



South Fork Wind Farm COP Survey 2017
Protected Species Observer Technical Report

Prepared by: A.I.S. Inc.

Prepared for: Deepwater Wind New England, LLC

Submitted to: BOEM and NMFS

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This report is being submitted to satisfy the following permit stipulations:

National Marine Fisheries Service, Incidental Harassment Authorization (IHA), originally issued on June 16, 2017, updated on October 17, 2017:

Within 90 days after completion of the marine site characterization survey activities, a technical report shall be provided to NMFS and BOEM that fully documents the methods and monitoring protocols, summarizes the data recorded during monitoring, estimates the number of marine mammals that may have been taken during survey activities, and provides an interpretation of the results and effectiveness of all monitoring tasks. Any recommendations made by NMFS shall be addressed in the final report prior to acceptance by NMFS.

1 INTRODUCTION

Deepwater Wind South Fork, LLC (Deepwater Wind), an affiliate of lease holder Deepwater Wind New England, LLC is proposing to develop the South Fork Wind Farm (SFWF) project, an offshore wind energy project within the Bureau of Ocean Energy Management (BOEM) Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS-A 0486) (Lease) interconnecting with the Long Island Power Authority transmission system on Long Island, New York.

Deepwater Wind completed site characterization surveys in the Lease area and along the submarine cable route, consisting of High Resolution Geophysical (HRG), geotechnical sampling, marine archaeological and benthic habitat surveys between July 15th, 2017 and December 31st, 2017.

In order to comply with the Lease and an Incidental Harassment Authorization (IHA) issued by the National Marine Fisheries Service (NMFS), Deepwater Wind contracted A.I.S. Inc. (AIS) to provide Protected Species Observers (PSO) and Passive Acoustic Monitoring (PAM) operators to monitor for marine mammals and sea turtles during HRG and geotechnical survey operations. These monitoring activities were completed in accordance with the agency-approved SFWF COP Survey Plan and Alternative Monitoring Plan (AMP) (Attachment 1).

This Protected Species Observation Technical Report documents the complete results of the 2017 HRG and geotechnical surveys conducted by Deepwater Wind. A summary of the data collected, the number of sightings and acoustic detections, and incidental takes are included in this report. PSO methodology and monitoring protocols are discussed, however detailed description is provided in the Alternative Monitoring Plan (AMP) (Attachment 1). An assessment of effectiveness of PSO monitoring and future recommendations is provided in the Protected Species Observer Mitigation Report (Attachment 2).

2 SUMMARY OF HRG AND GEOTECHNICAL SURVEY ACTIVITIES

HRG surveys were completed on the R/V Fugro Enterprise between July 15 and November 10, 2017. Both PSOs and PAM operators were aboard the Fugro Enterprise during HRG survey in accordance with the COP Survey Plan.

HRG surveys were completed along potential nearshore cable routes on the R/V Harry Miller between July 24 and August 16, 2017. HRG surveys on the R/V Harry Miller were limited to daylight hours only with monitoring by PSOs in accordance with the COP Survey Plan.

Geotechnical surveys were completed on the R/V Megan T. Miller between October 20 and December 31, 2017. Both PSO and PAM operators monitored geotechnical survey activities in accordance with the COP Survey Plan and AMP. PSOs were positioned aboard the R/V James Miller, which circled the R/V Megan T. Miller during geotechnical operations. The PAM operators were stationed aboard the R/V Megan Miller.

3 PROTECTED SPECIES OBSERVATION

Full details of the methodology and protocols used by the PSO can be found in the Protected Species Observer Mitigation Report (Attachment 2).

3.1 PROTECTED SPECIES OBSERVER TRAINING AND COMPLIANCE

Protected species observers received two project specific trainings prior to observing onboard during HRG and geotechnical survey work. All PSO and PAM operators attended the Permit and Environmental Compliance Training put together by Deepwater Wind and given by the Environmental Compliance Support person at A.I.S., Inc. Additionally, all PSO and PAM operators received project specific training that covered the following topics:

- Permits and plans relevant to the project
- Environmental compliance requirements
- Health and safety requirements
- PSO/PAM operator requirements and scheduling
- Protected species mitigation methods
- Communication
- Authorized takes
- Data form
- PSO and PAM equipment, use, and maintenance
 - Binoculars with reticles
 - Rangefinders
 - Night vision monoculars
 - Thermal cameras (Fugro Enterprise only)
 - PAM equipment (Fugro Enterprise and Meghan Miller only)
- Protected species identification review

Trainings occurred on the following dates with each respective PSO and PAM Operator included in Table 1. There are several occurrences where a PSO or PAM operator attended multiple times. This is due to the fact that each training was tailored to the specific vessel that the individual would be working from. Some PSO equipment was not needed or available depending on the vessel being used for observations. Additionally, the mitigation methods also varied slightly from vessel to vessel to comply with the COP survey plan and attached AMP (Attachment 1).

Table 1 PSO and PAM Operator Training Attendance

Date	PSO/PAM Operators Attending
7/14/2017	Trevor Horwell, Michelle Klein, Kerry Lyons, Cara Sands, Lorenzo Scala, Rebecca Snyder, Kathryn Roy
7/24/2017	Keith Pawlowski
7/27/2017	Trevor Lyle
7/29/2017	Rachel Rice
8/8/2017	Cameron Brooks, Lori Cabrera, Amanda Dubuque
8/23/2017	Christine Voightlander
9/14/2017	Laura Bluth, Keith Pawlowski
10/18/2017	Lori Cabrera, Michelle Klein, Trevor Lyle, Molly Martin, Christina Mehle, Gregory Seward
11/9/2017	Matthew Cunningham, Emma Fowler, Taren Manley
11/21/2017	Rachel Rice, Laura Wyatt

All involved PSO and PAM operators were approved by BOEM, as per lease stipulation 4.3.4. Additionally, to be permitted aboard the Fugro vessels, all PSO and PAM staff were in compliance with Fugro operating standards, possessing medical clearance, offshore safety training and a valid passport.

Detailed PSO methodology and monitoring protocols are provided in the Alternative Monitoring Plan (AMP) (Attachment 1). An assessment of effectiveness of PSO monitoring and future recommendations is provided in the Protected Species Observer Mitigation Report (Attachment 2).

3.2 PROTECTED SPECIES OBSERVATION DATA

PSO and PAM entries and mitigation summaries were recorded on data sheets, which were provided to Deepwater Wind on a daily basis via a web portal. Attached are summaries of the sightings and detections from PSO/PAM data for each of the vessels as well as survey type. Summary details provided include:

- Dates, times, locations
- Species encountered and identification characteristics
- Description of the observed behaviors (in both the presence and absence of activities)
- A summary of event details
- Description of survey activities at the time of sighting/detection
- Environmental conditions when sightings were made including:
 - Water conditions (e.g., Beaufort sea state, water depth)
 - Weather conditions (e.g., cloud cover, visibility, wind direction)
- Duration of sighting
- Any other relevant data regarding marine mammals observed (for pre-activity, during activity, and post-activity surveys)
- Estimated exposure/take numbers during activities.

4 HRG SURVEY DATA SUMMARY

4.1 HRG Survey – Sighting Data

There were a total of 382 sighting events (376 aboard R/V Fugro Enterprise and 6 aboard R/V Harry Miller) and 310 acoustic detections during HRG surveys. One hundred and forty-one of these visual sighting events were paired with an acoustic detection. A summary of these sightings along with associated details can be found in Attachment 2 (R/V Fugro Enterprise Sighting Summary) and Attachment 3 (R/V Harry Miller Sighting Summary).

Table 2 provides the number of individuals by species visually sighted and/or acoustically detected that did not result in Level B take during the HRG survey on both the R/V Fugro Enterprise and R/V Harry Miller. All sightings/detections listed in Table 2 occurred when the animals were outside the exclusion zone. Note that multiple individuals may have been sighted or acoustically detected during each event.

Table 2 Species and Number of Individual Sighted or Detected during HRG Survey

Species	Number of Individuals
Dolphin, Risso's	8
Dolphin, Short-Beaked Common (incl. delphinid unk)	2677
Porpoise, Harbor	4
Sea Turtle, Loggerhead	1
Whale, Fin	44
Whale, Humpback	144
Whale, Minke	12
Whale, North Atlantic Right	1
Whale, Sperm	5
Whale unk	83

4.2 HRG Survey - Estimated Level B Takes

Level B takes were recorded when marine mammals or sea turtles were sighted within 200 m when HRG survey equipment was powered on or at 400m if a sparker system was operational. Level B take on the R/V Fugro Enterprise is summarized in Table 3 and detailed further in Attachment 4 (R/V Fugro Enterprise Take Summary). There was no Level B Take documented during HRG surveys on the R/V Harry Miller.

Table 3 Summary of Level B Take during HRG Survey

Species	Number of Level B Takes
Dolphin, Short-Beaked Common (incl. delphinid unk)	346
Sea Turtle, Loggerhead (incl. Sea Turtle unk)	3
Whale, Fin (incl. Whale unk)	2
Whale, Humpback	6
Whale, Minke	2
Whale, North Atlantic Right	1
Whale, Sperm	2

No injured or dead marine mammals or sea turtles were witnessed during the HRG survey.

5 GEOTECHNICAL SURVEY DATA SUMMARY

5.1 Geotechnical Survey - Sighting Data

There were a total of 53 sighting events and 25 acoustic detections made during the geotechnical survey. Nineteen of these visual sighting events were paired with acoustic detections. Table 4 provides the number of individuals by species visually sighted and/or acoustically detected that did not result in Level B take. All of the sightings/detections listed in Table 4 occurred when the animals were outside the exclusion zone. Note that multiple individuals may have been sighted or acoustically detected during each event. A detailed summary of these sightings and detections is provided in Attachment 5 (R/V James Miller Sighting Summary).

Table 4 Species and Number of Individuals Sighted or Detected during Geotechnical Survey

Species	Number of Individuals Sighted/Detected
Dolphin, Short-Beaked Common (incl. delphinid unk)	607
Seal, Grey	2
Seal, Harbor	2
Seal unk	10
Porpoise, Harbor	2
Whale, Fin	4
Whale, Humpback	12
Whale, Sperm	1
Whale unk	1

5.2 Geotechnical Survey - Estimated Level B Takes

Level B take were recorded when marine mammals or sea turtles were sighted within 200 m when the cone penetration test and vibracore equipment was active. Additionally, Level B take was recorded when harbor porpoise were sighted within 208m when the vibracore equipment was active. As summarized in

Table 5 and in Attachment 6 (R/V James Miller Take Summary), Level B take during the geotechnical survey was limited to short-beaked common dolphins.

Table 5 Summary of Level B Take during Geotechnical Survey

Species	Number of Level B Takes
Dolphin, Short-Beaked Common (incl. delphinid unk)	67

No injured or dead marine mammals or sea turtles were witnessed during geotechnical survey during the reporting period.

Attachment 1
Alternative Monitoring Plan

Alternative Monitoring Plan to Support 2017 Geophysical and Geotechnical Surveys

OCS Lease # OCS-A 0486

May 19, 2017

Revision 1: October 6, 2017

Revision 2: October 20, 2017

Prepared for: Deepwater Wind New England, LLC

Prepared by:

A.I.S. Inc.
14 Barnabas Road
Marion, MA 02738



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1. Purpose of this Document

Deepwater Wind has developed this Alternative Monitoring Plan (Plan) to satisfy the following stipulations of commercial lease OCS-A 0486 (Lease):

- **Addendum C, Stipulation 4.3.2: Visibility.** The Lessee must not conduct G&G surveys in support of plan (i.e. SAP and / or COP) submittal at any time when lighting or weather conditions (e.g. darkness, rain, fog, sea state) prevents visual monitoring of the HRG survey exclusion zone (see 4.3.6) or the geotechnical sampling exclusion zone (see 4.3.7) except as allowed under 4.3.3.
- **Addendum C, Stipulation 4.3.3: Modification of Visibility Requirement.** If the Lessee intends to conduct G&G survey operations in support of plan submittal at night or when visual observation is otherwise impaired, it must submit to the Lessor an alternative monitoring plan detailing the alternative monitoring methodology (e.g. active or passive acoustic monitoring technologies). The Lessor may, after consultation with NMFS, decide to allow the Lessee to conduct G&G surveys in support of plan submittal at night or when visual observation is otherwise impaired using the proposed alternative monitoring methodology.

Beginning in July 2017, Deepwater Wind began conducting geophysical and geotechnical surveys within the Lease and along a proposed export cable route options for the South Fork Wind Farm (SFWF) see Figure 1. Deepwater Wind respectfully submits this Plan and request BOEM approval for geophysical and geotechnical survey to occur 24 hours per day, 7 days per week. The original Plan was dated and submitted May 19, 2017. The Plan was revised and resubmitted on October 18, 2017, and again on October 20, 2017 to include changes made during the geotechnical portion of the OCS-A-0486 COP Survey.

This Plan covers additional mitigation measures that will be used at night or when visual observation is otherwise impaired. A separate 2017 Geophysical and Geotechnical Protected Species Monitoring Plan will be prepared which will summarize all requirements for monitoring during the surveys.

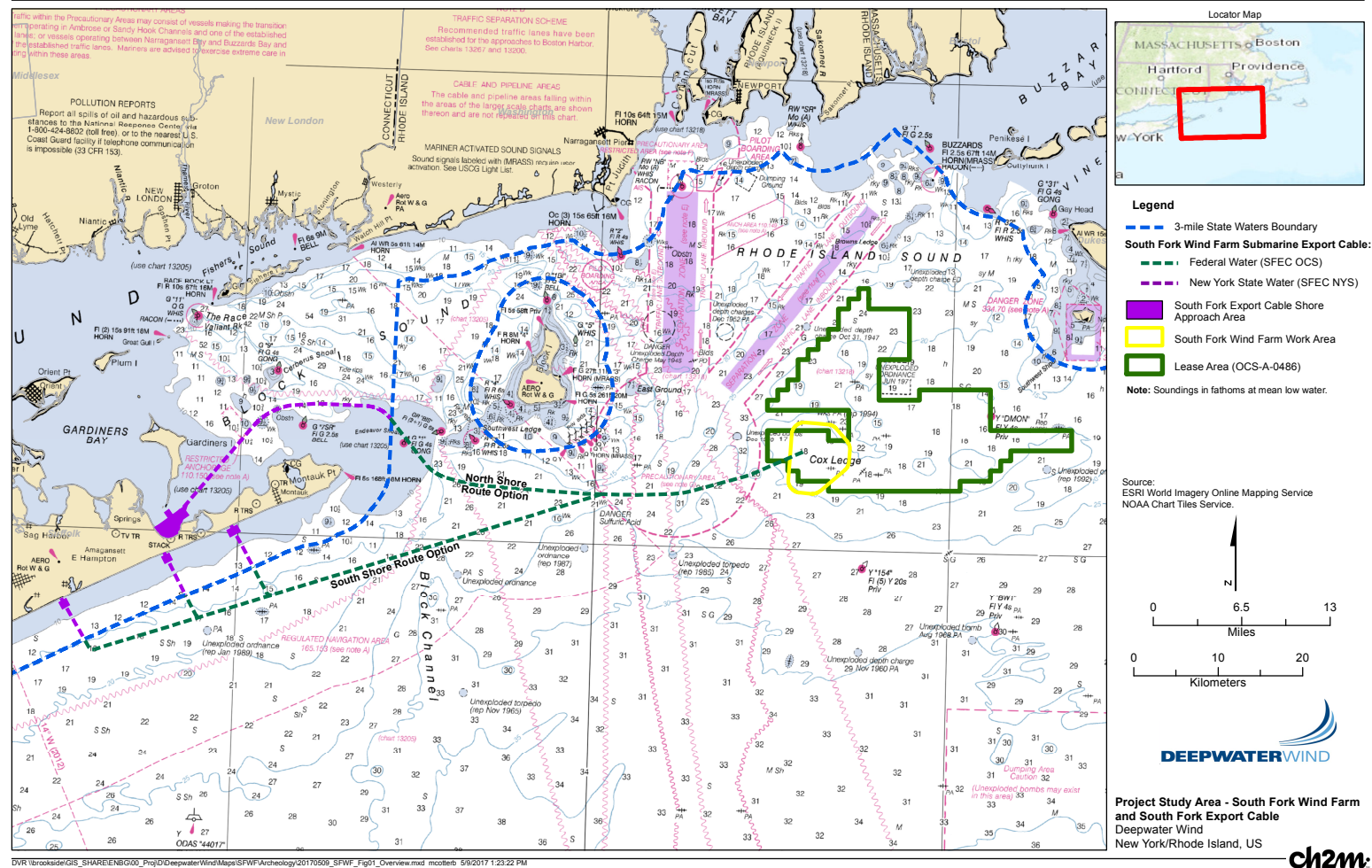


Figure 1 SFWF project area and export cable route options

2. Protected Species Monitoring

Protected Species Observers (PSO) must receive written approval by the National Marine Fisheries Service (NMFS) before they can serve as a PSO on this project. Resumes will be provided to BOEM and NMFS at least 45 days prior to the start of the project. Additionally, all PSO and PAM operators will receive project specific training prior to the start of the geophysical and geotechnical surveys.

The primary survey vessel, the Fugro Enterprise, will conduct all geophysical survey work in offshore waters (COP Survey Plan Appendix B). The primary survey vessel will carry PSOs and monitoring equipment. A smaller vessel comparable to the Freedom Surveyor, will be used to complete the nearshore geophysical survey in shallow waters (COP Survey Plan Appendix B). The smaller geophysical survey vessel will carry PSOs and monitor during daylight hours only.

Geotechnical explorations, both in shallow and offshore waters, will be conducted from the primary survey vessel the Fugro Enterprise, and from a smaller secondary vessel the Megan Miller (COP Survey Plan Appendix B). A sister vessel, the James Miller, will monitor for protected species and marine mammals alongside the Megan Miller during geotechnical surveys. Operations during all geotechnical surveys will be 24 hours, 7 days a week.

PSO observations on all vessels must be conducted in accordance with the following:

- The watch schedule for PSO will follow the guidelines in the National Standards for a Protected Species Observer and Data Management Program which requires no PSO will be allowed more than 4 consecutive hours on watch as a visual observer and a break time of no less than 2 hours must be allowed before a PSO begins another visual monitoring watch rotation. This will reduce eye fatigue. No PSO will be assigned a combined watch schedule of more than 12 hours in a 24 hour period.
- A Lead PSO will be designated during every shift. The Lead PSO will be responsible for:
 - Communication with the PAM operators, the Protected Species Observer Manager, and the vessel survey team. The Lead PSO will communicate with the vessel and survey equipment operators in the event that mitigation measures need to be implemented.
 - Monitoring the NMFS North Atlantic right whale reporting systems for the presence of right whales during the geophysical and geotechnical surveys. This includes checking the Early Warning System, Sighting Advisory System, and the Mandatory Ship Reporting System.

An example of a shift rotation schedule for the PSO and PAM operators deployed on the Fugro Enterprise is showing in Table 1. This table incorporates the requirement that PSO must not be

on watch for more than 4 consecutive hours, with at least a 2 hour break after a 4 hour watch. Two PSO will be on watch during daylight hours. During night time operations, one PSO and one PAM operator will monitor for any visual or acoustic signs of protected species. It is assumed that the work will take place in late May through July when the sunrise is around 5:00 and sunset is around 20:15. This schedule calls for 4 PSO and 2 PAM operators to be utilized during the course of the survey.

Hours	PAM 1	PAM 2	PSO1	PSO2	PSO3	PSO4
1200-1300						
1300-1400						
1400-1500						
1500-1600						
1600-1700						
1700-1800						
1800-1900						
1900-2000						
2000-2100						
2100-2200						
2200-2300						
2300-0000						
0000-0100						
0100-0200						
0200-0300						
0300-0400						
0400-0500						
0500-0600						
0600-0700						
0700-0800						
0800-0900						
0900-1000						
1000-1100						
1100-1200						

Table 1 Example of 24 Hour PSO/PAM Schedule on the Fugro Enterprise

Two examples of shift rotation schedules for the PSO and PAM operators deployed on the James Miller is shown in Table 2. Table 2 also incorporates the requirement that PSO must not be on watch for more than 4 consecutive hours, with at least a 2 hour break after a 4 hour watch. Two PSOs will be on watch at all times. During night time operations, one PAM operator will monitor for visual or acoustic signs of protected species and to two PSOs will monitor using night vision monoculars. It is assumed that the work will take mid-October through mid-November when the sunrise is around 6:45 and sunset is around 18:00. This schedule calls for 4 PSO and 2 PAM operators to be utilized.

	PSO1	PSO2	PSO3	PSO4	PAM1	PAM2
0000-0100						
0100-0200						
0200-0300						
0300-0400						
0400-0500						
0500-0600						
0600-0700						
0700-0800						
0800-0900						
0900-1000						
1000-1100						
1100-1200						
1200-1300						
1300-1400						
1400-1500						
1500-1600						
1600-1700						
1700-1800						
1800-1900						
1900-2000						
2000-2100						
2100-2200						
2200-2300						
2300-2400						

	PSO1	PSO2	PSO3	PSO4	PAM1	PAM2
0000-0100						
0100-0200						
0200-0300						
0300-0400						
0400-0500						
0500-0600						
0600-0700						
0700-0800						
0800-0900						
0900-1000						
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1500-1600						
1600-1700						
1700-1800						
1800-1900						
1900-2000						
2000-2100						
2100-2200						
2200-2300						
2300-2400						

Table 2 Examples of 24 Hour PSO/PAM Schedules on the James Miller

To ensure that the most efficient protected species monitoring plan is executed, immediate and effective communication will be required between the PSO team and PAM operator when they are working in low visibility conditions. When a protected species is visually detected by the PSO team, the Lead PSO will communicate with the PAM operator so that the PAM operator can potentially pair the sighting with any acoustic detection.

The PSO duties will include:

- Visually monitoring the exclusion zone 360° around the survey vessel operations, 24/7 for the presence of marine mammals and all other protected species leading up to and during operations of the sub-bottom profiler and ultra high resolution survey sound source. They will document all protected species sightings and environmental conditions on approved data forms and report all incidents to proper personnel.
- Informing captain, or designated personnel, if a protected species is heading towards or enters the exclusion zone around the vessel so as to minimize or reduce the chance of injuring a protected species.

- Summarizing daily monitoring effort and submitting data forms to the appropriate staff or database.

For every protected species observation the following information will be recorded on the approved PSO data logs:

- Date and location of survey vessel
- Time of observation
- Environmental conditions (e.g. tidal stage, sea state, weather, water temperature)
- Species identification characteristics
- Numbers and age classification (if known) of individuals observed
- Frequency of observation
- Location of protected species (i.e. distance from the sound source)
- Sound source status (i.e. soft start/ramp-up, active, post survey, etc.)
- Reaction of the animal(s) to relevant sound source (if any) and observed behavior, including bearing and direction of travel
- Details of any observed Taking (e.g. behavioral disturbances or injury/mortality)
- Action taken (i.e., ramp-down, shut-down)

During geotechnical sampling the Megan Miller will be stationary. PSOs will be stationed onboard the James Miller which will circle around the Megan Miller at a safe distance to avoid entanglement with the geotechnical equipment and PAM cable. The James Miller will circle the Megan Miller at a distance of approximately 175m to 225m at a speed of 3 - 5kts. The distance that the James Miller will keep between itself and the Megan Miller may be adjusted in the field if any safety concerns arise due to weather or gear interactions. The PAM Operators will be stationed on the Megan Miller and the PAM equipment will be deployed vertically over the side, which will allow for better distance estimation with the PAMGuard software for any acoustic detections. The PSO and PAM operators will be equipped with VHF radio to allow for immediate communication between one another to ensure swift interactions when detections (both visual and acoustic) are made. The vessel crew will also monitor the same channel to be notified of the need for shutdown. This is the preferred option for the stationing of the PSO and PAM equipment.

Alternatively, during geotechnical sampling, the James Miller will house both the PSO and PAM operators and the PAM equipment will be towed behind the Megan Miller as it circles around the Megan Miller at a distance of approximately 175m to 225m at a speed of 3-5kts. This is a secondary option as this pattern of circling of the vessel and PAM equipment causes the distance estimation portion of the PAM equipment to become less effective.

2.1. Visual Monitoring (Day Light Hours)

Visual monitoring will be conducted on a 24 hour basis. During daylight hours, two PSO will be on watch at all times using the following guidelines:

- PSO must be stationed on the highest available vantage point on the vessel.
- Two PSO will actively observe during daylight hours; each PSO will observe on opposite sides of the survey vessel, in 180° sweeps to ensure 360° observation. The Lead PSO will work with the PSO team and vessel crew to determine the best position for the PSO to have an unobstructed view of the entire exclusion zone.
- PSO will estimate distances to protected species visually, using laser range finders, using reticle binoculars, or using range finder sticks during daylight hours.
- If possible, all protected species sightings will be documented via digital camera with video capabilities.

2.2. Visual Monitoring (During Night Hours and Times of Limited Visibility)

Visual monitoring during nighttime hours and periods of limited visibility will differ depending on which vessel the PSO are stationed on. The details of these observations are outlined below.

2.2.1. Visual Monitoring (During Night Hours and Time of Limited Visibility) onboard Fugro Enterprise

During periods of darkness or limited visibility (e.g. fog, heavy rain, poor lighting conditions), thermal imaging cameras will be used to supplement PAM operations. Three camera systems, each providing 120-degrees of coverage, will be positioned at a location high on the vessel and in an area with minimal obstruction to ensure 360-degree coverage of the area surrounding the vessel including the exclusion zone. The PSO will monitor images received from the high definition thermal imaging cameras on display screens. An iPad will also be available for monitoring of the camera displays over a wireless connection.

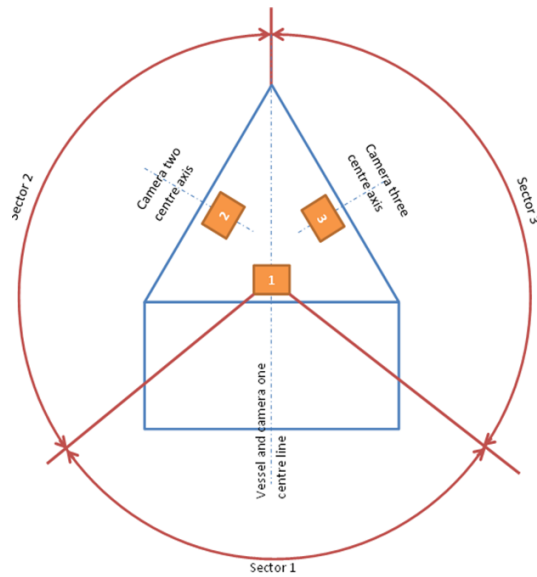


Figure 2 Camera system configuration illustrating 360-degree coverage

In addition to utilizing the thermal imaging cameras and software, the PSO will also be issued Gen 3 Night Vision Monoculars to be used as a supplement and backup in the event that the thermal imaging cameras malfunction.

If the thermal imaging cameras were to malfunction a second PSO would be summoned to assist in visual observations to ensure maximum coverage with the night vision monoculars. The range of the night vision monoculars is roughly 500m. In the event that a protected species is sighted with night vision while the thermal imaging cameras are down, mitigation measures would immediately be implemented as it will be assumed that the protected species has entered the exclusion zone if detected using night vision.

2.2.2. Visual Monitoring (During Night Hours and Time of Limited Visibility) onboard James Miller

During periods of darkness or limited visibility (e.g. fog, heavy rain, poor lighting conditions), PSO completing observations will utilize Gen 3 Night Vision Monoculars. The same model being used on the Fugro Enterprise will be used on the James Miller. Two PSOs will be on watch throughout night hours and times of limited visibility to ensure maximum visual coverage of the area. Three monocular units will be located on the James Miller to have a spare in the event that one malfunctions. The range of the night vision monoculars is roughly 350m.

2.3. Visual Monitoring Equipment

PSO will be supplied the following equipment, and will be trained in the proper use and care of the equipment:

- Personal Protective Equipment including steel toed shoes, hard hat, USCG approved PFD, polarized safety glasses, hearing protection, and rain gear
- Waterproof marine binoculars with reticles
- Rangefinder
- Handheld GPS
- High resolution digital camera with video capabilities
- Gen 3 night vision monocular (AN/PVS-14)
- Laptop computer
- Waterproof notebook and pencils
- Field identification guides

The specifications for the Gen 3 AGM-HS Hand Select Night Vision Monocular is as follows:

- Generation: Gen 3
- Image Tube Type: Gen 3 A Grade Autogated/Pinnacle Manual Gain Hand Select
- FOV @1000 yards: 40*/218ft
- Magnification: 1x
- Resolution: 64 to 72 lp/mm
- Range of Focus: "10" to infinity
- IR Illuminator: Built In
- Environmental Rating: Waterproof to 66'
- Diopter Adjustment: +2 to -6
- Detection Range: 1148 ft
- Recognition Range: 984 ft

In addition, the following equipment will be included with the Seiche thermal imaging system located on the Fugro Enterprise. Each pan and tilt module makes up a wholly separable Remote High-definition Visual Monitoring (RHVM) system consisting the following:

- Pan and tilt head with two cameras (one HD visual camera and one IR camera)
- Cat7 link to display system
- Display system consisting of one screen per RHVM system
- Overlay of mitigation zone circle/ellipse on both images
- Image stabilization in software such that all images are real time with the horizon horizontal in the displayed image
- Option to stop scan and control pan and tilt manually
- Computer system and software control panel
- Data storage

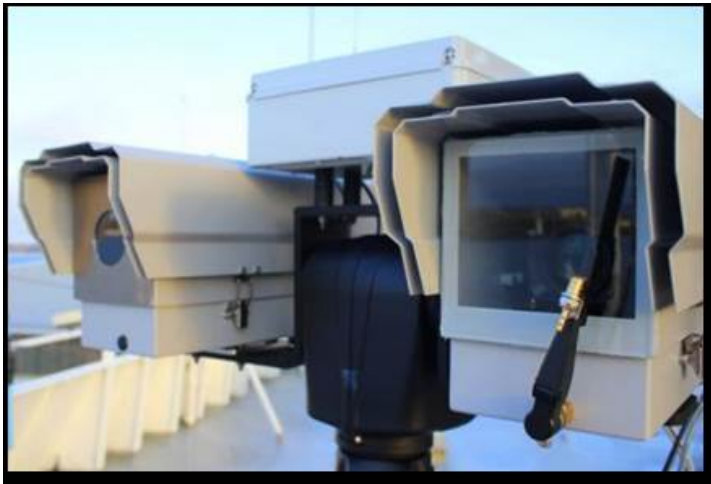


Figure 3 HD and Thermal Imaging Camera

The system uses one screen per RHVM system to display images from both thermal and visual cameras. Depending on individual preference, a user can choose to view only thermal or visual images at a time to get higher resolution. Images displayed simultaneously will be at smaller resolution.

The images are stabilized in software using horizon detection and an inertial measurement unit. Graphics are drawn on the images to demarcate the mitigation zone on the sea surface. In addition, a mouse pointer system enables distance determination to any point on the image.

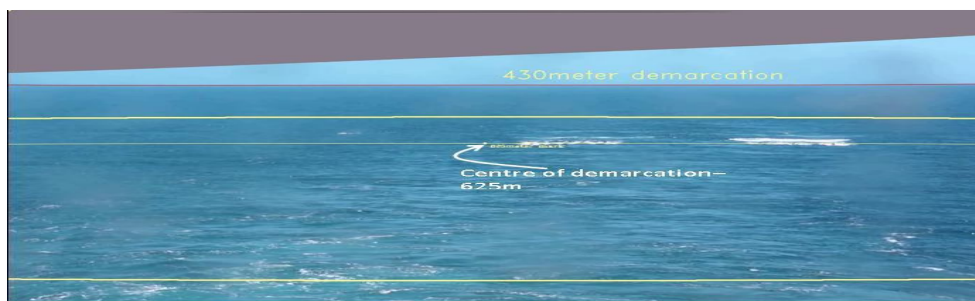


Figure 4 Horizon Detection and Demarcation Zone around Seismic Guns



Figure 5 HD and Thermal Images



Figure 6 HD and Thermal Images of a blow visually confirmed at 3500m.

3. Passive Acoustic Monitoring

The PAM operators will begin monitoring 30 minutes before sunset and continually monitor until 30 minutes after sunrise. No nighttime operations will take place without both visual and PAM operations being fully operational. If visibility is reduced during daylight hours (i.e. fog, poor weather, or rough seas) the Lead PSO will direct the PAM operators to conduct passive acoustic monitoring in order to allow geophysical and geotechnical survey operations to continue until visibility has improved enough for the PSO to monitor the exclusion zone effectively.

The PAM operators will monitor both the sound received by the hydrophones as well as the visual output in the form of spectrographs and click detectors. The PAM system will be operated using PAMGuard software. The PAM system, hardware (hydrophones, pre-amp, etc.) and software will be calibrated prior to dispatch. The PAM operators will make any necessary changes (deployment and/or software adjustments) throughout the survey to ensure optimal system performance within the frequency bandwidths of interest for the particular survey activity, species, and environment where the survey is occurring.

If the PAM operator determines that an acoustic detection has been made, the PAM operator will notify the Lead PSO, who will in turn notify the survey vessel representative immediately and request mitigation measures be taken if the detection is made within the exclusion zone, or if the animal appears to be transiting towards the exclusion zone. The PAM operator will notify the Lead PSO of any detection either inside or outside the exclusion zone. The Lead PSO will notify the other PSO (if a second PSO is on watch depending on time of day) and they will determine if they have any visual detections of a protected species. Because protected species can start or stop vocalizing at any time, both the PSO and PAM operators will have to communicate effectively so that they can monitor any protected species sighted acoustically or visually. In the event that vocalizations consistent with North Atlantic right whales are detected by the PAM operators but are not possible to be localized and visual confirmation cannot be made by the PSO, the Lead PSO will call for a shut down or delay of operations for any sound sources operating below 200kHz.

For every acoustic detection of protected species by the PAM operators the following information will be recorded:

- Whether the detection was linked with a visual sighting
- Time when animal is first detected and time last detected
- Types and nature of sounds heard (i.e. clicks, whistles, creaks, burst pulses, continuous, sporadic, etc.)
- Strength of detected signals
- Bearing of the animal to the vessel (if determinable)
- Species or taxonomic group (if determinable)

Upon any sightings or detections of protected species by the PSO or the PAM operator, the Lead PSO will be responsible for communicating the need for a shut down or reduction of power depending on the equipment being used by the survey vessel. Communication between the PSO team and survey crew will occur via the VHF radio or directly person to person.

3.1.Passive Acoustic Monitoring Equipment

A designated area will be required onboard the vessel for the PAM equipment including computer, monitor, and electronic data capture and processing unit to be stationed. The PAM operators will maintain a daily record of protected species detections, as well as a record of how the PAM equipment functioned, if any malfunctions occurred and the times at which they occurred.

During the geophysical survey, the PAM array will be towed behind the vessel. PAM array deployment during geotechnical operations will depend on operational constraints. Three possible methods include: horizontal deployment from the leeward side of the vessel, incorporating a drogue at the tail end of the array to generate the drag needed to horizontally deploy the array; towed directly behind the circling PSO vessel; or vertical deployment with the hydrophones positioned in the water column. Direction-finding and localization will not be possible if vertically deployed, however distance estimation is more accurate. The PAM array will be deployed such that the distance of the hydrophones behind the vessel is able to accommodate the portion of the exclusion zone ahead of the vessel.

The primary PAM equipment will include the following items:

- 250m Hydrophone Array Cable containing 2 Low Frequency hydrophones (10Hz to 24kHz), 2 Ultra Broadband hydrophones (200Hz to 200kHz), and 2 Broadband hydrophones (2kHz to 200kHz)
- 100m deck cable
- Electronic data capture and processing unit including:
 - Headphones RF transmitter
 - Fireface audio interface
 - Rackmount PC
 - Buffer interface unit
- Integral screen and keyboard

During the survey, a 250m towed hydrophone array will be utilized. 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, 8m separation) consists of two “Low Frequency” hydrophones with a response of 10Hz to 24kHz. The middle pair (H3 and H4, 2.0m separation) consists of two “Ultra Broadband” hydrophones with a response of 200Hz to 200kHz. The rear pair (H5 and H6, 0.25m separation) consists of two “Broadband” hydrophones with a response of 2kHz to 200kHz. The “Low Frequency” hydrophones are configured to detect very low frequency vocalizations while the “Ultra Broadband” and “Broadband” 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 during the survey.

Simulation exercises were carried out 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 500m mitigation zone.

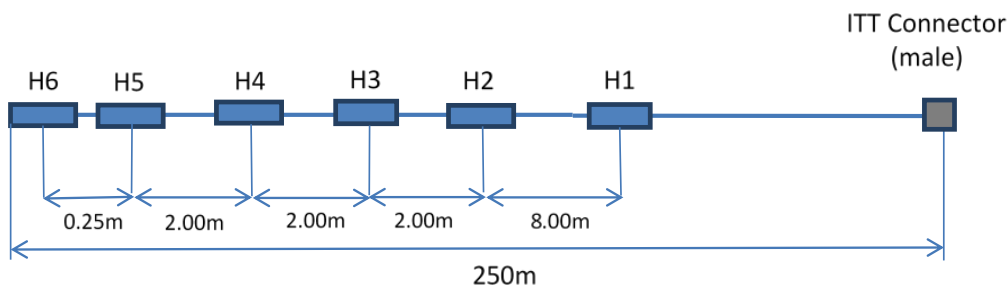


Figure 7 Set Up of the 6 Hydrophone Array Cable

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. The frequency response curves provided were generated from 10Hz to 24kHz, 200Hz to 200kHz, and 2kHz to 200kHz hydrophone elements (including pre-amps) of a Seiche towed array and are representative of the response curves for the arrays that will be deployed for the survey. 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.

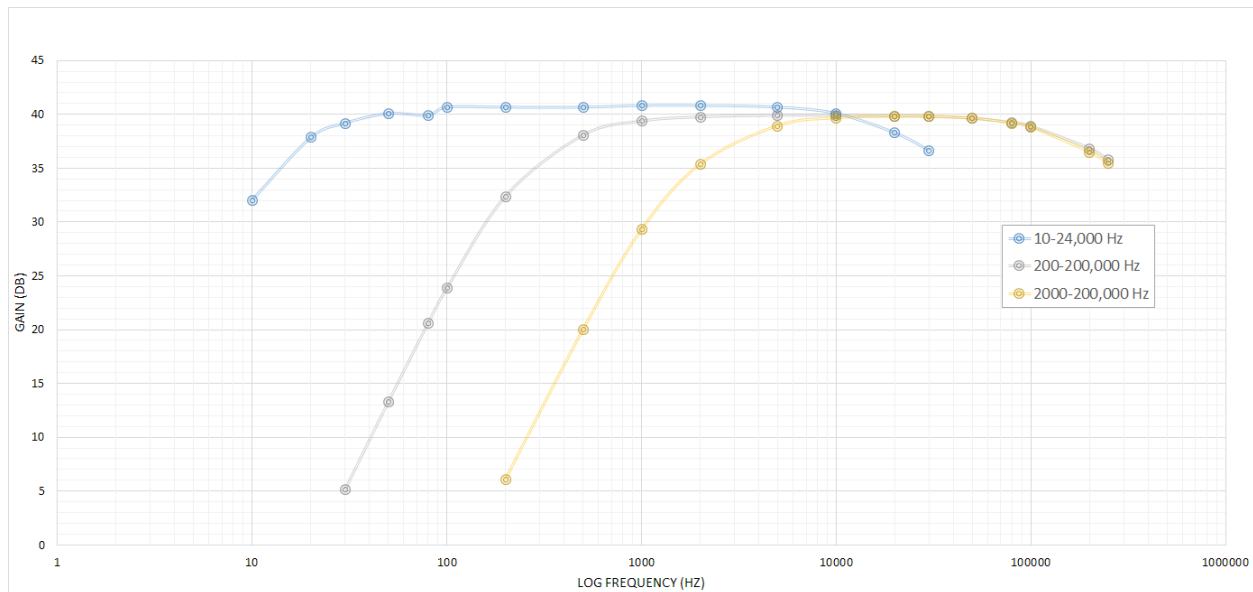


Figure 8 Frequency Response Curve of the Three Types of Hydrophones in the 6 Hydrophone System

4. Distance Calibration

Calibration exercises will be conducted regularly by the PSO during the course of the survey. Whenever objects of adequate size are visible (e.g. other vessels, navigation buoys, land masses, other fixed structures) the ship's radar and rangefinders will be used to measure "true" distances which will be compared to distances obtained using reticule binoculars and range-finding sticks. Measurements will be obtained during different weather and lighting conditions during mobilization and periodically throughout the course of survey effort.

The thermal imaging cameras that will be primarily used during observations conducted during periods of limited visibility and nighttime, are able to triangulate distance using the Real-time Automated Distances Estimation at Sea (RADES) software included with the camera system. An overlay of the exclusion zone will be included in the visual output of the cameras on the display screen and also on the included iPads to allow the PSO to make confident assessments in whether a protected species is approaching or has entered the exclusion zone. Additionally, there is a mouse pointer system included in the software that allows distance determination to any point on the image. The accuracy of distance measurements made using the RADES software will be validated at the time of installation using objects of known distances. Additionally, the spatial coverage of each camera system will be validated on installation to ensure the margins of each 120-degree span align to provide a complete 360-degree coverage area.

The night vision monoculars proposed to be used during the survey do not have a function that determines distance. Additionally, reticule binoculars, range finders, and range-finding sticks cannot be used as a calibration tool during periods of limited visibility and during night time

observation hours. In order to test the effectiveness of the night vision monoculars at night, the distance of stationary objects at a known distance will be checked against the vessels radar whenever possible.

5. Reporting

A comparative assessment of protected species detection using PAM and visual monitoring efforts will be completed at the conclusion of the geophysical and geotechnical surveys. This report will include a summary of the equipment used for detections, the methods in which protected species were detected/sighted, and recommendations for future use. The assessment and final report will be submitted to BOEM within 30 days of the survey being completed.

Attachment 2

Protected Species Observer Mitigation Report



South Fork Wind Farm COP Survey 2017
Protected Species Observer Mitigation Report

Prepared by: A.I.S. Inc.

Prepared for: Deepwater Wind New England, LLC

Submitted to: BOEM and NMFS

Submittal Date: January 31, 2018

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SFWF COP Survey 2017 PSO Mitigation Report

This report is being submitted to satisfy the following permit conditions:

National Marine Fisheries Service, Incidental Harassment Authorization (IHA), originally issued on June 16, 2017, updated on October 17, 2017:

In addition to the Holder's reporting requirements outlined above, the Holder shall provide an assessment report of the effectiveness of the various mitigation techniques, i.e. visual observations during day and night, compared to the PAM detections/operations. This shall be submitted as a draft to NMFS and BOEM 30 days after the completion of the HRG and geotechnical surveys and as a final version 60 days after completion of the surveys.

BOEM Receipt and Acceptance of Updated Construction and Operations Plan (COP) Survey Plan and Alternative Monitoring Plan, BOEM Comments sent on October 27, 2017:

Please describe how the 2 vessels working together (noise) impacted PAM effectiveness (if at all) The results of this will be different depending on if the static PAM is deployed or the mobile PAM when the PSOs are used.

1 INTRODUCTION

Deepwater Wind South Fork, LLC (Deepwater Wind), an affiliate of lease holder Deepwater Wind New England, LLC is proposing to develop the South Fork Wind Farm (SFWF) project, an offshore wind energy project within the Bureau of Ocean Energy Management (BOEM) Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS-A 0486) (Lease) interconnecting with the Long Island Power Authority transmission system on Long Island, New York.

Deepwater Wind completed site characterization surveys in the Lease area and along the submarine cable route, consisting of High Resolution Geophysical (HRG), geotechnical sampling, marine archaeological and benthic habitat surveys between July 15th, 2017 and December 31st, 2017.

In order to comply with the Lease and an Incidental Harassment Authorization (IHA) issued by the National Marine Fisheries Service (NMFS), Deepwater Wind contracted A.I.S. Inc. (AIS) to provide Protected Species Observers (PSO) and Passive Acoustic Monitoring (PAM) operators to monitor for marine mammals and sea turtles during HRG and geotechnical survey operations. These monitoring activities were completed in accordance with the agency-approved SFWF COP Survey Plan and Alternative Monitoring Plan (AMP) (Attachment 1).

This Protected Species Observation Assessment Report provides a summary of the various mitigation techniques that were used during the course of the 2017 HRG and geotechnical surveys conducted by Deepwater Wind and their effectiveness in monitoring for the presence of protected species. In addition, a full technical report under separate cover which will include a record of all PSO observations and takes will be submitted within 90 days of the completion of the COP Survey.

2 SUMMARY OF HRG AND GEOTECHNICAL SURVEY ACTIVITIES

HRG surveys were completed on the R/V Fugro Enterprise between July 15 and November 10, 2017. Both PSOs and PAM operators were stationed aboard the Fugro Enterprise during the HRG survey in accordance with the COP Survey Plan and AMP (24-hour operations).

HRG surveys were completed along potential nearshore cable routes on the R/V Harry Miller between July 24 and August 16, 2017. HRG surveys on the R/V Harry Miller were limited to daylight hours only with monitoring by PSOs in accordance with the COP Survey Plan and AMP.

Geotechnical surveys were completed on the R/V Megan T. Miller between October 20 and December 31, 2017. Both PSO and PAM operators monitored geotechnical survey activities in accordance with the COP Survey Plan and AMP. PSOs were positioned aboard the R/V James Miller, which circled the R/V Megan T. Miller during geotechnical operations. The PAM operators were stationed aboard the R/V Megan Miller.

