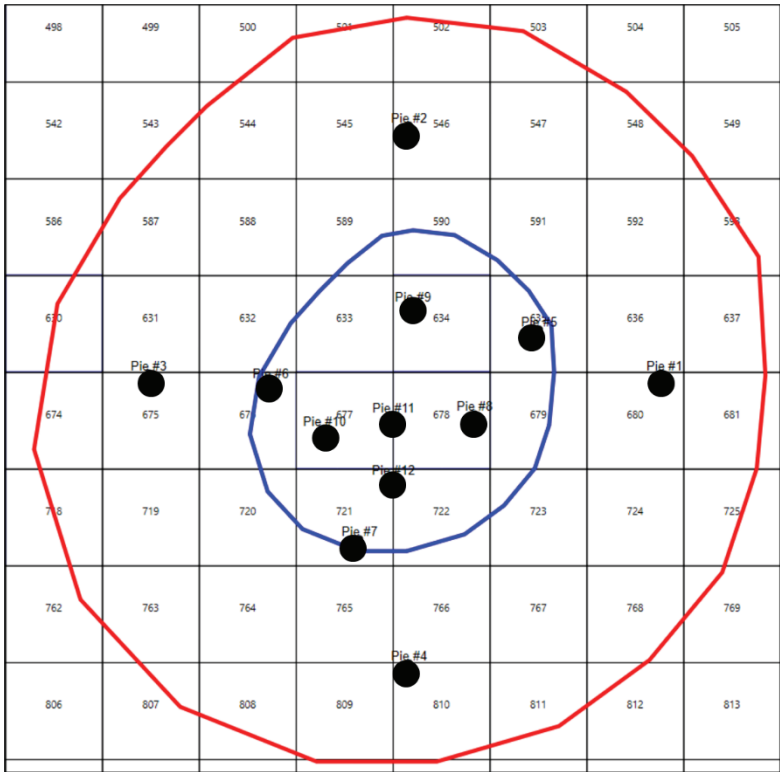


Figure 3 Water velocity measurements will be derived from deployment of Pressure Inverted Echo Sounder (PIES). A maximum of twelve PIES units will be deployed in the node/source coverage area approximately as displayed above.

2. **Attach a map view diagram/schematic that illustrates vessel(s) source and receiver(s) configuration. Label each vessel indicating its function and include the dimensions of streamer(s), tow fish, etc. Indicate the number of chase and alternate vessels to be used.**

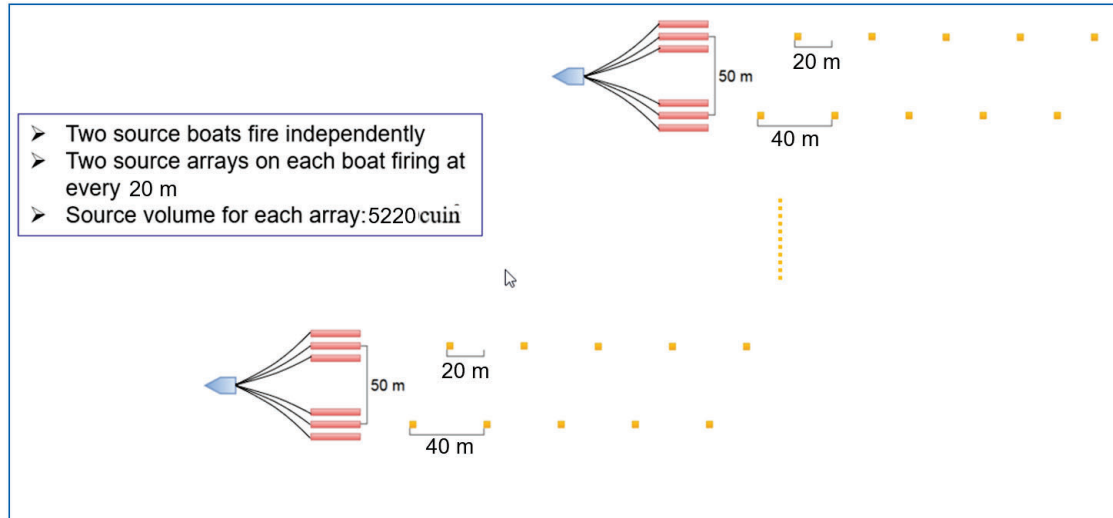


Figure 4 Source Vessel(s) configuration.

2- Source Vessels: Fulmar Explorer and Sanco Sword
 2- Node Vessels: Olympic Artemis and Rem Saltire
 Specifications and Configurations below.

G&G Permits Request for Information

The following information is requested to ensure BOEM has the details necessary to evaluate your proposed action and ensure it will protect the ESA-listed species covered by the 2020 Biological Opinion. If your activity includes any of the following, please provide additional details on the equipment / technology, procedures for ensuring ESA-listed species are not impacted, and/or results of modeling and analysis of sound associated with pile-driving or air guns.

This information must be included as part of your application.

1. Use of New or Unusual Technology (NUT).
2. Use of a vessel with a moon pool.
3. Equipment with an entanglement or entrapment risk (e.g., flexible lines/ropes).
4. Please indicate on a Vicinity Map all associated support bases / ports used and verify that no vessels, including supply and crew vessels, cross or enter the Bryde's whale area. If vessels will enter the Bryde's whale area, you must clearly state this, as additional restrictions will apply.
5. Provide the total number of days you project to have an active seismic source.
6. Speed (knots) the acoustic sources will be towed.
7. Maximum and minimum water depth of your operation
8. Review and update your application to verify the threatened or endangered species, critical habitat, and marine mammal information reflects the requirements found in the 2020 Biological Opinion.

The 2020 Biological Opinion may be found here:

<https://www.fisheries.noaa.gov/resource/document/biological-opinion-federally-regulated-oil-and-gas-program-activities-gulf-mexico>.

The Appendices may be found here:

(<https://www.fisheries.noaa.gov/resource/document/appendices-biological-opinion-federally-regulated-oil-and-gas-program-gulf-mexico>).



New and Unusual Technology Statement

Chevron U.S.A., Inc

St Malo OBN 2026

No New or Unusual Technology (NUT) in the context of BOEM (Bureau of Ocean Energy Management) and BSSE (Bureau of Safety and Environmental Enforcement) per regulatory classification will be used on St Malo OBN 2026 seismic program.

- Nothing is planned that has not been previously approved by BOEM or BSSE.
- Nothing is significantly different from standard seismic survey methods (e.g., airguns).
- Nothing poses unknown environmental or operational risks.

S. Baker
Chevron
Geophysics
June 25, 2025



Moon Pool Statement

Chevron U.S.A., Inc

St Malo OBN 2026

The use of a moon pool is not anticipated in this Ocean Bottom Node (OBN) seismic program in the Gulf of America. Having said this, the anticipated vessels do have moon pools but we do not intend to use the moon pool to deploy ROVS or baskets. We intend to use over the side with ROVs and baskets. Chevron will abide by all regulatory oversight by both BOEM (Bureau of Ocean Energy Management) and BSEE (Bureau of Safety and Environmental Enforcement) with respect to these moon pools.

S. Baker
Chevron
Geophysics
June 25, 2025



Entanglement Statement

Chevron U.S.A., Inc

St Malo OBN 2026

The St Malo OBN 2026 program involves the use of ROV systems with tethers and umbilicals. To mitigate the risk of entanglement and physical hazards, all operations will be conducted under strict coordination between ROV, diving supervisors, and all simops in the field. Tether management systems will be employed to minimize slack, and exclusion zones will be established around active equipment. All personnel will be briefed on entanglement risks, and emergency response procedures will be in place in accordance with BSEE safety guidelines and industry best practices.

S. Baker
Chevron
Geophysics
June 25, 2025



Brydes Whale Statement

Chevron U.S.A., Inc

St Malo OBN 2026

The St Malo OBN 2026 program does not intend, per our most recent understanding, to cross the Brydes Whale area. If the program does cross a Brydes Whale area and there are regulations such as BOEM NTL No. 2023-G01, or any other, Chevron will abide by them. See 4-VicinityMap-BrydesWhaleStatement.pdf for a map.

S. Baker
Chevron
Geophysics
June 25, 2025



Statements

5-Active Seismic Sources Days

6-Speed of Source Towing

7-Max/Min Water Depths

Chevron U.S.A., Inc
St Malo OBN 2026

Active Seismic Source Days

The St Malo OBN 2026 program anticipates the seismic source to be active 60-days. In the case of no down time for technical, weather or any other reason the ideal case would be as follows:

# of Days per Month					
jan	31	may		sep	
feb	28	jun		oct	
mar	1	jul		nov	
apr		aug		dec	

Having said this, we will have time waiting on deploying nodes in the beginning, technical and weather down time, and retrieving nodes at the end of the program. So, the operational active seismic source window is set between January 1, 2026 and April 19, 2026, the 60-days of active seismic source will land within this period. This is also stated in our LoA request.

Speed of Source

Target speed of towing the active seismic source is 4.6 knots over ground.

Water Depths

The water depths are approximately 6630 ft minimum and 9510 ft maximum.

S. Baker
Chevron
Geophysics
June 25, 2025



8-Verification the Threatened or Endangered Species, Critical Habitat, and marine mammal information reflects the requirements in the 2020 Biological Opinion (and others) Statement

Chevron U.S.A., Inc

St Malo OBN 2026

This statement describe proposed survey activities (i.e., vessel use, benthic impacts, acoustic sources, etc.) and describe the environmental effects of the proposed activity, including potential adverse effects on marine life. Describe what steps are planned to minimize these adverse effects (mitigation measures). For example: 1) Potential Effect: Excessive sound level Mitigation; Soft Start, Protected Species Observers (PSO's), mammal exclusion zone or 2) Potential Effect: Bottom disturbance; Mitigation: ROV deployment/retrieval of bottom nodes) (use continuation sheets as necessary or provide a separate attachment. Label as BOEM-0327 Section A General Information.):

CHEVRON RESPONSE:

The proposed survey activity will acquire 3D OBN seismic data using air gun sources within Walker Ridge Area: Walker Ridge Blocks: 234-237, 277-284, 320-331, 363-378 , 406-426, 449-473, 492-518, 535-561, 578-604, 621-647, 664-690, 707-733, 750-776, 794-819, 838-862, 883-905 928-948, 973-991 and Amery Terrace Blocks: 6-23, 51-66, 96-109, 141-152, 186-195, 231-238, 276-281. The source points will be acquired using 1 source vessel, each with 2 source arrays. A total of ~2,000 OBN units (seismic receivers) will be deployed on the ocean floor. All OBN units will be carefully deployed and retrieved by ROV aboard a single OBN handling vessel. To mitigate potential environmental effects, including potential adverse effects on marine life, Chevron will comply with:

- Any permit conditions of approval,
- 2020 NMFS Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico and the following appendices:
 - Appendix A: Seismic Survey Mitigation and Protected Species Observer Protocols

- Appendix B: Gulf of Mexico Marine Trash and Debris Awareness and Elimination Survey Protocols
 - Appendix C: Gulf of Mexico Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols
 - Appendix J: Sea Turtle Handling and Resuscitation Guidelines
- 2021 NMFS Incidental Take Regulations (ITR [86 FR 5322]) and the general, mitigation, monitoring, and reporting requirements included in the Letter of Authorization.
- 2021 NMFS Incidental Take Regulations (ITR [86 FR 5322]) and the general, mitigation, monitoring, and reporting requirements included in the Letter of Authorization.
- Applicable NTLs, including but not limited to:
 - BOEM NTL 2016-G01: Vessel Strike Avoidance and Injured/Dead Protected Species Reporting
 - BOEM NTL 2016-G02: Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program
 - BSEE NTL 2015-G03: Marine Trash and Debris Awareness and Elimination
 - Joint NTL 2011-G01: Revisions to the List of OCS Lease Blocks Requiring Archaeological Resource Surveys and Reports
 - NTL 2009-G40: Deepwater Benthic Communities
 - NTL 2009-G39: Biologically-Sensitive Underwater Features
 - NTL 2008-G05: Shallow Hazards Program
 - NTL 2005-G07: Archaeological Resource Reports and Surveys

Details on potential effects and specific mitigations are below.

1. Potential Effect: Excessive sound level

Significant adverse effects on marine life from the sound sources are not anticipated to occur. Potential adverse effects related to the use of air gun sources will be mitigated by implementing NTL 2016-BOEM-G02, Biological Opinion Appendix A, and the Incidental Take Regulations.

All aspects of the NTL and Biological Opinion Appendix A will be implemented including these key topics, summarized:

- Ramp-up Procedures to warn marine mammals and sea turtles of impending seismic operations and to allow sufficient time for those animals to leave the immediate vicinity.

- Protected Species Visual Observers who have completed a protected species observer training program will be implemented on all source vessels in accordance with the NTL requirements.
- Reporting of the results of the mitigation measures as detailed in the NTL including daily Observer Effort Reports, Daily Survey Reports, Sighting Reports to be submitted on the 1st and 15th of every month.
- Passive Acoustic Monitoring for Protected Species.

In addition to mitigation measures required by BOEM NTL 2016-G02 and Biological Opinion Appendix A, the mitigation measures required for Deep Penetration Surveys in Subpart S, Sections 217.184 and 217.185 of the Incidental Take Regulations (ITR [86 FR 5322]) issued by the National Marine Fisheries Service to allow for the authorization, through LOAs, of take of marine mammals incidental to the conduct of geophysical surveys for oil and gas activities in Federal waters of the U.S. Gulf of Mexico will be implemented. The ITR mitigations are aligned with those in BOEM NTL 2016-G02 but include additional requirements for deep water, deep penetrating surveys including:

- Mitigation Requirements for PSO Dolphin Observations: The ITR requires seismic airgun survey shutdowns for large dolphins identified within the 500-meter exclusion zone for deep penetration surveys.
- Additional Mitigation Requirements for PSO Whale Observations: The ITR requires deep penetration seismic airgun survey shutdowns due to PSO sightings of baleen whales, sperm whales, beaked whales, and Kogia species outside of the 500-meter exclusion zone and within a 1,500-meter extended distance shutdown zone.
- PAM Implementation Requirements and Associated Mitigation for Whale Detections: The ITR implementation of PAM 24 hours/day for deep penetration airgun surveys in water depths greater than 100 meters. PAM detections of baleen whales, sperm whales, beaked whales, and Kogia species require shutdown of deep penetration seismic airgun surveys.
- PSO Equipment Requirements: The ITR requires deep penetration survey vessels to provide pedestal-mounted “bigeye” binoculars for PSOs.
- PSO Training and Experience Requirements: The ITR requires that all PSOs: a) must have appropriate training and must be third-party (i.e., not crew members); b) at least one visual PSO must have a minimum 90 days relevant experience, completed not less than 18 months prior; and c) at least two acoustic PSOs must have a minimum 90 days relevant experience, completed not less than 18 months prior.
- Reporting Requirements: The Final Rule specifies that all surveys must submit reports within 90 days of the conclusion of the survey concerning the activity

conducted, observations of marine mammals, and details of mitigation implementation, as applicable.

2. Potential Effect: Bottom Disturbance

The proposed activity includes the placement of ocean bottom nodes on the sea floor. Bottom disturbance resulting from node placement will be temporary and limited to the physical footprint of the node. To reduce the potential effects to the sea floor the following measures will be implemented:

- Nodes will be deployed to predetermined locations and retrieved using ROVs launched from a dedicated vessel
- ROVs will be fitted with cameras to aid in the placement of the nodes
- Location of all nodes will be recorded for recovery at the end of the survey activity

3. Potential Effect: Vessel Strike

To reduce potential effects to protected species resulting from vessel strikes, mitigation measures described in BOEM NTL 2016-G01 and the 2020 Biological Opinion, Appendix C will be implemented. These include:

- Vessel operators and crews will maintain vigilant watch for all marine protected species
- Vessel speeds will be reduced to 10 knots or less when mother/calf pairs or large assemblages (greater than three individuals) are observed near the vessel
- Vessels will maintain a 100-m minimum separation distance sperm whales and 500 m from any baleen whale
- Vessels will maintain a 50-m minimum separation distance from other aquatic protected species

4. Potential Effect: Entanglement or Entrapment of Protected Species

Entrapment in Moon Pool

A vessel containing a moon pool may be utilized to deploy the ROV for ocean bottom node placement and retrieval. To reduce the likelihood of entrapment of a protected species in the moon pool, the following mitigation measures will be implemented:

- When no activity is occurring within the moon pool, attempt to keep hull doors (if present) closed unless the safety of crew or vessel require otherwise.
- Moon pool will be regularly monitored when open to water column and vessel is not underway.
- Moon pool will additionally be monitored prior to closure of hull door, movement of vessel, and during ROV deployment.

Entanglement in Slack Lines (e.g. flexible lines or rope)

If operations require the use of flexible, small diameter (< 2 inch) lines to support operations (with or without divers), the slack in the lines will be reduced to the extent practicable to prevent accidental entanglement of protected species.

- Tensioning tools and/or other appropriate procedures will be used to reduce unnecessary looseness in the lines and/or potential looping.
- The lines must remain taut, as long as additional safety risks are not created by this action.

5. Potential Effect: Transit across Bryde's whale area

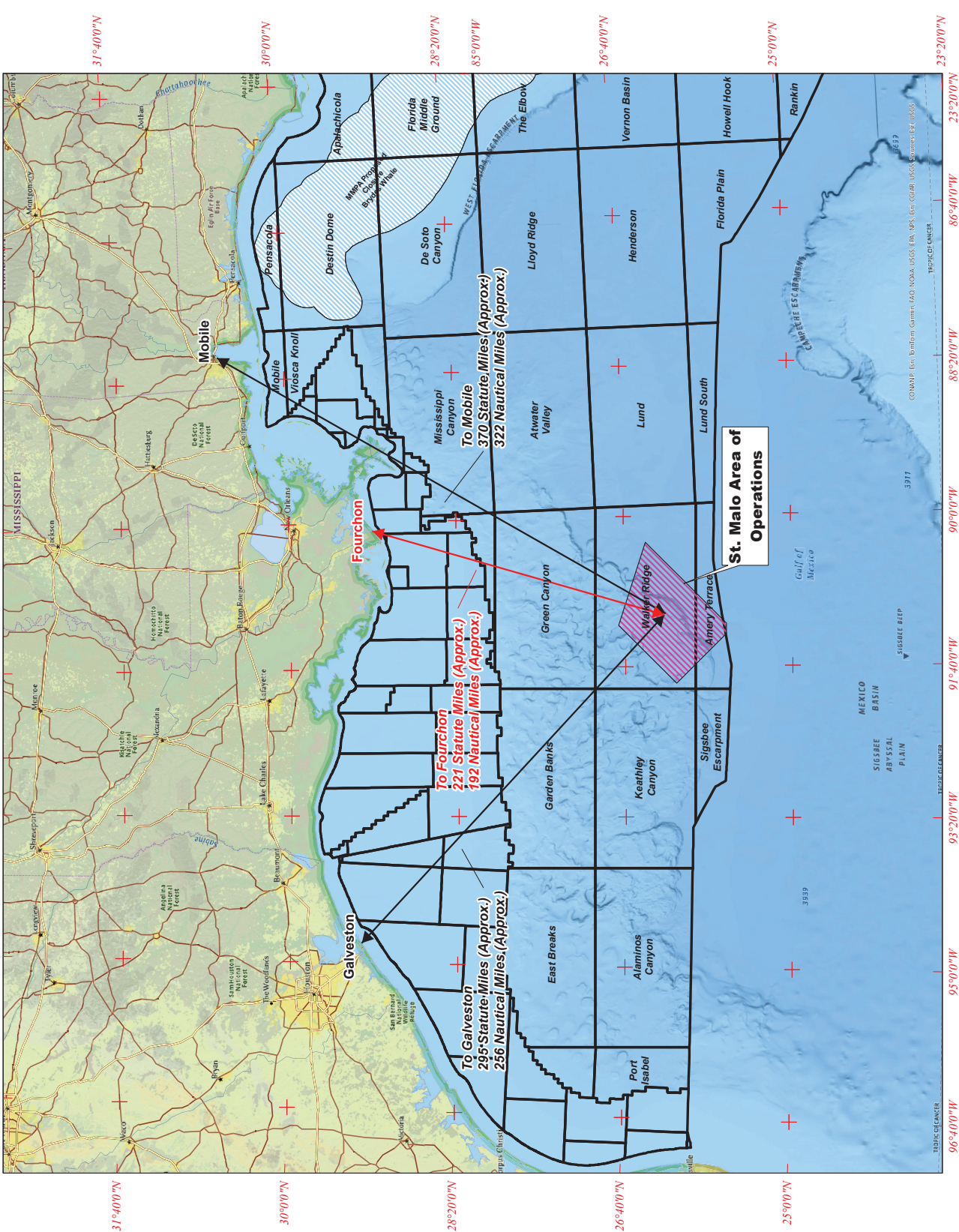
If vessel transit is planned across the Bryde's whale area while conducting the proposed seismic acquisition survey. BOEM/BSEE will be contacted to ensure the latest NTL is followed.

6. Potential Effect: Marine Trash and Debris effects to protected species

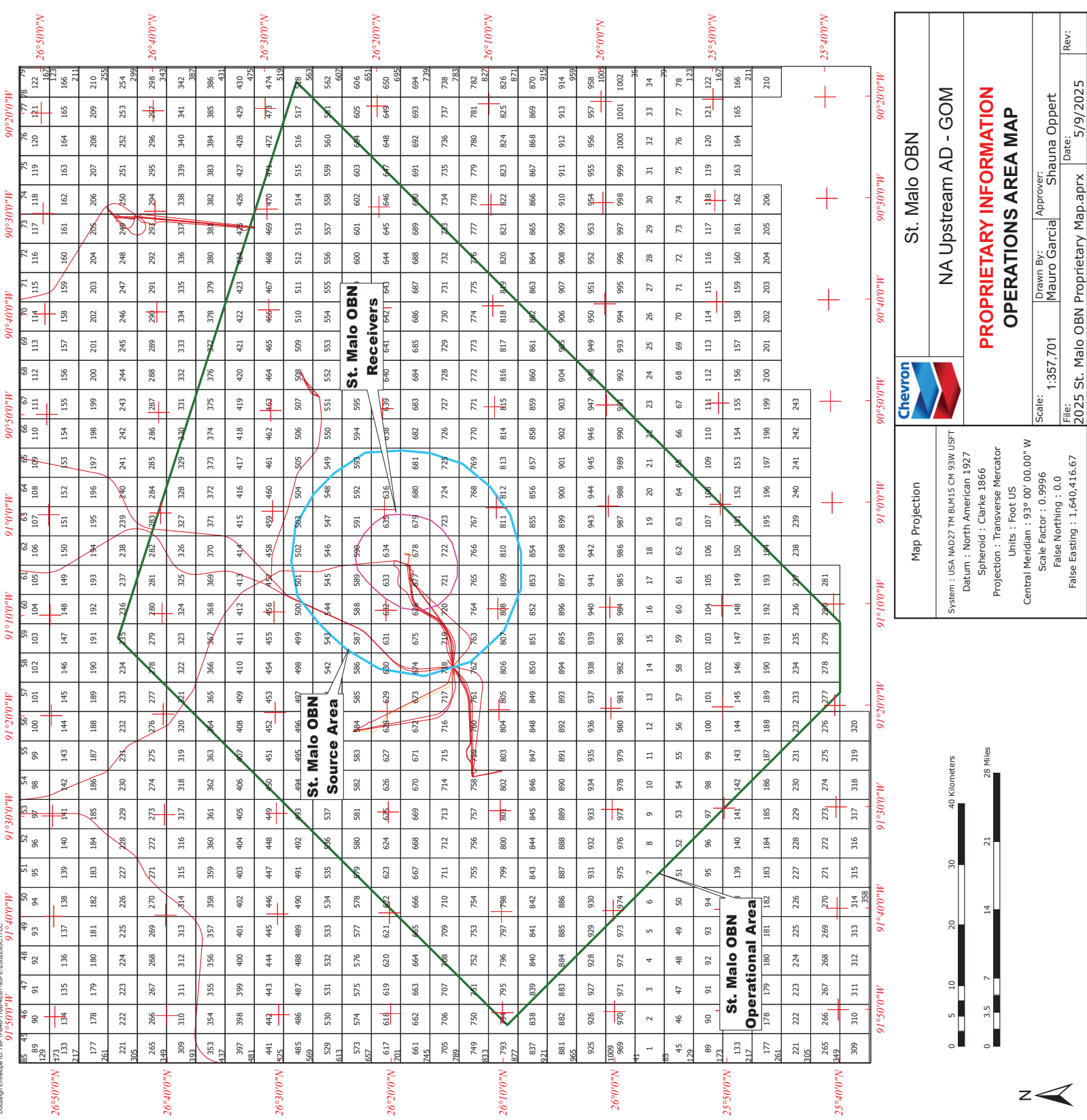
To mitigate any potential effects resulting from marine trash and debris, the protocols described in Appendix B of the 2020 Biological Opinion and in BSEE NTL 2015-G03 will be implemented. These protocols include:

- Posting marine trash and debris placards on survey vessels
- Providing crew members with marine trash and debris awareness training.

S. Baker
Chevron
Geophysics



Map Projection		St. Malo OBN	
System : USA NAD27 TM BLM15 CM 93W USFT Datum : North American 1927 Spheroid : Clarke 1866 Projection : Transverse Mercator Units : Foot US Central Meridian : 93° 00' 00.00" W Scale Factor : 0.9996 False Northing : 0.0 False Easting : 1,640,416.67		NA Upstream AD - GOM	
PUBLIC INFORMATION VICINITY MAP		Shaun Roberts	
Scale:	1:2,641,793	Drawn By:	Shaun Roberts
File:	2025 St. Malo OBN Public Map.aprx	Approver:	Shaun Roberts
Rev:	5/23/2025	Date:	5/23/2025



MASS III



Typical Node Specifications

Seismic Data Channels:

4

ADC Resolution:

32 bits (31 + sign)

Sample Interval:

0.5, 1.0, 2.0, 4.0 ms

Preamplifier Gain steps

1, 2, 4, 8, 16, 32, 64
(0 dB to 36 dB in 6 dB steps)

Anti-Alias Filter

Digital Decimation Filter
206.5 Hz @ 2 ms, (82.6% of Nyquist)
(360 dB/octave)
SINC/FIR Linear Phase

Low Cut Filter

Geophone: Out
Hydrophone: 2 Hz (6 dB/octave)

Internal memory

128 - 256 GB

Operating Temperature Range

- 10°C to + 60°C

Operating Life

150 days

Acquisition Channel

@ 2 ms sample interval, 25°C,
14 Hz, internal test

Total Harmonic Distortion

< - 111 dB @ 0 dB Gain

Equivalent Input RMS Noise

Geophone:
 $\pm 0.0507 \mu\text{m/s}$ @ 0 dB Gain
Hydrophone:
 $\pm 0.9759 \mu\text{Bar}$ @ 0 dB Gain

Maximum Peak Input Signal

Geophone:
 $\pm 1.6066 * 10^5 \mu\text{m/s}$ @ 0 dB Gain
Hydrophone:
 $\pm 3.0898 * 10^6 \mu\text{Bar}$ @ 0 dB Gain

Dynamic Range

127 dB @ 0 dB Gain

Gain Accuracy

0.50 %

Timing Accuracy

$\pm 1\text{ms}$ - corrected post-acquisition

Self Test Features

Offset and noise test
Geophone connection test
Hydrophone connection test
Total Harmonic Distortion test
Internal clock check
Upload data integrity (CRC)

Sensors

Geophone:
3 orthogonal, omnidirectional,
14 Hz 375 Ohm, 70% damped
15.56 V/m/s
Hydrophone:
2 Hz - 30 kHz
- 201 dB re: 1V/ μPa (8.9 V/Bar)

Orientation - Tilt

Inclinometer $\pm 1.5^\circ$

Orientation - Azimuth

Magnetic Field Logger
 $\pm 5^\circ$ (at latitudes within $\pm 50^\circ$
of the Equator)

Node Physical

Weight:

7.6 kg with casing, in air
5.67 kg with casing, in water

Dimensions:

Length 26.26 cm
Width 18.4 cm
Height 9.2 cm

Operating Depth: 3000 m

Fulmar Explorer



Vessel Specifications

Owner	SeaBird Explorations Vessels Limited
Flag	Cyprus
Port of Registry	Limassol
Built / Rebuilt	2009
Class	BV
Class Notation	+1A1 Clean COMF(V3) DK(+) DYNPOS(AUTR) E0 HELD
IMO Number	9418860
Ship Type	MT 6007 (Seismic Research Vessel)
Call Sign	5BKQ5
Overall Length	80.35 m
Breadth / Beam	16.4 / 19.2 / 21.2 m
Max Draft	6.20 m
Depth to main deck	7.45 m
Gross Tonnage	5061
Net Tonnage	1519

Deadweight	3000 t
Max Speed / Consumption	15 Knots / 32-34 m ³ /24hrs
Cruising Speed / Consumption	10 Knots / 12-15 m ³ /24hrs
Fuel Capacity	1230 m ³ MGO
Fresh Water	603 m ³
Fresh Water Production	15m ³ / 24hrs
Roll Reduction Tanks	83 m ³ at boat deck level
Water Ballast	1625 m ³
Helideck	D 21m / 12.8 t

Power specifications

Engines	4 x 1900 kW Caterpillar
Harbour Generator	1 x 410 kW Caterpillar
Configuration	Diesel Electric
Propellers	2 x 2600kW Steerprop Azimuth Thrusters
Azimuth Thruster	1 x 880kW Brunvoll
Bow Thrusters	1 x 800kW Brunvoll
Electrical Distribution	220V, 415V & 690V @ 60Hz
Redundant Propulsion	Fully redundant propulsion - DP2

Communication Systems

Satcom	2 x Sealink Vsat C Band
MF/HF Radio	1 x Thrane & Thrane / CU5100
VHF	2 x Sailor RT5020 VHF DSC 3 x Sailor C4900
Inmarsat C	2 x Sailor 3606 (Thrane & Thrane)
Inmarsat F77	1 x Sailor Inmarsat fleet 77
EPIRB-AUTO	1 x Mcmurdo G5
EPIRB-TRON	1 x Tron 40S
Helicopter VHF	2 x Jotron TR810
Heli Beacon	1 x TS Radion Beacon TS1B 410 kHz
SART	2 x Jotron-Tron SART 9 GHz
GMDSS	3 x Jotron portable VFH / Tron TR20

Navigation Systems

Radars	1 x X-Band Raytheon Anschutz 1 x S-Band Raytheon Anschutz
Gyro Compass	3 x Anschutz STD 22
Autopilot	1 x Anschutz NP 2015
Speed Log	1 x Skipper SB-60-SA
Echo Sounder	1 x Skipper GDS102 1 x Simrad/ EA600 18 kHz & 200 kHz
ECDIS	2 x Raytheon Pathfinder ST MK 2
DPS	1 x Kongsberg Seatex / DPS 200 1 x Kongsberg Seatex / DPS 132
DGPS	1 x Kongsberg Seatex / DGPS 464
AIS	1 x SAAB R4
Navtex	1 x JRC NCR-333

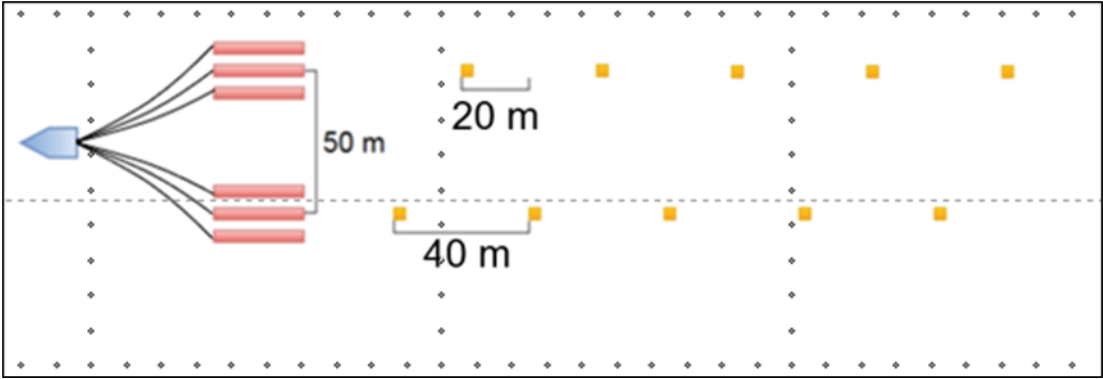
Arrangement

Cabin Types	3 State Cabins w seperate bedroom 23 Single Cabins 4 Double Cabins 10 1+1 man Cabins
Total	40 Cabins and 54 Berths
Conference and Training Room	1 Conference Room
Sauna and Fitness Room	2 Day Rooms and 1 Gym
Client Office	2

Seismic Source

Compressors	4 x NEA 57
Air capacity	4 x 2200 cfm @ 2200 psi
Source arrays	9 sub-arrays / gunstrings
Airguns	Bolt 1500 LL & 1900 LLX-T
Nearfield Hydrophones	GL 4k Hydrophone calibrated
RGPS	SeaMap / Buoylink 4DX
Gun controller	SeaMap GunLink 2500
Navigation	Gator II. Ver 1.9

Configuration



End Fulmar Explorer

Sanco Sword



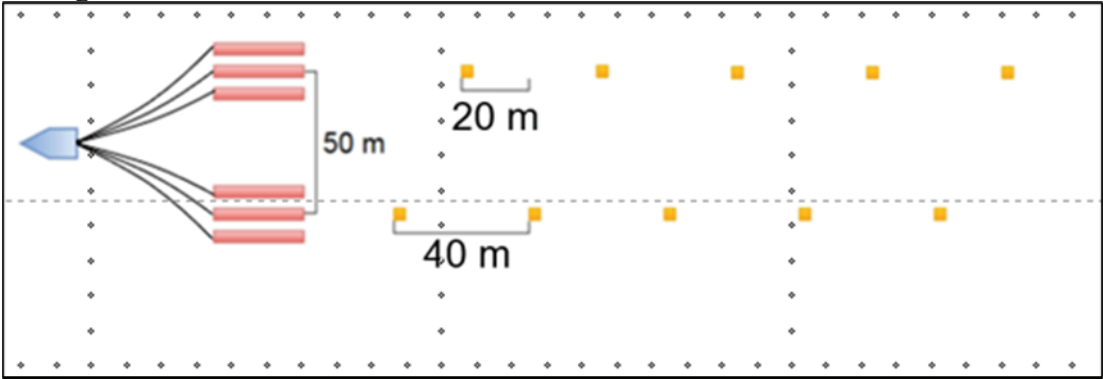
General

SHIP DESIGN		ST 324, Seismic survey vessel with 3-D / 2-D & Source capability	
CLASSIFICATION		BV	
BUILDER		Kleven Myklebust Verft AS, Norway , build no. 358,	
BUILT		Year 2014	
PORT OF REGISTRY		Gibraltar	
FLAG		Gibraltar	
IMO NUMBER		9662100	
CALL SIGN		ZDNE 7	
OWNER:	Sanco Holding AS Moljevegen 32, N-6083 Gjerdsvika, NORWAY	Technical & Seismic Manager:	Sanco Shipping AS Moljevegen 32, N-6083 Gjerdsvika, NORWAY
MAIN DIMENSIONS		CLASS NOTATIONS	
Length O.A	96,15 m	BV: I +HULL, ICE CLASS 1B, AUT-UMS, SDS, COMF-VIB(3)-NOICE(3), AVM-DPS, CLEANSHIP Super, SYSNEQ-1, MON-SHAFT, SPS, HELDK-SH. Unrestricted navigation BV ID Number: 34702 W	
Length P.P	84,60 m		
Breadth	23.0 m		
Draft, loaded	7,00 m		
Gross Tonnage	8772		

Details

MACHINERY AND PROPELLER PLANTS	
Main propulsion:	2 x Scana Volda, 2 x 5500 kW, Nozzle
Main engines:	4 x 4000 kW, MAN 32/40 Diesel, 600 rpm
Main gear:	2 x Scana Volda, twin in, single out
Generators:	4 x 2600 kW each
Propeller:	2 x 4 bladed Scana, Ø=3900, 139 rpm
Emergency Aux.	1 x 900 kW + 1 x 300 kW
Bow thruster:	1 x Brunvoll Retract./Tunnel, 1000 kW
Stern thruster:	1 x Brunvoll, tunnel, 800 kW
Starting/Working air Comp:	2 x Sperre . + 1 Atlas Copco
ELECTRIC POWER	
690 V, 440 V, 230 V all 60Hz	
DECK MACHINERY	
Deck Crane:	2 x 16T / 13,5M -5T / 22M
Provision crane:	1 x 1,5T / 13M
Hydraulic power pack:	2 x 280 bar
Seismic Cable winches:	12 x 12000 m each, + 4 spare winches
Seismic Gun winches:	8 x 1000 m each,
Tow points:	16 pcs.
Auxiliary winches:	18 pcs on gun & streamer deck
NAVIGATION EQUIPMENT	
Auto Pilot:	Anschutz Nautopilot 2025
GPS:	2 x Furuno GP-150
Radar 1:	1 x 3 cm Furuno FCR 2117, Arpa
Radar 2:	1 x 10 cm Furuno FCR 2137 S, Arpa
Electronic Chart navigation:	2 x Furuno TECDIS AW, type Telco
Gyro 1 & 2:	2 x Sperry Navigat Mk1
GPS compass:	Furuno SC-50
Survey gyro compass:	1 x TSS Meridian surveyor
AIS:	Furuno FA-150 AIS
C-Joy with track steering:	Kongsberg tracksteering with dedicated software
Echo sounder bridge:	Furuno FE 700
Echo sounder, dual frequency:	Simrad EA- 600 with 12, 38 & 200 kHz
Voyage Data Recorder:	Furuno VR-3000 6G
Water speed Log:	Nortek VMCP
Acoustic Current Profiler:	Nortek VMCP
SEISMIC	
On-line Nav. system:	ION Gator II / ORCA possible
Primary Navigation:	Fugro Starfix XP2/G4
GPS receiver:	Fugro StarPack
Gun array tracking:	Fugro StarTrack RGNSS, 2 per subarray
Acoustic / Transducer:	1 x 350 mm bottom valve installed
Nav Post Processing	FGPS SeisPos
ENERGY SOURCE	
Type, Bolt:	1900 LLXT & 1500 LL
Number of Sub. Arrays:	6 pcs sub. arrays in use, (8 arrays possible) 6 position each array (max 7 positions) and 2.5 meter between guns
Configuration:	Single / Dual / Triple source
Tow width:	Tripple source, (2 arrays pr source) 200 m max COS
Firing control:	Gunlink 4000
QC:	Gunlink
NFH:	2 NFH on each gunplate
PT:	1 PT on each gunplate
DT:	1 DT on each gunplate
Air Manifold:	Evotec high flow Air Manifold with non return valves. Installed in 2021
Deflectors:	Baro C 680-4000, Midi 140 %
Seismic compressors:	3 x Neuman & Esser, SAPS 62
Compressor capacity:	3 x 2200 cfm = 6600 cfm in total Working pressure 2000 Psi Freq. drives with auto RPM control
Tow system:	Partner plast Flex. 18' float system
SPEED AND FUEL CONSUMPTION	
Max. speed, approx.:	17 knots – 65 m3/day
Service speed, approx.:	12 knots – 30 m3/day
Economic speed, approx.:	10 knots – 23 m3/day
Seismic shooting, approx.:	4,5 knots – 20 m3/day
Bollard pull:	216 tons
Endurance shooting:	140 days
Endurance economic speed:	94 days
IN LINE BUNKERING CAPABILITY	
The vessel is arranged with in line bunkering over the bow	
CAPACITY	
Diesel oil, MGO:	2160 m3
Lube oil:	112 m3
Gun oil:	1,2 m3
Sewage:	16,5 m3
Grey water:	20,6 m3
Dirty oil / Sludge oil:	95,1 m3
Fresh water generator:	2 x Alfa Laval (2 x 20m3/day)
Sewage treatment plant:	Gertsen & Olufsen BR-011100 BVG
Ballast treatment plant:	MMC Green Technology 150 m3
Waste compactor:	Delitek, Type DT- 500 MC
Incinerator:	Team Tec GS 500 CS
Black water:	JETS FD/PC-V
Helideck, Sikorsky S-92, Daylight:	D-value 21,0 meter, 14,6 tones
LIFE SAVING EQUIPMENT	
Safety manning level:	10 persons
Rescue / FRC / MOB:	Wedo 700, water jet
Workboat:	Westplast 950 Seisworker
Inflatable life rafts:	6 x 35 persons Viking DK 35
Life Jackets:	64 pcs + 6 kids
Life buoy:	21 pcs
Survival suits:	64 pcs
Emergency radios:	3 x Sailor SP 3530
Radar transponders:	2 x Jotron Tron
Fire detection system:	Tynn Marine Services Minerva Marine T2000CV
Fire pumps:	3 x Allweiler 1 x 247,4 m3/h + 1 x 125m3/h + 1 x 50 m3/h
Co2 system:	Heien Larssen
Lifesaving capacity max.:	60 persons
COMMUNICATION	
Fixed satellite line, Iridium:	
Marlink VSAT KU band:	
Inmarsat C:	Sailor 6100
M/F & H/F:	2 x SSB, Sailor 6300, 150W
VHF Stationary:	3 x Sailor
Handheld VHF radios:	3 x Sailor SP 3530
UHF stationary:	5 x Motorola GM 360
UHF portable:	8 x Motorola GP 380
Internal communication:	Alcatel - Lucent
Satellite – Inmarsat Type C:	2 x Sailor TT 6300
Nav. Tex.:	Furuno NX-700
Satellite com. Equipment:	Sailor 500 bridge.sword@sanco.no captain.sword@sanco.no
Vessel E-mail:	
ACCOMMODATION	
Instrument room:	1 x sep. aircon. with 100% redundancy
Gun Shack:	1 pcs with air-condition
Work Shop:	2 pcs with air-condition
Seismic store:	3 pcs
Mess room:	Seating for 42 persons
Day rooms:	3 x dayrooms 1 conference room, 1 internet café
Gymnasium:	One, + Solarium and Sauna
Air condition:	Teknotherm Marine AS / Aeron
Cabins:	46 x 1 bed with bathroom 7 x 2 bed with bathroom Hospital with bathroom
Swimming pool:	Outdoor, heated

Configuration



End Sanco Sword

Olympic Artemis



General	
Name	Olympic Artemis
Design	MT 6021
Built	Kleven Yard Norway
Year delivered	2015
IMO registration	9726217
Call sign	LAFV8
MMSI number	257040610
Bureau Veritas id. number	41380F
Inmarsat C number	No 1: 14134216 / No 2: 14134283
Flag state	Norway, NIS

Port of registration	Fosnavaag
Classifications	ffi HULL ffi MACH Offshore support vessel (Supply ; Lifting -heavycargo) SP60 Unrestricted navigation ffi AUT-UMS , ffi SYS-NEQ-1 , CLEANSHIP SUPER , ffi ALM , ffi DYNAPOS AM/AT R , SDS, COMF VIB 3
Owner	Olympic Artemis AS
Manager	Olympic Shipping AS Holmsildgata 12, Fosnavåg Brygge 2 etg, 6090 Fosnavåg, Norway Phone: +47 70 08 12 24 (Chartering / Operations) Emergency phone (for vessel/captain use only): +47 70 08 16 66 Emergency phone (for clients/customers use): +47 70 08 12 00
Manager's contact person	Tord Vågsholm – Operations manager Tord.vagsholm@olympic.no cc: chartering@olympic.no

Engines and propulsion

Total propulsion output	6030 kW / 9648 HP
Main engines / generators	2 x Caterpillar 3516C – 2250 kW – 1800 rpm 2 x Caterpillar 3512C – 1785 kW – 1800 rpm 1 x Caterpillar C32 – 994 kW – 1800 rpm (harbor generator) Total: 9064 kW / 12155 HP
Emergency generator	1 x Volvo Penta D13 – 375 kVA – 1800 rpm
Bow tunnel thrusters	1 x 680 kW + 1 x 790 kW Rolls Royce TT1850 FP
Bow retractable thruster	1 x 880 kW Rolls Royce UL1201 FP
Stern tunnel thruster	1 x 680 kW Rolls Royce TT2000 FP
Main azimuth thrusters	2 x 1500 kW Rolls Royce US205P20 CRP

Main technical data

Length overall	87.75 m
Length betw. Perpendiculars	81.1 m
Breadth	19.0 m
Depth to main deck	8.0 m
Draught	Max draught: 6.35 m
Displacement	6921 t at max draught
DP Class	DP Class 2, BV Dynpos-Autr
ERN DP2	99,99,99,99
Gross tonnage	4744 t
Net tonnage	
Lightship weight	3784.6 t
Main deck area	820 m ²
Deck strength	Main deck from stern to #73: 10 t/m ²
Deck cargo capacity	2000 t
Fuel capacity	1180 m ³
Fuel consumption	• 10.5 t/day @ 10.0 kn (one engine) • 14 t/day @ 11.0 kn • 17 t/day @ 12.0 kn • 20.5 t/day @ Full speed • DP average conditions: 5-7 t/day • Harbor: 2.5 t/day
Max speed	13.4 kn
Fresh water capacity	760 m ³
Water ballast	2500 m ³
Main crane	Main winch: 60 t @ 14m with AHC and CT. 2000 m wire length. Aux winch: 10 t @ 23 m – no AHC/CT. 500 m wire length.
ROV handling	2 x Evotec 12 t LARS with AHC, from indoor hangars
ROV	2 x Millennium® Plus

Main subsea crane

Manufacturer/type	TTS GPOKa 1250-60-23
Design basis	DNV, Standard for certification No.2.22, Lifting Appliances, October 2011
SWL	60 t main winch 10 t aux winch 4 t tugger winches
Wire length main winch	2000 m
Wire length aux winch	500 m
Active heave compensation	Yes, on main winch only
Constant tension	Yes, on main and aux winch
Max operational wind speed	25 m/s
Max crane roll and pitch	Max 5° heel and 2° trim

Main technical data

Length overall	87.75 m
Length betw. Perpendiculars	81.1 m
Breadth	19.0 m
Depth to main deck	8.0 m
Draught	Max draught: 6.35 m
Displacement	6921 t at max draught
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ERN DP2	99,99,99,99
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Net tonnage	
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Constant tension	Yes, on main and aux winch
Max operational wind speed	25 m/s

Max crane roll and pitch	Max 5° heel and 2° trim
--------------------------	-------------------------

Main hook

Wire length	2000 m (11.05.2020) see updated in Unisea Tender
Wire diameter	56 mm
Wire weight	Dry weight: 14.3 kg/m Wet weight: 17.0 kg/m
Hoisting speed	SWL: 0-24 m/min Light load: 0-50 m/min
Maximum outreach	20.0 m
Minimum outreach	4.6 m
AHC Design performance	Yes
Constant tension	Yes
SWL	at 2000m water depth estimated to 40 t.

Auxiliary hook

Hook travel length	500 m (11.05.2020)
Wire diameter	25 mm
Hoisting speed	SWL: 50 m/min Light load: 100 m/min
Maximum outreach	23.0 m
Minimum outreach	5.0 m
AHC performance	No
Constant tension	

Tugger winches

2 x tugger winches	
SWL	4 t
Wire length	60 m (11.05.2020)
Constant tension	Yes, 0-4 t
Hoisting speed	0-60 m/min
Wire diameter	16 mm
Wire output angle	±30° adjustable from crane cabin

MAIN DECK AND DECK EQUIPMENT

Available area	820 m ²
Deck load capacity	2000 t
Deck strength	10 t/m ²
Removable bulwark sections	Starboard side: 15.6 m Port side: two sections: 9.4 m & 11.5 m Stern: 14.0 m
Bulwark height	1.5 m

VESSEL SYSTEM INFORMATION

DP System

Manufacturer	Kongsberg Maritime	
Model	Kongsberg K-POS	
ERN	99,99,99,99	
Class notation	DP Class 2, DNV DYNPOS - AUTR	
DP Sensors	4 x VRS	4 x Seatex MRU 5
	3 x Gyros	3 x Alphasat
	2 x Wind Sensors	2 x Gill wind observer 2
	3 x DGPS	1 x Seatex DPS 232
DP Reference systems		1 x Seatex DPS 132
		1 x Seapath 300
	1 x Tautwire	1 x Tautwire starboard side
	1 x Cyscan	1 x Cyscan

		2 x Cyscan reflectors
	2 x HiPAP	2 x HiPAP 501
	1 X RADIUS 1000	1 x transponder onboard

General navigation equipment

Radars	X-Band – 2 x SAM L3 S-Band – 1 x SAM L3
AIS	1 x FA-150 Furuno
Gyro	3 x Alphatron
Autopilot	1 x Track Pilot SAM L3
DGPS / GPS	Seatex DPS 232, Seatex DPS 132, GPS Furuno GP 150
VDR	Consilium F2
Echo sounder	1 x Furuno FE -700
Charts	ECDIS, (2x) ECDIS SAM L3
Navtex	Furuno NX-700A

Communication

GMDSS Equipment MF/HF	Sailor 6301
GMDSS VHF	Sailor - 2 x TT 6222 DSC - 3 x TT 6210 - 2 x TT 6204
GMDSS Marine satellite station	Inmarsat-C Sailor 6006 / Satellite phone "Fleet 77"
VSAT High Speed Communications	
VHF for marine crew	1 x Tron TR20
VHF	6 x Fixed
UHF	12 x Handhold Motorola DP4800
Helicopter communication VHF/AM	Jotron
Internal communication	Internal telephone Clearcom
Navtex/Weather Fax	Furuno NX-700B
COSPAS-SARSAT No 1&2 (Emergency satellite beacon)	Jotron Tron 60S & Tron 40S

IT & Phone Communication

VSAT High Speed Communications GMDSS Equipment MF/HF	Sealink maritime VSAT from Marlink
DUAL VSAT Antenna	2x1,5 m antennas
Phone lines Vessels/Client	30 digital PRI voice lines
Internal Ethernet	Yes
WiFi System	Bazeport, new HP Aruba WIFI from 06.23
Capability to split Bandwidth	Yes

UHF frequencies

UHF Channel	Frequency, MHz	PL, Hz
1	407.1625	79.7
2	407.2125	79.9
3	407.2625	79.9

Anti-Heeling system

The vessel is equipped with six anti-heeling tanks operated by reversible propeller pump.

Anti-Rolling System

The ship is equipped with one passive anti-rolling tanks.

Cargo facilities

	Capacity
Marine diesel oil	1180 m ³
Ballast water	2500 m ³
Fresh water capacity	760 m ³
Fresh water transfer rate	100 m ³ /h
Fresh water maker	30 t/24h
Heeling tanks	455 m ³

Lifesaving equipment

Olympic Artemis is equipped with lifesaving equipment for 68 persons, which is the maximum accommodation capacity onboard.

Safety equipment	Acc. To NMD/SOLAS
Life boat	2 x Noreq LBT650, capacity: 36 each
Life rafts	2 x. Capacity: 25 each
Rescue boat	1 x WEEDO 700, capacity: 10 persons
Survival suits	73 Pax
EEBD	12 pieces

Helicopter operation

Helideck diameter/D-value	20.88 m
Maximum takeoff weight	12.8 t
Certification	CAP 437, BSL D 5-1, HCA
Certifying agency	Helideck Certification Agency (HCA)
Class	Heldk
Helicopter	S-92
Helideck monitoring system	HMS Shore Connection

Accommodation

Cabin accommodation	71 persons (20 marine crew)
Cabins	11 single cabins 30 double cabins (3 cabin considered single for Client Rep, OM & APM)
Gymnasium	1
Hospital	1
Dayrooms	2 (Deck 4 for Client & Deck 7 for Marine Crew)
Sky-lobby	1
Mess-room	1 (30 seats)
Conference room	1
Online room	1
Offline room	1
Heli reception	1
Offices	2

WORK CLASS ROV SYSTEMS

WROV system

Olympic Artemis is equipped with two Millennium® Plus ROV, on port and starboard side of the vessel.

The WROV system is equipped and designed to meet all requirements for subsea construction and intervention services, in addition to full survey interface and capabilities.

They are currently configured to handle Seismic

Nodes. The ROV is launched over the side

through hangar doors, not moon pool.

Specifications

Vehicle Specifications		Vehicle Optional Power and Data Interfaces	
Weight in air	8,800 lb / 4,000 kg	Data links	Multiple RS232 and RS485 Ethernet Optical fiber
Dimensions (LxWxH)	10.8 x 5.5 x 6.3 ft / 3.3 x 1.7 x 1.9 m	Power	24 V DC and 110 V AC
Depth rating	10,000 ft / 3,000 m (standard) 13,000 ft / 4,000 m (optional)		
Vehicle Power and Performance		Tether Management System (TMS)	
Hydraulic power units	2 x 110 hp(E)	Type	Side entry cage or top-hat
Propulsion	4 x vectored horizontal 4 X vertical	Propulsion	2 x horizontal (cage only)
Thrust		Hydraulic power unit	1 x 110 hp(E)
Forward/reverse:	2,000 lb / 900 kg	Electro-optical tether	2,000 ft / 600 m (cage) 4,000 ft / 1,200 m (cage) optional 1,300 ft / 400 m (top-hat)
Lateral:	2,000 lb / 900 kg	Cameras	2 x charge-coupled device (CCD)
Vertical:	2,080 lb / 950 kg	Lighting	2 x 250 W (quartz halogen or high-intensity LED)
Vehicle Manipulators and Tooling		Launch and Recovery Systems (LARS) (choice of)	
Manipulators (2)	5 or 7 function: rate, SC, or hybrid control	Overboarding	
Hydraulic Tool Control	Multiple directional control valves with proportional pressure and flow control Maximum 40 gal/min	A-frame w/ or w/o docking head	
		Heavy-weather overboarding system	
Vehicle Cameras and Lighting		Cursor	
Cameras	Standard definition (SD) High definition (HD) 3D HD (optional)	Winch	
Lighting	Up to 8 x 250 W (quartz halogen or high-intensity LED)	Heavy lift winch with conventional or OHRA level wind	
Vehicle Control and Navigation			
Automatic control	Fly-by-wire station keeping system Auto heading/depth/altitude/pitch Cruise control		
Heading and altitude sensors	Survey-grade gyro Backup flux gate compass		
Depth sensor	High-resolution digiquartz Backup analog depth sensor		
Navigation sensor	Doppler velocity log		
Obstacle avoidance sonar	Kongsberg 1071 or 1171 Tritech SeaKing		

Launch & recovery system (LARS) for WROV

There are installed LARS on both sides of the vessel, located in hangar on main deck level.

System overall

Type	A-frame & separate winch
Manufacturer	Kongsberg
Drive system	Hydraulic
SWL	12 t
A-frame dynamic amplification factor, 4J	3.0
Winch type	Kongsberg
Max ROV weight	12 t (dry weight)
Speed	200 kN / 1.0 m/s first layer 119 kN / 1.0 m/s last layer
Max heave comp capability	Speed: 2.5 m/s Acceleration: 2.0 m/s ²
Regulations	Designed according to DNV Rules for Certification of Lifting Appliances

A-frame

Type	A-frame
A-frame SWL	12 t
Parking area ROV	Length: 6.8 m Width: 4.5 / 3.6 m
Dynamic factor	3.0 (if load not hanging straight down: 2.0)

A-frame and winch

Manufacturer	Kongsberg
Model	Umbilical winch
SWL	200 kN
Umbilical diameter	20-50mm
Manufacturer	Nexans
Cable outer diameter	36 mm
Weight in air	4.4 kg/m
Weight in seawater	3.4 kg/m
Minimum dynamic bending diameter	1.1 m
Armoring breaking strength	655 kN
Tension @ conductor yield	185 kN
Length port side	2400 m (21.04.2020)

Configuration

Configuration is for over the side ROV deployment of ocean bottom nodes. There is a moon pool but we are not planning to use it. All OBN units will be carefully deployed and retrieved by ROVs aboard an OBN handling vessel, mitigating any potential disturbance of the sea bottom. No equipment is dropped from the surface. The positions of the OBN units will be determined at the time of deployment/retrieval using a combination of inertial location on the ROV and USBL acoustic positioning to achieve high accuracy.

end Olympic Artemis

REM Saltire



Overview

MV "REM SALTIRE"

SHIP DESIGN

CLASSIFICATION

BUILDER

PORT OF REGISTRY

FLAG

MMSI

IMO NUMBER

DELIVERY

ST-327-L

DNV

Bergen Yards BMV AS

Limassol

Cyprus

209254000

9377016

2008

OWNER:

REGISTERED OWNER:

Rem Offshore AS

Rem Saltire AS

MANAGER:

Rem Maritime AS

N-6090 Fosnavåg

MAIN DIMENSIONS

LENGTH O.A

LENGTH P.P

BREADTH

MAX DRAFT

GROSS TONNAGE

NET TONNAGE

DEADWEIGHT

LIGHTWEIGHT

111m

100.3m

24m

7.5m

9603mt

2881mt

6687mt

5832.9mt

CLASS NOTATIONS

DNV A1 ICE-C SF COMF-V(3)C(3) HELDK-SH, E0

DYNPOS-AUTR CLEAN DK(+) TMON

ERN: 99,99,99,68

Specifications



OUTLINE SPECIFICATION

MACHINERY AND PROPELLER PLANTS

Main Engines:	4x Rolls Royce Bergen B32:40L9A
Emergency Generator:	1x 595kW Mitsubishi
Main Propulsion:	2x 4200kVA Marelli Diesel-Electric
Azimuth:	1x 1400kW Brunvoll
Bow tunnel thruster:	2x 2000kW Brunvoll
Stern thruster:	2x 1400kW Brunvoll

CARGO CAPACITIES*

Deck Cargo:	2260 mt
Deck Area:	1000 m ²
Deck Strength:	10 mt/ m ²
Fuel Oil:	2680.6 m ³
Fresh Water:	696 m ³
Ballast Water:	2318 m ³

ENVIRONMENT AND CARGO CONTROL PLANTS

Incinerator:	Kai Lindegard SH-20-SM/SR
Hot water Boiler:	Pyro AS
Equipment on deck:	Norwegian Deck Machinery AS

NAVIGATION

DP System:	Kongsberg K Pos DP 22
Joystick System:	Kongsberg Joystick
Motion System:	HPR, 2x seatex & 1x Client HIPAP Pole
Fanbeam:	1x MDL mk 4 fanbeam
Speed log:	1x Furuno DS-80
DGPS:	1x Seatex DPS i4, 1x Seatex DPS i4
Wind Gauge:	2x WindObserver II Ultrasonic
Radar 1:	1x Furuno FAR-2827
Radar 2:	1x Furuno FAR-2837S
Echo Sounder:	Furuno FE 700
Gyro:	3x Kongsberg MGC-R2
VDR:	Furuno VR-3000
GPS:	2x Furuno GP 150
ECDIS:	2x Tecdis T-2136
Autopilot:	1x Simrad Robertson AP9 Mk3

INDICATIVE SPEED & FUEL CONSUMPTION

Full (Service) speed:	14.0 knots, 25 m ³ /d
Economic speed:	12.0 knots, 19 m ³ /d
DP operation:	10-15 m ³ /d at position keeping
Port stay:	4 m ³ /d

CARGO HANDLING EQUIPMENT

1x kn. Boom crane SB Hydramarine	SWL 150 mt/ 10m
1x kn. Boom crane PS Hydramarine	SWL 10 mt/ 10m
Mooring Winch	2x 19.6 T
Windlass	2x 19.6 T
Capstan	3x Type C-8
Tugger Winch PS/ SB	2x 4 T
Cargo securing	12x Rollers

LIFE SAVING EQUIPMENT

Ship Certificate:	105 persons
Life Rafts:	6x 35 pax Viking Float-free
MOB boat:	Monohull waterjet 170kW
Lif jackets:	110x seamaster
Survival Suits:	109x Helly Hansen Nordic N6

COMMUNICATION

Navtex:	Furuno NX-700B
Radar Transponder:	2x Jotron Tron SART 20
DSC Terminal:	2x Furuno FM-8800S
AIS:	Furuno FA 150
EPIRB manual:	1x Jotron Tron-60S
EPIRB Free Float:	1x Jotron Tron-60GPS
Radio Station:	Furuno FS-2570C MF/HF
VHF(Emerg) Portable:	3x Jotron Tron TR 20 GMDSS
VHF Station:	2x Furuno FM-8800S
UHF Portable:	6x Motorola GP-340
UHF Portable:	4x Motorola DP-4400e
UHF Portable:	4x Motorola DP-4400ex
Inmarsat C:	2x Furuno Felcom-15
Iridium:	Iridium Pilot BUG1501
Sound System:	Phontech 8300 MkII
Emergency:	Vingtor VSP-213-L
PA System:	Vingtor VMP 603
Sat. Communication:	+ 42 09 25 41 5
Mobile Phone:	+ 47 23 67 62 47
Vessel E-Mail:	captain@saltire.remoffshore.no bridge@saltire.remoffshore.no

ACCOMMODATION

Single Cabins:	37 with bathrooms
Double Cabins:	34 with bathrooms
Hospital:	1 Highest standard
Office:	10 fully outfitted
Mess Room:	3 comfortably outfitted
Gymnasium:	1 fully outfitted
Auditorium:	1x auditorium/cinema – 54 seats
Conference room:	1

Configuration

Configuration is for over the side ROV deployment of ocean bottom nodes. There is a moon pool but we are not planning to use it. All OBN units will be carefully deployed and retrieved by ROVs aboard an OBN handling vessel, mitigating any potential disturbance of the sea bottom. No equipment is dropped from the surface. The positions of the OBN units will be determined at the time of deployment/retrieval using a combination of inertial location on the ROV and USBL acoustic positioning to achieve high accuracy.

end Rem Saltire

3. List each energy source to be used (e.g., airgun, airgun array(s), sparker, towed dipole, side scan sonar, sub bottom profiler, etc.).

- a. Indicate the source's manufacturer, model, Source Level (SL) in dB re 1µPa @1m in water (RMS) and if applicable, Source Level (SL) in dB re 1µPa @1m in water Peak to Peak) and ping rate. If the manufacturer does not provide a peak to peak level (many side scan sonars, etc.), please enter N/A. Additionally, provide the operational frequency ranges.**

Energy Source	Manufacturer	Model	Total Array Volume & Number of Elements (cubic inches or Liters.)	Source Level (SL) in dB re 1µPa@1m in water (RMS)	Source Level (SL) in dB re 1µPa@1m in water (Peak to Peak)	Operating Frequency (Hz, kHz, range)	Pulse Duration (seconds, milliseconds)	Pulse Rate (or Cycle) (Pulses per second or minute)	Towing Depth of the Source (ft or m)	Towing Depth of the Receiver(s) (ft or m)	Duration of Use (Number of Days or Percent of Active Sound Source Days)
*Air Gun array previously used by CVX	Bolt	1900 LLXT	5220 cu in 42 elements	241	267	6-70Hz	200 ms	10.8 pulses/sec for 4.5 knot Vessel speed	12 m	Not applicable to OBN	60 150 days of shooting
PIES	Sonardyne	PIES 8302	NA	80-120 dB	190-202 dB	14-20 kHz	NA	30 min	PIES are placed at water bottom	PIES are placed at water bottom	Duration of the survey up to 180 days

Table above: Detailed source and Pies information.

4. (12.) Attachment Requirements

Attach map(s), plat(s), and chart(s) (preferably at a scale of 1:250,000) and an electronic version of same showing latitude and longitude, scale, specific protraction areas, OCS boundary/3-mile limit, block numbers. The map, plat or chart should be submitted at a sufficient size and scale to make out all details of the activities shown. The map should be labeled "Proprietary." For 2D data acquisition provide specific track lines with line identifications with the total number of line miles proposed or a representative polygon and total number of blocks for 3D surveys. Along with the hardcopy map, submit on CD or flashdrive (subject to security screening), the necessary ArcGIS shape files to reproduce the map for 2D track lines including individual line names in the attribute table. For 3D surveys provide a representative polygon as an ArcGIS shape file. You must provide a shapefile data set of the latitude/longitude location for all track lines, shot lines, and node placements. This can be submitted at a later time but must be received before activities can take place.

For the above requirements please refer to:

In TIMS – Public Information Map Attachment 3.pdf

In TIMS – Proprietary Information Map Attachment 5.pdf

In TIMS – 3-ShapesOps-Src-Nodes Areas.zip (pending finalization)



Full array report with directivity

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Technical Overview

The following report was compiled using the Gundalf source array modelling program.

Gundalf has been calibrated for all modern airgun types including the latest environmental e300,e500 and BluePulse sources, long-life guns, G guns, and sleeve guns both singly and in clusters. It is also capable of modelling low-frequency sources such as TPS and Gemini as well as injector guns. Gundalf users can access calibration information directly within the product in a variety of environments. Gundalf calibration is revisited periodically whenever new data becomes available. The current calibration epoch is given in the header of this report. [For more information](#)

From 2022 it can optionally model a growing number of alternative types, including some sparkers, boomers and marine vibrators.

[Array Summary](#)

The following table optionally includes error bounds for the primary characteristics of the source signature where relevant: peak to peak, primary to bubble and bubble period. Error bounds for airguns are derived during calibration where possible, a time-consuming process involving optimally matching the model to many near- and far-field measurements of different quality, bandwidth and provenance, for both single and clustered airguns. Error bounds are not normally available for other source types modelled by Gundalf. For more on this, see the Modelling Notes at the end of this report and also the online help for calibration in Gundalf itself.

Note that it is important to state the conditions under which the RMS is computed since it depends directly on the length of the window used. Here an energy criterion determines the length when less than the full window must be used, specified as a percentage of the energy in the full window as is the case with drop-out computations. The energy window used is indicated in the table.

Note also that some of these parameters, most obviously the peak measurements will depend on the maximum model bandwidth, which is shown for reference. In addition some parameters for example those associated with bubbles are difficult to define for some source types

Where given, the error bounds shown in the table represent 95% confidence intervals for the Gundalf model against its calibration data.

Amplitude spectral scaling uses Parseval-compliant method throughout.

Number of guns	42 (5220.00 cu.in., 85.54 litres)
Peak to peak in bar-m.	132.1 (13.21 MPa, 262 dB re 1muPa. at 1m.)
Zero to peak in bar-m.	58.7 (5.87 MPa, 255 dB re 1muPa. at 1m.)
RMS pressure in bar-m. (full window)	9.56 (0.956 MPa, 240 dB re 1muPa. at 1m.)
Primary to bubble (peak to peak)	7.0
Bubble period (s.)	0.047
Maximum spectral ripple (dB)	39 (10 - 70 Hz.)
Maximum spectral value (dB)	221 (10 - 70 Hz.)
Average spectral value (dB)	214 (10 - 70 Hz.)
Total acoustic energy (Joules)	791589.8
Total acoustic efficiency (%)	67.0
Maximum model bandwidth (Hz)	0-1024

Array geometry

The following table lists all the guns modelled in the array along with their characteristics. Please note the following:-

- The peak to peak varies only as the cube root of the volume for the same gun type so that even small guns contribute significantly. This is particularly relevant to drop-out analysis.
- The peak to peak can also be depressed due to clustering effects as reported long ago by Stranden and Vaage (1992), "Signatures from clustered airguns", First Break, 10(8).
- The zero to peak is approximate and estimated from the peak to peak.
- A wave-shape kit value less than 1 indicates a wave-shape kit is implemented. This may impact the quality of calibration due to the paucity of relevant data.
- Last but not least, the peak to peak values may not be linear with volume for the same gun type. Recall that calibration data for airguns reveals that zero to peak values can vary by around 5% for the same gun for a number of reasons set out in the section on *Calibration notes* below. In essence this means that the zero to peak value is somewhere within a range and the calibration data and therefore Gundalf, can be no more precise than that. In practice, this has a minor effect on processing because the period is accurately defined by modelling.

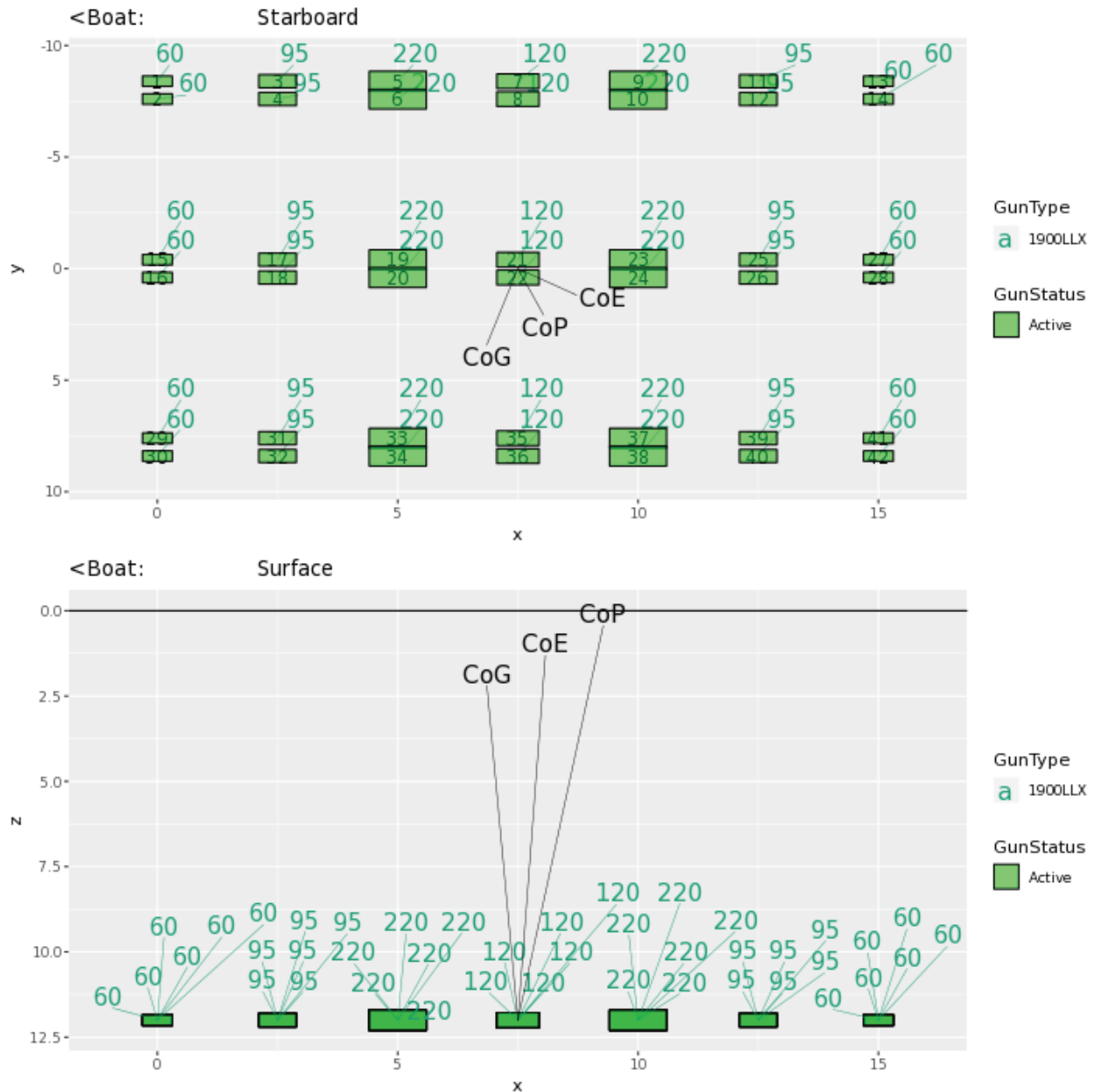
Gun number	Press. (psi)	Volume cu.in	Gun Type	x m.)	y m.)	z m.)	Delay s.)	Wave-Shape kit	Sub-array number	Peak to peak contrib. percent)	Zero to peak contrib. bar-m.)	Max. bub. rad m.)	Source Type
1	2000.00	60.00	1900L LX	0.000	-8.400	12.000	0.00000	1.00	1	2.3	1.3	0.3	Airgun
2	2000.00	60.00	1900L LX	0.000	-7.600	12.000	0.00000	1.00	1	2.2	1.3	0.3	Airgun
3	2000.00	95.00	1900L LX	2.500	-8.400	12.000	0.00000	1.00	1	2.3	1.3	0.3	Airgun
4	2000.00	95.00	1900L LX	2.500	-7.600	12.000	0.00000	1.00	1	2.3	1.3	0.3	Airgun
5	2000.00	220.00	1900L LX	5.000	-8.400	12.000	0.00000	1.00	1	2.8	1.6	0.4	Airgun
6	2000.00	220.00	1900L LX	5.000	-7.600	12.000	0.00000	1.00	1	2.7	1.6	0.4	Airgun
7	2000.00	120.00	1900L LX	7.500	-8.400	12.000	0.00000	1.00	1	2.4	1.4	0.3	Airgun
8	2000.00	120.00	1900L LX	7.500	-7.600	12.000	0.00000	1.00	1	2.4	1.4	0.3	Airgun
9	2000.00	220.00	1900L LX	10.000	-8.400	12.000	0.00000	1.00	1	2.8	1.6	0.4	Airgun
10	2000.00	220.00	1900L LX	10.000	-7.600	12.000	0.00000	1.00	1	2.7	1.6	0.4	Airgun
11	2000.00	95.00	1900L LX	12.500	-8.400	12.000	0.00000	1.00	1	2.3	1.3	0.3	Airgun
12	2000.00	95.00	1900L LX	12.500	-7.600	12.000	0.00000	1.00	1	2.3	1.3	0.3	Airgun
13	2000.00	60.00	1900L LX	15.000	-8.400	12.000	0.00000	1.00	1	2.3	1.3	0.3	Airgun
14	2000.00	60.00	1900L LX	15.000	-7.600	12.000		1.00	1	2.2	1.3	0.3	Airgun

Gun number	Press. (psi)	Volume (cu.in)	Gun Type	x (m.)	y (m.)	z (m.)	Delay (s.)	Wave-Shape kit	Sub-array number	Peak to peak contri. b. percent)	Zero to peak contri. b. bar-m.)	Max. bub. rad m.)	Source Type
	0		LX	0		0	0.0000						
15	2000.00	60.00	1900L LX	0.000	-0.400	12.000	0.0000	1.00	2	2.2	1.3	0.3	Airgun
16	2000.00	60.00	1900L LX	0.000	0.400	12.000	0.0000	1.00	2	2.2	1.3	0.3	Airgun
17	2000.00	95.00	1900L LX	2.500	-0.400	12.000	0.0000	1.00	2	2.2	1.3	0.3	Airgun
18	2000.00	95.00	1900L LX	2.500	0.400	12.000	0.0000	1.00	2	2.2	1.3	0.3	Airgun
19	2000.00	220.00	1900L LX	5.000	-0.400	12.000	0.0000	1.00	2	2.6	1.5	0.4	Airgun
20	2000.00	220.00	1900L LX	5.000	0.400	12.000	0.0000	1.00	2	2.6	1.5	0.4	Airgun
21	2000.00	120.00	1900L LX	7.500	-0.400	12.000	0.0000	1.00	2	2.2	1.3	0.3	Airgun
22	2000.00	120.00	1900L LX	7.500	0.400	12.000	0.0000	1.00	2	2.3	1.3	0.3	Airgun
23	2000.00	220.00	1900L LX	10.000	-0.400	12.000	0.0000	1.00	2	2.6	1.5	0.4	Airgun
24	2000.00	220.00	1900L LX	10.000	0.400	12.000	0.0000	1.00	2	2.6	1.5	0.4	Airgun
25	2000.00	95.00	1900L LX	12.500	-0.400	12.000	0.0000	1.00	2	2.2	1.3	0.3	Airgun
26	2000.00	95.00	1900L LX	12.500	0.400	12.000	0.0000	1.00	2	2.2	1.3	0.3	Airgun
27	2000.00	60.00	1900L LX	15.000	-0.400	12.000	0.0000	1.00	2	2.2	1.3	0.3	Airgun
28	2000.00	60.00	1900L LX	15.000	0.400	12.000	0.0000	1.00	2	2.2	1.3	0.3	Airgun
29	2000.00	60.00	1900L LX	0.000	7.600	12.000	0.0000	1.00	3	2.2	1.3	0.3	Airgun
30	2000.00	60.00	1900L LX	0.000	8.400	12.000	0.0000	1.00	3	2.3	1.3	0.3	Airgun
31	2000.00	95.00	1900L LX	2.500	7.600	12.000	0.0000	1.00	3	2.3	1.3	0.3	Airgun
32	2000.00	95.00	1900L LX	2.500	8.400	12.000	0.0000	1.00	3	2.3	1.3	0.3	Airgun
33	2000.00	220.00	1900L LX	5.000	7.600	12.000	0.0000	1.00	3	2.7	1.6	0.4	Airgun
34	2000.00	220.00	1900L LX	5.000	8.400	12.000	0.0000	1.00	3	2.8	1.6	0.4	Airgun
35	2000.00	120.00	1900L LX	7.500	7.600	12.000	0.0000	1.00	3	2.3	1.4	0.3	Airgun
36	2000.00	120.00	1900L LX	7.500	8.400	12.000	0.0000	1.00	3	2.4	1.4	0.3	Airgun
37	2000.00	220.00	1900L LX	10.000	7.600	12.000	0.0000	1.00	3	2.7	1.6	0.4	Airgun
38	2000.00	220.00	1900L LX	10.000	8.400	12.000		1.00	3	2.8	1.6	0.4	Airgun

Gun number	Press. (psi)	Volume (cu.in)	Gun Type	x (m.)	y (m.)	z (m.)	Delay (s.)	Wave-Shape kit	Sub-array number	Peak to peak contribution (percent)	Zero to peak contribution (bar-m.)	Max. bub. rad (m.)	Source Type
	0		LX	0		0	0.0000						
39	2000.00	95.00	1900L LX	12.500	7.600	12.000	0.0000	1.00	3	2.3	1.3	0.3	Airgun
40	2000.00	95.00	1900L LX	12.500	8.400	12.000	0.0000	1.00	3	2.3	1.3	0.3	Airgun
41	2000.00	60.00	1900L LX	15.000	7.600	12.000	0.0000	1.00	3	2.2	1.3	0.3	Airgun
42	2000.00	60.00	1900L LX	15.000	8.400	12.000	0.0000	1.00	3	2.3	1.3	0.3	Airgun

Array plan and side views

The plan and side views appear below. These are annotated for gun type (colour of floating text indicating volume in cuin. for airguns), gun active status (fill colour) and also gun number, matching the table above. The side view is a view from the port side towards the starboard side and shares the same x-axis as the plan view. This is annotated identically to the plan view.



Array centres

In the plan and side views of the array above, the array geometric centre (CoG), the centre of pressure (CoP) and the centre of energy (CoE) are shown. They are defined as follows:-

- The array geometric centre is defined to be the arithmetic mean of the x,y,z positions for each gun (non-active guns are ignored).
- The centre of pressure is defined to be the array centre when each active gun position is weighted by its contribution to the overall peak to peak pressure value.
- The centre of energy is computed by weighting the coordinates by the self-energy of the active gun at that position. In an interacting array this may be a long way from the centre of pressure as some guns may absorb energy giving a negative self-energy.

Depending on how first breaks are calculated, these can be used for first break analysis.

Spare guns are shown as blue rectangles whilst live guns are shown as green rectangles.

Note that Gundalf by default uses the deepest gun to define time zero for the vertical far-field and it uses the nearest gun to the observation point to define time zero if an observation point is specified. This means that if one gun is accidentally run deep, this will cause the bulk of the signature to appear to be delayed. It is still a matter of debate how an airgun array should be timed. There are several candidates as defined above but it is not currently clear which if any is appropriate in complex scenarios such as Ocean Bottom Deployment. Positions are shown as (x,y,z).

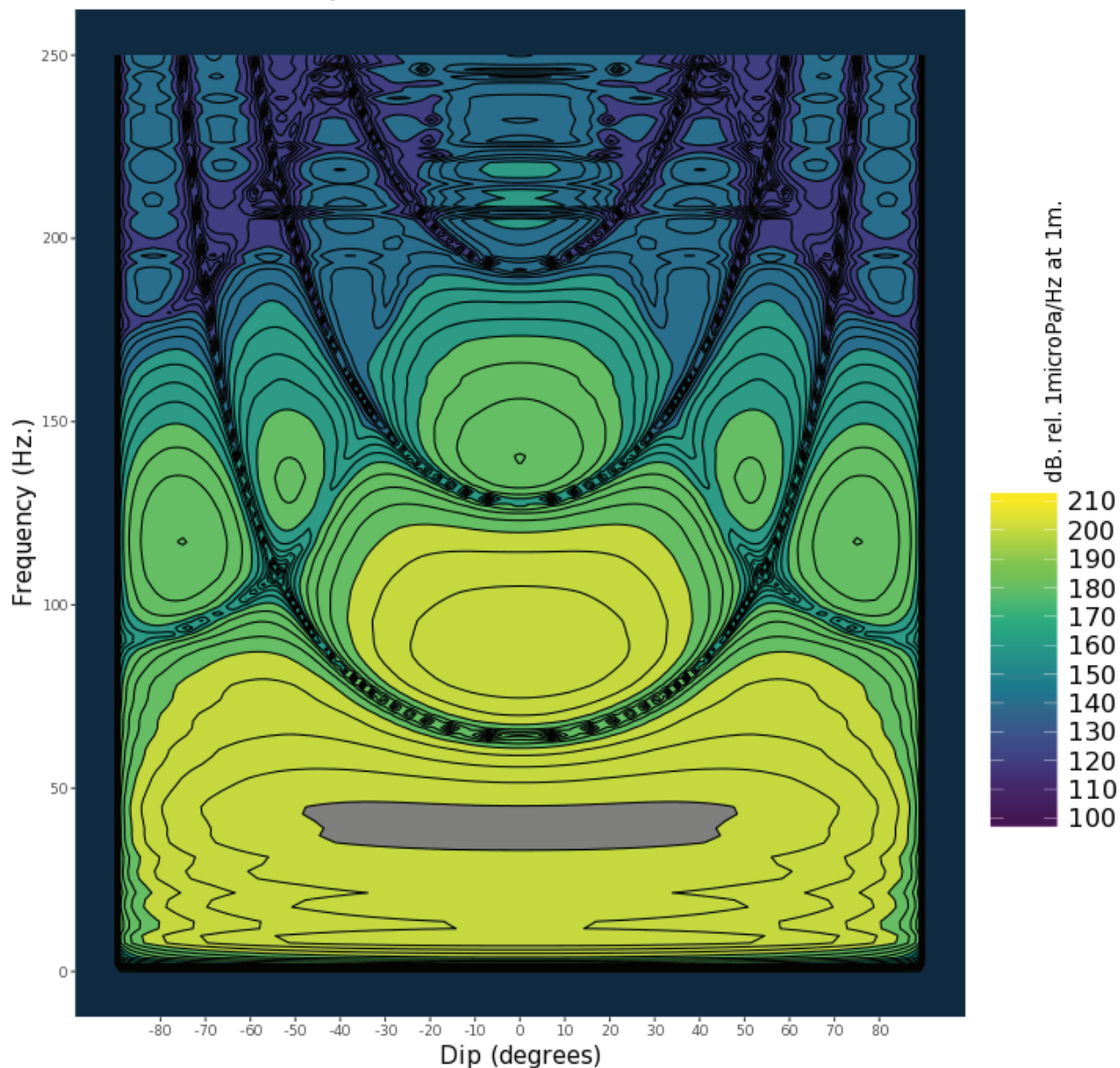
CoG coordinates (m.)	CoP coordinates (m.)	CoE coordinates (m.)
7.50, 0.00, 12.00)	7.50, 0.00, 12.00)	7.50, 0.00, 12.00)

Array directivity

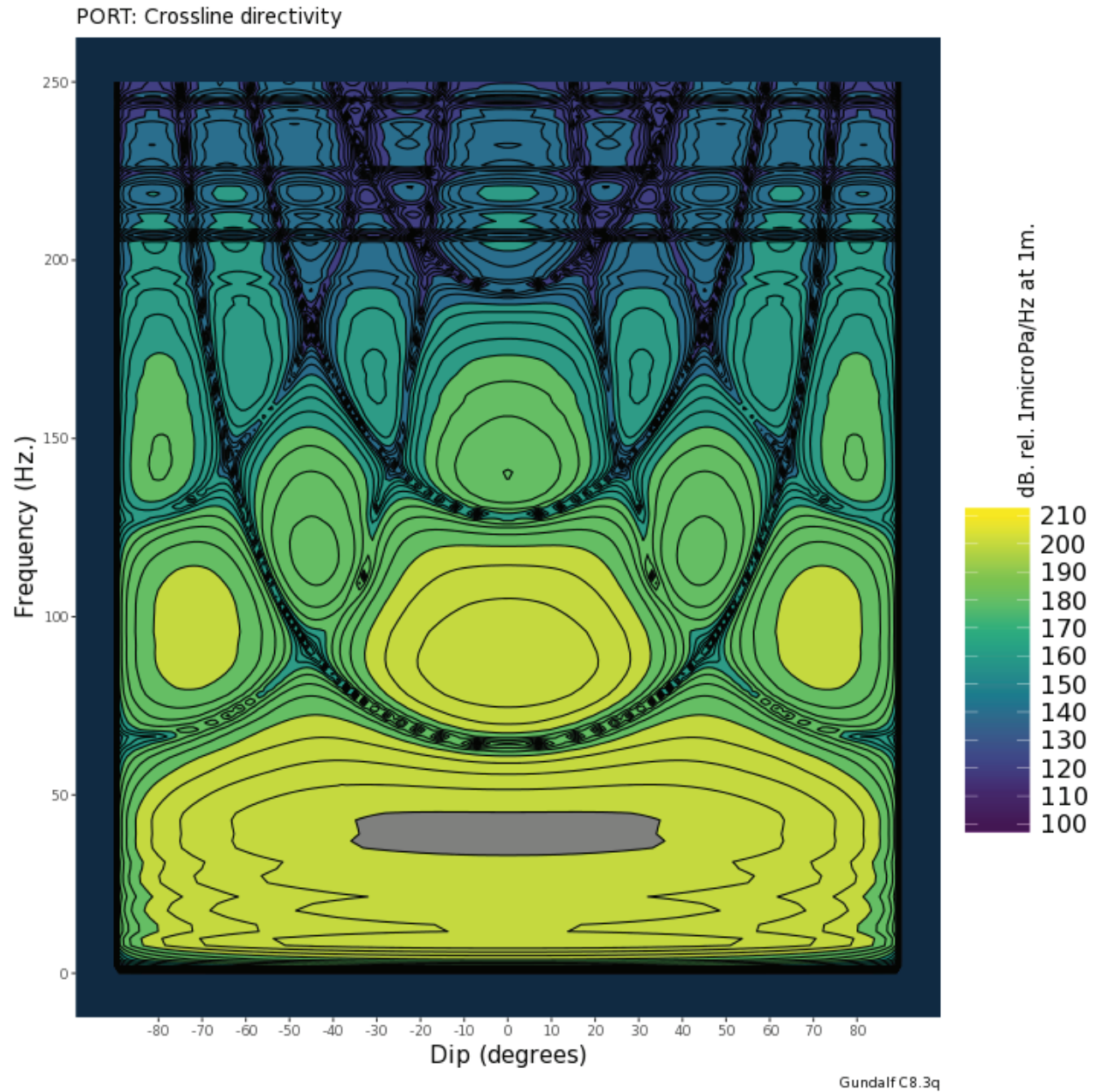
The following tables show the inline and crossline directivity of the array. These are scaled as db. relative to 1 microPa. per Hz. at 1m. The inline directivity is annotated to indicate the boat direction and the crossline directivity is annotated with 'Port' to show the correct crossline orientation.

Angle-frequency form

<- BOAT: Inline directivity



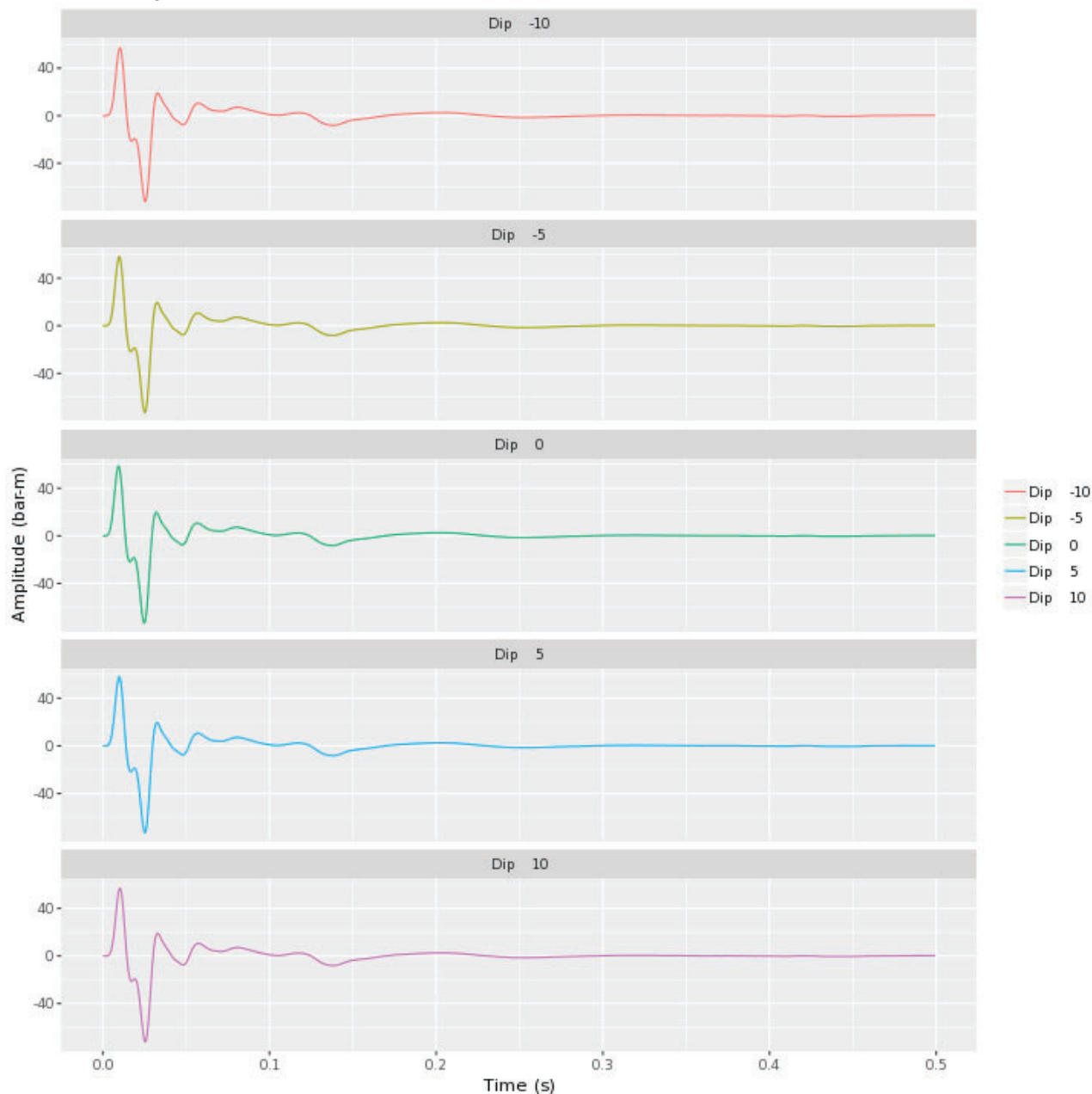
Gundalf C8.3q



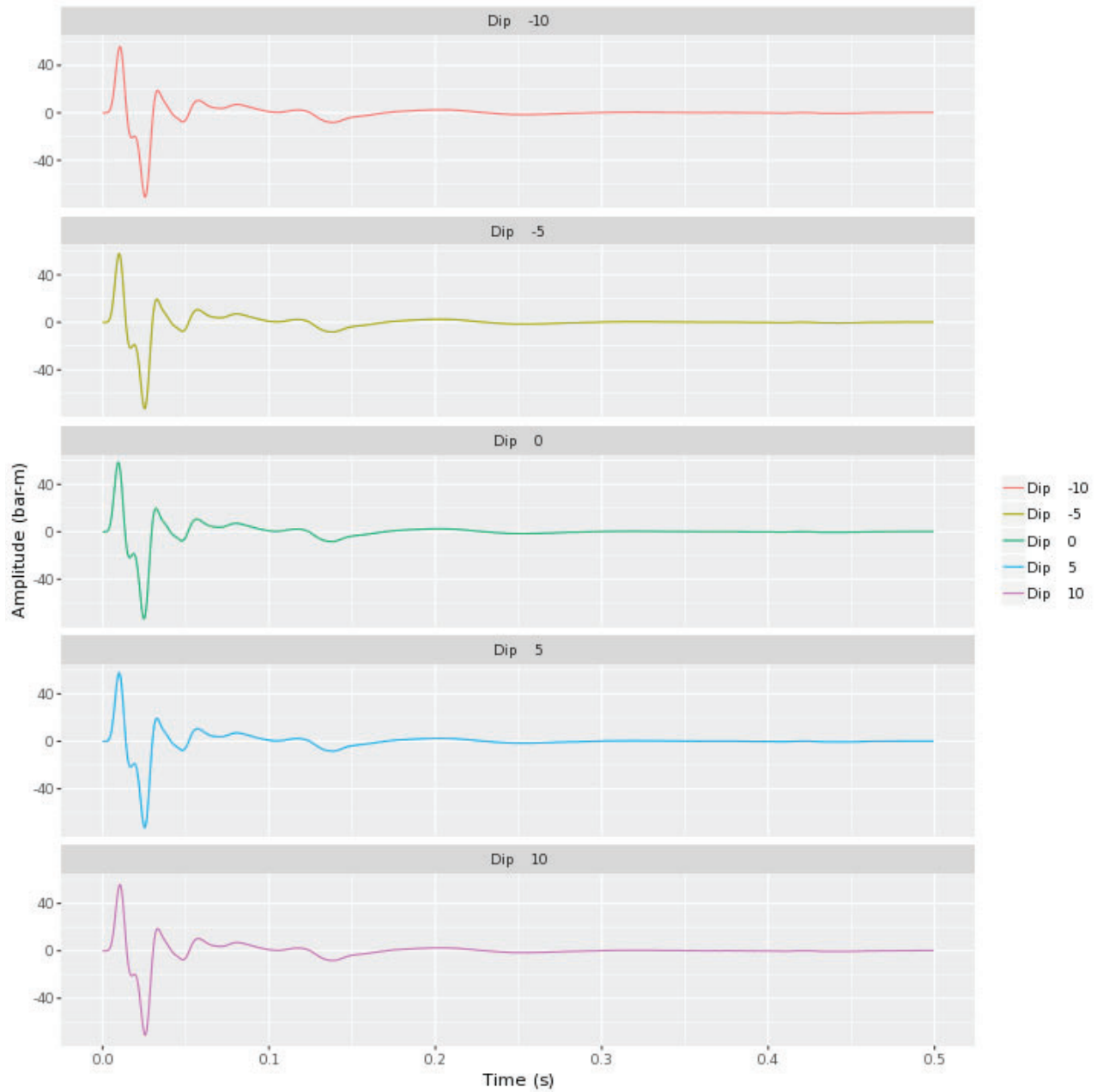
Angle-amplitude form

The following tables show the inline and crossline directivity of the array in (dip angle, amplitude) form. The computed signature (or under option the amplitude spectrum) for each angle is shown in colour varying from for each angle computed with a legend to indicate which is which. The vertical scale indicates the type of plot, time or frequency. Both types of plot are individually scaled and plotted with the same units as the corresponding plots in the Signature Characteristics section.

Inline directivity



Crossline directivity

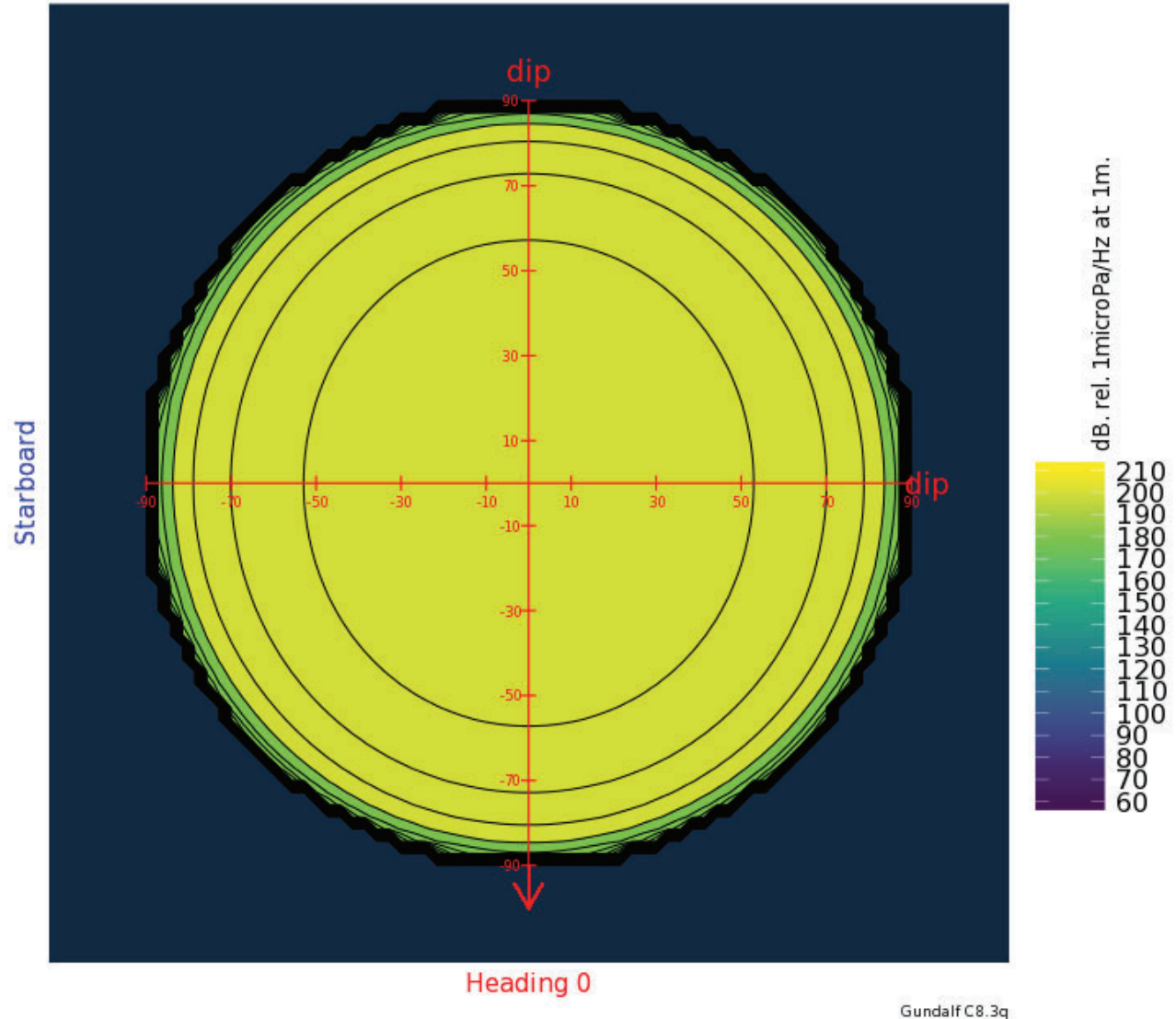


Array directivity

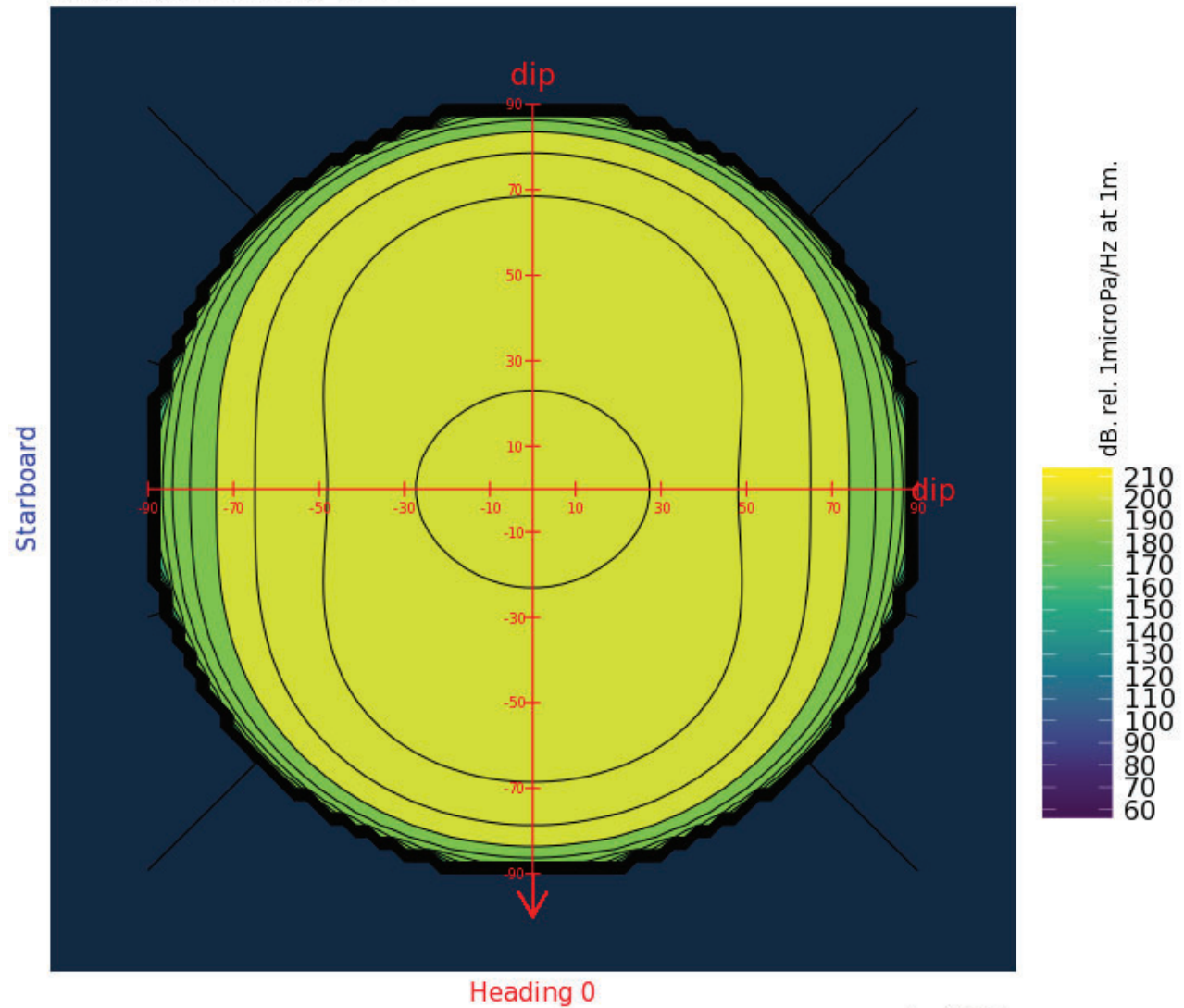
The following tables show the azimuthal directivity (i.e. plan view) theta-phi plots, at four user-specified frequencies. The dip, theta is the angle to the vertical so a value of zero corresponds to vertically down, (the centre of the plot). The azimuthal angle phi is measured relative to the positive x axis so the boat direction corresponds to a value of phi of 180 degrees as shown by the red arrow. The plots are scaled as dB. relative to 1 muPa. per Hz. at 1m.

Dip-azimuthal form

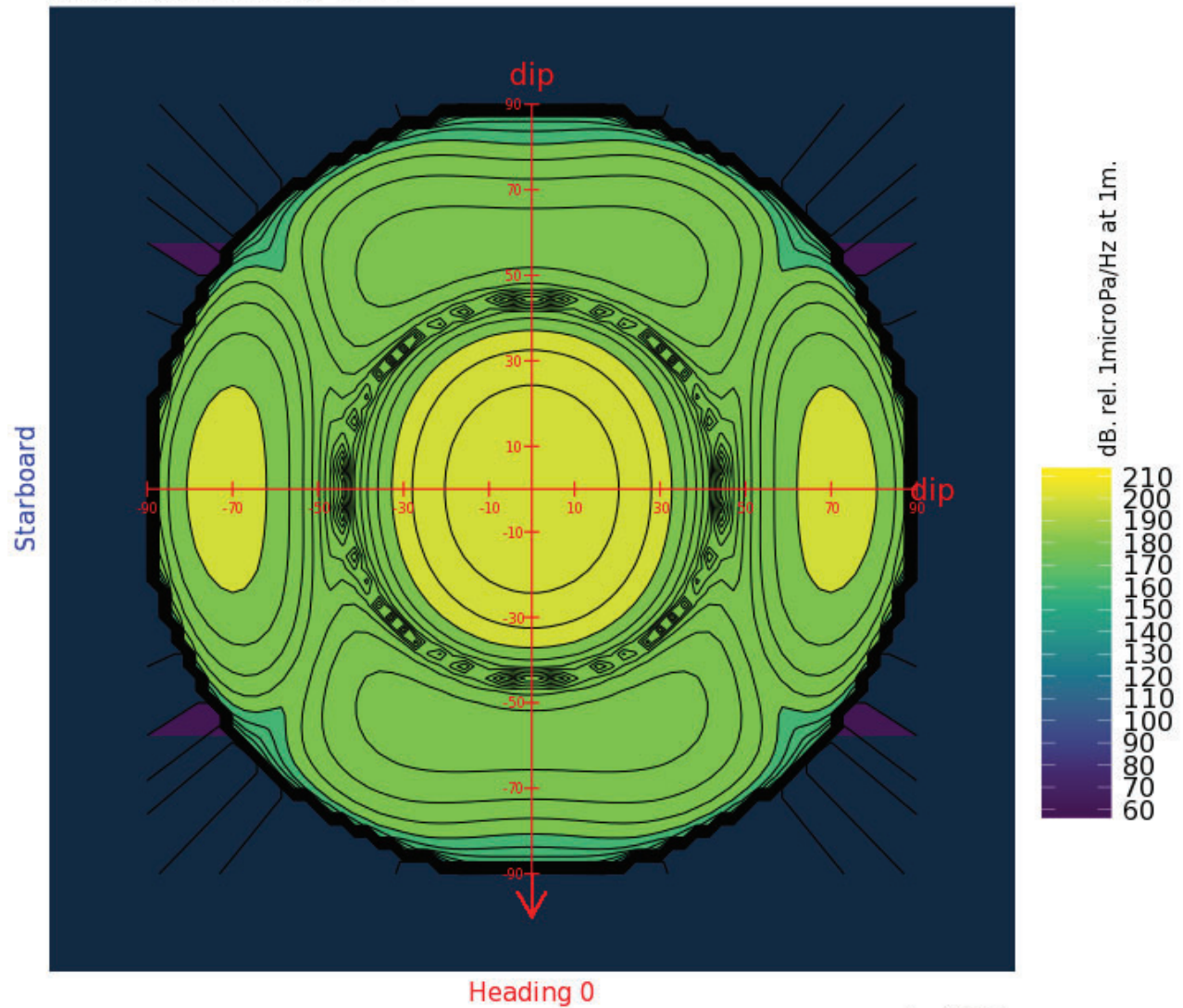
Dip/azimuthal directivity: 30 Hz.



Dip/azimuthal directivity: 60 Hz.

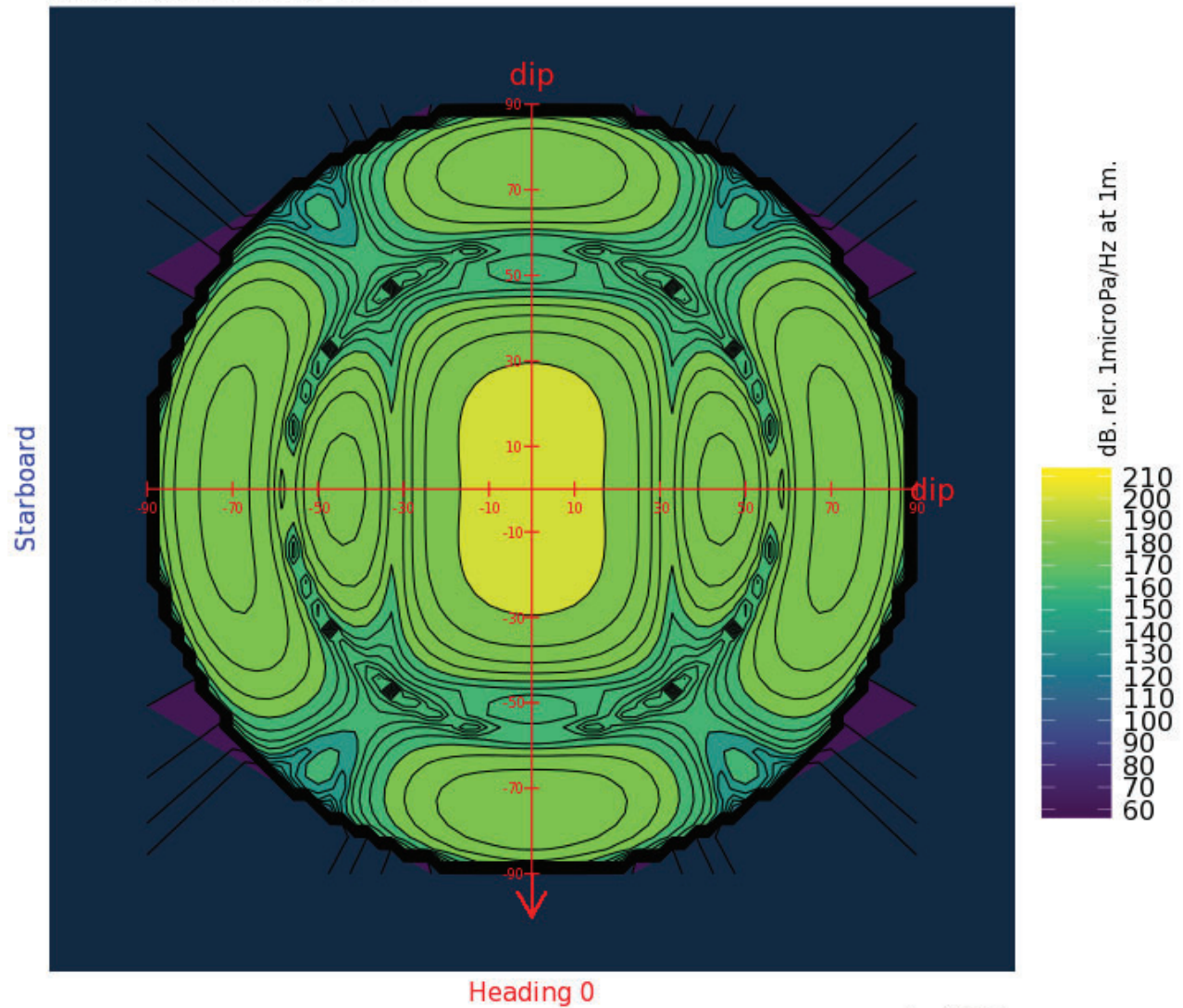


Dip/azimuthal directivity: 90 Hz.



Gundalf C8.3q

Dip/azimuthal directivity: 120 Hz.



Gundalf C8.3q

Acoustic energy characteristics

The following table lists the individual gun contributions to the acoustic energy field in joules. A negative value means the gun is actually absorbing energy. This is very common in interacting arrays. It does not however mean that the gun is damaging the array performance. Rather it is acting as a catalyst to allow the other guns to perform more efficiently. The total acoustic energy gives the true performance of the array as a whole. See Laws, Parkes and Hatton (1988) Energy-interaction: The long-range interaction of seismic sources, Geophysical Prospecting (36), p333-348 and 38(1) 1990 p.104 for more details. Note that internal energy is not included in the data below. The true acoustic efficiency of airgun arrays was typically less than 5 percent of the total initial energy until gun clustering became common and the efficiency is now often above 25 percent.

Overall acoustic energy contribution

Total acoustic energy output (j.)	Acoustic energy output due to energy-interaction (j.)	Total potential energy available in array(j.)	Percentage of total potential energy appearing as acoustic energy
791589.8	36972.3	1180663.8	67.0

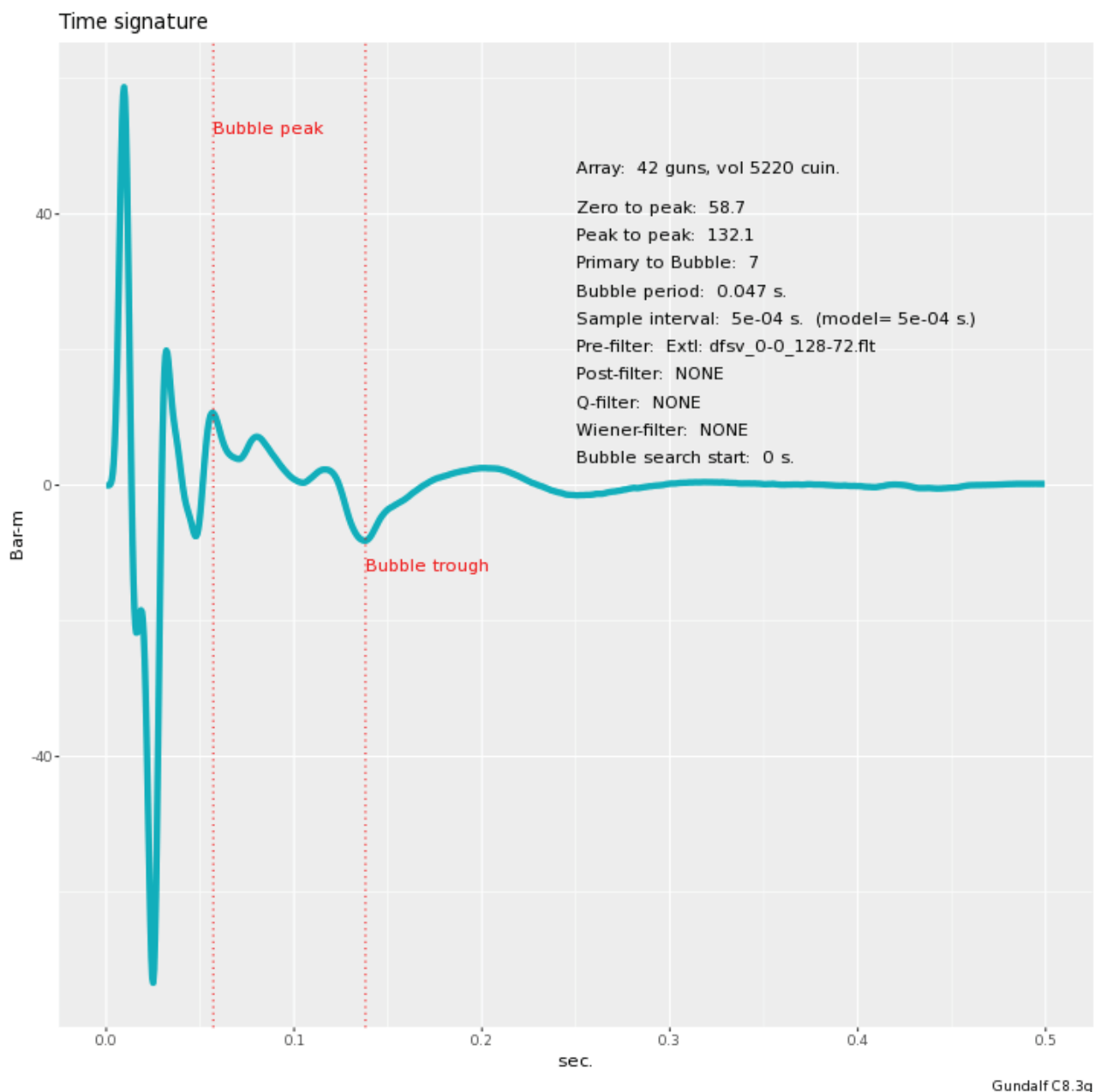
Individual acoustic energy contributions

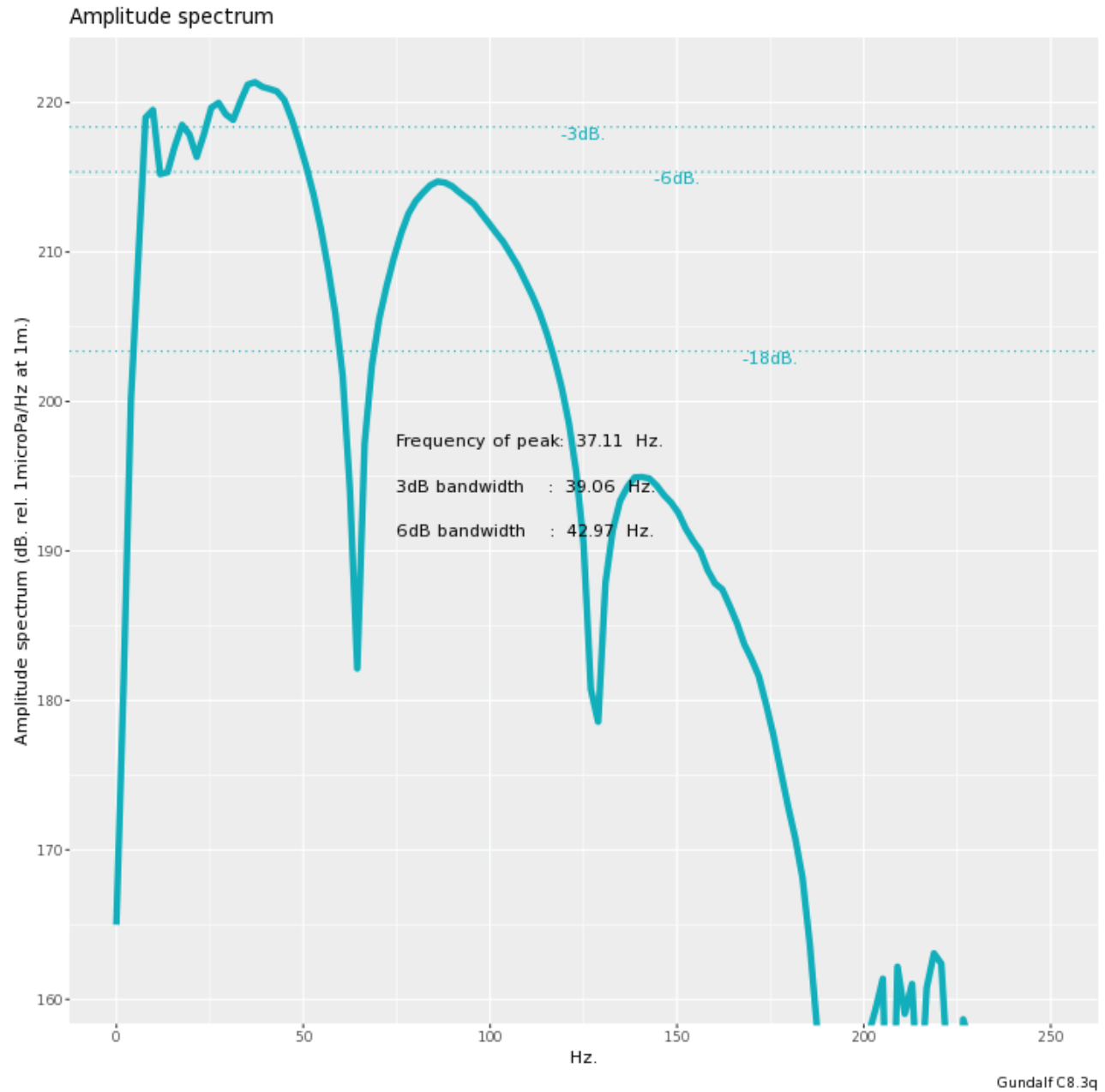
Volume (cuin)	x (m.)	y (m.)	z (m.)	Acoustic energy contribution (j.)
60.0	0.00	-8.40	12.00	21750.5
60.0	0.00	-7.60	12.00	22256.4
95.0	2.50	-8.40	12.00	23787.9
95.0	2.50	-7.60	12.00	24229.0
220.0	5.00	-8.40	12.00	4876.2
220.0	5.00	-7.60	12.00	3225.9
120.0	7.50	-8.40	12.00	28134.9
120.0	7.50	-7.60	12.00	28479.4
220.0	10.00	-8.40	12.00	4881.7
220.0	10.00	-7.60	12.00	3230.8
95.0	12.50	-8.40	12.00	23789.7
95.0	12.50	-7.60	12.00	24230.1
60.0	15.00	-8.40	12.00	21753.5
60.0	15.00	-7.60	12.00	22258.5
60.0	0.00	-0.40	12.00	24755.8
60.0	0.00	0.40	12.00	24785.3
95.0	2.50	-0.40	12.00	27038.3
95.0	2.50	0.40	12.00	27104.0
220.0	5.00	-0.40	12.00	2180.1
220.0	5.00	0.40	12.00	2339.6
120.0	7.50	-0.40	12.00	30640.9
120.0	7.50	0.40	12.00	30716.1
220.0	10.00	-0.40	12.00	2183.9
220.0	10.00	0.40	12.00	2346.1
95.0	12.50	-0.40	12.00	27038.4
95.0	12.50	0.40	12.00	27106.7
60.0	15.00	-0.40	12.00	24759.4
60.0	15.00	0.40	12.00	24787.7
60.0	0.00	7.60	12.00	22226.2
60.0	0.00	8.40	12.00	21782.1
95.0	2.50	7.60	12.00	24162.6
95.0	2.50	8.40	12.00	23858.7

Volume (cuin)	x (m.)	y (m.)	z (m.)	Acoustic energy contribution (j.)
220.0	5.00	7.60	12.00	3063.4
220.0	5.00	8.40	12.00	5048.9
120.0	7.50	7.60	12.00	28416.7
120.0	7.50	8.40	12.00	28204.6
220.0	10.00	7.60	12.00	3068.5
220.0	10.00	8.40	12.00	5053.6
95.0	12.50	7.60	12.00	24164.8
95.0	12.50	8.40	12.00	23859.6
60.0	15.00	7.60	12.00	22228.7
60.0	15.00	8.40	12.00	21784.4

Signature

This section shows the time signature and the amplitude spectrum of the modelled array. The bubble period was determined automatically. The bubble start time was input as 0s. The computed positions of the bubble peak and bubble trough are shown for QC purposes. If these do not match your visual estimate of the bubble, for example, if the filter you are using delays the peak somewhat, try again specifying your own bubble search start time, relative to time zero. The amplitude spectrum plot comprises two separate displays. One curve shows the amplitude spectrum itself in units of dB. relative to 1 microPa. per Hz. at 1m. If selected, the curve in red follows the SEG guidelines and shows the energy flux in dB. relative to 1 Joule/m²/Hz. at 1m.