3 OBSERVATION METHODS

Visual observations were conducted by NMFS certified PSOs, who were approved by BOEM, and in accordance with the COP Survey Plan and AMP. The AMP included additional measures, as described below, that were taken to allow operations to be conducted during night time hours and periods of limited visibility.

3.1 VISUAL OBSERVATIONS

During night observations and periods of limited visibility, PSOs monitored high definition and thermal imaging cameras at the monitoring station located within the science laboratory on the Fugro Enterprise. On the James Miller, observations conducted during night and periods of limited visibility were completed by 2 PSO stationed outside, on either side of the vessel, using night vision monoculars.

Regardless of time of day, PSOs collected the following information when a protected species was sighted:

- Dates, times, locations
- Species encountered
- Description of the observed behaviors (in both the presence and absence of activities)
- A summary of event details
- Environmental conditions when sightings were made including:
 - Water conditions (i.e., Beaufort sea state, water depth)
 - Weather conditions (i.e., cloud cover, visibility, wind direction)
- Duration of sighting
- Any other relevant data regarding marine mammals observed (for pre-activity, during activity, and post-activity surveys)
- Estimated exposure/take numbers during activities.

If on watch, the PSO would communicate with the PAM operators to notify them of any observations of animals that could be paired with acoustic detections. The same was the case in reverse as well. If a PAM

operator had a detection via the PAM equipment, they would notify the PSO in an attempt to visually pair it with the acoustic detection to assist in species confirmation.

3.1.1 VISUAL OBSERVATION EQUIPMENT

In addition to binoculars with rangefinders, PSO used several tools during periods of limited visibility and night time operations, including night vision monoculars and thermal cameras. The primary tool used varied based on the vessel being used.

3.1.1.1 NIGHT VISION MONOCULARS

During the HRG survey conducted onboard the Fugro Enterprise, night vision monoculars were used as a backup option in the event that the thermal imaging cameras malfunctioned. During the geotechnical survey, night vision monoculars were the primary tool utilized during night time operations as additional thermal imaging cameras were not available when the survey began. The same model of night vision monoculars were used on both the Fugro Enterprise and the James Miller. The specifications for the Gen 3 AGM-HS Hand Select Night Vision Monocular were as follows:

- Generation: Gen 3
- Image Tube Type: Gen 3 A Grade Autogated/Pinnacle Manual Gain Hand Select
- FOV @1000 yards: 40*/218ft
- Magnification: 1x
- Resolution: 64 to 72 lp/mm
- Range of Focus: “10” to infinity
- IR Illuminator: Built In
- Environmental Rating: Waterproof to 66’
- Diopter Adjustment: +2 to -6
- Detection Range: 1148 ft
- Recognition Range: 984 ft

3.1.1.2 THERMAL CAMERAS

Thermal cameras were the primary tool used by the PSOs during night time observations and periods of limited visibility, in conjunction with PAM, onboard the Fugro Enterprise during the HRG survey.

Three camera systems, each providing 120-degrees of coverage, were positioned on either side of the wheel house and one looking aft over the stern of the vessel to ensure 360-degree coverage of the area surrounding the vessel including the exclusion zone. The PSOs monitored images received from the high definition thermal imaging cameras on three display screens located within the science laboratory on the Fugro Enterprise.

Each pan and tilt module make up a wholly separable Remote High-definition Visual Monitoring (RHVM) system consisting of the following:

- Pan and tilt head with two cameras (one high definition (HD) visual camera and one infrared (IR) camera)
- Cat7 link to display system
- Display system consisting of one screen per RHVM system

SFWF COP Survey 2017 PSO Mitigation Report

- Overlay of mitigation zone circle/ellipse on both images
- Image stabilization in software such that all images are real time with the horizon horizontal in the displayed image
- Option to stop scan and control pan and tilt manually
- Computer system and software control panel
- Data storage

The HD cameras used during the survey were Samsung SNZ-5200 20x zoom network units with a varifocal lens, a variable focal length, and display resolution of 1280 x 720 pixels. The IR cameras used during the survey are FLIR A615 with 15 degree field of view lens, a thermal sensitivity of 0.05°K and a focal length of 50mm. The IR display resolution is 640 x 480 pixels. The thermal camera system was designed and manufactured by Seiche Limited.

The system uses one screen per RHVM system to display images from both thermal and visual cameras. Depending on individual preference, a user can choose to view only thermal or visual images at a time to get higher resolution. Images displayed simultaneously will be at lower resolution.

The PSOs used the Real-time Automated Distance Estimation at Sea (RADES) software, developed by Seiche Limited, to manipulate the cameras and set them to pan and tilt automatically until a protected species was detected. The images were stabilized by the software using horizon detection and an inertial measurement unit. The RADES software detected the horizon and used it and the known height of the cameras to calculate the distance to any object in the image. If a protected species was sighted on the cameras the PSO could use the mouse to point to the location on the image and a distance would be generated by the RADES software. Additionally, graphics depicting the exclusion zone were superimposed on the image for a visual of where the animal was located in relation to the exclusion zone.

3.2 PASSIVE ACOUSTIC MONITORING

Acoustic monitoring for marine mammals was conducted by two experienced PAM operators during HRG and geotechnical operations in accordance with the COP Survey Plan and AMP. Acoustic monitoring was conducted from the scientific instrument room onboard the Fugro Enterprise during the HRG survey and on the Meghan Miller during the geotechnical survey. The PAM station location within the scientific instrument room allowed the operators to keep close attention to survey activities. There were some challenges with relaying the information to the PSO onboard the Megan Miller, but the PAM operators implemented a strategy to relay information gathered onwards to the shift lead PSO who was available at all times. These lines of communication were crucial to effective mitigation for marine mammals and to ensure the general smooth operations of the mitigation team.

During an acoustic monitoring shift, the PAM operator aurally monitored the signal from the hydrophones while monitoring pertinent visualization modules in PAMGUARD. A detection was defined as any acoustic event during which cetacean vocalizations were aurally and/or visually observed in PAMGUARD, regardless of the total duration of the event. Cetacean vocalizations detected greater than 10 minutes apart were considered separate detections. Upon an acoustic or visual detection of marine mammal vocalizations, the PAM operator would immediately collect audio recordings, make note of vessel position and water depth, collect screen images of the PAMGUARD visualization displays, and continue to monitor for vocalizations, while using existing tracking and localization functions within

PAMGUARD to assess range to vocalizing marine mammals. Detections were monitored until vocalizations were no longer detected aurally and/or visually in PAMGUARD. Mitigation actions were implemented when appropriate and were communicated directly to the vessel crew. Notes on the detection, including vocalization type, frequency, duration, etc., were collected throughout the detection event. Details on operations and vessel position were also recorded during the monitoring shift.

Species identification during acoustic monitoring can be challenging, particularly with delphinid species. As such species were identified to the lowest level of confidence (unidentified cetacean, unidentified odontocete, unidentified delphinid, etc.), unless the operator was confident in their species identification or there was visual confirmation.

Range estimates in PAMGUARD were obtained by analyzing the bearings to vocalizations obtained through the click detector, clip generator, and whistle and moan detector modules and looking for concentrated areas of cross-bearings on the map display.

3.2.1 PASSIVE ACOUSTIC MONITORING EQUIPMENT

3.2.1.1 PAM HARDWARE

The 255m hydrophone array contained six hydrophone elements, two low frequency elements with a frequency response of 10Hz to 200kHz (H1 and H2), two ultra-broadband elements with a frequency response of 200Hz to 200kHz (H2 and H3), and two broadband elements with a frequency response of 2kHz to 200kHz (H4 and H5; Figure 1). The frequency responses for the hydrophones represent the flat response between the two 3dB points. The hydrophones remain sensitive beyond the minimum and maximum frequencies quoted; however, the gain begins to roll off as the frequencies move above or below these values. Hydrophone sensitivity was -166dB re 1V/ μ Pa for the broadband elements and -157dB re 1V/ μ Pa for the low frequency and ultra-broadband elements. In addition to the hydrophone elements, the array cable also contained a depth sensor.

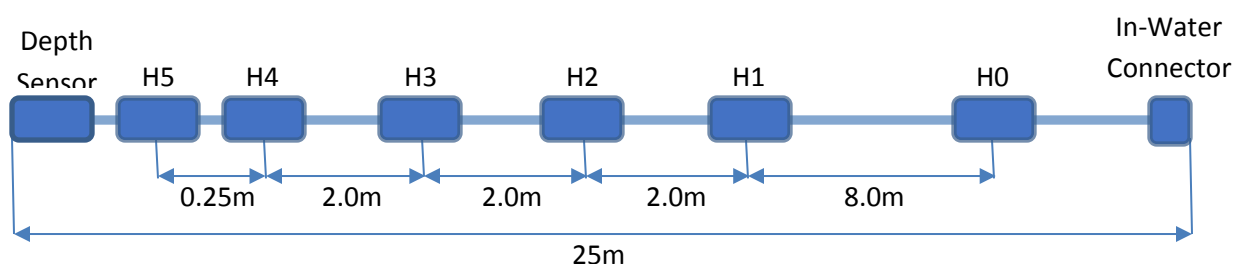


Figure 1 Array configuration with hydrophone separation distances and position of the depth sensor.

A 100m deck cable was used as an interface between the hydrophone array cable and the acoustic monitoring station.

The electronics processing unit contained two analogue to digital converters (ADCs) used for sampling the raw signal from the hydrophones and an additional ADC for the depth sensor. Power to the hydrophone array was also provided by the electronics processing unit. One sound ADC, the National Instruments (NI) DAQ card, was used to sample acoustic signals at 500kHz, while the second sound

ADC, the Fireface 800, was used to sample acoustic signals at 48kHz. Use of the two sound cards allowed for acoustic signals to be sampled at rates consistent with low, mid, and high frequency cetacean vocalizations.

The PAM system was designed and manufactured by Seiche Limited.

3.2.1.2 HYDROPHONE DEPLOYMENT

3.2.1.2.1 Fugro Enterprise

The hydrophone array was deployed directly off the port side of the Fugro Enterprise using a hydraulic winch and was secured to the deck using a port stern bollard. The total length of cable deployed varied between 75 and 200m, with longer lengths of cable deployed when operating in water depths greater than 30m. One or more fishing buoys were attached to keep the hydrophones off the seafloor when operating in shallow waters (less than 30m). Tow depth increased with the amount of cable deployed and ranged from 3 to 25m.

The array cable was recovered and secured on deck during the day when the vessel was scheduled to run nearshore survey lines that moved into very shallow water (less than 10m). This was done to prevent damage to the hydrophone elements via encounters with the seafloor and submerged debris while the operator was in standby mode during the day.

3.2.1.2.2 Megan Miller

The hydrophone array was deployed vertically from the port side of the Megan Miller. Deployment depth was site dependent and ranged from approximately 5m to 30m during the survey. The array cable was kept afloat using a fishing buoy and the cable was tied off on deck to the appropriate length.

3.2.1.3 PAM SOFTWARE

PAMGUARD is an open source software program for passive acoustic monitoring developed with the support from the International Association of Oil and Gas Producers (IOGP) Sound and Marine Life Program. The software can be configured by the user to meet any specific project requirements. The user can add in various modules that will allow for visualization of the raw and/or filtered signal from the hydrophones, implementation of detectors for tonal and pulsed vocalizations, permit recording of one to multiple hydrophone channels, and provide tracking and localization capabilities.

The PAM system was configured to monitor for low, mid, and high frequency cetacean vocalizations using PAMGUARD version 1.15.11 (64 bit). Two click detectors were incorporated, one for low/mid frequency clicks produced by delphinids and sperm whales and one for high frequency clicks produced by echolocating delphinids, porpoise, and beaked whales. The low/mid frequency click detector utilized the raw signal from the Fireface 800 ADC, with a 4kHz (4th order) high pass Butterworth pre-filter and trigger filter of the same configuration. The high frequency click detector utilized the raw signal from the NI DAQ ADC, with a 20kHz to 180kHz (8th order) band pass Butterworth pre-filter and a 30kHz to 160kHz (6th order) band pass Butterworth trigger filter. The trigger threshold was set to 10dB for both click detectors.

General classifiers for beaked whales, delphinids, and porpoise were included in the high frequency click detector. Click waveforms, spectrums, and Wigner plots were also available through the click detector for further analysis and potential identification/confirmation of cetacean group or in some cases species.

Two whistle and moan detectors were also included in the PAMGUARD configuration. One detector, the moan detector, was configured to detect low frequency tonal calls from mysticetes and the second, the whistle detector, was configured to detect mid frequency delphinid whistles. To improve the efficiency for the detection of low frequency vocalizations, a decimator was integrated, which resampled the 48kHz raw signal from the Fireface 800 ADC at 2kHz and an 800Hz (8th order) low pass Butterworth filter. The decimated data was used as the data source for the moan detector, while the raw signal from the Fireface 800 ADC was used as the data source for the whistle detector.

Two spectrogram displays were incorporated to cover the wide range of frequencies used by cetacean vocalizations. The configuration for each spectrogram is provided in Table 1.

Table 1 Spectrogram parameters.

Spectrogram	FFT Spectrogram Engine Settings				Frequency Range
	Data Source	FFT Length	FFT Hop	Window	
Low Frequency	decimator	256	50%	Hann	0-500Hz
Mid-Frequency	Fireface raw	2048	50%	Hann	0-24kHz

3.2.1.3.1 PAM Software Specifics: Fugro Enterprise

Filters to remove unwanted or interfering signals were not incorporated. The acoustic sources were too broad in frequency to remove without also removing significant bands of interest for marine mammal detection. The chirper sub-bottom profiler saturated much of the signal below 10kHz, while the sparker sub-bottom profiler produced a broadband signal with energy in excess of 24kHz (Figure 2). The magnetometer beacon and multi-beam echo sounder also contributed to the soundscape; however, these sources were of narrower bandwidths at larger, albeit still short, duty cycles than the two sub-bottom profilers.

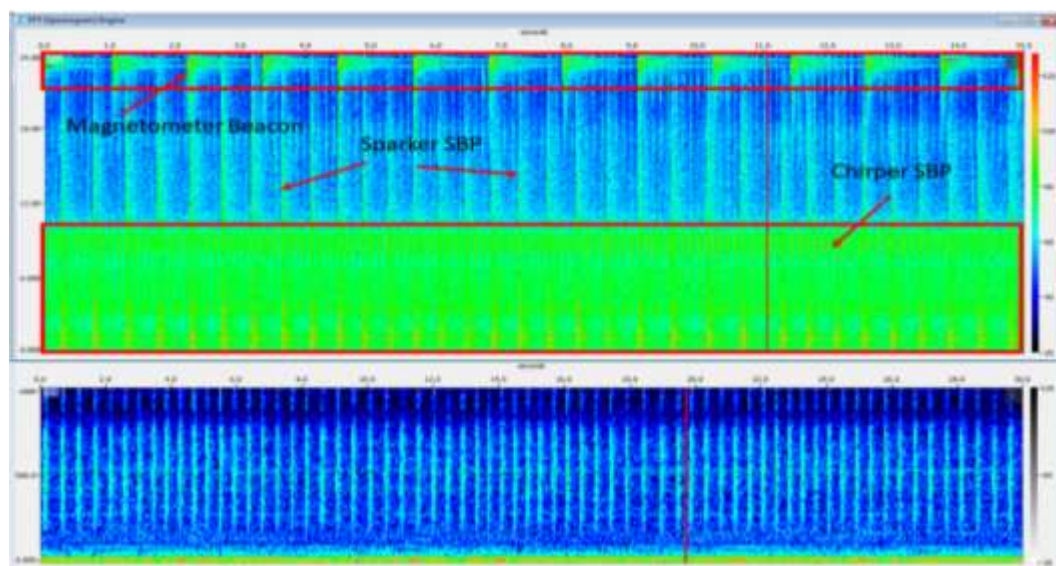


Figure 2 PAMGUARD spectrogram with the various acoustic sources identified.

The click detector, whistle and moan detector, and clip generator modules in PAMGUARD may all be used for localization based on target motion analysis (TMA). The two detectors and clip generator use cross-correlation to match the occurrence of a signal on different hydrophone channels and calculate a bearing angle to the signal from the time of arrival differences (TOADs) between the hydrophones in the pairing. When a detection event is long enough, a series of bearings to the vocalizing marine mammal will be plotted on the map display as the vessel advances along the survey line and the animal remains at approximately the same location. These bearing lines will begin to converge, providing an estimated position to the marine mammal (Figure 3).

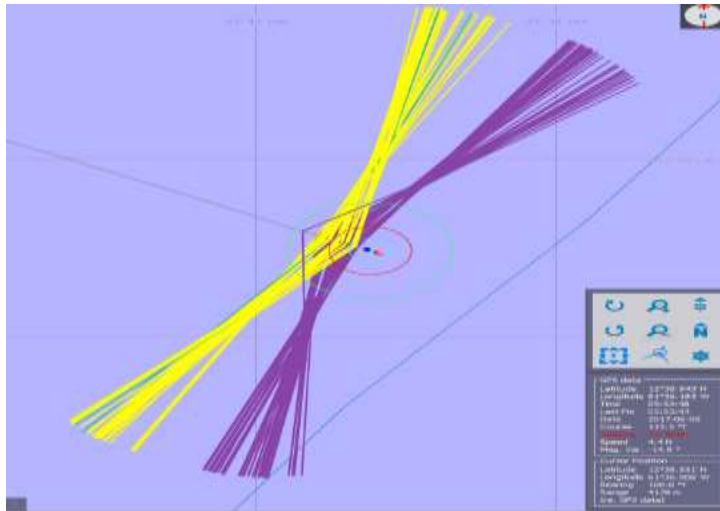


Figure 3 Two localizations (not from the current survey) shown on the map display.

The use of TMA for localizing marine mammals requires the animal to be stationary or moving slowly relative to the vessel. A long series of vocalizations must also be confidently assigned to an individual animal or very close group of animals. The process works well for sperm whales and singing humpback whales. However, because delphinids are fast moving and change position rapidly, the use of TMA to estimate distance is very difficult.

Range for high frequency vocalizations was estimated based on the frequency content of the acoustic signals. High frequency sounds attenuate quickly in water and are therefore detectable at much shorter ranges when compared to low and mid frequency signals. Clicks with content above 80kHz were therefore generally considered to be within 300 to 500m of the hydrophone receiver.

3.2.1.3.2 PAM Software Specifics: Megan Miller

Localization of acoustic signals using a vertically deployed hydrophone array is typically achieved by interpreting the relative signal amplitude levels (dB) and frequency range (Hz) as a proxy for distance.

Detections on the HF Click detector are likely to be of fast-moving schools of echolocating delphinids. High frequency echolocation does not propagate far, so HF signals (> 80 kHz) attributed to delphinid species are a good indicator that at least some of the individuals are close to or within 300-500m of the receiving hydrophones. Detection certainty is often strengthened by observing delphinid type whistles on the spectrogram displays. Often the intensity (number of detected whistles) and amplitude (relative to background noise) of whistles will increase as the distance to the hydrophones of individuals within the

school of delphinids decreases. Confidence in species identification and distance from the source apparatus is ultimately verified by concurrent visual detections of the same group of animals by the PSO, so collaboration with the visual observation team is important in this regard.

Other localization techniques such as TMA are not suitable using a vertically deployed, stationary array as this technique requires continuous movement of a hydrophone pair relative to a stationary or slow-moving animal in order to achieve cross-correlation time of arrival differences (TOAD).

4 RESULTS

4.1 VISUAL OBSERVATIONS

4.1.1 FUGRO ENTERPRISE: VISUAL MONITORING EFFORT

PSOs monitored for protected species while transiting to and from the survey sites for ship strike avoidance purposes in addition to monitoring in anticipation of and during HRG survey activity. PSO monitored for approximately 2248 hours during the course of the HRG survey. Approximately 48% of these hours occurred between sunset and sunrise (i.e. darkness).

4.1.2 FUGRO ENTERPRISE: VISUAL DETECTIONS

There were 376 visual sighting events that occurred during the geotechnical survey, 150 of which occurred during hours between sunset and sunrise. Of those sightings events that occurred between sunset and sunrise, 108 were paired with an acoustic detection by the PAM operators (72%).

Table 2 Summary of sighting events onboard the Fugro Enterprise.

Month	Species/species group	Daylight Number of Sighting Events	Night Number of Sighting Events
July	Delphinid spp.	8	3
	Dolphin, Short-Beaked Common	7	0
	Porpoise, Harbor	1	0
	Whale, Fin	2	0
	Whale, Humpback	8	1
	Whale spp.	12	4
August	Delphinid spp.	5	17
	Dolphin, Short-Beaked Common	21	15
	Sea Turtle, Loggerhead	3	0
	Sea Turtle spp.	1	0
	Whale, Fin	20	1
	Whale, Humpback	40	2
	Whale, Minke	11	1
	Whale spp.	36	9
September	Delphinid spp.	2	18
	Dolphin, Short-Beaked Common	11	13
	Whale, Fin	2	0
	Whale, Humpback	3	0
	Whale, Minke	1	0
	Whale spp.	5	0
October	Delphinid spp.	2	19
	Dolphin, Short-Beaked Common	18	31
November	Delphinid spp.	1	6
	Dolphin, Short-Beaked Common	6	10

4.1.3 JAMES MILLER: VISUAL MONITORING EFFORT

PSOs monitored for protected species while transiting to and from the survey sites for ship strike avoidance purposes in addition to monitoring in anticipation of and during geotechnical survey activity. PSO monitored for approximately 707 hours during the course of the geotechnical survey. Approximately 58% of these hours occurred between sunset and sunrise (i.e. darkness).

4.1.4 JAMES MILLER: VISUAL DETECTIONS

There were 98 visual sighting events that occurred during the geotechnical survey, 50 of which occurred during hours between sunset and sunrise. Of those sightings that occurred during darkness, 22 were paired with an acoustic detection by the PAM operators or 46%.

Table 3 Summary of sighting events onboard the James Miller.

Month	Species/species group	Daylight Number of Sightings Events	Night Number of Sightings Events
October	Delphinid spp.	1	0
	Dolphin, Short-Beaked Common	1	1
	Seal, Harbor	1	0
	Whale, Humpback	6	0
	Whale, Sperm	1	0
November	Delphinid spp.	2	4
	Dolphin, Short-Beaked Common	17	21
December	Dolphin, Short-Beaked Common	9	24
	Porpoise, Harbor	1	0
	Seal, Grey	2	0
	Seal, Harbor	1	0
	Seal spp.	1	0
	Whale, Fin	4	0
	Whale spp.	1	0

4.2 PASSIVE ACOUSTIC MONITORING

4.2.1 FUGRO ENTERPRISE: ACOUSTIC MONITORING EFFORT

The total PAM monitoring effort carried out from June 15th to November 9th, 2017 on the Enterprise was 995 hours (rounded to the nearest hour). This equated to approximately 80% of PAM effort during the normal monitoring hours of darkness, and 20% effort concentrated during periods of reduced daylight visibility (Figure 4). Persistent fog on a few days during the survey resulted in the two PAM operators having to work the full 24 hours (12 hours each). On these days, there was a high risk of fatigue due to short, interrupted rest periods.

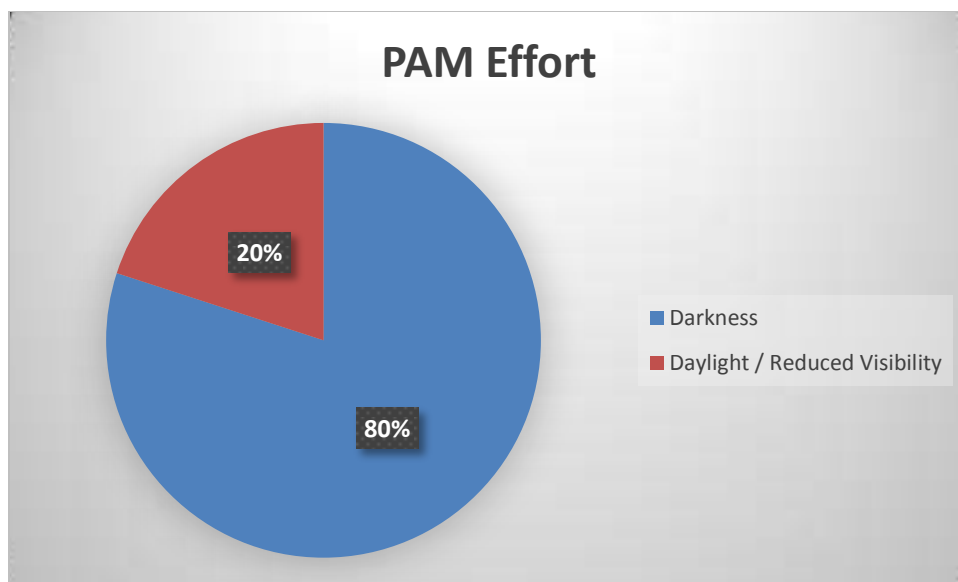


Figure 4 Percentage of acoustic monitoring during the hours of darkness and reduced daylight visibility on board the Fugro Enterprise.

4.2.2 FUGRO ENTERPRISE: ACOUSTIC DETECTIONS

There were 310 acoustic detections of marine mammals, of which no less than 296 (95%) were sighting events first detected acoustically by the PAM operator. This key statistic highlights the importance of PAM as a tool for monitoring of marine mammals. PAM detections almost always preceded a visual sighting of the same animal or group and often the PAM operator was able to pass species and/or localization information onto the PSO/camera operator to assist in their detection. PAM detections were therefore important validators for sighting events and likewise in instances where acoustic detections were concurrently detected by the PSO or camera operator, information on animal bearing, distance, behavior and species ID could be passed among the team. A summary of the sightings detected by PAM grouped by month and species ID is provided in Table 4. Acoustic detections were predominately of delphinid species, which were present throughout the survey. Those delphinids which were concurrently detected by the PSO were often identified to species level and in all cases were Short-beaked common dolphin (*Delphinus delphis*). In August there were four acoustic detections of Sperm whale (*Physeter macrocephalus*), on two separate days. It is likely that the two detections on either day were the same individuals, but that enough time lapsed between detections that they were counted separately.

Table 4 Summary of marine mammal acoustic detections onboard the Fugro Enterprise.

Month	Species/species group	Number of detections
July	Delphinid spp.	30
	Dolphin, Short-Beaked Common	2
August	Delphinid spp.	57
	Dolphin, Short-Beaked Common	12
	Whale, Sperm	4
September	Delphinid spp.	51
	Dolphin, Short-Beaked Common	19
October	Delphinid spp.	62
	Dolphin, Short-Beaked Common	10
November	Delphinid spp.	53
	Dolphin, Short-Beaked Common	10

4.2.3 MEGAN MILLER: ACOUSTIC MONITORING EFFORT

PAM provided a means of continuous monitoring for marine mammals during the hours of darkness and periods of poor visibility due to fog or increased sea state. The operators were situated in close proximity to the geotechnical survey team and consequently able to relay operational information on to PSO on the James Miller quickly and efficiently. These lines of communication were crucial to effective mitigation for marine mammals and to ensure the general smooth operations of the mitigation team.

The total PAM monitoring effort carried out from November 1st to December 30th, 2017 on the Megan Miller was 215 hours and 47 minutes. This equated to approximately 92% of PAM effort during the normal monitoring hours of darkness, and 8% (16 hours 15 mins) effort concentrated during periods of reduced daylight visibility. (Figure 5)

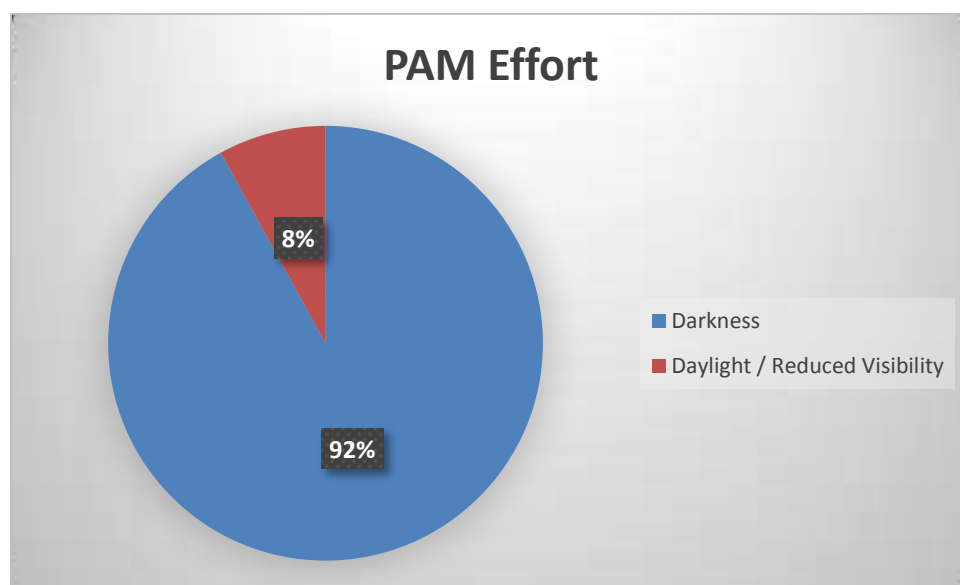


Figure 5 Percentage of acoustic monitoring during the hours of darkness and reduced daylight visibility onboard the Megan Miller.

4.2.4 MEGAN MILLER: ACOUSTIC DETECTIONS

There were 54 acoustic detections of marine mammals during the Megan Miller geotechnical survey, 22 of which were concurrently detected by the PSO on the James Miller. There were 22 acoustic detections that were identified as short-beaked common dolphins (*Delphinus delphis*) and 30 detections were logged as dolphin spp.

5 SYSTEM PERFORMANCE

5.1 FUGRO ENTERPRISE: THERMAL CAMERA SYSTEM PERFORMANCE

Overall the thermal camera system performed effectively and efficiently. There was only one occurrence where one of the thermal cameras stopped working during the survey, however this occurrence and other minor operational issues did not cause major delays to the survey and back up methods were rarely relied upon.

5.1.1 DETECTION CAPABILITIES

The thermal imaging cameras greatly increased the distance that the PSOs were able to monitor during times of poor lighting and limited visibility. However, while the PSOs were able to detect protected species at a much greater distance than they would have been able to with only night vision, identifying some animals to species proved to be challenging using only thermal cameras. Delphinids were the most common species sighted during night time hours and were often difficult to identify to species using only the thermal cameras. The thermal cameras only showed the silhouette of the animal and because delphinid species are so quick moving, some species are best confirmed via coloration patterns. The PSO found that the best method to confirm species if the animals approached close enough to the vessel, was for the PSO to go outside and use the night vision monoculars. This allowed them to see coloration in “grey” scale and further confirm species identification. Of the large whales (fin, humpback, minke, sperm) sighted using thermal cameras at night 33% of the sightings events were able to be identified to species. The PSO were able to use their larger, more visible characteristics at a greater distance as they have a tendency to surface at a slower rate. The PSO were then able to use characteristics such as the shape of their blow, pectoral fins, and tail, to be able to identify them to species depending on the angle.

5.1.2 HARDWARE MALFUNCTIONS

There was one occurrence where one of the thermal cameras stopped working, which caused the PSO to switch to their backup of using night vision until the issue was resolved.

5.1.2.1 THERMAL CAMERAS

On September 9th, the starboard side thermal camera stopped functioning properly and was not producing an HD or thermal image at the camera monitoring station. The Lead PSO contacted the technical support team at Seiche and it was determined that a new Power Supply Unit (PSU) was needed. Because the lone PSO could only successfully monitor for mitigation purposes using the thermal cameras if all three were working because without one camera, they would not be able to have 360 degree visual coverage surrounding the vessel and mitigation zone. Because of this, the PSO had to revert to the backup plan. The PSO schedule was altered temporarily, while still meeting the BOEM requirements to have no PSO on watch for more than 4 hours followed by a 2 hour break, and no PSO on watch for more than 12 hours in a 24 hour period. Two PSO were scheduled to monitor 24 hours per day (instead of switching to only

one PSO on watch during night time hours). During times of limited visibility and night time operations, one PSO would monitor the two working thermal cameras, while the second PSO used night vision monoculars to monitor the remaining 120 degree area. The PSOs would alternate so that the PSOs took turns monitoring using both methods. This arrangement was used until a new PSU was delivered and installed at the next port call on September 17th.

Early on in the survey, there was some trouble with buildup of condensation inside the thermal and HD camera housing. This required the PSO team to periodically clear the condensation manually. Seiche personnel suggested the use of silica packets to wick moisture out of the air proactively. This greatly reduced the need to manually clear the condensation from the housing. Additionally, there was some buildup of condensation within the connections early on during the survey. This was remedied by adding additional tape to the connections to reduce the chances that water would penetrate.

5.1.3 SOFTWARE MALFUNCTIONS

Early during the survey, there were several minor issues with the software used to manipulate thermal cameras. After trying several things to resolve the issue, Seiche was contacted and a software patch was sent that resolved the issue.

5.2 FUGRO ENTERPRISE: PAM SYSTEM PERFORMANCE

Overall the PAM system performed effectively and efficiently. Only a few minor issues occurred, but none resulted in delays to the survey.

5.2.1 DETECTION CAPABILITIES

The two sub-bottom profilers (sparker and chirper) used for the HRG survey generated a wide band of noise that made detection of cetacean vocalizations below 10kHz challenging. When one or both sources were active, cetacean vocalizations below 10kHz were essentially masked for detection by the operators and therefore reduced the detection capabilities of the system (Figure 4). Aural monitoring was also difficult for long periods; therefore, the operators would often alternate between periods with the headphones over their ears and with the headphones around the neck, just below the ears.

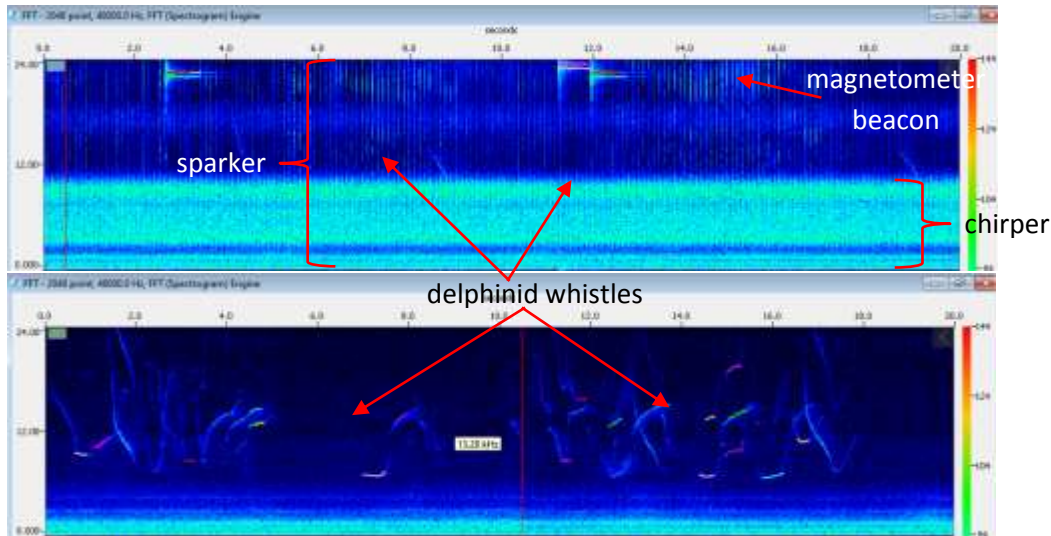


Figure 6 PAMGUARD spectrograms from the same delphinid detection event, with the acoustic sources active on the top panel and the acoustic sources inactive on the bottom panel.

Filtering of the sound sources was not possible due to the wideband nature of the acoustic sources. Removing the sound sources from the raw signal would have also removed signals of interest below 10kHz. Reducing the source activity or ‘shot point’ interval for the various acoustic sources may have lessened the effect; however, this was not tested, and the intervals used were necessary to accomplish the goals of the survey.

5.2.2 HARDWARE MALFUNCTIONS

A few minor hardware issues were recorded during the course of the survey; none of which negatively impacted the survey efforts. Summaries of these minor occurrences are noted below.

5.2.2.1 HYDROPHONE ARRAY

Early in the project, static interference was detected on one of the hydrophone arrays due to water ingress at the connector between the hydrophone tow and array cables. The connectors were dried and cleaned and the system was tested and the signal was clean. To prevent further water ingress, the connectors were taped and an additional application of water sealing grease was applied to the threaded section of the connector. No further issues of this nature were reported for the duration of the survey.

When transitioning from deeper waters (greater than 30m) into shallow waters the hydrophone array would occasionally come in contact with the seabed. The PAM operators tried to mitigate this from happening by keeping a close eye on the bathymetry data from the survey team but were not always able to modify the deployment (reduce length of cable deployed, addition of a buoy, etc) ahead of any seabed interactions and the cable dragged on the seafloor a few times throughout the survey. The cable was inspected for damage after each instance and no damage was found.

The hydrophone array cable became entangled with the survey equipment on August 16, 2017. The Fugro Enterprise was undertaking numerous turns at the time, in an area with water depths less than 20m. Because of the shallow water depths, the hydrophone was deployed in a manner to ensure a shallow tow depth (5 to 7m). The entanglement is thought to have occurred due to the shallow tow depth of the

hydrophone cable (at a depth similar to that of the other survey equipment) and the frequent turns. No damage occurred to the hydrophone cable or the survey equipment. The incident took place during the day during good visibility when the PAM operator was on standby.

The hydrophone cable became caught on a buoy, along with the magnetometer cable, on September 26, 2017. The cable was recovered, inspected, and redeployed within a period of 5 minutes. There was no damage to either cable.

5.2.2.2 OTHER COMPONENTS

Overall, the PAM system worked well as expected. The GPS signal was spotty for a period of time before ultimately going out during the day on September 4, 2017. Through a series of system checks, the operator on duty identified the source of the signal loss to the RS232 to USB adapter. The adapter was replaced with the spare and the GPS signal into PAMGUARD restored prior to the operator beginning their shift.

5.2.3 SOFTWARE MALFUNCTIONS

There were several occasions where the PAMGUARD software froze and or stopped processing data. The PAM operators were quick to follow the necessary steps to resolve the disturbances and the issues were resolved within minutes, causing no delays to the survey effort.

5.3 MEGAN MILLER: PAM SYSTEM PERFORMANCE

Overall, the PAM system functioned effectively and efficiently. There were several minor issues that occurred with the PAM equipment located on the Megan Miller, none of which caused interruptions to survey activities. They are outlined below.

5.3.1 DETECTION CAPABILITIES

The hydrophone array was deployed vertically at variable depths during geotechnical operations, while the Megan Miller was near-stationary. This enabled a relatively stable background noise floor with which to carry out PAM. The specification of the hydrophones array and monitoring software were configured to allow detection of all available marine mammals likely to be encountered within the survey area. Acoustic detections of delphinid species were recorded up to 1000m from the hydrophone array. There were no acoustic detections of baleen whales. It should be noted though, while delphinids typically vocalize regularly and are therefore available for detection, baleen whale vocalizations are more selectively attributed to certain behaviors, such as mating calls and communication between groups and so are not always available for detection.

Overall, the PAM system provided a reliable means for the PAM operator to act upon any instances of animals encroaching within the exclusion zone in sufficient time to make the appropriate mitigation decision.

5.3.2 HARDWARE MALFUNCTIONS

There was one reported hardware problem resulting in intermediate loss of connectivity between the monitoring software and the MF ADC. This was attributed to a faulty connection in the firewire cable of the Fireface 800 sound acquisition unit. To resolve the problem, the firewire cable was replaced with a spare, and a hot glue gun was used to seal the firewire connection. This solution markedly improved the connectivity issues and was regularly maintained throughout the remainder of the survey.

5.3.3 SOFTWARE MALFUNCTIONS

While the PAMGuard software functioned effectively for the majority of the survey, there were some reports of continuous interference at high frequencies, resulting in false positives on HF click detector early on. It was ultimately realized that the interference was attributed to local echo sounders on the Megan Miller, and once turned off the interference vanished. The long-term solution was agreed to turn off the interfering positioning echo sounder, once the Megan Miller was successfully maneuvered into positioning.

6 RECOMENDATIONS FOR FUTURE WORK

Several challenges occurred through the course of the HRG and geotechnical surveys. Those challenges and suggestions for future improvements are listed below.

6.1 CHALLENGES WITH MULTI-VESSEL OPERATIONS

During the geotechnical survey, the PSO and PAM operators were stationed on two different vessels due to space constraints on the survey vessel, Megan Miller. Preferably, all PSO and PAM operators would be stationed on the vessel conducting the survey work. While the splitting up of the teams called for a little more coordination, ultimately the PAM operators and PSO were able to develop an efficient system to effectively communicate and work with the survey team to ensure the project ran as smoothly as possible.

The PSO also noticed some disadvantages with using night vision while surveying the area surrounding a neighboring vessel. The deck lights on the Megan Miller caused enough light pollution that it made the night vision monoculars less effective when looking towards the Megan Miller. The lights could not be turned off for safety reasons while the crew was readying and tending to the survey equipment, however the additional light provided by the deck allowed the PSO to see the waters immediately surrounding the Megan Miller.

The PSO worked with the captains of the James Miller and Megan Miller to determine a comfortable distance to keep between the two vessels. The Megan Miller was at anchor while conducting the geotechnical survey work, and the James Miller had to be careful not to get too close to interfere or run over the anchor lines. The captain of the James Miller preferred to keep between 350m and 400m between the James Miller and Megan Miller, which is just at the range of the night vision monoculars. The extra light produced by the deck lights on the Megan Miller, while it did hinder the night vision monoculars slightly, did illuminate the waters surrounding the Megan Miller to aid in making visual observations.

6.2 EFFECTIVENESS OF PAM WITH MULTI-VESSEL OPERATIONS

For the geotechnical operations, the James Miller and Megan Miller were deployed and in operation within relatively close distances at times. The question was raised as to whether this would negatively affect PAM detection capabilities on the Megan Miller due to masking of critical frequencies for marine mammal vocalizations. Feedback from PAM operators on board the Megan Miller would suggest that PAM detection capabilities were not adversely affected by noise generated by the James Miller. On a few instances, in very shallow water, the James Miller noise signature could be detected on the PAMGUARD click detector. However, as the noise signature from a vessel tends to be consistent in frequency band and bearing, this could easily be excluded as false positive clicks and disregarded.

6.3 SURVEY EQUIPMENT MASKING

The sound sources used during both the HRG and geotechnical portions of the survey resulted in a reduced effectiveness of the PAM systems frequency detection range, such that marine mammal vocalizations of less than 10 kHz in frequency were masked while the sound sources were active. This did not prove to be a major problem for the detection of delphinid species, whose tonal and click-pulse vocalizations are broadband with energy up to 110 kHz. However, this did reduce the PAM systems detectability of low frequency vocalizing baleen whales, whose vocalizations may be limited to a few hundred hertz. This is something to consider on future projects using similar sources and rapid shot-point intervals (SPI). In this case, the 24-hour PSO coverage (visual & camera) proved effective for detecting species otherwise missed by PAM and in combination provided a comprehensive suite of tools to mitigate effectively throughout the project.

6.4 PSO AND PAM OPERATOR SCHEDULING

During the one occasion that the thermal cameras malfunctioned on the Fugro Enterprise and for the duration of the geotechnical survey, it was necessary to have two PSO on watch during night time observations. With a total of four PSO stationed on each vessel, adhering to the requirement for no more than 4 hours on watch, with 2 hours off and no more than 12 hours on watch total each day meant shorter uninterrupted periods off watch. In situations where it was necessary to have PSO coverage around the clock, having an additional PSO would have been beneficial to allow for longer recovery periods.

Similarly, the requirement for PAM operators to cover hours of reduced visibility did also encroach into operator rest time. For future surveys carried out in areas where PAM operators are required to work no more than 4 hour shifts and no more than 12 hours in any 24-hour time period, it may be more appropriate to have additional PAM operators on a continuous 24 hour monitoring schedule.

Alternatively, for both PSO and PAM schedule flexibility, having at least one PSO dual certified as a PAM operator would allow for additional flexibility in staffing needs of the survey either as a PSO or PAM operator depending on what is needed at the time.

6.5 THERMAL CAMERA REQUIREMENT FOR NIGHTTIME OPERATIONS

Thermal cameras were very effective and had multiple benefits in addition to allowing the PSO to view protected species at a greater distance than with night vision monoculars. Having three cameras stationed for a 360 degree view surrounding the vessel with a central monitoring station allowed for one PSO to monitor all three cameras and allowed for longer uninterrupted breaks in the PSO schedule for rest. When one camera malfunctioned in September, causing the PSO scheduled to be revised to have two PSO monitoring during nighttime hours, this caused increased fatigue among the PSO team. We were unable to develop a schedule with the given parameters for 4 PSO with 2 on watch continuously 24/7 that allowed for enough uninterrupted time off to catch up on sleep effectively. The use of thermal cameras for future work requiring monitoring 24/7 would be the preferred method to reduce the number of PSO in situations where space is already limited and helped to reduce overall fatigue by creating better scheduling.