Modelling Summary

The following table lists the modelling parameters for the array quoted in various commonly used units for convenience.

General parameters ...	
Sample interval (s.)	0.0005
Number of samples in signature	1000
Duration of signature (s.)	0.500
Observation point	Infinite far-field
Gun controller variation (s.)	0
SEG polarity	Disabled
Turn on legacy SEG amplitude spectrum scaling	Disabled
Shroud individual gun details	Disabled
Compute primary to bubble from zero	Disabled
Compute error bounds for signature parameters	Disabled
Bubble search start time (s.)	0
Use string.num format for gun numbers	Disabled
Add SEG recommended cumulative energy spectrum	Disabled
Plot amplitude spectrum with logarithmic frequency axis	Disabled
Maximum amplitude (bar/bar-m.) to display	0
Maximum amplitude (dB.) to display	0
Range of amplitudes (dB.) to display	60
Inline angle	0
Crossline angle	90
Maximum frequency (Hz.) to display on inline/crossline spectra	250
Contour annotation interval in dB.	0
Maximum dip (degrees) for directivity plot	90
Minimum dB (rel. to 1 muPa/Hz at 1m)	100
Maximum dB (rel. to 1 muPa/Hz at 1m)	210
Dip increment for directivity signatures	5
Show amplitude spectra with dip	Disabled
Show dip signatures or amplitude spectra with common y-axis	Disabled
Azimuthal frequency 1 (Hz)	30
Azimuthal frequency 2 (Hz)	60
Azimuthal frequency 3 (Hz)	90
Azimuthal frequency 4 (Hz)	120
Minimum dip-azi dB (rel. to 1 muPa/Hz at 1m)	60
Maximum dip-azi dB (rel. to 1 muPa/Hz at 1m)	210
Pre-filter parameters ...	
Anti-alias/instrument filtering	Standard filter: dfsv_0-0_128-72.flt
Post-modelling parameters ...	
Band-pass filtering	No band pass filter applied
Q filtering	No Q filtering applied
Wiener filtering	No Wiener filtering applied

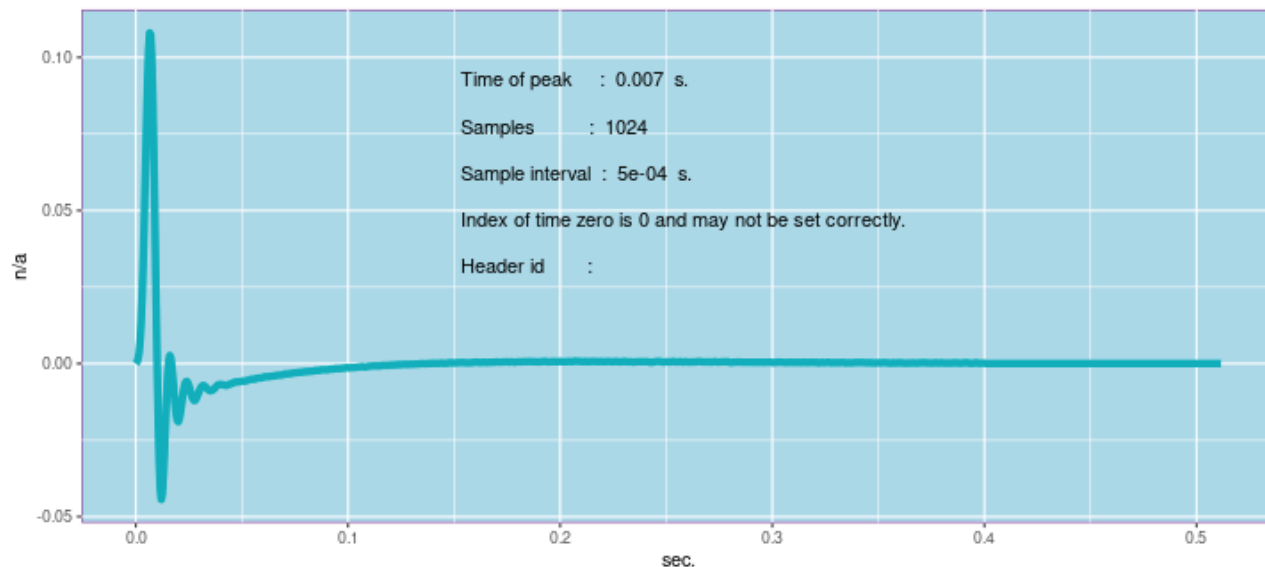
Signature filtering details

The details of any pre- or post-processing band-pass filters which have been requested for a Gundalf model, are shown here with filter information sheets. Special filters such Q or Wiener filtering are applied to the output signature if requested but do not have filter information sheets.

Pre-Filtering Impulse Response and Amplitude Spectrum

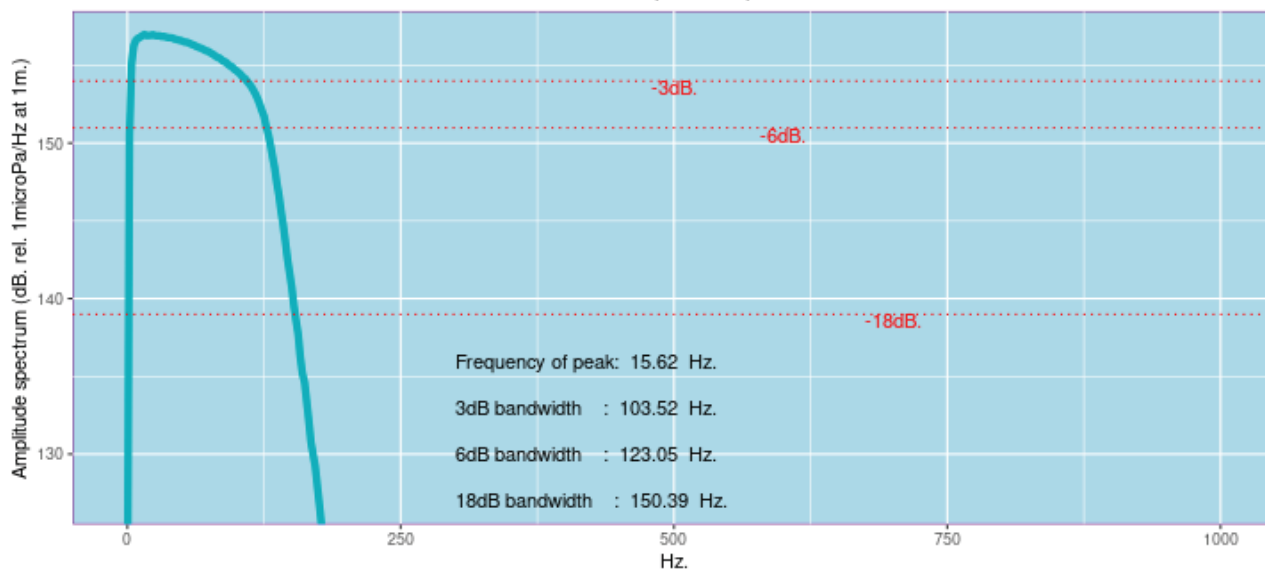
This section shows the filter information sheet for the Pre-processing filter. The modelled Gundalf signature amplitude spectrum is multiplied by this spectrum, the spectrum of any post-processing filters and any special filters.

Gundalf filter information sheet. Filter: dfsv_0-0_128-72.flr Impulse Response



Gundalf C8.3i Filter Info. sheet

Gundalf filter information sheet: dfsv_0-0_128-72.flr Amplitude Spectrum



Gundalf C8.3i Filter Info. sheet

Post-Filtering Impulse Response and Amplitude Spectrum

No post-processing filtering was applied.

Signature filtering policy

For marine environmental noise reports, Gundalf performs no signature filtering other than anti-alias filtering in the modelling engine itself, along with any requested marine animal weighting functions.

For all other kinds of reports, Gundalf performs filtering in this order:-

- If a pre-conditioning filter is chosen, for example, an instrument response, it is applied at the modelling sample interval.
- If the output sample interval is larger than the modelling sample interval, Gundalf applies appropriate anti-alias filtering. (This can be turned off in the event that anti-alias filtering is included in the pre-conditioning filter, in which case Gundalf will issue a warning.)
- Finally, Gundalf applies the chosen set of post-filters, Q, Wiener and band-pass filtering as specified, at the output sample interval. If none are specified, (often known as unfiltered), only the above anti-alias and/or pre-conditioning are applied.

In reports, when filters are applied, they are applied to the notional sources first so that signatures, directivity plots and spectra are all filtered consistently. The abbreviation muPa is used for microPascal throughout.

Finally note that modelled signatures always begin at time zero for reasons of causality.

Physical parameters

The following table gives the values of the physical parameters used where relevant. The sea temperature, velocity of sound in sea water, wavelet dominant frequency and average wave height were input parameters.

The surface reflection coefficient was entered directly.

The physical parameters used were:-

Sea temperature (deg.C)	Velocity of sound in water (m.sec-1)	Wavelet dominant frequency (Hz.)	Average wave height (m.)	Surface reflection coeff.
25	1535	20	0	-1

Some notes on the modelling algorithm

The Gundalf airgun modelling engine is the end-product of 20 years of state of the art research. It takes full account of all air-gun interactions including interactions between sub-arrays. No assumptions of linear superposition are made. This means that if you move sub-arrays closer together, the far-field signature will change. The effect is noticeable even when sub-arrays are separated by as much as 10m. The engine is capable of modelling airgun clusters right down to the 'super-foam' region where the bubbles themselves collide and distort.

Calibration notes

Airgun modelling programs like Gundalf must be calibrated against real data and no computational model is any better than the quality of that calibration. Calibration datasets however are themselves subject to experimental error so Gundalf is calibrated to best fit the various datasets which are used across the extensive range of volumes, pressures and depths available.

In practice, such experimental errors arise for a variety of reasons including

- Depth inaccuracies. These are usually around 3-5% even in the best facilities particularly if there is sea surface movement.
- How frequently the gun is being cycled during measurement. This is rarely recorded but a warmed up gun might be 50deg C warmer than the sea, changing its normal peak-to-peak and other parameters by 5-10% compared with when it is first fired.
- Filtering differences. Filtering is recorded but filtering errors are still more frequent than we would like and analog filter v. digital filter differences are also sometimes a factor.

As a guideline, typical individual errors across different measurement datasets for the best-calibrated guns are of the order of 5% for peak to peak, 15% for primary to bubble and 2% for bubble periods.

Where shown, individual gun errors are calculated from the data shown in Help -> Calibration (which themselves accumulate gun data from different sources) and the resulting array error bounds are calculated by accumulating these errors for each gun in the array. The error bounds are calculated as 95% error bounds and for simplicity assume that errors are non-correlated although in practice some are systematic. The total error bound is always greater than any of the individual error bounds and is strongly influenced by the largest gun contributions.

The error bounds simply mean that *it is very likely that the true values for these primary characteristics will be within the ranges shown, but it is not possible to be more precise*. If other comparison data or models indicate values outside this range, this means that those data or models are very likely to be *incompatible* with Gundalf's calibration data. This may be due to several causes as described above. For more on calibration see Gundalf's calibration Help pages.

Addendum to Section D Proprietary Attachment

Long Form — Assumes proprietary materials of BOEM G&G application are not provided to NMFS by applicant or BOEM

Letter of Authorization Application

BOEM Control Number: [to be inserted once G&G permit application is submitted and control number assigned by BOEM]

Requested Period of Effectiveness:

Start Date: December 1, 2025

End Date: November 30, 2026

Type of Survey:

Please indicate which type of survey will be used in the proposed activity	
☒	Deep Penetration Seismic (greater than 1,500 in³ total airgun array volume) • 2D Seismic-towed Streamer • 2D Seismic-Sea-floor Cable or Nodes • 3D Seismic-towed Streamer • 3D Seismic-Sea-floor Cable or Nodes • NAZ • WAZ • 4D (Time Lapse) • Vertical Cable • Borehole Seismic (VSP)
☐	Shallow Penetration Seismic less than 1,500 in³ total airgun array volume) • Surface Vessel • Surface Vessel and AUV/ROV • Borehole Seismic (VSP)
☐	HRG Surveys (no airguns used) • Surface vessel • AUV/ROV • Both
☐	Other <u>Describe (if Other):</u>

Survey Area and Operational Plan:

Question:	Response
Location: (Lease Block(s), Facility or Prospect Name, Lat/Lon, etc.)	Lease Blocks: Centered on Lease Blocks Walker Ridge 633, 634, 67, 678
Overall Duration of the Activity (days):	180 days
Areal extent of the survey area: (in OCS lease blocks or km ²) (Attach GIS file(s) of survey lines and/or survey area perimeter)	OCC Lease Blocks: - Operations 423 Blocks - Source 47 Blocks - Nodes 9 Blocks
G&G ITR/PEIS Modeling Zone(s) in which the activity will occur (1-7):	7
Number of days during the overall activity period on which the sound source(s) listed in Section C will operate: (If the activity will occur in more than one Modeling Zone, provide the number of operating days within each modeling zone.)	60 days total, does not include turns and downtime such as weather or technical. Seasonal distribution of days used in the Take Estimates shown in Section D: Jan(31), Feb(28), Mar(1) all with Zone 7

Sound Sources:

- List the same sound sources provided in response to question #3 in "Section D Proprietary Information Attachment" to the BOEM G&G Permit Application and indicate their duration of use.

Energy Source	Manufacturer	Model	Total Array Volume & Number of Elements (cubic inches or Liters.)	Source Level (SL) in dB re 1µPa@1m in water (RMS)	Source Level (SL) in dB re 1µPa@1m in water (Peak to Peak)	Operating Frequency (Hz, kHz, range)	Pulse Duration (seconds, milli-seconds)	Pulse Rate (or Cycle) (Pulses per second or minute)	Towing Depth of the Source (ft or m)	Towing Depth of the Receiver(s) (ft or m)	Duration of Use (Number of Days or Percent of Active Sound Source Days)
*Air Gun array previously used by CVX	Bolt	1900LLXT	5220 cu in 42 elements	241	267	6-70Hz	200 ms	10.8 pulses/sec for 4.5 knot Vessel speed	12 m	Not applicable to OBN	60 150 days of shooting
PIES	Sonardyne	PIES 8302	NA	80-120 dB	190-202 dB	14-20 kHz	NA	30 min	PIES are placed at water bottom	PIES are placed at water bottom	Duration of the survey up to 180 days



Source Description:

The seismic source for the proposed geophysical survey will be comprised of 42 active airguns with a total operating volume of 5220 in³ (85.54 litres). The 42 airguns will be distributed in three sub-arrays comprised of 14 airguns each (Figure below). Individual airgun sizes range from 60 in³ to 220 in³. Airguns will be operated at 2000 psi. The sub-arrays will be towed at a water depth of ~12 m. The sources vessels tow two source arrays and activate them alternately in the standard flip-flop pattern every 20 m along the sail line, resulting in approximately 80 source discharges per mile.

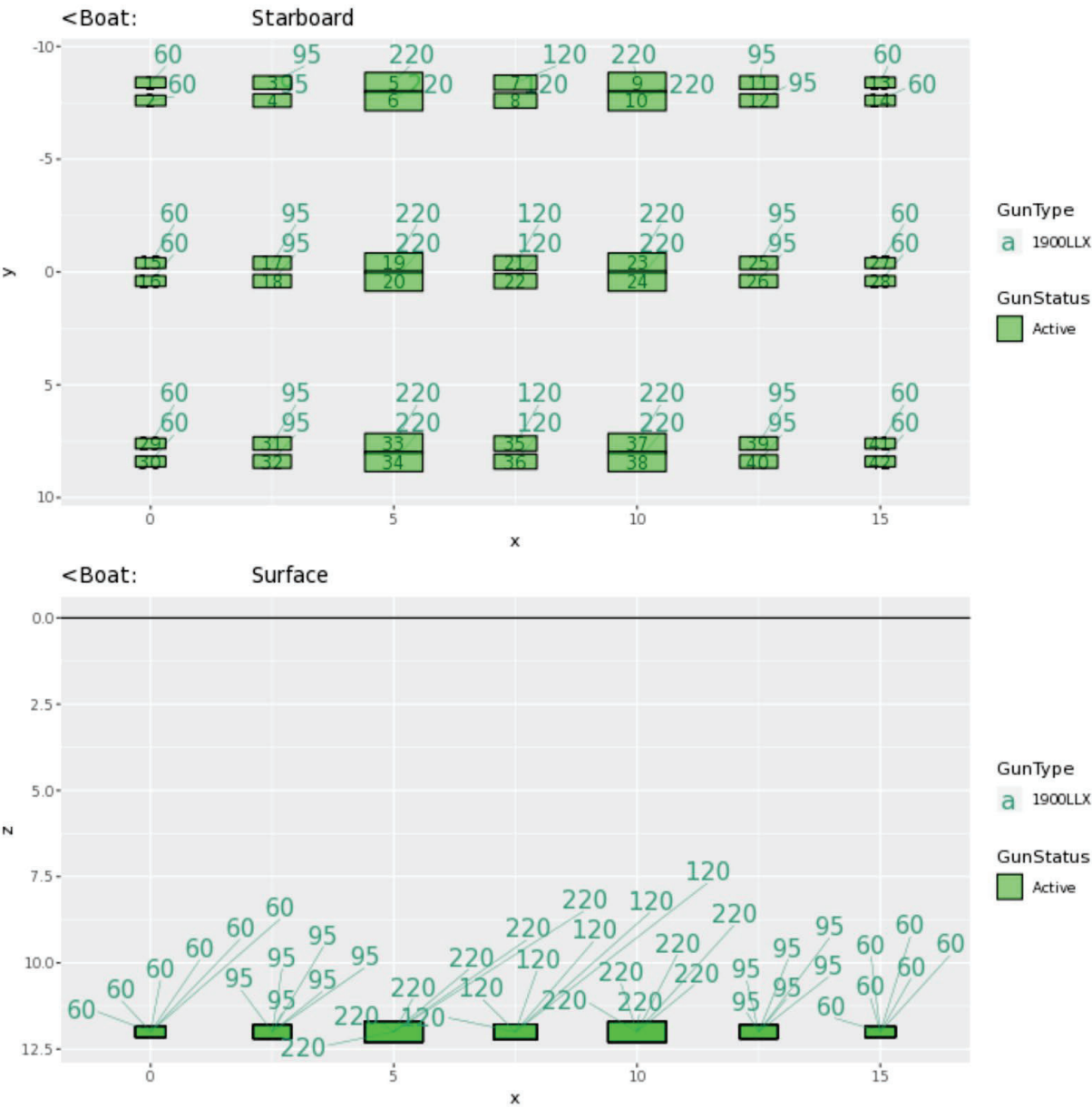


Figure 1. Layout of airguns in each source array.

Table 1. Volume and location of airgun array elements.

Gun number	Press. (psi)	Volume (cu.in)	Gun Type	x (m.)	y (m.)	z (m.)	Delay (s.)	Sub-array number	Peak to peak contrib. (percent)	Max. bub. rad (m.)
1	2000.00	60.00	1900LLX	0.000	-8.400	12.000	0.0000	1	2.1	0.3
2	2000.00	60.00	1900LLX	0.000	-7.600	12.000	0.0000	1	2.1	0.3
3	2000.00	95.00	1900LLX	2.500	-8.400	12.000	0.0000	1	2.4	0.3
4	2000.00	95.00	1900LLX	2.500	-7.600	12.000	0.0000	1	2.4	0.3
5	2000.00	220.00	1900LLX	5.000	-8.400	12.000	0.0000	1	2.7	0.4
6	2000.00	220.00	1900LLX	5.000	-7.600	12.000	0.0000	1	2.7	0.4
7	2000.00	120.00	1900LLX	7.500	-8.400	12.000	0.0000	1	2.4	0.3
8	2000.00	120.00	1900LLX	7.500	-7.600	12.000	0.0000	1	2.4	0.3
9	2000.00	220.00	1900LLX	10.000	-8.400	12.000	0.0000	1	2.7	0.4
10	2000.00	220.00	1900LLX	10.000	-7.600	12.000	0.0000	1	2.7	0.4
11	2000.00	95.00	1900LLX	12.500	-8.400	12.000	0.0000	1	2.4	0.3
12	2000.00	95.00	1900LLX	12.500	-7.600	12.000	0.0000	1	2.4	0.3
13	2000.00	60.00	1900LLX	15.000	-8.400	12.000	0.0000	1	2.1	0.3
14	2000.00	60.00	1900LLX	15.000	-7.600	12.000	0.0000	1	2.1	0.3
15	2000.00	60.00	1900LLX	0.000	-0.400	12.000	0.0000	2	2.0	0.3
16	2000.00	60.00	1900LLX	0.000	0.400	12.000	0.0000	2	2.0	0.3
17	2000.00	95.00	1900LLX	2.500	-0.400	12.000	0.0000	2	2.4	0.3
18	2000.00	95.00	1900LLX	2.500	0.400	12.000	0.0000	2	2.4	0.3
19	2000.00	220.00	1900LLX	5.000	-0.400	12.000	0.0000	2	2.6	0.4
20	2000.00	220.00	1900LLX	5.000	0.400	12.000	0.0000	2	2.6	0.4
21	2000.00	120.00	1900LLX	7.500	-0.400	12.000	0.0000	2	2.4	0.3
22	2000.00	120.00	1900LLX	7.500	0.400	12.000	0.0000	2	2.4	0.3
23	2000.00	220.00	1900LLX	10.000	-0.400	12.000	0.0000	2	2.6	0.4
24	2000.00	220.00	1900LLX	10.000	0.400	12.000	0.0000	2	2.6	0.4
25	2000.00	95.00	1900LLX	12.500	-0.400	12.000	0.0000	2	2.4	0.3
26	2000.00	95.00	1900LLX	12.500	0.400	12.000	0.0000	2	2.4	0.3
27	2000.00	60.00	1900LLX	15.000	-0.400	12.000	0.0000	2	2.0	0.3
28	2000.00	60.00	1900LLX	15.000	0.400	12.000	0.0000	2	2.0	0.3
29	2000.00	60.00	1900LLX	0.000	7.600	12.000	0.0000	3	2.1	0.3
30	2000.00	60.00	1900LLX	0.000	8.400	12.000	0.0000	3	2.1	0.3
31	2000.00	95.00	1900LLX	2.500	7.600	12.000	0.0000	3	2.4	0.3
32	2000.00	95.00	1900LLX	2.500	8.400	12.000	0.0000	3	2.4	0.3
33	2000.00	220.00	1900LLX	5.000	7.600	12.000	0.0000	3	2.7	0.4
34	2000.00	220.00	1900LLX	5.000	8.400	12.000	0.0000	3	2.7	0.4
35	2000.00	120.00	1900LLX	7.500	7.600	12.000	0.0000	3	2.4	0.3
36	2000.00	120.00	1900LLX	7.500	8.400	12.000	0.0000	3	2.4	0.3
37	2000.00	220.00	1900LLX	10.000	7.600	12.000	0.0000	3	2.7	0.4
38	2000.00	220.00	1900LLX	10.000	8.400	12.000	0.0000	3	2.7	0.4
39	2000.00	95.00	1900LLX	12.500	7.600	12.000	0.0000	3	2.4	0.3
40	2000.00	95.00	1900LLX	12.500	8.400	12.000	0.0000	3	2.4	0.3
41	2000.00	60.00	1900LLX	15.000	7.600	12.000	0.0000	3	2.1	0.3
42	2000.00	60.00	1900LLX	15.000	8.400	12.000	0.0000	3	2.1	0.3

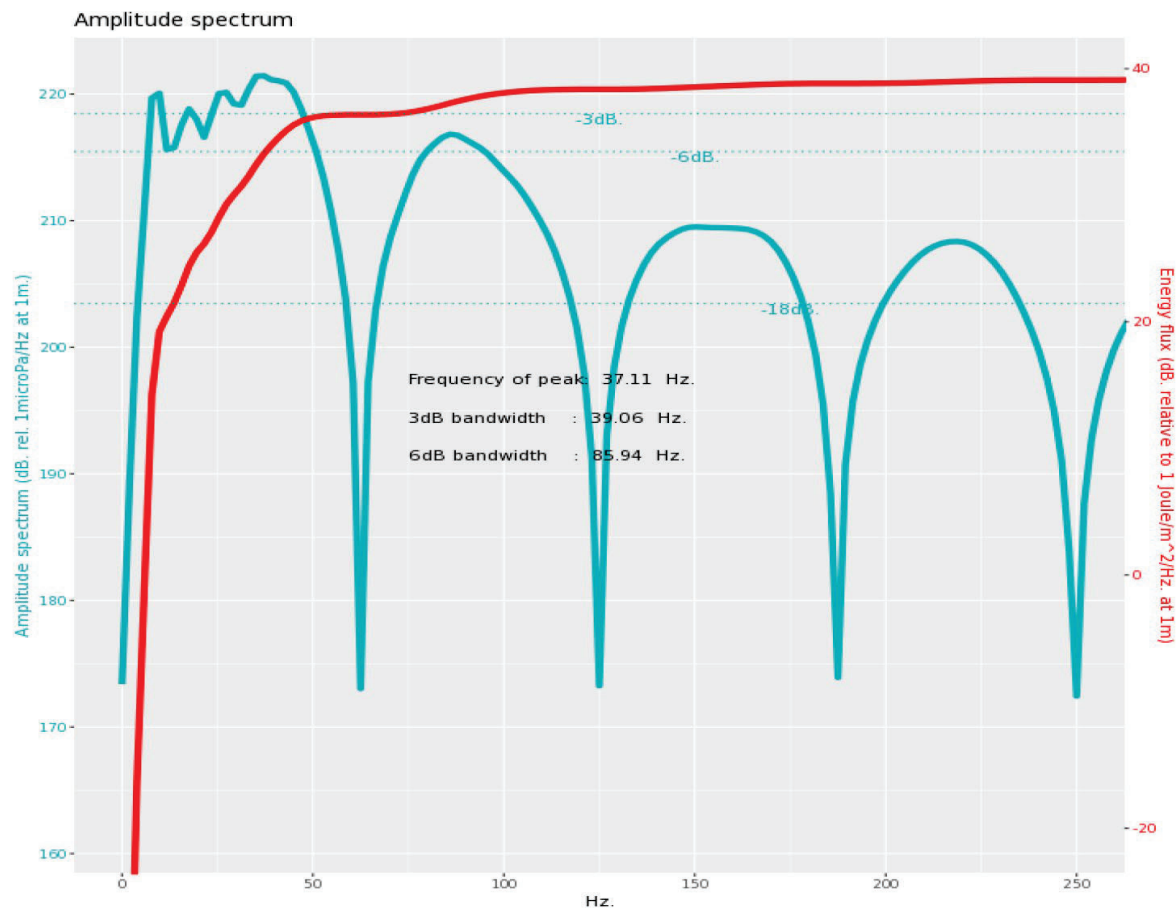


Figure 2. Source Array Vertical Farfield Signature and Frequency Spectrum in dB 1 μ Pa per Hz at 1 m.

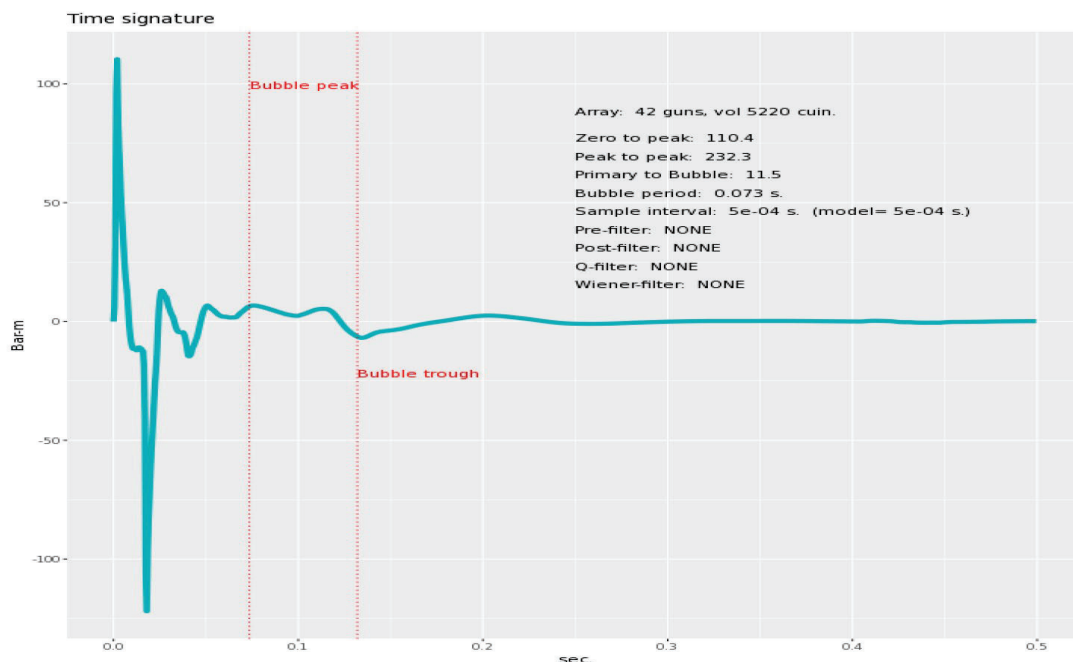


Figure 3. Overpressure signature and power spectrum of the 42 airgun 5220 in3 array.

D. Take Estimate:

Since Level B takes are based on the number of individuals exposed above SPL_{rms} thresholds (see Wood et al. 2012; NMFS 2018) over a 24-hour period, regardless of the duration of an exposure, the area covered (in square kilometers) by a source vessel (or source vessels) within 24-hrs is directly related to the number of Level B takes that may occur. Thus, comparing the area covered over a 24-hour period by the source vessel(s) in the different Survey Types simulated in the exposure modelling (Zeddies et al. 2015) to the area expected to be covered during a planned survey provides a means to select the Survey Type most appropriate for the planned survey.

In the exposure modelling conducted by Zeddies et al. (2015; pg. D-157), the Coil survey type assumed four source vessels sailing at 4.9 knots (2.5 m/s) along a series of overlapping circles 12.5 km in diameter. This circular pattern concentrated survey activities in a smaller area relative to the patterns used to simulate 2D, 3D NAZ, and 3D WAZ Survey Types. The survey area in which the Coil survey pattern was simulated was 58 km x 58 km, or 3,364 km². Over the course of the 7-day simulation, 30% of the area was covered (1,009 km²) or 144 km² per day.

The other Survey Types were simulated in a different sized survey area (145 km x 48 km) using 2 to 4 survey vessels sailing at 4.5 or 4.9 kts along various patterns resulting in the following estimated areas covered:

- 2D – 5,568 km² in 7 days or 795 km² per day;
- 3D NAZ – 1,392 km² in 7 days or 199 km² per day;
- 3D WAZ – 5,916 km² in 7 days or 845 km² per day.

Chevron used the “Gulf of Mexico Seismic Survey Exposure Calculator” dated 5/25/2022 to evaluate the number of potential takes from 60 days of survey activity in months January through April 19, 2026 by iteratively starting with

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each successive month and entering the maximum number of survey days possible into that month and each subsequent month until the total 60 survey days was reached. Since the survey will not occur after April 19, 2026, the latest start date would be February 18, 2026. This start date was used to calculate the potential takes associated with starting the survey in “March.” This exercise showed that there was no time during this period when 60 survey days in this location would potentially cause more than small numbers of takes for any species or stock. The greatest number of total takes were calculated when assuming the survey would start in January month, and the highest percentage of any one species (or species guild) was also found if the survey were to start in January months (striped dolphin, 24.2%; see table below).

Zeddies, D., S. Denes, C. Pyc. 2017. Gulf of Mexico Acoustic Exposure Model Variable Analysis. Prepared by JASCO Applied Sciences (USA) Inc. for International Association of Geophysical Contractors and American Petroleum Institute. 171 pp.

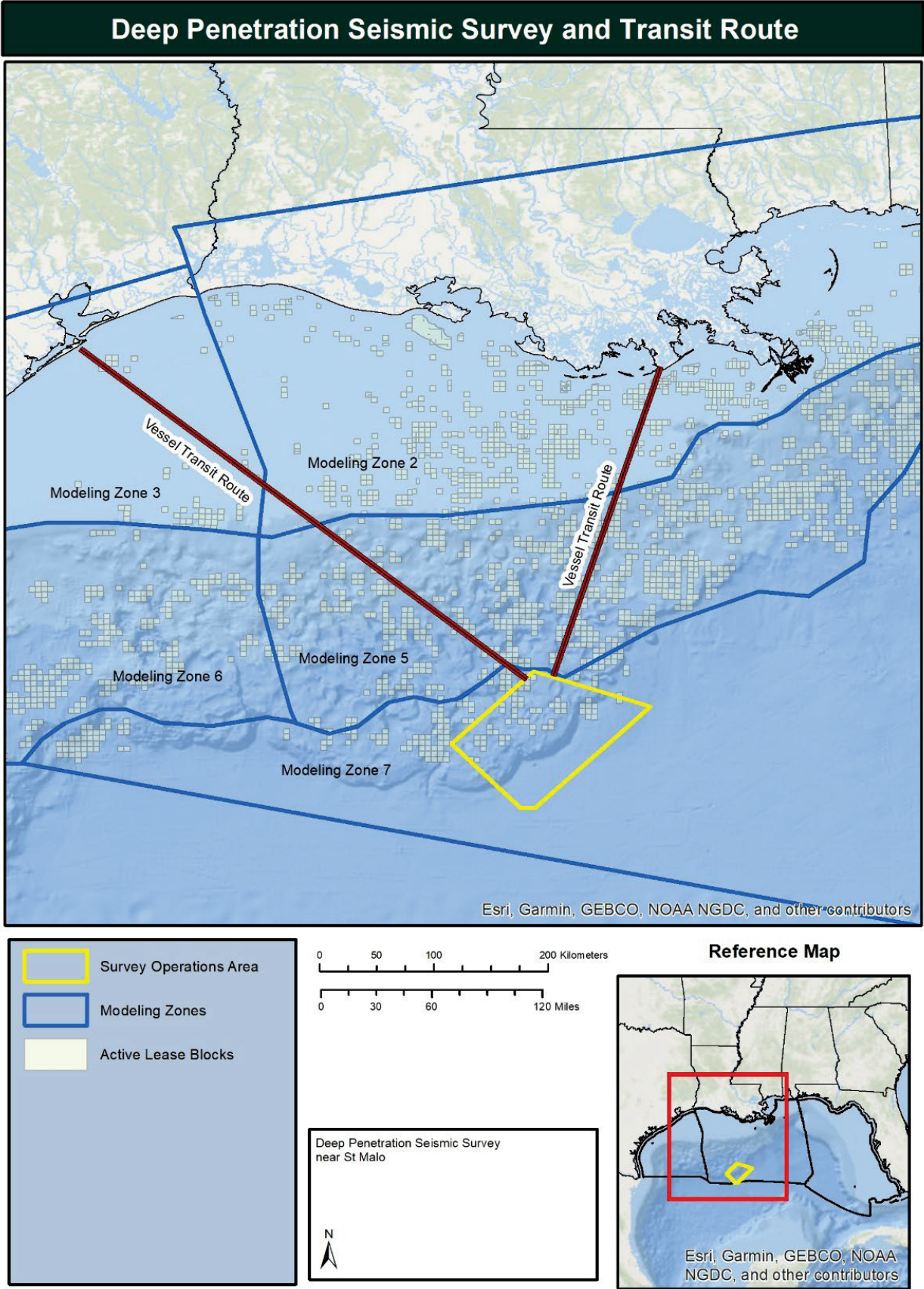
Mitigation and Monitoring Efforts:

Question:	Response:
Please indicate which set of monitoring and mitigation measures from the ITR’s apply to the planned activity:	All monitoring and mitigation measures in the ITRs applicable to Airgun Surveys with a total volume >1,500 in³ (Deep Penetration) will be followed.
Confirm that you will apply this set of monitoring and mitigation measures during the activity:	Yes

User Selections									
Parameters					# of Days per Month				
Survey Type	COIL				jan	31	may		sep
Zone Number	7				feb	28	jun		oct
Array	5110cuin				mar	1	jul		nov
					apr		aug		dec

Exposures by Metric																
F.H.G	Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total (No Level B Scaling)	Level A Colour Legend	
Level A																Level A SEL > Level A Peak
LF	Rice's whale	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		Level A Peak > Level A SEL
HF	Kogia spp. ^a	9.87	8.92	0.32	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	19.11	Total (Including Level B Scaling)	
Level B																
LF	Rice's whale	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
MF	Atlantic spotted dolphin	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	
	Bottlenose dolphin	1.90	2.48	0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	4.48	1.29	
	Clymene dolphin	949.89	720.34	14.80	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	1,685.04	483.61	
	Beaked whales ^b	38.73	33.44	1.23	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	73.40	7.41	
	Fraser's dolphin ^d	195.90	176.94	6.32	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	379.15	108.82	
	Blackfish ^f	1,578.97	1,454.78	40.18	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	3,073.92	906.81	
	Pantropical spotted dolphin	6,382.68	6,189.63	153.34	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	12,725.65	3,652.26	
	Risso's dolphin	29.83	23.52	0.88	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	54.23	16.00	
	Rough-toothed dolphin ^d	423.43	382.45	13.66	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	819.54	235.21	
	Short-finned pilot whale	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	Sperm whale	95.95	85.97	3.23	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	185.15	78.32	
	Spinner dolphin	46.81	42.61	1.55	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	90.97	26.11	
	Striped dolphin	2,774.82	1,927.02	40.30	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	4,742.13	1,360.99	
HF	Kogia spp. ^a	134.01	121.04	4.32	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	259.38	83.26	

Map of Survey Area and Transit Route



Appendix 1 – Mitigation Measures for Deep Penetration Surveys

(Using a source array with greater than 1,500 in³ total volume)

The text below is a summary of that which appears in the Federal Register Notice of the Final Rule. It has been lightly edited for clarity and some related materials from different locations within the Final Rule have been consolidated into a single section in this document.

- **General Conditions and PSO use (§217.184(a)(3-4); §217.185(a-b))**

- The acoustic source must be deactivated when not acquiring or preparing to acquire data, except for necessary testing; unnecessary use of the acoustic source must be avoided
- Notified operational capacity (i.e., total array volume) (not including redundant backup airguns) must not be exceeded during the survey, except where unavoidable for source testing and calibration purposes
- All occasions where activated source volume exceeds notified operational capacity must be communicated to the PSO(s) on duty and fully documented
- The lead PSO must be granted access to relevant instrumentation documenting acoustic source power and/or operational volume
- PSOs must be employed by a third-party observer provider, must have no tasks other than to conduct observational effort, collect data, and communicate with and instruct relevant vessel crew with regard to the presence protected species and mitigation requirements (including brief alerts regarding maritime hazards), and must be qualified pursuant § 217.185(a) (except as specified at § 217.184(d)(2)(iii-iv))
- Acoustic PSOs are required to complete specialized training for operating passive acoustic monitoring (PAM) systems and are encouraged to have familiarity with the vessel on which they will be working.
- PSOs may act as both acoustic and visual observers (but not simultaneously), so long as they demonstrate that their training and experience are sufficient to perform each task.
- At least one visual PSO and two acoustic PSOs (when required) aboard each acoustic source vessel must have a minimum of 90 days at-sea experience working in those roles, respectively, with no more than eighteen months elapsed since the conclusion of the at-sea experience (except as specified at § 217.184(d)(2)(iii))
- One visual PSO with such experience must be designated as the lead for the entire PSO team. The lead must coordinate duty schedules and roles for the PSO team and serve as the primary point of contact for the vessel operator.
 - Note that the responsibility of coordinating duty schedules and roles may instead be assigned to a shore-based, third party monitoring coordinator.
- To the maximum extent practicable, the lead PSO must devise the duty schedule such that experienced PSOs are on duty with those PSOs with appropriate training but who have not yet gained relevant experience.

- **PSO Qualification and Equipment Requirements §217.185(a-b))**

- PSOs must successfully complete relevant, acceptable training including completion of all required coursework and passing (80% or greater) a written and/or oral examination developed for the training program
- PSOs must have successfully obtained a bachelor's degree from an accredited college or university with a major in one of the natural sciences and a minimum of 30 semester hours or equivalent in the biological sciences, and at least one undergraduate course in math or statistics. The educational requirements may be waived if the PSO has acquired the relevant skills through alternate experience. Requests for such a waiver must be submitted to NMFS and shall include written justification. Requests will be granted or defined (with justification) by NMFS within one week of receipt of submitted information
 - Secondary education and/or experience comparable to PSO duties;
 - Previous work experience conducting academic, commercial, or government-sponsored marine mammal surveys; or
 - Previous work experience as a PSO; the PSO should demonstrate a good standing and consistently good performance of PSO duties
- LOA-holders are required to provide PSOs with bigeye binoculars (e.g., 25 x 150; 2.7 view angle; individual ocular focus; height control) of appropriate quality solely for PSO use. These must be pedestal-mounted on the deck at the most appropriate vantage point that provides for optimal sea surface observation, PSO safety, and safe operation of the vessel
- For each vessel required to use a PAM system, provide a PAM system that has been verified and tested by an experienced acoustic PSO who will be using it during the trip for which monitoring is required
- Work with the selected third-party observer provider to ensure PSOs have all equipment (including backup equipment) needed to adequately perform necessary tasks, including accurate determination of distance and bearing to observed marine mammals. Such equipment at a minimum must include:
 - Reticle binoculars (e.g., 7 x 50) of appropriate quality (at least one per PSO, plus backups)
 - Global Positioning Unit (GPS) (plus backup);
 - Digital camera with a telephoto lens (the camera or lens should also have an image stabilization system) that is at least 300 mm or equivalent on a full-frame single lens reflex (SLR) (plus backup)
 - Compass (plus backup)
 - Radios for communication among vessel crew and PSOs (at least one per PSO, plus backups); and
 - Any other tools necessary to adequately perform necessary PSO tasks

- **Visual Monitoring (§217.184(b)(2))**

- During survey operations (i.e., any day on which use of the acoustic source is planned to occur, and whenever the acoustic source is in the water, whether activated or not), a minimum of two PSOs must be on duty and conducting visual observations at all times during daylight hours (i.e., from 30 minutes prior to sunrise through 30 minutes following sunset).
- Visual monitoring must begin not less than 30 mins prior to ramp-up and must continue until one hour after use of the acoustic source ceases or until 30 minutes past sunset.

- Visual PSOs shall coordinate to ensure 360 degrees visual coverage around the vessel from the most appropriate observation posts, and must conduct visual observations using binoculars and the naked eye while free from distractions and in a consistent, systematic, and diligent manner.
- Visual PSOs must immediately communicate all observations of marine mammals to the on-duty acoustic PSO, including any determination by the PSO regarding species identification, distance, and bearing and the degree of confidence in the determination.
- Any observation of marine mammals by crew members aboard any vessel associated with the survey must be relayed to the PSO team
- During good conditions (daylight hours; Beaufort Sea state (BSS) of 3 or less) visual PSOs must conduct observations when the acoustic source is not operating for comparison of sighting rates and behavior with and without use of the acoustic source and between acquisition periods, to the maximum extent practicable
- Visual PSOs may be on watch for a maximum of two consecutive hours followed by a break of at least one hour between watches and may conduct a maximum of 12 hours of observation per 24-hour period. NMFS may grant an exception for LOA applications that demonstrate such a “two hours on/one hour off” duty cycle is not practicable, in which case visual PSOs will be subject to a maximum of four consecutive hours on watch followed by a break of at least two hours between watches. Combined observational duties (visual and acoustic but not at the same time) must not exceed 12 hours per 24-hour period for any individual PSO.
- **Acoustic Monitoring: (§217.184(b)(3))**
 - All surveys must use a towed passive acoustic monitoring (PAM) system at all times when operating in waters deeper than 100 m, which must be monitored by a minimum of one acoustic PSO beginning at least 30 mins prior to ramp-up and at all times during use of the acoustic source, and until one hour after use of the acoustic source ceases
 - Acoustic PSOs must immediately communicate all detections of marine mammals to visual PSOs (when visual PSOs are on duty), including any determination by the PSO regarding species identification, distance, and bearing and the degree of confidence in the determination.
 - Acoustic PSOs may be on watch for a maximum of four consecutive hours followed by a break of at least two hours between watches and may conduct a maximum of 12 hours of observation per 24-hour period. Combined observational duties (visual and acoustic but not at the same time) must not exceed 12 hours per 24-hour period for any individual PSO.
 - Survey activities may continue for 30 minutes when the PAM system malfunctions or is damaged, while the PAM operators diagnose the issue. If the diagnosis indicates that the PAM system must be repaired to solve the problem, operations may continue for an additional two hours without acoustic monitoring during daylight hours only under the following conditions:
 - Sea state is less than or equal to BSS 4,
 - No marine mammals (excluding delphinids) detected solely by PAM in the applicable exclusion zone in the previous two hours,
 - NMFS is notified via email as soon as practicable with the time and location in which operations began without an active PAM system; and
 - Operations with an active acoustic source, but without an operating PAM system, do not exceed a cumulative total of four hours in any 24-hour period

- **Exclusion and Buffer Zones: (§217.184(b) 4 ; (§217.184(b) 5**
 - These zones must be based upon radial distance from the edges of the air gun array (rather than being based on the center of the array or around the vessel itself)
 - During use of the acoustic source (i.e., anytime the acoustic source is active, including ramp-up), occurrence of marine mammals within the relevant buffer zone (but outside the exclusion zone) should be communicated to the operator to prepare for the potential shutdown of the acoustic source
 - Two exclusion zones are defined, depending on the species and context. A standard exclusion zone encompassing the area at and below the sea surface out to a radius of 500 meters from the edges of the airgun array (0-500 m) is defined. For special circumstances the exclusion zone encompasses an extended distance of 1,500 meters (0- 1,500 m) (defined at § 217.184(b)(6)(v)).
 - During pre-start clearance monitoring (i.e., before ramp-up begins), the buffer zone acts as an extension of the exclusion zone in that observations of marine mammals within the buffer zone would also preclude airgun operations from beginning (i.e., ramp-up). For all marine mammals (except where superseded by the extended 1,500-m exclusion zone), the buffer zone encompasses the area at and below the sea surface from the edge of the 0-500 meter exclusion zone out to a radius of 1,000 meters from the edges of the airgun array (500-1,000 m). The buffer zone is not applicable when the exclusion zone is greater than 500 meters, i.e., the observational focal zone is not increased beyond 1,500 meters
- **Ramp-up: (§217.184(b)(5))**
 - A 30-minute prestart clearance observation period must occur prior to the start of ramp-up
 - The operator must notify a designated PSO of the planned start of ramp-up as agreed upon with the lead PSO; the notification time should be less than 60 mins prior to the planned ramp-up.
 - Ramp-ups shall be scheduled as to minimize the time spent with source activated prior to reaching the designated run in.
 - A designated PSO must be notified again immediately prior to initiating ramp-up procedures and the operator must receive confirmation from the PSO to proceed.
 - Ramp-up must not be initiated if any marine mammal is within the applicable exclusion or buffer zone.
 - If a marine mammal is observed within the exclusion zone or buffer zone during the 30-minute pre-start clearance period, ramp-up must not begin until the animal(s) has been observed exiting the zones or until an additional time period has elapsed with no further sighting (15 minutes for small delphinids and 30 minutes for all other species)
 - Ramp-up must begin by activating a single airgun on the smallest volume in the array and shall continue in stages by doubling the number of active elements at the commencement of each stage with each stay of approximately the same duration
 - Total duration must not be less than 20 minutes
 - The operator must provide information to the PSO documenting appropriate procedures were followed
 - Ramp-up must cease and the source shut down upon observation of marine mammals within the applicable exclusion zone. Once ramp-up has begun, observations of marine mammals within the buffer zone do not require shutdown.
 - Ramp-up may occur at times of poor visibility, including nighttime, if appropriate acoustic monitoring has occurred with no detections of a marine mammal other than delphinids in the 30 minutes prior to beginning ramp-up.

- Acoustic source activation may only occur at night where operational planning cannot reasonably avoid such circumstances.
- If the acoustic source is shut down for brief periods (i.e., less than 30 minutes) for reasons other than implementation of prescribed mitigation (e.g., mechanical difficulty), it may be activated again without ramp-up if PSOs have maintained constant visual and/or acoustic observation and no visual or acoustic detections of any marine mammal have occurred within the applicable exclusion zone. For any longer shutdown, pre-start clearance observation and ramp-up are required. For any shutdown at night or in periods of poor visibility (e.g., BSS 4 or greater), ramp-up is required, but if the shutdown period was brief and constant observation maintained, pre-start clearance watch is not required
- Testing of the acoustic source involving all elements requires ramp-up
- Testing limited to individual source elements or strings does not require ramp-up but does require the pre-start clearance observation period.
- **Shutdowns (§217.184(b)(6))**
 - Any PSO on duty has the authority to delay the start of survey operations or to call for shutdown of the acoustic source pursuant to the requirements of this subpart
 - The operator must establish and maintain clear lines of communication directly between PSOs on duty and crew controlling the acoustic source to ensure that shutdown commands are conveyed swiftly while allowing PSOs to maintain watch
 - When both visual and acoustic PSOs are on duty, all detections must be immediately communicated to the remainder of the on-duty PSO team for potential verification of visual observations by the acoustic PSO or of acoustic detections by visual PSOs
 - When the airgun array is active (i.e., anytime one or more airguns is active, including during ramp-up) and (1) a marine mammal appears within or enters the applicable exclusion zone and/or (2) a marine mammal (excluding delphinids) is detected acoustically and localized within the applicable exclusion zone, the acoustic source must be shut down
 - When shutdown is called for by a PSO, the acoustic source must be immediately deactivated, and any dispute resolved only following deactivation
 - The extended 1,500-m exclusion zone must be applied upon detection (visual or acoustic) of a baleen whale, sperm whale, beaked whale, or Kogia spp. within the zone
 - Shutdown requirements are waived for dolphins of the following genera: Tursiops, Stenella, Steno, and Lagenodelphis. If a delphinid is visually detected within the exclusion zone, no shutdown is required unless the PSO confirms the individual to be of a genus other than those listed above, in which case a shutdown is required. Acoustic detection of delphinids does not require shutdown.
 - If there is uncertainty regarding identification or localization, PSOs may use best professional judgment in making the decision to call for a shutdown
 - Upon implementation of the shutdown, the source may be reactivated after the marine mammal(s) has been observed exiting the applicable exclusion zone or following a 30-minute clearance period with no further detection of the marine mammal(s)
- **Time-area Closure (§217.184(e))**
 - From January 1 through May 31, no use of airguns may occur shoreward of the 20-m isobath and between 90-84° W.

- **Entanglement Avoidance: (§217.184(f))**

- Use negatively buoyant coated wire-core tether cable.
- Retrieve all lines immediately following completion of the survey.
- Attach acoustic pingers directly to the coated tether cable; acoustic releases should not be used.

- **Vessel Strike Avoidance (§217.184(g))**

- Vessel operators and crew must maintain a vigilant watch for all marine mammals and slow down or stop their vessel or alter course, as appropriate regardless of vessel size, to avoid striking any marine mammal.
- A visual observer aboard the vessel must monitor a vessel strike avoidance zone around the vessel, which shall be defined according to the parameters stated in their subsection.
- Visual observers monitoring the vessel strike avoidance zone may be third party observers (i.e., PSOs) or crew members, but crew members responsible for these duties must be provided sufficient training to distinguish marine mammals from other phenomena and broadly identify a marine mammal as a baleen whale, sperm whale or other marine mammal.
- Vessel speeds must be reduced to 10 knots or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed near a vessel.
- All vessels must maintain a minimum separation distance of 500 meters from baleen whales.
- All vessels must maintain a minimum of 100 meters from sperm whales.
- All vessels must, to the maximum extent practicable, attempt to maintain a minimum separation distance of 50 meters from all other marine mammals, with an exception made for those animals that approach the vessel; and
- When marine mammals are sighted while a vessel is underway, the vessel must take action as necessary to avoid violating the relevant separation distance, e.g., attempt to remain parallel to the animal's course, avoid excessive speed or abrupt changes in direction until the animal has left the area.
- If marine mammals are sighted within the relevant separation distance, the vessel must reduce speed and shift the engine to neutral, not engaging the engines until animals are clear of the area. This does not apply to any vessel towing gear or any vessel that is navigationally constrained.
- These requirements do not apply in any case where compliance would create an imminent and serious threat to a person or vessel or to the extent that a vessel is restricted in its ability to maneuver and, because of the restriction, cannot comply.

- **Reporting: (§217.185(d))**

- Annual reporting must be submitted as specified in this paragraph:
 - LOA-holders must submit a summary report to NMFS on all activities and monitoring results within 90 days of the completion of the survey or expiration of the LOA, whichever comes sooner, and must include all information described above under (§217.185 (c)). If an issued LOA is valid for greater than one year, the summary report must be submitted on an annual basis.
 - The report must describe activities conducted and sightings of marine mammals, must provide full documentation of methods, results, and interpretation pertaining to all monitoring, and must summarize the dates and locations of survey operations and all marine mammal sightings (dates, times, locations, activities associated survey activities, and information regarding locations where

the acoustic source was used.). In addition to the report, all raw observational data must be made available to NMFS.

- For operations requiring the use of PAM, the report must include a validation document concerning the use of PAM, which should include necessary noise validation diagrams and demonstrate whether background noise levels on the PAM deployment limited achievement of the planned detection goals. Copies of any vessel self-noise assessment reports must be included with the report.
- The LOA-holder must provide geo-referenced time-stamped vessel tracklines for all time periods in which airguns (full array or single) were operating. Tracklines must include points recording any change in airgun status (e.g., when the airguns began operating, when they were turned off). GIS files must be provided in ESRI shapefile format and include the UTC date and time, latitude in decimal degrees, and longitude in decimal degrees. All coordinates must be referenced to the WGS84 geographic coordinate system.
- The draft report must be accompanied by a certification from the lead PSO as to the accuracy of the report, and the lead PSO may submit directly to NMFS a statement concerning implementation and effectiveness of the required mitigation and monitoring.
- A final report must be submitted within 30 days following resolution of any comments on the draft report.
- Comprehensive reporting must be submitted as specified in this paragraph
 - LOA- holders must contribute to the compilation and analysis of data for inclusion in an annual synthesis report addressing all data collected and reported through annual reporting in each calendar year. The synthesis period shall include all annual reports deemed to be final by NMFS in a given one-year reporting period. The report must be submitted to NMFS within 90 days following the end of a given one-year reporting period.
- **Reporting of Dead or Injured Animals: (§217.185(e))**
 - In the event that personnel involved in the survey activities discover an injured or dead marine mammal, the LOA-holder must report the incident to the Office of Protected Resources (OPR), NMFS and to the Southeast Regional Stranding Network as soon as feasible. The report must include the following information:
 - Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable)
 - Species identification (if known) or description of the animal(s) involved;
 - Condition of the animal(s) (including carcass condition if the animal is dead);
 - Observed behaviors of the animal(s), if alive;
 - If available, photographs or video footage of the animal(s); and
 - General circumstances under which the animal was discovered.
 - In the event of a ship strike of a marine mammal by any vessel involved in the survey activities, the LOA-holder must report the incident to OPR, NMFS and to the Southeast Regional Stranding Network as soon as feasible. The report must include the following information:

- Time, date, and location (latitude/longitude) of the incident;
 - Species identification (if known) or description of the animal(s) involved;
 - Vessel's speed during and leading up to the incident;
 - Vessel's course/heading and what operations were being conducted (if applicable);
 - Status of all sound sources in use;
 - Description of avoidance measures/requirements that were in place at the time of the strike and what additional measures were taken, if any, to avoid strike;
 - Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, visibility) immediately preceding the strike;
 - Estimated size and length of animal that was struck;
 - Description of the behavior of the marine mammal immediately preceding and following the strike;
 - If available, description of the presence and behavior of any other marine mammals immediately preceding the strike;
 - Estimated fate of the animal (e.g., dead, injured but alive, injured and moving, blood or tissue observed in the water, status unknown, disappeared); and
 - To the extent practicable, photographs or video footage of the animal(s).
- For deep penetration surveys, in the event of a live stranding (or near-shore atypical milling) event within 50 km of the survey operations, where the NMFS stranding network is engaged in herding or other interventions to return animals to the water, the Director of OPR, NMFS (or designee) will advise the LOA-holder of the need to implement shutdown procedures for all active acoustic sources operating within 50 km of the stranding. Shutdown procedures for live stranding or milling marine mammals include the following:
 - If at any time, the marine mammal(s) die or are euthanized, or if herding/intervention efforts are stopped, the Director of OPR, NMFS (or designee) will advise the LOA-holder that the shutdown around the animals' location is no longer needed.
 - Otherwise, shutdown procedures will remain in effect until the Director of OPR, NMFS (or designee) determines and advises the LOA-holder that all live animals involved have left the area (either of their own volition or following an intervention).
 - If further observations of the marine mammals indicate the potential for re-stranding, additional coordination with the LOA-holder will be required to determine what measures are necessary to minimize that likelihood (e.g., extending the shutdown or moving operations farther away) and to implement those measures as appropriate.
 - If NMFS determines that the circumstances of any marine mammal stranding found in the vicinity of the activity suggest investigation of the association with survey activities is warranted, and an investigation into the stranding is being pursued, NMFS will submit a written request to the LOA-holder indicating that the following initial available information must be provided as soon as possible, but no later than 7 business days after the request for information. In the event that the investigation is still inconclusive, the investigation of the association of the survey activities is still warranted, and the investigation is still being

pursued, NMFS may provide additional information requests, in writing, regarding the nature and location of survey operations prior to the time period above.

- Status of all sound source use in the 48 hours preceding the estimated time of stranding and within 50 km of the discovery/notification of the stranding by NMFS; and
- If available, description of the behavior of any marine mammal(s) observed preceding (i.e., within 48 hours and 50 km) and immediately after the discovery of the stranding.

- **General Mitigation Required During All G&G Activities:**

- Vessel Strike Avoidance (NTL 2016-BOEM-G01)
- Marine Trash and Debris (NTL 2015-BSEE-G03)
- Biologically Sensitive Underwater Features/Areas (NTL 2009-BOEM-G39)
- Deepwater Benthic Communities (NTL 2009-BIEM-G40)
- Archaeological Resource Surveys (NTL 2005-G07)
- Military Warning and Water Test Areas (NTL 2014-G04)
- Revisions to the List of OCS Leas Blocks Requiring Archaeological Resource Surveys (NTL 2011-JOINT-G01)
- Shallow Hazards Program (Section VI.B of NTL 2008-G05)
- Ancillary Activities (NTL 2009-G34)
- Guidance for Activities in or Near NMS (NMSs 15 CFR 9.22 Subpart L)

End of Section D Proprietary Attachment-4



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
 NATIONAL MARINE FISHERIES SERVICE
 1315 East-West Highway
 Silver Spring, Maryland 20910

LETTER OF AUTHORIZATION

Chevron and its designees are hereby authorized under section 101(a)(5)(A) of the Marine Mammal Protection Act (MMPA; 16 U.S.C. 1371(a)(5)(A)) to take marine mammals incidental to geophysical survey activities in the Gulf of America, subject to the provisions of the MMPA and the Regulations Governing Taking Marine Mammals Incidental to Geophysical Survey Activities in the Gulf of America (50 CFR Part 217, Subpart S) (Regulations).

1. This Letter of Authorization (LOA) is valid from October 15, 2025, through April 19, 2026.
2. This LOA authorizes take incidental to the specified geophysical survey activities (3D OBN survey in all or portions of 435 Lease Blocks centered on Lease Block Walker Ridge 678) described in the LOA request.
3. General Conditions
 - (a) A copy of this LOA must be in the possession of the Holder of the Authorization (Holder), vessel operator, other relevant personnel, the lead protected species observer (PSO), and any other relevant designees operating under the authority of the LOA.
 - (b) The species and/or stocks authorized for taking are listed in Table 1. Authorized take, by Level A and Level B harassment only, is limited to the species and numbers listed in Table 1.
 - (c) The taking by serious injury or death of any of the species listed in Table 1 or any taking of any other species of marine mammal is prohibited and may result in the modification, suspension, or revocation of this IHA. Any taking exceeding the authorized amounts listed in Table 1 is prohibited and may result in the modification, suspension, or revocation of this IHA.
 - (d) The Holder must instruct relevant vessel personnel with regard to the authority of the protected species monitoring team (PSO team), and must ensure that relevant vessel personnel and PSO team participate in a joint onboard briefing, led by the vessel operator and lead PSO, prior to beginning work to ensure that responsibilities, communication procedures, protected species monitoring protocols, operational procedures, and LOA requirements are clearly understood. This briefing must be repeated when relevant new personnel join the survey operations before work involving those personnel commences.
 - (e) The acoustic source must be deactivated when not acquiring data or preparing to acquire data, except as necessary for testing. Unnecessary use of the acoustic source must be avoided. Notified operational capacity (i.e., total array volume)



(not including redundant backup airguns) must not be exceeded during the survey, except where unavoidable for source testing and calibration purposes. All occasions where activated source volume exceeds notified operational capacity must be communicated to the PSO(s) on duty and fully documented. The lead PSO must be granted access to relevant instrumentation documenting acoustic source power and/or operational volume.

(f) PSO requirements:

- i. LOA-holders must use independent, dedicated, qualified PSOs, meaning that the PSOs must be employed by a third-party observer provider, must have no tasks other than to conduct observational effort, collect data, and communicate with and instruct relevant vessel crew with regard to the presence of protected species and mitigation requirements (including brief alerts regarding maritime hazards), and must be qualified pursuant to section 5(a) of this LOA. Acoustic PSOs are required to complete specialized training for operating passive acoustic monitoring (PAM) systems and are encouraged to have familiarity with the vessel on which they will be working. PSOs may act as both acoustic and visual observers (but not simultaneously), so long as they demonstrate that their training and experience are sufficient to perform each task.
- ii. The Holder must submit PSO resumes for NMFS review and approval prior to commencement of the survey (submit to nmfs.psoreview@noaa.gov). Resumes should include dates of training and any prior NMFS approval, as well as dates and description of last experience, and must be accompanied by information documenting successful completion of an acceptable training course. NMFS is allowed one week to approve PSOs from the time that the necessary information is received by NMFS, after which PSOs meeting the minimum requirements will automatically be considered approved.
- iii. At least one visual PSO and two acoustic PSOs aboard each acoustic source vessel must have a minimum of 90 days at-sea experience working in those roles, respectively, with no more than eighteen months elapsed since the conclusion of the at-sea experience. One visual PSO with such experience must be designated as the lead for the entire PSO team. The lead must coordinate duty schedules and roles for the PSO team and serve as the primary point of contact for the vessel operator. (Note that the responsibility of coordinating duty schedules and roles may instead be assigned to a shore-based, third-party monitoring coordinator.) To the maximum extent practicable, the lead PSO must devise the duty schedule such that experienced PSOs are on duty with those PSOs with appropriate training but who have not yet gained relevant experience.

4. Mitigation Requirements

(a) Visual monitoring requirements:

- i. During survey operations (i.e., any day on which use of the acoustic source is planned to occur, and whenever the acoustic source is in the water, whether activated or not), a minimum of two PSOs must be on duty and conducting visual observations at all times during daylight hours (i.e., from 30 minutes prior to sunrise through 30 minutes following sunset).
- ii. Visual monitoring must begin not less than 30 minutes prior to ramp-up and must continue until one hour after use of the acoustic source ceases or until 30 minutes past sunset.
- iii. Visual PSOs must coordinate to ensure 360° visual coverage around the vessel from the most appropriate observation posts, and must conduct visual observations using binoculars and the naked eye while free from distractions and in a consistent, systematic, and diligent manner.
- iv. Visual PSOs must immediately communicate all observations of marine mammals to the on-duty acoustic PSO, including any determination by the PSO regarding species identification, distance, and bearing and the degree of confidence in the determination.
- v. Any observations of marine mammals by crew members aboard any vessel associated with the survey must be relayed to the PSO team.
- vi. During good conditions (e.g., daylight hours; Beaufort sea state (BSS) 3 or less), visual PSOs must conduct observations when the acoustic source is not operating for comparison of sighting rates and behavior with and without use of the acoustic source and between acquisition periods, to the maximum extent practicable.
- vii. Visual PSOs may be on watch for a maximum of two consecutive hours followed by a break of at least one hour between watches and may conduct a maximum of 12 hours of observation per 24-hour period. NMFS may grant an exception for LOA applicants that demonstrate such a “two hours on/one hour off” duty cycle is not practicable, in which case visual PSOs will be subject to a maximum of four consecutive hours on watch followed by a break of at least two hours between watches. Combined observational duties (visual and acoustic but not at the same time) must not exceed 12 hours per 24-hour period for any individual PSO.

(b) Acoustic monitoring requirements:

- i. All source vessels must use a towed PAM system at all times when operating in waters deeper than 100 m, which must be monitored by a

minimum of one acoustic PSO beginning at least 30 minutes prior to ramp-up, at all times during use of the acoustic source, and until one hour after use of the acoustic source ceases. “PAM system” refers to calibrated hydrophone arrays with full system redundancy to detect, identify, and estimate distance and bearing to vocalizing cetaceans, coupled with appropriate software to aid monitoring and listening by a PAM operator skilled in bioacoustics analysis and computer system specifications capable of running appropriate software. The PAM system must have at least one calibrated hydrophone (per each deployed hydrophone type and/or set) sufficient for determining whether background noise levels on the towed PAM system are sufficiently low to meet performance expectations. Applicants must provide a PAM plan including description of the hardware and software proposed for use prior to proceeding with any survey where PAM is required.

- ii. Acoustic PSOs must immediately communicate all detections of marine mammals to visual PSOs (when visual PSOs are on duty), including any determination by the PSO regarding species identification, distance, and bearing, and the degree of confidence in the determination.
- iii. Acoustic PSOs may be on watch for a maximum of four consecutive hours followed by a break of at least two hours between watches, and may conduct a maximum of 12 hours of observation per 24-hour period. Combined observational duties (visual and acoustic but not at the same time) must not exceed 12 hours per 24-hour period for any individual PSO.
- iv. Survey activity may continue for 30 minutes when the PAM system malfunctions or is damaged, while the PAM operator diagnoses the issue. If the diagnosis indicates that the PAM system must be repaired to solve the problem, operations may continue for an additional two hours without acoustic monitoring during daylight hours only under the following conditions:
 - (A) Sea state is less than or equal to BSS 4;
 - (B) No marine mammals (excluding delphinids) detected solely by PAM in the applicable exclusion zone in the previous two hours;
 - (C) NMFS is notified via email as soon as practicable with the time and location in which operations began occurring without an active PAM system; and
 - (D) Operations with an active acoustic source, but without an operating PAM system, do not exceed a cumulative total of four hours in any 24-hour period.

- (c) PSOs must establish and monitor applicable exclusion and buffer zones. These zones must be based upon the radial distance from the edges of the airgun array (rather than being based on the center of the array or around the vessel itself). During use of the acoustic source (i.e., anytime the acoustic source is active, including ramp-up), occurrence of marine mammals within the relevant buffer zone (but outside the exclusion zone) should be communicated to the operator to prepare for the potential shutdown of the acoustic source.
 - i. Two exclusion zones are defined, depending on the species and context. A standard exclusion zone encompassing the area at and below the sea surface out to a radius of 500 meters from the edges of the airgun array (0-500 m) is defined. For special circumstances (defined at 4(e)(v) of this LOA), the exclusion zone encompasses an extended distance of 1,500 meters (0-1,500 m).
 - ii. During pre-start clearance monitoring (i.e., before ramp-up begins), the buffer zone acts as an extension of the exclusion zone in that observations of marine mammals within the buffer zone would also preclude airgun operations from beginning (i.e., ramp-up). For all marine mammals (except where superseded by the extended 1,500-m exclusion zone), the buffer zone encompasses the area at and below the sea surface from the edge of the 0-500 meter exclusion zone out to a radius of 1,000 meters from the edges of the airgun array (500-1,000 m). The buffer zone is not applicable when the exclusion zone is greater than 500 meters, i.e., the observational focal zone is not increased beyond 1,500 meters.
- (d) A ramp-up procedure, involving a step-wise increase in the number of airguns firing and total active array volume until all operational airguns are activated and the full volume is achieved, is required at all times as part of the activation of the acoustic source. A 30-minute pre-start clearance observation period must occur prior to the start of ramp-up. The Holder must adhere to the following pre-start clearance and ramp-up requirements:
 - i. The operator must notify a designated PSO of the planned start of ramp-up as agreed upon with the lead PSO; the notification time should not be less than 60 minutes prior to the planned ramp-up.
 - ii. Ramp-ups must be scheduled so as to minimize the time spent with source activated prior to reaching the designated run-in.
 - iii. A designated PSO must be notified again immediately prior to initiating ramp-up procedures and the operator must receive confirmation from the PSO to proceed.
 - iv. Ramp-up must not be initiated if any marine mammal is within the

applicable exclusion or buffer zone. If a marine mammal is observed within the exclusion zone or the buffer zone during the 30-minute pre-start clearance period, ramp-up must not begin until the animal(s) has been observed exiting the zones or until an additional time period has elapsed with no further sightings (15 minutes for small delphinids and 30 minutes for all other species).

- v. Ramp-up must begin by activating a single airgun of the smallest volume in the array and shall continue in stages by doubling the number of active elements at the commencement of each stage, with each stage of approximately the same duration. Total duration must not be less than 20 minutes. The operator must provide information to the PSO documenting that appropriate procedures were followed.
 - vi. Ramp-up must cease and the source shut down upon observation of marine mammals within the applicable exclusion zone. Once ramp-up has begun, observations of marine mammals within the buffer zone do not require shutdown.
 - vii. Ramp-up may occur at times of poor visibility, including nighttime, if appropriate acoustic monitoring has occurred with no detections of a marine mammal other than delphinids in the 30 minutes prior to beginning ramp-up. Acoustic source activation may only occur at night where operational planning cannot reasonably avoid such circumstances.
 - viii. If the acoustic source is shut down for brief periods (i.e., less than 30 minutes) for reasons other than implementation of prescribed mitigation (e.g., mechanical difficulty), it may be activated again without ramp-up if PSOs have maintained constant visual and/or acoustic observation and no visual or acoustic detections of any marine mammal have occurred within the applicable exclusion zone. For any longer shutdown, pre-start clearance observation and ramp-up are required. For any shutdown at night or in periods of poor visibility (e.g., BSS 4 or greater), ramp-up is required, but if the shutdown period was brief and constant observation maintained, pre-start clearance watch is not required.
 - ix. Testing of the acoustic source involving all elements requires ramp-up. Testing limited to individual source elements or strings does not require ramp-up but does require the pre-start clearance observation period.
- (e) Shutdown requirements:
- i. Any PSO on duty has the authority to delay the start of survey operations or to call for shutdown of the acoustic source pursuant to these requirements.

- ii. The operator must establish and maintain clear lines of communication directly between PSOs on duty and crew controlling the acoustic source to ensure that shutdown commands are conveyed swiftly while allowing PSOs to maintain watch.
 - iii. When both visual and acoustic PSOs are on duty, all detections must be immediately communicated to the remainder of the on-duty PSO team for potential verification of visual observations by the acoustic PSO or of acoustic detections by visual PSOs.
 - iv. When the airgun array is active (i.e., anytime one or more airguns is active, including during ramp-up) and (1) a marine mammal appears within or enters the applicable exclusion zone and/or (2) a marine mammal (excluding delphinids) is detected acoustically and localized within the applicable exclusion zone, the acoustic source must be shut down. When shutdown is called for by a PSO, the acoustic source must be immediately deactivated and any dispute resolved only following deactivation.
 - v. The extended 1,500-m exclusion zone must be applied upon detection (visual or acoustic) of a baleen whale, sperm whale, beaked whale, or *Kogia* spp. within the zone.
 - vi. Shutdown requirements are waived for dolphins of the following genera: *Tursiops*, *Stenella*, *Steno*, and *Lagenodelphis*. If a delphinid is visually detected within the exclusion zone, no shutdown is required unless the PSO confirms the individual to be of a genus other than those listed above, in which case a shutdown is required. Acoustic detection of delphinids does not require shutdown.
 - vii. If there is uncertainty regarding identification or localization, PSOs may use best professional judgment in making the decision to call for a shutdown.
 - viii. Upon implementation of shutdown, the source may be reactivated after the marine mammal(s) has been observed exiting the applicable exclusion zone or following a 30-minute clearance period with no further detection of the marine mammal(s).
- (f) *Entanglement avoidance.* To avoid the risk of entanglement, if conducting surveys using ocean-bottom nodes or similar gear the Holder must:
- i. Use negatively buoyant coated wire-core tether cable;
 - ii. Retrieve all lines immediately following completion of the survey; and

- iii. Attach acoustic pingers directly to the coated tether cable; acoustic releases should not be used.

(g) *Vessel strike avoidance.* The Holder must adhere to the following requirements:

- i. Vessel operators and crews must maintain a vigilant watch for all marine mammals and must slow down, stop their vessel, or alter course, as appropriate and regardless of vessel size, to avoid striking any marine mammal. A visual observer aboard the vessel must monitor a vessel strike avoidance zone around the vessel, which shall be defined according to the parameters stated in this subsection. Visual observers monitoring the vessel strike avoidance zone may be third-party observers (i.e., PSOs) or crew members, but crew members responsible for these duties must be provided sufficient training to distinguish marine mammals from other phenomena and broadly to identify a marine mammal as a baleen whale, sperm whale, or other marine mammal;
- ii. Vessel speeds must be reduced to 10 kn or less when mother/calf pairs, pods, or large assemblages of marine mammals are observed near a vessel;
- iii. All vessels must maintain a minimum separation distance of 500 m from baleen whales;
- iv. All vessels must maintain a minimum separation distance of 100 m from sperm whales;
- v. All vessels must, to the maximum extent practicable, attempt to maintain a minimum separation distance of 50 m from all other marine mammals, with an exception made for those animals that approach the vessel; and
- vi. When marine mammals are sighted while a vessel is underway, the vessel must take action as necessary to avoid violating the relevant separation distance, e.g., attempt to remain parallel to the animal's course, avoid excessive speed or abrupt changes in direction until the animal has left the area. If marine mammals are sighted within the relevant separation distance, the vessel must reduce speed and shift the engine to neutral, not engaging the engines until animals are clear of the area. This does not apply to any vessel towing gear or any vessel that is navigationally constrained.
- vii. These requirements do not apply in any case where compliance would create an imminent and serious threat to a person or vessel or to the extent that a vessel is restricted in its ability to maneuver and, because of the restriction, cannot comply.

5. Monitoring Requirements

(a) PSO qualifications:

- i. PSOs must successfully complete relevant, acceptable training, including completion of all required coursework and passing (80 percent or greater) a written and/or oral examination developed for the training program.
- ii. PSOs must have successfully attained a bachelor's degree from an accredited college or university with a major in one of the natural sciences, a minimum of 30 semester hours or equivalent in the biological sciences, and at least one undergraduate course in math or statistics. The educational requirements may be waived if the PSO has acquired the relevant skills through alternate experience. Requests for such a waiver must be submitted to NMFS and shall include written justification. Requests will be granted or denied (with justification) by NMFS within one week of receipt of submitted information. Alternate experience that may be considered includes, but is not limited to:
 - (A) secondary education and/or experience comparable to PSO duties;
 - (B) previous work experience conducting academic, commercial, or government-sponsored marine mammal surveys; or
 - (C) previous work experience as a PSO; the PSO should demonstrate good standing and consistently good performance of PSO duties.

(b) *Equipment.* The Holder is required to:

- i. Provide PSOs with bigeye binoculars (e.g., 25 x 150; 2.7 view angle; individual ocular focus; height control) of appropriate quality solely for PSO use. These must be pedestal-mounted on the deck at the most appropriate vantage point that provides for optimal sea surface observation, PSO safety, and safe operation of the vessel.
- ii. For each vessel required to use a PAM system, provide a PAM system that has been verified and tested by an experienced acoustic PSO who will be using it during the trip for which monitoring is required;
- iii. Work with the selected third-party observer provider to ensure PSOs have all equipment (including backup equipment) needed to adequately perform necessary tasks, including accurate determination of distance and bearing to observed marine mammals. (Equipment specified in A. through G. below may be provided by an individual PSO, the third-party observer provider, or the LOA-holder, but the LOA-holder is responsible for ensuring PSOs have the proper equipment required to perform the duties specified herein.) Such equipment, at a minimum, must include:

- (A) Reticle binoculars (e.g., 7 x 50) of appropriate quality (at least one per PSO, plus backups);
 - (B) Global Positioning Unit (GPS) (plus backup);
 - (C) Digital camera with a telephoto lens (the camera or lens should also have an image stabilization system) that is at least 300 mm or equivalent on a full-frame single lens reflex (SLR) (plus backup);
 - (D) Compass (plus backup);
 - (E) Radios for communication among vessel crew and PSOs (at least one per PSO, plus backups); and
 - (F) Any other tools necessary to adequately perform necessary PSO tasks.
- (c) *Data collection.* PSOs must use standardized electronic data forms. PSOs must record detailed information about any implementation of mitigation requirements, including the distance of marine mammals to the acoustic source and description of specific actions that ensued, the behavior of the animal(s), any observed changes in behavior before and after implementation of mitigation, and if shutdown was implemented, the length of time before any subsequent ramp-up or activation of the acoustic source. If required mitigation was not implemented, PSOs must record a description of the circumstances. At a minimum, the following information should be recorded:
- i. Vessel names (source vessel and other vessels associated with survey), vessel size and type, maximum speed capability of vessel, port of origin, and call signs;
 - ii. PSO names and affiliations;
 - iii. Dates of departures and returns to port with port name;
 - iv. Dates of and participants in PSO briefings;
 - v. Dates and times (Greenwich Mean Time) of survey effort and times corresponding with PSO effort;
 - vi. Vessel location (latitude/longitude) when survey effort began and ended and vessel location at beginning and end of visual PSO duty shifts;
 - vii. Vessel location at 30-second intervals (if software capability allows) or 5-minute intervals (if location must be manually recorded);

- viii. Vessel heading and speed at beginning and end of visual PSO duty shifts and upon any line change;
- ix. Environmental conditions while on visual survey (at beginning and end of PSO shift and whenever conditions changed significantly), including Beaufort sea state and any other relevant weather conditions including cloud cover, fog, sun glare, and overall visibility to the horizon;
- x. Vessel location when environmental conditions change significantly;
- xi. Factors that may have contributed to impaired observations during each PSO shift change or as needed as environmental conditions change (e.g., vessel traffic, equipment malfunctions);
- xii. Survey activity information, such as acoustic source power output while in operation, number and volume of airguns operating in an array, tow depth of an acoustic source, and any other notes of significance (i.e., pre-start clearance, ramp-up, shutdown, testing, shooting, ramp-up completion, end of operations, streamers, etc.); and
- xiii. Upon visual observation of a marine mammal, the following information:
 - (A) Watch status (sighting made by PSO on/off effort, opportunistic, crew, alternate vessel/platform);
 - (B) PSO who sighted the animal and PSO location (including height above water) at time of sighting;
 - (C) Time of sighting;
 - (D) Vessel coordinates at time of sighting;
 - (E) Water depth;
 - (F) Direction of vessel's travel (compass direction);
 - (G) Speed of the vessel(s) from which the observation was made;
 - (H) Direction of animal's travel relative to the vessel;
 - (I) Pace of the animal;
 - (J) Estimated distance to the animal (and method of estimating distance) and its heading relative to vessel at initial sighting;

- (K) Identification of the animal (e.g., genus/species, lowest possible taxonomic level, or unidentified), PSO confidence in identification, and the composition of the group if there is a mix of species;
- (L) Estimated number of animals (high/low/best);
- (M) Estimated number of animals by cohort (adults, juveniles, group composition, etc.);
- (N) Description (as many distinguishing features as possible of each individual seen, including length, shape, color, pattern, scars or markings, shape and size of dorsal fin, shape of head, and blow characteristics);
- (O) Detailed behavior observations (e.g., number of blows/breaths, number of surfaces, breaching, spyhopping, diving, feeding, traveling; as explicit and detailed as possible; note any observed changes in behavior), including an assessment of behavioral responses to survey activity;
- (P) Animal's closest point of approach (CPA) and/or closest distance from any element of the acoustic source;
- (Q) Platform activity at time of sighting (e.g., deploying, recovering, testing, shooting, data acquisition, other); and
- (R) Description of any actions implemented in response to the sighting (e.g., delays, shutdown, ramp-up) and time and location of the action.

xiv. Upon acoustic detection of a marine mammal using a PAM system, the following information:

- (A) An acoustic encounter identification number, and whether the detection was linked with a visual sighting;
- (B) Date and time when first and last heard;
- (C) Types and nature of sounds heard (e.g., clicks, whistles, creaks, burst pulses, continuous, sporadic, strength of signal); and
- (D) Any additional information recorded such as water depth of the hydrophone array, bearing of the animal to the vessel (if determinable), species or taxonomic group (if determinable), spectrogram screenshot, and any other notable information.

6. Reporting Requirements

(a) Annual reporting:

- i. The Holder must submit a summary report to NMFS on all activities and monitoring results within 90 days of the completion of the survey or expiration of the LOA, whichever comes sooner, and must include all information described above under section 5(c) of this LOA. If an issued LOA is valid for greater than one year, the summary report must be submitted on an annual basis.
- ii. The report must describe activities conducted and sightings of marine mammals, must provide full documentation of methods, results, and interpretation pertaining to all monitoring, and must summarize the dates and locations of survey operations and all marine mammal sightings (dates, times, locations, activities, associated survey activities, and information regarding locations where the acoustic source was used). In addition to the report, all raw observational data must be made available to NMFS.
- iii. For operations requiring the use of PAM, the report must include a validation document concerning the use of PAM, which should include necessary noise validation diagrams and demonstrate whether background noise levels on the PAM deployment limited achievement of the planned detection goals. Copies of any vessel self-noise assessment reports must be included with the report.
- iv. The Holder must provide geo-referenced time-stamped vessel tracklines for all time periods in which airguns (full array or single) were operating. Tracklines must include points recording any change in airgun status (e.g., when the airguns began operating, when they were turned off). GIS files must be provided in ESRI shapefile format and include the UTC date and time, latitude in decimal degrees, and longitude in decimal degrees. All coordinates must be referenced to the WGS84 geographic coordinate system.
- v. The draft report must be accompanied by a certification from the lead PSO as to the accuracy of the report, and the lead PSO may submit directly to NMFS a statement concerning implementation and effectiveness of the required mitigation and monitoring.
- vi. A final report must be submitted within 30 days following resolution of any comments on the draft report.

- (b) *Comprehensive reporting.* The Holder must contribute to the compilation and analysis of data for inclusion in an annual synthesis report addressing all data

collected and reported through annual reporting in each calendar year. The synthesis period shall include all annual reports deemed to be final by NMFS in a given one-year reporting period. The report must be submitted to NMFS within 90 days following the end of a given one-year reporting period.

(c) Reporting of injured or dead marine mammals:

- i. In the event that personnel involved in the survey activities discover an injured or dead marine mammal, the Holder must report the incident to the Office of Protected Resources (OPR), NMFS and to the Southeast Regional Stranding Network as soon as feasible. The report must include the following information:
 - (A) Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
 - (B) Species identification (if known) or description of the animal(s) involved;
 - (C) Condition of the animal(s) (including carcass condition if the animal is dead);
 - (D) Observed behaviors of the animal(s), if alive;
 - (E) If available, photographs or video footage of the animal(s); and
 - (F) General circumstances under which the animal was discovered.
- ii. In the event of a ship strike of a marine mammal by any vessel involved in the survey activities, the LOA-holder must report the incident to OPR, NMFS and to the Southeast Regional Stranding Network as soon as feasible. The report must include the following information:
 - (A) Time, date, and location (latitude/longitude) of the incident;
 - (B) Species identification (if known) or description of the animal(s) involved;
 - (C) Vessel's speed during and leading up to the incident;
 - (D) Vessel's course/heading and what operations were being conducted (if applicable);
 - (E) Status of all sound sources in use;
 - (F) Description of avoidance measures/requirements that were in place

at the time of the strike and what additional measures were taken, if any, to avoid strike;

- (G) Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, visibility) immediately preceding the strike;
- (H) Estimated size and length of animal that was struck;
- (I) Description of the behavior of the marine mammal immediately preceding and following the strike;
- (J) If available, description of the presence and behavior of any other marine mammals immediately preceding the strike;
- (K) Estimated fate of the animal (e.g., dead, injured but alive, injured and moving, blood or tissue observed in the water, status unknown, disappeared); and
- (L) To the extent practicable, photographs or video footage of the animal(s).

7. Actions to Minimize Additional Harm to Live-Stranded (or Milling) Marine Mammals

- (a) In the event of a live stranding (or near-shore atypical milling) event within 50 km of the survey operations, where the NMFS stranding network is engaged in herding or other interventions to return animals to the water, the Director of OPR, NMFS (or designee) will advise the Holder of the need to implement shutdown procedures for all active acoustic sources operating within 50 km of the stranding. Shutdown procedures for live stranding or milling marine mammals include the following:
 - i. If at any time, the marine mammal(s) die or are euthanized, or if herding/intervention efforts are stopped, the Director of OPR, NMFS (or designee) will advise the LOA-holder that the shutdown around the animals' location is no longer needed.
 - ii. Otherwise, shutdown procedures will remain in effect until the Director of OPR, NMFS (or designee) determines and advises the LOA-holder that all live animals involved have left the area (either of their own volition or following an intervention).
 - iii. If further observations of the marine mammals indicate the potential for re-stranding, additional coordination with the LOA-holder will be required to determine what measures are necessary to minimize that likelihood (e.g., extending the shutdown or moving operations farther away) and to implement those measures as appropriate.

- (b) If NMFS determines that the circumstances of any marine mammal stranding found in the vicinity of the activity suggest investigation of the association with survey activities is warranted, and an investigation into the stranding is being pursued, NMFS will submit a written request to the LOA-holder indicating that the following initial available information must be provided as soon as possible, but no later than 7 business days after the request for information. In the event that the investigation is still inconclusive, the investigation of the association of the survey activities is still warranted, and the investigation is still being pursued, NMFS may provide additional information requests, in writing, regarding the nature and location of survey operations prior to the time period above.
 - i. Status of all sound source use in the 48 hours preceding the estimated time of stranding and within 50 km of the discovery/notification of the stranding by NMFS; and
 - ii. If available, description of the behavior of any marine mammal(s) observed preceding (i.e., within 48 hours and 50 km) and immediately after the discovery of the stranding.
- 8. This Authorization may be modified, suspended or revoked if the Holder fails to abide by the conditions prescribed herein (including, but not limited to, failure to comply with monitoring or reporting requirements), or if NMFS determines: (1) the authorized taking is likely to have or is having more than a negligible impact on the species or stocks of affected marine mammals, or (2) the prescribed measures are likely not or are not effecting the least practicable adverse impact on the affected species or stocks and their habitat.

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Kimberly Damon-Randall
Director,
Office of Protected Resources,
National Marine Fisheries Service.

Table 1. Authorized Incidental Take.

Common name	Scientific name	Level A harassment	Level B harassment
Sperm whale	<i>Physeter macrocephalus</i>	0	259
Pygmy/Dwarf sperm whale	<i>Kogia</i> spp.	21	259
Beaked whales	<i>Ziphius cavirostris/ Mesoplodon</i> spp.	0	105
Rough-toothed dolphin	<i>Steno bredanensis</i>	0	820
Bottlenose dolphin	<i>Tursiops truncatus</i>	0	21
Clymene dolphin	<i>Stenella clymene</i>	0	1,691
Pantropical spotted dolphin	<i>Stenella attenuata</i>	0	13,206
Spinner dolphin	<i>Stenella longirostris</i>	0	152
Striped dolphin	<i>Stenella coeruleoalba</i>	0	4,750
Fraser's dolphin	<i>Lagenodelphis hosei</i>	0	379
Risso's dolphin	<i>Grampus griseus</i>	0	81
Blackfish ¹		0	3,087

¹The "blackfish" guild includes melon-headed whales, false killer whales, pygmy killer whales, and killer whales.

Attachment 1: The Bureaus' Geophysical Survey Mitigation Protocol (in Bureaus' Focused BA Appendix A.1)

These protocols will be programmatically implemented by the Bureau of Ocean Energy Management (BOEM), the Bureau of Safety and Environmental Enforcement (BSEE), and provide guidelines to operators in complying with the Endangered Species Act (ESA; 16 U.S.C. §§ 1531-1544) and Marine Mammal Protection Act (MMPA; 16 U.S.C. §§1361- 1423h). The measures contained in this attachment apply to, among other activities, all geophysical surveys associated with the federally regulated oil and gas program in the Gulf of America. This protocol, jointly developed with NMFS and the Bureaus, is intended to be a standard for geophysical survey use. Hence, it includes a broader scope of measures that may apply to activities beyond the Gulf of America oil and gas program.

BOEM and BSEE require the lessee or the lessee's representatives (e.g., operators, contractors) (collectively, the "lessee") to follow these programmatically applied protocols, also known as "Conditions of Approval (COA)" for authorized oil and gas activities on the Outer Continental Shelf (OCS) of the Gulf of America. Reporting requirements are included where appropriate.

A.1 Operational National Mitigation Protocols for Geophysical Surveys¹

Table 1. Summary of Tiers and Associated Protocols

Elements	Tier 1	Tier 2	Tier 3 ²	Tier 4
Sources	Airgun arrays > 1,500 in ³ or any array with > 12 airguns	Airgun arrays ≤ 1,500 in ³ or ≤ 12 airguns	Sparkers	<i>De minimis</i> sources (see below)
Visual Protected Species Observers (PSO) ³	Minimum of 2 NMFS-approved PSOs on duty during daylight hours (30 minutes before sunrise through 30 minutes after sunset); Limit of 4 consecutive hours on watch followed by a break of at least 1 hour; Maximum of 12 hours on watch per 24-hour period	Minimum of 2 NMFS-approved PSOs on duty during daylight hours (30 minutes before sunrise through 30 minutes after sunset); Limit of 4 consecutive hours on watch followed by a break of at least 1 hour; Maximum of 12 hours on watch per 24-hour period	Minimum of 1 PSO on duty during daylight hours (30 minutes before sunrise through 30 minutes after sunset); PSOs must be either designated by the Federal agency funding/conducting the survey or approved by NMFS	Not required
Passive acoustic monitoring (PAM)	Required ⁴ ; minimum of 1 NMFS-approved PAM operator on duty from 30 minutes before start of source to 1 hour past the end of source use; Limit of 4 consecutive hours on watch followed by a break of at least 1 hour; Maximum of 12 hours on watch per 24-hour period	Not required		
Shutdown zones	• 500 m (all marine mammals) • 1,500 m (special circumstances; see Table 2 below) • 150 m (sea turtles)	• 100 m (all marine mammals and sea turtles) • 500 m (special circumstances; see Table 2 below)	Not required	

¹ Agencies responsible for the preparation of these protocols include NOAA's NMFS, BOEM, and BSEE. The DOI's U.S. Geological Survey and the National Science Foundation provided input. Requirements for notifications, reporting, etc. to BOEM and/or BSEE are limited to activities occurring pursuant to those agencies' relevant statutory and regulatory authorities.

² A MMPA incidental take authorization is not required for Tier 3 surveys implementing these protocols.

³ 24-hr visual monitoring may be required as warranted by improvements in low-light detection capabilities.

⁴ PAM is not required for Tier 1 surveys occurring in Cook Inlet or in water depths < 100 m in the Gulf of America. Borehole seismic surveys (also referred to as vertical seismic profiles [VSP]) involving use of a stationary source position that is close to the well (e.g., deployed from a platform), such as zero-offset VSPs, are not required to use PAM.

Elements	Tier 1	Tier 2	Tier 3 ²	Tier 4
Pre-start clearance (additional buffer zone as applicable)	Required; 30-minute clearance period of the following zones: • 1,000 m (all marine mammals) • 1,500 m (special circumstances; see Table 2 below) • 150 m (sea turtles) Following detection within zone, animal must be observed exiting or additional period of 15 or 30 minutes	Required; 30-minute clearance period of the following zones: • 200 m (all marine mammals) • 100 m (sea turtles) • 500 m (special circumstances; see Table 2 below) Following detection within zone, animal must be observed exiting or additional period of 15 or 30 minutes	Required; 30-minute clearance period of the following zones: • 100 m (all marine mammals and sea turtles) • 500 m (special circumstances; see Table 2 below) Following detection within zone, animal must be observed exiting or additional period of 15 or 30 minutes	Not required
Ramp-up	Required; duration ≥ 20 minutes	Required for arrays only; duration dependent on number of elements; no minimum duration required	Required when technically feasible; ramp up sources to half power for 5 minutes and then to full power	Not required
Shutdown	Shutdown required for marine mammal detected within defined shutdown zones; Shutdown (i.e., pause) not requiring ramp -up for sea turtles detected within defined shutdown zones (during Tier 3 surveys, shutdown [i.e., pause] for sea turtles is optional); Exception for certain delphinids and pinnipeds; Re-start allowed following clearance period of 15 or 30 minutes.			Not required

A.1.1 Background

The use of marine acoustic sources for acquiring geophysical data (geophysical surveys) may have an impact on marine life, including marine mammals (all of which are protected under the Marine Mammal Protection Act [MMPA]) and species listed under the ESA. In addition, the Outer Continental Shelf Lands Act (OCSLA) requires that geophysical survey data be obtained in an environmentally sound manner. Due to these legal and environmental concerns, protocols have been developed to mitigate the impacts of these sources on sensitive species and habitats.

These protocols⁵ reflect past and current requirements and are based on measures identified through the following: review of mitigation protocols required or recommended elsewhere; review articles and other available scientific literature; project design criteria, terms and conditions, and reasonable and prudent measures identified in ESA section 7 consultations; mitigation, monitoring, and reporting requirements identified in previous MMPA Incidental Take Authorizations (ITAs) issued to survey operators; and NMFS' technical memorandum on standards for a protected species observer and data management program (Baker et al., 2013).

To protect marine mammals and ESA-listed species (hereafter referred to as protected species) during operations, operators are required to follow specific survey protocols. Here, we address standardized baseline operational mitigation and monitoring protocols. However, it is important to be clear that different and/or additional protocols may sometimes be required depending on

⁵ These protocols are designed for use in conjunction with activities for which take is authorized and/or exempted under the MMPA and/or ESA (Tiers 1/2) or may be used to avoid the potential for take (Tier 3). "Take" is defined under the respective statutes.

the specific action, location, and/or circumstances.⁶ For example, time/area restrictions (which are not discussed here) may be required where sensitive species or stocks and/or critical biological functions are known to occur, or where subsistence uses are occurring.

Compliance with these standard operational requirements must be demonstrated by submitting reports as detailed below in the Reporting section (A.1.10).

Geophysical surveys are conducted to acquire information on marine seabed and subsurface geology, seafloor bathymetry, and water column features. The purposes of geophysical surveys include, but are not limited to: (1) obtaining data for hydrocarbon and mineral exploration and production; (2) siting of oil and gas structures, facilities, and pipelines and renewable energy structures and cables; (3) identifying possible seafloor or shallow-depth geologic hazards; (4) locating archaeological resources and benthic habitats; (5) mapping seafloor bathymetry and structure; and (5) conducting academic or government research. A general hierarchy of protocols is presented for three different categories of activities: Tier 1, Tier 2, and Tier 3. *De minimis* sources are included in a Tier 4, with no required mitigation protocols.

A.1.2 Tier Summary

Tier 1: Airgun arrays with total volume greater than 1,500 in³ or any array with more than 12 airguns

Tier 2: Airgun arrays with total volume less than or equal to 1,500 in³ and 12 airguns or fewer; single airgun

Tier 3: Sparkers

Tier 4: *De minimis* sources.

Examples of *de minimis* sources:

- Multibeam echosounders (hull-mounted or portable)

⁶ We note that for any MMPA authorization issued, measures ensuring the “least practicable adverse impact” must be included, and that this standard applies to both marine mammal species or stocks and their habitat, as well as subsistence uses. This means that while a standardized list of measures will be helpful by increasing efficiency and effectiveness, NMFS still must independently evaluate every application, and there may occasionally be circumstances wherein the appropriate application of the “least practicable adverse impact” standard necessitates either the inclusion of additional measures or the shutdown of otherwise standard measures. Likewise, each ESA section 7 consultation requires analysis of the specific action proposed by the action agency. Protocols considered part of the proposed action are referred to as conservation measures in ESA consultations and the extent to which they avoid or minimize the effects of the action on ESA-listed species and/or designated critical habitat is analyzed as part of the consultation. Formal ESA section 7 consultations require NMFS issue a Biological Opinion with an associated Incidental Take Statement (ITS) that includes Reasonable and Prudent Measures (RPMs) considered necessary or appropriate to minimize the impact of any incidental take of ESA-listed species. Terms and Conditions (T&C) to implement the RPMs are included in the ITS. The RPMs and associated T&Cs may require additional measures to minimize take of ESA-listed species. There may also be cases where NMFS determines the measures described in this document and included in conservation measures that are part of the proposed action require modification or are not sufficiently protective as to avoid or minimize the effects of the action on ESA-listed species and/or designated critical habitat.

- Side-scan and sector-scanning sonars
- Hull-mounted non-parametric sub-bottom profilers (SBPs) (e.g., Knudsens)
- Parametric shallow penetration SBPs (e.g., Innomars)
- Fathometers for navigation
- Towed non-parametric SBPs/ Compressed High-intensity Radiated Pulse (Chirp) systems (e.g., Edgetech 424, Edgetech 512i)
- EK60/EK80 split-beam echosounders
- 3-plate boomers
- Pingers (acoustic locators) for locating over the side wireline instrumentation in the water column
- Acoustic releases (brief duration pinging), e.g., for moorings, landers, OBS
- Ultra-short baseline (USBL) and long baseline (LBL) positioning equipment, e.g., for navigation of submersibles, remotely operated vehicles (ROVs), etc.
- All Acoustic Doppler Current Profiling (ADCP) equipment
- All instrumentation on human occupied vehicle (HOV)/ autonomous underwater vehicle (AUV)/ROVs
- Pressure-equipped inverted echo sounders (PIES) and Pressure Monitoring Transducers (PMTs)
- Electromagnetic sources
- Wolfspar⁷
- All instruments operated at 180 kHz or greater

Any additional sources that have the similar source level/directivity/frequency characteristics as those already included here may be included in Tier 4.

A.1.3 Definitions

Terms used in these protocols have the following meanings:

1. Protected species means any NMFS trust species listed under the ESA and/or protected by the MMPA. The requirements discussed herein primarily focus on air-breathing protected species that are more readily observed at the surface, such as marine mammals and sea turtles. However, other ESA-listed species are also protected, and observations of these species should be reported as detailed below.
2. Protected Species Observer (PSO) means a trained, independent biologist employed for purposes of conducting visual and/or acoustic observation for protected species. A conditionally-approved PSO is one with limited geophysical survey experience (i.e., less than 90 days tier-specific at-sea duty time under a lead PSO). An unconditionally-approved PSO is one with more than 90 days tier-specific at-sea experience (but no more than 18 months elapsed since the conclusion of the at-sea experience).

⁷ Wolfspar is a proprietary low-frequency source used to supplement the quantity and quality of data collected during surveys using conventional airgun sources. Wolfspar is a variable-frequency marine resonator designed to produce ultra-low frequency (from 1.4-16 Hz, but typically used to produce signals at 2-4 Hz) swept (non-impulsive) signals. Other alternative low-frequency sources may be evaluated on a case-by-case basis.

3. An Incidental Take Authorization (ITA), issued pursuant to the MMPA, authorizes the take of marine mammals incidental to a specified activity. An ITA may be either an incidental harassment authorization (IHA), which is effective for a maximum period of one year, or a letter of authorization (LOA), which is issued under incidental take regulations (ITR) and may be effective for a period of up to five years.
4. An Incidental Take Statement (ITS) is provided with a biological opinion, in cases where NMFS concludes that a proposed agency action is found to be consistent with section 7(a)(2) and the proposed action may incidentally take ESA-listed species. The ITS specifies the impact of any incidental taking of listed species. To minimize such impacts, Reasonable and Prudent Measures (RPMs) and Terms and Conditions to implement the RPMs must be provided. Section 7(b)(4)(C) of the ESA provides that take of ESA-listed marine mammals may be included in the ITS of a biological opinion only if the taking is authorized through an MMPA ITA.
5. Tier 1 surveys are those using an airgun array with a total volume of greater than 1,500 in³, or those containing more than 12 airguns, as the acoustic source. These surveys are also referred to as deep penetration or high energy surveys.
6. Tier 2 surveys are those using an airgun array with total volume of 1,500 in³ or less, with 12 or fewer airguns, or a single airgun as the acoustic source. These surveys are also referred to as shallow penetration or low energy surveys.
7. Tier 3 surveys are those using a sparker.
8. “De minimis” here refers to sources considered unlikely to result in the incidental take of protected species. No mitigation protocols are required during surveys using only *de minimis*, or Tier 4, sources. Generally, use of these sources may be considered as not likely to adversely affect ESA-listed species and would not result in incidental take of marine mammals (as defined under the MMPA).
9. The term “small odontocetes” is used herein to define a group of cetacean species for purposes of defining the appropriate pre-start clearance period. Small odontocetes, as defined here, include certain genera of the Family Delphinidae (*Delphinus*, *Lagenodelphis*, *Lagenorhynchus*, *Lissodelphis*, *Stenella*, *Steno*, and *Tursiops*) and members of the Family Phocoenidae (i.e., porpoises). Note that the use of the term “small” in this context is not an absolute reference to size, but is rather used as reference to a group of species that are not typically deep diving.
10. The term “small delphinid” is used herein to define a group of cetacean species for which shutdown requirements are waived. Small delphinids, as defined here, include the same genera of the Family Delphinidae as are included in the definition of the term “small odontocete” above.
11. Pre-start clearance refers to a period of monitoring that may be required in order to ensure that protected species are not present within defined zones prior to activation of the sound source.
12. Ramp-up means the gradual and systematic increase of emitted sound levels from an active acoustic source.
13. Shutdown of the acoustic source means the immediate de-activation of the source, including all individual airgun elements of an array.
14. Shutdown zone (formerly exclusion zone) means the area to be monitored for possible shutdown upon detection of protected species within or entering that zone.

15. Buffer zone means a focal area beyond the standard shutdown zone to be monitored for the presence of protected species.
16. Visual monitoring means the use of trained PSOs (visual PSOs) to systematically scan the ocean surface visually for the presence of protected species and implement the required mitigation procedures. These PSOs must have successfully completed a PSO training program as described below. The focal area for visual observation includes the shutdown zone and buffer zone (when required), but PSOs should periodically scan adjacent waters. Visual monitoring of the shutdown zones and adjacent waters is intended to establish and, when visual conditions allow, maintain zones around the sound source that are clear of protected species. Visual monitoring of the buffer zone (when required) is intended to (1) provide additional protection to protected species that may be in the area during pre-start clearance, (2) aid in establishing and maintaining the shutdown zone by alerting the PSOs and crew of protected species that are outside of, but may approach and enter, the shutdown zone, and (3) enable collection of additional monitoring data to support an understanding of the effects of the activity on protected species.
17. Acoustic monitoring means the use of trained PSOs (acoustic PSOs⁸) to operate PAM equipment to acoustically detect the presence of vocalizing marine mammals. These observers must have successfully completed an acoustic PSO (or PAM operator) training program as described below. Acoustic monitoring involves acoustically detecting vocalizing marine mammals regardless of distance from the source, as localization of animals may not always be possible. Acoustic monitoring is intended to further support visual monitoring in maintaining a shutdown zone around the sound source. In cases where visual monitoring is not effective (e.g., due to weather, nighttime), acoustic monitoring may be used to allow certain activities to occur (or continue), as further detailed below.

A.1.4 General Requirements (Tiers 1–3)

1. A copy of any issued BOEM permit (if applicable) and/or ITA (if required) must be in the possession of the holder, vessel operator, other relevant personnel, the lead PSO (see description below), and any other relevant designees operating under the authority of the permit and/or ITA.
2. The operator must instruct relevant vessel personnel with regard to the authority of the protected species monitoring team, and must ensure that relevant vessel personnel and the protected species monitoring team participate in a joint onboard briefing (hereafter PSO briefing), led by the vessel operator and lead PSO, prior to beginning work to ensure that responsibilities, communication procedures, protected species monitoring protocols, safety and operational procedures, and permit/ITA requirements are clearly understood. This PSO briefing must be repeated when relevant new personnel (e.g., PSOs, acoustic source operator) join the survey operations before work commences.
3. The acoustic source must be deactivated when not acquiring data or preparing to acquire data, except as necessary for testing. Unnecessary use of the acoustic source must be avoided. For use of airgun arrays, notified operational capacity (not including redundant backup airguns) must not be exceeded during the survey, except where unavoidable for source testing and calibration purposes. All occasions where activated volume exceeds

⁸ Acoustic PSOs may be referred to as PAM operators.

notified operational capacity must be communicated to the PSO(s) on duty and fully documented. The lead PSO must be granted access to relevant instrumentation documenting acoustic source power and/or operational volume.

A.1.5 Protected Species Observers

NMFS-approved PSOs must be used during Tier 1-3 surveys; Tier 3 surveys funded/conducted by Federal agencies are exempted from the requirements specified here but must designate qualified shipboard personnel to fulfill this role. Minimum PSO qualifications and required equipment for Tier 1-3 survey types (aside from the aforementioned Tier 3 surveys funded/conducted by Federal agencies) are identified here. The approval process includes NMFS' review of PSO qualifications using standardized guidance for PSO requirements. The number and types of PSOs required are included in the survey-specific sections below.

A.1.5.1 Qualifications

1. The operator must use independent, dedicated, trained PSOs, meaning that the PSOs must be employed by a third-party observer provider, must have no tasks other than to conduct observational effort (visual or acoustic⁹), collect data, and communicate with and instruct relevant vessel crew with regard to the presence of protected species and mitigation requirements (including brief alerts regarding maritime hazards), and must have successfully completed an approved PSO training course for geophysical surveys appropriate for their designated task (visual or acoustic). Acoustic PSOs are required to complete specialized training for operating PAM systems and should have familiarity with the vessel and associated equipment with which they will be working, to the extent practicable. PSOs can act as acoustic or visual observers (but not simultaneously) as long as they demonstrate that their training and experience are sufficient to perform each task.
2. NMFS maintains a list of currently approved PSOs. PSO names must be provided to NMFS by the operator for review and confirmation of their approval for specific roles prior to commencement of the survey.¹⁰ For prospective PSOs not previously approved, or for PSOs whose approval is not current, NMFS must review and approve PSO qualifications. Resumes should include information related to relevant education, experience, and training, including dates, duration, location, and description of prior PSO experience. Resumes must be accompanied by relevant documentation of successful completion of necessary training.
3. NMFS may approve PSOs as conditional or unconditional. A conditionally-approved PSO may be one who is trained but has not yet attained the requisite tier- and region-specific experience. An unconditionally-approved PSO is one who has attained the necessary experience within the relevant region. For unconditional approval, the PSO must have a minimum of 90 days at sea performing the role (either visual or acoustic) at the particular Tier level (1–3), with the conclusion of the most recent relevant experience not more than 18 months previous.
4. At least one of the visual and two of the acoustic PSOs (if required) aboard the vessel must be unconditionally-approved. One unconditionally-approved visual PSO must be designated as the lead for the entire PSO team. This lead should typically be the PSO

⁹ Acoustic PSOs are only required for Tier 1 surveys.

¹⁰ PSO-related inquiries should be directed to nmfs.psoreview@noaa.gov.

with the most experience, would coordinate duty schedules and roles for the PSO team¹¹, and serve as primary point of contact for the vessel operator. To the maximum extent practicable, the duty schedule must be planned such that unconditionally-approved PSOs are on duty with conditionally-approved PSOs.

5. PSOs must successfully complete relevant training, including completion of all required coursework and passing (80 percent or greater) a written and/or oral examination developed for the training program. Training requirements are described in Baker et al. (2013).
 - a) PSOs must have successfully attained a bachelor's degree from an accredited college or university with a major in one of the natural sciences, a minimum of 30 semester hours or equivalent in the biological sciences, and at least one undergraduate course in math or statistics. The educational requirements may be waived if the PSO has acquired the relevant skills through alternate experience. Requests for such a waiver must be submitted to NMFS and must include written justification. Requests must be granted or denied (with justification) by NMFS within one week of receipt of submitted information. Alternate experience that may be considered includes, but is not limited to (1) secondary education and/or experience comparable to PSO duties; (2) previous work experience conducting academic, commercial, or government-sponsored protected species surveys; (3) previous work experience as a PSO (PSO must be in good standing and demonstrate good performance of PSO duties); and (4) traditional knowledge (in Alaska only).

A.1.5.2 Equipment

The operator is required to:

1. For Tier 1 surveys only (see below), provide PSOs with reticle bigeye binoculars (e.g., 25 x 150; 2.7 view angle; individual ocular focus; height control¹²) of appropriate capability solely for PSO use. These must be pedestal-mounted on the deck at the most appropriate vantage point that provides for optimal sea surface observation, PSO safety, and safe operation of the vessel.
2. Each survey required to have PAM will include a passive acoustic monitoring system that has been verified and tested by the acoustic PSO prior to or during the initiation of survey activities.
3. Work with the selected third-party observer provider to ensure PSOs have all equipment (including backup equipment) needed to adequately perform necessary tasks, including accurate determination of distance and bearing to observed marine mammals, and to ensure that PSOs are capable of calibrating equipment as necessary for accurate distance estimates and species identification. Such equipment, at a minimum, must include:
 - a) At least one thermal (infrared) imaging device suited for the marine environment (BOEM program specific).
 - b) Reticle binoculars (e.g., 7 x 50) of appropriate quality (at least one per PSO, plus backups).
 - c) Global Positioning Units (GPS) (at least one plus backups).

¹¹ Responsibility for coordination of duty schedules and roles may be delegated, such as to a shore-based monitoring coordinator employed by the third-party observer provider.

¹² Equipment specifications are provided as examples with regard to appropriate capability only.

- d) Digital cameras with a telephoto lens that is at least 300 mm or equivalent on a full-frame single lens reflex (SLR) (at least one plus backups). The camera or lens should also have an image stabilization system.
- e) Equipment necessary for accurate measurement of distances to protected species.
- f) Compasses (at least one plus backups).
- g) Means of communication among vessel crew and PSOs.
- h) Any other tools deemed necessary to adequately and effectively perform PSO tasks.

Equipment specified in (a) through (g) above may be provided by an individual PSO, the third-party observer provider, or the operator, but the latter is responsible for ensuring PSOs have the proper equipment required to perform the duties specified within these protocols.

A.1.6 Tier-Specific Survey Protocols

For purposes of defining mitigation requirements, we differentiate here between requirements for the three survey “tiers” that may reasonably be associated with potential for impacts to protected species (refer to definitions given earlier). Protocols associated with each tier are detailed below.

A.1.6.1 Tier 1 Survey Protocols

Tier 1 survey protocols are generally considered applicable to surveys using airgun arrays with a total volume greater than 1,500 in³, or with 12 or more airguns. See Table above.

A.1.6.1.1 Visual Monitoring

1. During survey operations (e.g., any day on which use of the acoustic source is planned to occur, and whenever the acoustic source is in the water, whether activated or not), a minimum of two PSOs must be on duty and conducting visual observations at all times during daylight hours (i.e., from 30 minutes prior to sunrise through 30 minutes following sunset).
2. Visual monitoring must begin no less than 30 minutes prior to ramp-up and must continue until one hour after use of the acoustic source ceases or until 30 minutes past sunset.
3. Visual PSOs must coordinate to ensure 360° visual coverage around the vessel from the most appropriate observation posts, and must conduct visual observations using binoculars and the naked eye while free from distractions and in a consistent, systematic, and diligent manner.
4. PSOs must establish and monitor applicable shutdown and buffer zones (see below). These zones must be based upon the radial distance from the edges of the airgun array (rather than being based on the center of the array or around the vessel itself). During use of the acoustic source (i.e., anytime the acoustic source is active, including ramp-up), occurrence of protected species within the relevant buffer zone (but outside the shutdown zone) should be communicated to the operator to prepare for the potential shutdown of the acoustic source.
5. Three shutdown zones are defined, depending on the species and context. A standard shutdown zone encompassing the area at and below the sea surface out to a radius of 500 meters (m) from the edges of the airgun array (0–500 m) is defined for marine mammals. For special circumstances, the shutdown zone encompasses an extended distance of 1,500 meters (0–1,500 meters, see Table 2). For sea turtles a standard shutdown zone of 150 meters (0–150 meters) from the edges of the airgun array applies.

6. During pre-start clearance monitoring (i.e., before ramp-up begins), the buffer zone acts as an extension of the shutdown zone in that observations of protected species within the buffer zone would also preclude airgun operations from beginning (i.e., ramp-up). Pre-start clearance zones are defined as follows. For all marine mammals (other than special circumstances), the pre-start clearance zone encompasses the area at and below the sea surface from the edge of the 500-meter shutdown zone out to a radius of 1,000 meters from the edges of the airgun array. For sea turtles, the pre-start clearance zone is the same as the shutdown zone (150 m). No buffer is added to the extended distance shutdown zone (1,500 m).
7. Visual PSOs must immediately communicate all observations of marine mammals to the on-duty acoustic PSO(s), including any determination by the PSO regarding species identification, distance, and bearing and the degree of confidence in the determination.
8. Any observations of protected species by crew members aboard any vessel associated with the survey must be relayed to the PSO team.
9. During good conditions (e.g., daylight hours; Beaufort sea state (BSS) 3 or less), visual PSOs must conduct observations when the acoustic source is not operating for comparison of sighting rates and behavior with and without use of the acoustic source and between acquisition periods, to the maximum extent practicable.
10. Visual PSOs may be on watch for a maximum of four consecutive hours followed by a break of at least one hour between watches and may conduct a maximum of 12 hours of observation per 24-hour period. Combined observational duties (visual and acoustic but not at the same time) may not exceed 12 hours per 24-hour period for any individual PSO.