Attachment 3

R/V Fugro Enterprise Sighting Summary

Attachment 3 - R/V Fugro Enterprise Sighting Summary



Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
7/15/2017	12:42	133	Continuous layer of clouds	NE	2	10	41 18.4	71 03.4	1		Whale spp.	200	470	1	transiting	survey	Sighting was brief and did not see much of animal. Just barely surfaced 4 times for approximately one second each time. Possibly a Pilot Whale, but did not see sufficient characteristics to make determination. Only multibeam fathometer was powered on, animal was outside of exclusion zone and did not appear to be affected by the sound source.	0:04
7/18/2017	20:19	120-130	Partly Cloudy	SE	2	10	41 17.402	71 05.086	2	500	Dolphin spp.	226/246				multi-beam calibration line	localisation not obtained, estimate range to be >500m	0:13
7/18/2017	20:24	122	Partly Cloudy	SE	2	10	41 17.1	71 05.6	2	500	Dolphin spp.	260	520	2	transiting	multi-beam calibration	Sighting was brief. First notified by PAM monitor via radio that a dolphin was in the area, then sighted ahead of vessel. Exclusion zone was 200 m at time of sighting. Distance from sound source determined with binocular reticules. Only saw them break the surface a few times each, swimming across bow forward of the vessel and away from the vessel, behavior appeared normal/swimming through area at surface. Distance from vessel and diminishing light conditions made species identification difficult.	0:02
7/18/2017	20:49	120-130	Partly Cloudy	SW	2	10	41 17.830	71 04.500		501	Dolphin spp.	31/51				multi-beam calibration line	localisation not obtained, estimate range to be >500m	0:12
7/19/2017	0:01	120-130	Partly Cloudy	SW	2	10	41 11.790	71 10.132		502	Dolphin spp.	139/279				multi-beam calibration line		0:49
7/19/2017	1:30	120-130	Partly Cloudy	SW	2	10	41 07.290	71 13.930		503	Dolphin spp.	100/260				multi-beam calibration line	short burst HF clicks	0:05
7/19/2017	8:03		Clear	SSW	3	10	41 04.6	71 15.0	3		Whale spp.	350		1	3 distinct blows about 800 m away	waiting to start survey lines. Equipment on, except sparker		0:06
7/19/2017	10:07	120-130	Clear	SSW	3	10	41 05.896	71 14.980		504	Dolphin, Short-beaked Common	254/314				sources active	incidental by PAM operator while off duty; camera #1 (rear facing); power down for dolphin, turned off all sources	0:15
7/19/2017	10:20		Clear	SSW	3	10	41 05.7	71 13.8	5		Whale, Humpback	280	700	1	blows	transit		0:10
7/19/2017	12:30		Clear	SW	3	10	41 06.7	71 12.5	6		Whale spp.	180	1600	1	blows	transit	Blows too big at this distance to be dolphin/seal/porpoise. Unable to determine ID based off blows seen	0:05
7/19/2017	13:20		Clear	SW	3	10	41 07.1	71 13.2	7		Whale, Humpback	190	1300	1	breaching, blows	Ramping up equipment	First spotted with naked eye (breached and made a large splash), then confirmed sighting with binoculars. Breached a second time, displaying a flipper. Then saw 2 broad bush shaped blows. Animal was not seen again, sighting ended 13:24	0:04
7/19/2017	14:54		Partly Cloudy	SW	2	10	41 07.4	71 14.2	8		Whale, Humpback	175	1500	1	breaching, blows	Troubleshooting equipment issues	First sighted breaching/large splash with naked eye. Then breached a second time, rolling and showing its ventral side and long flipper, was followed by 2 forceful bush shaped blows of moderate height (unable to determine height at this distance). Animal last seen at 1457. Distance estimated with binocular reticules. Unable to determine direction of travel	0:03
7/19/2017	19:18	132	Partly Cloudy	W	3	8	41 04.455	71 18.355		505	Dolphin spp.					all but sparker active, head to SOL	localisation not obtained, estimate range to be >500m	0:04
7/19/2017	19:31		Partly Cloudy	W	3	8	41 04.3	71 17.7	9		Whale spp.	210	2660	1	breach, blow	Troubleshooting equipment	Saw breach one time off starboard side of vessel, followed by one blow. Animal was not seen after that. Distance estimated by binocular reticules. Sighting too brief/far away to make species determination. Definitely a whale based on size/distance/blow. Unable to determine direction of travel.	0:02
7/19/2017	22:10	112	Partly Cloudy	W	3	10	41 06.395	71 08.507		506	Dolphin spp.					line change, sources active	localisation not obtained, estimate range to be >500m	0:03
7/20/2017	2:40	106	Partly Cloudy	WNW	2	10	41 06.196	71 10.461		507	Dolphin spp.	42/142				survey line, sources active	localisation not obtained, estimate range to be >500m	0:08
7/20/2017	3:04	113	Partly Cloudy	WNW	2	10	41 06.115	71 08.142		508	Dolphin spp.					line change, sources active		0:00
7/20/2017	3:28	107	Partly Cloudy	WNW	2	10	41 06.130	71 09.870		509	Dolphin spp.					survey line, sources active	localisation not obtained, estimate range to be >500m	0:05
7/20/2017	4:45	105	Partly Cloudy	WNW	2	10	41 05.870	71 12.068		510	Dolphin spp.					survey line, sources active	no screengrabs	0:00
7/20/2017	5:11	108	Partly Cloudy	WNW	2	10	41 05.754	71 09.638		511	Dolphin spp.	60/120				survey line, sources active		0:03
7/20/2017	6:48	110	Partly Cloudy	NW	2	10	41 05.6	71 14.4	10		Dolphin spp.	30	1600	20	traveling	traveling		0:02
7/20/2017	9:25		Partly Cloudy	W	2	10	41 04.5	71 13.1	11		Dolphin spp.	275	800	15	traveling	Running line	Unidentified dolphin species spotted first with naked eye and then verified with binoculars. Distance at first sighting estimated with reticule binoculars. Dolphins crossed perpendicularly in front of vessel but remained outside 400m exclusion zone. Closest approach to vessel was estimated to be about 500m using reticule binoculars.	0:20
7/20/2017	9:50		Partly Cloudy	W	2	10	41 04.4	71 10.6	12		Whale spp.	315	1800	1	Blows	Running line	Unidentified whale species was sighted with naked eye and then tracked via reticule binoculars. Animal(s) were estimated to be about 1800m away at first sighting using reticule binoculars. The whales swimming direction was variable, animals were likely milling about, possibly feeding. Animals remained well beyond 400m exclusion zone as we passed by.	0:10
7/20/2017	15:13		Clear	SW	2	10	41 05.2	71 15.5	13		Whale spp.		800	1		running lines	A blow was visible at about 800m at first sighting via naked eye. We attempted to track the animal using reticule binoculars, but only one blow was seen. Unable to identify to species based on blow shape alone.	0:05
7/20/2017	17:35	147	Fog or Thick Haze	SW	3	2	41 03.9	71 20.4	14		Whale spp.	210	800	1	blows	running line		0:08
7/20/2017	17:41	143	Fog or Thick Haze	SW	3	2	41 03.822	71 20.702		512	Dolphin, Short-beaked Common	156/336			from camera: tail slapping, porpoising around equipment buoys, breaching	survey line, sources active	incidental detection by PAM operator on standby; powerdown; acoustic detection continued beyond visual (PSO and camera - cameras 1 (stern) and 2 (starboard)); initial range estimate >500m and closest range (estimated from IR) to source 5m	1:51
7/20/2017	18:45	137	Fog or Thick Haze	SW	3	2	41 04.3	71 21.2	16		Dolphin, Short-beaked Common	170	400	30	jumping, traveling	ramp up	Just started ramp up. Asked to power down and wait 10 mins to start ramp up again.	0:05
7/20/2017	20:14	127	Partly Cloudy	E	2	5	41 03.272	71 25.358		513	Dolphin spp.	88/98				survey line, sources active	localisation not obtained, estimate range to be >500m	0:32
7/21/2017	0:23	135	Partly Cloudy	SW	2	10	41 00.52	71 39.856		515	Dolphin spp.	45/315	500	2		survey line, sources active	Dolphins judged to be inside mitigation zone due to intensifying whistles and HF clicks (30-110 kHz).	4:44
7/21/2017	1:19		Partly Cloudy	SW	2	10	41 01.001	71 38.963		516	Dolphin spp.			2		standby		0:12
7/21/2017	2:43	132	Partly Cloudy	SW	2	10	41 00.504	71 39.907		517	Dolphin spp.	47/107				full power		0:18
7/21/2017	3:40	120	Partly Cloudy	SW	3	10	41 00.383	71 41.563		518	Dolphin spp.	44/104				full power		0:06
7/21/2017	5:26	101	Partly Cloudy			8	40 58.245	71 48.820		519	Dolphin spp.			2		standby	survey line was already stopped due to sighting of humpback whale on thermal camera	0:04

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
7/21/2017	10:23	98	Partly Cloudy	NW	2	10	40 54.5	72 03.2	18		Dolphin spp.	185	1600	5	Jumping	running line		0:00
7/21/2017	16:25	110	Partly Cloudy	SSW	2	10	40 57.7	71 50.9	19		Whale spp.	230	1800	2	blows	running line		0:05
7/21/2017	19:53	144	Partly Cloudy	SW	3	10	41 02.8	71 30.7	20		Dolphin spp.	155	1650	2	leaping	mid survey line	saw animal leap from water (2), and splash. Completely breached the surface. Too small to be from whale. Radioed PAM operator and confirmed there were acoustic detections of dolphin in the area. unable to determine ID due to distance from vessel. Distance determined with binocular reticules. Direction of travel unknown.	0:01
7/21/2017	22:10	126	Partly Cloudy	SW	3	10	41 03.140	71 29.910		521	Dolphin spp.					survey line, sources active	bearing variable	0:46
7/22/2017	1:04	122	Continuous layer of clouds	WSW	3	10	41 03.664	71 40.856		522	Dolphin spp.	100/260				line full volume		4:58
7/22/2017	20:01	105	Continuous layer of clouds	S	1	8	41 06.6	71 11.3		523	Dolphin spp.					survey line, sources active	whistles quite faint with only 11-13kHz band observed, sparker was briefly inactivated which enabled detection of whistles down to 8kHz whistles detected while chirper off after EOL for noise file, another whistle detected after chirper re-activated	0:25
7/22/2017	21:30	130	Continuous layer of clouds	S	1	8	41 04.6	71 17.1		524	Dolphin spp.					line change, sources active		0:07
7/22/2017	21:58	132	Continuous layer of clouds	S	1	8	41 04.4	71 17.8		525	Dolphin spp.	197/313				survey line, all but sparker active		1:12
7/23/2017	0:00	125	Continuous layer of clouds	S	1	10	41 03.3	71 24.8		526	Dolphin spp.	100/260				survey line, sources active		0:10
7/23/2017	1:01	130	Continuous layer of clouds	S	1	10	41 03.2	71 28.0		527	Dolphin spp.	72/287				survey line, all but sparker active	range to dolphin at start likely >1km, whistles became more prominent at 01:58 and began to detect MF clicks, chirper was inactive already (courtesy request due to presence of dolphin - to make them easier to detect) when dolphin entered the 200m chirper EZ at 02:04, full power down requested at 02:04 with only magnetometer still running, dolphin in and out of 200m zone periodically throughout detection; last detection in the zone was 03:23 (start of pre-watch); visual observed in cameras 1 (rear-facing) and 2 (port)	2:25
7/23/2017	2:05		Continuous layer of clouds	SW	1	10	41 03.2	71 03.5	22		Dolphin spp.		300	8	leaping, porpoising, milling	Survey line with sidescan sonar, multibeam sounder and magnetometer	Dolphins first detected by PAM. Estimated to be within 500 meters once chirper was turned off (allowed more accurate acoustic detection). Difficult to determine behavior through PAM and thermal imaging, so a 60 minute EZ clearance was requested by lead PSO before beginning ramp up procedure (unable to verify voluntary approach with available information). Lead PSO called for equipment shutdown at 0205 upon sighting the dolphins on thermal imaging camera. Shutdown occurred immediately. ALL HRG equipment was powered off before animals reached the 200 m incidental take zone. Sparker was already powered off prior to initial acoustic detection.	unk
7/23/2017	3:08		Rain	SW	1	10	41 03.4	71 36.4	23		Dolphin spp.		420	1	Splashing at surface	All equipment except magnetometer beacon powered down	Dolphin(s) detected on cameras 1 and 3, video recorded; Splashing at surface; Unable to determine direction of travel as animal(s) were only briefly sighted	0:15
7/26/2017	12:05	60	Partly Cloudy	S	2	10	41 20.7	71 04.9	24		Dolphin, Short-beaked Common	145	300	30	milling, then transiting, porpoising, leaping	transit to survey site, no active HRG equipment	Dolphins sighted milling off port side of vessel. A few individuals swam near the vessel (within 100 m) then rejoined the group after a few minutes. Last sight of pod at 12:10 (estimated distance 1600 m), at which point they appeared to be in transit.	0:05
7/26/2017	12:32	132	Partly Cloudy	S	2	10	41 15.8	71 07.4	25		Dolphin spp.	150	1600	25	transiting, porpoising	transit to survey site, no active HRG equipment	Dolphins in transit. Last sighted at 12:40 1600m away.	0:08
7/26/2017	21:27	130	Partly Cloudy	SW	2	10	41 02.9	71 30.4		528	Dolphin spp.	154/338				chirp+multi-beam+sonar active	GPS down at start of detection (position is from last GPS fix at 21:25)	0:37
7/26/2017	22:17	129	Partly Cloudy	SW	2	10	41 03.1	71 30.5		529	Dolphin spp.					approaching SOL, sources active		0:03
7/26/2017	23:18	129	Partly Cloudy	SW	2	10	41 03.3	71 28.9		530	Dolphin spp.	variable				chirp+multi-beam+sonar active		0:40
7/27/2017	5:01	117	Partly Cloudy	SSW	2	10	41 00.5	71 39.9	28		Whale spp.		1500	1	only blow was visible	Survey line, all HRG equipment powered on	Bearing of vessel to animal unknown	0:03
7/27/2017	5:58	279	Partly Cloudy	SSW	1	10	40 57.8	71 50.3	29		Whale spp.	220	1000	1	only blows visible off port bow	Survey line, all HRG equipment powered on		unk
7/27/2017	6:28	279	Partly Cloudy	SSW	1	10	40 57.1	71 53.0	30		Whale spp.	25	1700	2	3 blows seen in the distance off starboard side of vessel while vessel was moving further away from the whale	Survey line, all HRG equipment powered on	whale sighting on previous line was still in the area keeping a distance of 800-900 m away from vessel on the port side. Last sight of whale at 06:33	0:05
7/27/2017	9:52	103	Partly Cloudy	S	2	10	40 57.0	71 54.0	32		Whale, Humpback	340	1600	1	Transiting across bow perpendicular to vessel path, frequent plume like blows observed, no fluking observed, milling or travelling (but too far away to tell for certain). Then transiting away from vessel towards Montauk.	All HRG equipment shut down	Lost sight of whale at 10:00	0:08
7/27/2017	9:57	103	Partly Cloudy	S	2	10	40 57.0	71 54.0	33		Whale, Humpback	85	1604	1	fluking, diving, blows. Transiting parallel to vessel in opposite direction. Frequent blows, then dove and displayed full fluke at 10:04.	All HRG equipment shut down	Lost sight of whale after diving at 10:04	0:07
7/27/2017	16:03	113	Rain	SSW	2	10	40 52.2	72 10.3	33		Whale spp.	80	1600	1	blows	transiting to start of line. All HRG equipment powered on	Saw blows about 1600m from vessel. Last sighted 16:18 still 1600 meters from vessel. Adult/Juvenile/Calf unknown.	0:15
7/27/2017	17:00	99	Rain	SSW	2	10	40 52.0	72 11.1	34		Whale, Humpback	85	1600	1	blows, surfacing, breaching	transiting to survey line. All HRG equipment powered on.	saw blows and surfacing in distance about 1600m away from vessel. Saw a breach. Last sighted at 17:35, approx 1600 m away from vessel	0:35
7/27/2017	18:34	88	Rain	SSW	2	10	40 53.0	72 11.9	35		Whale spp.	220	1600	1	blows	Survey line. All HRG equipment powered on.	Saw blows from whale about 1600m from vessel. Last seen at 18:45 >1600m away	0:11
7/28/2017	15:09	112	Fog or Thick Haze		1	4	41 01.7	71 35.3	37		Whale spp.	205	1900	1	swimming, only blow was visible.	running lines	first seen at 15:09 off port side bow moving parallel to the vessel in the opposite direction, keeping a distance of 160-1500 m away. Last sighting was 15:14 1500m away towards the stern on the port side	0:05
7/28/2017	16:44	146	Partly Cloudy	S	1	10	40 59.4	71 44.3	38		Whale, Fin	205	850	1	blows, transiting	running line	Saw a few blows (tail oval shaped) and slight surfacing from distance. Closest approach approximately 850 m from vessel.	0:03
7/28/2017	16:51	72	Partly Cloudy	S	1	10	40 59.4	71 44.1	39		Whale, Fin	100	1330	1	transiting away from vessel, observed 6 blows over 4 minutes, then arched back/rolled as it dove. No fluking observed	Survey line, All HRG equipment powered on	Lost sight of whale after it dove, was approx 2000 m from the sound source at last sighting. Saw blows, dive and dorsal fin clearly through binoculars. Sighted by Trevor Horwell while briefly covering watch for Michelle.	0:03

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
7/28/2017	19:36	148	Partly Cloudy	SE	1	10	unk	unk	40		Porpoise, Harbour	150	1000	4	transiting, swimming at surface, non-acrobatic	Survey line, Sparker inactive, all other HRG equipment powered on	Sighted off starboard bow. Traveling opposite direction of the vessel. Closest approach approx 805 m from the starboard side of vessel. Then turned and lost sight of them at approximately 1200 m distance.	0:00
7/28/2017	19:35	143	Partly Cloudy	SE	1	10	40 58.8	71 45.0	41		Dolphin spp.	135	1600	15	travelling in a tight group, porpoising. Swam across bow of vessel (port to stbd), then turned and continued travelling away from the vessel.	Survey line. Sparker inactive, all other HRG equipment powered on	Closest approach was approximately 900 m off the bow at 19:36. Last sighted approximately 2000 m off the starboard bow travelling away from the vessel.	0:08
7/28/2017	19:53	164	Partly Cloudy	SE	1	10	40 58.3	71 44.8	42		Dolphin spp.	195	875	20	travelling, porpoising. Swam across bow, then changed direction and swam further from the vessel in SE direction	Survey line, Sparker inactive, all other HRG equipment powered on	Closest approach was approximately 700 m from sound source, then turned and swam further away. Lost sight of animals when approximately 2000 m from vessel swimming in SE direction.	0:17
7/28/2017	20:01	146	Partly Cloudy	SE	1	10	40 57.8	71 44.5		532	Dolphin spp.	142/172				Survey line. Sparker inactive, all other HRG equipment powered on	localisation not possible due to low number of whistles picked up by detector for mapping of bearings, number of individuals unknown as was direction of travel relative to the ship.	0:41
7/29/2017	4:31	87	Continuous layer of clouds	SE	1	10	40 55.3	71 58.3		534	Dolphin spp.	n/a	1500	1	n/a	All HRG equipment shut down	localisation not possible, too few whistles. Number of animals and direction of travel from true north and relative to vessel unknown.	1:29
7/31/2017	6:45		Clear	S	1	10	41 00.6	71 13.3	44		Whale spp.	260	1600	1	swimming, diving	Depth data unavailable	Behaviour unknown.	unk
7/31/2017	14:57	90	Partly cloudy	S	3	10	41 03.3	71 16.2	45		Dolphin, Short-beaked Common	20	1650	10	Transiting, porpoising, leaping. Swimming parallel to vessel/towards the vessel, then turned swimming parallel/away from the vessel in SE direction	Survey line, All HRG equipment powered on except multibeam sounder	Depth approximate (from chart). Closest approach was approx 1000 m. Definite dolphin species, saw light yellow patch on sides of bodies when dolphins leaped (through binoculars at approx 1000 m from vessel), but not close enough to make out distinct hourglass pattern (probably common dolphin).	0:03
7/31/2017	22:22		Partly Cloudy	SW	2	10	41 06.6	71 12.2	46		Whale spp.		1550	1	Large splash (possible breach) followed by 2 blows	Chirp and Sidescan Sonar powered on	Depth data unavailable. Lost sight of whale after 2nd blow, was approximately 1350 m from sound source at closest approach	0:03
7/31/2017	23:32		Partly Cloudy	SW	2	10	41 05.6	71 14.3		535	Dolphin spp.	197	600	1	na	Chirp, side scan sonar powered on	Depth data unavailable, accurate localisation not possible, range determined by relative amplitude of received sounds and freq. range of clicks	0:25
8/1/2017	0:39		Partly Cloudy	SW	2		41 03.8	71 19.9		536	Dolphin spp.	146	1000	5	porpoising, approaching vessel	Chirp, side scan sonar powered on	Depth data unavailable. First seen on thermal camera 1000m from sound source. Detected on PAM just after visual sighting. Dolphins approached vessel. Localisation achieved by camera verification	0:31
8/1/2017	0:39		Partly Cloudy	SW	2	10	41 03.5	71 19.5	47		Dolphin spp.	220	1050	5	traveling towards vessel, porpoising	Chirp, side scan sonar powered on	Depth data unavailable. Observed splashes 1000m away on the port side camera approaching vessel, swimming in variable direction. Whistles and clicks were detected on PAM a few seconds after visual sighting on thermal camera. Dolphins entered 500m EZ at 00:41, PSO requested power down of equipment at 00:41.	0:02
8/1/2017	1:32		Partly Cloudy	SW	2	10	41 03.3	71 24.5		537	Dolphin spp.	245	500	1	porpoising, approaching vessel	All HRG equipment turned off, preparing for transit to New Bedford	Depth data unavailable. sources were powered down from previous sighting	0:31
8/1/2017	1:50		Partly Cloudy	SW	2	10	41 03.2	71 26.1	48		Dolphin spp.		300	5	traveling towards vessel, porpoising, bow riding	All HRG equipment turned off, preparing for transit to New Bedford	Depth data unavailable. Bearing of vessel to animal unknown. Observed splashes on thermal cam #3, 300m from sound source, dolphins then porpoising toward the bow. They continued to porpoise near the bow until 02:00 before swimming away.	0:10
8/2/2017	4:10		Partly Cloudy	SSW	2	10	41 16.3	71 29.3	49		Dolphin spp.	87	627	3	porpoising	In transit	Several dolphins were seen porpoising behind the vessel while in transit (on camera 1-recording made); could not see features well enough to make a positive species ID but dorsal fin appeared to be triangular and animals appeared to be too large to be harbor porpoises; animals were last seen behind vessel swimming away from vessel; no mitigation required as no survey or PAM equipment was deployed	0:01
8/3/2017	10:29	140	Partly cloudy	SSE	1	10	41 03.7	71 42.0	50		Whale spp.	200	1800	1	Only blow visible	Survey line, Chirp, sidescan sonar and magnetometer powered on	One tall blow visible at about 1800m away. Did not see any other activity	0:01
8/3/2017	11:30	140	Partly Cloudy		2	10	41 03.6	71 42.9	52		whale spp.	205	1900	1	breaching	HRG equipment shutdown from turtle inc take at 11:09	Observed whale breach 8 times approximately 1900m off starboard side of vessel. Followed by several blows before losing sight of the animal/ Sighting lasted for 10 minutes.	0:10
8/3/2017	19:42		Partly Cloudy	S	2	10	41 06.5	71 43.6	53		Whale, Humpback	210	800	1	breach, dive, fluke, blows	Transit, No HRG equipment deployed	Initially sighted off bow, saw 3 blows followed by a dive. Arched its back and exposed fluke while diving. Whale then breached, followed by 2 blows and a second dive, arching its back and exposing fluke. Closest approach was approximately 250 meters. Whale was joined by a group of common dolphins just before 2nd dive. Depth data unavailable	0:07
8/3/2017	19:48		Partly Cloudy	S	2	10	41 06.0	71 42.0	54		Dolphin, Short-beaked Common	240	250	10	porpoising, leaping, transiting	Transit, No HRG equipment deployed	Initially sighted off starboard bow within a few meters of humpback whale (previous sighting). Continued swimming in opposite direction of vessel travel. Saw several dolphins leap from water exposing the hourglass pattern used to id species (sighted through binoculars)	0:08
8/3/2017	21:02		Partly Cloudy	S	3	10	41 03.3	71 29.7		538	Dolphin spp.	139/339				no source activity, pre-watch	faint whistles detected at start of event, becoming more pronounced over time but only a few picked up by whistle/moan detector, MF clicks detected as event progressed with detection becoming primarily clicks near middle and end of event, few faint burst pulses, no depth data (multi-beam not operational)	0:38
8/3/2017	22:08	128	Partly Cloudy	S	2	10	41 03.5	71 28.1		539	Dolphin spp.					survey line (magnetometer+depth sounder)	few faint whistles (not picked up by detector - no bearing details); depth from separate depth sounder	0:00
8/3/2017	22:22	124	Partly Cloudy	S	2	10	41 03.2	71 29.3		540	Dolphin spp.					survey line (magnetometer+depth sounder)	burst of down sweeping whistles, bearing variable	0:01
8/3/2017	22:39	134	Partly Cloudy	S	2	10	41 02.7	71 31.0		541	Dolphin spp.					survey line (magnetometer+depth sounder)	short detection event consisting of only three whistles; the signals were not picked up by the whistle/moan detector, therefore no bearing details	0:01
8/3/2017	23:50	123	Partly Cloudy	S	3	10	41 01.1	71 37.7		542	Dolphin spp.	75/ 285				survey line (magnetometer+depth sounder)	brief encounter, distance unknown, but greater than 1000m	0:04
8/4/2017	2:46	96	Partly Cloudy	S	3	10	40 56.9	71 53.8		543	Dolphin spp.	na	1000			survey line (magnetometer+depth sounder)	distance likely greater than 1000m	0:51
8/4/2017	3:53	89	Partly Cloudy	S	3	10	40 55.3	72 00.0		544	Dolphin spp.	177/317				survey line (magnetometer+depth sounder)	distance unknown due to limited information available	0:01

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Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
8/4/2017	4:16	86	Partly Cloudy	S	3	10	40 54.8	72 02.1		545	Dolphin spp.	224	1400		porpoising	survey line (magnetometer+depth sounder)	faint detection at first then intensified then spotted on thermal camera no. 2 (port). This helped determine bearing and distance. Closest approx 700m.	0:40
8/4/2017	4:52	102	Partly Cloudy	S	3	10	40 53.9	72 05.4	55	545	Dolphin spp.	74	1244	3	Splashing at surface	Survey line, magnetometer only. No sound source powered on	Whistles heard on PAM first then splashing at surface seen at 1244m on thermal camera 2 (recording made): Dolphins were too far away to make a definite ID	0:03
8/4/2017	6:57	123	Partly Cloudy	SSW	2	10	40 55.0	72 13.6	56		Whale spp.	230	1650	1	Blows	Survey line, magnetometer only. No sound source powered on	Whale appeared to be traveling slowly parallel to ship in opposite direction. Never approached closer than 1600 and was last seen at 07:07, as the vessel was turning away from the beach	0:03
8/4/2017	20:32	134	Partly Cloudy	SSW	2	10	40 59.8	71 42.2		547	Dolphin spp.	193/299				no source activity	whistles faint at start of detection with an occasional whistle of higher amplitude, MF clicks began at 20:58 and continued through 21:14, detected only whistles through end of detection after 21:14	1:35
8/4/2017	21:38	156	Partly Cloudy	SSW	2	10	41 00.0	71 42.7	57		Whale spp.		650	1	2 blows	waiting for clearance to ramp up following operational shutdown	Sighting too brief and distant to identify species, only blows visible. Bearing of vessel to animal unknown, adult/juvenile/calf unknown	0:01
8/4/2017	22:12	146	Partly Cloudy	SSW	2	10	41 00.8	71 39.6		548	Dolphin spp.	0/152		3		survey line, sparker	three simultaneous MF click trains at different bearings pass from ahead to behind hydrophones, whistles detected at 22:18	0:10
8/4/2017	22:33	136	Partly Cloudy	SSW	2	10	41 00.7	71 38.9		549	Dolphin spp.	224/264				survey line, sparker	some whistles quite faint, but initially whistles were moderately high amplitude	0:18
8/4/2017	23:05	126	Partly Cloudy	SSW	2	10	40 59.9	71 42.1		550	Dolphin spp.	142/218		4		survey line, sparker	short detection so couldn't determine direction of travel re to vessel except that the animals approached from ahead of the hydrophones to behind or parallel before moving off	0:05
8/4/2017	23:54	138	Partly Cloudy	S	3	10	40 59.0	71 45.8	58		Whale spp.	30	600	1	4 blows (3 rounded/plume, 1 round/bush shaped)	Survey line, Sparker powered on	Only blows visible on thermal camera. 3 blows at 600-650m from sound source, fourth at 700m from sound source. Vessel was moving away from whale after initial sighting. Unable to determine whale species based on observation. Adult/Juvenile/Calf # unknown.	0:03
8/5/2017	2:05	93	Partly Cloudy	S	3	10	40 55.4	71 58.5	59		Whale, Humpback		775	1	breaching, pec slapping, blows	Survey line, sparker powered on	First breach spotted at 02:05 1 km away on the port side camera close to the bow. Saw several breaches and pectoral slaps until 02:10. Closest approach was 700 m away from vessel. Recorded on video. Bearing of vessel to animal unknown.	0:46
8/5/2017	2:22	92	Partly Cloudy	S	3	10	40 55.2	72 00.1		551	Dolphin spp.	203	200			survey line, sparker	dolphins spotted on port side camera at 200m PSO called for shut down at 2:51, animals passed from ahead to behind hydrophones last detected in mitigation zone at 2:56.	0:38
8/5/2017	3:30	94	Partly Cloudy	S	3	10	40 54.5	72 03.2		552	Dolphin spp.	10/150	300			power-down	source was powered down from previous dolphin detection so no mitigation action necessary this time, but reset ramp-up time to 03:49, entered zone again and reset ramp up time to 04:40.	1:26
8/5/2017	3:46	99	Partly Cloudy	S	3	10	40 55.1	72 01.1	61		Dolphin spp.	59	422	3	porpoising/splashing at surface; whistles, clicks and burst pulses detected on PAM; didn't appear to be approaching vessel	HRG equipment shutdown from Inc Take at 02:51	splashing at surface observed at 3:46; a group of small delphind species was seen on thermal camera 1 (recording made); dolphins did not appear to be approaching vessel, but may have been following us parallel to/behind vessel in direction of travel of the survey vessel. #Adult/Juvenile/Calf unknown	0:03
8/5/2017	4:34	32	Partly Cloudy	S	3	10	40 55.7	71 58.1	62		Dolphin spp.	299	448	5	surfacing behind vessel; many whistles detected by PAM	HRG equipment shutdown from Inc Take at 02:51	a group of small delphind species was seen on thermal camera 1 (recording made) at 4:37 at 448m; dolphins appeared to be following us parallel to/behind vessel in direction of travel of the survey vessel; distance at closest approach was measured at 346m on thermal cameras; last seen at 4:40 on thermal cameras but whistles were still heard on PAM. # Adult/Juvenile/Calf unknown.	0:06
8/5/2017	5:28	91	Partly Cloudy	S	3	10	40 54.7	72 02.3		553	Dolphin spp.					power-down	short detection, few whistles, distance not discernable	0:04
8/5/2017	5:51	90	Partly Cloudy	S	3	10	40 55.3	72 00.4		554	Dolphin spp.		800			sparker ramp-up	detected during ramp-up but outside mitigation zone so no mitigation necessary. Unable to determine bearing or # of animals	0:12
8/5/2017	7:57	87	Partly cloudy	S	3	10	40 54.8	72 01.8	64		Whale spp.	130	1600	1	breach, 2 blows	Ramp up	Saw two blows and a breach off the port stern, 1600 m from vessel before it disappeared into the horizon	0:02
8/5/2017	11:25	58	Rain	SE	4	4	40 54.8	72 13.4	65		Whale spp.	140	1600	1	blows	Survey line, Sparker and sidescan sonar powered on	Saw several blows at 1600 meters off starboard side of vessel. Last sighted 11:32	0:07
8/5/2017	14:13		Continuous layer of clouds	SE	3		40 55.7	71 54.1	66		Dolphin, Short-beaked Common	275	50	2	traveling toward vessel on starboard side bow, porpoising/bow riding for 1 minute. Didn't see them again after that	transiting to next survey line	Saw dolphins at 50 m and approached closer to vessel. Could clearly see the pattern on their back as they were porpoising, but after a few leaps at the bow they moved away from the vessel and were not seen again. Depth data unavailable	0:01
8/5/2017	17:29	143	Partly Cloudy	SE	3	10	41 00.8	71 15.7		555	Dolphin spp.					no sources active	incidental detection - dolphin whistles detected as powered PAM system up after deployment at 17:28 (200m cable no buoy), notified MMOs but no visual confirmation	0:13
8/6/2017	1:48	108	Partly Cloudy	SW	3	10	41 04.3	71 09.4		556	Dolphin spp.	106/248				chirp, multi-beam	location not established but distance estimated to be greater than 2500m based on relative amplitude of received signal	0:16
8/6/2017	3:07	114	Partly Cloudy	NW	3	10	41 02.9	71 11.6		557	Dolphin spp.	30-264				sparker, chirp	dolphins passed from ahead of hydrophones to behind.	0:01
8/6/2017	3:43	107	Partly Cloudy	NW	3	10	41 05.3	71 11.5		558	Dolphin spp.	58-62				sparker, chirp	location not established but distance estimated to be greater than 750m based on relative amplitude of received signals	0:40
8/6/2017	12:35	108	Partly Cloudy	NW	4	10	41 06.5	71 09.6		559	Dolphin spp.					chirp, magnetometer	no bearing/range information	0:00
8/6/2017	20:43	115	Partly Cloudy	W	3	10	41 08.4	71 10.8		560	Dolphin spp.	85/207				chirp+magnetometer+sonar	only single whistle therefore no localisation	0:00
8/7/2017	0:48	123	Partly Cloudy	W	3	10	41 02.2	71 10.8		561	Dolphin spp.	253	1500			chirp, sparker, sonar	distance estimate based on relative amplitude of received signals and detected click freq.	0:24
8/7/2017	3:18	106	Partly Cloudy	W	3	10	41 05.9	71 10.5	67	562	Dolphin spp.	120/240				chirp, sparker, sonar	animals observed by PSO on camera 3 (starboard) and 1 (rear-facing) in exclusion zone at 3:36 detected on PAM then camera.	0:35
8/7/2017	5:18	110	Partly Cloudy	W	3	10	41 03.8	71 10.7		563	Dolphin spp.	22/338	750			chirp, sparker, sonar	distance estimate based on amplitude of received signals, and direction of travel based on lack of detected transient pulse signals.	0:37
8/7/2017	19:14	156	Rain	SSW	3	10	41 02.7	71 11.0		564	Whale, Sperm	120/240	3000	2		no sources active	no sources active due to shutdown called by PSOs for different event (humpback visual sighting); some clicks were lower in amplitude, therefore not all clicks were observed on LF click detector	0:28
8/7/2017	19:43	161	Rain	S	4	10	41 00.2	71 11.3		565	Dolphin spp.	80/139				no sources active	whistles faint, no localisation	0:12
8/7/2017	20:30		Continuous layer of clouds	S	4	10	41 02.6	71 11.7		566	Whale, Sperm					sparker active full power	clicks briefly detected while chirper was off for noise file before SOL. Bearing/distance/# animals unknown. Did not record depth	0:00

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
8/10/2017	16:34	112	Partly Cloudy	S	2	10	41 06.2	71 11.7	70		Dolphin, Short-beaked Common	135	495	50	porpoising, milling about in a group	Survey line, Sparker, chirp, sidescan sonar & multibeam sounder powered on	A group of about 15-20 dolphins was sighted at 495m (distance estimated using reticule binoculars); Dolphins appeared to be milling about/porpoising, but then started approaching vessel. PSO requested powerdown at 16:34; Kept eyes on dolphins and then 2 more separate groups of at least 10-15 dolphins each also approached the vessel (40-50 animals total estimated) within 2-3 m, and circled the vessel/attempted to bow ride; Dolphins remained in the vicinity of vessel/mitigation zone for over 10 minutes. Approach determined to be voluntary based on observation, and PSO gave clearance for ramp up at 16:44, 10 minutes after powerdown occurred. Dolphins last seen at 1709. Unable to determine # adult vs juvenile/calf	0:35
8/10/2017	17:21	115	Partly Cloudy	S	2	10	41 06.1	71 08.8	71		Dolphin spp.	160	1600	15	porpoising, leaping, transiting	Survey line, Sparker, chirp, sidescan sonar & multibeam sounder powered on	Sighted group of dolphins off port side of vessel (T. Horwell temporarily covering watch for C. Brooks). First noticed some large splashes with naked eye, then used binoculars to id species and determine distance. Unable to determine exact species, but leaping individuals were positively identified as a dolphin species. Last sighted approx 2700 m from vessel and traveling east.	0:09
8/10/2017	17:40	112	Partly Cloudy	S	2	10	41 06.2	71 10.7	72		Dolphin, Short-beaked Common	345	850	15	milling, porpoising, leaping, then transiting around vessel and away from it	Survey line, Sparker, chirp, sidescan sonar & multibeam sounder powered on	Sighted group of dolphins off starboard side of vessel transiting east(sighted by T. Horwell while briefly covering watch for M. Klein, M. Klein then assisted with sighting upon return). First transiting opposite vessel approx 805 m off stbd side (approx 850m from active sparker), then milling (1745-1750), then turned and resumed transiting across stern (stbd to port). Closest approach was at 17:53 (550m from sparker), but animals did not approach vessel and continued to swim south away from vessel after crossing stern. Last sighted approximately 1600 m off port stern.	0:21
8/10/2017	22:54	124	Partly Cloudy	E	2	10	41 06.5	71 07.7		567	Dolphin spp.			1		All HRG, online	Bearing/direction of travel/distance greater than 500m. last whistle at 23:04	0:10
8/11/2017	0:20	111	Partly Cloudy	E	2	10	41 04.9	71 10.9		568	Dolphin spp.					All HRG, online	only 3 whistles, not able to determine bearing or distance	0:03
8/11/2017	1:33	111	Partly Cloudy	E	2	10	41 05.4	71 11.0	73	569	Dolphin spp.	55/305	500	4		All HRG, online	No clean click trains to track; 500m distance estimate based on HF vocalizations	0:22
8/11/2017	1:37	108	Partly Cloudy	E	2	10	41 05.2	71 10.4	73	569	Dolphin spp.	55	450	5	porpoising toward the stern	Power-down	First seen at the stern around 450 m away and approaching closer. Closest approach was 150 m. 01:40 was the last visual confirmation. 01:50 was the last PAM detection inside the mitigation zone.	0:03
8/11/2017	2:51	118	Partly Cloudy	E	2	10	41 05.3	71 15.2		570	Dolphin spp.			4		All HRG, online	dolphin whistles	1:13
8/11/2017	3:17	119	Partly Cloudy	E	1	10	41 05.4	71 15.4	74	570	Dolphin spp.		764	5	porpoising, chasing fish	running a survey line	dolphins first seen on thermal camera 3 at 764 m (recording made), PAM operator requested shutdown at 3:23 when whistles and clicks were heard on HF hydrophone; dolphins seen again on camera 2 at 23m (recording made) after power down; dolphins were seen on cameras for 11 minutes after powerdown; approach determined to be voluntary (vessel attraction/dolphins not deterred by sound source/remained near vessel for 10 minutes); dolphins last seen at 3:34 after vessel turned	0:17
8/11/2017	4:58	118	Partly Cloudy	E	1	10	41 05.3	71 09.1		571	Dolphin spp.			1		All HRG, online	All HRG active, whistles too faint and infrequent to determine distance and bearing	0:17
8/11/2017	10:52	116	Partly Cloudy				41 05.3	71 09.4	75		Dolphin, Short-beaked Common	215	450	10	leaping, porpoising	Survey line, Sparker, Chirp, sidescan sonar, multibeam sounder powered on	Sighted a group of 8-12 individuals 450 meters off starboard side of vessel (distance estimated using reticled binoculars). Group was porpoising (and leaping) parallel to the vessel. The group then swam opposite and further away from vessel (west) from 11:00-11:10 (800-1000 m from vessel at this time), then turned and transited in a SW direction, approximately 1600m from vessel at 11:13, and last sighted approximately 2000 m from vessel at 11:18. The dolphins never came within 400m of the vessel or sound source. Identifying characteristics include an hourglass shape on the leaping individuals' sides, with beige coloration near the head, and gray near the caudal fin, and a mid-body dark falcate dorsal fin.	0:26
8/11/2017	15:48	115	Partly Cloudy	NE	1	10	41 04.8	71 08.6	76		Dolphin spp.	160	1500	15	porpoising, transiting	survey lines, all HRG equipment	pod of dolphins (at least 10) was sighted approximately 1500m off the port side of vessel, transiting opsite direction and away from vessel. # adult/juvenile/calf unknown	unk
8/11/2017	21:22	116	Partly Cloudy	SSW	2	10	41 05.4	71 10.9		572	Dolphin spp.			7		All sources active	Initially detected outside EZ. Dolphin entered EZ 01:26 and PSO requested power down, then tracked on HF at 200m post shut down.	0:36
8/11/2017	21:33	115	Partly Cloudy	SSW	2	10	41 05.4	71 12.4	77	572	Dolphin spp.		750	8	porpoising, transiting, leaping	Power down from PAM detection at 21:26	Already powered down from PAM detection at 21:26. This group of dolphins did not enter the mitigation zone. Coincided with PAM detection (572) that indicated multiple groups of dolphins	unk
8/11/2017	21:49	115	Partly Cloudy	SSW	2	10	41 05.7	71 12.6	78	572	Dolphin spp.		47	6	porpoising, leaping, swimming directly to bow of vessel, then attempted bow riding, vessel attraction	Power down from PAM detection at 21:26	Dolphins had already been detected by PAM inside 200m for over 10 minutes. Sighted on thermal camera (distance determined by RADES software) porpoising directly at bow of vessel, then milling/attempting to bow ride. Approach determined to be voluntary/vessel attraction. Coincided with PAM detection 572.	unk
8/12/2017	2:03	151	Partly Cloudy	S	2	10	41 01.7	71 16.6		573	Dolphin spp.		500	1		All sources active	No mitigation required	0:01
8/12/2017	4:27	111	Rain and Fog	S	2	5	41 05.3	71 12.8		574	Dolphin spp.			2		chirper and sparker	Only chirper and sparker active - magnetometer disabled for maintenance; overlapping whistles from at least 2 dolphins; only a few faint whistles, no localization possible	0:01