A.1.6.1.2 Acoustic Monitoring¹³

1. Source vessels must use a towed PAM system at all times¹⁴, which must be monitored by a minimum of one acoustic PSO beginning at least 30 minutes prior to ramp-up, at all times during use of the acoustic source, and until one hour after use of the acoustic source ceases. Remote acoustic PSOs may be utilized in conjunction with at least one vessel-based, unconditionally approved acoustic PSO.
2. Acoustic PSOs must immediately communicate all detections of marine mammals to visual PSOs (when visual PSOs are on duty), including any determination by the PSO regarding species identification, distance and bearing, and the degree of confidence in the determination.
3. Acoustic PSOs may be on watch for a maximum of four consecutive hours followed by a break of at least one hour between watches and may conduct a maximum of 12 hours of observation per 24-hour period. Combined observational duties (acoustic and visual but not at the same time) may not exceed 12 hours per 24-hour period for any individual PSO.
4. Survey activity may continue for 30 minutes when the PAM system malfunctions or is damaged, while the PAM operator diagnoses the issue. If the diagnosis indicates that the PAM system must be repaired to solve the problem, operations may continue for an

¹³ See PAM Requirements below for further detail.

¹⁴ PAM may not be required when certain circumstances are present. For example, in the GULF OF AMERICA, use of towed PAM is not required for surveys operating in water depths shallower than 100 meters, and PAM is not required in Cook Inlet, Alaska.

additional five hours without acoustic monitoring during daylight hours only under the following conditions:

- a) Sea state is less than or equal to BSS 4;
- b) No marine mammals (excluding delphinids) detected solely by PAM in the applicable shutdown zone in the previous two hours;
- c) NMFS and BSEE¹⁵ are notified via email as soon as practicable with the time and location in which operations began occurring without an active PAM system; and
- d) Operations with an active acoustic source, but without an operating PAM system, do not exceed a cumulative total of ten hours in any 24-hour period.

A.1.6.1.3 Pre-start clearance and Ramp-up

A ramp-up procedure, involving a step-wise increase in the number of airguns firing and total active array volume until all operational airguns are activated and the full volume is achieved, is required at all times as part of the activation of the acoustic source. A 30-minute pre-start clearance observation period must occur prior to the start of ramp-up. The intent of pre-start clearance observation (30 minutes) is to ensure no protected species are within the shutdown zones, and buffer zone if applicable, prior to the beginning of ramp-up. The only time detections of protected species in the buffer zone would prevent operations is during pre-start clearance (i.e., the beginning of ramp-up). The intent of ramp-up is to warn protected species of pending operations and to allow sufficient time for those animals to leave the immediate vicinity. All operators must adhere to the following pre-start clearance and ramp-up requirements:

1. The operator must notify a designated PSO of the planned start of ramp-up as agreed upon with the lead PSO; the notification time should not be less than 60 minutes prior to the planned ramp-up in order to allow the PSOs time to monitor the shutdown and buffer zones for 30 minutes prior to the initiation of ramp-up (pre-start clearance). During this 30 minute pre-start clearance period the entire applicable shutdown and buffer zones must be visible, except as indicated in #7 below.
2. Ramp-ups must be scheduled so as to minimize the time spent with the source activated prior to the start of acquisition.
3. A visual PSO conducting pre-start clearance observations must be notified again immediately prior to initiating ramp-up procedures and the operator must receive confirmation from the PSO to proceed.
4. Any PSO on duty has the authority to delay the start of survey operations if a protected species is detected within the applicable pre-start clearance zone.
5. The operator must establish and maintain clear lines of communication directly between PSOs on duty and crew controlling the acoustic source to ensure that mitigation commands are conveyed swiftly while allowing PSOs to maintain watch.
6. When both visual and acoustic PSOs are on duty, all detections of marine mammals must be immediately communicated to the entire on-duty PSO team for potential verification of visual observations by the acoustic PSO or of acoustic detections by visual PSOs.
7. Ramp-up may not be initiated if any protected species is within the applicable shutdown or buffer zone. If a protected species is observed within the applicable shutdown zone or the buffer zone during the 30 minute pre-start clearance period, ramp-up may not begin

¹⁵ Notifications to BSEE required for survey activities related to oil and gas, renewable energy, or marine minerals programs in Federal waters.

until the animal(s) has been observed exiting the zones or until an additional time period has elapsed with no further sightings (15 minutes for small odontocetes and pinnipeds and 30 minutes for all other species).

8. Ramp-up must begin by activating a single airgun of the smallest volume in the array and must continue in stages by doubling the number of active elements at the commencement of each stage, with each stage of approximately the same duration. Total ramp-up duration must not be less than 20 minutes. The operator must provide information to the PSO documenting appropriate procedures were followed.
9. PSOs must monitor the shutdown and buffer zones 30 minutes before and during ramp-up, and ramp-up must cease and the source must be shut down upon detection of a protected species within the applicable shutdown zone. Once ramp-up has begun, detections of protected species within the buffer zone do not require shutdown, but such detection must be recorded and communicated to the operator to prepare for potential shutdown.
10. Ramp-up may occur at times of poor visibility, including nighttime, if appropriate acoustic monitoring has occurred with no detections of protected species within the pre-start clearance zone in the 30 minutes prior to beginning ramp-up. Acoustic source activation may only occur at night where operational planning cannot reasonably avoid such circumstances.
11. If the acoustic source is shut down for brief periods (i.e., less than 30 minutes) for reasons other than implementation of prescribed mitigation (e.g., mechanical difficulty), it may be activated again without ramp-up if PSOs have maintained constant visual and/or acoustic observation and no visual or acoustic detections of protected species have occurred within the pre-start clearance zone. For any longer shutdown, pre-start clearance observation and ramp-up are required.
12. Testing of the acoustic source involving all elements requires ramp-up. Testing limited to individual source elements or strings does not require ramp-up but does require a 30-minute pre-start clearance period.

A.1.6.1.4 Shutdown

All operators must adhere to the following shutdown requirements:

1. Any PSO on duty has the authority to call for shutdown of the acoustic source if a protected species is detected within the applicable shutdown zone.
2. The operator must establish and maintain clear lines of communication directly between PSOs on duty and crew controlling the acoustic source to ensure that shutdown commands are conveyed swiftly while allowing PSOs to maintain watch.
3. When both visual and acoustic PSOs are on duty, all detections of marine mammals must be immediately communicated to the entire on-duty PSO team for potential verification of visual observations by the acoustic PSO or of acoustic detections by visual PSOs.
4. When the airgun array is active (i.e., anytime one or more airguns is active, including during ramp-up) and (1) a protected species appears within or enters the applicable shutdown zone and/or (2) a marine mammal (excluding delphinids) is detected acoustically and localized within the applicable shutdown zone, the acoustic source must be shut down. When shutdown is instructed by a PSO, the acoustic source must be immediately deactivated and any dispute resolved only following deactivation.

5. The shutdown requirement is waived for small delphinids¹⁶ and pinnipeds¹⁷.
 - a) If a delphinid (individual belonging to the indicated genera of the Family Delphinidae) or pinniped is visually detected within the shutdown zone, no shutdown is required unless the PSO confirms the individual to be of a genus other than those listed, in which case a shutdown is required. Acoustic detection of delphinids does not require shutdown.
6. If there is uncertainty regarding identification of a marine mammal species (i.e., whether the observed marine mammal(s) belongs to one of the delphinid genera for which shutdown is waived or one of the species with a larger shutdown zone), PSOs may use best professional judgment in making the decision to call for a shutdown.
7. Upon implementation of shutdown, the source may be reactivated after the protected species has been observed exiting the applicable shutdown zone (i.e., animal is not required to fully exit the buffer zone where applicable) or following a clearance period (15 minutes for small odontocetes and 30 minutes for all other species) with no further detection of the protected species. For sea turtles observed in the shutdown zone, a shutdown not requiring ramp-up (i.e., a “pause”) is to be implemented until the sea turtle is no longer observed in the shutdown zone.

A.1.6.2 Tier 2 Survey Protocols

Tier 2 survey protocols are generally considered applicable to surveys using airgun arrays of 1,500 in³ volume or smaller and 12 airguns or fewer, or surveys using single airguns. See Table above.

A.1.6.2.1 Visual Monitoring

1. During survey operations (e.g., any day on which use of the acoustic source is planned to occur, and whenever the acoustic source is in the water, whether activated or not), a minimum of two PSOs must be on duty and conducting visual observations at all times during daylight hours (i.e., from 30 minutes prior to sunrise through 30 minutes following sunset).
2. Visual monitoring must begin no less than 30 minutes prior to ramp-up and must continue until one hour after use of the acoustic source ceases or until 30 minutes past sunset.
3. Visual PSOs must coordinate to ensure 360° visual coverage around the vessel from the most appropriate observation posts, and must conduct visual observations using binoculars and the naked eye while free from distractions and in a consistent, systematic, and diligent manner.
4. PSOs must establish and monitor applicable shutdown and buffer zones (see below). These zones must be based upon the radial distance from the edges of the airgun array (or single airgun) (rather than being based on the center of the array or around the vessel itself). During use of the acoustic source (i.e., anytime the acoustic source is active, including ramp-up), occurrence of protected species within the relevant buffer zone (but

¹⁶ Applicable genera will be specific to the region, and include the following: *Delphinus*, *Lagenodelphis*, *Lagenorhynchus*, *Lissodelphis*, *Stenella*, *Steno*, and *Tursiops*. This list may be revised as taxonomy changes.

¹⁷ Waiver for pinnipeds may not be applicable for surveys that may affect ESA-listed pinnipeds.

outside the shutdown zone) should be communicated to the operator to prepare for the potential shutdown of the acoustic source.

5. Two shutdown zones are defined, depending on the species and context. Here, a standard shutdown zone encompassing the area at and below the sea surface out to a radius of 100 meters from the edges of the airgun array (0–100 meters) is defined for marine mammals and sea turtles. For special circumstances, the shutdown zone encompasses an extended distance of 500 meters (0-500 meters, see Table 2).
6. During pre-start clearance monitoring (i.e., before ramp-up begins), the buffer zone also acts as an extension of the shutdown zone in that observations of protected species within the buffer zone would also preclude airgun operations from beginning (i.e., ramp-up). Pre-start clearance zones are defined as follows. For all marine mammals (other than special circumstances), the pre-start clearance zone encompasses the area at and below the sea surface from the edge of the 100-meter shutdown zone out to a radius of 200 meters from the edges of the airgun array (or single airgun). For sea turtles, the pre-start clearance zone encompasses the area at and below the sea surface from the edge of the 100-meter shutdown zone. No buffer is added to the extended distance shutdown zone (500 m).
7. Any observations of protected species by crew members aboard any vessel associated with the survey must be relayed to the PSO team.
8. During good conditions (e.g., daylight hours; Beaufort sea state (BSS) 3 or less), visual PSOs must conduct observations when the acoustic source is not operating for comparison of sighting rates and behavior with and without use of the acoustic source and between acquisition periods, to the maximum extent practicable.
9. Visual PSOs may be on watch for a maximum of four consecutive hours followed by a break of at least one hour between watches and may conduct a maximum of 12 hours of observation per 24-hour period.

A.1.6.2.2 Pre-start Clearance and Ramp-up

A ramp-up procedure, involving a step-wise increase in the number of airguns firing and total active array volume until all operational airguns are activated and the full volume is achieved, is required at all times as part of the activation of the acoustic source. (Ramp-up is not relevant for surveys using a single airgun as the acoustic source.) A 30-minute pre-start clearance observation period must occur prior to the start of ramp-up. The intent of pre-start clearance observation (30 minutes) is to ensure no protected species are within the shutdown zones, and buffer zone if applicable, prior to the beginning of ramp-up. The only time detections of protected species in the buffer zone would prevent operations is during pre-start clearance (i.e., the beginning of ramp-up or single airgun testing). The intent of ramp-up is to warn protected species of pending operations and to allow sufficient time for those animals to leave the immediate vicinity. All operators must adhere to the following pre-start clearance and ramp-up requirements:

1. The operator must notify a designated PSO of the planned start of ramp-up as agreed upon with the lead PSO; the notification time should not be less than 60 minutes prior to the planned ramp-up in order to allow the PSOs time to monitor the shutdown and buffer zones for 30 minutes prior to the initiation of ramp-up (pre-start clearance). During this 30-minute pre-start clearance period the entire applicable shutdown and buffer zones must be visible, except as indicated below (see item 7.).

2. Ramp-ups must be scheduled so as to minimize the time spent with the source activated prior to the start of acquisition.
3. A visual PSO conducting pre-start clearance observations must be notified again immediately prior to initiating ramp-up procedures and the operator must receive confirmation from the PSO to proceed.
4. Any PSO on duty has the authority to delay the start of survey operations if a protected species is detected within the applicable pre-start clearance zone.
5. The operator must establish and maintain clear lines of communication directly between PSOs on duty and crew controlling the acoustic source to ensure that mitigation commands are conveyed swiftly while allowing PSOs to maintain watch.
6. Ramp-up may not be initiated if any protected species is within the applicable shutdown or buffer zone. If a protected species is observed within the applicable shutdown zone or the buffer zone during the 30-minute pre-start clearance period, ramp-up may not begin until the animal(s) has been observed exiting the zones or until an additional time period has elapsed with no further sightings (15 minutes for small odontocetes and pinnipeds and 30 minutes for all other species).
7. Ramp-up must begin by activating a single airgun of the smallest volume in the array and must continue in stages by doubling the number of active elements at the commencement of each stage, with each stage of approximately the same duration. Total ramp-up duration will be dependent on the number of array elements. The operator must provide information to the PSO documenting appropriate procedures were followed.
8. PSOs must monitor the shutdown and buffer zones 30 minutes before and during ramp-up, and ramp-up must cease and the source must be shut down upon observation of a protected species within the applicable shutdown zone. Once ramp-up has begun, observations of protected species within the buffer zone do not require shutdown, but such observation must be recorded and communicated to the operator to prepare for potential shutdown.
9. Ramp-up may occur at times of poor visibility, including nighttime, if appropriate visual monitoring has occurred with no detections of protected species in the 30 minutes prior to beginning ramp-up. Acoustic source activation may only occur at night where operational planning cannot reasonably avoid such circumstances.
10. If the acoustic source is shut down for brief periods (i.e., less than 30 minutes) for reasons other than implementation of prescribed mitigation (e.g., mechanical difficulty), it may be activated again without ramp-up if PSOs have maintained constant visual observation and no detections of protected species have occurred within the applicable shutdown zone. For any longer shutdown, pre-start clearance observation and ramp-up are required.
11. Testing of the acoustic source involving all elements requires ramp-up. Testing limited to individual source elements or strings does not require ramp-up but does require a 30-minute pre-start clearance period.

A.1.6.2.3 Shutdown

All operators must adhere to the following shutdown requirements:

1. Any PSO on duty has the authority to call for shutdown of the acoustic source if a protected species is detected within the applicable shutdown zone.

2. The operator must establish and maintain clear lines of communication directly between PSOs on duty and crew controlling the acoustic source to ensure that shutdown commands are conveyed swiftly while allowing PSOs to maintain watch.
3. When the acoustic source is active (i.e., anytime one or more airguns is active, including during ramp-up) and a protected species appears within or enters the applicable shutdown zone, the acoustic source must be shut down. When shutdown is instructed by a PSO, the acoustic source must be immediately deactivated and any dispute resolved only following deactivation.
4. The shutdown requirement is waived for small delphinids and pinnipeds.
 - a) If a delphinid (individual belonging to the indicated genera of the Family Delphinidae) or pinniped is visually detected within the shutdown zone, no shutdown is required unless the PSO confirms the individual to be of a genus other than those listed, in which case a shutdown is required.
5. If there is uncertainty regarding identification of a marine mammal species (i.e., whether the observed marine mammal(s) belongs to one of the delphinid genera for which shutdown is waived or one of the species with a larger shutdown zone), PSOs may use best professional judgment in making the decision to call for a shutdown.
6. Upon implementation of shutdown, the source may be reactivated after the protected species has been observed exiting the applicable shutdown zone (i.e., animal is not required to fully exit the buffer zone where applicable) or following a clearance period (15 minutes for small odontocetes and 30 minutes for all other species) with no further detection of the marine mammal(s). For sea turtles observed in the shutdown zone, a shutdown not requiring ramp-up (i.e., a “pause”) is to be implemented until the sea turtle is no longer observed in the shutdown zone.

A.1.6.3 Tier 3 Survey Protocols

Tier 3 survey protocols are generally considered applicable to surveys using sparkers and some other sources that have not yet been fully evaluated to the point that a final determination has been made about their tiering (e.g., 1- and 2-plate boomers and bubble guns). Operators may elect to implement Tier 3 mitigation protocols to avoid potential take of marine mammals, or may instead elect to request an incidental take authorization under the MMPA in lieu of implementing these protocols. See Table above.

A.1.6.3.1 Visual Monitoring

1. During survey operations (e.g., any day on which use of the acoustic source is planned to occur, and whenever the acoustic source is in the water, whether activated or not), a minimum of one PSO must be on duty and conducting visual observations at all times during daylight hours (i.e., from 30 minutes prior to sunrise through 30 minutes following sunset).
2. Qualified shipboard personnel may be designated by the operator to fulfill these roles during Federally funded/conducted research. PSOs must be NMFS-approved for other Tier 3 survey effort.
3. Visual monitoring must begin no less than 30 minutes prior to ramp-up and must continue until one hour after use of the acoustic source ceases or until 30 minutes past sunset.
4. Visual PSOs must coordinate to ensure 360° visual coverage around the vessel from the most appropriate observation posts and must conduct visual observations using

binoculars and the naked eye while free from distractions and in a consistent, systematic, and diligent manner.

5. PSOs must establish and monitor applicable shutdown zones (see below). These zones must be based upon the radial distance from the acoustic source (rather than being based around the vessel itself).
6. Two shutdown zones are defined, depending on the species and context. Here, a standard shutdown zone encompassing the area at and below the sea surface out to a radius of 100 meters from the sound source (0–100 meters) is defined for marine mammals and sea turtles. For special circumstances, the shutdown zone encompasses an extended distance of 500 meters (0-500 meters, see Table 2).
7. Any observations of protected species by crew members aboard any vessel associated with the survey must be relayed to the PSO team.
8. Visual PSOs may be on watch for a maximum of four consecutive hours followed by a break of at least one hour between watches and may conduct a maximum of 12 hours of observation per 24-hour period.

A.1.6.3.2 Pre-start Clearance and Ramp-up

A ramp-up procedure, involving a gradual increase in source level output, is required at all times as part of the activation of the acoustic source when technically feasible. Operators should ramp up sources to half power for 5 minutes and then proceed to full power. A 30-minute pre-start clearance observation period must occur prior to the start of ramp-up. The intent of pre-start clearance observation (30 minutes) is to ensure no protected species are within the shutdown zones prior to the beginning of ramp-up. The intent of ramp-up is to warn protected species of pending operations and to allow sufficient time for those animals to leave the immediate vicinity. All operators must adhere to the following pre-start clearance and ramp-up requirements:

1. The operator must notify a designated PSO of the planned start of ramp-up as agreed upon with the lead PSO; the notification time should not be less than 60 minutes prior to the planned ramp-up in order to allow the PSOs time to monitor the shutdown zones for 30 minutes prior to the initiation of ramp-up (pre-start clearance). During this 30-minute pre-start clearance period the entire applicable shutdown zone must be visible, except as indicated below (see #7 below).
2. Ramp-ups must be scheduled so as to minimize the time spent with the source activated.
3. A visual PSO conducting pre-start clearance observations must be notified again immediately prior to initiating ramp-up procedures and the operator must receive confirmation from the PSO to proceed.
4. Any PSO on duty has the authority to delay the start of survey operations if a protected species is detected within the applicable pre-start clearance zone.
5. The operator must establish and maintain clear lines of communication directly between PSOs on duty and crew controlling the acoustic source to ensure that mitigation commands are conveyed swiftly while allowing PSOs to maintain watch.
6. Ramp-up may not be initiated if any protected species is within the applicable shutdown zone. If a protected species is observed within the applicable shutdown zone during the 30-minute pre-start clearance period, ramp-up may not begin until the animal(s) has been observed exiting the zones or until an additional time period has elapsed with no further sightings (15 minutes for small odontocetes and pinnipeds and 30 minutes for all other species).

7. PSOs must monitor the shutdown zones 30 minutes before and during ramp-up, and ramp-up must cease and the source must be shut down upon observation of a protected species within the applicable shutdown zone.
8. Ramp-up may occur at times of poor visibility, including nighttime, if appropriate visual monitoring has occurred with no detections of protected species in the 30 minutes prior to beginning ramp-up. Acoustic source activation may only occur at night where operational planning cannot reasonably avoid such circumstances.
9. If the acoustic source is shut down for brief periods (i.e., less than 30 minutes) for reasons other than implementation of prescribed mitigation (e.g., mechanical difficulty), it may be activated again without ramp-up if PSOs have maintained constant visual observation and no detections of protected species have occurred within the applicable shutdown zone. For any longer shutdown, pre-start clearance observation and ramp-up are required.

A.1.6.3.3 Shutdown

All operators must adhere to the following shutdown requirements:

1. Any PSO on duty has the authority to call for shutdown of the acoustic source if a protected species is detected within the applicable shutdown zone.
2. The operator must establish and maintain clear lines of communication directly between PSOs on duty and crew controlling the acoustic source to ensure that shutdown commands are conveyed swiftly while allowing PSOs to maintain watch.
3. When the acoustic source is active and a protected species appears within or enters the applicable shutdown zone, the acoustic source must be shut down. When shutdown is instructed by a PSO, the acoustic source must be immediately deactivated and any dispute resolved only following deactivation.
4. The shutdown requirement is waived for small delphinids and pinnipeds.
 - a) If a delphinid (individual belonging to the indicated genera of the Family Delphinidae) or pinniped is visually detected within the shutdown zone, no shutdown is required unless the PSO confirms the individual to be of a genus other than those listed, in which case a shutdown is required.
5. If there is uncertainty regarding identification of a marine mammal species (i.e., whether the observed marine mammal(s) belongs to one of the delphinid genera for which shutdown is waived or one of the species with a larger shutdown zone), PSOs may use best professional judgment in making the decision to call for a shutdown.
6. Upon implementation of shutdown, the source may be reactivated after the protected species has been observed exiting the applicable shutdown zone or following a clearance period (15 minutes for small odontocetes and 30 minutes for all other species) with no further detection of the protected species. For sea turtles observed in the shutdown zone, a voluntary shutdown not requiring ramp-up (i.e., a “pause”) may be implemented until the sea turtle is no longer observed in the shutdown zone.

A.1.7 Additional Standard Protocols

The following protocols are required when relevant, regardless of tier.

A.1.7.1 Entanglement and Entrainment Risk Reduction

All lines (rope, chain, cable, etc.) associated with geophysical surveys should be stiff, taut, and non-looping to the extent practicable to avoid possible entanglement and entrainment risk. When feasible, flexible lines such as nylon or polypropylene that could loop or tangle protected species should be enclosed in a sleeve to add rigidity and prevent looping or tangling. No excess underwater line is allowed. Equipment, especially towed apparatuses (e.g., tail buoys), must be operated in a way as to prevent entrainment of sea turtles or other protected species to the extent feasible.

A.1.7.2 Nodal Survey Requirements

To avoid the risk of entanglement, BOEM permit-holders conducting surveys using ocean-bottom nodes or similar gear must:

1. Use negatively buoyant coated wire-core tether cable;
2. Ensure all cables/lines are designed to be rigid;
3. Retrieve all lines immediately following completion of the survey; and
4. Attach acoustic pingers directly to the coated tether cable; acoustic releases should not be used.

A.1.8 Vessel Strike Avoidance Requirements

Crew and supply vessel personnel should use an appropriate reference guide that includes identifying information on all marine mammals, sea turtles, and other marine aquatic protected species that may be encountered. Vessel operators must comply with the below measures except under extraordinary circumstances when the **safety of the vessel or crew is in doubt or the safety of life at sea is in question**. These requirements do not apply in any case where compliance would create an imminent and serious threat to a person or vessel or to the extent that a vessel is restricted in its ability to maneuver and, because of the restriction, cannot comply (e.g., having an array).

1. Vessel operators and crews must maintain a vigilant watch for all protected species and slow down, stop their vessel, or alter course, as appropriate and regardless of vessel size, to avoid striking any protected species. A single protected species at the surface may indicate the presence of submerged animals in the vicinity of the vessel; therefore, precautionary measures should always be exercised. A visual observer aboard the vessel must monitor a vessel strike avoidance zone around the vessel (species-specific distances detailed below). Visual observers monitoring the vessel strike avoidance zone may be third-party observers (i.e., PSOs) or crew members, but crew members responsible for these duties must be provided sufficient training¹⁸ to 1) distinguish protected species from other phenomena and 2) broadly to identify a marine mammal as a right whale, other whale (defined in this context as sperm whales or baleen whales other than right whales), or other marine mammals.
2. All vessels (e.g., source vessels, chase vessels, supply vessels), regardless of size, must observe a 10-knot speed restriction in specific areas designated by NMFS for the protection of North Atlantic right whales from vessel strikes. These include all Seasonal

¹⁸ For example, see the U.S. Navy's Marine Species Awareness Training: <https://www.youtube.com/watch?v=KKo3r1yVBBA>

Management Areas (SMA) (when in effect) and any dynamic management areas (DMA) (when in effect). See www.fisheries.noaa.gov/national/endangered-species-conservation/reducing-ship-strikes-north-atlantic-right-whales for specific detail regarding these areas.

3. In the Gulf of America, all vessels (e.g., source vessels, chase vessels, supply vessels), regardless of size, must observe a 10-knot speed restriction in the 2020 Rice's Whale Area (2020 RWA), as identified in the Biological and Conference Opinion on Bureau of Ocean Energy Management's Oil and Gas Program Activities in the Gulf of America, which is the area from 100- to 400- meter isobaths from 87.5° W to 27.5° N plus an additional 10 km around that area.
4. In the Gulf of Alaska and Bering Sea, all vessels (e.g., source vessels, chase vessels, supply vessels), regardless of size, must observe a 10-knot speed restriction while within designated North Pacific right whale critical habitat.
5. Vessel speeds must also be reduced to 10 knots or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed near a vessel.
6. All vessels must maintain a minimum separation distance of 500 m from right whales. If a right whale is sighted within the relevant separation distance, the vessel must steer a course away at 10 knots or less until the 500-m separation distance has been established. If a whale is observed but cannot be confirmed as a species other than a right whale, the vessel operator must assume that it is a right whale and take appropriate action. In the Gulf of America, this requirement is expanded to include any species of baleen whale.
7. All vessels must maintain a minimum separation distance of 100 m from sperm whales and all other baleen whales.
8. All vessels must, to the maximum extent practicable, attempt to maintain a minimum separation distance of 50 m from all other protected species, with an understanding that at times this may not be possible (e.g., for animals that approach the vessel).
9. When protected species are sighted while a vessel is underway, the vessel must take action as necessary to avoid violating the relevant separation distance (e.g., attempt to remain parallel to the animal's course, avoid excessive speed or abrupt changes in direction until the animal has left the area, reduce speed and shift the engine to neutral). This does not apply to any vessel towing gear or any vessel that is navigationally constrained.

A.1.9 Data Collection¹⁹

PSOs must use standardized electronic data forms to record data. PSOs must record detailed information about any implementation of mitigation requirements, including the distance of protected species to the acoustic source and description of specific actions that ensued, the behavior of the animal(s), any observed changes in behavior before and after implementation of mitigation, and if shutdown was implemented, the length of time before any subsequent ramp-up of the acoustic source. If required mitigation was not implemented, PSOs should record a description of the circumstances. At a minimum, the following information must be recorded:

¹⁹ Data collection and reporting (see below) requirements reference requirements that may be transmitted to an operator via permit, ITA, ITS, and/or lease stipulations. Outside of these contexts, data collection and reporting may not be required.

1. Vessel names (source vessel and other vessels associated with survey), vessel size and type, maximum speed capability of vessel²⁰;
2. Dates of departures and returns to port with port name;
3. PSO names and affiliations;
4. Date and participants of PSO briefings (as discussed in **A.1.4. General Requirements**, item 2.);
5. Visual monitoring equipment used;
6. PSO location on vessel and height of observation location above water surface;
7. Dates and times (Greenwich Mean Time) of survey on/off effort and times corresponding with PSO on/off effort;
8. Vessel location (decimal degrees) when survey effort begins and ends and vessel location at beginning and end of visual PSO duty shifts;
9. Vessel location at 30-second intervals if obtainable from data collection software, otherwise at practical regular interval;
10. Vessel heading and speed at beginning and end of visual PSO duty shifts and upon any change;
11. Water depth (if obtainable from data collection software);
12. Environmental conditions while on visual survey (at beginning and end of PSO shift and whenever conditions change significantly), including BSS and any other relevant weather conditions including cloud cover, fog, sun glare, and overall visibility to the horizon;
13. Factors that may contribute to impaired observations during each PSO shift change or as needed as environmental conditions change (e.g., vessel traffic, equipment malfunctions);
14. Survey activity information (and changes thereof), such as acoustic source power output while in operation, number and volume of airguns operating in an array, tow depth of an acoustic source, and any other notes of significance (i.e., pre-start clearance, ramp-up, shutdown, testing, shooting, ramp-up completion, end of operations, streamers, etc.); and
15. Upon visual observation of any protected species, the following information:
 - a) Watch status (sighting made by PSO on/off effort, opportunistic, crew, alternate vessel/platform);
 - b) Vessel/platform/survey activity at time of sighting (e.g., deploying, recovering, testing, shooting, data acquisition, other);
 - c) PSO who sighted the animal;
 - d) Time of sighting;
 - e) Initial detection method;
 - f) Sightings cue;
 - g) Vessel location at time of sighting (decimal degrees);
 - h) Water depth;
 - i) Direction of vessel's travel (compass direction);
 - j) Speed of the vessel(s) from which the observation was made;
 - k) Direction of animal's travel relative to the vessel;
 - l) Identification of the animal (e.g., genus/species, lowest possible taxonomic level, or unidentified), and the composition of the group if there is a mix of species;
 - m) Species reliability (an indicator of confidence in identification);
 - n) Estimated distance to the animal and method of estimating distance;

²⁰ Data collection requirements referencing vessels and related data are not applicable to surveys conducted with a stationary acoustic source, e.g., 0-offset vertical seismic profiling.

- o) Estimated number of animals (high/low/best);
 - p) Estimated number of animals by cohort (e.g., adults, yearlings, juveniles, calves, group composition);
 - q) Description (as many distinguishing features as possible of each individual seen, including length, shape, color, pattern, scars or markings, shape and size of dorsal fin, shape of head, and blow characteristics);
 - r) Detailed behavior observations (e.g., number of blows/breaths, number of surfaces, breaching, spyhopping, diving, feeding, traveling; as explicit and detailed as possible; note any observed changes in behavior before and after point of closest approach);
 - s) Animal's closest point of approach and/or closest distance from any element of the acoustic source; and
 - t) Description of any actions implemented in response to the sighting (e.g., delays, shutdown, ramp-up) and time and location of the action.
16. If a marine mammal is detected using a PAM system, the following additional information should be recorded:
- u) An acoustic encounter identification number, and whether the detection was linked with a visual sighting;
 - v) Date and time when first and last heard;
 - w) Types and nature of sounds heard (e.g., clicks, whistles, creaks, burst pulses, continuous, sporadic, strength of signal);
 - x) Any additional information recorded such as water depth of the hydrophone array, bearing of the animal to the vessel (if determinable), species or taxonomic group (if determinable), spectrogram screenshot, and any other notable information.

A.1.10 Reporting²¹

1. The operator must submit a draft comprehensive report (see ITA and/or permit for contact information) on all activities and monitoring results within 90 days of the completion of the survey or expiration of the ITA and/or permit, whichever comes sooner. The report must describe all activities conducted and sightings of protected species, must provide full documentation of methods, results, and interpretation pertaining to all monitoring, and must summarize the dates and locations of survey operations and all protected species sightings (dates, times, locations, activities, associated survey activities). The draft report must also include geo-referenced time-stamped vessel tracklines for all time periods during which acoustic sources were operating. Tracklines should include points recording any change in acoustic source status (e.g., when the sources began operating, when they were turned off, or when they changed operational status such as from full array to single airgun or vice versa). GIS files must be provided in ESRI shapefile format and include the UTC date and time, latitude in decimal degrees, and longitude in decimal degrees. All coordinates must be referenced to the WGS84 geographic coordinate system. In addition to the report, all raw observational data must be made available. The report must summarize the information submitted in interim monthly reports (if required) as well as additional data collected as described above in *Data Collection*. A final report must be submitted within 30 days following resolution of any comments on the draft report.

²¹ Reporting as required through relevant regulatory documents issued by NMFS and/or BOEM.

2. For operations requiring the use of PAM, the report must include a validation document concerning the use of PAM, which should include necessary noise validation diagrams and demonstrate whether background noise levels on the PAM deployment limited achievement of the planned detection goals. Copies of any vessel self-noise assessment reports must be included with the report. See **PAM Requirements** below.
3. Reporting injured or dead protected species: Sightings of any injured or dead protected species must be reported to NMFS, regardless of the cause of injury or death.

For reporting dead or injured marine mammals, refer to the reporting requirements described below. For reporting other dead or injured protected species, refer to NMFS' website at <https://www.fisheries.noaa.gov/report>.

In the event that personnel involved in the survey activities discover an injured or dead marine mammal, the incident must be reported to NMFS and to the applicable regional stranding network(s) as soon as feasible. The report must include the following information:

- a) Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
- b) Species identification (if known) or description of the animal(s) involved;
- c) Condition of the animal(s) (including carcass condition if the animal is dead);
- d) Observed behaviors of the animal(s), if alive;
- e) If available, photographs or video footage of the animal(s); and
- f) General circumstances under which the animal was discovered.

In the event of a ship strike of a marine mammal by any vessel involved in the survey activities, the incident must be reported to NMFS and to the regional stranding network(s) as soon as feasible. The report must include the following information:

- g) Time, date, and location (latitude/longitude) of the incident;
- h) Species identification (if known) or description of the animal(s) involved;
- i) Vessel's speed during and leading up to the incident;
- j) Vessel's course/heading and what operations were being conducted (if applicable);
- k) Status of all sound sources in use;
- l) Description of any avoidance measures/requirements that were in place at the time of the strike and what additional measures were taken, if any, to avoid strike;
- m) Environmental conditions (e.g., wind speed and direction, BSS, cloud cover, visibility) immediately preceding the strike;
- n) Estimated size and length of animal that was struck;
- o) Description of the behavior of the marine mammal immediately preceding and/or following the strike;
- p) If available, description of the presence and behavior of any other marine mammals immediately preceding the strike;
- q) Estimated fate of the animal (e.g., dead, injured but alive, injured and moving, blood or tissue observed in the water, status unknown, disappeared); and
- r) To the extent practicable, photographs or video footage of the animal(s).

A.1.10.1 Marine Mammal Stranding

Marine mammals involved in live stranding events (or near-shore atypical milling) are considered especially susceptible to the effects of additional stressors. The shutdown procedures below are not related to the investigation of the cause of any such stranding and their

implementation is not intended to imply that the activity of the authorized entity is the cause of the stranding. Rather, shutdown procedures are intended to protect marine mammals exhibiting indicators of distress by minimizing their exposure to possible additional stressors, regardless of the factors that contributed to the stranding.

In the event of a live stranding (or near-shore atypical milling) event within 50 km of the survey operations, where the NMFS stranding network is engaged in herding or other interventions to return animals to the water, NMFS will advise of the need to implement shutdown procedures for all active acoustic sources operating within 50 km of the stranding. Shutdown procedures for live stranding or milling marine mammals include the following:

1. If at any time, the marine mammal(s) die or are euthanized, or if herding/intervention efforts are stopped, NMFS will advise that the shutdown around the animals' location is no longer needed.
2. Otherwise, shutdown procedures will remain in effect until NMFS determines and advises that all live animals involved have left the area (either of their own volition or following an intervention).
3. If further observations of the marine mammals indicate the potential for re-stranding, additional coordination will be required to determine what measures are necessary to minimize that likelihood (e.g., extending the shutdown or moving operations farther away) and to implement those measures as appropriate.

If NMFS determines that the circumstances of any marine mammal stranding found in the vicinity of the activity suggest investigation of the association with survey activities is warranted, and an investigation into the stranding is being pursued, NMFS will submit a written request indicating that the following initial available information must be provided as soon as possible, but no later than 7 business days after the request for information:

1. Status of all sound source use in the 48 hours preceding the estimated time of stranding and within 50 km of the discovery/notification of the stranding by NMFS; and
2. If available, description of the behavior of any marine mammal(s) observed preceding (i.e., within 48 hours and 50 km) and immediately after the discovery of the stranding.
3. In the event that the investigation is still inconclusive, the investigation of the association of the survey activities is still warranted, and the investigation is still being pursued, NMFS may provide additional information requests, in writing, regarding the nature and location of survey operations prior to the time period above.

A.1.11 References

Baker K, Epperson D, Gitschlag G, Goldstein H, Lewandowski J, Skrupky K, et al. 2013. National standards for a protected species observer and data management program: a model using geological and geophysical surveys. NOAA Technical Memorandum NMFS-OPR-49, National Marine Fisheries Service.

Table 2. Extended Distance, Shutdown Zone, Species and Context.¹

Species and/or Group	Shutdown Zone (meters) Tier 1	Shutdown Zone (meters) Tier 2/3
North Atlantic right whale (<i>Eubalaena glacialis</i>)	0-1,500	0-500
North Pacific right whale (<i>Eubalaena japonica</i>)	0-1,500	0-500
Rice's whale (<i>Balaenoptera ricei</i>)	0-1,500	0-500
Beaked whales (<i>Ziphiidae spp.</i>)	0-1,500	0-500
Dwarf and pygmy sperm whales (<i>Kogia spp.</i>)	0-1,500	0-500
Southern resident killer whale (<i>Orcinus orca</i>)	0-1,500	0-500
Cook Inlet beluga whales (<i>Delphinapterus leucas</i>)	0-1,500	0-500
Large whale with calf ²	0-1,500	0-500
Groups (6+) of large whales	0-1,500	0-500

¹ This list is not exhaustive. Other species or circumstances may warrant use of the extended shutdown zone in certain situations.

² "Large whale" is defined as a sperm whale or any baleen whale; calf defined as an animal less than two-thirds the body size of an adult observed to be in close association with an adult.

PAM Requirements

Towed PAM systems should consist of hardware (e.g., hydrophone array, recorder, cables) and software (e.g., data processing program and algorithm). Some type of automated detection software must be used. Acoustic signals are processed for output to the PAM operator with software designed to detect marine mammal vocalizations. Current PAM technology has some limitations (e.g., limited directional capabilities and detection range, detection of signals due to vessel and flow noise, low accuracy in localization) and there are no formal guidelines currently in place regarding specifications for hardware, software, or operator training requirements.

NMFS' requirement to use PAM refers to the use of calibrated hydrophone arrays with full system redundancy to detect, identify, and estimate distance and bearing to vocalizing cetaceans, to the extent possible. With regard to calibration, the PAM system should have at least one calibrated hydrophone, sufficient for determining whether background noise levels on the towed PAM system are sufficiently low to meet performance expectations. Additionally, if multiple hydrophone types occur in a system (i.e., monitor different bandwidths), then one hydrophone from each such type must be calibrated, and whenever sets of hydrophones (of the same type) are sufficiently spatially separated such that they would be expected to experience ambient noise environments that differ by 6 dB or more across any integrated species cluster bandwidth, then at least one hydrophone from each set should be calibrated. In terms of calibrating the rest of the system, the signal route to the data recorder and monitoring software must be calibrated so that the binary amplitude data written to hard disk can be converted into units of acoustic pressure. The configuration of hardware should be coupled with appropriate software to aid monitoring and listening by a PAM operator skilled in bioacoustics analysis and computer system specifications capable of running appropriate software. GPS data acquisition is recommended for all PAM operations. If the PAM plan (see below) claims an ability to localize, every localization estimate obtained from a PAM system must be accompanied by some estimate of uncertainty and ambiguity.

In the absence of formal standards addressing any of these three facets of PAM technology, all Tier 1 survey operators must provide a PAM plan including description of the hardware and software proposed for use. Following the survey, a validation document must be submitted as part of required reporting (see below). The purpose of the PAM plan is to demonstrate that the PAM system being proposed for use is adequate for addressing the mitigation goals. The plan must include methodology and documentation requirements for all stages of the project. As recommended by Thode et al. (2017), PAM plans should, at minimum, adequately address and describe (1) the hardware and software planned for use, including a hardware performance diagram demonstrating that the sensitivity and dynamic range of the hardware is appropriate for the operation; (2) deployment methodology, including target depth/tow distance; (3) definitions of expected operational conditions, used to summarize background noise statistics; (4) proposed detection-classification-localization methodology, including anticipated species clusters (using a cluster definition table), target minimum detection range for each cluster, and the proposed localization method for each cluster; (5) operation plans, including the background noise sampling schedule; (6) array design considerations for noise abatement; and (7) cluster-specific details regarding which real-time displays and automated detectors the operator would monitor. Where relevant, the plan should address the potential for PAM deployment on a receiver vessel or other associated vessel separate from the acoustic source.

Species clusters – The plan must list the species of concern during the upcoming operation. While some species may be listed individually for special attention, in many circumstances it is

expected that for the purposes of a PAM operation multiple species can be grouped together in a “cluster” that shares similar acoustic and behavioral characteristics (e.g., sperm whale, beaked whales). The plan must specify a target minimum detection (and possibly localization) range for each species cluster used in the document. Different ranges can be defined for different operational conditions. The PAM system may exceed this detection range, but must always be capable of achieving this minimum detection range.

Hardware and software specifications – The plan must have a section dedicated to demonstrating that the PAM hardware is sensitive enough to detect signals from the species clusters of concern at the target minimum detection ranges specified. The plan should include a hardware specification table and hardware performance diagram. The diagram will show the sensitivity and bandwidth of the combined array hardware and recording system, as well as the received levels required for a given species cluster to be detectable at the target minimum detection range. The overall goal of the diagram is to visually demonstrate that the planned PAM array/recording system would have the capability of detecting various species clusters at required target ranges, provided that background noise levels are not an issue.

Operational conditions – The validation document should demonstrate whether the PAM system has been compromised by excessive background noise, whether that noise is electronic interference, flow, platform, or environmental noise. Therefore, the plan must define a set of “operational conditions” under which detection statistics (background noise profiles) will be categorized during the project. Operational conditions consist of three categories: platform activity and status, mitigation (activity) status, and environmental status.

Operating procedures – The plan must describe the level of effort that is reasonably expected to occur for the monitoring requirements. For every species cluster, the plan should detail which part of the PAM display would be used for detecting that cluster. For example, if a scrolling spectrogram display is being used for a species cluster, then the spectrogram’s fast Fourier transform sample size, frequency bandwidth, and their refresh rate must be specified. Similar details would be provided for other software tools, such as click detectors and other automated detectors and classifiers. The plan must also provide a screenshot of the expected monitor display.

In coordination with vessel crew, the lead PAM operator will be responsible for deployment, retrieval, and testing and optimization of the hydrophone array. While on duty, the PAM operator must diligently listen to received signals and/or monitoring display screens in order to detect vocalizing cetaceans, except as required to attend to PAM equipment. The PAM operator must use appropriate sample analysis and filtering techniques and must report all cetacean detections. While not required prior to development of formal standards for PAM use, NMFS recommends that vessel self-noise assessments be undertaken during mobilization in order to optimize PAM array configuration according to the specific noise characteristics of the vessel and equipment involved, and to refine expectations for distance/bearing estimations for cetacean species during the survey. Copies of any vessel self-noise assessment reports must be included with the summary trip report.

This report must also include a validation document concerning the use of PAM, which should include necessary noise validation diagrams (NVD) and demonstrate whether background noise levels on the PAM deployment limited achievement of the planned detection goals. A separate diagram must be produced for every background noise percentile chosen for analysis. Background noise percentiles, rather than a simple average of the data, are required because the highly non-stationary characteristics of many background noise profiles cannot be described by

a simple mean. For example, data collected during a seismic survey will have short periods of time containing high-intensity pulses and longer periods of time dominated by lower levels of reverberation. Taking a simple mean of these noise data would imply background noise levels substantially higher than what may actually have been present between seismic pulses. A validation report would typically contain between three to five diagrams, depending on the number of percentiles analyzed. At a minimum, the validation report should contain three diagrams that include the 50th percentile (median), 5th percentile, and 95th percentile. The 25th percentile and 75th percentile may also be included. In each percentile diagram, a separate background noise curve must be drawn for each defined operational condition. In general, the NVD should be generated from the data stream that is used for detecting the presence of marine mammal signals. For example, if beamforming or some other form of array gain has been applied before invoking signal detection, then the NVD should be generated using the beamformed data, and not omnidirectional data. The complete set of NVDs, one for each percentile of interest, combined with a table that lists the fraction of time the activity was in each operational state, provides a means of reviewing the background noise-limitations encountered by the PAM system during various operational conditions. Actual marine mammal detections should be plotted on this diagram for a reasonableness check on the expected received levels. Overall, the validation document should reiterate all the goals and parameters stated in the planning document and verify that goals were/were not met, why, changes, etc. Also, the validation document should state whether the planning was suited to the needs of the survey and met the required mitigation standards.

Attachment 3: The Bureaus' Vessel Strike Avoidance and Injured and/or Dead Aquatic Protected Species Reporting Protocols (in Bureaus' Focused BA Appendix A.3)

These protocols will be programmatically implemented by the Bureau of Ocean Energy Management (BOEM), the Bureau of Safety and Environmental Enforcement (BSEE), and provide guidelines to operators in complying with the Endangered Species Act (ESA; 16 U.S.C. §§ 1531-1544) and Marine Mammal Protection Act (MMPA; 16 U.S.C. §§1361- 1423h). The measures contained in this attachment apply to all activities approved by the Bureaus and associated with the federally regulated oil and gas program in the Gulf of America.

BOEM and BSEE require the lessee or the lessee's representatives (e.g., operators, contractors) (collectively, the "lessee") to follow protocols, also known as "Conditions of Approval (COA)" for authorized oil and gas activities on the Outer Continental Shelf (OCS) of the GOA. Reporting requirements are included where appropriate.

A.3 Vessel Strike Avoidance and Injured and/or Dead Aquatic Protected Species Reporting Protocols

These protocols will be required by BOEM, BSEE, and provide guidelines to operators in complying with the ESA (16 U.S.C. §§ 1531-1544) and MMPA (16 U.S.C. §§1361- 1423h). The measures contained herein apply to all vessels associated with the federally regulated oil and gas program in the Gulf of America.

A.3.1 Aquatic Protected Species Identification

Crew and supply vessel personnel should use a Gulf of America reference guide that includes identifying information on marine mammals, sea turtles, and other marine protected species (i.e., species that are not marine mammals and ESA- listed such as Gulf sturgeon, giant manta ray, or oceanic whitetip shark; hereafter collectively termed “other aquatic protected species”) that may be encountered in the Gulf of America OCS or anywhere activity occurs. Vessel operators must comply with the below measures except under extraordinary circumstances when the **safety of the vessel or crew is in doubt or the safety of life at sea is in question.**

A.3.2 Vessel strike avoidance

1. Vessel operators and crews must maintain a vigilant watch for all aquatic protected species and slow down, stop their vessel, or alter course, as appropriate and regardless of vessel size, to avoid striking any protected species. A single aquatic protected species at the surface may indicate the presence of submerged animals in the vicinity of the vessel; therefore, precautionary measures should always be exercised. A visual observer aboard the vessel must monitor a vessel strike avoidance zone (species-specific distances detailed below) around the vessel according to the parameters stated below, to ensure the potential for strike is minimized. Visual observers monitoring the vessel strike avoidance zone can be either third-party observers or crew members (e.g., captain), but crew members responsible for these duties must be provided sufficient training to distinguish aquatic protected species to broad taxonomic groups, as well as those specific species detailed further below.
2. Vessel speeds must also be reduced to 10 knots or less when mother-calf pairs, pods, or large assemblages (greater than three) of any marine mammal are observed near a vessel.
3. All vessels must maintain a minimum separation distance of 100 m from sperm whales, and 500 m from any baleen whale to specifically protect the Rice’s whale. If the species is indistinguishable, then operators should assume it is a Rice’s whale and act accordingly.
4. All vessels must, to the maximum extent practicable, attempt to maintain a minimum separation distance of 50 m from all “other aquatic protected species” including sea turtles and manatees, with an exception made for those animals that approach the vessel.
5. When aquatic protected species are sighted while a vessel is underway, the vessel should take action as necessary to avoid violating the relevant separation distance (e.g., attempt to remain parallel to the animal’s course, avoid excessive speed or abrupt changes in direction until the animal has left the area). If aquatic protected species are sighted within the relevant separation distance, the vessel should reduce speed and shift the engine to neutral, not engaging the engines until animals are clear of the area. This does not apply to any vessel towing gear (e.g., source towed array and site clearance trawling).

6. All vessels 65 ft or greater in support of oil and gas activities must have a functioning AIS onboard and operating at all times as required by the USCG. Even if the USCG does not require AIS for the vessel, it is strongly encouraged. At minimum, the reporting (as specified) must be followed and include trackline (e.g., time, location, and speed) data with Automatic Identification System (AIS) Maritime Mobile Service Identity (MMSI) numbers, if available.

The above requirements do not apply in any case where compliance would create an imminent and serious threat to a person or vessel or to the extent that a vessel is restricted in its ability to maneuver and, because of that restriction, is unable to comply.

A.3.3 Injured and/or dead protected species reporting

At all times, vessel operators must report sightings of any injured or dead aquatic protected species as soon as possible but no greater than 24 hours, regardless of whether the injury or death was caused by the operator's vessel. If the injury or death was caused by a collision with the operator's vessel, the operator must immediately report the incident to the appropriate NMFS contact below for 24-hour response. The operator must further notify BOEM, BSEE, and NMFS immediately of the strike by email to protectedspecies@boem.gov and protectedspecies@bsee.gov and takereport.nmfs@noaa.gov. The report must include the following information:

1. Name, telephone number, and email of company providing the report;
2. The vessel name at time of activity;
3. The lease number;
4. Time, date, and location (latitude and longitude [lat/long]) of the incident;
5. Species identification (if known) or description of the animal(s) involved;
6. Vessel's speed during and leading up to the incident;
7. Vessel's course/heading and what operations were being conducted (if applicable);
8. Status of all sound sources in use;
9. Description of avoidance measures/requirements that were in place at the time of the strike and what additional measures were taken, if any, to avoid strike;
10. Environmental conditions (e.g., wind speed and direction, Beaufort Sea State, cloud cover, visibility) immediately preceding the strike;
11. Estimated size and length of animal that was struck;
12. Description of the behavior of the marine mammal immediately preceding and following the strike;
13. If available, description of the presence and behavior of any other marine mammals immediately preceding the strike;
14. Estimated fate of the animal (e.g., dead, injured but alive, injured and moving, blood or tissue observed in the water, status unknown, disappeared); and
15. To the extent practicable, photographs or video footage of the animal(s).

A.3.4 Incidents requiring immediate reporting

Review of your proposed activities identified use of equipment that has the potential for entanglement and/or entrapment of protected species (i.e., species protected under the ESA and/or MMPA) that could be present during operations. In case of entrapment, procedures and measures for reporting are dependent upon the situation at hand.

Certain scenarios or incidents require immediate reporting to Federal agencies; these are

described below. Should any of the following occur at any time, **immediate reporting** of the incident is required after personnel and/or diver safety is ensured:

- Entanglement or entrapment of a protected species (i.e., an animal is entangled in a line or cannot or does not leave a moon pool of its own volition).
- Injury of a protected species (e.g., the animal appears injured or lethargic).
- Interaction or contact with equipment by a protected species.
- Any observation of a leatherback sea turtle within a moon pool (regardless of whether it appears injured, or an interaction with equipment or entanglement and/or entrapment is observed).

As soon as personnel and/or diver safety is ensured, any of the incidents listed above must be reported to NMFS by contacting the appropriate expert for 24-hour response. If an immediate response is not received, the operator must keep trying until contact is made. Any failed attempts should be documented. Contact information for reporting is as follows:

- Marine mammals: contact WHALE HELPLINE at 877-942-5343.
- Sea turtles: contact NMFS Veterinary Medical Officer at 352-283-3370. If no answer, contact 301-310-3061. This includes the immediate reporting of any observation of a leatherback sea turtle within a moon pool.
- Other protected species (e.g., giant manta ray, oceanic whitetip shark, or Gulf sturgeon): contact the ESA Section 7 biologist at 301-427-8413 (nmfs.psoreview@noaa.gov) and report all incidents to takereport.nmfs@noaa.gov.

The report must include the following information:

1. Time, date, water depth and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
2. Name, type, and call sign of the vessel in which the event occurred;
3. Equipment being used at time of observation;
4. Species identification (if known) or description of the animal(s) involved;
5. Approximate size of animal;
6. Condition of the animal(s) during the event and any observed injury and/or behavior;
7. Photographs or video footage of the animal(s), if able; and
8. General narrative and timeline describing events that took place.

After the appropriate contact(s) have been made for guidance and/or assistance as described above, the operator may call BSEE at 985-722-7902 (24 hours/day) for questions or additional guidance on recovery assistance needs (if still required) and continued monitoring requirements. The operator may also contact this number if a timely response from the appropriate contact(s) listed above were not received. Minimum post-incident reporting includes all information described above in addition to the following:

9. NMFS liaison or stranding hotline that was contacted for assistance;
10. For moon pool observations or interactions:
11. Size and location of moon pool within vessel (e.g., hull door or no hull door);
12. Whether activities in the moon pool were halted or changed upon observation of the animal; and
13. Whether the animal remains in the pool at the time of the report, or if not, the time and date the animal was last observed.

Post-incident reporting should be made to BOEM/BSEE and NMFS (protectedspecies@boem.gov, protectedspecies@bsee.gov, takereport.nmfs@noaa.gov).

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Appendix B: Environmental Management Plan

CHEVRON ST MALO– 4D OBN SURVEY- L25-014

**Environmental Management Plan: Marine Mammal and Sea Turtle
Monitoring, Mitigation, and Reporting**



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CHEVRON ST MALO– 4D OBN SURVEY- L25-014

Environmental Management Plan: Marine Mammal and Sea Turtle
Monitoring, Mitigation, and Reporting

With reference to the Biological Opinion (BO) issued by the National Marine Fisheries Service on 20 May 2025 & BOEM Permit OCS L25-014.

Revision		
Date	Version	Revision made
13 October 2025	1	Submitted to client
15 October 2025	2	Updated distribution list in section 9.1.1
12 November 2025	3	Updated language for short breaks in section 8.6.2
	3	
	4	

Approval for issue

Name: Stephanie Milne

Signature

Signed by:

Stephanie Milne

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APPENDIX A: Passive Acoustic Monitoring System

APPENDIX B: LOA

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1 INTRODUCTION

Chevron U.S.A. Inc. (Chevron) has contracted TGS to conduct a 4D Ocean Bottom Node (OBN) seismic survey within the Gulf of America (GOA). The details of the survey activities are provided in the survey plan application.

In an effort to minimize the potential impacts of seismic operations on certain protected species, including marine mammals and sea turtles, the Bureau of Ocean Energy Management (BOEM), the National Marine Fisheries Service (NMFS), and the Bureau of Safety and Environmental Enforcement (BSEE), have outlined monitoring, mitigation, and reporting procedures that survey operators and permit holders are expected to implement during their seismic survey operations.

1.1 Applicable Regulatory Documents and Permits

Protected species monitoring, mitigation and reporting procedures that are applicable to the 4D OBN survey are contained in the following regulatory documents:

1. The Biological Opinion (BO) issued by the NMFS on 20 May 2025, where Protected Species Observer (PSO) procedures are outlined in detail in Attachment 1
2. The survey permit issued by BOEM, permit OCS Permit L25-014, 03 September 2025
3. The Letter of Authorization (LOA) issued by NMFS, effective from 15 October 2025, through 19 April 19, 2026

This document, the Environmental Management Plan (EMP), prepared by RPS on behalf of Chevron, describes how monitoring, mitigation, and reporting measures for protected species will be executed during the 4D OBN program to maintain compliance with the regulatory requirements in the 2025 Gulf of America Biological Opinion and its attachments, the BOEM survey permit L25-014, and NMFS LOA.

2 MARINE PROTECTED SPECIES

Marine protected species or protected species refers to any marine species for which dedicated monitoring and mitigation procedures will be implemented, including:

- All marine mammals
- All sea turtles
- Gulf sturgeon, oceanic whitetip shark, giant manta ray*

*Note that strike avoidance procedures apply to these Endangered Species Act (ESA) listed species, but monitoring and sound source mitigation procedures do not need to be implemented.

3 PROTECTED SPECIES OBSERVERS AND PASSIVE ACOUSTIC MONITORING OPERATORS

3.1 Staffing Plan

A team of three Protected Species Observers (PSOs), supplied by RPS, will be onboard each source vessel to undertake day-time visual watches, implement mitigations, conduct data collection and reporting in accordance with the BO and the survey permit.

A team of three Passive Acoustic Monitoring (PAM) Operators, supplied by RPS, will conduct 24-hour PAM monitoring, implement mitigations, and conduct data collection and reporting in accordance with the BO and the survey permit.

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3.2 Roles and Responsibilities

Lead PAM Operator

- Maintain copies of the regulatory documents including the LOA and the BOEM survey permit as well as the most up-to-date version of the EMP
- Install and operate PAM as required, including permit to work and task-based risk assessment
- Communicate with seismic operator to delay or shutdown operations
- Acoustically detect and identify protected species in accordance with regulatory requirements
- Organize and maintain appropriate monitoring schedules
- Monitor seismic operations for compliance to the regulatory requirements
- Prepare required reports (with lead PSO)
- Support visual watches when possible
- Participate in daily operation meeting with crew when appropriate

Lead PSO

- Coordinate and oversee PAM and PSO Operations and ensure compliance with monitoring requirements
- Visually monitor, detect, and identify protected species, as well as determine distance from source.
- Record and report protected species sightings, survey activities, and environmental conditions, per regulations
- Monitor and advise on sound source and vessel operations for compliance with the environmental requirements for the survey
- Communicate with the crew to implement mitigation actions as required by environmental protocols
- Participate in daily operation meeting with crew when appropriate

PSO

- Visually monitor, detect, and identify protected species
- Record and report according to survey plan
- Monitor and advise on sound source and vessel operations for compliance with the environmental requirements for the survey plan
- Communicate with the crew to implement mitigation actions as required by environmental protocols
- Participate in daily operation meeting with crew when appropriate

PAM Operators

- Acoustically monitor, detect, and identify marine mammals and determine distance to source
- Record and report marine mammal sightings, survey activities and environmental conditions, per regulations
- Monitor and advise on sound source and vessel operations for compliance with the environmental requirements for the survey
- Assist in maintaining and troubleshooting the PAM system hardware and software
- Communicate with the crew to implement mitigation actions as required by environmental protocols, including delays to initiation of survey equipment
- Participate in daily meetings and drills with crew when appropriate

3.3 PSO and PAM Operator Requirements

- All Protected Species Observers (PSOs) and PAM Operators will have completed a protected species observer training program as described in the BO.
- PAM Operators will have completed a PAM training course as described in the BO.

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- PSOs' and PAM Operators' CVs will be submitted to NMFS for approval prior to deployment on the project.
- PSOs will have completed HUET / Sea Survival training.
- PSOs and PAM Operators' will have completed a medical examination(Norwegian or OEUK).
- PSOs and PAM Operators' will be equipped with Personnel Protective Equipment (PPE), including hard hat, steel-toe boots, fire-retardant coveralls, work gloves, and safety glasses.
- PSOs and PAM Operators' will have completed Chevron orientation

4 MONITORING EQUIPMENT

4.1 Visual Monitoring Equipment

The PSOs on duty will monitor for marine protected species using the naked eye, hand-held reticle binoculars, and big-eye binoculars as described in BO.

Digital single-lens reflex camera equipment, including zoom lens, will be used to record sightings and verify species identification.

4.2 Passive Acoustic Monitoring Plan

4.2.1 Passive Acoustic Monitoring (PAM) System

The Seiche PAM system is designed to provide a flexible approach to monitoring for marine mammals using a 6-channel towed hydrophone system. The system uses PAMGuard software modules such that the optimum system can be configured for the application, vessel, and deployment method. The source vessel will have two acoustic monitoring systems installed, a primary system and a secondary system available as back-up should any issues be encountered with the main system.

The PAM system has been designed to monitor for most cetacean species found in the Gulf of Mexico, covering a broad range of frequencies up to 200 kilohertz (kHz). Some propeller and engine noise will dominate the lowest frequencies, but the species of concern should all be detectable and vocalize above the range where engine noise dominates.

Mid and low frequency marine mammal vocalizations are processed by RME Fireface Audio Interface, including sperm whale click trains and codas and delphinid whistles in the frequency range of approximately 2 kHz to 48 kHz. Kogia species, beaked whales, and delphinid echolocation clicks may be emitted at very high frequencies above 80 kHz, and these are processed by a specialized National Instruments sound card, capable of sampling audio at 500 kHz and detecting clicks up to 250 kHz. PAM system specifications are provided in Appendix A.

4.2.2 Calibration

The Seiche PAM systems are of modular design for the purpose of maximizing redundancy and operational uptime. Components include hydrophone arrays, tow cables, deck cables, and electronics processing units, where each component of each full kit is compatible with all the components of other kits. In this sense, a deployment that includes a single main and single spare full kit has 16 different functionally identical configurations. On a given survey, the four components of the main and spare kits will be of identical model, specifications, and calibration to the corresponding component in the opposite kit, ensuring that different component configurations will function within specification. A specifications table, a frequency response curve graph for the three calibrated hydrophones, and calibration values for PAMGuard, can be found in Appendix A. The systems are calibrated during construction and before deployment by Seiche in-house, then calibrated with sensitivity tests in-house when returned to Seiche for maintenance and refresh. Due to the proprietary nature of the array design and the nature of multiple in-line hydrophones on a single cable, there is currently no off-the-shelf piston-phone solution for frequency response testing/calibration in the field.

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4.2.3 Deployment Configuration Calibration and Testing

The performance of PAM systems is affected by ambient noise from both the environment and anthropogenic sources, including the ship engines, propellers, air compressors, deployed gear, flow noise, and electromagnetic noise introduced into the system by power cables and the power generators themselves. For this reason, PAMGuard will be used to analyze the deployment's impact on the ability of the PAM system to detect vocalizing mammals. When indicated, adjustments to the PAM cable deployment will be made to improve monitoring conditions. Because relevant data cannot be assessed at the dock or in transit, such assessments will be made in the survey area with survey gear deployed, prior to the start of seismic operations. Similar assessments shall be made weekly and any time a component of the PAM system is replaced.

To assess sound pressure levels for noise validation and reporting, five minutes of analog audio data will be recorded automatically every 30 minutes over the course of the survey, providing ample audio for analysis among all operations statuses. In order to provide the required post-project validation analysis and Noise Validation Diagram(NVD), sound samples from all statuses will be analyzed with a bank of band-pass filters to show typical background sound levels in different bands.

The NVD will visually demonstrate how background noise levels in specific bands interact with the various species clusters in their bands, thus showing how background noise may or may not have affected the system's ability to detect the local species. The noise validation document shall include three diagrams that include the 5th percentile, 50th (median), and 95th percentiles. Each diagram will include separate background noise curves for each defined operational condition, as well as plots for the system's quantization floor and clipping ceiling.

4.2.4 PAM Deployment and Retrieval Procedures and JSA

The Lead PSO/PAM Operator will develop, in cooperation with the vessel crew, a vessel-specific deployment and retrieval procedure that considers both the minimization of entanglement risks with other towed equipment while maximizing the acoustic range of the system. A job safety analysis (JSA) will be completed prior to every hydrophone deployment and retrieval.

4.2.5 Species Vocalization Clusters by PAMGuard Module

For the purpose of noise validation, cetacean species are categorized within clusters that share frequency bands, described in the Species cluster table in Appendix A. This section describes which PAMGuard modules are used to detect which clusters. PAMGuard configurations use two primary types of detection modules: spectrograms and click detectors, then a variety of supporting modules, from recorders, to maps, to sound analysis tools.

The typical PAMGuard configuration for Seiche PAM systems consists of two or three spectrograms (covering different frequency ranges from ultra-low to low to low-mid) and two click detectors (one low to mid-frequency and one mid to high-frequency). In the US Gulf, Rice's whale vocalizations are detectable on the ultra-low and low frequency spectrograms. Delphinid tonals and low to mid-frequency clicks up to 48 kHz for all odontocetes are detectable on the low-mid frequency spectrogram.

Odontocete clicks are also detectable on the low and high-frequency click detectors. Because most ship and array noise that can mask cetacean vocalizations exist in the lower frequency bands, the high-frequency click detector uses a band pass filter to exclude sound below 16 kHz. This arrangement allows clearer observation of odontocete clicks in all bands where such vocalizations are easily observed, from 16 kHz up to 250 kHz, in a single detector.

4.2.6 Distance Estimation of Acoustic Detections

There are three basic methods that can be used to estimate the distance to vocalizing marine mammals using the acoustic detection software, PAMGuard. With a linear towed array, PAMGuard can determine relative bearing to an animal with a method known as time of arrival difference (TOAD). Bearing is calculated by analysis of the difference in time for a single pressure wave to be measured by two hydrophones of known separation distance. Because this method determines an angle relative to the orientation of the array, which matches the heading of the ship, the bearing is recorded with left-right ambiguity, where only the angle

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relative to the array's orientation (where the heading of the ship/array is zero degrees) is known, not whether or not that angle is to port or starboard of the orientation of the array. Because TOAD is based around the hydrophone pairs, maintaining an orientation in line with the heading of the ship, a tail of polypropylene line may be added to the array at the depth gauge to add a small degree of drag behind the hydrophones to stabilize the array, reduce array *wag*, and improve the localization accuracy.

The click detector modules in PAMGuard allow PAM Operators to select individual clicks, for which PAMGuard will draw bearing lines in its map module from the hydrophone array toward the point of origin for that click. By choosing to draw bearing lines from multiple clicks from the same animal, and because the vessel is moving, the bearing line from the hydrophone array originates at different points as the ship moves, and the intersection of bearing lines to clicks from the same animal will intersect at the approximate location of the animal. From there, the map module in PAMGuard allows the operator to measure distance and bearing from the ship to the approximate location of the vocalizing animal. This method of localization is reliant on the precision of the bearing measurement, which can vary with factors such as the frequency of the vocalization. PAMGuard also provides a level of certainty for each determined bearing, which will be provided in the detection description when such localization is employed. This method can be used to localize delphinids, sperm whales, beaked whales, and kogia. Another module in PAMGuard known as the Radar, will use the same TOAD method to determine bearing to animals making tonal vocalizations, but with much less certainty and no reliable estimation of distance, and thus no spatial localization. For such detections where PAMGuard can provide only the bearing, the PAM Operator will rely on the estimation method described below.

When the distance to a vocalizing animal cannot be determined by PAMGuard, the experienced PAM Operator can make a distance estimation assisted by the noise or detection score system developed by Gannier et al. in *Distribution and relative abundance of sperm whales in the Mediterranean Sea* (Marine Ecology Progress Series, 2002). Gannier et al. monitored sperm whales in the Mediterranean both visually and acoustically. A scale was developed based upon the strength or intensity of the sperm whale clicks at various distances that were then measured when the sperm whales surfaced and were visually observed. Although the scale is subjective, and sounds produced in marine environments will vary according to local conditions, the scale provides a measure for approximating distances when using a single, linear hydrophone array.

5 VISUAL AND ACOUSTIC MONITORING PROCEDURES

5.1 Visual Monitoring Watches

There will be **at least two PSOs on visual watch** during:

- All seismic source activity in daylight hours, including testing
- Search periods in daylight hours prior to activating the seismic source
- **Any day on which there is planned acoustic source activity, regardless of whether the source is deployed**

While the Biological Opinion allows for one person watches, **only under the listed conditions below, no one person watches can occur without this project's RPS Project Manager (PM) approval by email.**

There will be **at least one PSO on visual watch when:**

- Acoustic source is not operating and no plans of operating during the day
- **AND**
- Monitoring condition is "poor" (poor conditions are defined in the BO as Beaufort sea state of 4 or more).

Visual monitoring will begin 30 minutes before sunrise and continue until 30 minutes after sunset.

The following guidelines will apply to these watch periods:

- No additional duties may be assigned to the PSO during his/her visual observation watch

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- No PSO will be allowed more than **two consecutive hours on watch** before being allocated a one-hour break from visual monitoring
- No PSO will be assigned a combined watch schedule of more than 12 hours in a 24-hour period

The PSOs will stand watch in a suitable, outdoor location that will not interfere with the navigation or operation of the vessel and affords an optimal view of the sea surface. PSOs will maintain 360° coverage surrounding the vessel and the seismic source.

If a protected species is observed, the PSO should first take care of any necessary mitigation actions, or if no mitigation actions are required, they will note and monitor the position (including latitude/longitude of the vessel and relative bearing and estimated range to the animal) until the animal dives or moves out of visual range of the observer.

5.2 Passive Acoustic Monitoring Watches

Passive acoustic monitoring will be conducted, day and night, during all uses of the seismic sources, during the search periods prior to activation of the seismic sources, AND for an additional 1 hour after source operations ceases.

During acoustic monitoring watches, the following guidelines shall be followed:

- No additional duties may be assigned to the PAM Operator during their acoustic monitoring watch
- No PAM Operator will be allowed more than **four consecutive hours of acoustic monitoring** before they will be allocated a break of two hours
- No person on watch as a PSO or PAM Operator will be assigned a combined watch schedule of more than 12 hours in a 24-hour period

Acoustic monitoring must be consistent, diligent, and free of distractions for the duration of the watch.

5.2.1 Procedures for PAM System Malfunction

In the event that a PAM system is not functional for the purposes of mitigation monitoring, whether because of malfunction with the cables, electronics, monitoring software or another issue, the PAM Operator is permitted **30 mins to diagnose the issue** without the need to shut down the source array.

During daylight when PSOs are also on watch, an additional 2 hours is permitted to conduct repairs, where seismic operations can continue during that time **if all the following conditions are met:**

1. The sea state at the time of the malfunction is BSS4 or less. AND
2. There were no acoustic-ONLY detections of marine mammals other than delphinids inside the applicable SZ in the 2 hours preceding the malfunction.

Operations conducted without ongoing acoustic monitoring **may not exceed a total of 4 hours in a 24-hour period.**

NMFS and BSEE must be notified as soon as is practicable of any PAM system malfunctions exceeding 30 minutes in duration that occur while acoustic source operations are ongoing. Reporting procedures are outlined in the Reporting section of this EMP.

6 PROJECT BRIEFING

The vessel crew and PSO team should participate in a project briefing that includes communication procedures, monitoring requirements and operating protocols.

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The briefing should be repeated every time relevant new personnel join the vessel before operations begins.

7 MITIGATION PROCEDURES: STRIKE AVOIDANCE

7.1 Strike Avoidance Monitoring and Vessel Maneuvering

Vessel operators must maintain a vigilant watch for all aquatic protected species.

Vessels must slow down, stop their vessel, or alter course, as appropriate and regardless of vessel size, to avoid striking any protected species:

- All marine mammals
- All sea turtles
- Gulf sturgeon, oceanic whitetip shark, giant manta ray

These procedures apply to physical interactions involving vessels and the towed equipment.

7.2 Vessel Speed Restrictions

Vessel speeds must be reduced to 10 knots or less **when mother/calf pairs, pods, or large assemblages (greater than three) of any marine mammal** are observed near a vessel.

7.3 Separation Distances

When protected species are sighted while a vessel is underway, the vessel should take action as necessary to avoid violating the relevant separation distance (e.g., attempt to remain parallel to the animal's course, avoid excessive speed or abrupt changes in direction until the animal has left the area).

If marine protected species are sighted within the relevant separation distance, the vessel should reduce speed and shift the engine to neutral, not engaging the engines until animals are clear of the area. While Attachment 3 of the BiOp states that this does not apply to any vessel that is towing gear, an effort should still be made. All vessels must, to the maximum extent practicable, attempt to maintain the minimum separation distance. Thus, PSOs shall provide the request for Vessel Strike Avoidance (VSA) and allow the vessel crew to make determination on whether that procedure can be executed without risk to the safety of the vessel and crew.

NOTE: Vessels are not required to shift into neutral for animals that approach the vessel voluntarily.

- **500 m:** All baleen whales including the Rice's whale (formerly known as the Bryde's whale)
- **100 m:** Sperm whales
- **50 m:** All other marine mammals (including manatees), and sea turtles, and the ESA-listed fish species referenced in Section 7.1.

NOTE: Any large whale for which species can't be identified should be mitigated for as a baleen whale.

7.4 Rice's Whale Area

In accordance with the new language in the BOEM permit, operators or their recognized representatives must notify BOEM or BSEE as appropriate of their intention to transit through the Rice's Whale Area (from 100- to 400- meter isobaths from 87.5° W to 27.5° N as described in the species' status review plus an additional 10 km around that area) Figure 1 below.

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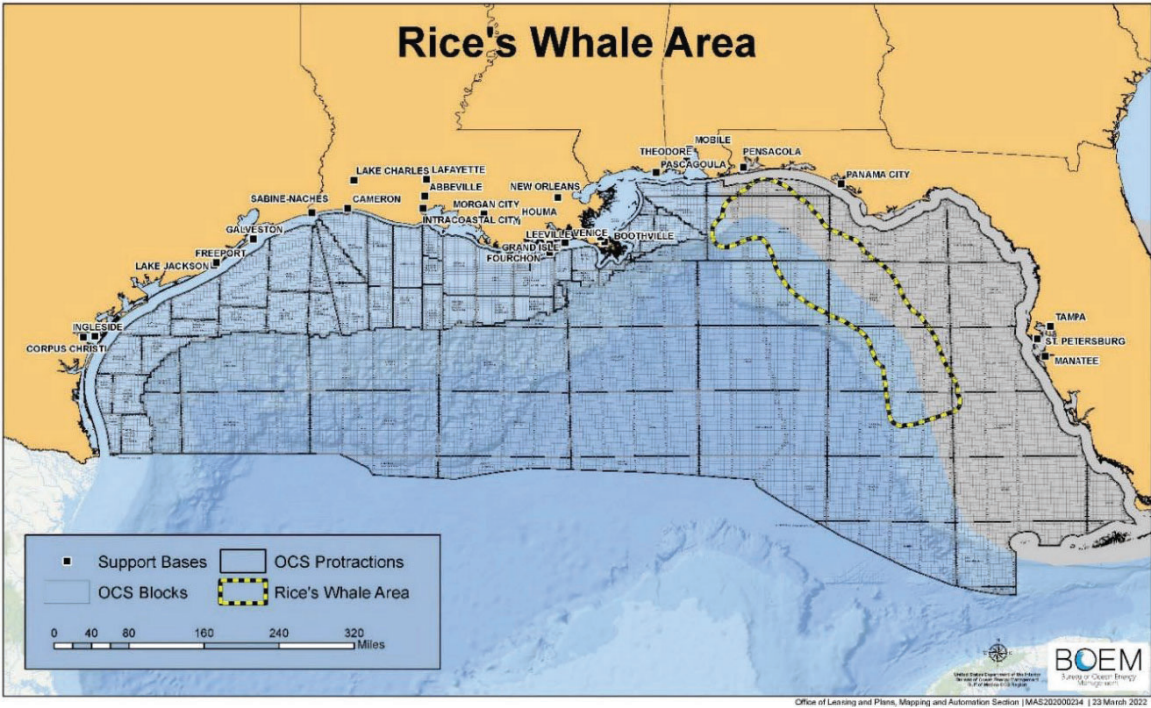


Figure 1: Rice's Whale Area as described in BOEM Permit.

For this survey the Rice's Whale Area should not be a consideration as the survey area and transit path in and out of the survey area does not approach the Rice's Whale Area.

8 MITIGATION PROCEDURES: SOUND SOURCES

8.1 Survey Equipment Subject to Monitoring and Mitigation Procedures

All of the survey equipment that produces sound below 200kHz is subject to the following monitoring and mitigation protocols, with the exception of the USBL, which is considered to be navigational equipment.

Equipment	Array or Airgun Size (cu. in.)	Frequency	Subject to Monitoring and Mitigation Requirements
Bolt 1900 LLX air gun array	5220	2-70 Hz	Yes
Pressure Inverted Echo-Sounder (PIES)	--	14 – 20 kHz	No
Ocean Bottom Nodes	--	--	No

8.2 Sound Source Shutdown Zones and Buffer Zones

Two types of zones will be established around the seismic sources, both radii that extend from the outer edge of the airgun array.

Buffer Zones (BZ): Applicable during the pre-clearance search periods conducted prior to initiating the sound source from silence, where detections of a protected species inside it's applicable BZ during the search will result in a delay to activating the source

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- **1500 meters:** Baleen whales, beaked whales, Sperm whales, Kogia species, large whale with calf, and group of 6+ large whales
- **1000 meters:** All other marine mammals
- **150 meters:** Sea turtles

Shutdown Zones (SZ): Applicable once the source has been activated, where detections of a protected species inside it's applicable SZ will result in a shutdown of the sound source.

- **1500 meters:** Baleen whales, beaked whales, Sperm whales, Kogia species, large whale with calf, and group of 6+ large whales
- **500 meters:** All other marine mammals
- **150 meters:** Sea turtles

To activate the sound source, a minimum of a 30-minute search period must be conducted.

During the daytime, the search will be conducted visually by the PSOs and acoustically by the PAM Operator.

During nighttime, the search will be conducted acoustically by the PAM Operator.

PSO and PAM on watch should be notified of the intent to turn on the source from silence, either to conduct a ramp-up or for testing, at least 60 minutes prior to the planned start,

8.3 Delays to Initiation of the Seismic Source

If any marine mammal or sea turtle was detected inside its respective BZ during the 30-minute search period, initiation of the seismic source must be delayed until:

- When all marine protected species that were observed inside the relevant BZ have been confirmed by the visual observer to have exited the relevant BZ.
- 15 minutes from last detection for small odontocetes if not observed exiting the BZ
- 30 minutes from last detection for all other protected species, including sea turtles, if not observed exiting the BZ
- 30 minutes from last detection for acoustic-only detections

NOTE: Both the 30-minute pre-clearance search period and the mandatory delay for animals not seen exiting the BZ must be completed before source initiation, but the pre-clearance search and delays can be implemented concurrently (they overlap). For a delay period that ends BEFORE the clearance search period is completed, the BZ will be cleared when the clearance search is completed. For a delay period that ends AFTER the standard clearance search period is completed, the source can be turned on when the delay period is completed.

8.4 Ramp Up Procedure and Testing

The intent of ramp-up is to warn marine mammals and sea turtles of pending seismic operations and to allow sufficient time for those animals to leave the immediate vicinity.

For all acoustic source activity, including source testing involving more than one airgun element, ramp-up procedures must be conducted to allow marine mammals and sea turtles to depart the shutdown zone before surveying begins.

- The vessel can test a single air gun or cluster without Ramp Up regardless of volume., If testing more than a single airgun or cluster, a ramp up is required as described below.

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- Ramp-up should be planned in an effort to minimize time that the source is active on the run in to the start of the survey line.
- Acoustic source activation may only occur at times of poor visibility (including night) where operational planning cannot reasonably avoid such circumstances.

Ramp-up procedures are as follows:

- Visually and acoustically (day) or acoustically (night) monitor the buffer zone and adjacent waters for the absence of marine mammals and sea turtles for at least 30 minutes before initiating ramp-up procedures.
- If no protected species are visually or acoustically detected inside their respective BZs, ramp-up procedures may begin. If animals are detected, refer to Procedures to clear the BZs prior to start of source operations.
- Seismic personnel confirm with PSOs on watch (daytime) and/or PAM Operator (day and night) that the BZs are clear of protected species.
- Ramp-up begins by activating a single airgun of the smallest volume in the array.
- Continue ramp-up in stages by doubling the number of active elements at the commencement of each stage, with each stage of approximately the same duration.
- Total duration of the ramp-up should not be less than 20 minutes.

8.5 Protected Species Shutdown Procedures

8.5.1 Shutdown During Ramp Up

If **any marine mammal** is visually or acoustically detected within its SZ, an immediate shutdown of the seismic source in ramp up is required. This shutdown also applies for the four “non-shutdown” species listed in Section 8.5.2 below.

1. No shutdown of the ramp up is required for marine mammals or sea turtles detected inside the BZ during ramp up, however, notification should be made that a shutdown could be called for if those animals move into the SZ.
2. No shutdown of the ramp up is required for acoustic only detections (day or night) unless those acoustic only detections can be localized inside the appropriate SZ. Notification should still be made that a shutdown could be called for if animals are able to be localized.

8.5.2 Shutdown During Full-Volume Operations

If any **marine mammal** is detected visually or acoustically within its SZ, an immediate shutdown of the seismic source is required.

The shutdown requirement is waived under the following circumstances:

1. Shutdown is not required for dolphins of the following genera: *Lagenodelphis*, *Stenella*, *Steno*, and *Tursiops*.
2. Shut down is not required for acoustic detections of delphinids inside the SZ unless the PSO or PAM Operator can confirm that the dolphin(s) present are from a different genus than those listed above.

If there is uncertainty regarding identification (i.e., whether the observed marine mammal(s) belongs to one of the delphinid genera for which shutdown is waived or one of the species with a larger shutdown zone), visual PSOs should use best professional judgment in making the decision to call for a shutdown.

The vessel operator must comply immediately with any shut-down request made by a PSO or PAM Operator. Any discussion can occur only after the shutdown has been implemented.

Subsequent restart of seismic source may only occur following clearance of the SZ of all marine protected species under the following conditions:

- When all other marine mammals have been confirmed by the visual observer to have been seen exiting the relevant SZ (not BZ)

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OR

When a marine mammal was not observed exiting the SZ, an additional 30 minutes has elapsed following the last detection inside the SZ.

NOTE: All resumptions of source activity following a protected species shutdown must begin with a ramp-up

8.5.3 Turtle Pause

For any turtle detected within 150 m from the edge of the source array, a pause shall be implemented, such that the turtle is greater than 150 m from the edge of the source array upon resumption of source activity.

8.6 Short Breaks in Source Operations

8.6.1 Daylight

In recognition of occasional short periods of silence for a variety of reasons other than for mitigation, during daylight operations, the seismic source may be silenced for periods of time not exceeding **30 minutes in duration** and may be restarted at the same volume for operations without a pre-start clearance observation and ramp-up if:

1. Visual and acoustic monitoring (daytime) is continued diligently through the silent period

AND

2. No marine protected species are visually or acoustically observed in their respective BZ during the silent period

NOTE: Procedures for returning to full volume without ramp up after silent periods also apply to returning to full volume from reduced volume.

However, if the source were operating at that reduced volume for more than 30 minutes, **a ramp up would be required to return to full volume.**

8.6.2 Night-time and Daylight Poor Visibility

In recognition of occasional short periods of silence for a variety of reasons other than for mitigation, the seismic source may be silenced for periods of time not exceeding **10 minutes in duration** and may be restarted at the same volume for operations without a ramp-up if:

1. Acoustic monitoring (nighttime) is continued diligently through the silent period

AND

2. No acoustic detections have been made at any distance

NOTE: Procedures for returning to full volume without ramp up after silent periods also apply to returning to full volume from reduced volume.

For example, if two of three strings were silenced from full volume for the purpose of testing single strings, and testing was completed in less than 10 minutes, the array could return to full volume without a ramp-up provided that the conditions described above were met.

However, if the source were operating at that reduced volume for more than 30 minutes, **a ramp up would be required to return to full volume.**

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8.7 Non-acquisition and Non-Testing Source Activity

The acoustic source should be deactivated when not acquiring data or preparing to acquire data, except as necessary for testing. Unnecessary use of the acoustic source shall be avoided.

9 REPORTING

9.1 Incident Reporting

9.1.1 Potential Non-Compliance Incidents

The Lead PSO or Lead PAM Operator verbally informs Party Manager and on-board Client Representative of any potential compliance related issues immediately. The Lead PSO/PAM Operator also informs the RPS Project Manager immediately of all potential non-compliance events.

If the issue can be resolved between the Lead PSO/PAM Operator, Client Representative and Party Manager, the lead PSO/PAM Operator will document in writing the compliance issue and the agreed-upon practices for minimizing future non-compliance incidents of the same nature. The party manager and QC Representative review and approve, and the statement is submitted to the following distribution list:

Islam Ibrahim Islam.Ibrahim@tetrattech.com
Jason Dean jason.dean@tetrattech.com
Anna Williams Anna.Williams@tetrattech.com
Scott Baker SBAKER@chevron.com
Shauna Oppert oppert@chevron.com
Adrian Peinado APeinado@chevron.com
Peter Nevill PeterNevill@chevron.com
Marcus Ruscio marcusruscio@chevron.com

The representatives listed above will distribute any pertinent information resulting from the incident to their respective crews as deemed necessary and appropriate.

If the issue cannot be resolved at the vessel level, TGS, Chevron and RPS will discuss and determine the appropriate future actions to be taken. When a common position is reached, notification of the agreed procedures will be distributed by Chevron to vessel crew and by RPS to the PSOs and PAM Operators.

If an agreement cannot be reached at the office level, a Chevron representative will contact BOEM/NMFS/BSEE for clarification. Results from the clarification will be distributed by Chevron.

9.1.2 Reporting A Non-functioning PAM System During Seismic Operations

The PAM Operator on duty will notify the RPS Project Manager as soon as possible. The RPS PM will email NMFS (nmfs.psoreview@noaa.gov) and BSEE (protectedspecies@bsee.gov) as soon as is practicable of any PAM system malfunctions exceeding 30 minutes in duration that occur while acoustic source operations are ongoing.

The notification will include the vessel name, the time and location (GIS position) in which the PAM system ceased function where seismic operations continued. The template for this email will be provided by the RPS PM.

The PAM Operator will also notify by email:

- The vessel Party Chief
- The Client Representative
- The RPS PM should also be copied on this

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9.1.3 Injured or Dead Protected Species Reporting

1. The PSO on watch will report the sightings of a dead and/or injured marine species to the Lead PSO, the RPS project manager, on board client representative and vessel Party Chief as soon as possible after the sighting.
2. The Chevron Representative will report the sighting to the Office of Protected Resources (OPR), NMFS and to the Southeast Regional Stranding Network. This will occur as soon as practicably possible but no more than 24 hours of the detection.
 - a. Marine mammals: contact Southeast Region's Marine Mammal Stranding Hotline at 1-877-433-8299.
 - b. Sea turtles: contact Brian Stacy, Veterinary Medical Officer at 352-283-3370. If unable to reach Brian Stacy, contact Lyndsey Howell at 301-310-3061.
 - c. Other protected species (e.g., giant manta ray, oceanic whitetip shark, or Gulf sturgeon): contact the ESA Section 7 biologist at 301-427-8413 (nmfs.psoreview@noaa.gov) and report all incidents to takereport.nmfs@noaa.gov.
3. A written report will be prepared by the Lead PSO including any photos taken of the animal and sent to RPS as soon as possible.
4. The RPS office will submit the written report to the following distribution list within 12 hours of the detection for review:
 - On-board:**
 - Onboard Party Chief
 - Client Representative
 - On-shore:**
 - Chevron Project Manager

RPS will provide the written report, once the draft has been reviewed and approved per above, to NOAA, NMFS, and BOEM with Chevron and TGS included in copy.

NOTE: Unless otherwise directed by BOEM, NOAA Fisheries, or NOAA, the dead or injured marine mammal or sea turtle SHOULD NOT be touched! Dead and injured marine mammals and sea turtles are still protected by the ESA and the MMPA and touching the animals in any manner is considered harassment and is punishable by law.

9.2 Daily Progress, Interim and Final Reporting

9.2.1 Daily Progress Reports

A daily report will be completed and submitted to the Party chief, onboard client representative and RPS project manager.

The template will be provided by RPS and Chevron will be provided opportunity to review and provide comments.

9.2.2 Interim Reports

RPS will submit interim reports in the format of an excel spreadsheet for each vessel containing the required information listed in the BO.

RPS will submit interim reports (a dataset in a format approved by NMFS and BSEE) on the 1st of each month to BSEE (protectedspecies@bsee.gov).

9.2.3 Final Report

RPS will develop a final report summarizing the survey activities and all PAM / PSO observations. The report will contain all the data required to meet the requirements of the BO.

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The RPS Project Manager will provide the draft final report to the Chevron Project Manager within 45 days of project completion and then the final submission of the report will be submitted to BOEM, BSEE, NMFS within 90 days of project completion.

Appendix A: Passive Acoustic Monitoring System

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A.1 PAM Equipment

The PAM equipment comprises the following items:

- 250 m Hydrophone Array Cable containing 2 Low Frequency hydrophones (10 Hz to 24 kHz), 2 Ultra Broadband hydrophones (200 Hz to 200 kHz), and 2 Broadband hydrophones (2 kHz to 200 kHz)
- 100 m deck cable
- Electronic data capture and processing unit including:
 - Headphones RF transmitter
 - Fireface audio interface
 - Rackmount Personal Computer (PC)
 - Buffer interface unit
- Integral screen and keyboard
- Backup System



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A.2 6-Hydrophone Array

The array includes six hydrophones arranged in three pairs of identical specification with appropriate physical separation to provide direction-finding (bearings) to marine mammals and localization using Target Motion Analysis (TMA).

- The front pair (H1 and H2, 8 m separation) consists of two “Low Frequency” hydrophones with a response of 10 Hz to 24 KHz.
- The middle pair (H3 and H4, 2 m separation) consists of two “Broadband” hydrophones with a response of 200 Hz to 200 kHz.
- The rear pair (H5 and H6, 0.25 m separation) consists of two “Standard” hydrophones with a response of 2 kHz to 200 kHz.

The “Low Frequency” hydrophones are configured to detect very low frequency vocalizations while the “Broadband” and “Standard” hydrophones are configured to detect low-mid frequency and mid-high vocalizations respectively. These three pairs of hydrophones provide the capability to detect the full range of marine mammal vocalizations anticipated to be encountered. Simulation exercises have been completed using the PAMGuard software to verify that pairing separation provides consistently accurate bearings to a range of marine mammal vocalizations. Test signals used in these exercises simulated right whale up-calls, broadband sperm whale clicks, delphinid whistles, and narrow-band high-frequency harbor porpoise clicks. Anecdotal reports from surveys utilizing Seiche PAM systems with simultaneous visual and acoustic monitoring indicate that the acoustic range estimates have been sufficiently accurate for decision-making on whether vocal animals are within or beyond a 500 m mitigation zone.

A.3 Noise Abatement

Both the array and tow cable are a single, low-profile, linear array to minimize drag and noise. The hydrophone pots are tapered at each end to improve vortex shedding and turbulence in the water flowing past the potting, thus mitigating the associated pressure fluctuations around the hydrophones that add noise to the system. Furthermore, modern Seiche tow cables, known as *heavy tow* cables, employ both a steel braid and Kevlar sheath that both strengthen the cable and increase weight without significantly increasing surface area. This maintains a low-profile cable that is heavy enough to tow deeply, reducing or eliminating the need to add chain weight to achieve desired tow depths, where such chain weights create the blunt protrusions in the length of the cable that increase vortex shedding and turbulence and add pressure fluctuations and sound to the water close to the hydrophones.

A.4 Species Vocalization Clusters

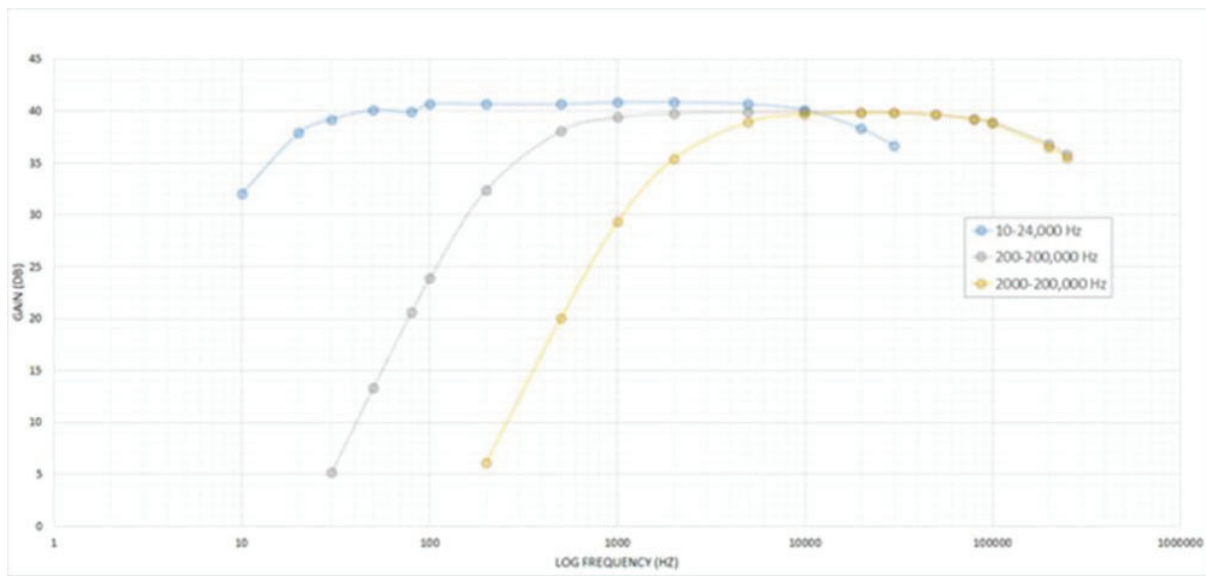
Because species tend to vocalize with certain frequency bands, it is necessary to categorize species within their respective bands to show a PAM system's ability to monitor for specific species. These categories, which cluster vocalizations from single species and multiple species into single categories, are known as species clusters. For this project, the relevant species are listed in the table below.

Name	Core detection bandwidth (Hz)	Apparent source level distribution dB re 1 uPa @ 1 m (rms)
Beaked whales	20,000-96,000	180± 9
Blackfish	4,000-8,000	122 ± 4
Dolphin tonals	2,000-24,000	148±13
Dolphin clicks	10,000 - 100,000	162 ± 10
High-frequency cetaceans	110,000-180,000	165 ±13
Rice's whale	60-160	155 ± 14
Sperm whale	2,000-24,000	186±3 (usual), 171 ± 5 (creaks)

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A.5 Frequency Response Curves

Frequency response curves provide a standard for demonstrating hydrophone sensitivity over a range of frequencies. A flat response between the frequencies of interest is desirable, indicating consistent sensitivity across the band of interest. These frequency response curves provided were generated from 10 Hz to 24 kHz, 200 Hz to 200 kHz, and 2 kHz to 200 kHz hydrophone elements (including pre-amps) of a Seiche towed array and are representative of the response curves for the 6 Hydrophone Array. The frequency response curves for each element within the arrays (main system and spare) used on the survey will be generated as part of the calibration process prior to their dispatch.



A.6 Calibration Values for PAM Software

Pamguard Array Manager

- H1 (Ch0, 0.01-24 kHz) Sensitivity = -196.3 dB re: 1 V/uPa, Preamplifier Gain = +21.1 dB
- H2 (Ch1, 0.01-24 kHz) Sensitivity = -196.6 dB re: 1 V/uPa, Preamplifier Gain = +21.2 dB
- H3 (Ch2, 0.2-200 kHz) Sensitivity = -197.1 dB re: 1 V/uPa, Preamplifier Gain = +39.9 dB
- H4 (Ch3, 0.2-200 kHz) Sensitivity = -193.5 dB re: 1 V/uPa, Preamplifier Gain = +39.9 dB
- H5 (Ch4, 2-200 kHz) Sensitivity = -197.2 dB re: 1 V/uPa, Preamplifier Gain = +39.9 dB
- H6 (Ch5, 2-200 kHz) Sensitivity = -196.9 dB re: 1 V/uPa, Preamplifier Gain = +39.8 dB

Pamguard Sound Acquisition

National Instruments USB-6251

- Terminal Configuration Differential
- Input Voltage Range 4 V (set as +/- 2 V per channel)
- Additional System Gain 0 dB
- Channels SW Ch0 / HW Ch4, SW Ch1 / HW Ch5
- Sample Rate up to 500 kHz
- Sample Size 16 bit

RME Fireface 800

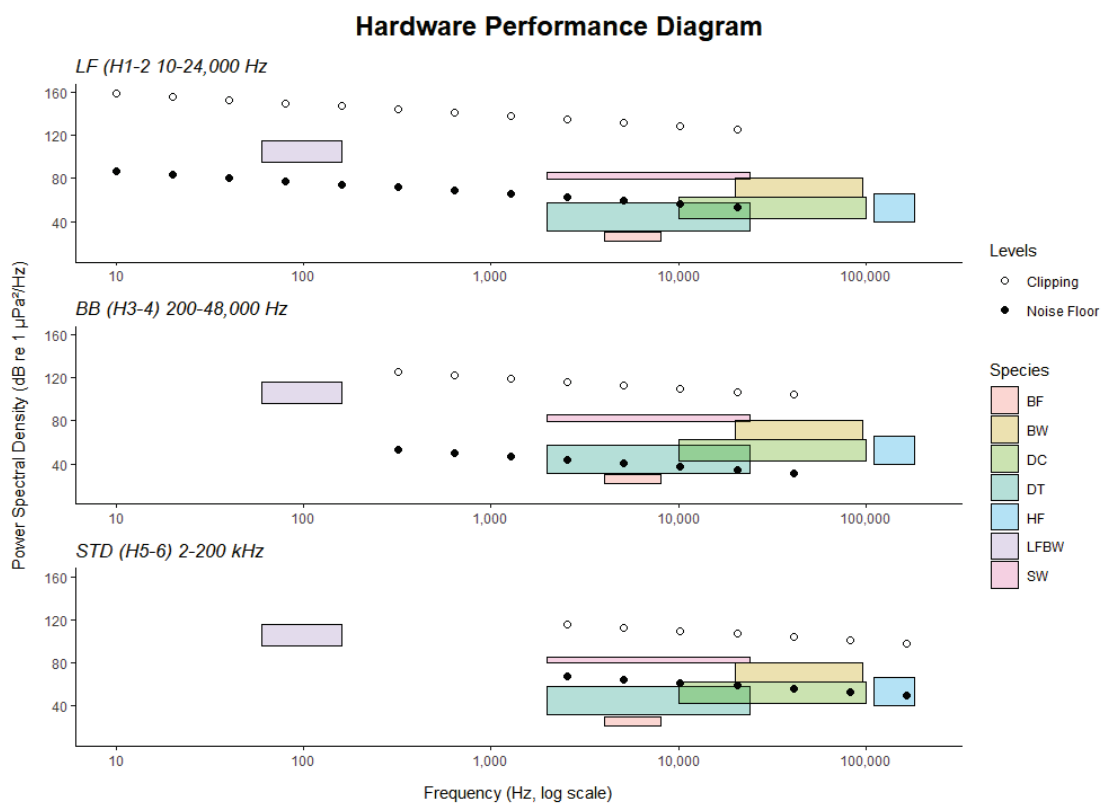
- Line Level Input -10 dBV (set in the Fireface Settings utility)

REPORT

- Input Voltage Range (p-p) 2 V (i.e., +/- 1 V)
- Additional System Gain 11.3 dB
- Channels SW Ch0 / HW Ch0, SW Ch1 / HW Ch1 .
..... SW Ch2 / HW Ch2, SW Ch3 / HW Ch3
- Sample Rate 48-192 kHz

Sample Size 24 bit

A.7 Hardware Performance Diagram



REPORT

Appendix B: LOA



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
 NATIONAL MARINE FISHERIES SERVICE
 1315 East-West Highway
 Silver Spring, Maryland 20910

LETTER OF AUTHORIZATION

Chevron and its designees are hereby authorized under section 101(a)(5)(A) of the Marine Mammal Protection Act (MMPA; 16 U.S.C. 1371(a)(5)(A)) to take marine mammals incidental to geophysical survey activities in the Gulf of America, subject to the provisions of the MMPA and the Regulations Governing Taking Marine Mammals Incidental to Geophysical Survey Activities in the Gulf of America (50 CFR Part 217, Subpart S) (Regulations).

1. This Letter of Authorization (LOA) is valid from October 15, 2025, through April 19, 2026.
2. This LOA authorizes take incidental to the specified geophysical survey activities (3D OBN survey in all or portions of 435 Lease Blocks centered on Lease Block Walker Ridge 678) described in the LOA request.
3. General Conditions
 - (a) A copy of this LOA must be in the possession of the Holder of the Authorization (Holder), vessel operator, other relevant personnel, the lead protected species observer (PSO), and any other relevant designees operating under the authority of the LOA.
 - (b) The species and/or stocks authorized for taking are listed in Table 1. Authorized take, by Level A and Level B harassment only, is limited to the species and numbers listed in Table 1.
 - (c) The taking by serious injury or death of any of the species listed in Table 1 or any taking of any other species of marine mammal is prohibited and may result in the modification, suspension, or revocation of this IHA. Any taking exceeding the authorized amounts listed in Table 1 is prohibited and may result in the modification, suspension, or revocation of this IHA.
 - (d) The Holder must instruct relevant vessel personnel with regard to the authority of the protected species monitoring team (PSO team), and must ensure that relevant vessel personnel and PSO team participate in a joint onboard briefing, led by the vessel operator and lead PSO, prior to beginning work to ensure that responsibilities, communication procedures, protected species monitoring protocols, operational procedures, and LOA requirements are clearly understood. This briefing must be repeated when relevant new personnel join the survey operations before work involving those personnel commences.
 - (e) The acoustic source must be deactivated when not acquiring data or preparing to acquire data, except as necessary for testing. Unnecessary use of the acoustic source must be avoided. Notified operational capacity (i.e., total array volume)



(not including redundant backup airguns) must not be exceeded during the survey, except where unavoidable for source testing and calibration purposes. All occasions where activated source volume exceeds notified operational capacity must be communicated to the PSO(s) on duty and fully documented. The lead PSO must be granted access to relevant instrumentation documenting acoustic source power and/or operational volume.

(f) PSO requirements:

- i. LOA-holders must use independent, dedicated, qualified PSOs, meaning that the PSOs must be employed by a third-party observer provider, must have no tasks other than to conduct observational effort, collect data, and communicate with and instruct relevant vessel crew with regard to the presence of protected species and mitigation requirements (including brief alerts regarding maritime hazards), and must be qualified pursuant to section 5(a) of this LOA. Acoustic PSOs are required to complete specialized training for operating passive acoustic monitoring (PAM) systems and are encouraged to have familiarity with the vessel on which they will be working. PSOs may act as both acoustic and visual observers (but not simultaneously), so long as they demonstrate that their training and experience are sufficient to perform each task.
- ii. The Holder must submit PSO resumes for NMFS review and approval prior to commencement of the survey (submit to nmfs.psoreview@noaa.gov). Resumes should include dates of training and any prior NMFS approval, as well as dates and description of last experience, and must be accompanied by information documenting successful completion of an acceptable training course. NMFS is allowed one week to approve PSOs from the time that the necessary information is received by NMFS, after which PSOs meeting the minimum requirements will automatically be considered approved.
- iii. At least one visual PSO and two acoustic PSOs aboard each acoustic source vessel must have a minimum of 90 days at-sea experience working in those roles, respectively, with no more than eighteen months elapsed since the conclusion of the at-sea experience. One visual PSO with such experience must be designated as the lead for the entire PSO team. The lead must coordinate duty schedules and roles for the PSO team and serve as the primary point of contact for the vessel operator. (Note that the responsibility of coordinating duty schedules and roles may instead be assigned to a shore-based, third-party monitoring coordinator.) To the maximum extent practicable, the lead PSO must devise the duty schedule such that experienced PSOs are on duty with those PSOs with appropriate training but who have not yet gained relevant experience.

4. Mitigation Requirements

(a) Visual monitoring requirements:

- i. During survey operations (i.e., any day on which use of the acoustic source is planned to occur, and whenever the acoustic source is in the water, whether activated or not), a minimum of two PSOs must be on duty and conducting visual observations at all times during daylight hours (i.e., from 30 minutes prior to sunrise through 30 minutes following sunset).
- ii. Visual monitoring must begin not less than 30 minutes prior to ramp-up and must continue until one hour after use of the acoustic source ceases or until 30 minutes past sunset.
- iii. Visual PSOs must coordinate to ensure 360° visual coverage around the vessel from the most appropriate observation posts, and must conduct visual observations using binoculars and the naked eye while free from distractions and in a consistent, systematic, and diligent manner.
- iv. Visual PSOs must immediately communicate all observations of marine mammals to the on-duty acoustic PSO, including any determination by the PSO regarding species identification, distance, and bearing and the degree of confidence in the determination.
- v. Any observations of marine mammals by crew members aboard any vessel associated with the survey must be relayed to the PSO team.
- vi. During good conditions (e.g., daylight hours; Beaufort sea state (BSS) 3 or less), visual PSOs must conduct observations when the acoustic source is not operating for comparison of sighting rates and behavior with and without use of the acoustic source and between acquisition periods, to the maximum extent practicable.
- vii. Visual PSOs may be on watch for a maximum of two consecutive hours followed by a break of at least one hour between watches and may conduct a maximum of 12 hours of observation per 24-hour period. NMFS may grant an exception for LOA applicants that demonstrate such a “two hours on/one hour off” duty cycle is not practicable, in which case visual PSOs will be subject to a maximum of four consecutive hours on watch followed by a break of at least two hours between watches. Combined observational duties (visual and acoustic but not at the same time) must not exceed 12 hours per 24-hour period for any individual PSO.

(b) Acoustic monitoring requirements:

- i. All source vessels must use a towed PAM system at all times when operating in waters deeper than 100 m, which must be monitored by a

minimum of one acoustic PSO beginning at least 30 minutes prior to ramp-up, at all times during use of the acoustic source, and until one hour after use of the acoustic source ceases. “PAM system” refers to calibrated hydrophone arrays with full system redundancy to detect, identify, and estimate distance and bearing to vocalizing cetaceans, coupled with appropriate software to aid monitoring and listening by a PAM operator skilled in bioacoustics analysis and computer system specifications capable of running appropriate software. The PAM system must have at least one calibrated hydrophone (per each deployed hydrophone type and/or set) sufficient for determining whether background noise levels on the towed PAM system are sufficiently low to meet performance expectations. Applicants must provide a PAM plan including description of the hardware and software proposed for use prior to proceeding with any survey where PAM is required.

- ii. Acoustic PSOs must immediately communicate all detections of marine mammals to visual PSOs (when visual PSOs are on duty), including any determination by the PSO regarding species identification, distance, and bearing, and the degree of confidence in the determination.
- iii. Acoustic PSOs may be on watch for a maximum of four consecutive hours followed by a break of at least two hours between watches, and may conduct a maximum of 12 hours of observation per 24-hour period. Combined observational duties (visual and acoustic but not at the same time) must not exceed 12 hours per 24-hour period for any individual PSO.
- iv. Survey activity may continue for 30 minutes when the PAM system malfunctions or is damaged, while the PAM operator diagnoses the issue. If the diagnosis indicates that the PAM system must be repaired to solve the problem, operations may continue for an additional two hours without acoustic monitoring during daylight hours only under the following conditions:
 - (A) Sea state is less than or equal to BSS 4;
 - (B) No marine mammals (excluding delphinids) detected solely by PAM in the applicable exclusion zone in the previous two hours;
 - (C) NMFS is notified via email as soon as practicable with the time and location in which operations began occurring without an active PAM system; and
 - (D) Operations with an active acoustic source, but without an operating PAM system, do not exceed a cumulative total of four hours in any 24-hour period.

- (c) PSOs must establish and monitor applicable exclusion and buffer zones. These zones must be based upon the radial distance from the edges of the airgun array (rather than being based on the center of the array or around the vessel itself). During use of the acoustic source (i.e., anytime the acoustic source is active, including ramp-up), occurrence of marine mammals within the relevant buffer zone (but outside the exclusion zone) should be communicated to the operator to prepare for the potential shutdown of the acoustic source.
 - i. Two exclusion zones are defined, depending on the species and context. A standard exclusion zone encompassing the area at and below the sea surface out to a radius of 500 meters from the edges of the airgun array (0-500 m) is defined. For special circumstances (defined at 4(e)(v) of this LOA), the exclusion zone encompasses an extended distance of 1,500 meters (0-1,500 m).
 - ii. During pre-start clearance monitoring (i.e., before ramp-up begins), the buffer zone acts as an extension of the exclusion zone in that observations of marine mammals within the buffer zone would also preclude airgun operations from beginning (i.e., ramp-up). For all marine mammals (except where superseded by the extended 1,500-m exclusion zone), the buffer zone encompasses the area at and below the sea surface from the edge of the 0-500 meter exclusion zone out to a radius of 1,000 meters from the edges of the airgun array (500-1,000 m). The buffer zone is not applicable when the exclusion zone is greater than 500 meters, i.e., the observational focal zone is not increased beyond 1,500 meters.
- (d) A ramp-up procedure, involving a step-wise increase in the number of airguns firing and total active array volume until all operational airguns are activated and the full volume is achieved, is required at all times as part of the activation of the acoustic source. A 30-minute pre-start clearance observation period must occur prior to the start of ramp-up. The Holder must adhere to the following pre-start clearance and ramp-up requirements:
 - i. The operator must notify a designated PSO of the planned start of ramp-up as agreed upon with the lead PSO; the notification time should not be less than 60 minutes prior to the planned ramp-up.
 - ii. Ramp-ups must be scheduled so as to minimize the time spent with source activated prior to reaching the designated run-in.
 - iii. A designated PSO must be notified again immediately prior to initiating ramp-up procedures and the operator must receive confirmation from the PSO to proceed.
 - iv. Ramp-up must not be initiated if any marine mammal is within the

applicable exclusion or buffer zone. If a marine mammal is observed within the exclusion zone or the buffer zone during the 30-minute pre-start clearance period, ramp-up must not begin until the animal(s) has been observed exiting the zones or until an additional time period has elapsed with no further sightings (15 minutes for small delphinids and 30 minutes for all other species).

- v. Ramp-up must begin by activating a single airgun of the smallest volume in the array and shall continue in stages by doubling the number of active elements at the commencement of each stage, with each stage of approximately the same duration. Total duration must not be less than 20 minutes. The operator must provide information to the PSO documenting that appropriate procedures were followed.
 - vi. Ramp-up must cease and the source shut down upon observation of marine mammals within the applicable exclusion zone. Once ramp-up has begun, observations of marine mammals within the buffer zone do not require shutdown.
 - vii. Ramp-up may occur at times of poor visibility, including nighttime, if appropriate acoustic monitoring has occurred with no detections of a marine mammal other than delphinids in the 30 minutes prior to beginning ramp-up. Acoustic source activation may only occur at night where operational planning cannot reasonably avoid such circumstances.
 - viii. If the acoustic source is shut down for brief periods (i.e., less than 30 minutes) for reasons other than implementation of prescribed mitigation (e.g., mechanical difficulty), it may be activated again without ramp-up if PSOs have maintained constant visual and/or acoustic observation and no visual or acoustic detections of any marine mammal have occurred within the applicable exclusion zone. For any longer shutdown, pre-start clearance observation and ramp-up are required. For any shutdown at night or in periods of poor visibility (e.g., BSS 4 or greater), ramp-up is required, but if the shutdown period was brief and constant observation maintained, pre-start clearance watch is not required.
 - ix. Testing of the acoustic source involving all elements requires ramp-up. Testing limited to individual source elements or strings does not require ramp-up but does require the pre-start clearance observation period.
- (e) Shutdown requirements:
- i. Any PSO on duty has the authority to delay the start of survey operations or to call for shutdown of the acoustic source pursuant to these requirements.

- ii. The operator must establish and maintain clear lines of communication directly between PSOs on duty and crew controlling the acoustic source to ensure that shutdown commands are conveyed swiftly while allowing PSOs to maintain watch.
 - iii. When both visual and acoustic PSOs are on duty, all detections must be immediately communicated to the remainder of the on-duty PSO team for potential verification of visual observations by the acoustic PSO or of acoustic detections by visual PSOs.
 - iv. When the airgun array is active (i.e., anytime one or more airguns is active, including during ramp-up) and (1) a marine mammal appears within or enters the applicable exclusion zone and/or (2) a marine mammal (excluding delphinids) is detected acoustically and localized within the applicable exclusion zone, the acoustic source must be shut down. When shutdown is called for by a PSO, the acoustic source must be immediately deactivated and any dispute resolved only following deactivation.
 - v. The extended 1,500-m exclusion zone must be applied upon detection (visual or acoustic) of a baleen whale, sperm whale, beaked whale, or *Kogia* spp. within the zone.
 - vi. Shutdown requirements are waived for dolphins of the following genera: *Tursiops*, *Stenella*, *Steno*, and *Lagenodelphis*. If a delphinid is visually detected within the exclusion zone, no shutdown is required unless the PSO confirms the individual to be of a genus other than those listed above, in which case a shutdown is required. Acoustic detection of delphinids does not require shutdown.
 - vii. If there is uncertainty regarding identification or localization, PSOs may use best professional judgment in making the decision to call for a shutdown.
 - viii. Upon implementation of shutdown, the source may be reactivated after the marine mammal(s) has been observed exiting the applicable exclusion zone or following a 30-minute clearance period with no further detection of the marine mammal(s).
- (f) *Entanglement avoidance.* To avoid the risk of entanglement, if conducting surveys using ocean-bottom nodes or similar gear the Holder must:
- i. Use negatively buoyant coated wire-core tether cable;
 - ii. Retrieve all lines immediately following completion of the survey; and

- iii. Attach acoustic pingers directly to the coated tether cable; acoustic releases should not be used.

(g) *Vessel strike avoidance.* The Holder must adhere to the following requirements:

- i. Vessel operators and crews must maintain a vigilant watch for all marine mammals and must slow down, stop their vessel, or alter course, as appropriate and regardless of vessel size, to avoid striking any marine mammal. A visual observer aboard the vessel must monitor a vessel strike avoidance zone around the vessel, which shall be defined according to the parameters stated in this subsection. Visual observers monitoring the vessel strike avoidance zone may be third-party observers (i.e., PSOs) or crew members, but crew members responsible for these duties must be provided sufficient training to distinguish marine mammals from other phenomena and broadly to identify a marine mammal as a baleen whale, sperm whale, or other marine mammal;
- ii. Vessel speeds must be reduced to 10 kn or less when mother/calf pairs, pods, or large assemblages of marine mammals are observed near a vessel;
- iii. All vessels must maintain a minimum separation distance of 500 m from baleen whales;
- iv. All vessels must maintain a minimum separation distance of 100 m from sperm whales;
- v. All vessels must, to the maximum extent practicable, attempt to maintain a minimum separation distance of 50 m from all other marine mammals, with an exception made for those animals that approach the vessel; and
- vi. When marine mammals are sighted while a vessel is underway, the vessel must take action as necessary to avoid violating the relevant separation distance, e.g., attempt to remain parallel to the animal's course, avoid excessive speed or abrupt changes in direction until the animal has left the area. If marine mammals are sighted within the relevant separation distance, the vessel must reduce speed and shift the engine to neutral, not engaging the engines until animals are clear of the area. This does not apply to any vessel towing gear or any vessel that is navigationally constrained.
- vii. These requirements do not apply in any case where compliance would create an imminent and serious threat to a person or vessel or to the extent that a vessel is restricted in its ability to maneuver and, because of the restriction, cannot comply.

5. Monitoring Requirements

(a) PSO qualifications:

- i. PSOs must successfully complete relevant, acceptable training, including completion of all required coursework and passing (80 percent or greater) a written and/or oral examination developed for the training program.
- ii. PSOs must have successfully attained a bachelor's degree from an accredited college or university with a major in one of the natural sciences, a minimum of 30 semester hours or equivalent in the biological sciences, and at least one undergraduate course in math or statistics. The educational requirements may be waived if the PSO has acquired the relevant skills through alternate experience. Requests for such a waiver must be submitted to NMFS and shall include written justification. Requests will be granted or denied (with justification) by NMFS within one week of receipt of submitted information. Alternate experience that may be considered includes, but is not limited to:
 - (A) secondary education and/or experience comparable to PSO duties;
 - (B) previous work experience conducting academic, commercial, or government-sponsored marine mammal surveys; or
 - (C) previous work experience as a PSO; the PSO should demonstrate good standing and consistently good performance of PSO duties.