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
8/12/2017	11:01	148	Continuous layer of clouds	S	2	10	41 01.9	71 24.9	79		Whale, Humpback	183	809	2	diving, fluking, transiting	Survey lines, all HRG equipment except Magnetometer running	8-9 large bushy blows were spotted with naked eye at 809 meters away (distance estimated using reticled binoculars) at 183 degrees, followed by simultaneous dive (only larger whale displayed fluke). Both whales resurfaced 805m off the port side of vessel at 11:07. 6 additional blows sighted, followed by another simultaneous dive (arched backs/rolling motion prior to diving) of the pair of whales. White patches on flukes visible on larger whale while diving. Both whales again resurfaced at 11:11, 1600m off the port/stern of vessel. Last sighted transiting in the same direction/further away, approximately 2000m from the vessel/towed equipment. Closest approach of whales was at 11:03, approximately 700m from the active sound source. Distances estimated using reticled binoculars.	0:12
8/12/2017	16:25	133	Fog or Thick Haze	NW	1	0.5	40 59.8	71 41.9		575	Dolphin spp.		500	1		All sources	Possible dolphin outside mit zone, all sources active.	0:02
8/13/2017	6:59		Fog or Thick Haze	SSW	4	2	40 58.6	71 47.5	81		Whale spp.	330	550	1	one small, bushy blow	running lines with mag only	Sparker is out of the water; Chirp, mag and multi-beam powered on. Did not record depth. Adult/Juvenile/Calf unknown. Direction of travel unknown.	unk
8/13/2017	9:39	103	Fog or Thick Haze	SW	3	3	40 54.2	72 04.3	82		Whale, Humpback	265	250	1	pectoral flipper slapping at surface	Survey line. Chirp, Multibeam sonder and magnetometer powered on	One humpback whale seen at 9:39 by naked eye, distance estimated to be 250m using reticule bonculars; pectoral flipper slapping seen at surface; photos taken to confirm ID; Whale appeared to be traveling in opposite direction of vessel on the starboard side, close to the surface; Last sighted inside mitigation zone at 09:39. Last sighted outside mitigation zone at 09:41. Sparker was not deployed at time of sighting, (NOT an inc take, shutdown occurred when whale was over 200m from sound source)	0:02
8/13/2017	16:43	141	Partly Cloudy	WNW	2	10	40 59.6	71 44.3	83		Whale, Humpback	290	490	1	surfaced, arched back but did not fluke; one plume-like blow observed	Survey line. Chirp, sidescan sonar, multibeam sonder powered on	One humpback whale seen at 16:43 by naked eye, distance estimated to be 490m using reticule bonculars; one plume-like blow and arched, "humpy" back seen at surface and distinct hump on dorsal fin; Whale appeared to be crossing perpendicularly in front of the vessel towards the starboard side; Last seen at 16:43	0:00
8/13/2017	17:12	131	Partly Cloudy	WNW	2	10	41 00.6	71 41.8	84		Whale spp.	58	1600	4	surfaced with tall, column-like blows; 2 blows seen at same time so 2 individuals were estimated; did not fluke	shut down	Two whales sighted at 17:12 by naked eye, distance estimated to be 1600m using reticule bonculars; Whales never approached within 1600m; multiple tall, column-like/elliptical shaped blows seen (slight angle), with two occurring at the same time = 2 individuals; More blows seen around 17:30 (at least 4-5 individuals total but several of the blows looked lesser in height and more rounded/bush shaped, in addition to some continued tall/elliptical shaped blows) Blows were consistent and continued for over 60 minutes ; Whales appeared to be swimming away from vessel on the port side; Last sighted at 18:37 ranging from 1600m - 2500m from sound source, swimming towards Montauk Point	1:25
8/14/2017	2:19	124	Partly Cloudy	WSW	2	10	41 52.6	72 11.5		576	Whale, Sperm	90/270	558	1		Survey line. Sparker, chirp, sidescan sonar and multibeam sonder powered on.	Click train was tracked 558 meters from source.	0:05
8/14/2017	2:22	111	Partly Cloudy	WSW	2	10	40 52.3	72 11.2	85		Whale spp.	90	600	1	breaching, blows	Survey line. Sparker, chirp, sidescan sonar and multibeam sonder powered on.	broad, bushy blow was seen 600m away on aft thermal camera. PAM detection within the mitigation zone occurred approx 1 minute later. Only one whale was visible on the thermal camera. A breach was seen after HRG equipment was shut down (within mitigation zone), and it appeared to be a humpback - broad, flat head shape. However, PAM detections indicated Sperm Whales in the mitigation zone.	0:03
8/14/2017	3:35	102	Partly Cloudy	WSW	2	10	40 52.4	72 11.4		577	Whale, Sperm	21/201	263	2		Ramp up	Click train detected inside mitigation zone, shut down requested.	0:02
8/14/2017	8:24	96	Partly Cloudy	NE	2	10	40 52.2	72 09.8	86		Whale spp.	240	1600	1	only blow was visible, swimming/diving in front of the bow	Survey line. Sparker, chirp, sidescan sonar, multibeam sonder powered on	Sighted two blows approx 1500m from the bow off the starboard side of vessel. Adult/Juvenile, Calf unknown. Direction of travel unknown.	0:01
8/14/2017	11:30	75	Partly Cloudy	ENE	2	10	40 53.9	72 12.7	88		Whale, Humpback	250	2600	1	Pectoral slap, Tail slap	Survey line, sparker, chirp, sidescan sonar, multibeam sonder powered on	Whale sighted off starboard side of vessel, noticed splash. Then saw repeated pectoral and fin slapping. 4 bushy blows during duration of sighting. Then saw dorsal body/fin slightly arch/roll before losing sight of the animal.	0:09
8/16/2017	10:43	144	Clear	NW	2	10	40 58.6	71 44.8	90		Whale spp.	154	1618	1	blow at surface	Survey line, sparker, chirp, sidescan sonar, multibeam sonder powered on	Small bushy blow sighted at 154 degrees, 1618 meters (distance estimated using reticled binoculars) from vessel	0:07
8/16/2017	15:08	144	Partly Cloudy	NW	2	10	40 57.4	71 45.2	91		Whale, Humpback	160	900	1	traveling, diving	Survey line. Sparker, chirp, sidescan sonar, multibeam sonder powered on	Sighted bushy blow 900m off the starboard side of vessel. After the blow, the side of dorsal body and dorsal fin were visible before diving. Did not fluke. Whale was not sighted again.	0:00
8/16/2017	18:01	92	Partly Cloudy	SW	3	10	40 55.9	71 57.5	92		Whale spp.	15	700	1	blows	Survey line, sparker, chirp, multibeam sonder powered on	Sighted blow approx 700 off starboard side of vessel. Then a second blow at 18:00, and a third at 18:01 approx 1000m off the starboard stern. (T. Horwell temporarily covering watch for M. Klein at time of sighting)	0:00
8/17/2017	7:16	104	Partly Cloudy	ENE	3	10	40 54.7	72 00.1	93		Whale spp.	140	1550	1	Blow (no other behavior observed)	Survey line. All HRG equipment powered on	saw distinct tail blow 1500m from vessel. Could not see any of the body. Unable to determine direction of travel. First and final sighting was at 07:16	0:00
8/17/2017	8:10	96	Partly Cloudy	E	3	10	40 55.6	72 00.2	94		Whale spp.	130	850	1	Blows (no other behaviour observed)	Survey line. All HRG equipment powered on	Two plume-like blows seen at surface behind vessel at 850m (estimated using reticule binoculars); Likely a humpback, but could not ID with certainty as only blows were observed; Vessel turned just after whale was sighted and was seen again at 8:19 at 700m crossing perpendicularly in front of bow. Last seen at 8:33 at about 1700m	0:23
8/17/2017	9:27	92	Partly Cloudy	E	3	10	40 55.7	71 59.1	95		Whale spp.	165	900	1	Blow (no other behavior observed)	Survey line. All HRG equipment powered on.	One plume-like blow sighted 950m off starboard side of vessel (estimated using reticule binoculars); Likely a humpback, but could not ID with certainty as only one blow was observed; Vessel turned to the port side just after whale was sighted.	0:00

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Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
8/17/2017	12:48	102	Partly Cloudy	NE	2	10	40 55.9	71 56.2	96		Whale, Minke	150	805	1	traveling at/near surface	Survey line. Sparker, chirp, sidescan sonar, multibeam sounder powered on	Sighted off starboard side, forward of vessel, swimming across path of/ ahead of vessel (not perpendicular) eastward. Broke the surface 7-8 times showing back and dorsal fin. No noticeable blows or diving behavior. Swimming very fast. Too small to be a fin whale, too large to be a dolphin. Last sighted 671m from vessel.	0:02
8/17/2017	15:08	91	Partly Cloudy	S	2	10	40 59.2	71 59.4	97		Whale, Humpback	350	425	1	Feeding, Fluke, Dive	Survey line. Sparker, chirp, multibeam sonar, sidescan sonar powered on.	A large splash was seen at surface 350m off the bow of the vessel (approx 425m from sparker) followed by a large, plume-like blow and a fluke-up. Large schools of silver fish seen at the surface (possibly herring?) in the vicinity of where the whale was first sighted. Vessel turned to the port side and turned around and whale surfaced again at 15:13 approximately 500m from stern of vessel. Another blow was sighted at 15:19 in the same location. Vessel then moved away and the whale was not seen again.	0:11
8/17/2017	21:36	88	Partly Cloudy	S	2	10	40 56.6	71 56.3	98		Whale spp.	60	2050	3	Blows, possible breaching, dive/fluke	Survey line. Sparker, chirp, sidescan sonar, multibeam sounder powered on	First sighted splash, then multiple blows on starboard thermal camera (unit 3) just over 2km from sound source (distance estimated with RADES software). Some blows appeared broad and bushy, while others much taller and elliptical. Total of 10 broad/bushy/lesser height blows, and 7 taller more elliptical blows over duration of sighting. Sighted 2 dives with fluking, and 2 possible breaches. Appeared to be multiple whales, likely a mix of Fin and Humpback based on blow shape/height, dive/fluke. Approximately 2200m from sound source when last sighted off starboard stern. Unable to determine # adult/juvenile/calf. Recording was made.	0:11
8/18/2017	10:43	89	Continuous layer of clouds	S	3	8	40 58.1	71 53.4	99		Whale spp.	56	1618	1	blows	Survey line. Sparker, chirp, sidescan sonar, multibeam sounder powered on	Small bushy blow spotted 1618 meters from vessel (distance approximated using reticled binoculars) at 056 degrees. Whale surfaced 3 times with a singular blow each time before diving (therefore getting additional ID characteristics from that distance was difficult). Observed a tall, dark falcate dorsal fin.	0:07
8/18/2017	11:29		Rain	S	3	8	40 57.1	71 52.1	100		Whale, Fin	110	805	1	transiting	Survey line. Sparker, Chirp, Sidescan sonar, multibeam sounder powered on.	Sighted 2 blows off port bow. Whale was transiting eastward. Whale sighted again at 11:34 approx 1200m from vessel (after vessel turned) swimming in same direction. 8 more blows sighted, all were tall and elliptical shaped.	0:07
8/18/2017	17:13	165	Partly Cloudy	S	4	8	40 57.6	71 46.0	101		Whale spp.	320	625	1	Blows at surface	Survey line. Sparker, Chirp, Sidescan sonar, Multibeam sounder powered on.	One bushy-shaped blow sighted at 17:13, 575m off starboard side of bow; One additional blow sighted at 17:16, along with large, dark dorsal surface of whale, 500m off starboard side of bow (approx 550m from sound source); Whale appeared to be swimming towards survey vessel; Unable to get a good look at the dorsal fin due to sea state conditions and lots of whitecaps/spray; Requested shutdown when whale was sighted 500m off bow (approx 550m from sound source) at 17:16; Whale was not seen again. After discussion with lead pco, clearance was given for ramp up, as whale did not enter the EZ at any time (within 500m of sound source).	0:03
8/18/2017	17:49		Partly Cloudy	S	4	8	40 59.2	71 46.7	102		Whale spp.	135	1400	1	blows (no other behaviour observed)	Ramping up HRG equipment Survey line. Sparker, Chirp, Sidescan sonar, Multibeam sounder powered on	Two blows sighted off port side of vessel, then whale was not seen again. Depth not recorded	0:01
8/18/2017	19:23	150	Rain	S	4	8	40 57.3	71 46.4	103		Whale spp.	355	805	1	blows (no other behaviour observed)	Survey line. Sparker, Chirp, Sidescan sonar, Multibeam sounder powered on	Sighted off port side of vessel. Could not see body/dorsal fin due to sea state. Not sighted again after 2nd blow	0:02
8/18/2017	19:39	154	Rain	S	4	8	40 58.3	71 44.7	104		Whale spp.	188	1600	1	blows (no other behaviour observed)	Survey line. Sparker, Chirp, Sidescan sonar, Multibeam sounder powered on	2 large bushy blows sighted off starboard/bow (distance estimated using reticled binoculars). Did not observe any additional id characteristics due to sea state and distance from vessel.	0:01
8/18/2017	20:40	135	Drizzle	S	4	5	40 59.9	71 41.0		578	Dolphin spp.		600	1		silent	Delphinid vocalizations were detected outside of the mitigation zone after operational shut down due to weather. No mitigation action necessary. Unable to determine bearing.	4:03
8/19/2017	7:21	111	Partly Cloudy	W	4	8	40 58.4	71 42.8	105		Dolphin, Short-beaked Common	30	75	10	traveling towards vessel, porpoising, bow riding	standing down for weather	dolphins swam in towards the boat and started bow riding on the starboard side, then crossed the bow and swam away from the vessel on the port side. Last time of sighting was 07:25	0:04
8/19/2017	12:01	151	Partly Cloudy	WSW	3	10	40 59.3	71 45.3	106		Whale spp.	57	1600	1	blows (no other behavior observed)	standing down for weather	small bushy blow spotted twice; once at 57 degrees and once at 60 degrees off the vessels bow, at 1600 m (distance estimated using reticled binoculars). Whale moving away from vessel. Closest distance to vessel was 1600 m.	0:05
8/19/2017	12:07	161	Partly Cloudy	WSW	3	10	40 59.4	71 45.3	107		Whale, Fin	110	1200	1	transit, blows	shutdown for weather	1 tall elliptical shaped blow sighted off starboard bow. 2 more blows sighted (same shape/direction) at 12:13, approx 1500m off starboard bow. Whale not sighted again.	0:07
8/19/2017	12:29		Partly Cloudy	SW	3	8	41 00.2	71 45.1	108		Whale, Fin	145	750	1	Transit, dive, blow	shutdown for weather	Sighted 1 very tall elliptical shaped blow with naked eye off starboard side, mid ship. Then sighted whale diving with binoculars, arched/rolled back, dorsal fin visible. Not sighted again.	0:01
8/19/2017	15:13	115	Partly Cloudy	SW	4	10	41 03.4	71 43.2	109		Whale spp.	337	900	1	blows (no other behavior observed)	standing down for weather	2 large, plume-like blows seen at 15:13 via naked eye on starboard side bow; distance estimated to be 900m using reticled binoculars; only two surfacings/blows seen and whale not seen again; whale did not appear to be swimming towards or away from vessel. Last sighted at 15:13	0:00
8/19/2017	16:27	141	Partly Cloudy	WSW	3	10	41 00.8	71 42.1	110		Whale spp.	216	1500	1	blows no other behavior observed	standing down for weather	2 bushy blows, about 2 meters in height spotted 1500 m off vessels bow. Unable to spot any other ID characteristics	0:00
8/19/2017	21:02	155	Clear	S	3	10	40 58.4	71 44.5		579	Dolphin, Short-beaked Common	25	100	6		Full volume, all sources active	Dolphin entered the mitigation zone at 21:03 and the acoustic sources were silenced. At 21:54, ramp up began after their behavior was determined to be consistent with voluntary approach to the vessel/attempting to bowride.	3:11

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
8/19/2017	21:14		Clear	S	3	10	40 58.7	71 44.5	111	579	Dolphin spp.		100	10	Porpoising, milling	Powerdown after acoustic detection	Detected dolphins on thermal camera 3 (starboard) approx 100m from vessel and porpoising towards it. Then sighted again (5-6 dolphins) at 21:22 on camera 3 at approx 350m from sound source, with several more approx 650m from sound source. Some moved closer to approx 100m from sound source before losing sight of them. PAM detected dolphins inside mitigation zone/close proximity to vessel throughout, and after sighting. Unable to determine bearing. Distances estimated with RADES software. Depth data unavailable.	0:16
8/19/2017	21:42		Clear	S	3	10	40 59.2	71 43.1	112	579	Dolphin, Short-beaked Common		75	6	bow riding	Powerdown after acoustic detection	PAM detection continued. PSO went on deck with nightvision and sighted approx 6 common dolphins bow riding within 2-3m of hull. Behaviour continued for 10 minutes. PSO gave clearance for ramp up 10 minutes after voluntary approach was determined based on bow riding/vessel attraction behaviour. Depth data unavailable.	unk
8/19/2017	22:01		Clear	S	3	10	41 00.7	71 41.6	113	579	Dolphin spp.		100	5	bow riding, porpoising	Ramping up	Dolphins sighted (thermal camera) again porpoising toward bow, and attempting to bow ride. Several dolphins sighted at 22:08 off starboard side of vessel (close proximity to vessel, approx 150m from sound source), and were swimming with the vessel, towards the bow. At 22:13, approximately 6 dolphins were sighted 300-350 behind sound source (Thermal camera 1), then began porpoising directly at vessel, along the port side towards the bow. At 02:18 (thermal camera 2) the dolphins were seen again swimming alongside the portside of the vessel (200m from sound source), and at 22:21 they turned and swam away from the vessel, at which point lost sight of them. Distances estimated with RADES software. Depth data unavailable.	0:20
8/19/2017	22:57	160	Clear	S	3	10	40 59.1	71 43.5		579	Dolphin, Short-beaked Common	25	500	6			Last HF click train, still hearing occasional whistle observed on the spectrogram	1:16
8/19/2017	23:00	154	Clear	S	3	10	40 59.3	71 43.3		579	Dolphin, Short-beaked Common						Still hearing LF whistles; last whistle detected at 23:09, no vocalizations then until 23:16	1:13
8/19/2017	23:16	157	Clear	S	3	10	40 59.4	71 42.4		579	Dolphin, Short-beaked Common	110	500	13		Chirp and multibeam sounder powered on.	Additional HF click trains detected; as dolphins were again detected within the 500 m EZ after not being detected in that range for the previous 19 minutes; a second power down was initiated	0:58
8/19/2017	23:45		Clear	S	3	10	41 01.0	71 40.4	114	579	Dolphin, Short-beaked Common		75	12	bow riding, porpoising	Powered down	PSO went on deck with nightvision to observe/dolphin species. Dolphins sighted swimming with vessel and attempting to bow ride on both sides of bow. Observed bow riding behaviour for over 10 minutes, and determined dolphins approach to be voluntary as outlined by the IHA. PSO gave clearance for ramp up at 23:56. Did not record depth. Dolphins still visible via thermal cameras and nightvision bowriding and following vessel at end of shift (00:00)	unk
8/19/2017	23:57	150	Clear	S	3	10	41 01.4	71 39.6		579	Dolphin, Short-beaked Common	30-65	500	13			Visual observer confirmed that dolphins had been bow riding for more than 10 minutes and gave clearance for ramp up; dolphins last detected at 00:13	0:16
8/20/2017	0:59	170	Clear	S	3	10	41 00.5	71 41.3		580	Dolphin spp.	60-110	500	2		All HRG active	HF click trains from at least 2, possibly 3, dolphins were detected at an initially bearing of 60 degrees s ahead of the hydrophone. They were last detected at a bearing of 111- degrees at 01:01. Due to the brevity of the detection, the exact range of the dolphins could not be determined; however, as the vocalizations were HF, the dolphins were estimated to be within 500 meters	0:02
8/20/2017	1:21	190	Clear	S	3	10	41 01.3	71 39.9		581	Dolphin, Short-beaked Common	22	500	3		Silent	While still powered down/silent from previous detection (#580), additional dolphins were detected via HF click trains within the 500 m EZ. Initial detection consisted of HF click trains at a bearing of 22 degrees ahead of the hydrophones and faint whistles from 2-4 dolphins. From 01:21 to 01:33, faint sinusoidal whistles were observed on the spectrogram and audible and HF click trains were observed between 20-30 degrees. However none of the click trains were long enough to get a clear tracked range. At 01:35 the whistles became louder and clearer, and at 01:37, the visual observer confirmed that the dolphins were bow riding. Whistles and HF click trains continued to be detected until 01:47 when the vessel began to turn around. At 01:50 UTC, clear click trains on both the LF and HF click detectors were observed at a bearing of 100 degrees astern of the hydrophones moving ahead to a bearing of 60 degrees, ending at 01:51. From then until the end of the detection, only whistles continued to be detected.	2:57
8/20/2017	1:37	175	Clear	S	3	10	41 02.1	71 38.7	115	581	Dolphin, Short-beaked Common		75	8	traveling with the vessel on the port side (bow riding), porpoising, appeared to be feeding.	power down	Sighting coincided with acoustic detection 581. PAM continued to detect clicks and whistles. PSO went up on deck with nightvision and observed common dolphins traveling with the vessel, bow riding, porpoising, and feeding, 75m away from sound source. Maintained visual contact with them for 10 minutes as they were swimming along the vessel and was able to determine voluntary approach (attempting to bowride and following/swimming with the vessel)/vessel attraction behavior. Gave clearance to ramp up at 01:57. Dolphins continued to bow ride until end of PSO shift (0300). Did not record bearing to vessel.	1:23
8/20/2017	4:00	154	Clear	S	1	10	40 57.5	71 45.3		581	Dolphin, Short-beaked Common	37-123		5			AD 581 still ongoing at shift change; HF click trains still between 20-30 degrees and occasional faint whistle; at 04:06 HF click trains were tracked to a range of 21 meters and a bearing of 66 degrees; At 04:10 the vessel began a turn and dolphin vocalizations increased to HF click trains between 37-123 degrees with amplitudes up to 173 dB and frequencies up to 225 kHz; also heard were low frequency clicks pulses and buzzes. The last vocalizations of the detection occurred at 04:18.	0:18

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
8/20/2017	6:25	78	Clear	S	2	10	40 58.7	71 52.3	116		Whale, Humpback	15	475	1	blows, diving	running survey lines (chirp, sidescan sonar, multibeam sounder active)	two blows sighted off the starboard side, 475m away from sound source. After the second blow the dorsal was visible; the animal appeared to be traveling parallel to the vessel in the opposite direction before diving (saw fluke immediately after dorsal sighting) Called for shut down at 06:26. The next sighting was at 06:33; it was at the aft, still in the mitigation zone about 300m away from the sparker.	0:08
8/20/2017	7:14	78	Clear	S	2	10	40 58.9	71 52.2	117		Whale, Humpback	140	850	1	fin slaps, blows	shut down	Whale was seen 850m away from the source off the port side, fin slapping at 07:14. Several blows were seen after that until 07:26, farther in the distance. 1600m from vessel at last sighting	0:12
8/20/2017	11:28	125	Clear	W	2	10	40 58.1	71 47.6	118		Whale, Humpback	155	1675	1	transit, dive/fluke, blow	Survey line, Sparker, chirp, sidescan sonar, multibeam sounder powered on	Sighted off port bow, saw 2 broad bushy blows. Sighted again at 11:36, saw 3 blows approx 2000 m from sound source at bearing 110, (1st blow taller/plume shaped, 2nd/3rd were shorter/bush shaped). Whale then dove at 11:38 and displayed fluke and was transiting east. Whale sighted again at 11:46 off bow, approx 875 m from sound source, bearing 100. Sighted 3 more blows (1st taller plume shaped, 2nd & 3rd shorter/bush shaped), then arched back and dove at 11:48, but did not display fluke. Whale sighted again at 11:52, 3 broad/bush shaped blows observed before arching back and diving/fluking at 11:54, at distance of 1000m from sound source, bearing 060, heading opposite direction of the vessel. Vessel then turned at end of line, and lost sight of whale. (distances estimated using reticled binoculars)	0:26
8/20/2017	14:01	116	Clear	WSW	2	10	40 57.9	71 46.9	120		Whale spp.	62	1600	1	only one blow was visible	Survey line, Sparker, chirp, sidescan sonar, multibeam sounder powered on	Only saw one blow at 14:01. Direction of travel unknown.	0:00
8/20/2017	14:15		Clear	WSW	2	10	40 58.3	71 48.2	121		Whale, Humpback	68	1600	1	transit, dive/fluke, blows	Survey line, Sparker, chirp, sidescan sonar, multibeam sounder powered on	Sighted 2 blows on starboard side of vessel, followed by dive. Displayed fluke. Did not record depth	0:01
8/20/2017	14:26	118	Clear	WSW	2	10	40 58.3	71 48.4	122		Whale, Fin	150	1000	1	transit, 2 blows (no other behaviour observed)	Survey line, Sparker, chirp, sidescan sonar, multibeam sounder powered on	Sighted off port bow as vessel was turning to port after end of survey line. Two tall blows, and then whale was not sighted again	0:02
8/20/2017	14:40	125	Clear	WSW	2	10	40 57.9	71 47.3	123		Whale, Fin	250	800	1	transit, dive	Survey line, Sparker, chirp, sidescan sonar, multibeam sounder powered on	Sighted off starboard side of vessel. Sighted 2 tall elliptical shaped blows, and one of lesser height before dive. Whale rolled back prior to dive. Dorsal fin sighted but difficult to see (approx 1200m from sound source at dive, 14:43). Very sleek profile and long/large bodied. Sighted again at 14:47 approx 2000m from sound source, 2 more tall elliptical blows, then appeared to dive and was not seen again. Over 2km from sound source at 2nd dive, swimming away from vessel. Whale did not show fluke during either dive.	0:11
8/20/2017	18:36	134	Clear	W	2	10	40 57.6	71 46.5	124		Whale spp.	270	1500	1	surfacing, diving	Survey line, Sparker	broad bushy blows spotted 270 degrees forward of bow at 1500 m (Distance estimated using reticled binoculars). Whale resurfaced at 278 degrees at 18:42 forward of bow at 1300 m before diving again. Closest distance to vessel was 1300 m. Whale (a single blow) seen again at 1600m off stern (vessel hard turned) at 18:46	0:10
8/20/2017	19:01	161	Clear	W	2	10	40 57.4	71 45.0	125		Whale, Humpback	50	1800	1	transit, dive, fluke	Survey line, Sparker, chirp, sidescan sonar, multibeam sounder powered on	Sighted off port/stern of vessel. Observed 3 broad bush shaped blows, whale then arched back and dove, displaying fluke. Not seen again after dive.	0:01
8/20/2017	19:37	122	Clear	W	2	10	40 58.3	71 48.3	126		Whale spp.	210	900	1	blow (no other behaviours observed)	Survey line, Sparker, chirp, sidescan sonar, multibeam sounder powered on	Only single blow sighted.	0:00
8/20/2017	20:14	128	Partly Cloudy	WSW	3	10	40 57.9	71 48.2	127		Whale spp.	220	2000	1	blow (no other behavior observed)	Survey line. All HRG equipment powered on.	Single blow sighted and whale was not seen again. Adult/juvenile/Call unknown.	0:00
8/20/2017	21:44	138	Partly Cloudy	WSW	3	10	40 58.1	71 46.1		582	Dolphin, Short-beaked Common	22	143	6		All sources active	HF click trains were tracked inside mitigation zone. At 21:46 all equipment was powered down. Ramp up resumed with detection ongoing at 22:07.	5:34
8/20/2017	21:48	140	Partly Cloudy	WSW	3	10	40 56.9	71 45.1	128	582	Dolphin, Short-beaked Common	30	150	12	porpoising, bow riding, swimming with vessel at close range	Power down	Following PAM detection and power down, dolphins sighted on camera 2(port) 150m from sound source and swimming toward vessel. Then sighted again approximately 50m from the sound source. PSO went on deck at 21:54 to confirm species id and observe behavior with night vision. Dolphins were observed attempting to bow ride and swimming with alongside the vessel at close range (within 2 m) from hull. This behavior was observed for over 10 minutes. PSO gave clearance for ramp up at 22:06 (in accordance with IHA), as their approach was determined to be voluntary based on observed behavior (attempt to bow ride/vessel attraction/ swimming with vessel close to hull). Dolphins did not appear to be in distress at any time, and no change in behavior was noticed when ramp up began.	0:20
8/20/2017	23:20	144	Partly Cloudy	WSW	3	10	40 57.3	71 45.6	129	582	Dolphin, Short-beaked Common		75	7	porpoising, bow riding, swimming with vessel at close range	Survey line. All HRG equipment powered on.	PAM detection 582 has continued inside the mitigation since sighting 128 (21:48). 4 dolphins sighted on thermal cam 2 (port) swimming toward bow. PSO went on deck at 23:23 to id species and observe behavior. 6-8 common dolphins observed attempting to bow ride and swimming with/alongside the vessel within 2m of the hull. Observed this behavior for an additional 10 minutes, then returned to watch thermal camera. Sighted 3-4 dolphins on camera 2(port) at 23:42, then seen porpoising toward vessel within 50m of the sound source. PSO went on deck again at 23:45 to observe behavior and common dolphins were still attempting to bow ride and swimming with the vessel within 2 m of hull. Sighted 3-4 dolphins on camera 2 (port) at 23:48 alongside the vessel, and 3 dolphins on cam 3(stbd) 300m from sound source that then swam toward the vessel within 50m of sound source. At 23:53 sighted 3 dolphins on cam 3 (stbd) approx 300-400m from sound source that then swam back toward the bow. At 23:56 sighted 2 dolphins approx 200m from sound source on cam 3 that were porpoising and milling.	3:40

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
8/21/2017	1:11	122	Partly Cloudy		3	10	40 59.2	71 43.0	130		Whale spp.		800	1	only blows visible	Survey line. All HRG equipment powered on	Sighted two blows 800 m from source on thermal camera #1 (aft camera) next two blows were seen at 01:14, 1000 m from source off the stern	0:03
8/21/2017	3:45	151	Partly Cloudy	S	2	10	40 57.8	71 45.4		583	Dolphin spp.		600	1		All sources active	Faint whistles detected outside of mitigation zone. Unable to determine bearing/direction of travel.	0:01
8/21/2017	4:08	153	Partly Cloudy	S	2	10	40 58.6	71 44.0		584	Dolphin spp.		700	1		All HRG active	Three small whistles 11-13 KHz were observed on the spectrogram but were not audible. As no other vocalizations were detected, the dolphin's exact distance and bearing could not be determined. The PSO went outside with the night vision and could not locate the dolphin, indicating that it was at a distance greater than 500 meters.	0:01
8/21/2017	5:55		Partly Cloudy	SW	2	10	40 58.0	71 45.1	132		Whale, Minke	98	375	1	traveling, diving	Shut down All HRG equipment	whale sighted 300 m off the bow directly in front of the vessel, saw 2 blows and the dorsal side, followed by a dive. Did not see the whale again. Last sighting at 05:55. Blows and dorsal fin were visible at the same time. Adult/Juvenile/Calf unknown. Depth data unavailable.	0:00
8/21/2017	6:45		Partly Cloudy	SW	2	10	40 59.7	71 42.3	133		Whale spp.	290	2050	1	traveling, diving	Shut down All HRG equipment	broad bushy blow and fluke were visible, but it was too far away to see fluke shape and color variation. Sighted again at 06:53, 800m off the bow, bearing 120. Only small part of the back was visible- no blows or dorsal fin. Saw part of the back again at 06:59, bearing 310, 900 m away as vessel was turning and equipment ramping up. We turned and were heading away from the whale. Depth data unavailable.	0:14
8/21/2017	9:09	138	Clear	W	1	10	41.00.0	71 41.8	134		Whale, Humpback	345	1500	1	Breaching, diving, surfacing, fluking	Survey line. All HRG equipment powered on	Sighted full breach 2 times at 345 degrees, 1500 m from vessel (distance estimated using reticled binoculars). Long slender white pectoral fins and large black body clearly visible during breaches. At 09:11, 3 bushy blows approximately 3 m in height seen at 340 degrees and 1500 m away, followed by a fluke with several nicks on trailing edge. Whale last seen at 09:18. Whale's direction of travel varied between blows, and its closest approach to vessel: 1500m.	0:09
8/21/2017	14:05	151	Partly Cloudy	SW	1	10	40 59.6	71 43.3	136		Whale, Minke	185	650	1	traveling	Survey line. All HRG equipment powered on	Sighted whale slightly break surface with dorsal fin area 3 times, seemed to be swimming at high speed. Did not observe blow or dive.	0:02
8/21/2017	14:07	151	Partly Cloudy	SW	1	10	40 49.4	71 43.3	137		Whale, Humpback	250	1200	1	transit, dive/fluke, blows	Survey line. All HRG equipment powered on	Sighted 4 blows, followed by dive. Arched back and displayed fluke. Sighted 2nd-4th blow and dive through binoculars. Did not see whale again after dive.	0:03
8/21/2017	14:47	149	Partly Cloudy	SW	1	10	40 58.0	71 44.1	138		Whale, Minke	226	900	1	traveling	Survey line. All HRG equipment powered on	Sighted small whale at 14:47, no blows visible, but could see small part of the dorsal; dark dorsal side with falcate fin. First sighted 900m away from the source, and again at 14:50 650m away from source. Was not seen again	0:03
8/21/2017	16:57	154	Partly Cloudy	SW	1	10	40.59.4	71.42.8	139		Whale, Fin	122	1800	1	blows only (no other behavior witnessed)	Survey Line. All HRG equipment running	Sighted 1 tall elliptical blow 1800 m off the vessels bow (distance estimated using a reticled binoculars) at 122 degrees. No other behavior witnessed.	2:00
8/21/2017	17:22	157	Partly Cloudy	SW	1	10	40.59.9	71.42.5	140		Whale, Humpback	75	1800	3	Breaching, diving, fluking	Survey line. All HRG equipment powered on	2 whales breached 1800 m (distance estimated using reticled binoculars) off the vessels bow at 75 degrees at 17:22. Both whales had long slender white pectoral fins and large black bodies. At 17:29, several tall bushy blows were seen at 1200 m, with a distinct hump visible on leading edge of dorsal fin. A blotchy white and black fluke was visible on one of the whales when it dove at 17:31, and fluke had several nicks on trailing edge of fluke. The other whale did not fluke. At 17:38, 2 more blows sighted followed by a dive (single humpback whale) 800m off bow of vessel at bearing 170. 4 more tall/broad plume shaped blows sighted at 17:40-17:45, bearing 080, 1600m off bow of vessel. 2 humpback whales sighted diving and displaying flukes at 17:45. At 18:02, blows and dive/fluke were sighted again at 8 degrees and 1800 m.	0:40
8/21/2017	18:13	157	Partly Cloudy	SW	1	10	40.59.4	71.42.9	141		Whale spp.	330	1700	1	blows only (no other behavior witnessed)	Survey Line. All HRG equipment powered on	4 Bushy blows sighted 1700m off starboard side of vessel (distance estimated using reticled binoculars). Did not see body or dorsal.	0:02
8/21/2017	19:07	151	Clear	SW	2	10	41 00.9	71 38.4	142		Whale, Humpback	10	1600	1	Transit, dive/fluke	Survey line. All HRG equipment powered on	Sighted off port side of vessel (sighted through binoculars after 1st blow), 3 blows, followed by dive/fluke.	unk
8/21/2017	19:21	137	Clear	SW	2	10	41 01.3	71 36.9	143		Whale spp.	95	1500	1	blows only (no other behavior witnessed)	Survey line. All HRG equipment powered on	Sighted off port bow. Only one blow sighted. Unable to determine direction of travel, or adult/juvenile/calf.	0:00
8/21/2017	20:35	141	Clear	SW	2	10	41 01.2	71 37.5		586	Dolphin spp.	20	140	3		All HRG active	Three minute detection. Click trains on HF were localized inside the mitigation zone and power down was requested at 20:36.	0:03
8/21/2017	21:21	137	Clear	SW	2	10	41 01.6	71 36.2	144	587	Dolphin, Short-beaked Common		49	6		Silent	Click trains registered on HF during the 60 minute EZ clearance following powerdown at 20:36 (AD 586) . PSO identified species as common dolphin with night vision lens and established voluntary approach to bow ride. Ramp up began at 21:38. Unable to determine bearing.	0:57
8/21/2017	21:27	137	Clear	SW	2	10	41 01.8	71 35.6	144	587	Dolphin, Short-beaked Common		75	6	bow riding, swimming with/alongside vessel, feeding	Power down from PAM detection	Dolphins were again detected in close proximity to vessel by PAM. PSO went on deck with nightvision to id species and observe behavior. Dolphins observed attempting to bow ride and swimming with and alongside vessel within 2m. This behavior was observed for over 10 minutes, and PSO gave clearance for ramp up at 21:38	0:13
8/21/2017	22:28	131	Clear	SW	2	10	40 01.3	71 36.9	145	588	Dolphin spp.	35	200	3		All HRG active	Dolphin click trains detected inside mitigation zone less than one hour after previous detection. No mitigation action required.	0:41
8/21/2017	22:54	151	Clear	SW	3	10	41 01.1	71 37.5	145	588	dolphin spp.		75	4	porpoising toward bow	Survey line. All HRG equipment powered on	Sighted on camera 3 (starboard) following PAM detection at 22:50, porpoising toward vessel, then towards bow within a few meters of the hull. Dolphins then sighted on camera 1 (aft) porpoising alongside the vessel and towards the towed equipment. Went up on deck at 22:58 with nightvision to attempt to id species and observe behavior but could not find them again. Since it was less than 60 minutes since last detection in the mitigation zone, did not request power down.	0:04

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
8/22/2017	0:17	134	Clear	SSW	3	10	41 00.2	71 40.8		589	Dolphin spp.	85	500	2		All HRG active	At 00:17 click trains from at least two dolphins were detected on the high frequency click detector at bearings between 65 and 90 degrees to the hydrophones. The click trains moved astern to a bearing of 126 degrees by 00:19, and at 00:20 a few faint harmonics were observed on the spectrogram but were not audible over the headphones. From 00:21 to 00:22 the HF click trains moved further astern to a bearing of 135 degrees, and a single faint whistle was detected audible and on the spectrogram. The final vocalizations of the detection occurred at 00:23 with a final harmonic on the spectrogram and a HF click train at a bearing of 140 degrees. The HF click trains were too short to be reliably tracked, however as the LF vocalizations were very faint it was determined that the dolphins were at an estimated range of 500 meters.	0:06
8/22/2017	3:10	138	Clear	SSW	3	10	41 01.9	71 34.7		590	Dolphin spp.		600	1		All HRG active	Dolphin did not occur inside mitigation zone. No action taken. Unable to determine bearing.	0:16
8/22/2017	7:52	126	Clear	SSW	3	10	41 01.1	71 35.7	146		Whale spp.	260	1850	1	only blows were visible	Survey lines. All HRG equipment powered on.	two bushy blows sighted 1800m off the starboard bow. Saw two blows again at 08:09, same location and distance	0:17
8/22/2017	14:52	126	Fog or Thick Haze	S	4	7	41 01.7	71 37.1	149		Whale, Minke	185	65	1	traveling along side starboard side of vessel	Ramp up	Minke whale surfaced next to the boat 30m off the starboard side. PSO heard the blow first, then saw dorsal less than a second later. Had a high back arch with a falcate fin set farther back on the body, body was dark gray. Appeared to be a small whale (25-30 ft). Was seen again at 14:53 farther away from the vessel on the starboard side, traveling towards the stern.	0:01
8/22/2017	17:18	157	Clear	S	4	10	41.01.8	71.30.2	150		Whale, Humpback	183	1800	18	breaching, lunge feeding, diving, fluking, milling, tail/fin slaps	Survey line. All HRG equipment running	Large group of humpbacks (15-20) initially sighted off the bow from 183 to 195 degrees at 2000 m (Distance estimated using reticled binoculars). Whales fully breached many times during the sighting. During breaches, long slender pectoral fins were visible along with long ventral throat grooves. Feeding lunges and skimming the surface with mouths open were observed, often with large groups of birds in close proximity to the whales heads. Blows were broad and bushy, some tall and some of lesser height. Flukes often visible during dives, with white patches on undersides and jagged trailing edges. 1 whale seen slapping its pectoral fin at the surface. Common dolphins and Fin whales witnessed within group. Closest distance to vessel of any humpback whale during the duration of sighting was 50 meters. Difficult to estimate total number of whales as they were spread over a large area, and consistently diving/breaching/blowing. Last sighting within 500m of sound source at 19:40.	2:23
8/22/2017	18:10	157	Clear	S	4	10	41.01.8	71.30.2	151		Whale, Fin	290	75	4	milling, feeding, diving, breaching	Shut down All HRG equipment	1 Fin whale sighted 75 meters (distance visually estimated by PSO) travelling off the starboard side in the opposite direction of vessel, within group of humpback whales. Whale had a tall dark falcate dorsal fin near back third of its body. Body bent like a wheel while diving. Blows were tall and elliptical (about 5 meters in height). Difficult to estimate total number due to large pod of whales and constant blows, breaching, diving amongst group. 3 fin whales sighted simultaneously at one point. Closest distance of whale to vessel was 75 meters. Several more fin whales sighted amongst large group of whales.	0:46
8/22/2017	18:01	144	Clear	S	4	10	41 01.9	71 26.2	152		Dolphin, Short-beaked Common	185	100	12	porpoising, leaping, feeding, bow riding, milling	Shut down All HRG equipment	a group of 10-15 dolphins seen 5 m off the bow (distance estimated by PSO). Dolphins had slender body, with hourglass shape pattern on their lateral side, with tan patch forward, and grey patch aft. Dolphins were seen swimming under the bow of the vessel, Dolphins seen porpoising, and breaching.	0:11
8/22/2017	19:01		Partly Cloudy	S	4	10	41.02.0	71.27.5	153		Dolphin, Short-beaked Common		50	15	porpoising, leaping, feeding, bow riding, milling	Shut down All HRG equipment	Dolphins sighted again after having left area at 18:12. Potentially the same group as sighting 152. Swam around the vessel for a short time, attempting to bow ride and swimming at close range with the vessel. Did not record bearing.	0:07
8/23/2017	6:02		Partly Cloudy	SW	5	10	41 02.0	71 25.2	154		Whale, Humpback	205	850	8	traveling, diving, fluking, breaching, lunge feeding	Shut down for weather	8-10 whales sighted 850m off starboard bow (distance estimated using reticled binoculars). Whales seen fully breaching, lunge feeding, and had tall bushy blows. At 06:35, 3 whales sighted 150 m off the bow breaching and diving, and many additional blows were seen all around the vessel (7-8 whales) 350-700m away. At 07:15, 3-5 whales were still in sight, approx 1000-1600m from the vessel. Depth data unavailable.	1:18
8/23/2017	6:08		Partly Cloudy	SW	5	10	41.02.0	71.25.2	155		Whale, Fin	205	100	2	travelling, diving	Shut down for weather	at least 2 whales sighted 100 m off starboard bow, mixed in with other humpback whales. Blows were tall (noticeably taller than humpbacks blows) and elliptical. Closest approach to vessel was 200 m. Last time of sighting was 06:25 on the port side stern 900m away. Depth data unavailable.	0:17
8/23/2017	6:15		Partly Cloudy	SW	4	10	41.01.1	71.27.86	156		Dolphin, Short-beaked Common	335	10	10	porpoising, leaping, attempting to bow ride, swimming under the boat	Shut down for weather	a pod of dolphins (6-10) sighted 10 m off bow (distance estimated with naked eye). Porpoising, bow riding and swimming underneath the vessel for just over an hour before leaving the area.	1:06
8/23/2017	9:20		Partly Cloudy	SW	4	10	41 03.9	71 28.5	157		Whale, Fin	210	1600	2	Blows at surface	Shut down for weather	Two humpback whales sighted off port side bow at about 1600m (distance estimated using reticule binoculars); Tall, bushy blows visible with naked eye along with hump on dorsal surface when animals approached closer to the vessel while it was in transit; closest approach was 1100m. # Adult/Juvenile/Calf unknown. Depth data unavailable.	0:13
8/23/2017	9:25		Partly Cloudy	SW	4	10	41 03.5	71 28.2	158		Dolphin, Short-beaked Common	205	150	10	Bow riding; porpoising	Shut down for weather	8-15 dolphins seen approaching vessel at about 75m off bow; began bowriding and porpoising around the front of the vessel. # Adult/Juvenile/Calf unknown. Depth data unavailable.	0:28

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
8/23/2017	11:54		Continuous layer of clouds	SW	3	10	41.02.9	71.26.9	159		Whale, Humpback	277	1600	2	Transit, dive, fluke	Shut down for weather	2 Whales sighted 1600m off port side of vessel (distance estimated using reticled binoculars). 4-5 tall bushy blows followed by dives: 1 whale showed a splashy white fluke with several nicks on the trailing edge. Both whales had humps on leading edge of dorsal fin. Sighted again at 11:59, bearing 330, approx 800m off the port side of vessel. 9 broad plume and bush shaped blows, followed by dive (simultaneous) at 12:03. 1 whale displayed fluke, the other did not. Sighted again at 12:07, approx 700m off port stern of vessel. 8 broad plume and bush shaped blows, followed by another simultaneous dive (did not display flukes) at 12:10. Vessel then turned to starboard and whales not seen again. Depth data unavailable.	0:16
8/23/2017	12:19		Continuous layer of clouds	SW	3	10	41 03.1	71 25.2	160		Whale, Humpback	95	1600	1	transit, dive, fluke	Transit to survey site. No HRG equipment deployed	Whale sighted off port side of vessel. Sighted 3 broad/tall plume shaped blows, followed by dive/fluke at 12:23, arched back prior to dive. Sighted again at 12:28, several similar shaped blows followed by another dive (did not fluke). Whale not seen again. Depth data unavailable.	0:13
8/23/2017	12:21		Continuous layer of clouds	SW	3	10	41 03.1	71 25.1	161		Whale spp.	40	2500	3	Blows (no other behavior observed)	Transit to survey site. No HRG equipment deployed	Blows sighted off port stern of vessel towards Block Island. Sighted 20-25 blows during sighting, at distances of approx 2500-3000km from vessel. Depth data unavailable.	0:11
8/23/2017	18:48	160	Partly Cloudy	W	2	10	41.01.9	71.23.0	162		Whale, Humpback	240	4000	10	Milling, lunge feeding, diving, fluking	Survey line, all HRG equipment powered on	A group of 15-20 (Humpback and Fin) whales sighted initially 4000m ahead of vessel (distance estimated using reticled binoculars). Whales positively identified with binoculars as vessel approached the pod. Associating with Fin Whales, and later common dolphins. Large black body, small dorsal fin with hump on leading edge, white patches on underside of flukes, broad/bushy plume shape blows (2-3m height). Difficult to estimate the total number of Humpbacks present, as they were spread out over a wide area, and were frequently blowing/diving along with Fin Whales. Closest approach was approximately 200m from vessel (post shutdown). Last sighting within 500m EZ was at 19:33.	1:17
8/23/2017	18:48	160	Partly Cloudy	W	2	10	41 01.9	71 23.0	162		Whale, Fin	240	4000	5	Milling, feeding, diving	Survey line, all HRG equipment powered on	Tall elliptical blows sighted amongst group of 15-20 whales, initially 4000 m ahead of vessel, spread out over a large area. Whales positively identified with binoculars as vessel moved closer to pod. Closest approach was approx 300m from vessel (post shutdown). Associating with group of humpback whales, and later common dolphins. Difficult to estimate total number of Fin Whales present, as they were spread over a large area, frequently blowing and diving along with the Humpbacks. Last sighted within 500m EZ at 19:50.	1:17
8/23/2017	19:12		Partly Cloudy	NW	2	10	41.01.8	71.25.0	163		Dolphin, Short-beaked Common	275	575	35	Porpoising, milling, bow riding, feeding, leaping	Shut down all HRG	Large pod of dolphins first sighted approximately 500m off the starboard bow, porpoising towards bow of vessel. Dolphins observed bow riding, circling the vessel, milling and travelling in variable directions. Periodically swam away from and back to the vessel, but consistently came back to the vessel to bow ride. Also sighted associating with the whales nearby. The Dolphins stayed with the vessel until the end of PSO watch on deck, and were detected by PAM within the EZ until the gear was retrieved. Depth data unavailable. # Adult/Juvenile/Calf unknown	unk
8/23/2017	19:43		Partly Cloudy	NW	2	10	41 02. 0	71 25.3	163	591	Dolphin, Short-beaked Common	20	100	8		Silent	Multiple HF click trains were localized inside the mitigation zone. Clearance could not be given to finish line before transiting to dock. Depth data unavailable.	1:09
8/23/2017	21:23		Partly Cloudy	NW	2	10	41 01.8	71 25.2	164		Whale, Humpback	260	550	1	Transit, dive	Preparing to transit. No HRG equipment deployed	4 broad plume-like blows sighted on portside thermal cam, followed by a dive at 21:27. Sighted again 500m from vessel (aft cam) at 21:31, 4-5 additional blows followed by another dive. Dorsal appeared relatively small, and blows characteristic of humpback whale. Depth data unavailable.	0:11
8/23/2017	21:35		Partly Cloudy	NW	2	10	41 01.8	71 24.4	165		Dolphin spp.	90	300	25	Transit, porpoising	Preparing to transit. No HRG equipment deployed	Approx 6 dolphins first sighted on Cam 1 (aft) swimming towards vessel, followed by additional dolphins nearby vessel on cameras 2 & 3 (port/stbd). Also noticed a larger group of dolphins (15-20) in the distance on camera 1/3 (aft/stbd) approx 2km away. Approx 8-12 dolphins stayed with the vessel until 22:15, periodically visible on the thermal cameras. Depth data unavailable.	0:40
8/25/2017	12:44	157	Partly Cloudy	W	2	10	41.01.8	71 31.8	166		Whale spp.	120	2000	1	Blows (no other behavior observed)	Survey lines. All HRG equipment powered on.	2 bushy plume shaped blows sighted off port side of vessel. 2 additional blows sighted again at 12:52 (bearing 045). Whale not seen again.	0:09
8/25/2017	12:56	156	Partly Cloudy	W	2	10	41 01.8	71 32.5	167		Whale, Humpback	105	3500	5	Diving, fluking, pectoral fin slap	Survey lines. All HRG equipment powered on.	Tall plumelike blows sighted approx 3500m off port bow (distance estimated using reticled binoculars). 4-6 whales estimated based on number and frequency of blows in the area. Repeated blows seen throughout the duration of sighting. At 12:56, two whales seen diving and displayed flukes, and again at 13:01. At 13:27-13:34, one humpback whale (bearing 090, distance 2000m) was sighted slapping its pectoral flipper repeatedly, followed by multiple blows and another dive/fluke. More blows sighted at 13:38, 2000-2500m off the port side of vessel. Unable to determine direction of travel, may have been milling, variable or stationary.	0:42

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
8/25/2017	13:09	157	Partly Cloudy	NNW	2	10	41 01.8	71 30.1	168		Whale, Fin	138	2050	3	traveling, diving	Survey lines. All HRG equipment powered on.	Sighted multiple blows off the starboard side, 2000m away. At 13:14 (bearing 240), 1600m off starboard side of vessel, 7-8 blows sighted in rapid succession, followed by 2 dives, where whales rolled their backs, displayed dorsal fins, but did not display flukes. At 13:17 whales were sighted again, approx 700m from sound source off the starboard stern. They broke the surface several times, swimming across the stern (stbd to pt), at a fast pace. Multiple blows then seen, followed by 3 dives, where profile view of dorsal fins were visible. They again rolled their backs, and displayed tail stock but not the flukes (these 3 dives confirmed the species id). Whales sighted again at 13:23 by multiple very tall, elliptical blows, again followed by dives at 13:26. Whales were not seen again.	0:17
8/25/2017	13:56	162	Partly Cloudy	NNW	2	10	41 01.5	71 28.9	169		Whale, Humpback	0	2000	5	Diving, Fluking, Pectoral flipper slap, breaching, feeding lunges	Survey lines. All HRG equipment powered on.	Bushy blow sighted 2km off starboard side, toward Block Island. Then 4 whales head sighted through binoculars breaking the surface simultaneously (appeared to be feeding). Multiple breaches, dives displaying flukes, feeding lunges, and a large number of blows sighted. Direction of travel difficult to determine, but appeared to be variable, staying in the same general area during a probable feeding event. Potentially the same group of whales as sighting # 167. Approx 2-2.5 km from vessel at last sighting.	0:29
8/25/2017	14:10	161	Partly Cloudy	WNW	2	10	41 01.5	71 30.3	170		Whale spp.	205	875	1	Blows (no other behavior observed)	Survey lines. All HRG equipment powered on.	3 blows sighted off port bow. Approximately 900m from sound source at last sighting.	0:03
8/25/2017	15:48	133	Partly Cloudy	W	2	10	41 01.8	71 35.5	171		Whale, Humpback	45	2000	2	Blows (no other behavior observed)	Survey line. All HRG equipment powered on	Plume-like blows seen at 15:45 via naked eye. Distance estimated at 2000m off port side using reticule binoculars; Last seen at 16:12 at 1600m off port side near Block Island	0:24
8/25/2017	16:25	154	Partly Cloudy	W	2	10	41 01.8	71 31.7	172		Whale, Humpback	75	3000	6	Milling, diving, fluking	Survey line. All HRG equipment powered on	Tall plume-like blows sighted 3000m off vessels port bow (distance estimated using reticled binoculars). Estimated 5-8 whales based on number and frequency of blows in the area. Group of whales are likely same group we saw earlier today (sighting number 165 based on location of and estimated number of whales in group). Whales remained in same general area as our vessel motored away. Group of whales last seen 8000 meters off stern, bearing 005.	1:23
8/25/2017	17:10	147	Partly Cloudy	W	2	10	41 01.8	71 27.3	173		Whale, Fin	85	1500	1	Swimming at surface, diving, blows	Survey line. All HRG equipment powered on	Whale initially sighted approx 1500m off port side of vessel (distance estimated using reticled binoculars). Whale travelling opposite in direction to our vessel, but with a crossing pattern towards our stern. Whale last sighted 600 m from sound source, bearing 025, crossing stern towards starboard side of vessel.	0:05
8/25/2017	17:54	150	Partly Cloudy	W	2	10	41 01.9	71 22.6	174		Whale, Fin	160	1275	2	Feeding, Diving	Survey line. All HRG equipment powered on	3 blows sighted off starboard bow. Sighted several more blows followed by dive at 18:02, 600m from sound source (rolled back and displayed dorsal fin, tail stock, and part of fluke) sighted 1200m from sound source. Sighted again at 18:08, approx 475m from sound source and PSO requested shut down. Last sighted 1400m off stern, bearing 305. (T. Horwell briefly covering watch for C. Brooks at initial time of sighting)	0:26
8/25/2017	19:20	138	Partly Cloudy	W	2	10	41 01.9	71 24.2		592	Dolphin spp.		800	2		Magnetometer	Faint but audible LF whistles observed on LF Spectrogram and highlighted by Whistle-Moan Detector from 19:20-19:23, 19:25-19:31, and 19:39-19:42; estimated range of 800m. Whistles consisted of upsweeping, downsweeping, and sinusoidal with a frequency between 6-17KHz.	0:22
8/26/2017	0:11	154	Partly Cloudy	NW	2	10	41 01.9	71 27.6		593	Dolphin, Short-beaked Common	23	500	12		All HRG active	at least two dolphins at bearings 23 degrees and 34 degrees. Faint whistles 7-12 kHz were also detected on the spectrogram but not audibly, and the HF click trains moved astern to a bearing of 80 degrees with peak amplitudes of 167 dB. After the sources were silenced at 00:12, multiple overlapping whistles from between four and six dolphins were visible on the spectrogram and became more clearly audible over the headphones. At 00:14 the whistles increased in volume and intensity with frequency ranges between 6 and 24 kHz and amplitudes of 112 dB, and HF click trains were tracked on the map to a range of 67 meters. At 00:16, overlapping HF click trains from at least three dolphins were observed moving astern from an initial bearing of 85 degrees to a final bearing of 128 degrees. The LF whistles from at least five dolphins were continuous. At 00:19 LF clicks, pulses, buzzes and harmonics also began being detected on the spectrogram and audibly, and the HF click trains from at least three dolphins had moved back to bearings between 20 and 40 degrees. From 00:20 until 00:34, HF click trains were observed moving frequently between bearings 20 degrees and 140 degrees, with peak amplitudes up to 185 dB, and LF whistles, clicks, pulses, buzzes and harmonics were also consistently detected. Both HF and LF click trains were tracked during this time to ranges between 14 and 233 meters. At 00:34, the visual observer on shift had, after using the night vision equipment outside, determined that the dolphins were short-beaked common dolphins and that they were voluntarily staying around the vessel bowing and feeding; therefore, clearance was given for the HRG equipment to begin ramp-up. From 00:35 to 00:42, LF whistles, clicks and buzzes continued to be observed on the spectrogram and detected audibly and the HF click trains from at least six individuals were observed consistently between 40 and 140 degrees. During this time, HF and LF click trains were tracked between 52 and 218 meters. At 00:42 click trains on both the LF and HF click detectors were observed moving quickly and steeply astern from 23 to 138 degrees.	2:47

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Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
8/26/2017	0:22	178	Partly Cloudy	NW	2	10	41 01.9	71 27.8	175	593	Dolphin, Short-beaked Common		75	10	porpoising, bow riding, feeding	Survey lines (all HRG)	high frequency clicks were detected on PAM at 00:11, followed by whistles shortly after. Dolphins were not seen on thermal camera until 00:22 (starboard side bow) PSO went on deck with night vision and saw 8-10 dolphins porpoising, bow riding, and feeding on the starboard side. Watched until 00:33 and determined voluntary approach to bow ride/vessel attraction behavior during that time. PSO authorized ramp up at 00:33 based on this behavior (in accordance with IHA). Dolphins were last seen on the thermal camera at 01:30. PAM detections continued until 2:58	2:36
8/26/2017	0:52	144	Partly Cloudy	NW	2	10	41 02.1	71 28.0	176		Whale spp.	227	2000	4	slow swimming	Survey lines (all HRG)	Sighted 4 blows at the same time, 2000 from sound source on the aft camera (camera 1). Appeared to be broad and bushy shaped. Continued to see blows until 00:59	0:07
8/26/2017	3:08	138	Partly Cloudy	NW	2	10	41 01.6	71 30.7		594	Dolphin, Short-beaked Common	25	500	8		All HRG active	from previous detection; possibly correlated. A two second HF click train was observed at 03:08 at 25 degrees followed by multiple LF whistles with harmonics highlighted by the Whistle-Moan Detector. At 03:12 multiple HF click trains lasting between a half and 2 seconds were observed from 0—154 degrees; continuation of LF whistles. A power down was requested from visual at 03:21 due to confirmation of dolphins within the exclusion zone. Triangulation calculated the dolphins at approximately 100m forward of the hydrophones (roughly 85 meters from the center of the exclusion zone). Visual confirmed, via night vision binoculars, that the pod voluntarily approached the vessel and after 10 minutes of observation clearance was given to commence ramp-up of the Sparkler at 03:32. At 03:44 triangulation calculated the dolphins approximately 130m from the center of the exclusion zone. HF clicks train became sporadic and whistles were fainter and thus seldom highlighted by the Whistle-Moan Detector at 03:46. Frequency of HF click trains and LF whistles increased at 03:54; whistles were also louder and consistently highlighted by the Whistle-Moan Detector. HF click trains lasting between 1 and 8 seconds were observed at bearings from 23 to 122 degrees. Whistles consisted of sinusoidal, up and down sweep, and convex. PAM shift change at 04:00. From 04:00-04:10 continuous faint LF whistles were audible and observed on the spectrogram along with an occasional short HF click train between bearings 20-40 degrees. At 04:13 HF click trains from at least 3 dolphins were observed moving astern from a bearing of 51 degrees to a bearing of 130degrees, with peak amplitudes of 175 dB. From 04:16 to 04:17 HF click trains were observed moving ahead from a bearing of 135 degrees to a bearing of 85 degrees. From 04:18 to 04:20 short HF click trains were again observed around 40 degrees, and then at 04:24 a long HF click train was observed moving astern from 66 degrees to 90 degrees with peak amplitudes of 184 dB. By 04:27, the HF click trains were at a bearing of 108 degrees, and were tracked to a range of 309 meters. At 04:28	2:17
8/26/2017	3:21		Partly Cloudy	NW	2	10	41 01.8	71 33.7	178	594	Dolphin, Short-beaked Common		131	3	porpoising, bow riding, feeding on jumping fish	Survey lines (all HRG)	previous PAM detection ended at 2:58; high frequency clicks and whistles were detected by PAM at 03:08 (new PAM detection--had been 10 minutes since last HF detection); triangulated to 100m by PAM operator at 03:21; dolphins were not seen on thermal camera until 03:21 (starboard side bow) at 131m (thermal camera 3-recording made); called for power down at 3:21; PSO went up with night vision and saw 3-5 dolphins porpoising, bow riding, and feeding on the starboard side; dolphins crossed under bow to port side as well; watched until 03:21 and determined voluntary approach to bow ride/vessel attraction behavior during that time; Made the call to ramp up at 03:31; PAM still having HF detections until 4:50 but still hearing whistles after. Not an incidental take, as it was less than 60 minutes since the last detection of common dolphins in the EZ following the previous powerdown when dolphins were determined to be voluntarily approaching the vessel in attempt to bow ride.	unk
8/26/2017	6:06	141	Partly Cloudy	NW	2	10	41 01.9	71 20.6	179		Whale, Fin	220	600	1	porpoising, diving	Survey lines (all HRG)	Tall elliptical blows 600m off starboard side of vessel (distance estimated using reticle binoculars). Whale seen diving, body bent like a wheel during dive. Whale seen at 350 degrees 06:09. Last sighting was at 06:11, aft of vessel, crossing over to starboard side, 900m away from source	0:16
8/26/2017	8:06	138	Partly Cloudy	NW	2	10	41 01.9	71 24.5	180		Whale, Humpback	270	7000	7	Blows at surface; "fluke-up" diving, breaching, fin slaps	Survey lines (all HRG)	Several large, plume like blows seen at 8:06 off the starboard side bow with naked eye at 7000m (distance estimated using reticle binoculars); whale was seen surfacing, blows, and fluked at 8:06 (diving); definitely a humpback based on blow shape and v-shaped fluke. Saw 4 blows at the same time at 08:09 in the same location 4000m away.Saw breaching, diving, pectoral slaps (long, mostly white pectoral fins) At 08:50 7 distinct blows were seen from 7 different whales. Whales last seen 8000 m away at 09:40 at 355 degrees	1:34
8/26/2017	8:30	141	Partly Cloudy	NW	2	10	41 01.9	71 26.9	182		Whale, Fin	270	400	1	surfacing, tall blows	Shutdown all HRG equipment	All HRG equipment shutdown when first sighted. Last sighted in EZ at 08:30 Whale was seen again at 08:45 off the port side at 800m from the source	0:15
8/26/2017	10:18	147	Partly Cloudy	NE	2	10	unk	unk	183		Whale, Humpback	290	4000	6	surfacing, blows, diving, lunge feeding	Survey lines (all HRG)	Several bushy blows first seen at 10:18 approx 4000m off starboard bow (distance estimated using reticle binoculars); whales appeared to be feeding and surfacing as survey vessel headed in their general direction; Closest approach was 700m at 10:32; At 10:34 one humpback surfaced at 115m off the bow (slightly to the starboard side) and crossed the bow; Shut down was called for at 10:34; survey vessel changed course and 2-3 whales were still seen within the 500m exclusion zone off the port side; a pair of whales was seen at 229m off port side surfacing and diving at 10:52; last sighting in EZ was at 10:52; whales seen outside of EZ at 10:54	0:36

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
8/26/2017	10:59	148	Partly Cloudy	NE	2	10	41 01.7	71 24.2	184		Whale, Fin	195	800	3	surfacing, diving	Shutdown all HRG equipment	Initially sighted 800m off starboard side of vessel (distances estimated using reticled binoculars). Tail elliptical blows seen. 2 whales travelling parallel to the vessel in the same direction. Sighted again at 11:10, 1600m off starboard side of vessel, bearing 215. Multiple blows followed by dives at 11:13. Sighted again at 11:28, approx 3500 off starboard side of vessel, bearing 180. 3 whales sighted simultaneously. Multiple blows again, followed by 3 dives at 11:32. Sighted again at 11:42 approx 2000m off port stern (after vessel had turned and heading in opposite direction). Sighted multiple tail blows followed by dives at 11:45. Whales were not seen again.	0:46
8/26/2017	11:55	138	Clear	NE	2	10	41.01.8	71.23.6	185		Dolphin, Short-beaked Common	255	1275	15	porpoising, transit	Ramping up HRG equipment	Dolphins sighted off port bow, then began porpoising toward vessel. PSO requested powerdown once dolphins were less than 500m from sound source. Powerdown occurred before dolphins reached 400m from sound source. Dolphins swam within 100m of port side of vessel, then turned and quickly traveled away from the vessel. Last sighting within the EZ at 12:04. At 12:10, dolphins were approx 1600m off stern of vessel, traveling southeast. At 12:12, dolphins were approx 2500m off stern of vessel, traveling north port to stern.	0:17
8/26/2017	12:11	140	Clear	NE	2	10	41 01.9	71.24.5	186		Whale, Humpback	265	4000	5	diving, fluking	shut down	several tall bushy blows seen 4000 m off vessels bow (distance estimated using reticled binoculars). Whales last seen at 320 degrees, 7000 m away off vessels stern. Based on location of sighting and number of whales, it's likely this group is the same group from sighting # 183.	0:23
8/26/2017	12:13		Partly Cloudy	NE	2	10	41 01.9	71 24.8	187		Whale, Fin	210	2500	1	transit, blows, apparent dive	shut down	4 tall elliptical blows sighted, followed by dive. No fluking. Whale appeared to roll body prior to dive, but difficult to see at this distance. Whale not sighted again. Depth data unavailable.	0:03
8/26/2017	12:20		Partly Cloudy	E	2	10	41 02.2	71 24.7	188		Dolphin, Short-beaked Common	165	300	6	porpoising, vessel attraction, bow riding, chasing towed equipment, swimming with/alongside vessel	shut down	Dolphins sighted off port side of vessel, then swam to side of vessel within 5 m. Dolphins swam to bow, attempted to bow ride, swam underneath bow, toward stern and chased equipment, then back to bow. Dolphins continued this behavior for over 10 minutes, periodically swimming 100-200m away from vessel and quickly returning to the vessel. PSO authorized ramp up at 12:32 based on this behavior, but was then informed that the equipment had been shut down completely for operational reasons, and was not ready for ramp up. Dolphins remained within the mitigation zone until 12:37, then were traveling directly in front of vessel (in same direction as vessel) at distance of 500-800m off bow, until approx 12:45. Depth data unavailable.	0:25
8/26/2017	13:07		Partly Cloudy	SSE	2	10	41 01.9	71 27.7	189		Whale spp.	195	2500	1	blows (no other behavior observed)	shut down	2 blows sighted off starboard bow. Unable to determine direction of travel, or species. Depth data unavailable. Whale not seen again.	0:00
8/26/2017	13:51		Partly Cloudy	SSE	1	10	41 02.3	71 25.1	190		Whale, Humpback	340	3000	4	diving, fluking, feeding lunges, pectoral flipper slapping	Shut down (operational)	First sighted by a large splash and pectoral fin slapping. Then many blows seen in the area, along with feeding lunges, and repeated diving/fluking. Last sighted at horizon, over 7km from vessel. Depth data unavailable.	0:39
8/26/2017	13:56		Partly Cloudy	SSE	1	10	41 02.3	71 22.5	191		Whale, Fin	130	875	3	milling, diving	Shut down (operational)	Initially sighted 2 whales approx 800m off port bow (875m from non active sound source), and one appeared to dive at 13:58, 600m off the bow. At 14:00, 2 fin whales were sighted 300m off the starboard side of vessel, and both dove at 14:00, approximately 325m from non-active sound source. Another whale was sighted approximately 400m off the starboard side of the vessel at 14:01, and then whales were not seen again. PSO confirmed that all HRG equipment was still shut down upon initial sighting, and advised that ramp up must be delayed until 15:01.(distances estimated using reticules). Depth data unavailable.	0:05
8/26/2017	14:10		Partly Cloudy	SSE	1	10	41 02.3	71 23.7	192		Dolphin spp.	20	1600	35	porpoising, traveling	Shut down	Sighted 15-20 dolphins 1600m off port stern, traveling towards vessel. At 14:14, dolphins were approx 700m from sound source (non active), still trailing vessel. Another group of dolphins then sighted at 14:16 same bearing, traveling in same direction, approx 1600m from vessel. At 14:21, dolphins were approx 1000m off port stern, then turned east at 14:26. At 14:31, dolphins were approx 1600m off port stern, and lost sight of them at approx 2000m off port stern. Depth data unavailable. Unable to determine # Adult/Juvenile/Calf.	0:23
8/26/2017	14:42		Partly Cloudy	SSE	1	10	41 02.1	71 21.2	193		Whale, Fin	145	1050	2	Transit, diving	Shut down	Sighted tall blows 1000m off port bow, crossing to starboard. Saw additional blows at 14:45, and dorsal fins and bodies of 2 whales, both diving (rolled back) at 1447. An additional whale surfaced 500m off the bow at 14:48 (bearing 235), that quickly went under the surface. At 14:52, 7 tall elliptical blows sighted 1200m off port bow (bearing 215) and saw 2 whales dive simultaneously at 14:55. At 15:00, 2 whales surfaced on the starboard side of the vessel inside the EZ, approx 400m from the sound source (non-active). An additional whale then surfaced 500m off the opposite side of the vessel (port) at 15:02 (bearing 150). It swam past the stern of the vessel and was last sighted 900m of the stern. At 15:04, 2 of the whales sighted 1400m off the port bow, blowing 6-8 times and then diving at 15:09, approx 2000m off the bow. Continued to see the pair together (saw blows at least every 10 min) until 15: 43 on the port side moving away - 1200m away at 15:27, 1600m at 15:29. Last time of sighting was 15:43 2000m away. PSO advised survey to delay ramp up until 16:00 (last sighting in EZ was 15:00).	1:01
8/26/2017	17:38		Clear	SSE	1	10	41 03.4	71 16.1	195		Sea Turtle, Loggerhead	310	15	1	Surfacing, dive, swimming	Shutdown	Sea turtle sighted 15m off starboard side of vessel, was seen just below surface. Then it surfaced, stuck its head out of water and swam under the water away from the vessel; Last seen at 17:38. All HRG equipment had already been shut down. This sighting delayed potential ramp up time until 18:38.	0:00

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
8/26/2017	18:01		Clear	SW	1	10	41 03.5	71 13.8	196		Whale, Minke	185	350	2	Transit, diving	Shutdown all HRG equipment	First sighted off starboard bow (322m from vessel, approx 350m from sound source using reticules). Then another whale surfaced 201 m off the starboard side (closest approach) at 18:02. Sighted 400m off the starboard side at 18:04 (last sighting inside EZ, delayed ramp up until 19:04) and appeared to be swimming away from the vessel. Sighted again approx 1200m off the starboard side of vessel at 18:08. No blows observed.	0:07
8/26/2017	19:34	141	Clear	SW	1	10	41 04.2	71 16.8	197		Whale, Minke	235	250	1	transit, diving	HRG equipment ramping up	Sighted off starboard bow, 250m from source (distance estimated using reticled binoculars). PSO requested shut down (HRG equipment was in ramp up process) upon sighting. Whale sighted again at 19:36, 175m from sound source, and a third time at 19:37 alongside the vessel (starboard), approx 200m from sound source. Not seen again.	0:03
8/26/2017	19:57	138	Clear	SW	1	10	41 02.3	71 17.6		595	Dolphin spp.	15	800	1		Silent	A faint upsweeping whistle was detected on the LF Spectrogram at 19:57 and was highlighted by the Whistle-Moan Detector.	0:00
8/26/2017	20:44	126	Clear	SW	1	10	41 04.6	71 15.7		596	Dolphin spp.	67	80	10		Ramp-Up Sparker	Approximately 8 convex LF whistles were audible and observed with harmonics and highlighted by the Whistle-Moan Detector at 20:44 (00:44) until 20:46 (00:46); depicting one dolphin vocalizing. Faint LF whistles continue to be audible but not highlighted by the Whistle-Moan Detector due to masking by the Chirper. LF whistles were more audible and highlighted by the Whistle-Moan Detector starting at 21:00 (01:00). Multiple HF click trains lasting between a half and 1 second were observed at 21:06 (01:06) with a bearing of 67 degrees and triangulated at 80m from the center of the exclusion zone leading to an immediate call for a power down. This was followed by intermittent click trains from a half to 3 seconds at bearings from 75 to 92 degrees. Triangulation was again calculated at 09:13 (01:13) with the dolphins approximately 200m from the center of the exclusion zone. Multiple 1 to 3 second HF click trains were observed at 09:16 (01:16) at approximately 50 degrees veering to 100 degrees; depicting roughly 8 dolphins vocalizing. Sporadic short HF click trains were then observed until the end of the detection at 09:31 (01:31) with a 1 second click trains observed at 111 degrees. Triangulation was calculated periodically to verify that the dolphins remained within the 500m exclusion zone. Multiple LF whistles consisting of up and down sweeps, convex, sinusoidal, and constant were observed intermittently through out the detection until 21:54 (01:54); whistles were the most audible from 09:13 (01:13) until 09:26 (01:26). A shutdown was implemented at 21:07 (01:07) and navigators were informed of final detection within the exclusion zone at 09:31 (01:31).	0:47
8/26/2017	21:16	121	Clear	SW	1	10	41 04.6	71 14.4	198		Whale, Fin		575	1	Blows (no other behavior observed)	Shutdown all HRG equipment	3 blows sighted off starboard side of vessel (attempted to make recording but file corrupted). Whale was not seen again, and did not enter the 500m EZ.	0:02
8/26/2017	22:41	124	Clear	SW	1	10	41 03.8	71 09.4		597	Dolphin spp.		800	1		Ramp-Up Sparker	Approximately 10 convex and upsweeping whistles audible and observed at 22:41 (02:41) that were also highlighted by the Whistle-Moan Detector until 22:43 (02:43).	0:02
8/26/2017	23:56	137	Clear	SW	1	10	41 03.4	71 16.3		598	Dolphin, Short-beaked Common	121	417	3		All HRG active	amplitudes between 122 and 126 dB were detected on the spectrogram and whistle and moan detector but were not audible. At 23:57, a few more faint LF whistles 11-12 kHz and 106 dB were observed, and three short HF click trains were detected astern between 121 and 123 degrees, which were tracked to a range of 417 meters. As the dolphins were within the 500m EZ, a power down was requested at 23:58 and the operators implemented a full shut down at 23:59. At this time, few up-sweep whistles from two to three dolphins (8-14 kHz and 111-130 dB) were detected, along with longer HF click trains from at least two dolphins between 110 and 120 degrees. At 00:00, the chirper was accidentally turned back on while operators were troubleshooting equipment, and a second power down was requested and implemented at 00:01. At this time there was an increase in the detected LF vocalizations, including sinusoidal and upsweep whistles, clicks, pulses and harmonics; and long HF click trains at 121 degrees with amplitudes between 143 and 155 dB were tracked to a range of 96 meters. From 00:02 to 00:04 the LF vocalizations were continuously detected audibly and on the spectrogram, and HF click trains observed moving between 80 and 127 degrees, with amplitudes between 135 and 180 dB were tracked to ranges between 119 and 171 meters. At 00:05 the dolphins were detected on the starboard thermal camera approaching the vessel, and the visual observed confirmed the species as short-beaked common dolphins and estimated between three and four individuals. Additionally at this time, loud sinusoidal whistles 10-17 kHz were detected audibly and on the spectrogram, but the LF clicks and pulses had stopped. From 00:07 to 00:09, faint up sweep whistles 7-14 kHz and short HF click trains between 20 and 40 degrees were detected from at least two dolphins. At 00:10, visual observers confirmed that the dolphins were bow-riding, and a few down sweep and concave whistles 8-19 kHz and 119-123 dB were detected audibly and on the spectrogram. At 00:11 HF click trains at 20 degrees were tracked to a	1:22
8/27/2017	0:05	137	Clear	SSE	1	10	41 03.4	71 16.7	199	598	Dolphin, Short-beaked Common		100			HRG equipment shut down	PAM detection at 23:56 (whistles and high frequency clicks). PSO went on deck at 00:05 and observed bow riding, able to confirm common dolphin ID using night vision. Unable to confirm voluntary approach for 10 minutes. PAM still continued to get detections; saw again on alt thermal camera (#1) at 00:22 100m away from source. Bearing and # of animals not recorded.	0:17
8/27/2017	3:00	141	Clear	SE	1	10	41 03.6	71 16.5		599	Dolphin spp.	88	500	3		All HRG active	Multiple HF click trains detected at 03:00 lasting between 0.5s to 2s at a bearing of 88 degrees veering to 116 degrees; depicting 3 dolphins vocalizing. Final click train at 116 degrees lasting one second at 03:01.	0:01

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Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
8/27/2017	3:36		Clear	SE	1	10	41 05.1	71 15.1		600	Dolphin, Short-beaked Common	89	50	9			Detector at 03:36 lasting between a half and two seconds at bearings from 68 degrees to 93 degrees. Triangulation calculated the dolphins as close as 50m from the center of the exclusion zone and resulted in an extension of the 60 minute pre-clearance enacted by AD 599 at 03:01. Intermittent HF click trains continued to be observed along with LF whistles that were audible and highlighted by the Whistle-Moan Detector. An abundance of HF click trains were observed at 03:39 lasting between one and two seconds at bearings from 18 to 94 degrees; depicting 3 dolphins vocalizing until 03:47. Sporadic HF click trains continued to be observed along with a continuation of LF whistles that continued to be loud enough to be highlighted by the Whistle-Moan Detector. Abundant HF click trains were observed again at 03:57 lasting between a half and four seconds at bearings from 22 to 62 degrees along with stronger LF sinusoidal, concave, and up sweeping whistles. At 04:00 the visual observer confirmed that there were between 8 and 12 short-beaked common dolphins; however, they were unable to observe the dolphins bow riding for the required 10 minute period to give clearance for ramp up while the dolphins were still being detected and the sources remained silent. At 04:01 HF click trains at a bearing of 42 degrees were tracked to a range of 150 meters, and the visual observe confirmed that the dolphins had moved from the bow down the stbd side of the vessel. From 04:02 to 04:32 only intermittent whistles with frequency ranges between 6 and 18 kHz were detected audibly and on the spectrogram; however, the whistles were to infrequent to localize and track and the dolphins location and range during this time could not be confirmed. At 04:35 HF click trains were again observed at 20 degrees, and the visual observe confirmed that the dolphins were bow riding. From 04:36 to 04:40, HF click trains between 20 and 40 degrees were detected along with LF clicks and pulses. From 04:41 to 04:44 LF clicks, pulses and whistles were detected continuously, and HF click trains between 20 and 30 degrees were tracked within 200 meters. At 04:45 the visual observer	1:29
8/27/2017	3:56		Clear	SE	1	10	41 03.8	71 16.2	200	600	Dolphin, Short-beaked Common		60	10	bow riding, chasing fish, feeding	shut down	See notes in line above; HF click trains heard again at 03:56 on PAM; PSO went out on deck with night vision; Observed common dolphins bowriding from 03:56 until the left 500m EZ at 04:01 behind the vessel and could not be seen on night vision. Depth data unavailable. Did not record bearing.	0:05
8/27/2017	4:34		Clear	SE	1	10	41 04.3	71 17.7	201	600	Dolphin, Short-beaked Common		122	5	chasing fish, feeding	shut down	Dolphins seen on thermal camera #2 (recording made) at 04:34 at 120m; dolphins were chasing fish and feeding, approaching vessel; Seen on camera at 04:34 at 22m off port stern; PSO went on deck with night vision and observed dolphins swimming along port side of vessel within 10m of hull, from 04:34 to 04:44; Cleared for ramp up at 04:45 based on observed voluntary approach behavior (in accordance with IHA); soft start/ramp up of sparker started at 04:46; dolphins still seen with night vision and on thermal cameras as of 05:00 at MMO rotation; Last high frequency PAM detection was 05:05, also seen on aft thermal camera (camera #1) at 05:05, 100m, from the stern and swimming away from the vessel	0:31
8/27/2017	7:36	117	Clear	NE	1	10	41 03.6	71 13.6	202		Whale, Minke	260	800	1	traveling, diving	Survey line, All HRG equipment powered on	Sighted whale off starboard side, 800m from sound source, swimming toward stern. Only caught one view of its back before it dived. Sighting ended 07:37	0:01
8/27/2017	8:31	31	Clear	NE	1	10	41 03.6	71 41.3	203		Whale, Minke	240	800	1	slow traveling (variable direction) diving	Survey line, All HRG equipment powered on	Sighted another minke whale near the same location as previous sighting (possibly the same animal). Traveling back and forth in front of the bow 1000-1600 m away. Last time of sighting was 08:35	0:04
8/27/2017	10:02	144	Clear	NNE	2	10	41 02.2	71 18.1	204		Whale, Minke	276	1200	1	travelling, surfacing	Survey line, All HRG equipment powered on	First blows sighted 1200 m off starboard side of vessel (distance estimated using reticled binoculars). Closest approach to vessel was 1150 m.	0:04
8/27/2017	12:46	116	Partly Cloudy		3	10	41 04.8	71 13.0	205		Dolphin spp.	155	1700	12	travelling, porpoising	Survey line, All HRG equipment active	Sighted dolphins approx 1600m off vessel bow. Dolphins traveling across bow, then turned and swam SSW. Last sight of pod approx 2000m off bow, swimming away from vessel.	0:04
8/27/2017	16:21	151	Clear	E	2	10	41 01.9	71 22.1	206		Dolphin, Short-beaked Common	225	600	15	bow riding, porpoising	Survey line, All HRG equipment active	dolphins first seen 600m off vessels port bow (distance estimated using reticled binoculars). Dolphins were porpoising and bowriding. In addition, several (6-8 dolphins) were swimming next to the survey gear. Closest distance dolphins were to vessel was 5 m. Dolphins last seen within exclusion zone at 16:28 (only stayed within EZ for 7 minutes, so could not authorize ramp up based on voluntary approach), and last seen at 16:48.	0:27
8/27/2017	18:16	164	Clear	E	2	10	41 02.0	71 21.3	207		Dolphin, Short-beaked Common	218	1000	18	porpoising; bow riding; leaping	All HRG equipment on; Had not started survey line yet	a pod of 15-20 dolphins spotted 1000 m from sound source, off port bow (distance estimated using reticled binoculars). Dolphins were porpoising, leaping, bowriding and swimming next to survey gear for 10 minutes after entering the exclusion zone. Dolphins were still bow-riding and swimming within 5m of port side of vessel following start of ramp up; Dolphins last seen 800m from vessel.	0:33

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Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
																	that were highlighted by the Whistle-Moan Detector. Immediate power down was called. The click trains lasted between a half and 1 second at bearings from 54 to 70 degrees. Triangulation calculated the dolphins 120m from the center of source. Abundant HF click trains from .5-8s were observed from 17 to 173 degrees starting at 20:45 along with LF whistles consisting of down and up sweep, sinusoidal and constant that were audible and highlighted by the Whistle-Moan Detector. Approximately 15 dolphins were observed vocalizing with triangulation locating the pod 150m from the center of source. Multiple burst pulses were audible and also observed on the LF spectrogram during this time. At 21:17 the chirper was turned on and began masking the LF part of the detection though faint whistles were still audible and some were highlighted by the Whistle-Moan Detector. Triangulation was again calculated at 21:34 with the dolphins 100m from the source. The HF click trains were still abundant though the LF whistles were even weaker and less abundant. At 21:48 the detection became more active with triangulation calculated at 50m. Whistles became faint and less abundant with seldom highlighting at 22:01. HF click trains ceased from 22:13 until 22:20. The detection became more active on HF and LF at 22:26. The LF part of the detection ceased at 22:38 and returned with faint whistles that were barely highlighted at 22:56. Multiple HF click trains continued throughout this time. At 23:00 HF click trains were observed moving astern to a bearing of 144 degrees and then moving back ahead to a bearing of 54 degrees by 23:01. During this time the vessel was conducting a turn for a line change. Occasional whistles and HF click trains between 34 and 42 degrees were detected until 23:15, and then no vocalizations were detected again until 23:24 with a few HF click trains at 22 to 24 degrees and a few faint whistles. However, the visual observer had confirmed at 23:23 that there were still a few dolphins bow riding at that time. From 03:40 to 03:50 only intermittent whistles and HF click trains between 20 and 80 degrees were acoustically detected. From 23:53 to	
8/27/2017	20:33	144	Clear	E	3	10	41 01.9	71 28.7		601	Dolphin, Short-beaked Common	49	150	17		All HRG active		4:45
8/27/2017	20:40		Clear	E	3	10	41 01.9	71 29.2	208	601	Dolphin, Short-beaked Common		10	18	Bow riding, chasing equipment, feeding, porpoising, swimming with/following vessel	Survey line. All HRG equipment active	Dolphins first detected by PAM. PSO went on deck at 20:40, and observed 4 dolphins chasing the tail buoy and equipment at 21:41. Then observed 4 - 6 dolphins bow riding and swimming alongside vessel (within 3m of hull) from 21:44-21:52. Dolphins displayed a voluntary approach to chase the towed equipment and bow ride for over 10 minutes and PSO authorized ramp up based on this behavior (in accordance with IHA). Sighting continued on thermal cameras. At 20:56 3 dolphins sighted chasing tail buoy and equipment (aft cam). At 21:04, several dolphins sighted 91m from source off port stern chasing/following vessel (aft cam). At 21:07, 2 dolphins sighted bow riding (starboard cam). At 21:08, 2-3 dolphins sighted 200m from source (port cam). At 21:14, 2 dolphins sighted 97m from source off stbd stern (aft cam). At 21:15, 2 dolphins sighted 110m from source off bow (port cam). At 21:22 3-4 dolphins sighted less than 50m from source (aft cam). At 21:32, 3 dolphins sighted alongside vessel, 40-80m from source (port cam). PSO went on deck again (22:01-22:07) with nightvision, and observed approx 15-20 Common Dolphins swimming alongside vessel (both sides) within 3m of hull, bow riding, chasing towed equipment aft of the vessel, and jumping over equipment wires on starboard side of vessel. Sighting continued on thermal camera: At 22:28, 10-15 dolphins sighted 200m from source (aft cam) off starboard stern, porpoising towards vessel (recording made). At 22:40, 4-6 dolphins sighted 450m from source on port cam. At 22:55, 3-4 dolphins sighted 150m from source off port stern (aft cam). PSO went on deck again (23:13-23:23) and confirmed 4-6 Common Dolphins swimming along port side of vessel (within 3-5m of hull) and bow riding. PSO went on deck again (23:53-23:58) and could not locate dolphins directly around the vessel, although PAM continued to detect them in close proximity at this time. PAM detection 601 continued throughout duration of visual sighting 208. Did not record bearing/depth. # Adult/Juvenile/Calf unknown.	2:43
8/27/2017	21:45	156	Clear	E	3	10	41 01.9	71 29.2	209		Whale spp.	10	3500	6	blows, breaching	Survey line. All HRG active	Multiple blows sighted 3000-4000m from source. Breaches and large splashes observed. Possible mix of humpback and Fin whales based on blow size and breaching, but difficult to tell due to distance. Some Dolphins also observed in same view (sighting 208) from 21:49 - 21:53, 400-500m from sound source. Recording made. # Adult/Juvenile/Calf unknown.	0:13
8/28/2017	0:16	143	Clear	NE	3	10	41 01.8	71 28.9	210		Dolphin, Short-beaked Common	163	50	3	porpoising, chasing equipment	Survey lines (All HRG equipment)	Dolphins sighted on thermal camera #1 (aft) chasing equipment. No mitigation required due to consistent PAM detections inside E2 since initial power down at 20:33. Sighted again on thermal camera #2 (port) swimming toward the vessel, then bow riding and chasing fish, and again on aft camera at 00:45, traveling across the vessel from port to starboard. Continued to bow ride/chase fish both port and starboard until 01:05	0:49
8/28/2017	2:35	144	Clear	NE	3	10	41 01.9	71 19.6		602	Dolphin spp.	48	160	4		Survey lines (All HRG equipment)	Multiple HF click trains observed from 02:35 to 2:37, lasting between 0.5-1s, with bearings from 48-114 degrees and at a distance of 160m from the center of source. At 02:39 scattered HF clicks were observed followed by multiple HF click trains lasting between 10-2s at 67 degrees with a triangulation distance of 140m. Multiple HF click trains were again observed at 2:42 lasting between 0.5-1s at 106 degrees. At 02:51 multiple HF click trains were observed lasting between 0.5-3.5s from 16 to 144 degrees. Triangulation calculated at 02:57 with he dolphins 120m from the center of source. The detection ended with a 2s click train at 37 degrees at 02:59.	0:24

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
8/28/2017	3:48	138	Clear	NE	3	10	41 02.3	71 16.8		603	Dolphin spp.	28	90	4		All HRG active	bearings 28 and 61 degrees, and were tracked to a range of 90 meters. At the beginning of the detection the sound sources were powered down due to a previous dolphin detection within the exclusion zone. From 04:06 to 04:16 a few faint LF whistles were detected with frequencies between 11 and 14 kHz and amplitudes between 122 and 130 dB. At 04:19 a few sinusoidal whistles 8-14 kHz with amplitudes up to 140 dB were detected, and then at 04:21 HF click trains were again detected between 100 and 102 degrees. These click had amplitudes up to 155 dB and were tracked to ranges between 100 and 130 meters. At 04:22 the dolphins were visually sighted on the thermal cameras astern of the vessel moving towards the bow. From 04:23 to 04:26, HF click trains from at least three dolphins were observed moving between 18 degrees and 90 degrees and tracked to a range of 70 meters. At 04:27 faint whistles 11-12 kHz were again detected, and the HF click trains had moved mainly to bearings between 20 and 40 degrees. At 04:28 a long HF click train at 22 degrees was tracked to a range of 231 meters with peak click amplitudes of 150 dB. From 04:30 to 04:31, HF click trains at 23 degrees and 44 degrees were observed moving astern to bearings of 56 and 67 degrees with peak amplitudes of 166 dB, and some LF clicks were faintly audible and observed on the spectrogram. At 04:32 the visual observer had determined that the dolphins had been voluntarily bow riding for more than 10 minutes and that clearance could be given for the sound source to be ramped up. From 04:35 to 04:37 HF click trains continued to be detected between 20 and 70 degrees along with a few additional trains astern between 130 and 140 degrees. At 04:38 ramp up of the sound source was initiated. From 04:44 to 04:58, HF click trains continued to be detected moving between 20 and 40 degrees, along with some sinusoidal and up sweep whistles with frequency ranges between 8 and 15 kHz. The clicks during this time were tracked to a closest range of 67 meters. At 05:00 the ramp-up was completed, and from 09:01 to 09:38 HF click trains continued to be detected moving between 25 and 123 degrees.	2:15
8/28/2017	4:22	144	Clear	NE	3	10	41 02.3	71 16.0	211	603	Dolphin, Short-beaked Common		130	3	porpoising behind stem	Power down (Sparker at low power. All other HRG equipment off)	Several dolphins seen porpoising behind stem measured at 103m on thermal camera #1 (recording made); Last seen on camera #1 at 4:22; PSO went to top deck and observed 3-5 dolphins bow riding for 10 minutes with night vision; Cleared for ramp up at 4:32 after observing on night vision for 10 minutes continuously (bow riding, swimming with vessel); Soft start/ramp up began at 4:38 (dolphins still within in EZ and clicks heard on HF hydrophone); Another thermal camera recording made at 4:43 (camera #1)-dolphins were seen at 465m; Last seen on thermal cameras at 4:46. Did not record bearing.	0:24
8/28/2017	5:42	127	Clear	NE	3	10	41 02.0	71 20.4	212	603	Dolphin, Short-beaked Common		150	3	porpoising, bow riding	Survey lines (All HRG equipment)	Sighted off port side at start of on deck watch. Dolphins swam to vessel and observed bow riding 05:42 - 05:55. No mitigation required; dolphins have remained in close proximity to vessel since beginning ramp up at 04:38 (after it was determined to be voluntary approach to bow ride). Did not record bearing.	0:13
8/28/2017	6:37	129	Clear	NE	3	10	41 01.9	71 26.7	213		Whale, Humpback	160	3000	8	blows, diving, lunge feeding, breaching	Survey lines (All HRG equipment)	First saw 3 blows with binoculars- 3000m away off the starboard side bow near Block Island. As we got closer at 06:45 at least 8-10 individuals were seen breaching, diving and lunge feeding 2000-1600m off the starboard side of vessel. Long slender white pectoral fins seen on breaching whales. At 07:35 4 of them moved away from the group traveling away from the boat on the starboard side, could still see 4 blows in the distance 4000m away; last time of sighting for the group of 4 was 07:40. At 07:41- 2 whales sighted 2000m off the port bow (bearing 235), and 2 more approx 2000 m off the starboard side. Lost sight of the group at 07:47 (distance of 3000m); vessel was moving away from the whales, and glare in that direction made it difficult to see blows. Saw additional blow at 08:03, 6000m from vessel; Last blow seen 2000m from vessel at 08:07	1:30
8/28/2017	6:53		Clear	NE	3	10	41 01.9	71 28.4	214		Dolphin, Short-beaked Common	325	450	5	porpoising, traveling quickly on the starboard side, started swimming in opposite direction parallel to vessel	Survey lines (All HRG equipment)	Dolphins sighted 450m from sound source, off starboard bow. Last time of sighting in the mitigation zone was 06:56. No mitigation required; less than 60 minutes since dolphins last sighted bow riding following determination of voluntary approach at 04:32 (sighting # 211). Did not record depth.	0:03
8/28/2017	8:23	137	Clear	NE	3	10	41 01.4	71 34.7	215		Whale spp.	120	2000	2	blows (no other behavior observed)	Survey lines (All HRG equipment)	2 blows were spotted shortly after vessel had made a turn and was heading back in the direction of the previous humpback sighting. Sighted 200m off the starboard side. Last sighting was 700m from vessel at 08:28.	0:05
8/28/2017	8:49	137	Clear	NE	3	10	41 02.1	71 33.7	216		Whale, Humpback	55	1600	3	blows, breaching, tail slaps	Survey lines (All HRG equipment)	This sighting could be individuals from previous sighting (#215) but we hadn't seen then since 08:28; First blow seen at 8:49 at 1600m; Saw multiple breaches and tail slaps by two individuals side by side from 08:50-09:00	0:11
8/28/2017	9:20	147	Clear	NE	3	10	41.01.5	71.32.9	218		Whale, Humpback	75	1700	2	blows, breaching, tail slaps	Power down	Blows sighted 1700m off port bow (distance estimated using reticule binoculars); Another blow seen at 1600m in same general location at 09:24; As vessel approached, another blow was seen at 09:29 approx 1600m off port bow-could have been same individual swimming perpendicularly to vessel or possibly a second whale; Two blows seen concurrently, 6000m off port side at 09:31; Sighted at 09:38, 4000m off port side; Breaching and tail slapping at 10:12 at 800m by one whale, other whale seen at 2000m; Whale(s) never entered into 500m EZ so sparker ramp up time is still 10:12 pending any additional sightings in EZ	1:17
8/28/2017	10:00	148	Clear	NE	3	10	41 00.9	71 33.9	219		Whale, Fin	75	1200	1	Blows, surfacing	Power down	While observing sighting #218 a fin whale was spotted with the group of humpbacks 1200 m away (distance estimated using reticled binoculars). Whale had long sleek dark body, tall falcate dorsal fin with leading edge that met body with gentle angle.	0:37