(b) *Equipment.* The Holder is required to:

- i. Provide PSOs with bigeye binoculars (e.g., 25 x 150; 2.7 view angle; individual ocular focus; height control) of appropriate quality solely for PSO use. These must be pedestal-mounted on the deck at the most appropriate vantage point that provides for optimal sea surface observation, PSO safety, and safe operation of the vessel.
- ii. For each vessel required to use a PAM system, provide a PAM system that has been verified and tested by an experienced acoustic PSO who will be using it during the trip for which monitoring is required;
- iii. Work with the selected third-party observer provider to ensure PSOs have all equipment (including backup equipment) needed to adequately perform necessary tasks, including accurate determination of distance and bearing to observed marine mammals. (Equipment specified in A. through G. below may be provided by an individual PSO, the third-party observer provider, or the LOA-holder, but the LOA-holder is responsible for ensuring PSOs have the proper equipment required to perform the duties specified herein.) Such equipment, at a minimum, must include:

- (A) Reticle binoculars (e.g., 7 x 50) of appropriate quality (at least one per PSO, plus backups);
 - (B) Global Positioning Unit (GPS) (plus backup);
 - (C) Digital camera with a telephoto lens (the camera or lens should also have an image stabilization system) that is at least 300 mm or equivalent on a full-frame single lens reflex (SLR) (plus backup);
 - (D) Compass (plus backup);
 - (E) Radios for communication among vessel crew and PSOs (at least one per PSO, plus backups); and
 - (F) Any other tools necessary to adequately perform necessary PSO tasks.
- (c) *Data collection.* PSOs must use standardized electronic data forms. PSOs must record detailed information about any implementation of mitigation requirements, including the distance of marine mammals to the acoustic source and description of specific actions that ensued, the behavior of the animal(s), any observed changes in behavior before and after implementation of mitigation, and if shutdown was implemented, the length of time before any subsequent ramp-up or activation of the acoustic source. If required mitigation was not implemented, PSOs must record a description of the circumstances. At a minimum, the following information should be recorded:
- i. Vessel names (source vessel and other vessels associated with survey), vessel size and type, maximum speed capability of vessel, port of origin, and call signs;
 - ii. PSO names and affiliations;
 - iii. Dates of departures and returns to port with port name;
 - iv. Dates of and participants in PSO briefings;
 - v. Dates and times (Greenwich Mean Time) of survey effort and times corresponding with PSO effort;
 - vi. Vessel location (latitude/longitude) when survey effort began and ended and vessel location at beginning and end of visual PSO duty shifts;
 - vii. Vessel location at 30-second intervals (if software capability allows) or 5-minute intervals (if location must be manually recorded);

- viii. Vessel heading and speed at beginning and end of visual PSO duty shifts and upon any line change;
- ix. Environmental conditions while on visual survey (at beginning and end of PSO shift and whenever conditions changed significantly), including Beaufort sea state and any other relevant weather conditions including cloud cover, fog, sun glare, and overall visibility to the horizon;
- x. Vessel location when environmental conditions change significantly;
- xi. Factors that may have contributed to impaired observations during each PSO shift change or as needed as environmental conditions change (e.g., vessel traffic, equipment malfunctions);
- xii. Survey activity information, such as acoustic source power output while in operation, number and volume of airguns operating in an array, tow depth of an acoustic source, and any other notes of significance (i.e., pre-start clearance, ramp-up, shutdown, testing, shooting, ramp-up completion, end of operations, streamers, etc.); and
- xiii. Upon visual observation of a marine mammal, the following information:
 - (A) Watch status (sighting made by PSO on/off effort, opportunistic, crew, alternate vessel/platform);
 - (B) PSO who sighted the animal and PSO location (including height above water) at time of sighting;
 - (C) Time of sighting;
 - (D) Vessel coordinates at time of sighting;
 - (E) Water depth;
 - (F) Direction of vessel's travel (compass direction);
 - (G) Speed of the vessel(s) from which the observation was made;
 - (H) Direction of animal's travel relative to the vessel;
 - (I) Pace of the animal;
 - (J) Estimated distance to the animal (and method of estimating distance) and its heading relative to vessel at initial sighting;

- (K) Identification of the animal (e.g., genus/species, lowest possible taxonomic level, or unidentified), PSO confidence in identification, and the composition of the group if there is a mix of species;
- (L) Estimated number of animals (high/low/best);
- (M) Estimated number of animals by cohort (adults, juveniles, group composition, etc.);
- (N) Description (as many distinguishing features as possible of each individual seen, including length, shape, color, pattern, scars or markings, shape and size of dorsal fin, shape of head, and blow characteristics);
- (O) Detailed behavior observations (e.g., number of blows/breaths, number of surfaces, breaching, spyhopping, diving, feeding, traveling; as explicit and detailed as possible; note any observed changes in behavior), including an assessment of behavioral responses to survey activity;
- (P) Animal's closest point of approach (CPA) and/or closest distance from any element of the acoustic source;
- (Q) Platform activity at time of sighting (e.g., deploying, recovering, testing, shooting, data acquisition, other); and
- (R) Description of any actions implemented in response to the sighting (e.g., delays, shutdown, ramp-up) and time and location of the action.

xiv. Upon acoustic detection of a marine mammal using a PAM system, the following information:

- (A) An acoustic encounter identification number, and whether the detection was linked with a visual sighting;
- (B) Date and time when first and last heard;
- (C) Types and nature of sounds heard (e.g., clicks, whistles, creaks, burst pulses, continuous, sporadic, strength of signal); and
- (D) Any additional information recorded such as water depth of the hydrophone array, bearing of the animal to the vessel (if determinable), species or taxonomic group (if determinable), spectrogram screenshot, and any other notable information.

6. Reporting Requirements

(a) Annual reporting:

- i. The Holder must submit a summary report to NMFS on all activities and monitoring results within 90 days of the completion of the survey or expiration of the LOA, whichever comes sooner, and must include all information described above under section 5(c) of this LOA. If an issued LOA is valid for greater than one year, the summary report must be submitted on an annual basis.
- ii. The report must describe activities conducted and sightings of marine mammals, must provide full documentation of methods, results, and interpretation pertaining to all monitoring, and must summarize the dates and locations of survey operations and all marine mammal sightings (dates, times, locations, activities, associated survey activities, and information regarding locations where the acoustic source was used). In addition to the report, all raw observational data must be made available to NMFS.
- iii. For operations requiring the use of PAM, the report must include a validation document concerning the use of PAM, which should include necessary noise validation diagrams and demonstrate whether background noise levels on the PAM deployment limited achievement of the planned detection goals. Copies of any vessel self-noise assessment reports must be included with the report.
- iv. The Holder must provide geo-referenced time-stamped vessel tracklines for all time periods in which airguns (full array or single) were operating. Tracklines must include points recording any change in airgun status (e.g., when the airguns began operating, when they were turned off). GIS files must be provided in ESRI shapefile format and include the UTC date and time, latitude in decimal degrees, and longitude in decimal degrees. All coordinates must be referenced to the WGS84 geographic coordinate system.
- v. The draft report must be accompanied by a certification from the lead PSO as to the accuracy of the report, and the lead PSO may submit directly to NMFS a statement concerning implementation and effectiveness of the required mitigation and monitoring.
- vi. A final report must be submitted within 30 days following resolution of any comments on the draft report.

- (b) *Comprehensive reporting.* The Holder must contribute to the compilation and analysis of data for inclusion in an annual synthesis report addressing all data

collected and reported through annual reporting in each calendar year. The synthesis period shall include all annual reports deemed to be final by NMFS in a given one-year reporting period. The report must be submitted to NMFS within 90 days following the end of a given one-year reporting period.

(c) Reporting of injured or dead marine mammals:

- i. In the event that personnel involved in the survey activities discover an injured or dead marine mammal, the Holder must report the incident to the Office of Protected Resources (OPR), NMFS and to the Southeast Regional Stranding Network as soon as feasible. The report must include the following information:
 - (A) Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
 - (B) Species identification (if known) or description of the animal(s) involved;
 - (C) Condition of the animal(s) (including carcass condition if the animal is dead);
 - (D) Observed behaviors of the animal(s), if alive;
 - (E) If available, photographs or video footage of the animal(s); and
 - (F) General circumstances under which the animal was discovered.
- ii. In the event of a ship strike of a marine mammal by any vessel involved in the survey activities, the LOA-holder must report the incident to OPR, NMFS and to the Southeast Regional Stranding Network as soon as feasible. The report must include the following information:
 - (A) Time, date, and location (latitude/longitude) of the incident;
 - (B) Species identification (if known) or description of the animal(s) involved;
 - (C) Vessel's speed during and leading up to the incident;
 - (D) Vessel's course/heading and what operations were being conducted (if applicable);
 - (E) Status of all sound sources in use;
 - (F) Description of avoidance measures/requirements that were in place

at the time of the strike and what additional measures were taken, if any, to avoid strike;

- (G) Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, visibility) immediately preceding the strike;
- (H) Estimated size and length of animal that was struck;
- (I) Description of the behavior of the marine mammal immediately preceding and following the strike;
- (J) If available, description of the presence and behavior of any other marine mammals immediately preceding the strike;
- (K) Estimated fate of the animal (e.g., dead, injured but alive, injured and moving, blood or tissue observed in the water, status unknown, disappeared); and
- (L) To the extent practicable, photographs or video footage of the animal(s).

7. Actions to Minimize Additional Harm to Live-Stranded (or Milling) Marine Mammals

- (a) In the event of a live stranding (or near-shore atypical milling) event within 50 km of the survey operations, where the NMFS stranding network is engaged in herding or other interventions to return animals to the water, the Director of OPR, NMFS (or designee) will advise the Holder of the need to implement shutdown procedures for all active acoustic sources operating within 50 km of the stranding. Shutdown procedures for live stranding or milling marine mammals include the following:
 - i. If at any time, the marine mammal(s) die or are euthanized, or if herding/intervention efforts are stopped, the Director of OPR, NMFS (or designee) will advise the LOA-holder that the shutdown around the animals' location is no longer needed.
 - ii. Otherwise, shutdown procedures will remain in effect until the Director of OPR, NMFS (or designee) determines and advises the LOA-holder that all live animals involved have left the area (either of their own volition or following an intervention).
 - iii. If further observations of the marine mammals indicate the potential for re-stranding, additional coordination with the LOA-holder will be required to determine what measures are necessary to minimize that likelihood (e.g., extending the shutdown or moving operations farther away) and to implement those measures as appropriate.

- (b) If NMFS determines that the circumstances of any marine mammal stranding found in the vicinity of the activity suggest investigation of the association with survey activities is warranted, and an investigation into the stranding is being pursued, NMFS will submit a written request to the LOA-holder indicating that the following initial available information must be provided as soon as possible, but no later than 7 business days after the request for information. In the event that the investigation is still inconclusive, the investigation of the association of the survey activities is still warranted, and the investigation is still being pursued, NMFS may provide additional information requests, in writing, regarding the nature and location of survey operations prior to the time period above.
 - i. Status of all sound source use in the 48 hours preceding the estimated time of stranding and within 50 km of the discovery/notification of the stranding by NMFS; and
 - ii. If available, description of the behavior of any marine mammal(s) observed preceding (i.e., within 48 hours and 50 km) and immediately after the discovery of the stranding.
- 8. This Authorization may be modified, suspended or revoked if the Holder fails to abide by the conditions prescribed herein (including, but not limited to, failure to comply with monitoring or reporting requirements), or if NMFS determines: (1) the authorized taking is likely to have or is having more than a negligible impact on the species or stocks of affected marine mammals, or (2) the prescribed measures are likely not or are not effecting the least practicable adverse impact on the affected species or stocks and their habitat.

Kimberly Damon-Randall
Director,
Office of Protected Resources,
National Marine Fisheries Service.

Table 1. Authorized Incidental Take.

Common name	Scientific name	Level A harassment	Level B harassment
Sperm whale	<i>Physeter macrocephalus</i>	0	259
Pygmy/Dwarf sperm whale	<i>Kogia</i> spp.	21	259
Beaked whales	<i>Ziphius cavirostris/ Mesoplodon</i> spp.	0	105
Rough-toothed dolphin	<i>Steno bredanensis</i>	0	820
Bottlenose dolphin	<i>Tursiops truncatus</i>	0	21
Clymene dolphin	<i>Stenella clymene</i>	0	1,691
Pantropical spotted dolphin	<i>Stenella attenuata</i>	0	13,206
Spinner dolphin	<i>Stenella longirostris</i>	0	152
Striped dolphin	<i>Stenella coeruleoalba</i>	0	4,750
Fraser's dolphin	<i>Lagenodelphis hosei</i>	0	379
Risso's dolphin	<i>Grampus griseus</i>	0	81
Blackfish ¹		0	3,087

¹The "blackfish" guild includes melon-headed whales, false killer whales, pygmy killer whales, and killer whales.

REPORT

Appendix C: Map of Survey Area

REPORT

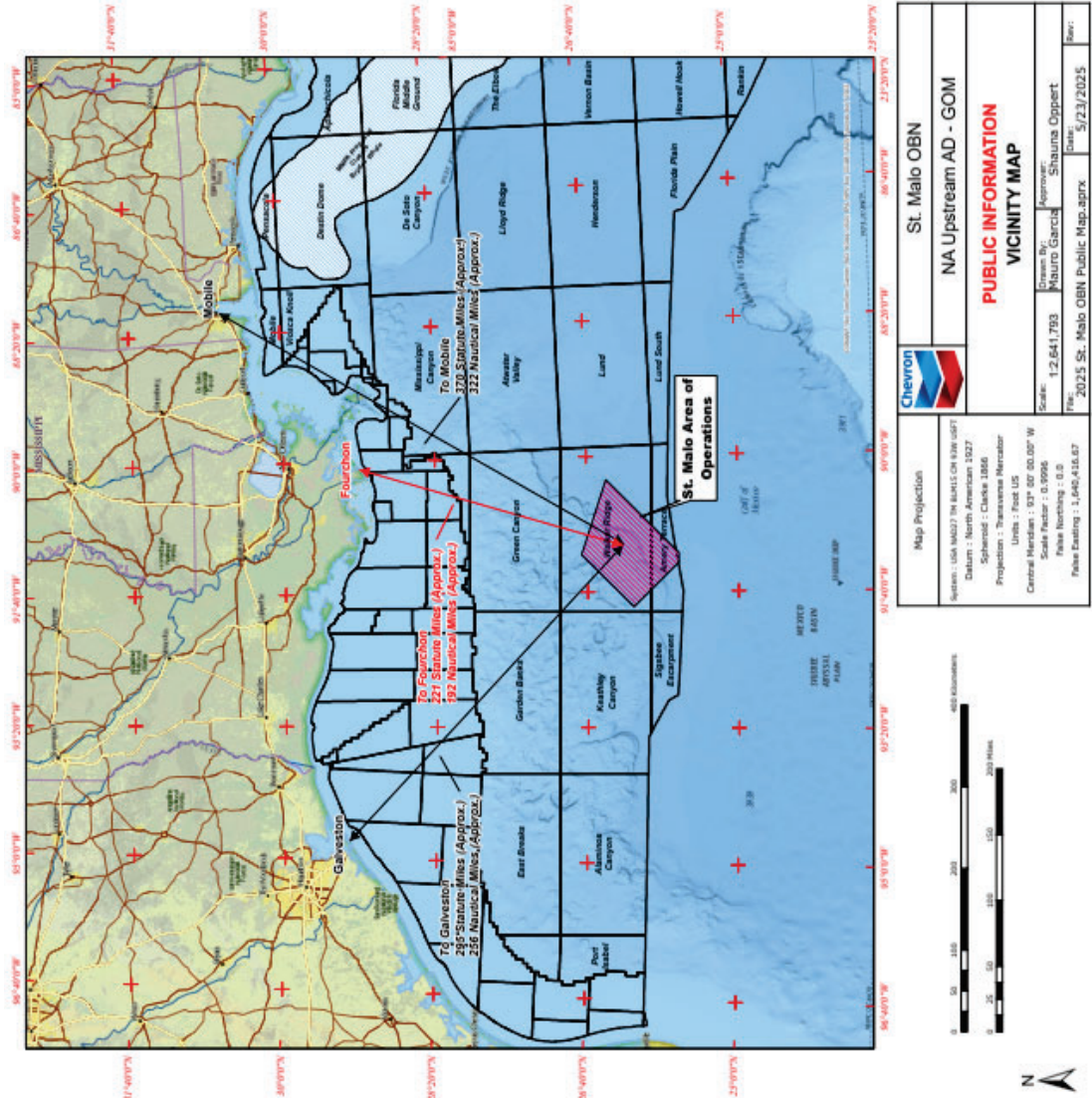


Figure 1: Map of St Malo survey area

REPORT

Appendix D: Survey Vessel Photos

REPORT



Figure 1. Source Vessel – R/V Sanco Sword



Figure 2. Node Handling Vessel – REM Saltire

REPORT



Figure 3. Support Vessel – Capt Woodrow



Figure 4. Support Vessel - M/V Kolt Levi

REPORT

Appendix E: PSOs and PAM Operators

REPORT

Tera Tech RPS Energy PSOs and PAM Operators

Tiffany Ramdoo

Fernando Diaz

Zuemy Rangel Gonzalez

Chase McShane

Christopher Hendricks

Ramnarine Ragoonanan

Heber Huizar

Ellisa Tienhaara

Michelle Klein

Rogelio Martinez

Tiffany Rusinko

Dylan Hickey

Victoria Garcia

Cesar Zavala

Norma Robles

Grace De Leon

Edgar Alvarado

Brenda Gomez

Amanda Dubuque

Michelle Klein

Karla Medina

Malcolm Cowan

Gloria Ponce

Daniela Durazo

Caleb Sistrunk

Maritza Martinez

Felipe Rodriguez

Appendix F: Reticle Binocular Calibration Table

REPORT

Week #	Date	Observer Name	Reticle Binocular Magnification (7x,10x, etc.)	Reticle Binocular Estimated Distance (m)	True Distance from Radar (m)	Sea State (Beaufort)	Wind Force (knots)	Swell (m)	Comments
1	10/19/2025	Ramnarine Ragoonanan	7x50	2669	2963	4	20	<2	Oil Tanker
1	10/19/2025	Fernando Diaz	7x50	1869	1852	4	20	<2	Oil Tanker
1	10/19/2025	Christopher Hendricks	7x50	2667	2960	4	20	<2	Oil Tanker
4	11/13/2025	Tiffany Rusinko	8x50	1192	1019	2	12	<2	Cargo Ship LPG
4	11/13/2025	Elisa Tienhaara	10x50	1362	1296	2	18	<2	Adriatic-supply vessel
4	11/13/2025	Dylan Hickey	8x50	1400	1296	2	18	<2	Adriatic-supply vessel
4	11/15/2025	Elisa Tienhaara	25xBig Eye	5900	4445	3	12	<2	Drill ship
4	11/15/2025	Tiffany Rusinko	25xBig Eye	5900	4445	3	12	<2	Drill ship
4	11/15/2025	Dylan Hickey	25xBig Eye	5900	4445	3	12	<2	Drill ship
5	11/22/2025	Tiffany Rusinko	8x50	1788	1666.8	1	9	<2	Platform
5	11/17/2025	Elisa Tienhaara	10x50	1361	1201	1	11	<2	Platform
5	11/22/2025	Dylan Hickey	8x50	1500	1660	1	2	<2	Platform
5	11/22/2025	Elisa Tienhaara	25xBig Eye	3520	2963	1	4	<2	Platform
5	11/22/2025	Tiffany Rusinko	25xBig Eye	3520	2963	1	4	<2	Platform
5	11/22/2025	Dylan Hickey	25xBig Eye	3520	2963	1	4	<2	Platform
6	11/24/2025	Dylan Hickey	8x50	795	833	2	7	<2	Platform
6	11/24/2025	Tiffany Rusinko	8x50	715	833	2	7	<2	Platform
6	11/25/2025	Elisa Tienhaara	10x50	2212	2352	3	13	<2	Platform
6	11/25/2025	Elisa Tienhaara	25xBig Eye	5866	4815	3	6	<2	Platform
6	11/25/2025	Tiffany Rusinko	25xBig Eye	5866	4815	3	6	<2	Platform
6	11/25/2025	Dylan Hickey	25xBig Eye	5866	4815	3	6	<2	Platform
6	11/30/2025	Victoria Garcia	10x50	7052	6667	2	7	<2	Cruise ship
6	11/30/2025	Cesar Zavala	10x50	6211	6667	2	7	<2	Cruise ship
6	11/30/2025	Norma Robles	7x50	6200	6667	2	7	<2	Cruise ship
6	11/30/2025	Victoria Garcia	25xBig Eye						No reference for calibration

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Week #	Date	Observer Name	Reticle Binocular Magnification (7x,10x, etc.)	Reticle Binocular Estimated Distance (m)	True Distance from Radar (m)	Sea State (Beaufort)	Wind Force (knots)	Swell (m)	Comments
6	11/30/2025	Cesar Zavala	25xBig Eye						No reference for calibration
6	11/30/2025	Norma Robles	25xBig Eye						No reference for calibration
7	12/1/2025	Victoria Garcia	10x50	2204	1852	3	14	<2	Breeze-supply vessel
7	12/6/2025	Cesar Zavala	10x50	4635	4444	3	14	<2	Support vessel Kelvin Colt
7	12/6/2025	Norma Robles	7x50	4455	4444	3	12	<2	Support vessel Kelvin Colt
7	12/1/2025	Victoria Garcia	25xBig Eye	2204	1852	3	14	<2	Breeze-supply vessel
7	12/1/2025	Cesar Zavala	25xBig Eye	2204	1852	3	14	<2	Breeze-supply vessel
7	12/1/2025	Norma Robles	25xBig Eye	2204	1852	3	14	<2	Breeze-supply vessel
8	12/9/2025	Victoria Garcia	10x50	4408	3704	3	11	<2	Cruise ship
8	12/9/2025	Cesar Zavala	10x50	3669	3704	3	11	<2	Cruise ship
8	12/12/2025	Norma Robles	7x50	3930	4444	2	14	<2	Cruise ship
8	12/12/2025	Victoria Garcia	25xBig Eye	1972	2407	2	11	<2	Cruise ship
8	12/12/2025	Cesar Zavala	25xBig Eye	1972	2407	2	11	<2	Cruise ship
8	12/12/2025	Norma Robles	25xBig Eye	1972	2407	2	11	<2	Cruise ship
9	12/16/2025	Victoria Garcia	10x50	1175	1111	2	5	<2	Cargo ship
9	12/15/2025	Cesar Zavala	10x50	2615	2407	2	11	<2	Cruise ship
9	12/17/2025	Norma Robles	7x50	2505	2222	3	11	<2	Cargo ship
9	12/16/2025	Victoria Garcia	25xBig Eye	1173	1111	2	5	<2	Cargo ship
9	12/16/2025	Cesar Zavala	25xBig Eye	1173	1111	2	5	<2	Cargo ship
9	12/16/2025	Norma Robles	25xBig Eye	1173	1111	2	5	<2	Cargo ship
10	12/24/2025	Victoria Garcia	10x50	2938	2778	5	19	2-4	Cargo ship
10	12/24/2025	Cesar Zavala	10x50	2407	2615	4	18	2-4	Cargo ship
10	12/24/2025	Norma Robles	7x50	2505	2778	5	19	2-4	Cargo ship
10	12/27/2025	Victoria Garcia	25xBig Eye	3520	2407	2	10	<2	Cargo ship
10	12/27/2025	Cesar Zavala	25xBig Eye	3855	4074	2	11	<2	Support vessel Kelvin Colt

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Week #	Date	Observer Name	Reticle Binocular Magnification (7x,10x, etc.)	Reticle Binocular Estimated Distance (m)	True Distance from Radar (m)	Sea State (Beaufort)	Wind Force (knots)	Swell (m)	Comments
10	12/27/2025	Norma Robles	25xBig Eye	3855	4074	2	11	<2	Support vessel Kelvin Colt
11	12/31/2025	Victoria Garcia	10x50						No reference for calibration
11	12/31/2025	Cesar Zavala	10x50	3669	4444	2	11	<2	Drill ship Seven Arctic
11	12/31/2025	Norma Robles	7x50	3521	4444	3	13	<2	Drill ship Seven Arctic
11	12/31/2025	Victoria Garcia	25xBig Eye	3855	4444	2	11	<2	Drill ship Seven Arctic
11	12/31/2025	Cesar Zavala	25xBig Eye	3855	4444	2	11	<2	Drill ship Seven Arctic
11	12/31/2025	Norma Robles	25xBig Eye	3855	4444	2	11	<2	Drill ship Seven Arctic
11	1/3/2026	Victoria Garcia	10x50	2519	2222	3	16	<2	Cargo ship
12	1/9/2026	Victoria Garcia	10x50	2204	2037	5	25	2-4	Cruise ship
12	1/5/2026	Cesar Zavala	10x50	3669	4444	2	5	<2	Cargo ship
12	1/7/2026	Norma Robles	7x50	2505	2963	3	7	<2	Cargo ship
12	1/9/2026	Victoria Garcia	25xBig Eye						No reference for calibration
12	1/9/2026	Cesar Zavala	25xBig Eye						No reference for calibration
12	1/9/2026	Norma Robles	25xBig Eye						No reference for calibration
12	1/11/2026	Michelle Klein	7x50						No reference for calibration
12	1/11/2026	Daniela Durazo	7x50						No reference for calibration
12	1/11/2026	Gloria Ponce	7x50						No reference for calibration
12	1/11/2026	Michelle Klein	25xBig Eye						No reference for calibration
12	1/11/2026	Daniela Durazo	25xBig Eye						No reference for calibration
12	1/11/2026	Gloria Ponce	25xBig Eye						No reference for calibration
13	1/13/2026	Michelle Klein	7x50	3958	4074	2	9	<2	Carnival cruise ship
13	1/13/2026	Daniela Durazo	7x50	1852	1470	2	9	<2	Carnival cruise ship
13	1/13/2026	Gloria Ponce	7x50	1852	1800	2	9	<2	Carnival cruise ship
13	1/13/2026	Michelle Klein	25xBig Eye	3970	4074	2	9	<2	Carnival cruise ship
13	1/13/2026	Daniela Durazo	25xBig Eye	3970	4074	2	9	<2	Carnival cruise ship

REPORT

Week #	Date	Observer Name	Reticle Binocular Magnification (7x,10x, etc.)	Reticle Binocular Estimated Distance (m)	True Distance from Radar (m)	Sea State (Beaufort)	Wind Force (knots)	Swell (m)	Comments
13	1/13/2026	Gloria Ponce	25xBig Eye	3970	4074	2	9	<2	Carnival cruise ship
14	1/19/2026	Michelle Klein	7x50	3958	3704	3	14	<2	Royal Caribbean cruise ship
14	1/19/2026	Daniela Durazo	7x50	2506	2778	3	14	<2	Royal Caribbean cruise ship
14	1/19/2026	Gloria Ponce	7x50	3500	3700	3	14	<2	Royal Caribbean cruise ship
14	1/19/2026	Michelle Klein	25xBig Eye	3820	3704	3	14	<2	Royal Caribbean cruise ship
14	1/19/2026	Daniela Durazo	25xBig Eye	3820	3704	3	14	<2	Royal Caribbean cruise ship
14	1/19/2026	Gloria Ponce	25xBig Eye	3820	3704	3	14	<2	Royal Caribbean cruise ship
15	1/28/2026	Michelle Klein	7x50	4487	4630	5	20	<2	Carnival cruise ship
15	1/28/2026	Daniela Durazo	7x50	4010	4630	5	20	<2	Carnival cruise ship
15	1/31/2026	Gloria Ponce	7x50						No reference for calibration
15	1/28/2026	Michelle Klein	25xBig Eye	4538	4630	5	20	<2	Carnival cruise ship
15	1/28/2026	Daniela Durazo	25xBig Eye	4538	4630	5	20	<2	Carnival cruise ship
15	1/28/2026	Gloria Ponce	25xBig Eye	4538	4630	5	20	<2	Carnival cruise ship
16	2/2/2026	Michelle Klein	7x50	5200	5370	2	4	<2	Royal Caribbean Cruise Ship
16	2/2/2026	Daniela Durazo	7x50	558	555	1	3	<2	Kolt Levi
16	2/2/2026	Gloria Ponce	7x50	500	555	1	3	<2	Kolt Levi
16	2/2/2026	Michelle Klein	25xBig Eye	5375	5370	2	4	<2	Royal Caribbean Cruise Ship
16	2/2/2026	Daniela Durazo	25xBig Eye	5375	5370	2	4	<2	Royal Caribbean Cruise Ship
16	2/2/2026	Gloria Ponce	25xBig Eye	5375	5370	2	4	<2	Royal Caribbean Cruise Ship
17	2/9/2026	Michelle Klein	7x50	3547	3519	1	2	<2	Tanker
17	2/9/2026	Daniela Durazo	7x50	3958	3519	1	2	<2	Tanker
17	2/11/2026	Gloria Ponce	7x50	3000	3333	2	6	<2	LNG Cargo Vessel
17	2/9/2026	Michelle Klein	25xBig Eye	3596	3519	1	2	<2	Tanker
17	2/9/2026	Daniela Durazo	25xBig Eye	3596	3519	1	2	<2	Tanker
17	2/9/2026	Gloria Ponce	25xBig Eye	3596	3519	1	2	<2	Tanker

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Week #	Date	Observer Name	Reticle Binocular Magnification (7x,10x, etc.)	Reticle Binocular Estimated Distance (m)	True Distance from Radar (m)	Sea State (Beaufort)	Wind Force (knots)	Swell (m)	Comments
17	2/14/2026	Maritza Martinez	7x50	234	220	4	14	<2	Seismic source strings
17	2/14/2026	Felipe Rodriguez	7x50	236	220	5	25	<2	Seismic source strings
17	2/15/2026	Maritza Martinez	25xBig Eye						No reference for calibration
17	2/15/2026	Felipe Rodriguez	25xBig Eye						No reference for calibration
18	2/17/2026	Michelle Klein	7x50	2210	2130	2	7	<2	Tanker ship
18	2/17/2026	Gloria Ponce	7x50	2700	2778	2	7	<2	Cargo ship CMA CGM
18	2/17/2026	Maritza Martinez	7x50	2201	2130	2	7	<2	Tanker ship
18	2/17/2026	Felipe Rodriguez	7x50	2536	2037	3	11	<2	Kolt Levi
18	2/17/2026	Michelle Klein	25xBig Eye	2136	2037	3	11	<2	Kolt Levi
18	2/17/2026	Gloria Ponce	25xBig Eye	2136	2037	3	11	<2	Kolt Levi
18	2/17/2026	Maritza Martinez	25xBig Eye	2136	2037	3	11	<2	Kolt Levi
18	2/17/2026	Felipe Rodriguez	25xBig Eye	2136	2037	3	11	<2	Kolt Levi

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Appendix G: PAM Calibration Certificates

SM.8198 System Frequency Response

This PAM system has been calibrated so that realistic sound level and signal amplitudes values may be displayed in PAM software. The system frequency response of the system when using this hydrophone array is shown below, and calibration settings are provided for use in Pamguard.

Table 2 provides -3 dB and -6 dB points of the system response curves for hydrophones in each group. These points delimit the 'flat' portion of the response curve. Groups H1-H2 and H3-H4 are acquired by the Fireface 800/802 sound card. Group H5-H6 is acquired by the NI USB-6251 DAQ. The frequency response curves are shown in Fig. 14.

Table 2 Frequency points for -3 dB and -6 dB sensitivity, for representative hydrophones of each group.

Hydrophone	Fireface 800, -3 dB	Fireface 800, -6 dB	USB-6251, -3 dB	USB-6251, -6 dB
H1	16-25,000 Hz	10-40,000 Hz	-	-
H3	400-80,000 Hz	250-80,000 Hz	-	-
H5	-	-	2,500-160,000 Hz	1,600-250,000 Hz

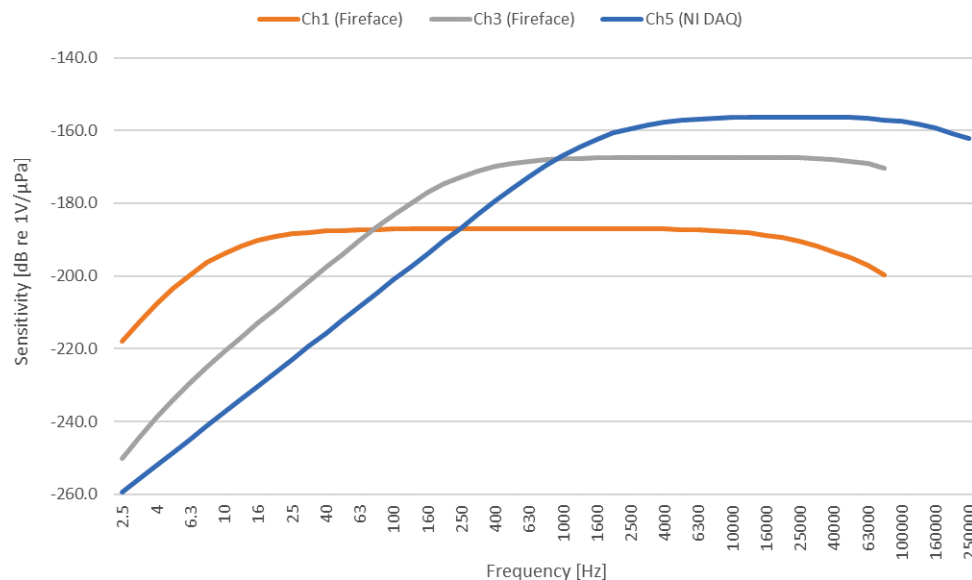


Fig. 14 System frequency response curves showing channel sensitivity for representative hydrophones of the H1-H2, H3-H4 and H5-H6 groups.

Calibration Values for PAM Software

Pamguard Array Manager

H1 (Ch0, 0.01-24 kHz)	Sensitivity = -196.7 dB re: 1 V/uPa, Preamplifier Gain = +21.0 dB
H2 (Ch1, 0.01-24 kHz)	Sensitivity = -195.8 dB re: 1 V/uPa, Preamplifier Gain = +21.1 dB
H3 (Ch2, 0.2-200 kHz)	Sensitivity = -195.8 dB re: 1 V/uPa, Preamplifier Gain = +39.8 dB
H4 (Ch3, 0.2-200 kHz)	Sensitivity = -196.2 dB re: 1 V/uPa, Preamplifier Gain = +39.8 dB
H5 (Ch4, 2-200 kHz)	Sensitivity = -196.0 dB re: 1 V/uPa, Preamplifier Gain = +39.7 dB
H6 (Ch5, 2-200 kHz)	Sensitivity = -196.2 dB re: 1 V/uPa, Preamplifier Gain = +39.7 dB

Pamguard Sound Acquisition

NI USB-6251

Terminal Configuration.....	Differential
Input Voltage Range	4 V (set as +/- 2 V per channel)
Additional System Gain.....	0 dB
Channels	SW Ch0 / HW Ch4, SW Ch1 / HW Ch5
Sample Rate.....	up to 500 kHz
Sample Size.....	16 bit

RME Fireface 800

Line Level Input	-10 dBV (set in the Fireface Settings utility)
Input Voltage Range (p-p).....	2 V (i.e., +/- 1 V)
Additional System Gain.....	11.3 dB
Channels	SW Ch0 / HW Ch0, SW Ch1 / HW Ch1
.....	SW Ch2 / HW Ch2, SW Ch3 / HW Ch3
Sample Rate.....	48-192 kHz
Sample Size.....	24 bit



Depth Sensor

The array section is terminated with a piezoresistive pressure sensor.

- Pressure Sensor Rating 10 bar
- Working Depth Range 0-100 m (overpressure limit = 200 m)
- ADC Measurement Computing USB-1208 LS
- Range to +2.5 V
- Hardware Channel 0
- Pamguard Calibration $\text{Depth (m)} = 64.8 * \text{Voltage} + 67.3 \text{ offset}$

SM. 8289 System Frequency Response

This PAM system has been calibrated so that realistic sound level and signal amplitudes values may be displayed in PAM software. The system frequency response of the system when using this hydrophone array is shown below, and calibration settings are provided for use in Pamguard.

Table 2 provides -3 dB and -6 dB points of the system response curves for hydrophones in each group. These points delimit the 'flat' portion of the response curve. Groups H1-H2 and H3-H4 are acquired by the Fireface 800/802 sound card. Group H5-H6 is acquired by the NI USB-6251 DAQ. The frequency response curves are shown in Fig. 14.

Table 2 Frequency points for -3 dB and -6 dB sensitivity, for representative hydrophones of each group.

Hydrophone	Fireface 800, -3 dB	Fireface 800, -6 dB	USB-6251, -3 dB	USB-6251, -6 dB
H1	16-25,000 Hz	10-40,000 Hz	-	-
H3	400-80,000 Hz	250-80,000 Hz	-	-
H5	-	-	2,500-160,000 Hz	1,600-250,000 Hz

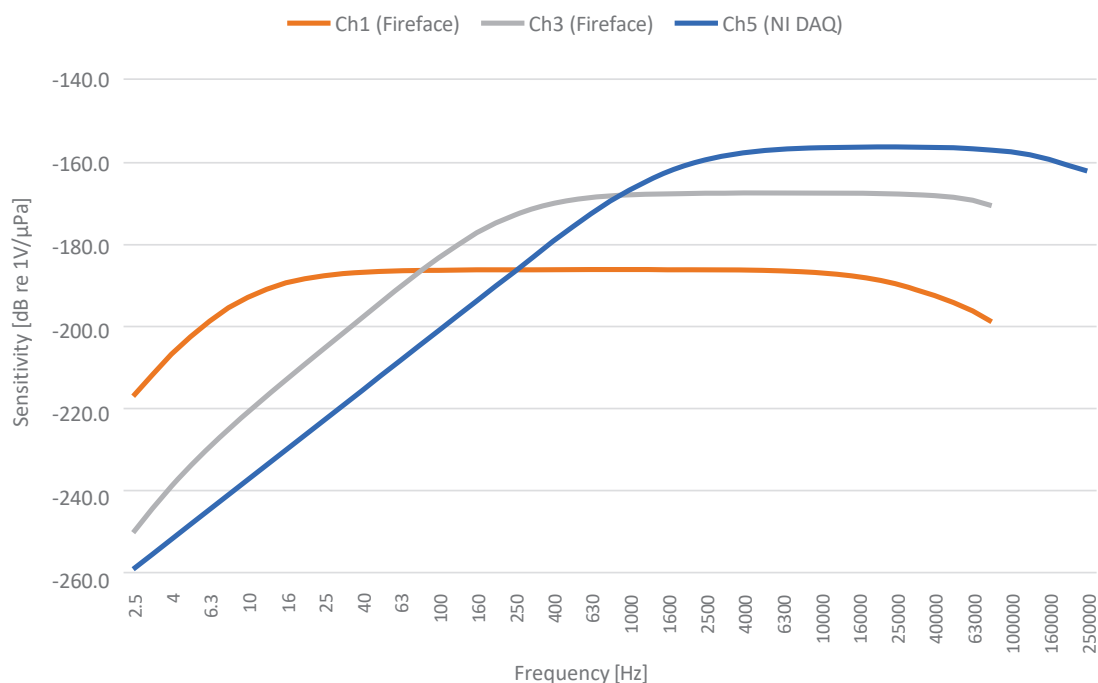


Fig. 14 System frequency response curves showing channel sensitivity for representative hydrophones of the H1-H2, H3-H4 and H5-H6 groups.

Calibration Values for PAM Software

Pamguard Array Manager

H1 (Ch0, 0.01-24 kHz)	Sensitivity = -195.8 dB re: 1 V/uPa, Preamplifier Gain = +21.1 dB
H2 (Ch1, 0.01-24 kHz)	Sensitivity = -195.8 dB re: 1 V/uPa, Preamplifier Gain = +21.1 dB
H3 (Ch2, 0.2-200 kHz)	Sensitivity = -195.9 dB re: 1 V/uPa, Preamplifier Gain = +39.9 dB
H4 (Ch3, 0.2-200 kHz)	Sensitivity = -196.0 dB re: 1 V/uPa, Preamplifier Gain = +39.8 dB
H5 (Ch4, 2-200 kHz)	Sensitivity = -195.9 dB re: 1 V/uPa, Preamplifier Gain = +39.7 dB
H6 (Ch5, 2-200 kHz)	Sensitivity = -195.9 dB re: 1 V/uPa, Preamplifier Gain = +39.7 dB

Pamguard Sound Acquisition

NI USB-6251

Terminal Configuration.....	Differential
Input Voltage Range	4 V (set as +/- 2 V per channel)
Additional System Gain.....	0 dB
Channels	SW Ch0 / HW Ch4, SW Ch1 / HW Ch5
Sample Rate.....	up to 500 kHz
Sample Size.....	16 bit

RME Fireface 800

Line Level Input	-10 dBV (set in the Fireface Settings utility)
Input Voltage Range (p-p).....	2 V (i.e., +/- 1 V)
Additional System Gain.....	11.3 dB
Channels	SW Ch0 / HW Ch0, SW Ch1 / HW Ch1
.....	SW Ch2 / HW Ch2, SW Ch3 / HW Ch3
Sample Rate.....	48-192 kHz
Sample Size.....	24 bit



Depth Sensor

The array section is terminated with a piezoresistive pressure sensor.

- Pressure Sensor Rating 10 bar
- Working Depth Range 0-100 m (overpressure limit = 200 m)
- ADC Measurement Computing USB-1208 LS
- Range to +2.5 V
- Hardware Channel 0
- Pamguard Calibration $\text{Depth (m)} = 64.8 * \text{Voltage} + 67.3 \text{ offset}$

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Appendix H: Vessel Specific PAM Deployment Procedures

***M/V Sanco Sword* PAM Cable Deployment/Retrieval Procedures**

January 11, 2026

The operations required at least one PAM operator to oversee the deployment and retrieval of the cable, and at least one gun mechanic or observer to operate the hydraulic winch.

Overview

The PAM equipment comprised the following items:

- A 230-meter tow cable.
- A 25-meter hydrophone array cable containing six hydrophones and a depth gauge.
- A 100-meter deck cable.
- Electronic data capture and processing unit, including:
 - Headphones RF transmitter,
 - Fireface audio interface,
 - Rackmount PC,
 - Buffer interface unit,
 - Integral screen and keyboard.
- Backup system.

The array included six hydrophones arranged in three pairs of identical specifications with appropriate physical separation to provide direction-finding (bearings) to marine mammals and localization using Target Motion Analysis (TMA) (Fig. 1).

- The front pair (H1 and H2, 8-meter separation) consisted of two “low frequency” hydrophones with a response of 10 hertz to 24 kilohertz.
- The middle pair (H3 and H4, 2-meter separation) consisted of two “broadband” hydrophones with a response of 200 hertz to 200 kilohertz.
- The rear pair (H5 and H6, 0.25-meter separation) consisted of two “standard” hydrophones with a response of 2 kilohertz to 200 kilohertz.

The “low frequency” hydrophones were configured to detect very low frequency vocalizations, while the “broadband” and “standard” hydrophones were configured to detect low-mid frequency and mid-high vocalizations, respectively. These three pairs of hydrophones provided the capability to detect the full range of marine mammal vocalizations anticipated to be encountered.

Simulation exercises have been completed using the PAMGuard software to verify that the within-pair separation provides consistently accurate bearings to a range of marine mammal vocalizations. Test signals used in these exercises simulated right whale up-calls, broadband sperm whale clicks, delphinid whistles, and narrow-band high-frequency harbor porpoise clicks. Anecdotal reports from surveys utilizing Seiche PAM systems with simultaneous visual and acoustic monitoring indicate that the acoustic range estimates have been sufficiently accurate for decision-making on whether vocal animals are within or beyond a 500-meter mitigation zone.

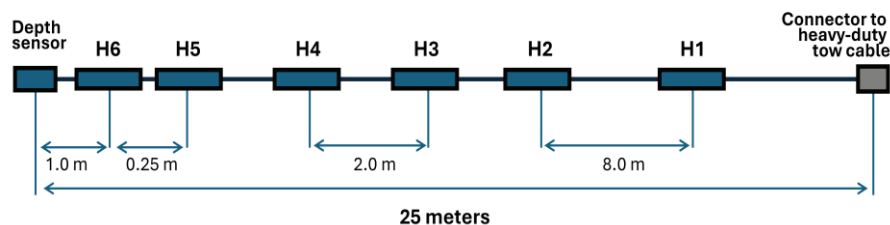


Figure 1: Schematic diagram of the hydrophone array cable indicating the position and separation of individual hydrophone elements and hydrophone pairs.

Two PAM systems, a main and a spare, each consisting of a 230-meter conventional tow cable, a 25-meter hydrophone array containing six hydrophone elements, and a 100-meter deck cable, were supplied for the **TGS Chevron St Malo 4D OBN Survey**. The main and spare 100-meter deck cables were guided through cable racks, mainly on the streamer deck, to the PAM station inside the instrument room (Fig. 2), and it was connected to the data processing unit (DPU) via a SD-16 connector to the hydrophone tow cable. The 230-meter main tow cable was spooled onto the port side winch, from where it was guided across the streamer deck, through a sliding collar, and into the water astern of the vessel. The spare tow cable and hydrophone array were installed and ready to use on the starboard side winch on the streamer deck (Fig. 3).

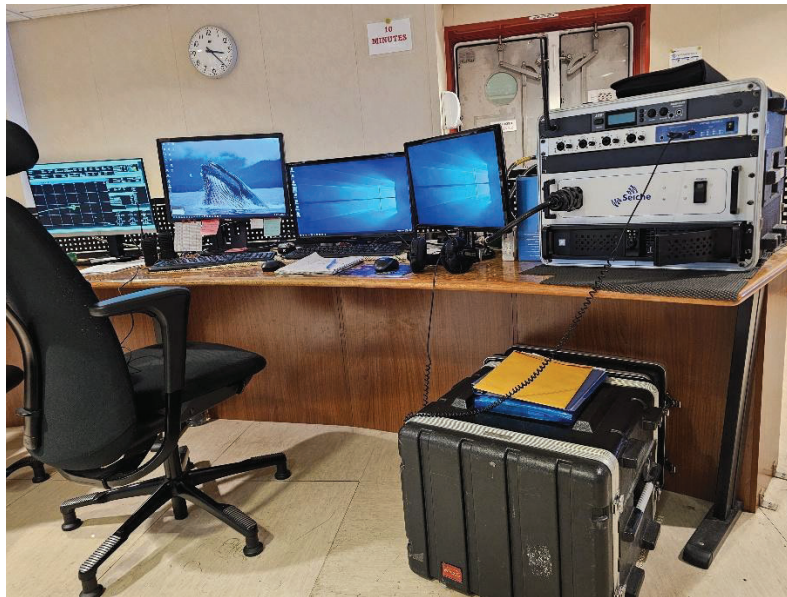


Figure 2: Passive acoustic monitoring station located in the instrument room.

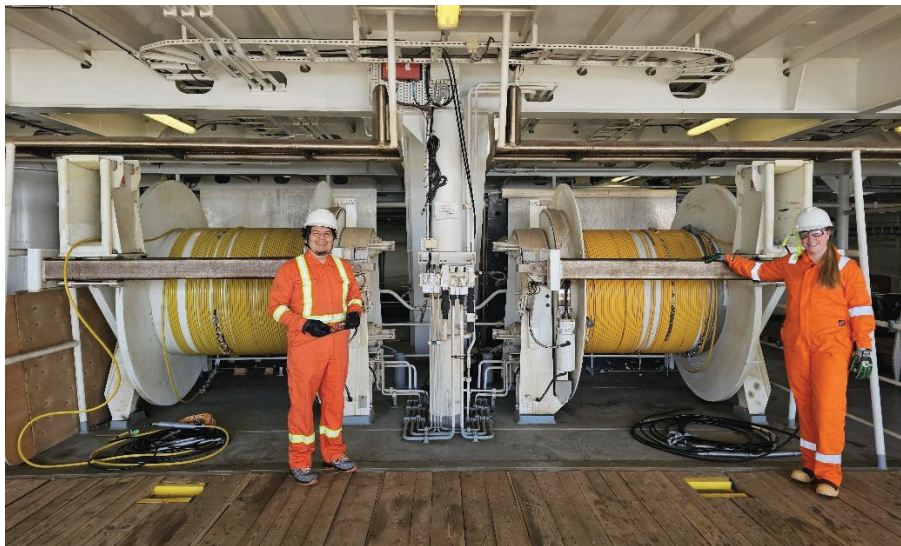


Figure 3: Main (left) on port side, and spare (right) on starboard side, PAM tow and hydrophone array cables on streamer deck.

Before deployment, the operator or the gun mechanic ensured that the hydraulic lever was closed (Fig. 4), then the PAM operator checked that the deck cable was disconnected from the tow cable and that the electronics in the instrument room were powered off. After notifying Navigation (Instrument Room), via radio, about the start of the deployment, the main PAM cable (port winch) was unspooled and manually placed across the aft streamer deck and through a sliding collar in the **CENTER OF THE STERN** (Fig. 3), leading with the hydrophone array first.

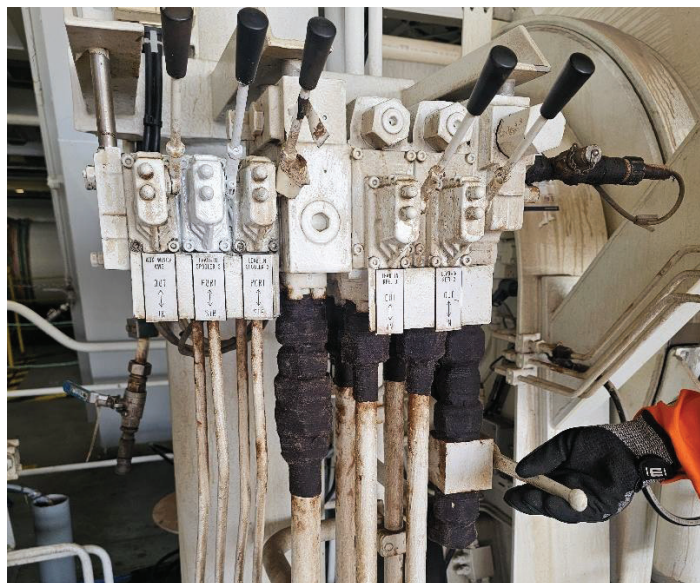


Figure 4. Hydraulic lever between the two streamer deck winches.

A gun mechanic would operate the winch and pay out the cable to the required length (25 meters of hydrophone array and 85 meters of tow cable deployed) (Fig. 5), while the PAM operator would pay attention to the sections of the cable, ballast weight, and Chinese finger, making sure they didn't entangle with the seismic gear. The mechanic would slow down the winch to allow these segments to go through the sliding collar smoothly (Fig. 6a and b). There is a Chinese finger, located 70 meters from the tow connection, that the mechanics will attach a rope with chain weights from the gun deck (Fig. 7). This rope acts as a tow point and helps to lower the cable further into the water, and assists in keeping the cable centered between the arrays. Once the cable was fully deployed over the stern and through the sliding collar, the mechanic would stop the winch and secure the two Chinese fingers on the tow cable to the two yellow rings on the deck floor (Fig. 8), one on each ring, with shackles. Finally, before returning to the instrument room, the deck cable was connected to the tow cable on the winch, and the Instrument Room was notified that deployment had finished.



**Figure 5: Main tow cable mounted on port winch and connected to deck cable
(deck cable at the bottom right side of winch)**

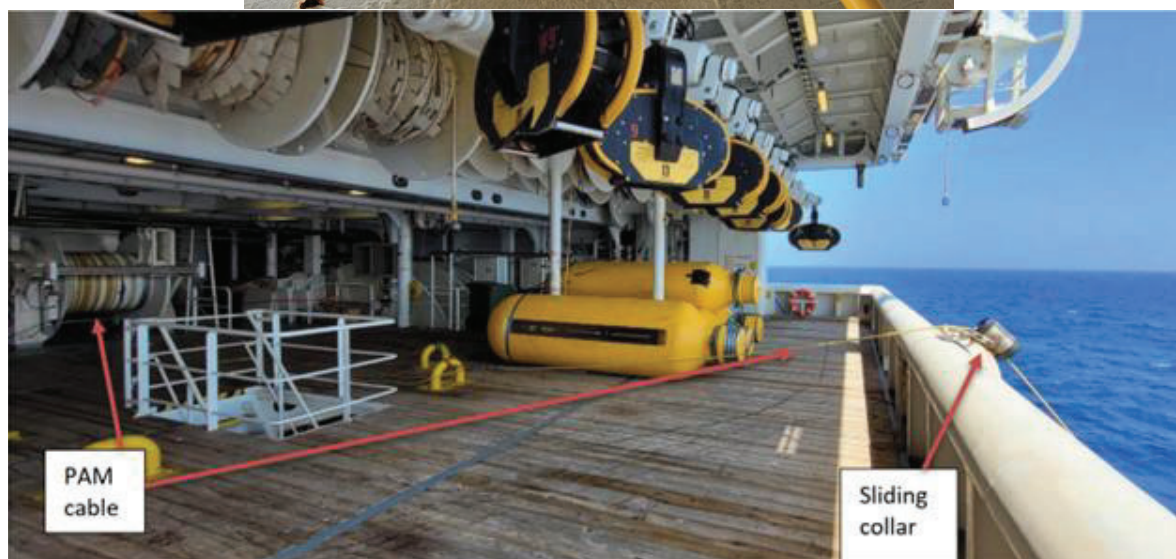
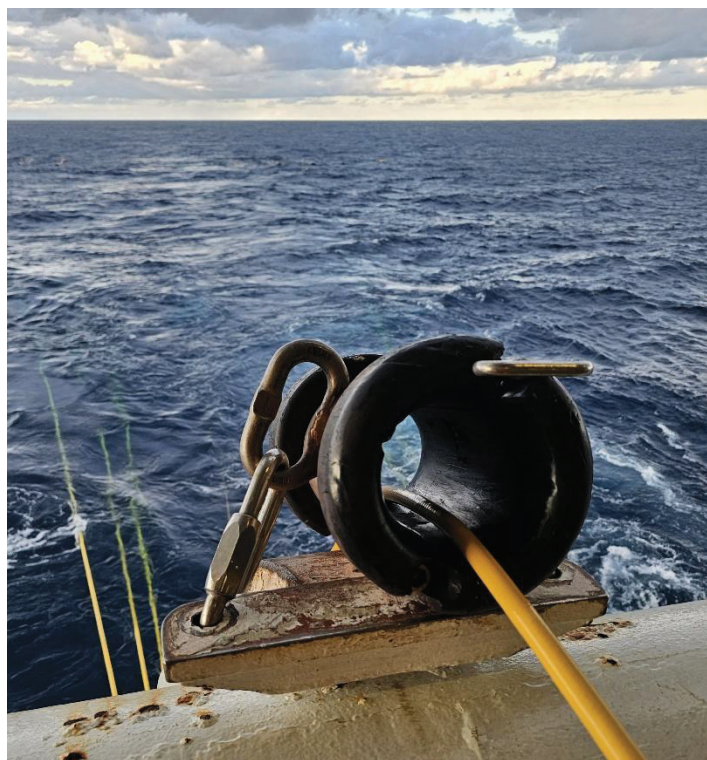


Figure 6a and 6b: Tow cable deployed through sliding collar in center of stern.

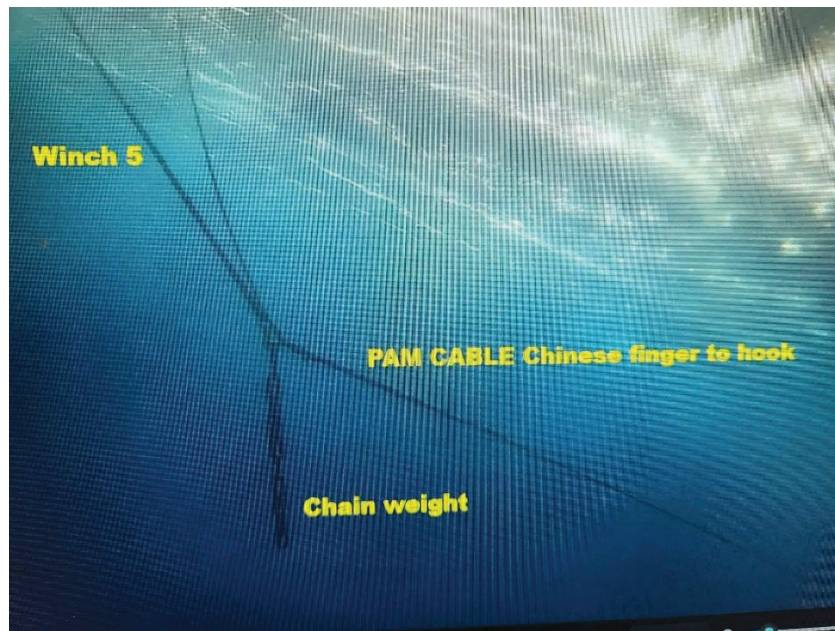


Figure 7. Chinese finger attached to rope from gun deck (a) and weighted by chains on the gun deck (b) the Chinese finger, pam cable and weight underwater.

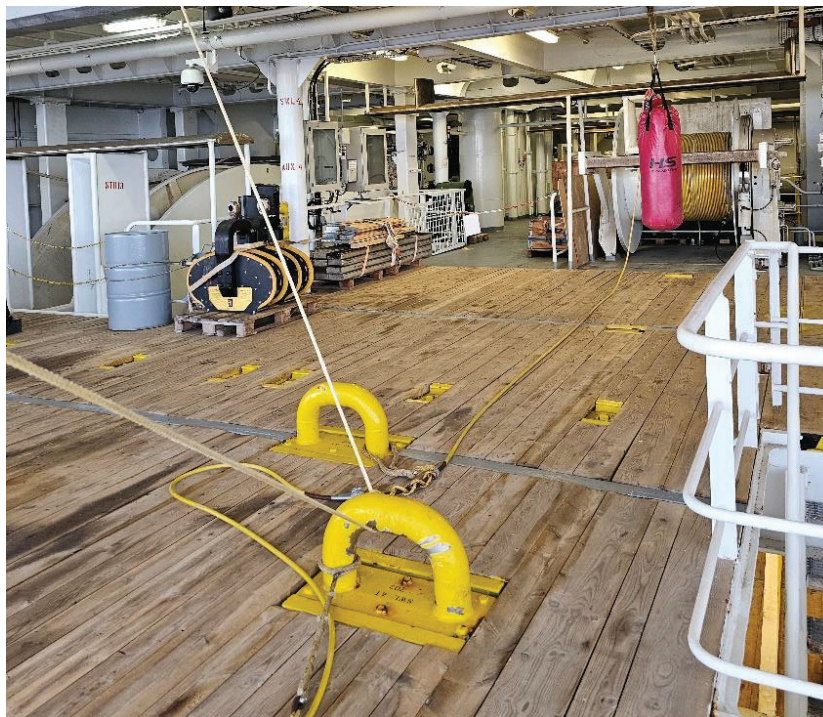


Figure 8: Attachment points for Chinese fingers to the streamer deck.

To decrease the likelihood of entanglement with the gun umbilical cables, the tow cable was weighted with a 5-kilogram chain link section to achieve a proper towing depth. The chain link was securely taped to the tow cable, at approximately 10 meters from the tow cable connection point to the hydrophone array.

Once the PAM cable was fully deployed 85 meters astern of the vessel, the hydrophones were approximately 114 meters from the center of the staggered array (Fig. 9) and approximately 94 meters from the port side gun strings. The towing depth was 7 to 20 meters, depending on the sea current and the vessel's speed.

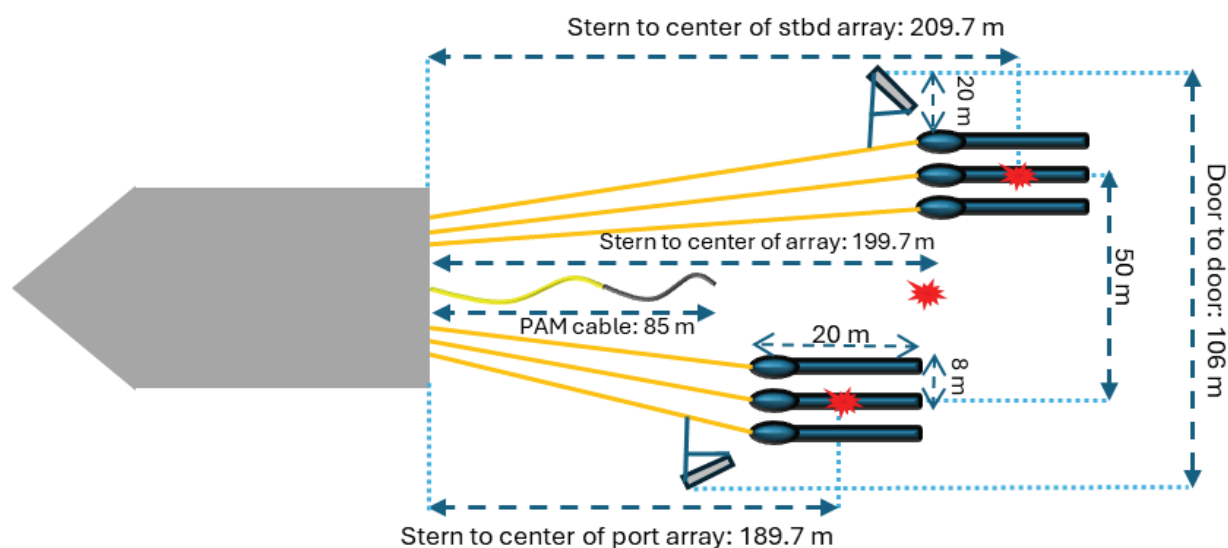


Figure 9: General offset of the PAM cable and seismic source deployed on the M/V Sanco Sword for TGS Chevron St Malo 4D OBN survey.

During retrieval, the PAM electronics were turned off, the deck cable was disconnected from the tow cable, and the connectors were taped to protect them from water and keep them clean. The mechanic enabled the winch and disconnected the three Chinese finger attachments from the streamer deck and the gun deck, and then the cable was retrieved using the winch. The PAM operator monitored the retrieval for any issues and helped guide the weights and connectors through the sliding collar, and then coiled the hydrophone array cable on the deck (Fig. 10).



Figure 10: Spare PAM cable when secured.

Pre-Deployment and Retrieval Tasks

- Ensure the system is tested and calibrated
- Toolbox meeting between on-shift personnel – PAM operator, Navigation, Observers, and Mechanics, alerting all parts of pending deployment.
- Assess environmental conditions consulting MOPO (chief mechanic, SL mechanic, PAM operators).
- Ensure all personnel assisting in the operation have full PPE – coveralls, hard hat with lanyard, safety glasses, gloves, eye protection, safety shoes, and life jacket.

Deployment

- Ensure that the PAM electronics unit is powered down.
- Ensure the hydraulic lever is closed getting closer to the winch.
- Ensure the PAM deck cable is disconnected from the hydrophone tow cable.
- Ensure the hydraulic lever is open to operate the winch.
- Deploy the main PAM cable from the port winch on the streamer deck, through the sliding collar and into the water until it is fully deployed.
- Stop deployment and secure the tow cable's Chinese fingers to the streamer deck rope and with the shackle to the rings on the streamer deck floor.
- Turn off winch and close hydraulic lever.
- Connect the PAM tow cable to the deck cable (remove rubber cap or tape from both connectors).
- Power up electronics on PAM station and check that the depth of the PAM cable is deeper than the umbilical cables (should be more than 10 meters) and verify noise levels are satisfactory.
- Tidy up the working area.
- Notify navigation time PAM cable was deployed.

Retrieval

- Ensure that the PAM electronics unit is powered down.
- Ensure the hydraulic lever is closed.
- Ensure the PAM deck cable is disconnected from the hydrophone tow cable.
- Open hydraulic lever.
- Release the tow cable from the secured shackles on the streamer deck floor and the gun deck rope.
- Recover the PAM cable and ensure it is free from any tangles when going in. If uncertain of entanglement or if the PAM cable crosses the gun cable, stop the operation and wait until the PAM cable is free from obstacles. Then, continue recovery and spool the cable onto the winch.
- Turn off and disconnect the winch; ensure the hydraulic lever is closed.
- When the cable is on board, plug it back in and ensure the equipment is working properly. Once tested, disconnect (use the rubber cap or tape both connectors to prevent corrosion), and secure the cable properly to avoid any slip or trip hazards.
- Tidy up the working area.
- Notify Navigation that retrieval has concluded.

Always ensure the deck cable is disconnected from the tow cable before operating the winch.

HSE

All PPE is required (hard hat, hard hat lanyard or chinstrap, boots, gloves, eye protection, and coveralls). A life jacket is required when working at the stern of the vessel. The operation carried a relatively low risk. Hazards include working close to the stern of the vessel, trip hazards, and pinch points at the winch.

Toolbox meetings are held with all the procedure participants.

A Job Safety Analysis (JSA) has been completed for this task. A JSA is required for review upon any additional modifications.

PAM Cable Repositioning for Source Maintenance

The PAM cable may be re-positioned to either the port or starboard side when gun mechanics require access to one side of the source, normally for maintenance, or if source retrieval needs to begin before the required 1-hour PAM after source operations has concluded.

Procedure requirements

- **Supervision:** The presence of at least one PAM operator on the streamer deck is mandatory to supervise this operation.
- **Toolbox Talk:** The supervising PAM operator must attend the toolbox meeting specific to the source retrieval and cable repositioning activity.

Operational steps

1. Disconnect the PAM cable from the gun deck tow rope. Leave the streamer deck connections in place.
2. The source mechanic will then operate the sliding collar to move the PAM cable across the top of the umbilicals to either the far port or far starboard sides, until it is settled between the door rope and the last umbilical.
3. The PAM operator on the streamer deck will monitor the movement and stop the operation if it looks like the PAM cable may become entangled.
4. If moving the cable is not safe, it will need to be fully retrieved first and then re-deployed off the far port or far starboard sides instead.



5. While the PAM cable is over to one side, the PAM operator on watch will monitor in PAMGuard, and if there is a change in the sound or hydrophone depth, they will notify the source mechanics to check on the PAM cable for any possible entanglements.
6. After source maintenance is completed, the PAM cable will be moved back to the center position and then re-connected to the gun deck tow rope by the source mechanics. This movement will also be monitored by a PAM operator out on the streamer deck.

Amanda Dubuque
Malcolm Cowen
Karla Rios

January 11, 2026

REPORT

Appendix I: Excel Data Sheets of Monitoring Effort, Source Operations and Detections of Protected Species During the Survey

REPORT

Appendix J: Letters of Data Certification



Report Certification Statement

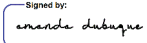
I, Amanda Dubugue, am familiar with the protocols outlined in Attachment 1: The Bureaus' Geophysical Survey Mitigation Protocol, implemented by the Bureau of Ocean Energy Management (BOEM) and Bureau of Safety and Environmental Enforcement (BSEE), which provide guidelines to operators in complying with the Endangered Species Act (ESA; 16 U.S.C. §§ 1531-1544) and Marine Mammal Protection Act (MMPA; 16 U.S.C. §§1361- 1423h).

I hereby certify that, to the best of my knowledge, the data collected by the Protected Species Observer (PSOs) offshore and the information that was provided to RPS by the PSO team for our vessel to compile this report is accurate.

Name: Amanda Dubugue

Position: Lead PAM Operator

Date: Mar 4, 2026

Signed  _____
Signed by: amanda.dubugue
A55DBEAC83C247D...

I, Jason Dean, am familiar with the protocols outlined in Attachment 1: The Bureaus' Geophysical Survey Mitigation Protocol, implemented by the Bureau of Ocean Energy Management (BOEM) and the Bureau of Safety and Environmental Enforcement (BSEE), which provide guidelines to operators in complying with the Endangered Species Act (ESA; 16 U.S.C. §§ 1531-1544) and Marine Mammal Protection Act (MMPA; 16 U.S.C. §§1361- 1423h).

I hereby certify that, to the best of my knowledge, the information provided in this report that was compiled by the RPS Project Support Manager is accurate.

Name: Jason Dean

Position: Environmental Project Manager

Date: Mar 5, 2026

Signed  _____
DocuSigned by: Jason Dean
FC19828DC740422...

REPORT

Appendix K: Photographs of Protected Species Visually Detected During the Survey

REPORT

PHOTOS OF PROTECTED SPECIES *R/V SANCO SWORD*



Figure 1. Visual detection #02 – Bottlenose dolphin – 11 November 2025



Figure 2. Visual detection #04 – Green sea turtle – 22 November 2025

REPORT

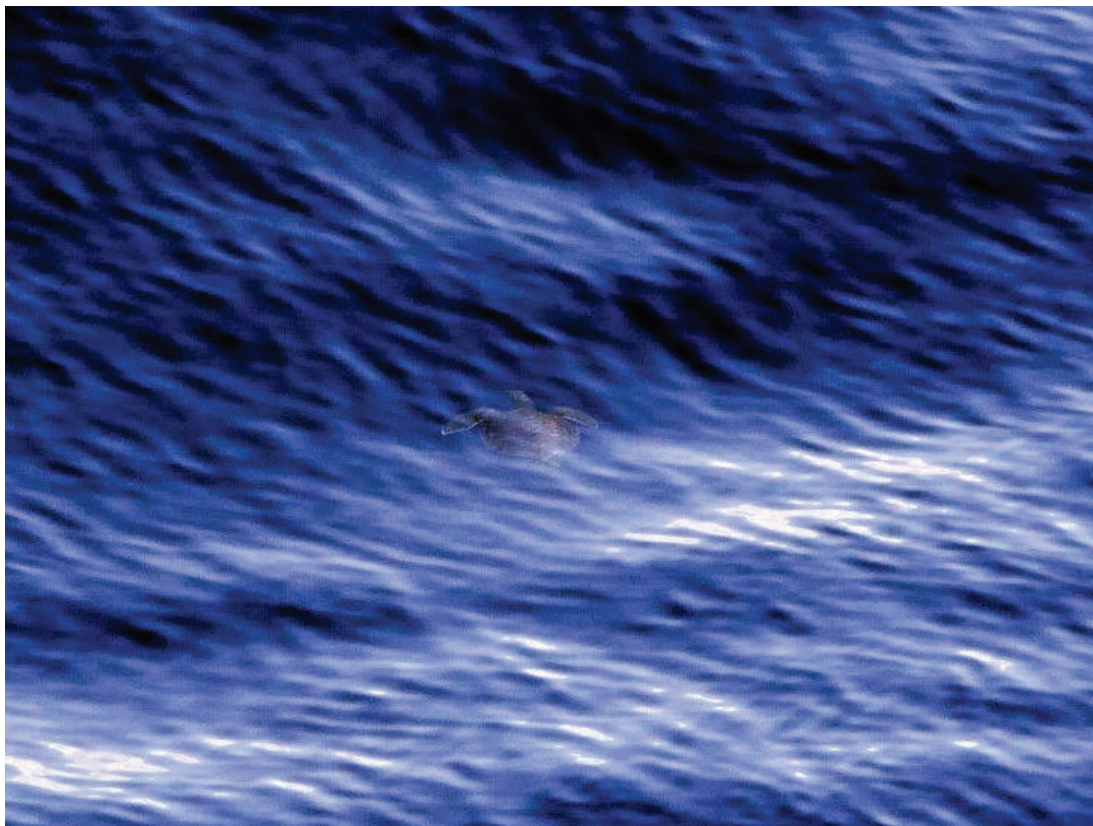


Figure 3. Visual detection #05 – Green sea turtle – 22 November 2025



Figure 4. Visual detection #06 – Hawksbill sea turtle – 22 November 2025

REPORT



Figure 5. Visual detection #07 – Bottlenose dolphins – 28 November 2025



Figure 6. Visual detection #09 – Sperm whale – 26 December 2025

REPORT



Figure 7. Visual detection #10 – Bottlenose dolphins – 11 January 2026

Appendix L: Protected Species Distribution Maps

FINAL REPORT

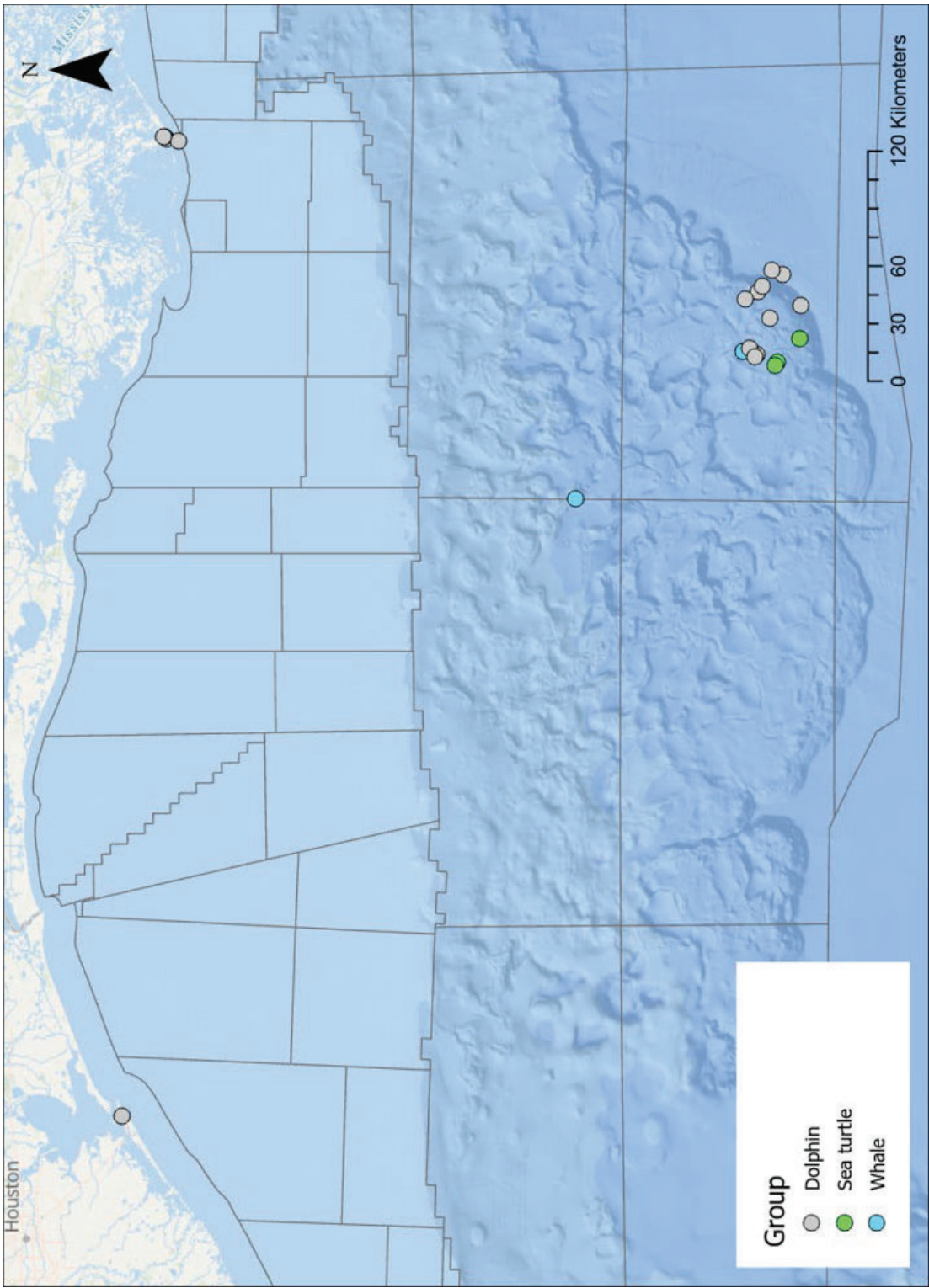


Figure 1. Detection distribution map for all protected species

FINAL REPORT

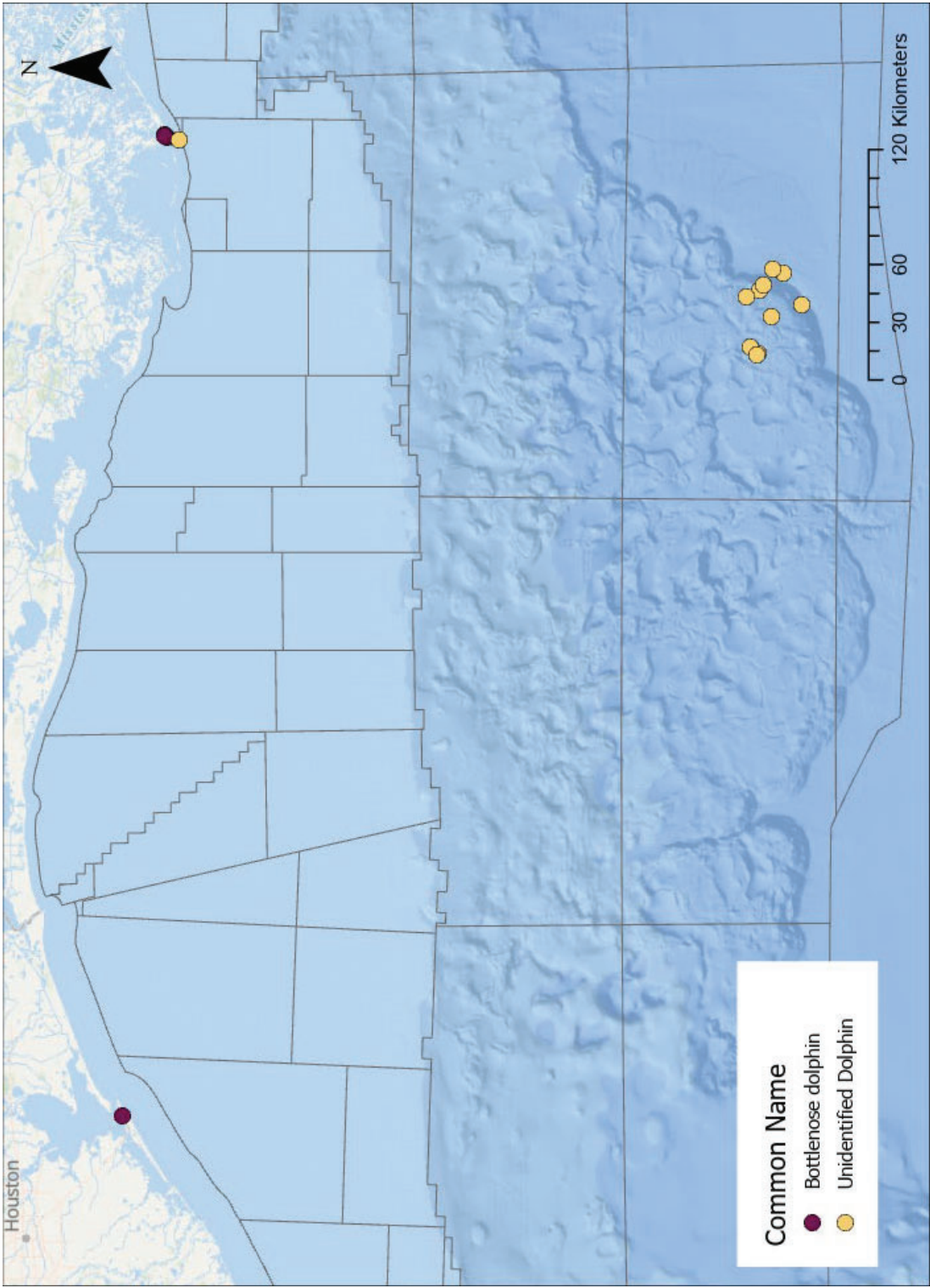


Figure 2. Detection distribution map for dolphins

FINAL REPORT

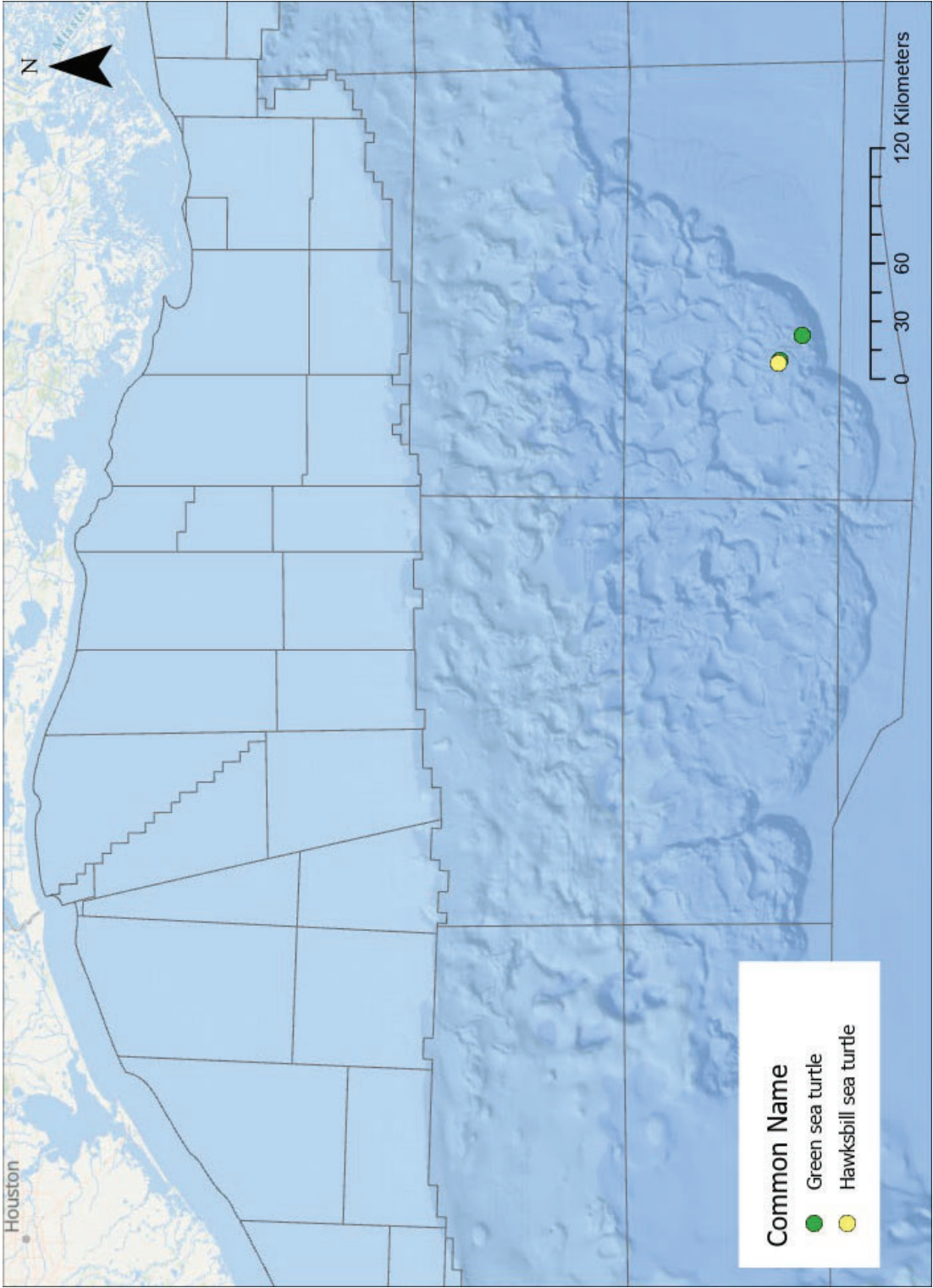


Figure 3. Detection distribution map for sea turtles

FINAL REPORT

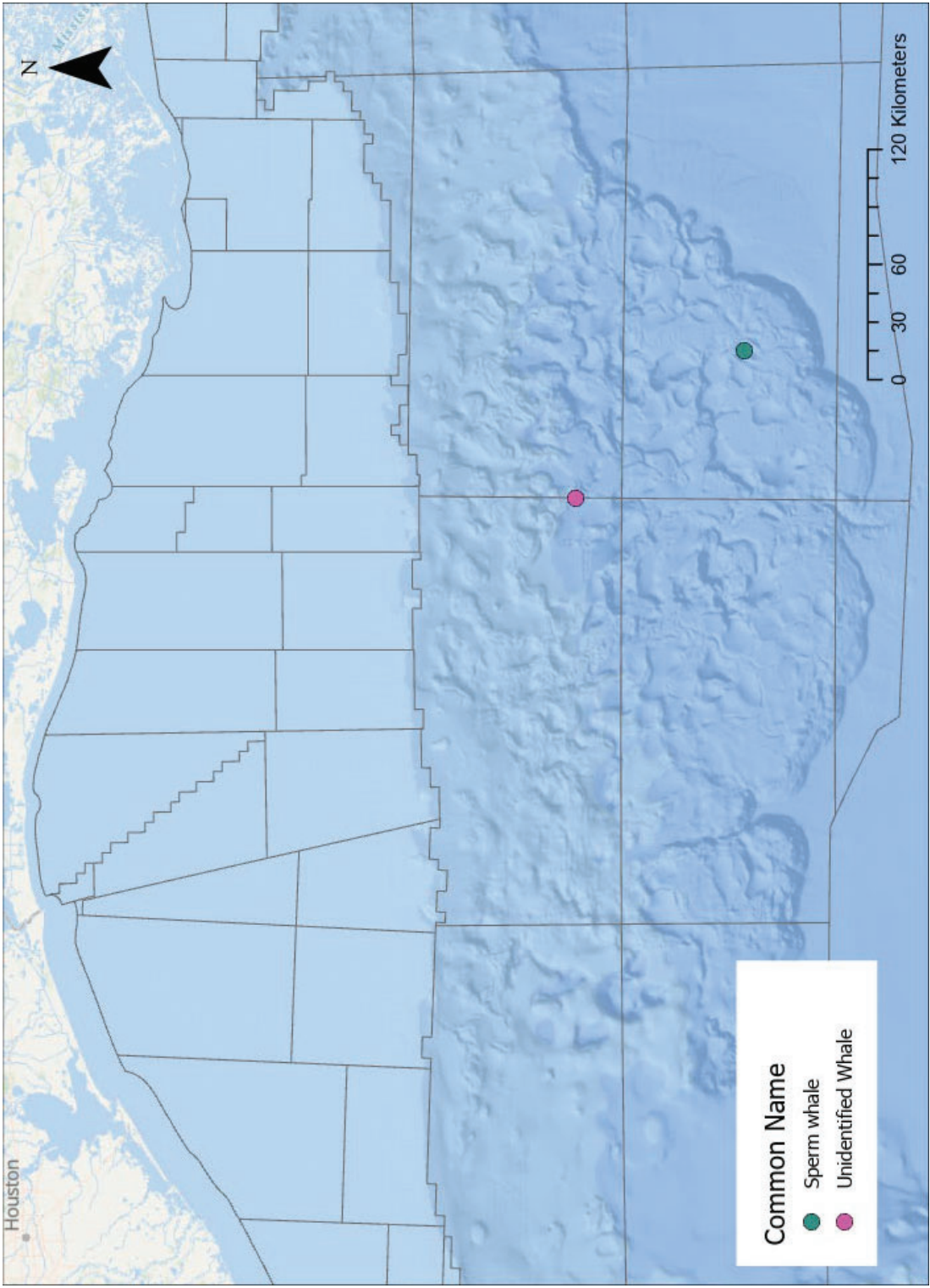


Figure 4. Detection distribution map for whales

REPORT

Appendix M: Screenshots of Protected Species Acoustically Detected During the Survey

REPORT

SCREENSHOTS OF ACOUSTIC DETECTIONS ON *R/V SANCO SWORD*

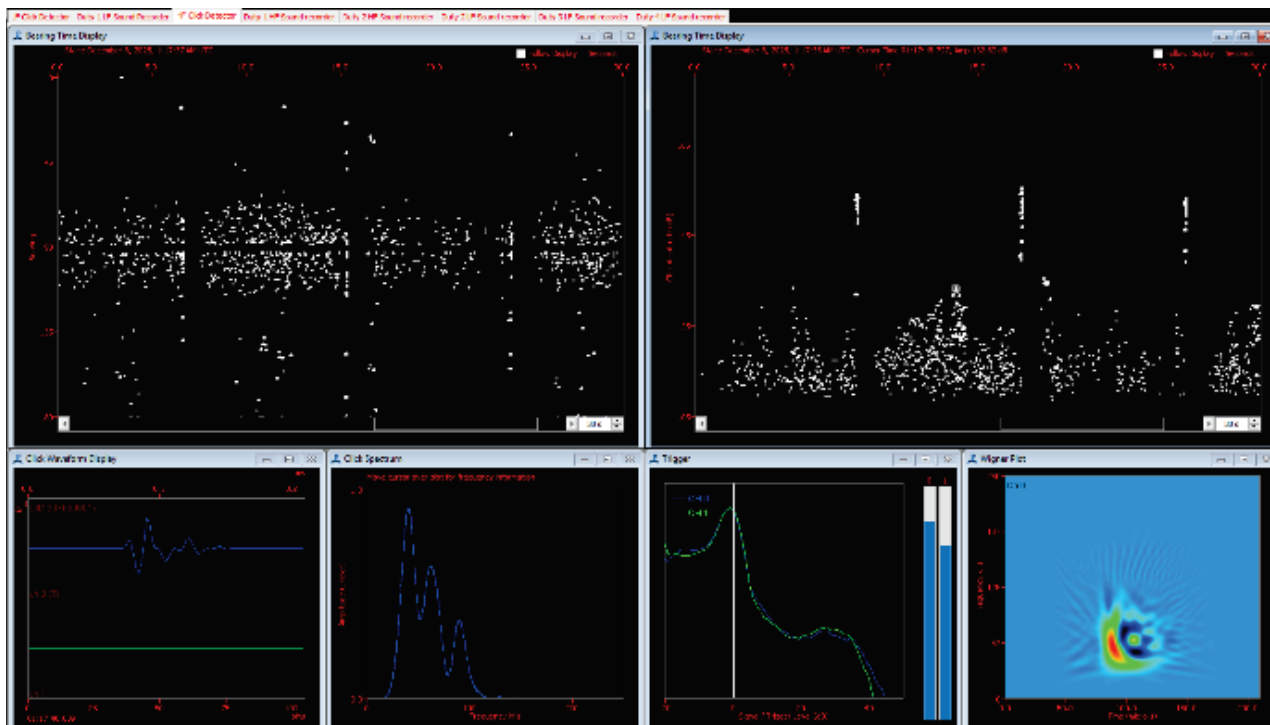


Figure 1. Acoustic detection #01 – Unidentified dolphin – 08 December 2025

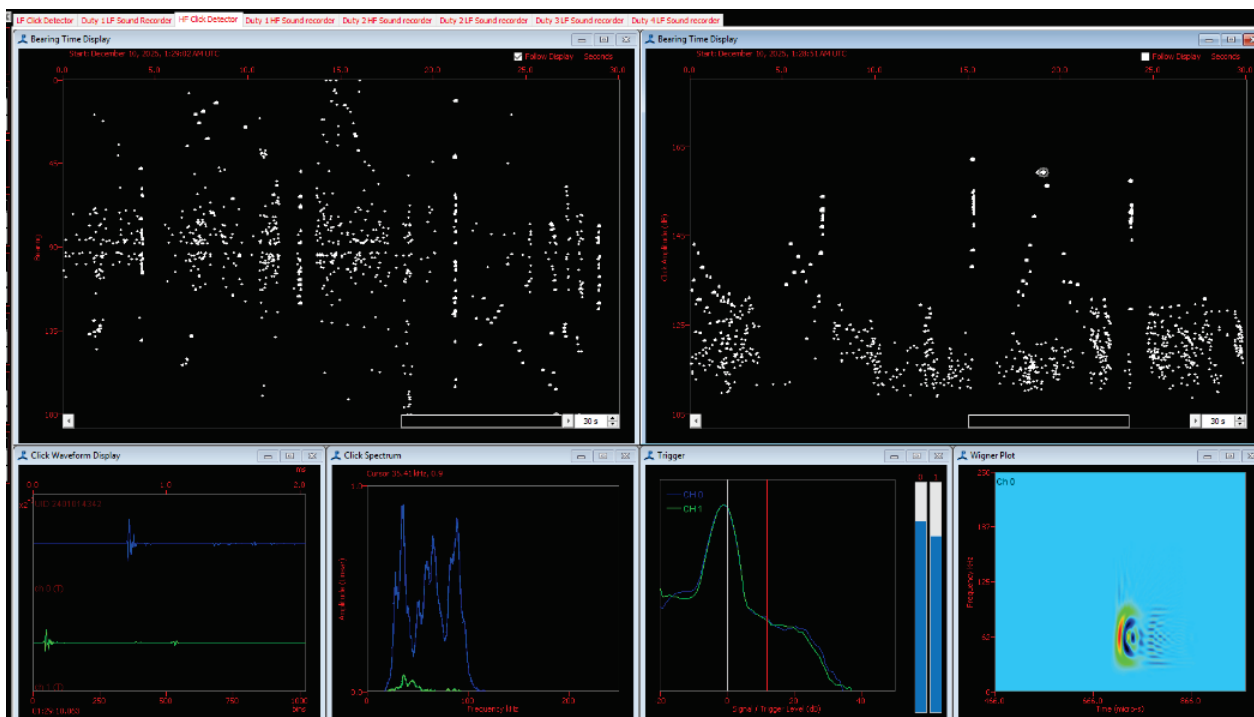


Figure 2. Acoustic detection #02 – Unidentified dolphin – 10 December 2025

REPORT

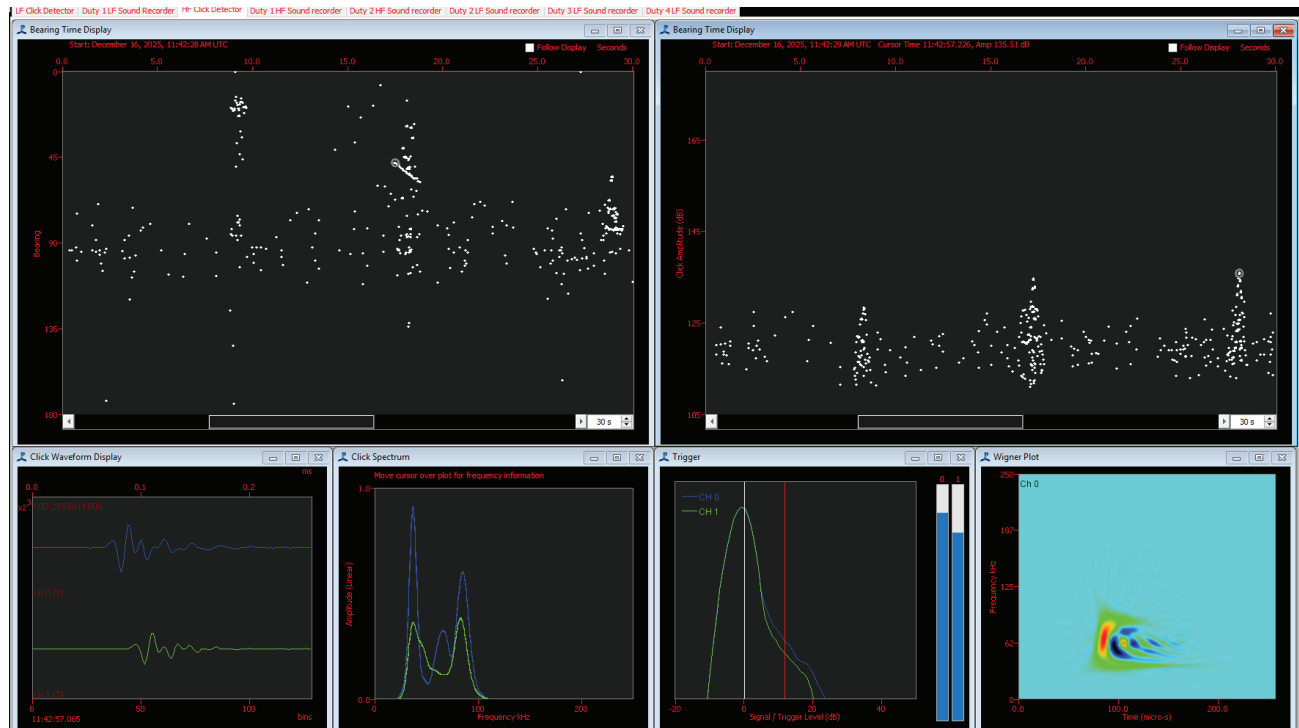


Figure 3. Acoustic detection #03 – Unidentified dolphin – 16 December 2025

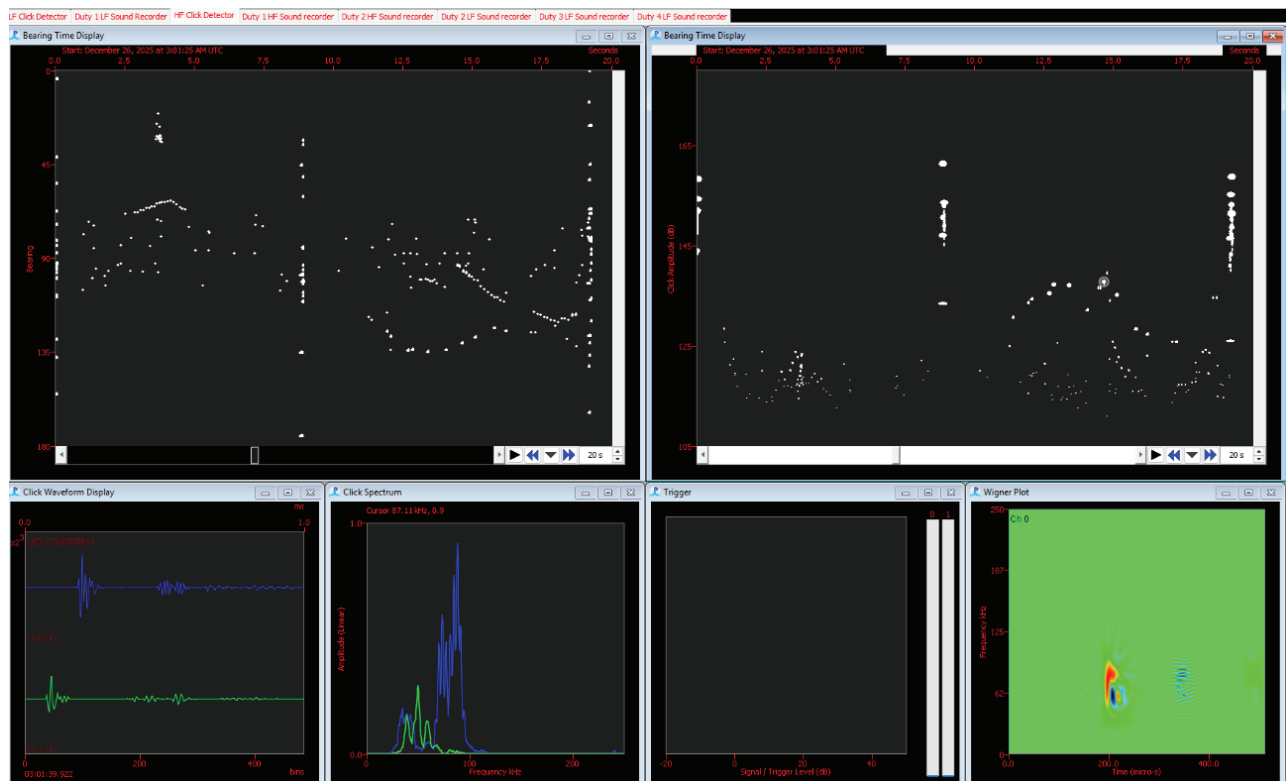


Figure 4. Acoustic detection #04 - Unidentifiable dolphin – 26 December 2025

REPORT

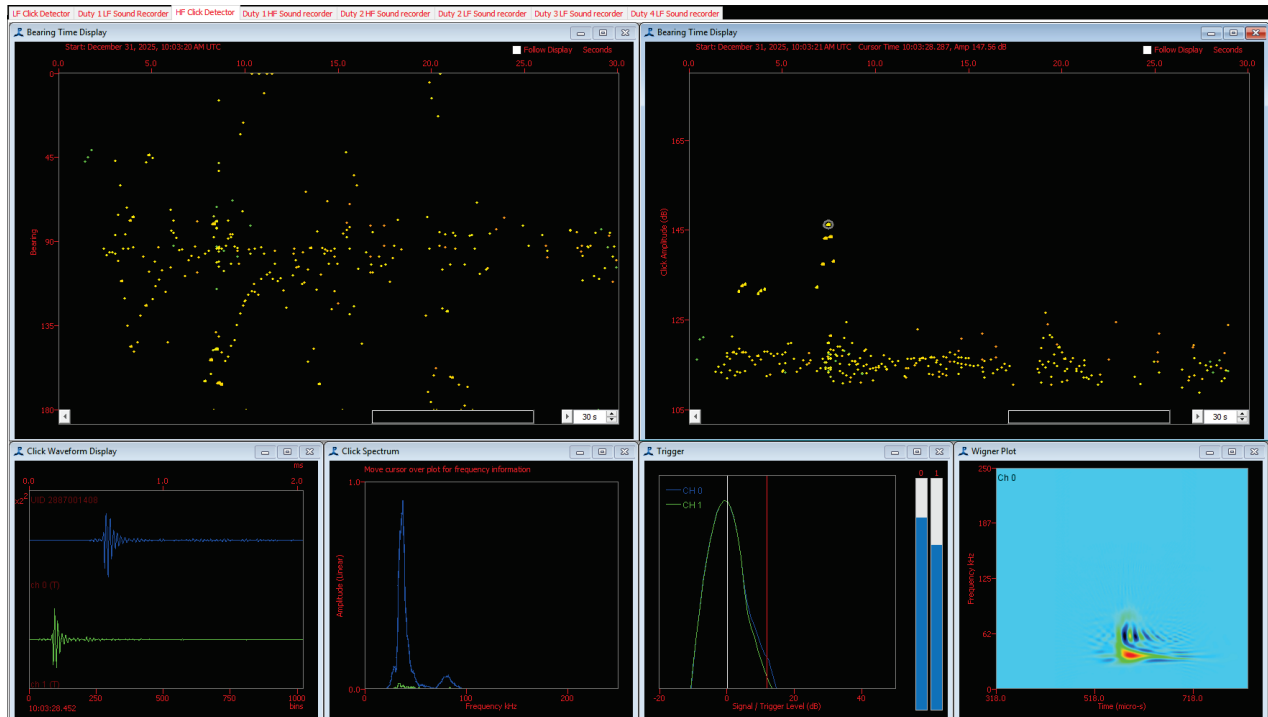


Figure 5. Acoustic detection #05 – Unidentified dolphin – 31 December 2025

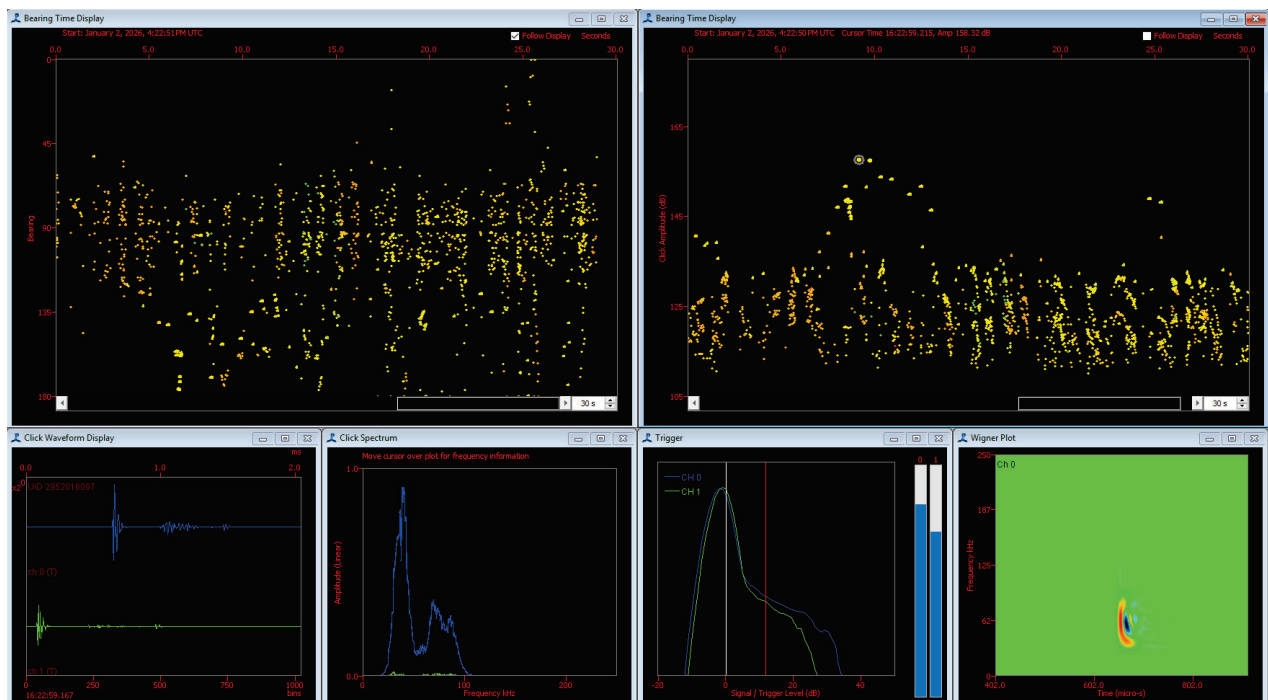


Figure 6. Acoustic detection #06 – Unidentified dolphin – 02 January 2026

REPORT

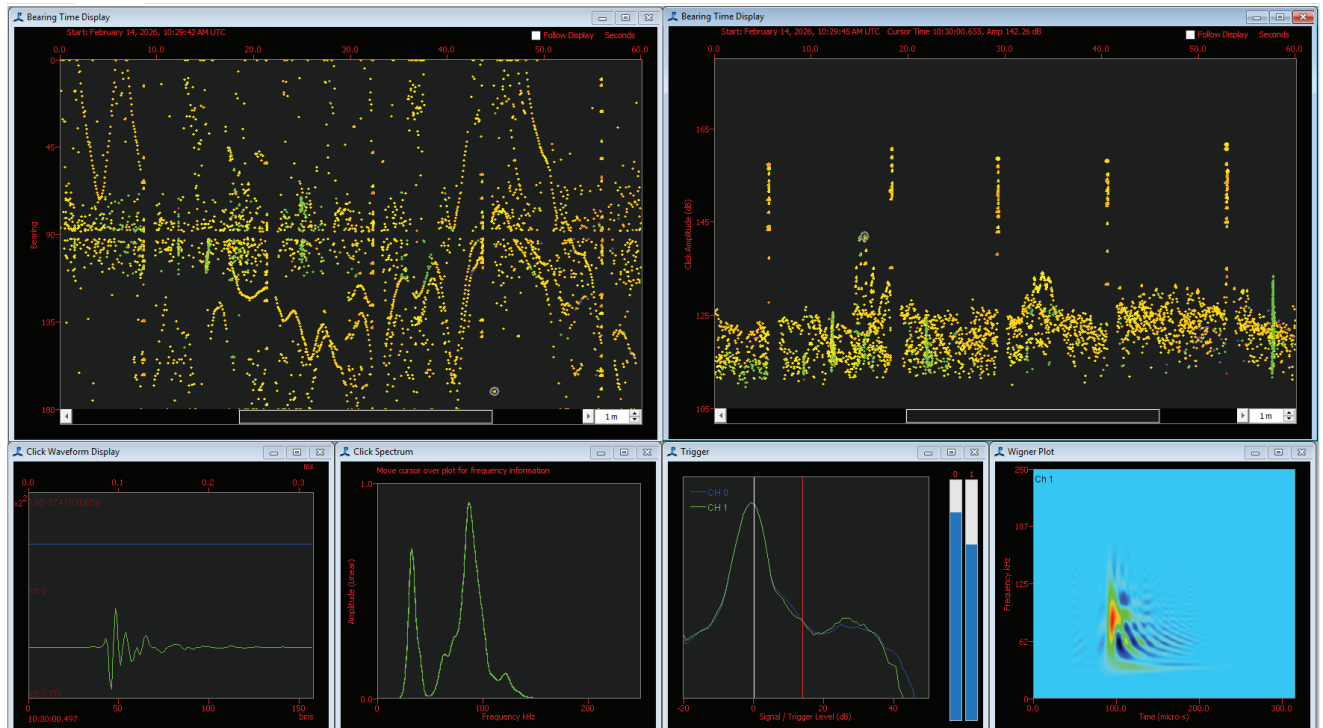


Figure 7. Acoustic detection #07 – Unidentified dolphin – 14 February 2026

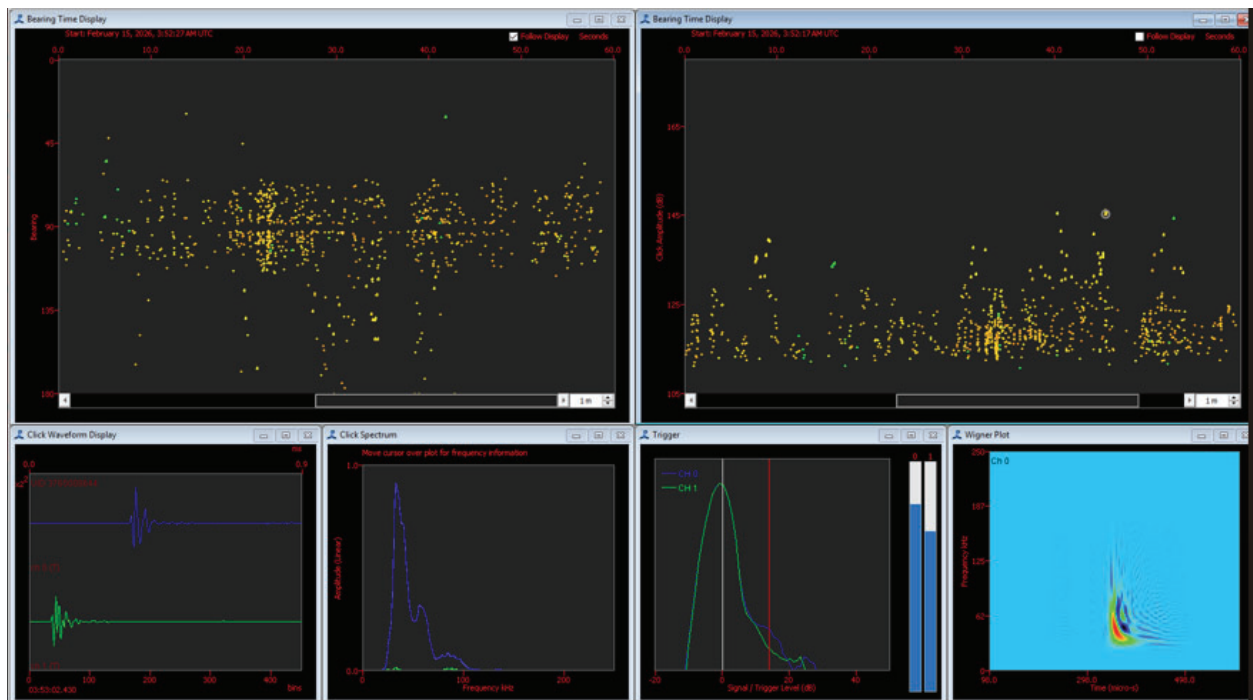


Figure 8. Acoustic detection #07 – Unidentified dolphin – 14 February 2026

REPORT

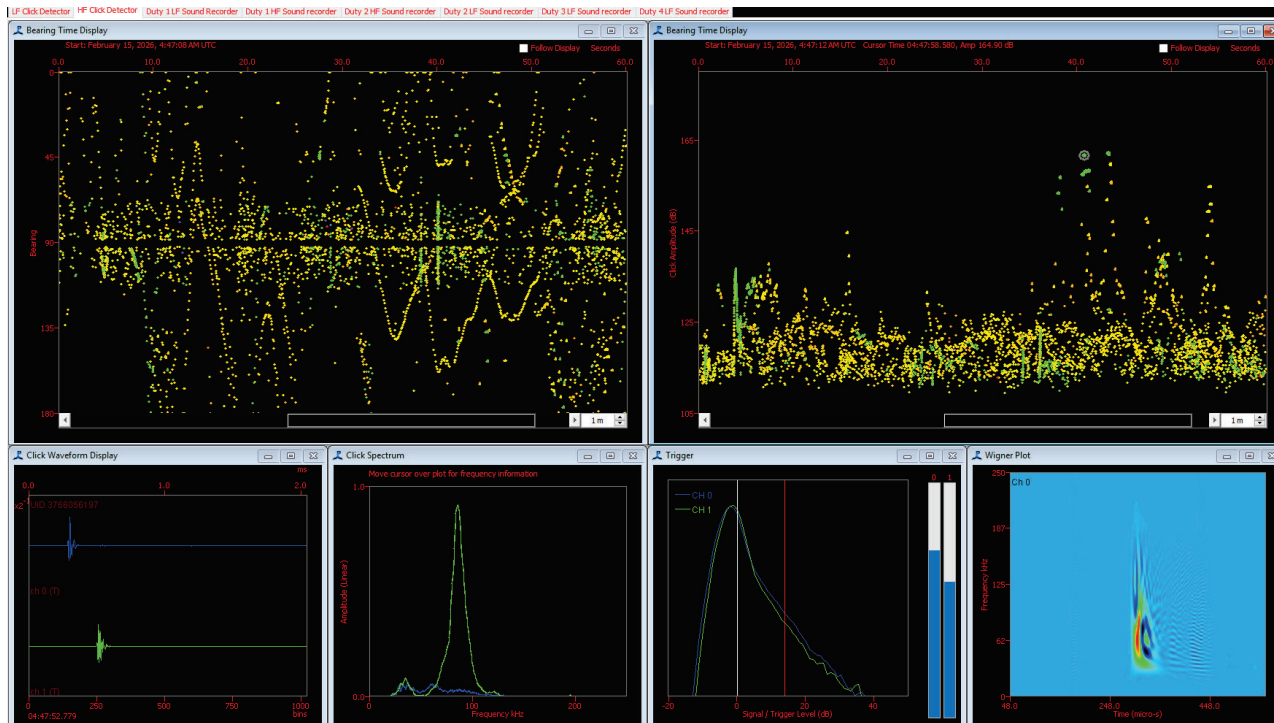


Figure 8. Acoustic detection #08 – Unidentified dolphin – 15 February 2026

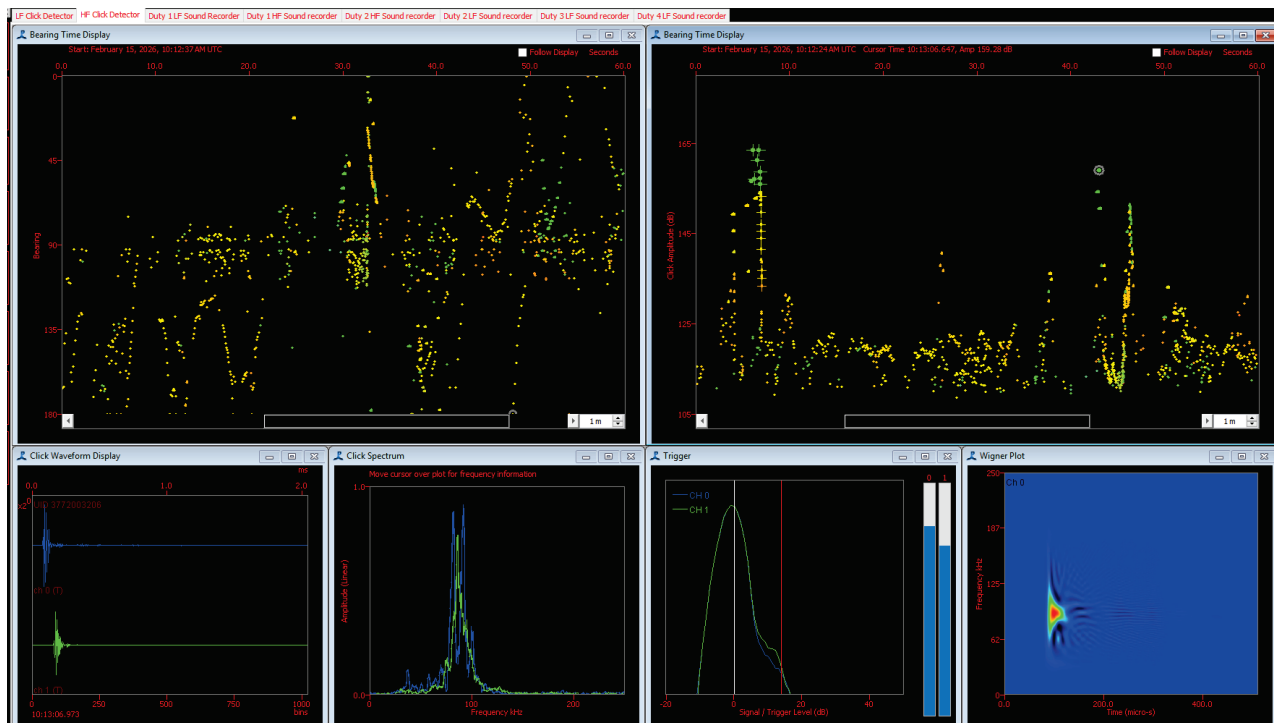


Figure 9. Acoustic detection #09 – Unidentified dolphin – 15 February 2026

REPORT

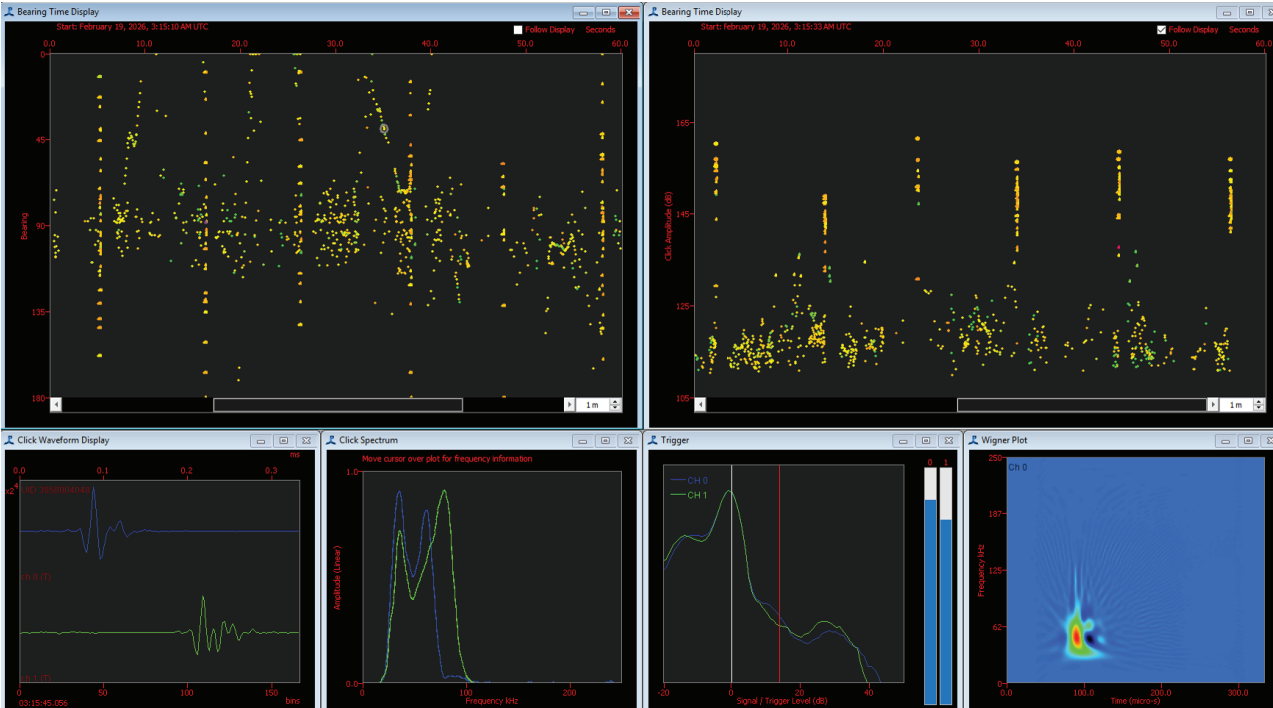


Figure 10. Acoustic detection #10 – Unidentified dolphin – 19 February 2026

Appendix N: Noise Validation Diagrams