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
8/28/2017	10:58	151	Clear	NE	3	10	41 02.2	71 33.0	220		Whale, Humpback	230	2000	2	Blows, surfacing	Survey lines. (All HRG active)	Broad bushy blows sighted 2000 m away at 230 degrees (distance estimated using reticled binoculars). Large dark body, with hump on leading edge of dorsal fin visible. Direction of travel variable.	0:03
8/28/2017	11:10		Clear	NE	4	10	41 02.2	71 32.8	221		Whale, Fin	200	700	1	transit, blow, diving	Survey lines (All HRG active)	A tall elliptical blow spotted off starboard bow (distance estimated using reticled binoculars). Body and dorsal fin sighted when whale surfaced again at 11:11. PSO requested shut down at 11:11 when whale was just inside 500m from sound source, off starboard bow. Whale continued traveling along starboard side of vessel, and was last sighted in the EZ at 11:13. Last sighting was at 11:14 off the starboard stern, outside the EZ. Whale and vessel were moving in opposite directions when last sighted. Depth data unavailable.	0:04
8/28/2017	11:20		Clear	NE	4	10	unk	unk	222		Whale, Humpback	190	1800	4	Transit, Diving, Fluking, Synchronized behavior	All HRG shut down	First sighted multiple (16-20) blows off starboard bow, in same general area. 2 dives displaying slukes sighted simultaneously at 11:20 (one much smaller, next to larger. Mother/Calf Pair). Additional blows sighted in same direction from 11:21-11:25, 2500-3000m off bow, appeared to be transiting away from the vessel. Lost sight of those whales at 11:25. Mother/Calf pair sighted again at 11:25, 1600m off the port side of vessel, traveling in the opposite direction of vessel. Repeated blows sighted followed by a simultaneous dive at 11:31, 1400m off starboard side of vessel (bearing 140). Multiple blows sighted again off starboard stern, bearing 090(11:34-11:45), initially at 2500m off the stern, and lost sight of whales at 11:45, 4000m off the stern. Depth data unavailable. Did not record gps position. Unable to recover from database.	0:25
8/28/2017	12:19	154	Partly Cloudy	NE	4	10	41 01.3	71 33.5	223		Whale, Humpback	130	2500	5	Transit, diving, fluking, breaching	Ramping up HRG	Multiple, repeated blows sighted off port bow, approx 2500m from sound source. Observed blows and occasional breaches throughout the sighting. From 12:37-12:40, the group of whales was approx 1800m from the sound source, off the bow. Closest approach by a whale was 1600m from the bow at 12:48. At 12:54, multiple blows were still sighted off the starboard side, ranging 2000-2500m from vessel. (distance estimated using reticled binoculars).	0:38
8/28/2017	14:32	149	Partly Cloudy	ENE	4	10	41 02.1	71 30.9	225		Whale, Humpback	180	1000	3	traveling, diving, fluking	ramp up	2 whales sighted off port side (8 blows, followed by 2 dives/1 fluke). Another whale sighted off starboard side (1000m from source) at 14:32; then again a few minutes later 800m away. Saw 2 blows followed by a view of the back and it fluked up right before a dive at 14:36. Additional blows 1200m off starboard bow at 14:36, followed by 2 dives/flukes at 14:38. 2 whales sighted again (blows, feeding lunges) at 14:45, 1600m off port stern. At 14:57, 2 whales sighted moving up and down at surface off bow, 700m from sound source. Both whales dove, and were sighted again 800-1000m off port stern before diving at 15:05. Not sighted again.	0:33
8/28/2017	15:46	144	Partly Cloudy	ENE	4	10	41 02.0	71 29.6	226		Whale spp.	90	7000	2	only blows visible	Survey lines (All HRG equipment)	2 blows in the distance on the port side, definitely 2 individuals. Direction of travel unknown.	0:00
8/28/2017	17:29	150	Clear	ENE	5	10	41 02.3	71 27.4	227		Whale, Humpback	81	6000	5	breaching, diving	Survey lines (All HRG equipment)	Several breaches seen with naked eye at 17:29 at 6000m (distance estimated using reticle binoculars); Closest whale seen at 3000m at 17:33. Lost of breaching and large plume-like blows;	0:38
8/28/2017	22:09	135	Partly Cloudy	ENE	5	10	41 03.4	71 16.3		605	Dolphin spp.	28	100	5		All HRG active	Multiple HF click trains were observed at 22:09 lasting between a half and two seconds at bearings from 22 to 96 degrees until 22:11, depicting 5 dolphins vocalizing. Triangulation calculated the dolphins at 100m from the center of the exclusion zone. At 22:13 more HF click trains were observed lasting between a half and one second long at bearings from 66 to 118 degrees. The detection ended at 22:15 with a half second click train at 119 degrees. This detection resulted in a power down.	0:06
8/28/2017	22:33	121	Partly Cloudy	ENE	5	10	41 04.8	71 14.8		606	Dolphins spp.		500			Sparker	Multiple LF faint whistles observed on the LF Spectrogram and slightly highlighted by the Whistle-Moan Detector at 19:35. This was followed by multiple HF click train lasting between a half and three seconds with bearings from 02 to 46 degrees. Triangulation calculated the pod approximately 150m from the center of the exclusion zone at 19:37. More abundant HF click trains were observed lasting between a half and five seconds at bearings from 03 to 82 degrees. LF whistles were observed throughout this time and were highlighted by the Whistle-Moan Detector until 19:38. The detection ended at 19:39 with one second click train at 33 degrees. This detection was correlated with a visual detection.	0:11
9/1/2017	5:01	78	Partly Cloudy	NW	3	10	40 56.8	72 03.5		607	Dolphin spp.	144/216		2		Sparker, Chirp, Multibeam sounder active	At 05:01 whistles from at least two dolphins were detected on the spectrogram and whistle and moan detector, with frequencies between 7 and 19 kHz and amplitudes between 123 and 124 dB. The whistles were very faint, were not audible over the headphones, and ended within 14 seconds of the initial detection. The bearing of the whistles was indicated on the whistle and moan detector to be astern of the PAM cable, between bearings 144 degrees and 216 degrees. Due to the briefness of the detection, a exact range could not be determined; however, due to how faintness of the whistles, the range of the dolphins was estimated to be greater than 500 meters. As the dolphins were determined to not be within the 500 meter EZ, no mitigation actions were required. The dolphins were not detected visually on the thermal cameras.	0:00

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Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
9/1/2017	22:08		Partly Cloudy	NW	3	10	41 02.9	71 16.8		608	Dolphin spp.	47	140	6		Survey line. All HRG equipment active	A faint upsweeping LF whistle was observed on the LF Spectrogram, and slightly highlighted by the Whistle-Moan Detector at 22:08, followed by multiple faint whistles that were not audible due to masking by the sparker. A half second click train was detected on the HF Click Detector at a bearing of 47 degrees and a power down was requested. Triangulation calculated the dolphin at 140m from the center of source. Approximately six dolphins were determined to be vocalizing at the time. Technical difficulties with the Sparker led to a full shutdown instead of power down and retrieval of the Sparker. Multiple half second to three second click trains were observed with bearings from 43 to 163 degrees until 22:25. Sporadic LF whistles still ongoing, audible, and highlighted by the Whistle-Moan Detector at 22:14, 22:18. Faint LF whistles inaudible and not highlighted by the Whistle-Moan Detector were observed at 22:33, 22:44, 22:49. A scattering of HF clicks were again observed at 22:50 along with LF whistles that were now highlighted by the Whistle-Moan Detector. Multiple HF click trains were then observed lasting between a half second and five seconds with bearings from 14 to 142 degrees. The detection got increasingly active on both the HF and LF displays peaking from 23:28 until 23:38; with multiple buzzes observed and audible. The detection ended with a faint downsweeping whistle at 23:41. Approximately 6 dolphins were vocalizing with the pod coming as close as 60m from the CoS. Water depth unavailable.	1:33
9/1/2017	22:11		Partly Cloudy	NW	3	10	41 03.1	71 14.7	230	608	Dolphin spp.	205	450	3	porpoising, travelling	Survey line. All HRG equipment active	Dolphins were first detected by PAM at 22:09. Sighted on thermal camera 1 (aft) at 22:11 (post shutdown), approx 450m from sound source. Sighted at 22:12, approx 200m from sound source, then lost sight. PSO went on deck (22:13-22:18) to try to locate/ID dolphins with nightvision, but could not find them. Depth data unavailable. # Adult/Juvenile/Calf unknown.	0:01
9/1/2017	23:29		Partly Cloudy	NW	3	10	41 01.3	71 17.2	231	608	Dolphin spp.	160	250	13	porpoising, chasing towed equipment	Shutdown	Dolphins sighted off starboard stern on Camera 1 (aft) approx 250m from sound source, porpoising toward vessel. Swam within 50m of sound source, then lost sight. Seen again 23:36-23:38 swimming near/chasing towed equipment. PSO went on deck with nightvision to ID species at 23:39, but could not locate the dolphins. Due to previous full shutdown, could not authorize ramp up, regardless of behavior. Depth data unavailable. # Adult/Juvenile/Calf unknown. Recording was made.	0:09
9/2/2017	0:37		Partly Cloudy	NW	3	10	41 02.8	71 15.2	232	609	Dolphin, Short-beaked Common	27	186	25		Shutdown	and on the spectrogram with frequencies between 4 and 22 kHz and amplitudes between 107 and 109 dB. At 00:38 HF click trains were detected at a bearing of 27 degrees and tracked to a range of 186 meters. From 00:42 to 00:56, short HF click trains from at least 4 dolphins were detected moving between bearings of 18 and 96 degrees. These click trains had peak amplitudes of 146 dB, and were tracked to a range between 46 and 100 meters. LF clicks also continued to be detected on the spectrogram but not audibly or on the LF click detector. Whistles during this time were mainly up sweep and sinusoidal with frequency ranges between 6 and 20 kHz. At 00:58 there was a large increase in the HF and LF clicks detected, with click trains from at least 4 dolphins between 24 and 48 degrees, peak click amplitudes of 153 dB, and ranges tracked to 304 meters. At 01:00 more whistles were detected, the HF click trains moved astern to bearings between 101 and 111 degrees, and the dolphins were located on the thermal cameras astern of the vessel. From 01:02 to 01:12, LF whistles, clicks and pulses, along with an occasional harmonic, were detected audibly and on the spectrogram. The HF click trains moved back ahead from bearings between 119 and 121 degrees to bearings between 20 and 30 degrees. The peak click amplitude during this time was 171 dB, and the click trains were tracked to ranges of 125 meters. At 01:13 there was a large increase in the number of whistles detected, with at least 5 dolphins producing overlapping whistles between 6 and 14 kHz, and at least 5 HF click trains were detected between 20 and 100 degrees. From 01:14 to 01:22 longer HF click trains were detected between 20 and 121 degrees with a tracked range of 150 meters. From 01:23 to 01:26 there was also an increase in the loudness and frequency of the whistles and LF clicks and pulses being detected. Beginning at 01:27, there was an large increase in the number and frequency of both LF and HF vocalizations. Multiple LF and HF click trains from at least 6 to 10 dolphins were detected moving between 20 and 132 degrees, with	5:43
9/2/2017	7:02		Partly Cloudy	N	3	10	41 02.5	71 15.7	233		Whale spp.	225	1600	1	blows at surface	Shutdown	A few large, bushy blows seen by naked eye at 1600m (estimated using reticule binoculars); whale was crossing ahead of bow in the distance; last seen at 1300m at 07:06.	0:04
9/2/2017	11:40	138	Partly Cloudy	N	2	10	41 03.5	71 16.8	234		Whale, Humpback	80	2000	1	transit, dive, fluke	Survey line. All HRG equipment active	Sighted off port bow, transiting west toward Block Island. 7 blows, followed by a dive/fluke at 11:43. Seen again at 11:48, 1600m off starboard side (after vessel turned), 3 blows followed by a dive at 11:50. Seen again at 11:56, 2000m off starboard stern. 6 blows followed by dive at 11:59. Sighted again at 12:04, 3000m off port stern (after another vessel turn), still transiting in the same direction. Last sighted over 4000m off port stern.	0:32
9/2/2017	17:50	138	Partly Cloudy	SSE	1	10	41 03.0	71 18.4	236		Whale, Minke	355	500	1	transit, surfacing	Shutdown	Sighted briefly approx 400m off bow, crossing from port to starboard, in front of vessel. Re-surfaced at 17:50, approx 50m off starboard bow, and appeared to be swimming parallel to vessel in opposite direction. PSO confirmed that all HRG equipment was still shut down. Whale was not seen again, 60 min EZ clearance required from time of last sighting.	0:00

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Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
9/2/2017	20:15	121	Continuous layer of clouds	SE	2	10	41 03.8	71 12.6		610	Dolphin spp.	40	150	5		All HRG active	Multiple sinusoidal whistles were observed, audible, and highlighted by the Whistle-Moan Detector at 20:15 followed by multiple down-sweeping whistles. Multiple HF click trains lasting between a half and eight seconds at bearings from one to 146 degrees were observed immediately afterwards. Triangulation calculated the pod of approximately 5 dolphins around 150m from the CoS. A power down was called for and commenced at 20:16. The last click train was observed at 20:17 and lasted a half a second at a bearing of 101 degrees. The detection ended with two up-sweeping audible and highlighted whistles at 20:18.	0:03
9/2/2017	22:24		Continuous layer of clouds	SE	2	10	41 03.5	71 13.7		611	Dolphin spp.	29	200	6		All HRG active	A half second HF click train with a bearing of 30 degrees was observed at 22:24, with a triangulation of 200m, and was followed by multiple HF click trains, lasting between a half second and five seconds, with bearings from 21 to 100 degrees until 22:27; during which triangulation calculated the dolphins as close as 145m. A LF constant whistle was audible and observed on the LF spectrogram along with being highlighted by the Whistle-Moan Detector at 22:25. HF click train abundance peaked at 22:29 with multiple click trains veering from 44 to 115 degrees; depicting approximately 6 dolphins vocalizing. The detection ended at 22:30 with a four second click train at a bearing of 95 degrees veering to 115 degrees. This detection was visually correlated. Water depth was unavailable.	0:06
9/2/2017	22:28		Rain	SE	2	10	41 03.4	71 13.9	237	611	Dolphin spp.		50	4	porpoising	Power down	Dolphins sighted on camera 1 (aft) following power down. Porpoising toward vessel, then across stern (stbd to port), then lost sight of them. PSO went on deck at 22:29 to attempt to id species and observe behavior with night vision, but could not locate the dolphins. Depth data unavailable.	0:01
9/2/2017	23:14		Rain	SE	2	10	41 03.5	71 14.4		612	Dolphin spp.	17	164	4		HRG powered-down	At 23:14 multiple whistles from at least two dolphins were detected audibly and on the spectrogram and whistle and moan detector. The whistles were loud and had a frequency range between 8 and 24 kHz. A few seconds later, LF clicks were also detected on the spectrogram, but not audibly or on the LF click detector, and overlapping HF click trains from at least two dolphins were detected between bearings 17 and 20 degrees. The HF click trains were tracked to a range of 164 meters from the source, and the clicks had peak amplitudes ranging between 138 and 141 dB. By 23:15 the LF clicks were not longer being detected on the spectrogram and the HF click trains had trailed astern slightly to a bearing of 42 degrees. The detection ended a few seconds later. Analysis of the detection recordings revealed that the clicks had frequency ranges between 8 and 203 kHz, and that there were simultaneous click trains from at least 4 dolphins. At the time of the detection, the sources were powered down due to a previous dolphin detection. The source had been due to ramp up at 23:30, however, this detection delayed the ramp up another 45 minutes. Depth data unavailable.	0:01
9/3/2017	2:14	128	Rain	SE	2	8	41 03.8	71 15.2		613	Dolphin spp.	25	72	5		All HRG active	A 4s HF click train was observed at 02:14 with a bearing of 25 degrees following by multiple HF click trains lasting between a half and eight seconds with bearings from 25 to 148 degrees until 02:19. Triangulation calculated the pod, of approximately 5 dolphins, as close as 72m to the CoS. After that a scattering of HF clicks with bearings from 60 to 113 degrees were observed until 02:22; triangulation calculated the dolphins within the 200m exclusion zone.	0:08
9/3/2017	3:38	100	Rain	SE	2	7	41 02.9	71 09.0		614	Dolphin spp.	66	165	3		All HRG active	A 1s click train was observed at 03:38 at a bearing of 66 degrees followed by multiple HF click trains lasting between a half and three seconds with bearings from 28 to 101 degrees until 03:39; depicting 3 dolphins vocalizing. Triangulation calculated the dolphins at 165m.	0:01

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
																	bearing of 25 degrees and range of 133 meters. LF clicks were also detected on the spectrogram, but not audibly or on the LF click detector. From 04:05 to 04:12, short HF click trains were detected at infrequent intervals between 21 and 25 degrees, with tracked ranges at 04:08 of 113 meters. LF clicks were also detected sporadically during this time, but were still not audible, and at 04:12 a few faint harmonics were also detected on the spectrogram. At 04:18 a few faint whistles were observed on the spectrogram, and at 04:24 more short HF click trains were detected between 20 and 25 degrees. These clicks were tracked to a range of 478 meters. From 04:26 to 04:28 HF click trains were observed trailing astern from 58 to 68 degrees, then moving back up to 27 degrees, then moving again astern to 47 degrees. During this time there were also a few loud down sweeping whistles 5-23 kHz with an amplitude of 124 dB detected. From 04:30 to 04:42, infrequent short HF click trains were detected between 22 and 59 degrees at irregular intervals and lengths, with a few able to be tracked to ranges between 124 and 158 meters. LF clicks and some faint harmonics were also occasionally detected during this time. At 04:49 there were again some very loud whistles detected. From 04:51 to 05:25, short infrequent HF click trains were observed moving between bearings of 20 degrees and 134 degrees. The majority were too short to track, but the few that were able to be tracked had ranges between 26 and 239 meters. During this time there also continued to be occasional LF clicks, harmonics and both loud and faint whistles detected on the spectrogram. At 05:26 all of the sound source equipment was disabled as operations were suspended for weather. Although the dolphins were still being detected at that time, acoustic monitoring was stopped at 05:27 after the seismic equipment had been silenced so that the PAM cable could be retrieved first. The dolphins were never visually detected by the PSOs on the thermal cameras. Analysis of the detection recordings revealed vocalizations, including HF clicks with frequency ranges between 16 and 250 kHz and amplitude ranges	1:23
9/3/2017	4:04		Rain	SE	2	7	41 02.8	71 08.4		615	Dolphin spp.	25	133	4		HRG powered-down		
9/3/2017	9:21		Drizzle	E	8	10	41 09.5	71 19.6	238		Dolphin, Short-beaked Common	104	150	6	porpoising	shutdown for weather (no gear deployed)	6-8 common dolphins seen at 09:21 at 150m off bow crossing perpendicularly in front of vessel; no survey equipment deployed at time of sighting; last seen at 9:21; depth information not available	0:00
9/3/2017	14:21		Fog or thick haze	E	5	5	41 04.2	71 38.6	239		Whale, Fin	280	900	2	transit	weather patterns	saw 2 blows at the same time, 900m off the starboard side of vessel (distance estimated from the bow). 8-10 additional blows sighted off starboard side of vessel, whales surfaced several times. Last seen off starboard stern as vessel was turning. Depth data unavailable.	0:05
9/3/2017	15:51		Fog or thick haze	E	5	4	41 13.8	71 39.5	240		Whale spp.		300	1	traveling, diving	weather patterns	saw 2 blows and part of the whales back before it dived. It appeared to be crossing in front of the bow. 300 m off the bow. Depth data unavailable. Did not record bearing.	unk
9/4/2017	15:39	125	Clear	SW	5	10	41 03.5	71 14.5	241		Whale, Fin	205	830	1	traveling, surfacing, blows,	Survey line. All HRG equipment active	First spotted tail, elliptical blows off port bow (830 m away from source). Sighted as it surfaced again (600m away from source), but looked like it was traveling away from the vessel in the opposite direction, and was not seen again.	0:04
9/4/2017	17:48		Clear	SW	5	10	41.01.1	71.18.6	242		Dolphin, Short-beaked Common	253	450	9	Porpoising, leaping, bow riding, swimming with vessel	shut down	8-10 dolphins spotted 450 m off port stern (distance estimated using reticled binoculars). Dolphins porpoised toward vessel, then along the port side vessel (within 5-10m of hull) toward the bow. Dolphins then attempted to bow ride, and circled the bow and vessel at close range. Dolphins left the vessel, then returned and continued the same behavior. All HRG equipment was still shut down from sighting 241. PSO notified survey crew about sighting and restarted 60 minute EZ clearance procedure at 18:40 (time of last sighting within EZ). Depth data unavailable.	0:52
9/4/2017	18:15		Clear	SW	5	10	41.00.9	71.19.6	243		Whale, Humpback	215	1600	2	surfacing	shut down	2 tall bushy blows sighted 1600 m off bow (distance estimated using reticled binoculars). PSO confirmed all HRG equipment was still shut down. Last sighted within EZ at 18:21, but ramp up still delayed until 60 minutes after Comon Dolphins (sighting 242) left the EZ. Depth data unavailable.	0:06
9/4/2017	20:21	146	Clear	SW	5	10	40 01.2	71 18.2		616	Dolphin spp.	103	500	1		Survey line. All HRG equipment active.	A 1s HF click train was observed at 20:21 with a bearing of 103 degrees followed by click trains lasting between a half second and three seconds at the same bearing. The detection ended with a one second click train at 130 degrees. Only a single dolphin was observed vocalizing. Triangulation was not calculated due to non-working GPS.	0:01
9/4/2017	22:07	145	Clear	SW	4	10	41 02.2	71 17.5		617	Dolphin spp.	103	230	2		Survey line. All HRG equipment active.	A 1s HF click train was observed at 103 degrees followed by multiple half second to two second click trains at the same bearing at 22:07. HF click trains were observed from 06 to 118 degrees lasting between a half second and two and a half seconds; depicting two dolphins vocalizing. Triangulation calculated the dolphins at 235m. Click trains were again observed at a bearing of 130 degrees lasting between a half and three seconds; with triangulation at 230m. The detection ended with one second click train at 132 degrees at 22:11.	0:04
9/5/2017	2:55		Clear	SSW	5	10	41 15.2	71 29.0	244		Dolphin spp.	340	100	2	porpoising	weather patterns	spotted two dolphins porpoising at the bow on camera #2 (port side)	0:05
9/9/2017	8:51		Clear	NNW	3	10	41 03.7	71 16.4	245		Dolphin, Short-beaked Common	215	50	10	porpoising	Running lines without equipment, marking lobster pot locations for later	8-12 common dolphins seen approaching bow from ahead at about 50 meters; at time of sighting, vessel was running lines without equipment, marking lobster pot locations for later; dolphins were porpoising and swimming around and under bow; left mitigation zone at 8:57. Depth data unavailable. Unable to determine # adult/ juvenile/calf.	0:06
9/9/2017	9:09		Clear	N	3	10	41 04.2	71 17.7	246		Whale spp.	188	6000	1	Blows (no other behavior observed)	Running lines without equipment, marking lobster pot locations for later	3 short, bushy blows sighted 6000m off port side of vessel (distance estimated using reticule binoculars). Depth data unavailable.	0:01

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Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
9/9/2017	22:10	124	Partly Cloudy	WNW	2	10	41 07.2	71 07.6	247	618	Dolphin spp.	74	360	3		All HRG active	A 1.5s click train was observed with a bearing of 74 degrees at 10:10 and was immediately followed by a faint constant whistle not highlighted by the Whistle-Moan Detector. Triangulation calculated the dolphins 360m from the CoS. Multiple HF click trains were again observed lasting between a half and 5 seconds long with bearings from 34 to 119 degrees with triangulation calculated the dolphins as close as 155m from the CoS. Multiple LF sinusoidal, downsweeping, and upsweeping whistles were observed and highlighted by the Whistle-Moan Detector. The detection ended with a 3s click train at 115 degrees at 22:19.	0:09
9/9/2017	22:12	124	Partly Cloudy	WNW	2	10	41.07.1	71.07.5	247	618	Dolphin, Short-beaked Common		150	5	porpoising	HRG equipment powered down	Dolphins sighted off starboard bow with night vision), porpoising toward vessel. Then swam toward stern and away from vessel and not seen again. Did not record bearing.	0:03
9/9/2017	23:08		Partly Cloudy	WNW	2	10	41 06.7	71 03.8		619	Dolphin spp.	77	67	5		HRG powered down	detected audible and on the spectrogram with frequencies between 8 and 24 kHz and amplitudes between 98 and 107 dB, and two to three HF click trains were detected between 77 and 107 degrees. The clicks had peak amplitudes between 132 and 143 dB, and were tracked to a closest range of 67 meters. From 23:11 to 23:33, a mixture of up sweep, convex and sinusoidal whistles between 6 and 24 kHz, with amplitudes between 105 and 112 dB, were detected from at least three dolphins, and HF click trains were detected between 113 and 188 degrees and tracked to a closest range of 42 meters. No vocalizations were detected between 23:33 and 23:46, when additional HF click trains were detected at a bearing of 52 degrees along with harmonic detected audibly and on the spectrogram. From 23:48 to 23:49, the HF click trains were observed moving between bearings of 15 degrees and 62 degrees, and at 23:50 there was an increase in the LF vocalizations begin detected, with LF clicks, pulses and harmonics being detected among the continued whistles. From 23:51 to 23:54, HF click trains were detected between 56 and 78 degrees, with tracked ranges between 32 and 153 meters and peak amplitudes of 165 dB. At 23:54 there also appeared to be a HF burst pulse, along with continued LF clicks, whistles and harmonics. At 23:55 a HF click train at 103 degrees was tracked to a range of 78 meters, and at 23:56 the dolphins were last sighted on the thermal cameras at a range of 231 meters. Again no vocalizations were detected until 00:09, when additional HF click trains were observed between 91 and 98 degrees. At 00:12, a HF click train at 100 degrees was tracked to a range of 100 meters. From 00:13 to 00:29, HF click trains were detected moving between 20 degrees and 125 degrees with tracked ranges between 23 and 275 meters. LF clicks, pulses, harmonics and whistles between 6 and 24 kHz also continued to be detected during this time. At 00:28 the dolphins were sighted on the thermal cameras astern of the vessel at a range of 435 meters, and they were last sighted on the cameras at 00:29 just inside the 500 m EZ. No acoustic Dolphins sighted off starboard bow (with night vision). Lost sight of them, then seen again 25m off bow at 23:51 attempting to bow ride, but quickly left the EZ (sighting less than 10 minutes). Depth data unavailable. Did not record bearing.	2:46
9/9/2017	23:47		Partly Cloudy	WNW	2	10	41.06.9	71.06.6	248	619	Dolphin, Short-beaked Common		100	4	feeding,	HRG powered down		0:06
9/10/2017	0:23		Partly Cloudy	N	2	10	41 07.3	71 05.8	249		Dolphin spp.		275	3	porpoising, feeding	HRG powered down	Sighted 275m from sound source off port stern. Sighted at 00:26 off stern, 440m from sound source. Last sighted at 475m off stern. Distance estimated with RADES software. Depth data unavailable. Did not record bearing. Unable to determine # adult/juvenile/calf.	20:06
9/10/2017	1:39	120	Partly Cloudy	N	2	10	41 06.9	71 05.7	250	619	Dolphin spp.	9	185	10	milling	Ramp up	~10 dolphins seen off port side on thermal cameras, 105m from sound source (no recording made due to RADES software malfunction); At 01:43 dolphins left exclusion zone; dolphins seen at 850m at 01:44; still seen at 1km at 01:45; last seen on thermal cameras at 1.5km at 01:47; HF click trains still heard at 02:35 until 02:42. Unable to determine # adult/juvenile/calf.	0:08

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Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
9/10/2017	23:23	118	Partly Cloudy	SSW	2	10	41 05.9	71 08.6		620	Dolphin spp.		800	3		All HRG equipment active	At 23:23 a few faint up sweep whistles (8-13 kHz and 122-129 dB) from at least one dolphin were detected on the spectrogram and were also faintly audible. At 23:30, additional faint whistles from at least 2 dolphins (9-14 kHz and 17-23 kHz) were also detected audibly and on the spectrogram. At 23:32 a few possible HF clicks were detected at a bearing of 60 degrees and a few non-audible LF clicks were detected on the spectrogram along with some continued whistles. At 23:33, a distinct HF click train was detected at a bearing of 65 degrees and a power down of the acoustic source was requested. The initial click train was not able to be tracked, but as HF sounds dissipate quickly with distance in the water, the dolphin was estimated to be within 500 meters of the source at that time, and a power down was initiated at 23:34. Also at 23:33, there was an increase in the LF clicks and there were also LF pulses and a few harmonics among the continued whistles. From 23:35 to 23:36, HF click trains from 2 to 4 dolphins were detected trailing astern from an initial bearing of 62 degrees to a final bearing of 108 degrees. The peak click amplitude at this time was 183 dB. The last few clicks at 23:36 at a bearing of 100 degrees were tracked to a range of 184 meters. From 23:38 to 23:49, only a few occasional faint whistles were detected on the spectrogram. At 23:50 HF click trains were again detected between 30 and 58 degrees, and the dolphins were located on the port side thermal camera at a range of 460 meters. At 23:51 several large up sweep whistles between 7 and 22 kHz were detected audibly and on the spectrogram along with a few harmonics. HF click trains from at least 3 dolphins were also detected at this time between 19 and 70 degrees and tracked to a range of 110 meters. The HF click trains then moved astern to a bearing of 63 degrees and then to a bearing of 86 degrees by 23:52. A few final HF click trains were detected at a bearing of 121 degrees. The detection concluded at 23:54 with a few faint final whistles observed on the spectrogram.	0:31
9/10/2017	23:50		Partly Cloudy	SSW	2	10	41 05.8	71 06.0	252	620	Dolphin spp.	175	460	3	swimming at surface	HRG powered down	2-4 dolphins seen on thermal camera at 23:50 at 460m (in E2); HF clicks first detected by PAM at 23:33; dolphins appeared to be swimming parallel to vessel in opposite direction on port side of vessel; dolphin last seen on camera at 23:52. Depth data unavailable. Unable to determine # Adult/Juvenile/Calif.	0:02
9/11/2017	0:24		Partly Cloudy	SSW	2	10	41 05.6	71 06.3		621	Dolphin spp.	86	500	4		HRG powered down	bearing of 86 degrees and 101 degrees with click amplitudes as high as 141 dB. At the time of the detection, the HRG was already powered down for a previous dolphin detection, and this detection delayed ramp-up. From 00:26 to 00:27, faint harmonics, whistles, pulses and clicks were observed on the spectrogram, but they were not really audible over the headphones. At 00:28/ a HF click train at a bearing of 104 degrees was tracked to a range of 378 meters. From 00:29 to 00:52, HF click trains of varying lengths were detected between bearings of 22 and 129 degrees, with click amplitudes up to 162 dB, and were tracked to a range of 381 meters. During this time there were also frequent faint whistles 8-13 kHz detected on the spectrogram. At 00:53 there was an increase in the frequency and number of LF clicks, whistles and pulses detected, and several HF click trains were observed trailing astern from bearings of 52 to 65 degrees to a bearing of 83 degrees. Short HF click trains were detected at 00:57 at 122 degrees and then at 00:58 at 81 degrees, and then only faint whistles were detected from 00:59 until 01:12. At 01:13 a short HF click train was detected at 107 degrees along with a few louder whistles, and then at 01:15 the dolphins were located on the stern thermal camera at a range of 700 meters heading away from the vessel. From 01:18 to 01:51, only continuous whistles were detected, mainly up sweep and sinusoidal, with frequency ranges between 5 and 22 kHz and amplitudes between 105 and 128 dB. At 01:53, additional HF click trains were detected trailing astern from 84 degrees to 116 degrees, and the dolphins were again located on the thermal cameras astern of the vessel at a range of 400 meters. Continued whistles were detected while more HF click trains were detected at 01:54 at 122 degrees and then at 01:56 at 115 degrees, which was tracked to a range of 128 meters. Abundant HF click trains were observed from 02:07-02:09 lasting between a half second and 13 seconds with bearings from 35 to 139 degrees. LF whistles were also audible and highlighted by the Whistle-Moan Detector along with LF buzzes. The HF click were sighted dolphins on camera #1 (aft camera) 650m away from the source, direction of travel: crossing perpendicular behind the ship. Last time of sighting was 01:19. Depth data unavailable.	2:54
9/11/2017	1:17		Partly Cloudy	SSW	2	10	41 05.9	71 11.4	253	621	Dolphin spp.	129	650	3	porpoising	HRG powered down		0:02
9/11/2017	1:55		Partly Cloudy	SSW	2	10	41 06.0	71 11.0	254	621	Dolphin spp.		400	2	porpoising, travelling	HRG powered down	Sighted dolphins on camera #1 (aft) 400m from sound source (closest approach), swimming in a variable direction around the stern. Last time of sighting was 01:58. Depth data unavailable. Did not record bearing.	0:03
9/11/2017	2:16		Partly Cloudy	SSW	2	10	41 05.9	71 09.7	255	621	Dolphin spp.	121	150	5	porpoising	HRG powered down	All HRG equipment powered down for dolphins. PAM detections continued until 03:13. Depth data unavailable.	0:06
9/11/2017	8:17	111	Partly Cloudy	N	3	10	41 06.7	71 12.2	256		Whale spp.	105	1500	1	Blow (no other behavior observed)	operational shutdown	Two tall, column-like blows seen at 1500m (estimated using reticule binoculars) off starboard side of vessel; Possible fin whale, but only blows were seen	0:00

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Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
9/11/2017	22:10	116	Clear	W	2	10	41 05.1	71 07.3		622	Dolphin spp.	85	125			All HRG active	A 1.5s click train was observed with a bearing of 74 degrees at 22:10 and was immediately followed by a faint constant whistle not highlighted by the Whistle-Moan Detector. Triangulation calculated the dolphins 360m from the CoS. Multiple HF click trains were again observed lasting between a half and 5 seconds long with bearings from 34 to 119 degrees with triangulation calculated the dolphins as close as 155m from the CoS. Multiple LF sinusoidal, downsweeping, and upsweeping whistles were observed and highlighted by the Whistle-Moan Detector. The detection ended with a 3s click train at 115 degrees at 22:19.	0:09
9/11/2017	23:09		Clear	W	2	10	41 04.8	71 05.6	257	622	Dolphin spp.		158	4	swimming at surface	powered down	2-3 dolphins seen behind survey vessel at 158m from sound source (measured using RADES) at 23:09; dolphins seen again at 23:12 at 85m from sound source swimming alongside starboard side of vessel; Dolphins were seen intermittently on cameras following vessel/ swimming with vessel at close range for over 10 minutes. PSO on deck with night vision was alerted of position; PSO on deck saw dolphins at 23:34 at 400m, still within the EZ; Dolphins appeared to be following vessel/swimming with vessel. Approach determined to be voluntary based on this behavior. PSO authorized ramp up at 23:34; 3-4 dolphins seen at 23:43 at 347m; last seen in EZ at 23:43; depth data and bearing to vessel not available	0:34
9/12/2017	0:33	116	Clear	W	2	10	41 05.0	71 07.0	258		Dolphin, Short-beaked Common	70	75	9	porpoising, chasing towed equipment, bow riding, leaping, feeding, swimming with vessel.	Survey line. All HRG equipment active.	Sighted off starboard stern on aft camera (#1). Porpoising toward vessel, then chasing towed equipment. Sighted within 5 m of sparker, then swam alongside vessel towards bow. Less than 60 minutes since dolphins last sighted within EZ (following ramp up authorized for voluntary behavior), so no mitigation required. Also, sighted at 00:35 by observer on deck using night vision, porpoising at the bow, chasing towed equipment, and feeding on the starboard side, until 00:52. 4 dolphins sighted at 01:08-01:12 with night vision on starboard side, chasing towed equipment and swimming with vessel (within 3m of hull). Sighted again with night vision 01:17-01:25, swimming along starboard side of vessel, and again at 01:34-01:45 bow riding. At 01:55, 8-10 dolphins sighted (adults and one calf) with night vision swimming along starboard side of vessel near the bow, then alongside the stern near the gear, feeding, porpoising, and leaping. Dolphin sightings within the mitigation zone continued (both cameras and night vision) until 02:36.	2:03
9/12/2017	1:55	115	Clear	W	2	10	41 05.1	71 11.1	259	623	Dolphin spp.	16	500	6		All HRG active	spectrogram, and a few short HF click trains were detected at a bearing of 23 degrees. As this detection began within the allowed 60 minutes since the previous detections dolphins were last located within the 500m EZ, a power down of the sound source was not required per the project regulations. At 01:57, Panguard froze and restarted; however, when the program resumed there was no data being received from the ASIO Fireface sound card. Data was still available from the National Instruments sound card at this time though, and additional HF click trains from at least two dolphins were observed at this time trailing aster from initial bearings of approximately 60 degrees to final bearings of approximately 100 degrees. Click amplitudes at this time were as high as 168 dB. At 02:00, the PAM operator attempted to get the LF sound card functioning again by restarting the Panguard program fully. This did not work in resuming LF data, so the operator shut down and re-started the whole system. At 02:04, fully operations of the PAM system resumed at full function and the detection resumed with HF click trains around 20-30 degrees and faint whistles on the spectrogram. LF whistles continued to be observed and highlighted but not audible, and multiple HF click trains were observed lasting between a half second and 4 seconds at bearings from 20 to 26 degrees until 02:10. There were no LF whistles observed from 02:17 to 02:31 when faint inaudible but slightly highlighted LF whistles were observed on the LF Spectrogram. Abundant HF click trains were observed at 2:33 lasting between 1-5s with bearings from 0 to 107 degrees until 2:36. A 1 second click train at 120 degrees at 02:37 marked the end of HF click trains until 02:54. LF whistles ended at 02:40 with a faint inaudible sinusoidal whistle that was highlighted by the Whistle-Moan Detector. Computer was restarted again at 02:54 due to malfunction mouse; resulted in fixed mouse and GPS. At 02:54 a 1s click train was observed at 76 degrees and was triangulated at 210m from the CoS. A faint inaudible and barely highlighted LF up-sweeping whistles was observed at 2:55. The HF part of the detection ended at 2:56 with a	1:10
9/13/2017	0:27		Clear	SW	4	10	41 05.9	71 04.3	260		Dolphin, Short-beaked Common	45	25	5	porpoising, feeding	Deploying gear	Dolphins sighted by PAM monitor while deploying equipment off port stern. Then sighted on aft thermal camera (#1), 00:27 - 00:29. Dolphins swimming with vessel and feeding. Sighted off port bow at 00:30-00:47 (camera #2) approx 5 - 10 m from hull, feeding and occasionally attempting to bow ride. Sighted on deck with night vision on starboard side from 0031-0045. Species id confirmed by PSO on deck with night vision. Depth data unavailable.	0:18

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
9/13/2017	0:30		Clear	SW	4	10	41 05.9	71 05.9	260	624	Dolphin, Short-beaked Common	45	25	5		deploying gear	At 00:30, several short HF click trains were detected at bearings between 19 and 24 degrees, with amplitudes up to 137 dB, and LF clicks, buzzes and a harmonics were also detected audibly and on the spectrogram. At 00:34, two HF click trains were detected at bearings 24 and 30 degrees, with amplitudes up to 138 dB, and peak frequencies of 43 kHz, and at 00:36 a two down sweep whistles were detected on the spectrogram along with more LF clicks. At 00:40, multiple short HF click trains were observed at 27 and 38 degrees, and a single short click train was observed at 62 degrees. Continued LF clicks were observed on the spectrogram, and the dolphins, approximately 5-6 probable common dolphins, were still being visually sighted on the camera right off the port stern feeding on fish. At 00:43 there was an increase in the LF clicks, pulses and buzzes, and longer HF click trains at 21 degrees, with amplitudes up to 154 dB. A loud down sweep whistle 9-16 kHz was detected at 00:56, and then another single convex whistle 11-14 kHz was detected at 00:59. No further vocalizations were detected until 01:11, when a few HF clicks were observed at a bearing of 24 degrees, and a very faint down sweep whistle was observed on the spectrogram. From 01:14 to 01:16, there was an increase in LF clicks, pulses and harmonics, along with a few down sweeping whistles and HF click trains between 23 and 35 degrees. At 01:15, overlapping sinusoidal whistles 7 to 24 kHz were detected, and at 01:16 there was approximately 10 seconds of quick small up sweep whistles 8 to 10 kHz. From 01:19 to 01:22, there was again an increase in the LF clicks, pulses and whistles detected, along with short HF click trains around 20 degrees. At 01:24, a longer HF click train at 26 degrees was tracked to a range of 261 meters with triangulation of the vocalizations off the bow of the vessel. At this time the dolphins were also still being sighted visually around the vessel; however, due to issues with the seismic equipment, acoustic monitoring had to be stopped at this time to retrieve the PAM cable along with the other gear.	0:54
9/13/2017	1:13		Clear	SW	4	10	41 05.8	71 02.3	261		Dolphin, Short-beaked Common		100	7	Porpoising, bow riding, feeding, swimming with vessel	Vessel scouting for fishing gear in the area.	Dolphins sighted 20m off port bow, swimming toward vessel. Continued to swim in close proximity with the vessel as close as 2-3m from hull. Lost sight of dolphins at 01:48. No mitigation required, vessel conducting scouting operations prior to re-deployment of equipment.	0:35
9/13/2017	4:30	111	Clear	SW	4	10	41 04.1	71 08.1		625	Dolphin spp.	22	500	4		silent	At 04:30 a few very faint whistles were detected on the spectrogram. None of them were audible and only one was partially highlighted by the whistle and moan detector. There were 3 up sweep whistles and 1 down sweep whistle, with frequencies between 8 and 14 kHz and amplitudes between 98 and 100 dB. No further vocalizations were detected until 04:43 when several short HF click trains were detected at a bearing of 22 degrees. At 04:44 a faint harmonics was audible and observed on the spectrogram, and from 04:45 to 04:46 multiple click trains from 2-4 dolphins were detected between 22 and 41 degrees. Click amplitudes at this time were as high as 158 dB, and the dolphins were tracked astern of the vessel approximately 49m from the CoS. At 04:47 a large number of LF clicks and a few pulses were audible and observed on the spectrogram, and longer HF click trains were detected between 26 and 35 degrees. The dolphins were tracked to a range of 85 meters from the CoS at this time. These click trains then trailed astern to bearings between 83 and 93 degrees by 04:48, at which time a few faint down sweep whistles 8 to 11 kHz were detected. The detection concluded at 04:48 with the final HF clicks and LF whistles. At the time of the detection the acoustic sources were silent while awaiting clearance for ramp up. As the dolphins were tracked within the 500 meter EZ, the detection resulted in a delayed ramp-up mitigation action.	0:18
9/13/2017	5:11	111	Clear	SW	4	10	41 05.8	71 08.1		626	Dolphin spp.	74	500	2		silent	At 05:11 several loudly sinusoidal whistles 6-14 kHz and 103-117 dB were detected audibly and on the spectrogram and whistle and moan detector. At 05:13 additional loud whistles were detected along with HF click trains around 74 degrees. By 05:14 the HF click trains had moved astern to a bearing of 87 degrees, and more sinusoidal whistles 6-24 kHz were also detected. At 05:17 a HF click train at 113 degrees was tracked to a range of 334 meters from the CoS astern of the vessel. More sinusoidal and down sweep whistles 6-23 kHz and 112-120 dB were detected at 05:18, and at 05:19 the last HF click trains were detected trailing astern from a bearing of 124 degrees to a bearing of 132 degrees. At 05:21 another loud whistle 9-11 kHz and 113 dB was detected, which was the last confirmed detection of the dolphins within the 500m EZ. From 05:24 to 05:38, faint whistles 6-17 kHz were detected on the spectrogram approximately every 3 to 5 minutes; however none of the whistles were audible or highlighted by the whistle and moan detector. The detection concluded with the last whistle at 05:38. At the time of this detection the acoustic sources were silent awaiting clearance for ramp up, and this detection resulted in a delayed ramp up mitigation action	0:27
9/13/2017	10:17	108	Clear	SW	3	10	41 04.2	71 08.9	262		Whale, Humpback	130	2000	1	breaching	Survey line. All HRG equipment active	Sighted 2000m off starboard side of vessel. Saw three breaches in a row, then whale never surfaced again within visual range as the vessel was making a turn	0:01
9/13/2017	15:51	124	Clear	SW	3	10	41 04.0	71 10.0	263		Dolphin, Short-beaked Common	167	800	15	feeding, porpoising, bow riding	Survey line. All HRG equipment active	Dolphins sighted feeding, 750 m off the bow. Vessel was heading in the direction of the group. Power down was requested, and occurred when dolphins were 450 m away from the sound source. Dolphins approached vessel and were sighted bow riding from 16:04-16:14. Last sighting was at 16:20, still inside EZ.	0:29

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9/13/2017	23:33		Partly Cloudy	SW	4	10	41 03.9	71 11.3		628	Dolphin spp.	20	158	3		HRG powered down	At 23:33, HF click trains from 3-4 dolphins were detected at bearings between 20 and 30 degrees and tracked to a range of 158 meters. At 23:34 the HF click trains became longer at 22 and 33 degrees, and then from 23:35 to 23:36 were observed trailing astern to a bearing of 73 degrees. A few LF clicks were also detected at 23:36 on the spectrogram but not audible. At 23:37 a short HF click train was detected at 122 degrees, and then no further vocalizations were detected until 23:49, when multiple faint whistles (8-12 kHz and 99-118 dB) were detected on the spectrogram, but not audibly. Faint whistles, mainly down sweeping between 5 and 15 kHz were detected until 23:54, and then more HF click trains at 57 and 69 degrees were detected at 23:57. The HF click trains quickly moved astern to 74 degrees by 23:58 and were tracked to a range of 80 meters. The HF click trains continued to move astern to 126 degrees by 23:49, and then at 00:00 were tracked to a range of 83 meters. From 00:01 to 00:15, short HF click trains were continuously observed between bearings of 120 and 160 degrees, and tracked to a range of 139 meters at 00:09 and to a range of 361 meters at 00:14. During this time there were also a few faint whistles observed on the spectrogram, but none of them were audible. At 00:17 a few short HF click trains were detected at 110 degrees, and then more faint whistles were observed on the spectrogram at 00:19. Again no vocalizations were detected from 00:19 to 00:22, when more HF click trains were detected at bearings between 45 and 47 degrees. The HF click trains quickly trailed astern to a bearing of 138 degrees by 00:35, and click amplitudes during this time were as high as 172 dB. The detection concluded at 00:36 with a few faint sinusoidal whistles 11-18 kHz. Depth data unavailable.	1:03
9/14/2017	1:56	117	Partly Cloudy	SW	4	10	41 03.8	71 05.1		629	Dolphin, Short-beaked Common	54	500	8		soft start/ramp-up	A HF click train lasting a half second was observed at 01:56 at a bearing of 54 degrees followed by multiple HF click trains lasting between a half and four and a half seconds at bearings from 23 to 1354 degrees, during which triangulation calculated the dolphins as close as 190m from the CoS. An upsweeping LF whistle was observed and highlighted by the Whistle-Moan Detector at 01:59 followed by multiple LF whistles that were also highlighted consisting of constant, convex, upsweeping, downsweeping, and sinusoidal; LF buzzes were also observed. Peak HF click trains were observed from 02:09 to 02:10 with triangulation calculating the dolphins as close as 60m to the CoS. A 1s HF click train at a bearing of 131 veering to 133 degrees marked the end of the HF part of the detection at 02:09 with a highlighted downsweeping LF whistle marking the end of the entire detection at 02:11.	0:15
9/14/2017	2:01		Partly Cloudy	SW	4	10	41 03.9	71 05.5	264	629	Dolphin, Short-beaked Common		100	4	Porpoising, bow riding	Powered down	Sighted dolphins on starboard side, intermittently bow riding and swimming alongside of vessel (2-3m from hull). Unable to observe behavior for 10 minutes/ authorize ramp up based on voluntary approach. Last sighting within EZ at 02:06. Depth data unavailable.	0:05
9/14/2017	3:19	118	Partly Cloudy	SW	4	10	41 04.1	71 12.8		630	Dolphin, Short-beaked Common	33	500	6		soft start/ramp-up	Multiple LF whistles were observed but inaudible at 03:19 consisting of barely highlighted upsweeping and downsweeping whistles. At 03:20 a 1s HF click train was observed at 33 degrees and a power-down was called for commencing at 03:22. Multiple HF click trains were observed lasting between a half and three seconds from 23 to 99 degrees until 03:29; triangulation calculated the dolphins as close as 195m to the CoS. LF whistles continued to be observed and highlighted, though still inaudible, until 03:45 consisting of sinusoidal, downsweeping, upsweeping, concave, and constant. Multiple HF click trains returned at 03:35 lasting between a half and xx seconds with bearings from 41 to 128 degrees. Triangulation calculated the dolphins as close as 340m from the CoS at 3:36. Peak HF click trains were observed from 03:44 to 03:47 lasting upwards of 18s and depicting approximately 6 dolphins vocalizing. Detection was visually correlated and identified as short-beaked common dolphins bowriding for 10 minutes resulting in clearance for ramp-up. Triangulation calculated the dolphins 145m from CoS at 03:52. More abundant HF click trains were observed at 03:57 to 03:58. The last HF click train was observed at 04:01 at a bearing of 135 degrees along with a few faint whistles marking the end of the detection.	0:42
9/14/2017	3:45		Partly Cloudy	SW	4	10	41 04.3	71 11.6	265	630	Dolphin, Short-beaked Common		100	5	Porpoising, bow riding	HRG powered down	PSO with night vision observed dolphins bow riding and swimming with vessel 2-3m from hull for over 10 minutes. Approach determined to be voluntary based on this behavior. Dolphins remained in sight in close proximity to vessel until 04:15. Depth unavailable. Did not record bearing. Unable to determine # adults/juvenile/calf.	0:30
9/14/2017	4:19	118	Fog or Thick Haze	SW	4	1	41 04.1	71 07.6		631	Dolphin spp.	50	96	1		All HRG active	At 04:19, short HF click trains from at least one dolphins were detected at bearings between 50 and 54 degrees. The clicks had amplitudes as high as 140 to 142 dB, and were tracked to a range of 96 meters. The detection concluded at 04:20 with a few final HF clicks at 86 degrees. Although the dolphin(s) was detected within the 500 m EZ, the detection occurred within 60 minutes of the end of the previous detection, and another mitigation action was not required to be implemented.	0:01

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9/14/2017	4:37	114	Fog or Thick Haze	SW	4	0.1	41 04.1	71 05.8		632	Dolphin spp.			3		All HRG active	At 04:37, simultaneous up sweep whistles from at least three dolphins were detected on the spectrogram. The whistles were very faint, barely highlighted by the whistle and moan detector, and not audible. Another single up sweep whistle followed a few seconds later. The detection totalled 10 seconds in duration. Due to the brevity of the detection, the bearing and range of the dolphins could not be determined. However, given how faint the whistles were, it was estimated that the dolphins were outside of the 500m EZ.	0:00
9/14/2017	4:59	121	Fog or Thick Haze	SW	4	0.1	41 04.1	71 07.3		633	Dolphin spp.	20	417	3		All HRG active	At 04:59, several short HF click trains were detected between bearings 20 and 30 degrees with amplitudes up to 135 dB. The click trains were tracked to a range of 417m. The HF click train moved astern to 54 and 82 degrees by 05:01, with amplitudes up to 156 dB. At 05:02 a short HF click train was observed at 112 degrees, and a few faint up sweep whistles 9-11 kHz and 107-112 dB were detected on the spectrogram. A few more faint whistles were detected at 05:06 and the detection concluded at 05:07. Although the dolphins were tracked within the 500 m EZ, no mitigation action was required as this detection occurred within 60 minutes of the previous detection of dolphins within the EZ.	0:08
9/14/2017	5:49	111	Fog or Thick Haze	SW	4	0.1	41 04.1	71 12.0		634	Dolphin spp.	104	500	1		All HRG active	At 05:49, a few short HF click trains were detected at a bearing of 104 degrees. None of the click trains were long enough to track; however, as HF sounds dissipate quickly it was estimated that the dolphin(s) was within the 500m EZ. The detection concluded at 05:51 with a few final HF clicks at 105 degrees. Although the dolphin(s) was estimated to be within the 500m EZ, no mitigation actions were required as this detection occurred within the allowed 60 minutes since the previous detection of dolphins within the EZ.	0:02
9/14/2017	6:14	121	Fog or Thick Haze	WSW	3	0.1	41 03.7	71 10.2		635	Dolphin spp.	68	500	3		All HRG active	At 06:14 loud whistles 9-24 kHz and 112-130 dB and LF clicks were detected audibly and on the spectrogram. A few seconds later, HF click trains were detected at a bearing of 68 degrees and amplitude of 162 dB. By 06:16 there was a long HF click train at 26 degrees, and two HF click trains at 59 degrees trailing astern to 115 degrees. Click amplitudes at this time were as high as 176 dB. Whistles continued to be detected until the end of the detection at 06:17. Due to the brevity of the detection, and the trailing HF click trains, the dolphins were not able to be tracked to a specific range. However, as HF sounds dissipate quickly with distance, and the whistles were loudly audible, it was estimated that the dolphins were within the 500m EZ. No mitigation actions were required though as these dolphins were detected within the allowed 60 minutes since the previous detections dolphins were last detected in the EZ.	0:03
9/14/2017	17:17		Partly Cloudy	SW	3	10	41 03.9	71 06.6	266		Whale spp.	220	3000	1	blows (no other behavior observed)	Survey line. All HRG equipment active	Saw 3 blows off the starboard side of the vessel. Not sighted again.	0:02
9/14/2017	18:30		Drizzle	SW	3	10	41 01.9	71 07.9	267		Dolphin, Short-beaked Common	140	800	20	porpoising, leaping, chasing towed equipment.	Survey line. All HRG equipment active	Approximately 20 dolphins sighted off starboard stern. 10-12 left the pod and porpoised toward vessel. Powerdown occurred when dolphins were between 450-500m from sparker. Dolphins immediately began chasing towed equipment (tail buoy, sparker, sidescan sonar) at close range (within 2m of equipment). Dolphins were still chasing the equipment at 18:43, and PSO authorized ramp up based on this behavior (voluntary approach to chase towed equipment), in accordance with IHA. This behavior continued until 18:49, and dolphins last sighted within EZ at 18:51. Depth data unavailable. Unable to determine # of adult/juvenile/calf.	0:21
9/14/2017	18:45	118	Drizzle	SW	3	10	41 02.8	71 08.1	267	636	Dolphin, Short-beaked Common	29	290	15		All HRG active	Upon starting of PAM watch LF whistles and HF click trains were observed at 18:45. Multiple HF click trains were observed lasting between 1-10s with bearings from 29 to 121 degrees. Triangulation calculated the dolphins 185m from the CoS at 18:46. The HF click trains ended with a half second click train at 68 degrees at 18:49. Peak LF whistles continued to be observed from 18:45 to 18:48 become less abundant and weaker until ending with a faint, highlighted, upsweeping whistle at 19:02. Visually correlated detection with 10min voluntary approach allowing for a ramp-up from 18:43 to 19:03.	0:06
9/14/2017	20:08	119	Drizzle	SSW	3	10	41 03.9	71 08.8		637	Dolphin spp.	57	500	5		Silent	Multiple HF click trains were observed at 20:08, while the vessel was silent and taking a noise file, and a power-down was implemented at 20:13. The click trains lasted between a half and 12 seconds with bearings from 25 to 134 degrees. Triangulation calculated the dolphin 250m from the CoS at 20:09. LF whistles were observed, but not audible, and highlighted by the Whistle-Moan Detector at 20:09 and consisted of down-sweeping, upsweeping, concave, convex, and sinusoidal. At 20:20 triangulation calculated the dolphins 100m from the CoS. LF buzzes were observed at 20:26 along with more abundant and louder LF whistles and a peak amount of HF click trains until 20:27; during this time triangulation calculated the dolphins 120m from CoS. HF click trains ended at 20:31 though faint barely highlighted LF whistles were still observed. HF click trains were observed again from 20:41 to 20:43 lasting between a half and 13 seconds at bearings from 05 to 114 degrees; triangulation calculated the dolphins 105m from the CoS. The detection ended at 21:01 with a faint partially highlighted sinusoidal whistle	0:53

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9/14/2017	22:46	121	Continuous layer of clouds	SSW	3	10	41 03.5	71 07.5		638	Dolphin spp.			3		All HRG active	At 22:46, multiple whistles from 3-4 dolphins were detected on the spectrogram. The whistles were very faint, not audible, and barely highlighted by the whistle and moan detector. Due to this, the initial bearing and range of the dolphins could not be determined. The whistles continued to be detected at infrequent intervals until 22:55, at which time HF click trains were detected and the dolphins were able to be tracked. The HF click trains were detected at an initial bearing of 35-38 degrees and were tracked to a range of 190 meters to the CoS. At that time, additional louder whistles along with LF clicks were also detected on the spectrogram and audible. The HF click trains quickly trailed astern to a bearing of 74 degrees. At 22:56 the dolphins were tracked to a range of 78 meters from the CoS. Click amplitudes during this time ranged as high as 162 dB. All vocalizations ceased at 22:56. A power down of the acoustic sources was requested immediately upon the dolphins being tracked within the EZ and implemented at 22:56.	0:10
9/14/2017	23:34	114	Continuous layer of clouds	SSW	3	10	41 05.8	71 08.0		639	Dolphin spp.	56	191	3		HRG powered down	At 23:34, several long HF click trains from at least 1 dolphin were detected at a bearing of 56 degrees, amplitudes up to 142 dB, and a range of 191m. At 23:35, short HF click trains from at least 3 dolphins were detected at bearings 26,28, and 42 degrees. At 23:36, HF click trains between 41 and 47 degrees, with amplitudes up to 157 dB, were tracked to a range of 78 meters. From 23:36 to 23:43, short HF click trains were detected between bearings of 21 and 52 degrees approximately once every 2-3 minutes. None of the click trains were long enough to track. At 23:45, the PSO outside confirmed visual sighting of the dolphins of the dolphins bow-riding for more than 10 minutes and gave clearance for ramp up - the sources had been powered down at the beginning of the detection from a previous dolphin detection. At 23:46, HF click trains at 26 degrees, 23 degrees, and 30 degrees were tracked to a range of 76 meters. Ramp up started at 11:48, and the last HF click train was detected at 11:52 at a bearing of 114 degrees.	0:18
9/14/2017	23:35	114	Continuous layer of clouds	SSW	3	10	41 05.8	71 08.0	268	639	Dolphin, Short-beaked Common		100	4	porpoising, bow riding	HRG powered down	From 23:35-23:50, PSO saw 3 adult and 1 juvenile dolphins bow riding using night vision. Dolphins approach determined to be voluntary to bow ride based on this behavior. PSO authorized ramp up after observing 10 min of this behavior (in accordance with IHA). Lost sight of dolphins after they left the bow of vessel. Did not record bearing.	0:15
9/15/2017	1:00	131	Continuous layer of clouds	SSW	3	10	41 06.5	71 08.4		640	Dolphin spp.	82	500	6		All HRG active	A 1s HF click train was observed at 01:00 at 82 degrees followed by multiple HF click trains lasting between a half and 4 seconds with bearings from 75 to 112 degrees until 1:10; triangulation calculated the dolphins at 450m from the CoS. LF whistles, inaudible and somewhat highlighted, were observed at 01:09. Triangulation calculated the dolphins 165m from CoS at 01:04. Sporadic HF click trains were observed again at 01:14 until 01:22; faint LF whistles still ongoing. At 01:39 Multiple HF click trains were observed again until 1:44 with LF whistles ending at 1:49. HF click trains returned at 02:04 with a 1s train at 116 degrees with triangulation at 185m from the CoS and continued until 02:26 when the detection ended with a 1.5s click train at 107 degrees.	1:26
9/15/2017	3:34		Continuous layer of clouds	SSW	3	10	41 05.4	71 08.6		641	Dolphin	101	500	4		soft start/ramp-up	Multiple HF click trains were observed at 03:34 while the vessel was ramping up. The clicks lasted between a half and 5 seconds at bearings from 24 to 125. LF down-sweeping whistles were observed at 03:35 though inaudible and not highlighted. Triangulation calculated the dolphin at 140m from the CoS at 03:36. Peak HF click trains were observed from 03:36 until 03:37 and a 03:42 until the end of the HF part of the detection at 3:43; depicting 4 dolphins vocalizing. LF whistles continued to be observed until 03:46 and consisted of concave, convex, constant, sinusoidal, down-sweeping, and up-sweeping; ending with a faint convex whistle that was inaudible and barely highlighted. Water depth unavailable.	0:12

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9/15/2017	4:21		Fog or Thick Haze	SSW	3	0.2	41 03.8	71 08.5		642	Dolphin, Short-beaked Common	123	500	9		HRG powered down	detected on the spectrogram; however they were barely highlighted by the whistle and moan detector and were not audible. At 04:26 a few HF clicks were detected scattered around 123 degrees; however, there were no clear trains that could be tracked. A short HF click train was detected at 04:29 at a bearing of 37 degrees, and then another short HF click train was detected at 04:30 at a bearing of 38 degrees. A few down sweeping whistles 9 to 17 kHz were also detected at this time. At 04:31 a high number of LF clicks and buzzes were detected audibly and on the spectrogram, and multiple short HF click trains were detected scattered around 26 degrees. From 04:32 to 04:46, constant LF clicks, buzzes, pulses and harmonics were detected along with occasional whistles, and multiple HF click trains from at least 5 dolphins were detected moving frequently between bearings of 20 degrees and 89 degrees. Click amplitudes during this time ranged between 134 and 178 dB. At 04:32 the dolphins were tracked to a range of 81 meters and at 04:35 the dolphins were tracked to a range of 93 meters. At 04:37, the vessel began making a turn, and there was a brief decrease in the number and frequency of vocalizations detected for approximately 45 seconds, and the dolphins were tracked to a range of 126 meters. At 04:38 the constant LF and HF vocalizations resumed with click trains between 17 and 135 degrees with amplitudes between 132 and 175 dB. At 04:40 simultaneous sinusoidal whistles from at least 2 dolphins were loudly audible and detected on the spectrogram with frequency ranges between 8 and 15 kHz and 17 and 95 kHz. At 08:41 the dolphins were tracked to a range of 58 meters. At 04:44, the visual observed had confirmed that 8-10 common dolphins had been sighted bow riding for more than 10 minutes and ramp up was cleared and started. By 04:48 the HF clicks were mainly being detected between bearings 130 to 145 degrees, and at 04:54 were tracked to a range of 112 meters. By 04:57 the vocalizations had again decreased, with a few scattered HF click trains around 23-36 degrees tracked to a range of 63 meters. At 05:00 a few whistles were detected along with	0:54
9/15/2017	4:32		Continuous layer of clouds	SSW	3	10	unk	unk	269	642	Dolphin, Short-beaked Common		150	9	porpoising, leaping, bow riding, chasing towed equipment, swimming with/chasing vessel, feeding	Powered down	Dolphins sighted porpoising toward starboard stern/towed equipment (with night vision, distances are visual estimates by PSO). 04:33-04:37 dolphins sighted chasing tail buoy, sparker and sidescan sonar. Then swam to bow and sighted bow riding and swimming alongside vessel (2-3m from hull) on starboard side from 04:38 - 04:40. Some dolphins then moved to the port side at 04:41 and the pod continued bow riding/ swimming with vessel on both sides until 04:50. Dolphins then swam back to the stern and continued to chase the equipment and vessel until 05:05. PSO determined dolphins approach voluntary to chase towed equipment and bow ride, and authorized ramp up after observing 10 minutes of this behavior. Dolphins last sighted approx 200m from sound source, still following the vessel but at increasing distance. Did not record bearing. Depth data unavailable.	0:33
9/15/2017	5:30	124	Continuous layer of clouds	SSW	3	10	41 07.3	71 08.4		643	Dolphin, Short-beaked Common	97	500	3		All HRG active	At 05:30, a few scattered HF clicks were detected at a bearing of 97 degrees with amplitudes up to 144 dB. From 05:31 to 05:32, more scattered HF clicks and short HF click trains were detected between bearings of 100 and 122 degrees. At 05:33 the dolphins were visually sighted on the cameras, and HF click trains at 29, 42 and 51 degrees were tracked to ranges between 26.5 and 500 meters. From 05:35 to 05:43, short HF click trains were observed between 49 and 117 degrees, with amplitudes between 136 and 147 dB. At 05:44 a longer HF click train at 49 degrees was tracked to a range of 402 meters. At 05:45, multiple HF click trains from 3-4 dolphins were detected moving astern from an initial bearing of 53 degrees to a final bearing of 112 degrees, with amplitudes up to 168 dB. No vocalizations were detected from 05:45 to 05:53, when the dolphins were again located on the cameras and more HF click trains between 22 and 32 degrees were detected along with some LF clicks on the spectrogram. At 05:54 a longer HF click train at 41 degrees were tracked to a range of 154 meters, with amplitudes up to 153 dB. LF clicks continued to be detected from 05:55 to 05:56 on the spectrogram but not audibly, and HF click trains were detected between 25 and 35 degrees. The LF and HF clicks ended at 05:56 at a bearing of 52 degrees. Faint whistles were detected on the spectrogram at 06:00, but were not audible. The detection concurred at 06:02 with a few faint, non-audible whistles on the spectrogram.	0:32
9/15/2017	5:34	128	Continuous layer of clouds	SSW	3	10	41 07.5	71 08.4	270	643	Dolphin spp.	200	575	10	transiting, porpoising, leaping, milling, feeding	Survey line. All HRG equipment active	Dolphins did not enter EZ. Unable to determine # adult/juvenile/calf.	0:34
9/15/2017	5:49		Continuous layer of clouds	SSW	3	10	41 08.7	71 08.5	271	643	Dolphin spp.	190	750	5	porpoising, leaping	Survey line. All HRG equipment active	3 - 5 Dolphins sighted crossing perpendicular behind vessel (Starboard to Port). Lost sight of this group at 05:54, at approximately 800m from sound source. 4-6 additional dolphins sighted 125m from sound source off port side of vessel, bearing 135, from 05:54-05:56. Appeared to be milling and feeding. Then sighted on aft camera (#1) at 05:57-05:59, 165m from sound source, porpoising toward port side and away from vessel. Distance estimated with RADES software. Unable to determine # adult/juvenile/calf. Did not record depth.	0:10

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
9/15/2017	7:33	124	Fog or Thick Haze	SSW	3	8	41 16.0	71 08.7	272	644	Dolphin, Short-beaked Common	119	500	9		All HRG active	At 07:33, immediately upon resuming PAM watch due to fog, multiple whistles 6-24 kHz and HF clicks at 119 to 129 degrees were detected from at least 5-6 dolphins. At 07:36 the dolphins were visually and acoustically tracked within 500 meters of the acoustic source and a power down was immediately requested and implemented. From 07:37 to 07:42, constant whistles 6-24 kHz with amplitudes up to 148 dB, frequent LF clicks and pulses, and HF click trains which were frequently moving between 27 and 130 degrees were detected audibly and in the spectrogram and click detectors. The dolphins were tracked to ranges of 99 meters at 07:28 and to ranges of 118 meters at 07:42. At 07:43 there was a very large increase in the LF clicks - with both LF and HF click trains observed moving sharply between bearings of 40 and 164 degrees. LF clicks at this time had amplitudes as high as 147 dB, and HF clicks at this time had amplitudes as high as 164 dB. There was a slight decrease in the vocalizations at 07:44, and multiple clear sinusoidal whistles were detected. At 07:45 the dolphins were tracked to a range of 433 meters. The vocalizations increased again at 07:46, with constant LF clicks, pulses and whistles, and HF click trains between 37 and 71 degrees, and 07:47 the PSOs visually confirmed 8-10 common dolphins chasing the equipment behind the vessel. As the dolphins had been observed with that behavior for more than 10 minutes, the PSOs gave clearance for the source to be ramped up. From 07:48 to 07:50, vocalizations greatly reduced while the vessel maneuvered around a buoy, which briefly snagged on the sparker, but then increased again at 07:51. Ramp up of the sparker was initiated at 07:54, at which time the HF click trains were observed moving between 52 and 90 degrees. By 08:01 the overall vocalizations being detected had greatly reduced, and remained so for the remainder of the detection. From 08:05 to 08:14, a few scattered HF click trains were detected between 24 degrees and 125 degrees. The source reached full volume at 08:14, and the detection concluded at 08:17 with a few final whistles.	0:44
9/15/2017	7:33	124	Fog or Thick Haze	SSW	3	8	41 16.0	71 08.7	272	644	Dolphin, Short-beaked Common	135	750	12	transiting, porpoising, leaping, chasing towed equipment, bow riding, swimming with/chasing vessel	Survey line. All HRG equipment active.	Dolphins sighted off starboard stern, porpoising toward vessel. PAM operator called for powerdown. PSO confirmed dolphins approx 460m from sound source at time of power down. Dolphins continued toward vessel and were chasing the sparker, sidescan sonar, and tail buoy from 07:39-07:50. Dolphins then moved closer to bow, swimming alongside the vessel on both sides (aft of mid ship). Dolphins then continued intermittently bow riding, swimming with vessel and chasing towed gear until 08:19. Approach determined to be voluntary to chase towed equipment and bow ride. PSO gave clearance for ramp up after observing this behavior for 10 minutes.	0:46
9/15/2017	10:17	124	Fog or Thick Haze	SSW	1	0.1	41 08.9	71 07.8		645	Dolphin spp.			2		All HRG active	At 10:17, faint whistles from at least 2 dolphins were detected on the spectrogram. The whistles were up and down sweeping between 7 and 18 kHz and 115 and 129 dB. A few more down sweep whistles 13-18 kHz were detected at 10:19, and then a few more up sweep whistles 13-18 kHz were detected at 10:20. No whistles were detected from 10:21 to 10:22, and then the detection concluded at 10:23 with a few final up sweep whistles 10-12 kHz. Due to how infrequent the whistles were detected, the bearing and range of the dolphins could not be determined. However, due to how faint the vocalizations were, the dolphins were estimated to be outside of the 500m EZ and no mitigation actions were required.	0:06
9/15/2017	15:03	107	Fog or Thick Haze	S	1	0.1	41 18.2	71 07.5		646	Dolphin spp.	62	800	3		All HRG active	LF whistles were detected at 15:03 and highlighted by the Whistle-Moan Detector though inaudible. Multiple HF click trains were observed at 15:11 and a power down was called and initiated at 15:12. The HF click trains lasted between 1-3s with bearings from 62 to 104 and were observed until 15:13; depicting 3 dolphins vocalizing. Triangulation calculated the dolphins 145m from the CoS. LF whistles continued to be observed until 15:18 and consisted of concave, convex, sinusoidal, down-sweeping, and up-sweeping.	0:15
9/16/2017	0:18	108	Fog or Thick Haze	SSW	2	8	41 07.1	71 11.4		647	Dolphin spp.	100	500	3		All HRG active	At 00:18, faint whistles 8-17 kHz from 2-4 dolphins were detected on the spectrogram but not audibly. At 00:20, HF click trains were detected at a bearing of 100 degrees trailing astern to a bearing of 130 degrees by 00:22, with amplitudes up to 145 dB. The click trains were tracked within ranges 400 to 500 meters of the CoS, therefore a power down was requested and implemented at 00:22. No whistles were detected from 00:24 to 00:25, at which time additional whistles were detected along with a few short HF click trains at a bearing of 90 degrees and amplitude of 143 dB. At 00:26, up and down sweep whistles 8-23 kHz were detected, and at 00:28 a few more short HF click trains were detected at a bearing of 121 degrees. From 00:32 to 00:35 there was an increase in the number of whistles detected, with a mix of up and down sweep, convex and sinusoidal whistles 6-18 kHz and 94-126 dB. The final HF clicks of the detection occurred at 00:34 at bearings 61 and 76 degrees, and were tracked to a range of 68 meters. From 00:35 until the end of the detection at 01:09, faint, non-audible whistles were detected on the spectrogram at inconsistent and infrequent intervals.	0:51

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
9/16/2017	1:40	113	Fog or Thick Haze	SW	2	1	41 06.8	71 10.9		648	Dolphin spp.	103	500	7		soft start/ramp-up	Two upsweeping whistles that were barely highlighted were observed at 01:40 followed by a 1s click train at 103 degrees at 01:41 resulting in a power-down at 01:42. Multiple HF click trains followed and were sporadic throughout the detection and lasted between a half and 13 seconds with bearings from 01 to 153 degrees. HF click trains were observed from 01:41-02:15, 02:27-03:07, 03:26-03:40, 03:45-04:04, 04:15-04:41, with peak activity from 01:52-01:53, 02:07-02:08, 02:47-02:58, 03:04-03:05, 04:01-04:02, 04:24-04:27, 04:32-04:33; approximately 7 dolphins were observed vocalizing. Triangulation calculated the dolphins 240m from the CoS at 01:42, coming as close as 125m at 01:52. Multiple LF whistles were detected throughout the detection and consisted of constant, concave, convex, sinusoidal, up-sweeping, and down-sweeping. Peak LF activity included loud audible whistles that were highlighted by the Whistle-Mean Detector at 02:16, 02:34, and 04:27; along with LF buzzes and harmonics. No vocalizations were detected from 04:04 to 04:15, when additional HF click trains were detected at 26, 32 and 73 degrees. From 04:16 to 04:25, multiple HF click trains were detected at various bearings between 20 and 102 degrees, and continuous whistles were detected audibly and on the spectrogram. At 04:28, there was an increase in the LF clicks detected on the spectrogram, and both HF and LF click trains were observed trailing astern from 35 to 90 degrees. LF clicks at this time had amplitudes as high as 143 dB and HF clicks at this time had amplitudes as high as 163 dB. From 04:32 to 04:39, HF click trains between 27 and 126 degrees along with LF clicks, pulses and whistles were detected constantly. The last HF clicks were detected at 04:41. No vocalizations were detected between then an 04:54, when additional faint single whistles were detected once a minute until 04:56. Additional faint whistles were detected at 05:08, 05:11 and 05:17, and then a faint harmonic was detected on the spectrogram at 05:19. The detection concluded at 05:24 with a few additional faint whistles.	3:44
9/16/2017	3:36	113	Fog or Thick Haze	SW	2	8	41 04.4	71 07.8	273	648	Dolphin spp.	171	50	3	porpoising, chasing equipment	reduced power (running mag lines only)	Saw dolphins on thermal camera #1 (aft) swimming in towards the stern and chasing equipment until at 03:36, then fog rolled in and reduced visibility. Last sight of them at 03:39.	0:03
9/16/2017	16:26	119	Fog or Thick Haze	SW	1	0.3	41 04.3	71 09.5		650	Dolphin spp.	76	500	5		All HRG active	A 1s HF click train was observed at 16:26 at a bearing of 76 degrees. A power-down was implemented at 16:27. Multiple HF click trains were then observed lasting between a half second and 6 seconds with bearings from 74 to 150 degrees. The detection ended at 16:28 with a HF click observed at 129 degrees. Triangulation was not obtained due to the brevity of the detection.	0:02
9/16/2017	17:31	124	Fog or Thick Haze	SW	1	0.3	41 06.5	71 09.2	275	651	Dolphin, Short-beaked Common	242	95	7	porpoising	Ramp up	5-9 dolphins seen about 10m off bow (95m from sound source) at 17:31; dolphins were porpoising and crossing perpendicularly in front of bow from the starboard side to the port side; dolphins last seen at 17:32	0:01
9/16/2017	17:31	124	Fog or Thick Haze	SW	1	0.3	41 06.5	71 09.4	275		Dolphin spp.	74	500	3		Ramp up	At 17:30, two minutes after ramp up was initiated, PSOs called down that there was dolphins in the EZ and the source was again powered down. At 17:31, a short HF click train was detected at a bearing of 74 degrees. A few seconds later, two click trains were detected at 43 and 56 degrees. The two click trains quickly trailed ahead to a bearing of 30 degrees and ended at 17:32. A few more HF clicks were detected at 17:33 at a bearing of 34 degrees, and a few overlapping whistles 10-22 kHz from 3-4 dolphins were detected on the spectrogram and faintly audible. All detected vocalizations stopped at 17:34, and then the detection concluded with a few final faint whistles at 17:37.	0:06
9/24/2017	0:15	152	Fog or thick haze	NE	3	0.3	41 00.7	71 19.2	276	652	Dolphin, Short-beaked Common	63	500	12		No HRG equipment powered on. Waiting for EZ clearance	HF click train registered at bearings between 20 and 135 degrees; predominantly forward of hydrophone array from initial detection to peak HF detection at 0:50, then aft of the hydrophone array until final HF detection at 1:10. Peak LF detection from 1:10 to 1:15, with intermittent whistles noted until final detection at 1:31. Water depth was unavailable.	1:16
9/24/2017	0:25		Fog or thick haze	NE	3	0.3	41 00.7	71 19.6	276	652	Dolphin, Short-beaked Common		75	4	bow riding	No HRG equipment powered on. Waiting for EZ clearance	PSO went on deck following AD # 652. Observed dolphins bow riding for 10 minutes from 0025-0035. Approach determined to be voluntary to bow ride based on observed behavior. PSO authorized ramp up (in accordance with IHA) at 00:35.	0:10
9/24/2017	1:58		Fog or thick haze	NE	3	0.3	41 04.2	71 15.6		653	Dolphin spp.	63	500	12		All HRG powered off. Standby for Fog	At 01:58 a 1s click train was observed at 63 degrees. HF click trains lasted between 0.5 and 11 seconds with bearings from 03 to 121 degrees including HF burst pulses. The LF detection consisted of upsweeping, downsweeping, and constant whistles along with harmonics and LF buzzes. Peak HF detection occurred from 02:11 to 02:12 and 02:15 to 02:16. Peak LF detection occurred from 02:11 to 02:12. Triangulation calculated the dolphins as close as 153m. The detection ended with an inaudible faint upsweeping whistle at 02:29. Water depth was unavailable.	0:31
9/24/2017	3:21		Fog or Thick Haze	NE	3	0.3	41 04.0	71 15.1		654	Dolphin spp.	23	500	12		All HRG powered off. Standby for Fog	At 03:21 a 0.5s click train was observed at 23 degrees. HF click trains lasted between 0.5 and 18 seconds with bearings from 22 to 157 degrees including HF burst pulses. The LF detection consisted of upsweeping, downsweeping, concave, convex, sinusoidal, and constant whistles along with harmonics and LF buzzes. Peak HF detection occurred from 03:25 to 03:29 and 06:19 to 06:20. Peak LF detection occurred from 03:59 to 04:01 and 06:17 to 06:20. Triangulation calculated the dolphins as close as 135m. The detection ended with an inaudible faint whistle at 06:30 when PAM watch ended due to daylight. Water depth was unavailable.	3:09
9/24/2017	6:20		Fog or Thick Haze	NE	2	0.5	41 04.3	71 17.8	277		Dolphin, Short-beaked Common	110	450	30	traveling, porpoising	stand down because of fog	Sighted 450m off the port side of vessel, traveling away from the vessel. Last time of sighting inside the mitigation zone was at 06:25	0:05

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
9/24/2017	22:29		Clear	NW	2	10	41 01.5	71 18.3	278	655	Dolphin, Short-beaked Common	260	100	8	porpoising, bow riding, swimming with vessel	HRG equipment powered down	PSO went on deck at 22:24 to locate/d dolphins using night vision. Sighted at 22:29 off starboard bow, swimming towards bow. Dolphins attempted to bow ride, circled vessel, swam along port side at close range, and stayed close to vessel/bow for over 10 minutes. Approach determined to be voluntary to bow ride/ vessel attraction based on observed behavior. PSO authorized ramp up at 22:39, after 10 minutes of visual observation with night vision. Depth data unavailable.	0:22
9/24/2017	23:36	131	Clear	W	2	10	41 03.8	71 16.1		656	Dolphin spp.	100	500	8		All HRG active	Brief detection with initial whistles noted at 23:36 and initial HF click trains at 23:37 aft of hydrophone array (100 degrees). HF click trains registered aft of hyd array until final detection in exclusion zone at 23:39 UTC, attempted localization indicating vocalizing dolphin(s) as close as 480m from the source. LF whistles noted until 23:41 UTC.	0:05
9/24/2017	23:54	141	Clear	W	2	10	41 03.1	71 16.5		657	Dolphin spp.	20	500	12		All HRG active	Initial HF click trains registered forward of hydrophone array (20 degrees) at 23:54. Peak HF detection at 23:56, with click trains indicated at bearings between 45 and 140 degrees. Attempted localization indicated vocalizing dolphin(s) as close as 97m from source. Faint whistles noted at 00:03 and HF click trains registered from 00:05 to final detection in exclusion zone at 00:07 UTC, indicating dolphins moving from bearings forward to bearings aft of hydrophone array.	0:13
9/25/2017	1:06	141	Clear	NE	1	10	41 03.2	71 16.7	279	658	Dolphin spp.	92	500	8		All HRG active	At 01:06 (59 min since last detection in EZ) a 1s click train was observed at 92 degrees. HF click trains lasted between 0.5 and 4.5 seconds with bearings from 25 to 148 degrees until 01:12. The LF detection consisted of downsweeping and upsweeping whistles observed from 01:14 to 01:16. Peak HF detection occurred from 01:07 to 01:08. Peak LF detection occurred from 01:14 to 01:15. Triangulation calculated the dolphins as close as 128m. The detection ended with an inaudible faint down-sweeping whistle at 01:16.	0:09
9/25/2017	1:09	135	Clear	NE	1	10	41 03.3	71 16.5	279	658	Dolphin spp.		100	2	porpoising, feeding at the stern	Running lines (all HRG equipment)	Less than 60 minutes since last PAM dolphin detection within the EZ (following clearance for based on voluntary approach behavior on 09/24/2017 at 23:39) so no mitigation was required. PAM detected high frequency clicks at 0106, then PSO sighted dolphins porpoising/feeding at the stern at 0109. Last PSO thermal camera detection was at 0110. Bearing unknown.	0:01
9/25/2017	1:45	142	Clear	NE	1	10	41 02.7	71 17.0		659	Dolphin, Short-beaked Common	77	500	5		All HRG active	At 01:45 a 0.5s click train was observed at 77 degrees. HF click trains lasted between 0.5 and 14 seconds with bearings from 02 to 161 degrees including HF burst pulses and were observed from 01:45 until 04:25. The LF detection consisted of upsweeping, downsweeping, concave, convex, sinusoidal, and constant whistles along with harmonics and LF buzzes observed from 01:45 until 05:19. Peak HF detection occurred from 02:10 to 02:20 and 04:20 to 04:25 while peak LF detection occurred from 03:44 to 03:45. Triangulation calculated the dolphins as close as 82m. The detection ended with an inaudible faint whistle at 05:19.	3:34
9/25/2017	12:41	141	Fog or Thick Haze	NE	1	0.2	41 03.6	71 16.8		660	Dolphin spp.	70		2		All HRG active	Multiple LF whistles were detected at 12:41 consisting of upsweep, downsweep, ornx, concave, constant, and sinusoidal and continued throughout the detection. At 13:34 a 1s click train was observed at 70 degrees followed by multiple click trains lasting between 0.5s and 3 seconds with bearings from 65 to 136 degrees until 13:38. HF click trains were again observed at 14:19 and lasted between 0.5 and 2 seconds with bearings from 51 to 74 degrees including HF burst pulses until 14:22. Peak HF click trains occurred from 13:34 to 13:35 and peak LF whistles occurred from 13:35 to 13:36. Triangulation calculated the dolphins as close as 107m. The detection ended with an inaudible faint down-sweeping whistle at 15:44.	3:03
9/25/2017	21:25	127	Fog or Thick Haze	E	2	0.05	41 03.6	71 13.7		661	Dolphin spp.	69	500	4		All HRG active	A 0.5s HF click train was observed at 21:25 at a bearing of 69 degrees followed by multiple HF click trains lasting between 0.5s and 11 seconds with bearings from 22 to 161 degrees including HF burst pulses until 22:03. Multiple LF whistles were detected at 21:27 consisting of upsweeping, convex, concave, and constant, and continued throughout the detection until 22:11. Peak HF click trains occurred from 21:31 to 21:34 and peak LF whistles occurred from 21:44 to 21:45. Localisation calculated the dolphins as close as 198m.	0:46
9/25/2017	22:34	131	Fog or Thick Haze	NE	2	0.03	41 03.3	71 14.8		662	Dolphin spp.					HRG powered down	Multiple LF whistles detected intermittently; peak detection from 23:24 to final detection at 23:29. No high frequency elements detected.	0:55
9/25/2017	23:40	128	Fog or Thick Haze	NE	2	0.02	41 03.6	71 12.9		663	Dolphin spp.	50	500	12		All HRG active	Initial HF click trains registered near bearing of 50 degrees. Peak HF detection occurred between 23:40 and 23:45, as well as 00:12 and 00:18; peak detections corresponded with a rapid change in click bearings, indicating the vocalizing dolphins moving from positions forward to aft of hydrophone array. Attempted localization indicated vocalizing dolphin(s) as close as 374m from the source. LF whistles consistently detected, with peak LF detection at 00:10. Final detection in exclusion zone at 00:18, and final detection of LF whistles at 00:25.	0:45
9/26/2017	2:36	124	Fog or Thick Haze	NE	2	0.02	41 03.5	71 13.5		664	Dolphin spp.	77	500	4		All HRG active	A 0.5s HF click train was observed at 02:36 at a bearing of 77 degrees followed by multiple HF click trains lasting between 0.5s and 13 seconds with bearings from 33 to 135 degrees including HF burst pulses until 02:58; ending with a half second click train at 117 degrees. Peak HF click trains occurred from 02:38 to 02:41. Localisation calculated the dolphins as close as 158m.	0:22

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
9/26/2017	4:28	121	Fog or Thick Haze	NE	2	0.02	41 03.5	71 11.7		665	Dolphin spp.	60	500	8		All HRG active	Initial HF click trains registered forward of hyd array, near bearings of 60 degrees. Final clicks registered aft of hydrophone array, near bearings of 118 degrees. Attempted localization indicated vocalizing dolphin(s) as close as 327m from the source. LF whistles registered intermittently throughout detection, with peak LF detection at 4:45. Final detection in exclusion zone at 4:31, and final detection of LF whistles at 5:15.	0:47
9/26/2017	13:25	128	Fog or Thick Haze	NW	1	0.2	41 04.2	71 09.9		666	Dolphin spp.			4		All HRG active	Multiple LF whistles detected intermittently from 13:25 to 13:37. No high frequency elements detected.	0:12
9/29/2017	22:27	127	Partly Cloudy	SW	3	10	41 06.5	71 07.5		667	Dolphin, Short-beaked Common	95	500	9		All HRG active	Initial HF click trains at 22:27 near bearing of 95 degrees, with initial whistles noted after power down, at 22:30. HF click events, with multiple, concurrent click trains, noted throughout detection period (aside from three ~20 minute breaks starting at 22:54, 23:22, and 0:21). Peak HF click events near 22:50, 23:50 and 0:50. Localization attempts indicated vocalizing dolphin(s) as close as 47m from the source. Brief LF whistle events noted intermittently. Final detection in exclusion zone at 1:10.	2:43
9/29/2017	22:45		Partly Cloudy	SW	3	10	unk	unk	280	667	Dolphin, Short-beaked Common		75	4	porpoising	HRG powered down	Could not locate dolphins on thermal cameras following acoustic detection. PSO went on deck with night vision. Observed 4 dolphins swimming along port side of vessel, within 10m of hull, from 22:45 - 22:47. Lost sight of dolphins after 2 minutes, continued searching perimeter of vessel with night vision until 23:05 and did not see them again. PSO went back on deck and searched with night vision 23:16-23:24 after an additional acoustic detection within the EZ, but could not locate the dolphins. Last PAM detection in EZ at 23:22. Depth data unavailable. Did not record bearing.	0:02
9/29/2017	23:46		Partly Cloudy	SW	3	10	41 06.2	71 02.2	281	667	Dolphin spp.		50	3	porpoising, chasing tail buoy	HRG powered down	Dolphins sighted on aft thermal camera near tail buoy after additional acoustic detection within the EZ. Sighted following the tail buoy, but only for approx 3 minutes, then left the area, so unable to authorize ramp up based on voluntary approach (could not observe them for 10 minutes). Went on deck after losing sight of them on thermal cameras, and searched the perimeter of the vessel with night vision from 23:51-23:58, but could not locate the dolphins. Depth data unavailable. Did not record bearing. Unable to determine # adult/juvenile/calf.	0:03
9/30/2017	2:06	123	Partly Cloudy	SW	3	10	41 06.5	71 06.4		668	Dolphin, Short-beaked Common	68	500	4		HRG powered down	Multiple HF click trains were observed at 02:06 lasting between 1 to 4 seconds with bearings from 31 to 136 degrees until 02:12. The HF click trains returned at 02:15, lasting between a half to 8 seconds with a bearing of 100 to 102 degrees along with multiple downswEEPing, constant, concave, and convex LF whistles. The HF click trains ended at 02:16 and the whistles at 02:19; marking the end of the LF part of the detection. HF click trains were again observed from 02:21 to 02:24 and again at 02:29, lasting between 1 and 4 seconds with bearings from 20 to 124 degrees, until 02:48 marking the end of the detection. Localization calculated the dolphins as close as 124m to the CoS at 02:08. Peak dolphin activity occurred from 02:35 to 02:49. This detection delayed ramp-up for another hour.	0:42
9/30/2017	2:42		Partly Cloudy	SW	3	10	unk	unk	282	668	Dolphin, Short-beaked Common		50	1	bow riding	Reduced output	PSO went on deck with night vision and was able to observe one dolphin bow riding on the port side. Able to positively ID as common dolphin, but was unable to observe voluntary approach/vessel attraction for 10 minutes. Last time of sighting was 02:43. Did not record bearing. Depth data unavailable. Last PAM detection in EZ at 02:48	0:01
9/30/2017	17:20	112	Continuous layer of clouds	E	4	10	41 06.1	71 10.6	283		Dolphin spp.	185	700	5	Porpoising, travelling	All HRG equipment running	a small pod of dolphins (between 4-6 individuals) seen 700 m off port side of vessel (distance estimate using reticled binoculars). Dolphins porpoising/travelling towards the stern of the vessel at a shallow angle. Due to wind and sea state, it was difficult to determine the species.	0:01
9/30/2017	23:46	113	Partly Cloudy	NE	5	10	41 05.0	71 04.4		669	Dolphin spp.	85	500	3		All HRG active	Broadband click trains indicated forward hydrophone array, between bearings of 20 and 90 degrees; peak event and final detection at 23:48. No LF whistles detected. Attempted localization indicated the vocalizing dolphins as close as 313m from source.	0:02
10/1/2017	0:32		Partly Cloudy	NE	5	10	unk	unk		670	Dolphin spp.	30	500	12		HRG powered down	Initial broadband click trains indicated forward hydrophone array, at bearing of 30 degrees. Mid-detection multiple, concurrent click trains indicated at bearings between 20 and 160 degrees. Peak click events at 0:40 and 0:43, with a majority of click trains indicated forward of hydrophone array. Attempted localization indicated the vocalizing dolphin(s) as close as 68m from source. LF concave whistle contours noted intermittently throughout detection until 00:41. Final detection in exclusion zone at 0:44. Depth data unavailable	0:12
10/1/2017	1:19	117	Partly Cloudy	NE	5	10	41 05.6	71 13.1		671	Dolphin spp.	82	500	3		HRG powered down	A half second click train was observed at 84 degrees at 01:19 followed by multiple HF click trains, lasting between a half and 3 seconds, with bearings from 20 to 111 degrees and observed sporadically until 01:55 when a 2s click train at 24 degrees marking the end of the detection. Peak dolphin activity occurred from 01:22 to 01:34. Localization calculated the dolphins as close as 30m to the CoS at 01:25. This detection would have delayed ramp-up for another hour except the vessel was already down for weather.	0:36
10/1/2017	6:02	117	Partly Cloudy	NE	5	10	41 05.2	71 07.2		672	Dolphin spp.	51	500	8		HRG powered down	Initial broadband click trains indicated forward hydrophone array, at bearing of 51 degrees. Peak click event 6:07, with attempted localization indicating the vocalizing dolphin(s) as close as 99m from source. Final click train detected aft of hydrophone array, near a bearing of 165 degrees, at 6:08. No LF whistle elements detected.	0:06

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
10/1/2017	20:35	118	Clear	SW	3	10	41 04.5	71 10.0		673	Dolphin, Short-beaked Common	31	500	5		All HRG active	A half second click train was observed at 31 degrees at 20:35 followed by multiple HF click trains, lasting between a half and 12 seconds, with bearings from 0 to 149 degrees and observed until 21:15 when a 2.5s click train at 126 degrees marked the end of the detection. Peak dolphin activity occurred from 20:47 to 20:54. Localization calculated the dolphins as close as 65m to the CoS at 20:36. This detection resulted in a power-down until visual confirmation of 10 min voluntary approach.	0:40
10/1/2017	20:40		Clear	SW	3	10	41 04.6	71 10.2	284	673	Dolphin, Short-beaked Common	160	50	5	porpoising, chasing towed equipment, following vessel	HRG equipment power down	PSO went on deck with night vision following PAM dolphin detection. Sighted 1 dolphin off port side of vessel (within 5 m of hull) swimming toward the stern of vessel. Then sighted approx 4 additional dolphins porpoising toward towed equipment. Dolphins continued to chase towed equipment, within 5-10m of the sparker and tail buoy, occasionally swimming near stern and along the starboard side of the vessel, then returning to chase the equipment. Dolphins last sighted with night vision approx 50m from the sparker, porpoising along the starboard side of vessel (were still alongside vessel when PSO returned to control room). Dolphins approach determined to be voluntary to chase the towed equipment based on behavior observed for over 10 minutes. PSO returned to thermal camera station and gave clearance to ramp up at 20:51 (based on behavior, in accordance with IHA). Last PAM detection within EZ at 21:15. Depth data unavailable. # Adult/Juvenile/Calf unknown.	0:11
10/1/2017	23:23	115	Clear	NW	3	10	41 04.4	71 06.7	285	674	Dolphin, Short-beaked Common	100	500	8		All HRG active	Initial HF click trains at 23:23 parallel with hyd array, near 100 degrees, and initial LF whistles noted at 23:27. Peak HF click events at 23:33, 23:39, 23:54 and 00:55, predominantly indicating movement from bearings forward to aft of hyd array, and followed by brief breaks in detected HF click activity. Attempted localizations indicated closest approach of 57m. Peak LF whistle activity at 23:35; intermittent LF whistles and burst pulses noted for duration of detection. Final detection in exclusion zone at 1:19, with HF click train noted at 100 degrees. For Trevor: Breaks in detected HF activity were 6-20 min. in duration and all noted in PAM log.	1:56
10/1/2017	23:28	112	Clear	NW	3	10	41 04.4	71 06.5	285	674	Dolphin, Short-beaked Common		30	3	porpoising, leaping	HRG equipment powered down	PSO went on deck with night vision following PAM detection of dolphins within the EZ. Sighted 3 dolphins porpoising/leaping near the starboard/stern of the vessel. Then swam towards the bow and were not seen again. Sighting was less than 2 minutes (unable to observe for 10 minutes in attempt to authorize ramp up based on behavior). Continued to search the perimeter of the vessel with night vision until 23:46, but was unable to locate the dolphins again. PSO went on deck again with night vision from 23:53-00:00 after PAM operator detected dolphins again in close proximity to the bow of the vessel, but was unable to locate any dolphins. Not sighted on thermal imaging cameras.	0:02
10/2/2017	2:24	108	Clear	NW	3	10	41 04.4	71 06.3		675	Dolphin spp.	26	500	3		Ramping up HRG equipment	A one second click train was observed at 26 degrees at 02:24 followed by multiple HF click trains, lasting between a half and 1.5 seconds, with bearings from 26 to 96 degrees and observed until 02:25. LF whistles were observed at 02:25 and sporadically until xxx. Localization was not calculated due to the brevity of the detection. This detection resulted in a power-down and a 60 minute pre-clearance.	0:55
10/2/2017	4:27	116	Clear	NW	3	10	41 04.5	71 08.7		676	Dolphin spp.	30	500			All HRG active	Initial HF click trains indicated forward of hyd array near bearing of 20 degrees. Peak LF whistle event at 4:39, with seven successive, down-sweeping whistles indicated within a 25-second timeframe. Peak HF click event between 4:59 and 5:02, with multiple, concurrent click trains indicated between bearings of 0 and 150 degrees. Attempted localizations indicated vocalizing dolphin(s) as close as 199m from source. Final detection in exclusion zone at 5:15, with click trains registered near bearing of 140 degrees.	0:48
10/2/2017	5:43	110	Clear	NW	3	10	41 04.6	71 07.0		677	Dolphin spp.	20	500			HRG powered down	Initial, concurrent HF click trains indicated forward of hyd array between bearings of 20 and 80 degrees. Peak HF click event at 5:47, indicated movement from forward to aft of hyd array. Two down-sweeping whistle contours (14-17kHz) noted at 5:49. Attempted localizations indicated vocalizing dolphin(s) as close as 152m from source. Final detection in exclusion zone at 5:53.	0:10
10/2/2017	19:51	113	Clear	SE	2	10	41 05.1	71 12.4		678	Dolphin spp.	38	500	4		All HRG active	A half second click train was observed at 38 degrees at 19:51 followed by multiple HF click trains, lasting between a half and 7.5 seconds, with bearings from 26 to 178 degrees and observed until 20:07. Peak dolphin activity was observed from 19:53 to 19:55. LF whistles were observed at 19:54 and then sporadically until 20:22. Localization calculated the dolphins as close as 126m to the CoS at 19:54. This detection resulted in a power-down and a 60 minute pre-clearance.	0:31
10/2/2017	19:56	118	Clear	SE	2	10	41 05.2	71 11.9	286	677	Dolphin spp.	180	300	3	Porpoising and milling behind vessel and towed equipment.	HRG equipment powered down	Sighted approximately 3 dolphins porpoising / milling 300m from the sound source off the stern of the vessel on the aft thermal camera (unit #1), following power down for PAM detection of dolphins within the EZ.	0:03
10/2/2017	20:48	124	Clear	SE	2	10	41 05.9	71 14.5		679	Dolphin, Short-beaked Common	48	500	5		HRG powered down	A one second click train was observed at 48 degrees at 20:48 followed by multiple HF click trains, lasting between 1 and 9 seconds, with bearings from 0 to 123 degrees and observed until 21:18, ending with a 1s click train at 111 degrees. LF whistles and burst pulses were observed at 20:49 and sporadically observed until 20:58. Peak dolphin activity occurred from 20:55 to 21:07. Localization calculated the dolphins as close as 151m to the CoS at 20:49. This detection resulted in a power-down with a 10min voluntary approach, visually confirmed at 21:06, resulting in a ramp-up to full power.	0:30

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
10/2/2017	20:52		Clear	SE	2	10	41 05.9	71 14.5	287		Dolphin, Short-beaked Common	200	50	5	Porpoising, leaping, chasing towed equipment, bow riding, swimming with/following vessel	HRG equipment powered down	Sighted dolphins off starboard stern within 10 m of hull, porpoising along side vessel. Then fell back and began to chase towed equipment until 20:56. Then sighted 3-4 move to bow. Observed attempt to bow ride and swimming approx 50m in front of the vessel (20:58-21:01). Then sighted dolphins porpoising/leaping alongside the vessel from 21:03-21:05, 30m off the starboard hull. Dolphins were still swimming with vessel at 21:05, and PSO returned to the control room. Authorized ramp up based on 10+ minutes observed behavior: voluntary approach to chase towed equipment and bow ride, and general vessel attraction/ swimming with and following vessel.	unk
10/3/2017	1:44	114	Clear	SE	2	10	41 05.0	71 11.1		680	Dolphin spp.	85	500	2		All HRG active	A one second click train was observed at 85 degrees at 20:44 followed by multiple HF click trains, lasting between 0.5 and 2.5 seconds, with bearings from 36 to 120 degrees and observed until 02:01, ending with a 1s click train at 66 degrees. Localization calculated the dolphins as close as 104m to the CoS at 01:56. This detection resulted in a power-down.	0:17
10/3/2017	2:47	118	Clear	SE	2	10	41 04.7	71 09.2		681	Dolphin spp.	83	500	2		HRG powered down	A half second click train was observed at 83 degrees at 02:47 followed by multiple HF click trains, lasting between a half and 5 seconds, with bearings from 73 to 134 degrees and observed until 03:12, ending with a 1s click train at 105 degrees. LF whistles were observed at 03:05, 03:16, and from 03:31 to 03:51, marking the end of the detection. Peak dolphin activity occurred from 02:48 to 02:52. Localization calculated the dolphins as close as 169m to the CoS at 02:51. This detection extended the power down/ delayed ramp up.	1:04
10/3/2017	4:18	117	Clear	SE	2	10	41 04.8	71 10.8		682	Dolphin spp.	45	500	8		Ramp-up /Softstart	Brief initial HF click event from 4:18 to 4:20, with registered click bearings indicating movement from forward to aft of hyd array. Peak LF whistles noted at 4:19, analyzed LF recordings indicated whistles during sparker transition from ramp-up to power down. LF whistles noted intermittently thereafter. HF click trains again noted from 4:42 to final detection in exclusion zone at 4:54. Peak HF event at 4:47 with multiple, concurrent click trains registered, again indicating movement from forward to aft of hyd array. Attempted localizations indicated the vocalizing dolphin(s) as close as 142m from source. Final HF click trains indicated aft of hyd array between bearings of 90 and 165 degrees. Final LF whistles noted at 5:12.	0:54
10/3/2017	22:41	112	Clear	S	3	10	41 06.5	71 09.5		683	Dolphin spp.			2		All HRG active	LF whistles detected intermittently between 22:41 and 23:24; insufficient data to determine location. No HF elements detected.	0:43
10/4/2017	4:13	121	Clear	SSW	4	10	41 06.6	71 07.2		685	Dolphin spp.	22	500	5		All HRG active	HF click trains registered intermittently forward of hyd array, between bearings of 20 and 40 degrees, until peak HF detection at 4:44, when click bearings indicated movement from forward to aft of the hyd array. Attempted localizations indicated the vocalizing dolphin(s) as close as 242m from source. Final detection in exclusion zone was of HF clicks at 4:45, indicated aft of hyd array at a bearing of 130 degrees. LF burst pulses noted sporadically throughout detection and detection ended with two whistles at 4:57.	0:44
10/6/2017	22:22	118	Fog or thick haze	SW	2	0.1	41 05.7	71 09.5		686	Dolphin spp.			3		All HRG active	LF whistles noted intermittently between 22:22 and 22:37. Insufficient data to estimate distance to source or # of animals	0:15
10/6/2017	23:00	116	Fog or thick haze	SW	2	0.1	41 06.9	71 09.4		687	Dolphin, Short-beaked Common	60	500			All HRG active	LF whistles noted at 22:59 with initial HF click trains detected at 23:00 forward of hyd array, between bearings of 60 and 90 degrees. Peak HF click event at 23:08 with multiple concurrent click trains indicated between bearings of 15 and 120 degrees. Attempted localizations indicated the vocalizing mammals as close as 171m from the source. Peak LF whistle event noted at 23:10 with several, overlapping whistles and burst pulses indicated. Second peak HF click event at 23:15 with registered click bearing indicating movement from forward to aft of hyd array. Final detection in exclusion zone at 23:17.	0:17
10/6/2017	23:07		Fog or thick haze	SW	2	0.1	41 07.3	71 09.5	288	687	Dolphin, Short-beaked Common	260	50	6	porpoising, chasing towed equipment, floowing/swimming with vessel	Power down	PSO went on deck with night vision after power down. Poor visibility with thermal cameras due to fog. Dolphins sighted off starboard side of vessel porpoising within 5-10m of the hull (also able to hear dolphins breaking the surface, blowing, and whistling while on deck). Continued to alternate between swimming alongside vessel and falling back to chase towed equipment/stern of vessel until 23:13. Then swam alongside vessel towards bow. Lost sight of dolphins briefly, then sighted at 23:15 off port stern. The same behavior continued on the port side and stern of vessel. Last sighted at 23:18 chasing the equipment/stern of vessel on the port side, approx 30m from sound source. Dolphins were still chasing vessel/equipment when PSO returned to survey room to authorize ramp up based on this behavior (voluntary approach/attempt to chase towed equipment for 10+minutes). Not sighted on thermal cameras, poor visibility due to fog. Depth data unavailable. Unable to determine # Adult/Juvenile/Calf.	0:11
10/7/2017	1:26	119	Fog or Thick Haze	S	2	0.5	41 03.5	71 10.5		688	Dolphin spp.			1		All HRG active	LF whistles noted intermittently between 1:26 and 1:30	0:04
10/7/2017	18:49	139	Partly Cloudy	S	3	10	41 14.6	71 08.7		689	Dolphin spp.	64	500	9		All HRG active	Multiple LF whistles were observed at 18:49 with HF click trains observed starting at 18:53 with a one second HF click train observed at 64 degrees. Multiple HF click trains followed, lasting between a half and 11 seconds, with bearings from 011 to 164 degrees. The LF whistles ended at 20:18 with a faint sinusoidal whistle and the HF click trains ended at 20:52 with a 3s click train at 125 degrees. Peak dolphin activity occurred from 19:55 to 20:09. Localization calculated the dolphins as close as 95m to the CoS at 20:50.	2:03

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
10/7/2017	21:19	135	Partly Cloudy	S	4	10	41 15.7	71 08.5		690	Dolphin spp.	58	500	2		Silent	An upsweeping LF whistle was observed at 02:10 and was the only LF part of the detection. A half second HF click train was observed at 60 degrees at 02:13 followed by multiple HF click trains, lasting between a half and 9 seconds, with bearings from 21 to 35 degrees and observed until 02:26 and from 02:29 to 02:37, ending with a 2.5s click train at 145 degrees. Peak dolphin activity occurred from 02:24 to 02:25. Localization calculated the dolphins as close as 52m to the CoS at 02:20. This detection resulted in a power-down.	0:24
10/7/2017	22:53		Continuous layer of clouds	SSW	3	10	41 12.4	71 08.6		691	Dolphin spp.	45	500	4		Ramp up - sparkler just reached 200 joules	At 22:53 initial broadband click trains registered forward of hyd array, bearing of 45 degrees. Successive convex whistle contours with prominent harmonics displayed clearly at 22:55. Peak click event at 22:57, with click bearings indicating movement from forward to aft of the hyd array. Attempted localizations indicated the vocalizing dolphins as close as 147m from the source. Consistent click events indicated aft of hyd array from 23:11 to 23:20, and forward of hyd array from 23:50 to 23:58. Final click detection in exclusion zone at 0:01, aft of hyd array near bearing of 120 degrees. Depth data unavailable	0:08
10/8/2017	0:33	118	Continuous layer of clouds	SSW	4	10	41 11.1	71 08.6		692	Dolphin, Short-beaked Common	70	500	10		HRG equipment powered down	At 00:33 initial broadband click trains registered just forward of hyd array, bearing of 70 degrees. Peak click event at 00:50, with click bearings indicating movement from forward to aft of the hyd array. Attempted localizations indicated the vocalizing dolphins as close as 134m from the source. No click trains were detected between 00:51 and 1:10; however sporadic whistles and peak whistle events were noted, including successive sinusoidal contours at 00:59 and successive downsweeping contours at 1:09. Consistent click events indicated from 1:15, with a second peak event at 1:28 indicating movement from forward to aft of hyd array, until final click detection in exclusion zone at 1:31, aft of hyd array near bearing of 100 degrees. Whistles noted intermittently until 2:04.	1:31
10/8/2017	1:22		Continuous layer of clouds	SSW	4	10	41 14.2	71 08.3	289	692	Dolphin, Short-beaked Common	176	50	4	porpoising, chasing towed equipment	HRG equipment powered down	PSO went on deck with night vision after PAM detections indicated dolphins were close to the vessel. Dolphins were sighted with night vision at 01:22 traveling towards the vessel at the stern, and were seen chasing the equipment until 01:26, before losing sight of them. PAM detections continued until 01:31. Depth data unavailable	0:04
10/8/2017	2:32	117	Continuous layer of clouds	SSW	4	10	41 10.7	71 08.4		693	Dolphin spp.	33	500	3		HRG equipment powered down	An upsweeping LF whistle was observed at 02:10 and was the only LF part of the detection. A half second HF click train was observed at 60 degrees at 02:13 followed by multiple HF click trains, lasting between a half and 9 seconds, with bearings from 21 to 35 degrees and observed until 02:26 and from 02:29 to 02:37, ending with a 2.5s click train at 145 degrees. Peak dolphin activity occurred from 02:24 to 02:25. Localization calculated the dolphins as close as 52m to the CoS at 02:20. This detection resulted in a power-down.	0:54
10/8/2017	4:01	118	Partly Cloudy	SSW	4	10	41 12.0	71 08.2		694	Dolphin spp.	70	500			HRG equipment powered down	AD694	1:43
10/8/2017	9:09	134	Partly Cloudy	SSW	5	10	41 14.7	71 06.3	291		Dolphin, Short-beaked Common	350	10	6	Porpoising, bow riding	Powered down	6 dolphins sighted 10 m off vessels port bow. Seen bow riding from 09:09 - 09:12, then swam away from vessel and were not sighted again. Closest approach to vessel was 5 m. This sighting delayed ramp up. Last sighting within EZ at 09:12.	0:03
10/8/2017	10:06	118	Continuous layer of clouds	SSW	5	10	41 17.8	71 06.4	292		Dolphin, Short-beaked Common	31	200	20	Porpoising, bow riding	Powered down	Dolphins seen porpoising 200 m off starboard side of vessel (distance estimated using reticled binoculars). Dolphins seen bowriding from 10:07.	0:14
10/9/2017	4:15		Continuous layer of clouds	SW	4	10	41 16.8	71 06.4		695	Dolphin, Short-beaked Common	118	500	9		Silent	Broadband click trains detected consistently from 4:15 to 6:18, and from 6:43 to 6:57, with multiple whistle events noted frequently throughout entire detection. Multiple, concurrent click trains noted at multiple bearings forward and aft of hyd, most consistently near 20 and 120 degrees. Peak click detection events at 4:30, 4:49, 5:26, 5:45, and 6:57 indicated movement from forward to aft of hyd array, with one peak click detection event at 5:13 indicating movement from aft to forward of hyd array. Peak LF whistle events corresponded closely in time with peak click events. Whistle events predominantly consisted of successive, single contours repeated at a regular interval. Attempted localizations indicated the vocalizing as close as 95m from the source. Final detection in exclusion zone was at 6:57. The source was silent for the duration of the detection. Depth data unavailable.	3:00
10/9/2017	5:25	120	Continuous layer of clouds	SW	4	10	41 17.2	71 06.3	293	695	Dolphin, Short-beaked Common	270	25	7	Porpoising and milling 25-50 meters off the starboard side of vessel, mid-ship to first article of trailing gear	All HRG equipment off	Dolphins sighted off starboard side of vessel with night vision. Porpoising and milling alongside vessel (25-50m) between mid ship and towed equipment. All HRG equipment off.	0:10
10/9/2017	6:49		Continuous layer of clouds	SW	3	10	41 16.4	71 06.5	294	695	Dolphin, Short-beaked Common	275	150	15	porpoising, traveling toward vessel, bow riding	HRG equipment off (60 min pre-watch, waiting to ramp up)	Dolphins sighted 100m off port side bow traveling towards the vessel. Approached to bow ride at 06:50. Last seen at 06:57 behind the boat and traveling away from vessel. Depth unavailable	0:08
10/9/2017	7:44	138	Continuous layer of clouds	SW	3	10	41 15.0	71 06.2	295		Dolphin, Short-beaked Common	150	650	7	porpoising, traveling toward vessel, bow riding	HRG equipment off (60 min pre-watch, waiting to ramp up)	Dolphins sighted 600 m off the port bow, porpoising towards the vessel, then bow riding on the port side before traveling away from the vessel at 07:48.	0:04

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
10/10/2017	22:02	118	Partly Cloudy	W	2	10	41 11.5	71 04.7		697	Dolphin spp.	60	500	5		All HRG equipment active	Initial broadband click train indicated forward of hyd array at 22:02, near bearing of 60 degrees. Initial LF whistle, sinusoidal contour (8-16kHz), indicated at 22:06. Peak HF click event at 22:08 registered bearing of 120 degrees. Peak LF whistles event at 22:15, with a burst pulse and successive down-sweep contours; LF contours noted intermittently thereafter. HF clicks were not detected from 22:15 until 22:42, when LF convex whistle contour was noted and HF click train registered at 46 degree bearing. Concurrent click trains noted at several bearings forward of hydrophone array until final detection in exclusion zone at 22:46.	0:44
10/10/2017	22:06	118	Partly Cloudy	W	2	10	41 10.5	71 04.7	297	697	Dolphin spp.	45	350	3	porpoising	All HRG equipment active	Dolphins sighted on aft thermal camera (#1) off port stern, porpoising between 300-400m from sound source. Difficult to see, but occasionally broke surface enough to confirm while porpoising. Sighting coincided with acoustic detection. No mitigation required: less than 60 minutes since last dolphin sighting within EZ (after ramp up authorized based on voluntary approach behavior).	0:04
10/10/2017	22:42	120	Partly Cloudy	W	2	10	41 08.1	71 04.7	298	697	Dolphin spp.	200	450	3	porpoising, leaping	All HRG equipment active	Dolphins sighted on starboard thermal camera (#3). Difficult to see due to distance. Observed occasional dorsal fin break surface while porpoising, and one distinct leap. Sighting coincided with acoustic detection. Recording made. No mitigation required: less than 60 minutes since last dolphin sighting within EZ (after ramp up authorized based on voluntary approach behavior).	0:03
10/11/2017	0:00	116	Clear	W	3	10	41 05.8	71 04.6		698	Dolphin spp.	70	500	2		All HRG active	Two-minute detection of broadband clicks, initial near 70 degrees and final near 120 degrees. Attempted localization indicated vocalizing dolphins as close as 246m from source. (Sighting not visually confirmed by PSO. Brief sighting, unable to locate on thermal camera)	0:02
10/11/2017	0:55	120	Clear	W	3	10	41 08.1	71 04.9		699	Dolphin spp.	20	500	4		HRG powered down	Brief detection of broadband clicks, initial near 20 degrees at 00:55. Peak detection at 00:57. Attempted localization indicated the vocalizing dolphins as close as 120 meters from the source. Final detection in exclusion zone near 120 degree bearings at 00:58. Sighting not visually confirmed by PSO (brief sighting, unable to locate on thermal camera)	0:03
10/11/2017	1:56	112	Clear	W	3	10	41 08.8	71 04.6		700	Dolphin, Short-beaked Common	26	500	3		HRG powered down	A 1 second HF click train was observed at 26 degrees at 01:56 followed by multiple HF click trains, lasting between a half and 5 seconds, with bearings from 20 to 118 degrees. The HF click trains were detected until 02:08 and ended with a one second click train at 101 degrees. A single downsweeping LF whistle that was inaudible and barely highlighted was observed at 01:59. Peak dolphin activity occurred from 01:57 to 01:58. Localization calculated the dolphins as close as 123m to the CoS at 01:58. This detection resulted in a delay of ramp-up.	0:12
10/11/2017	2:00		Clear	W	3	10	41 08.8	71 04.6	299	700	Dolphin, Short-beaked Common	166	50	3	porpoising, chasing equipment	HRG powered down	PAM HF detections at 01:56. Spotted one dolphin at 01:58 the on aft thermal camera traveling toward the vessel and started chasing equipment. PSO went up with night vision for a better view and saw 3 dolphins on the starboard side (70 m away) swimming parallel to the vessel. Sighting lasted from 02:00-02:05. PAM detections continued until 02:08. Depth unavailable	0:05
10/11/2017	9:38	128	Clear	W	1	10	41 15.7	71 08.9	301		Dolphin, Short-beaked Common	165	475	35	porpoising, bow riding	All HRG equipment running	large pod of dolphins sighted 475 meters off port side of vessel (distance estimated using reticled binoculars). PSO requested a power down which occurred immediately. Dolphins porpoised directly to the vessel, then continued to swim next to the vessel and bow riding at close range from 09:38-09:53. Approach determined to be voluntary to bow ride, and PSO authorized ramp up based on 10+ minutes of this observed behavior, in accordance with IHA.	0:15
10/11/2017	15:12		Partly Cloudy	NE	3	10	41 08.5	71 14.1	304		Dolphin, Short-beaked Common	181	100	5	Swimming under surface	Power down	Dolphins sighted 5 m off port bow swimming with vessel (distance estimated using reticled binoculars). Dolphins had hourglass shaped pattern on lateral side of body, with tan pattern forward and gray pattern aft. Dolphins swam with vessel from 15:12-15:15, then were not seen again.	0:03
10/11/2017	19:13	144	Partly Cloudy	NE	4	10	41 02.4	71 19.2		701	Dolphin spp.	61	500	4		All HRG active	A 1 second HF click train was observed at 26 degrees at 21:13 followed by multiple HF click trains, lasting between a half and 7 seconds, with bearings from 01 to 164 degrees. The HF click trains were detected from 19:13 until 19:22 and from 19:34 until 20:05 and ended with a 1 second click train at 164 degrees. Peak dolphin activity occurred from 19:46 to 19:51. Localization calculated the dolphins as close as 56m to the CoS at 20:00. This detection resulted in a power down. No visual confirmation due to choppy seas (PSO unable to locate dolphins with thermal camera or via attempt with night vision).	0:52
10/11/2017	21:36		Rain	ENE	5	10	41 02.9	71 22.6	305		Dolphin spp.	10	50	2	porpoising	Transit to port. No equipment active	Dolphins sighted briefly on thermal camera 2 (port), approx 50m from hull, porpoising toward vessel. Appeared to be traveling toward the bow. Lost sight of them quickly, difficult to keep camera on due to vessel and dolphin speed and sea state. Depth data unavailable. Unable to determine if adult/juvenile/calf.	0:01
10/13/2017	6:47		Partly Cloudy	NE	5	10	41 10.7	71 09.4	306		Dolphin, Short-beaked Common	60	150	10	porpoising, milling, bow riding	Weather patterns. No equipment active	Pod of dolphins sighted 150 m off the starboard bow of vessel (distance estimated using reticled binoculars). Dolphins travelled towards vessel and began bow riding and porpoising along starboard side and moved to port. Dolphins continued riding mid-ship along port side of vessel. Water depth not available. Last time of sighting was 07:16	0:29

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
10/13/2017	10:54		Partly Cloudy	ENE	5	10	41 01.7	71 20.0	307		Dolphin, Short-beaked Common	270	10	12	porpoising, milling, bow riding, feeding	Weather patterns. No equipment active	Pod of dolphins sighted 10 m of the bow, porpoising and bow riding on both sides. Dolphins continued bow riding until 11:20, then porpoised 150-200m ahead of the vessel, off the port bow, feeding on a school of fish. Dolphins continued following the school of fish off the port side, and last sighted approx 300 m off the stern of vessel at 11:23 (bearing 100). Water depth not available.	0:29
10/13/2017	18:55	118	Partly Cloudy	E	5	10	41 04.4	71 11.1		702	Dolphin spp.	62	500	2		All HRG active	A 1 second HF click train was observed at 62 degrees at 18:55 followed by multiple HF click trains, lasting between a half and 6 seconds, with bearings from 60 to 133 degrees. The HF click trains were detected until 19:17 and ended with a one second click train at 105 degrees. A sinusoidal LF whistle that was audible and slightly highlighted was observed at 19:02 and a faint upsweeping whistle that was inaudible was observed at 19:04. Peak dolphin activity occurred from 18:59 to 19:00. Localization calculated the dolphins as close as 132m to the CoS at 18:57. This detection resulted in a power-down. Not sighted on thermal cameras. PSO went on deck and searched perimeter of vessel with night vision from 19:03-19:24, but was unable to locate dolphins. Beaufort 5, 6-8 ft waves, many whitecaps made detection difficult.	0:22
10/13/2017	21:03	116	Partly Cloudy	E	4	10	41 04.3	71 10.0		703	Dolphin, Short-beaked Common	23	500	8		All HRG active	A 1 and a half second HF click train was observed at 23 degrees at 21:03 followed by multiple HF click trains, lasting between a half and 7.5 seconds, with bearings from 18 to 160 degrees. The HF click trains were detected until 22:51 and ended with a one and a half second click train at 152 degrees. LF whistles that were inaudible and sporadically highlighted were observed from 21:06 until 21:32 and from 21:37 until 21:41 with intermittent whistles observed from 21:46 until 22:49; ending with a faint upsweeping whistle. Peak dolphin activity occurred from 21:17 to 21:28. Localization calculated the dolphins as close as 82m to the CoS at 21:11. This detection resulted in a power-down with a visual confirmation of 10min voluntary approach leading to a ramp-up at 21:17.	1:48
10/13/2017	21:06		Partly Cloudy	E	4	10	41 04.3	71 10.2	310	703	Dolphin, Short-beaked Common		100	8	Bow riding	Power down	PSO was unable to locate dolphins on thermal cameras at time of PAM detection. Went on deck and sighted dolphins next to port side bow (within 2-5m of hull). Observed dolphins bow riding and swimming with vessel at close range on both sides of bow from 21:06-21:17. Dolphins were primarily swimming just under the surface of the water, and not porpoising/breaking the surface often. PSO authorized ramp up based on 10 minutes of observed behavior after power down (voluntary approach to bow ride), in accordance with IHA. Last sighted still bow riding at 21:07 upon return to thermal camera station. Not sighted on thermal cameras, possibly due to lack of porpoising/breaking the surface activity. Did not record bearing. Unable to determine # adult/juvenile/calf. Depth data unavailable.	0:11
10/13/2017	21:53	116	Partly Cloudy	E	4	10	41 04.3	71 01.7	311	703	Dolphin, Short-beaked Common		100	5	Bow riding	All HRG equipment active	Briefly sighted 1 dolphin on port thermal camera (unit #2) near bow of vessel. Went on deck and observed dolphins bow riding and swimming with vessel, within 3-5m of the hull from 21:55-22:03. Again, they were primarily swimming below the surface area with little porpoising/breaking the surface observed. Dolphins were still bow riding at 22:03 when PSO returned to thermal camera station. Mitigation not required: less than 60 minutes since previous sighting/PAM detection within the EZ (following ramp up based on voluntary approach behavior at 21:17). Did not record bearing.	0:10
10/14/2017	3:13	120	Partly Cloudy	SE	3	10	41 04.0	71 10.5		704	Dolphin spp.	20	500	3		All HRG active	A 1 second HF click train was observed at 20 degrees at 03:13 followed by multiple HF click trains, lasting between a half and 8 seconds, with bearings from 20 to 149 degrees. The HF click trains were detected until 03:16 and ended with a one second click train at 113 degrees. Peak dolphin activity occurred at 03:15. Localization calculated the dolphins as close as 142m to the CoS at 03:14. This detection resulted in a power-down. Not sighted on thermal cameras. PSO went outside with night vision and searched the perimeter of the vessel for dolphins from 03:20 to 03:33, but was unable to locate them. PAM detection within EZ was brief, only lasting 3 minutes.	0:03
10/14/2017	5:42	120	Partly Cloudy	SE	3	10	41 04.1	71 09.2		705	Dolphin spp.	28	500			All HRG active	AD705 - Initial whistle at 5:42. Initial broadband click trains at 5:44	0:22
10/14/2017	6:20	118	Partly Cloudy	SE	3	10	41 03.9	71 08.8		706	Dolphin, Short-beaked Common	78	500			HRG powered down	AD706	0:44
10/14/2017	6:45	128	Partly Cloudy	SE	3	10	41 04.1	71 11.5	312	706	Dolphin, Short-beaked Common	185	100	5	traveling towards vessel on port side	Power down	Observed 5 dolphins approximately 150 meters from source, mid-ship, starboard side of vessel heading towards vessel. Dolphins swam towards bow and began bow riding until 6:50. Dolphins then dove and were not seen again.	0:05
10/14/2017	21:37	109	Fog or thick haze	W	3	0.2	41 05.4	71 07.7		707	Dolphin spp.	111	500			All HRG active	A 1 second HF click train was observed at 20 degrees at 03:13 followed by multiple HF click trains, lasting between a half and 8 seconds, with bearings from 20 to 149 degrees. The HF click trains were detected until 03:16 and ended with a one second click train at 113 degrees. Peak dolphin activity occurred at 03:15. Localization calculated the dolphins as close as 142m to the CoS at 03:14. This detection resulted in a power-down.	1:21

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
10/14/2017	21:49		Fog or thick haze	W	3	0.2	41 05.0	71 08.8	313	707	Dolphin spp.	250	100	3	bow riding, milling	Power down	Unable to locate dolphins on thermal cameras following PAM detection. PSO went on deck with night vision at 21:43. First heard dolphin porpoise and blow at 21:51, then intermittently sighted 3 dolphins swimming near the bow, attempting to bow ride and occasionally porpoising from 21:49-21:54 (5 minutes intermittent observation, did not have visual on animals the entire time). Lost sight of the dolphins, and continued searching the perimeter of the vessel until 22:08, but could not locate or hear them again. Dense fog made sighting the animals difficult. Unable to observe voluntary approach behavior for 10 minutes and could not authorize ramp up. PSO made additional attempts to locate dolphins with night vision from 21:15-22:29 and 22:44-22:59 following continued PAM detections within the EZ, but was unsuccessful. Dense fog persists. Did not record water depth.	0:05
10/14/2017	23:06	117	Fog or thick haze	SW	2	0.1	41 05.5	71 10.2		708	Dolphin spp.	45	500	8		HRG powered down	AD708: Concurrent click trains predominantly registered forward of hydrophone array between bearings of 15 and 60 degrees. Constant whistles noted intermittently from 23:16. Ramp-up initiated at 23:24 and click bearings indicated movement from forward to aft of hyd array at 23:27, with intermittent click trains indicated near bearing of 160 degrees by 23:32. Click trains were again detected 23:41, forward of hyd array near bearing of 20 degrees. Full power was reached at 23:44 and peak click event at 23:50 indicated rapid movement from forward to aft of hyd array. Attempted localization indicated the dolphins as close as 130 meters from the source. Click trains registered intermittently between bearings of 20 and 120 degrees until final detection at 00:41. PSO sighted dolphins bow riding/chasing towed equipment using night vision (Sighting #313- 23-23:24), and was able to authorize ramp up due to observed voluntary approach behavior	1:35
10/14/2017	23:13		Continuous layer of clouds	SW	2	0.1	41 05.0	71 09.0	314	708	Dolphin spp.		100	4	Bow riding, porpoising, chasing towed equipment	Power down	Unable to locate dolphins on thermal cameras following PAM detection within EZ. PSO went on deck with night vision at 23:11. Sighted 2 dolphins on starboard side of vessel (first heard them breaking the surface) close to the stern, porpoising towards the bow. Then saw approx 4 dolphins bow riding and porpoising on both sides of the bow (within 2-5m from hull), occasionally breaking away/falling back from the bow towards the stern and chasing the equipment and vessel. This behavior continued and was observed from 23:13-23:24. PSO returned to survey room to authorize ramp up based on observed behavior, in accordance with IHA: voluntary approach to bow ride/chase towed equipment. Unable to determine species due to dense fog. Not sighted on thermal cameras upon returning to survey room, most likely due to dense fog and proximity of dolphins to vessel. Dolphins were still bow riding at last sighting. Did not record bearing. Unable to determine # adult/juvenile/calf. Did not record water depth.	0:11
10/15/2017	1:33	120	Fog or Thick Haze	W	2	0.05	41 05.5	71 09.9		709	Dolphin spp.	85	500	9		All HRG active	A half second HF click train was observed at 85 degrees at 01:33 followed by multiple HF click trains, lasting between a half and 6 seconds, with bearings from 01 to 162 degrees. The HF click trains were detected until 01:35, from 01:39 until 02:45, from 02:49 until 02:55, and from 03:17 until 03:18, ending with a 2 second click train at 64 degrees. LF whistles were observed from 01:49 until 01:52, at 01:54, from 01:58 until 02:44, and from 02:49 until 02:51, ending with a faint barely highlighted down-sweeping whistle. Peak HF dolphin activity occurred at 02:06 to 02:09 and peak LF dolphin activity occurred from 02:10 to 02:19. Localization calculated the dolphins as close as 72m to the CoS at 02:30. No mitigation required: less than 60 min since last PAM detection of dolphins within EZ (00:41) following ramp up based on voluntary approach (@ 23:23 10/14/2017).	1:45
10/15/2017	4:00	127	Fog or thick haze	W	2	0.3	41 05.8	71 16.0		710	Dolphin spp.	49	500	10		Silent	AD710: Following brief, successive click trains at initial detection, concurrent click trains were consistently indicated, predominantly between bearings of 20 and 135 degrees. Peak click event at 4:16. Attempted localization indicated the dolphins as close as 106 meters from the source. Initial whistles and burst pulses noted at 4:19. Click trains predominantly registered near bearing of 20 degrees from 4:30 to 5:30. Peak burst pulse event at 5:35 and break in HF click detection at 5:41, with intermittent whistle detection ongoing. Mid-frequency click event from 6:07 to 6:15 with concurrent click trains indicated between bearings of 55 and 120 degrees. Attempted localization during initial mid-frequency click event indicated the vocalizing dolphin(s) at a distance of 754 meters from the source, and by peak mid-frequency detection as close as 376 meters from the source. Final detection in exclusion zone was at 6:15. Three, successive downsweep contours detected at 6:25 and final detection of concave contour at 6:44. PSO's unable to locate dolphins on thermal cameras or with night vision, likely due to thick fog present	2:44
10/15/2017	7:50	112	Continuous layer of clouds	W	2	8	41 05.6	71 12.7	315		Dolphin, Short-beaked Common	215	800	15	traveling toward vessel	full power	Dolphins sighted 800m off the starboard traveling toward the vessel. PSO requested power down just before they entered the exclusion zone. Dolphins were approximately 450 m from sound source at time of power down. (Distance estimated using reticule binoculars) Dolphins remained in the exclusion zone from 07:50-07:52, before swimming away off the port side stern. Last time of sighting (outside the exclusion zone) was 07:54.	0:04

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
10/15/2017	18:32	117	Fog or thick haze	SSW	5	1	41 05.5	71 08.8		711	Dolphin spp.	106	500	6		All HRG active	A 1 second HF click train was observed at 106 degrees at 18:32 followed by multiple HF click trains, lasting between a half and 10 seconds, with bearings from 01 to 141 degrees. The HF click trains were detected until 19:06 and ended with a one second click train at 96 degrees. Peak dolphin activity occurred from 18:52 to 18:54. Localization calculated the dolphins as close as 70m to the CoS at 18:50. This detection resulted in a power-down with a visual confirmation of 10min voluntary approach being soft start at 19:01.	0:34
10/15/2017	18:40	111	Partly Cloudy	SSW	5	10	41 05.5	71 09.5	316	711	Dolphin, Short-beaked Common	90	75	3	Bow riding, porpoising, milling	Power down for PAM detection of dolphins within EZ. Sparker reduced to minimum output (100 joules). All other HRG equipment powered off.	PSO went on deck and searched perimeter of vessel with night vision from at 18:40-18:58. At 18:40 3 dolphins were briefly sighted 20 m off the starboard side of the vessel (approx 75m from source) near mid-ship, porpoising and milling. Dolphins then sighted again at 18:47 bow riding on both port and starboard. They continued bow riding from 18:47-18:58. At 18:58, PSO lost sight of dolphins. Dolphins were identified using night vision. PSO authorized ramp up based on 10 minutes observed behavior, in accordance with IHA: Voluntary approach to bow ride.	0:18
10/16/2017	7:52		Continuous layer of clouds	W	5	10	40 58.9	71 10.7	317		Dolphin, Short-beaked Common	265	350	6	porpoising, chasing vessel, bow riding	Transit. No HRG equipment active	Sighted dolphins 300m off the port side bow, travelling toward bow of vessel. Approached within 20m of bow at 07:54, then began bow riding from 07:54-08:14, before swimming away off the port stern. Last time of sighting was 08:18. Depth data unavailable.	0:26
10/16/2017	18:50	119	Continuous layer of clouds	NW	5	10	41 05.7	71 12.1		712	Dolphin spp.	61	500	2		All HRG active	A 1 second HF click train was observed at 61 degrees at 18:50 followed by multiple HF click trains, lasting between a half and 3 seconds, with bearings from 54 to 114 degrees. The HF click trains were detected until 19:00 and ended with a half second click train at 111 degrees. Peak dolphin activity occurred from 18:54 to 18:55. Localization calculated the dolphins as close as 138m to the CoS at 18:51. This detection resulted in a power-down. Not sighted on thermal cameras. PSO went on deck and searched perimeter of vessel with night vision from 18:55-19:10, but was unable to locate dolphins. Seas of 6-8 feet and many whitecaps made made detection difficult.	0:10
10/16/2017	21:31	114	Partly Cloudy	NW	6	10	41 05.5	71 07.5		713	Dolphin spp.	85	500	5		All HRG active	AD713: Concurrent click trains registered forward of hydrophone array, predominantly near a bearing of 20 degrees. Successive concave whistle contours noted at 22:04, source reached full power at 22:07, successive downsweep contours noted at 22:09 and successive sinusoidal contours noted at 22:11. By 22:14 concurrent click trains registered between 20 nd 120 degrees. Peak click event at 22:38 with click bearings indicating movement from forward to aft of hyrophone array. Attempted localization indicated the dolphins as close as 92 meters from source. Intermittent click trains noted after 22:49, with final detection in exclusion zone at 23:32.	2:01
10/16/2017	21:36		Partly Cloudy	NW	6	10	41 05.5	71 07.3	318	713	Dolphin spp.	150	80	4	Porpoising, Bow riding	Power down	PSO went outside at 21:34 following PAM detection of dolphins within EZ. Dolphins sighted at 21:36 on starboard side of vessel (approx 5 m from hull), swimming towards the bow. Then observed attempting to bow ride on both sides of the vessel, and occasionally moving 10-20m away from the bow, ahead of the vessel. Also observed them swimming around/circling the bow at times. This behavior continued for 10 minutes, and PSO authorized ramp up based on observed voluntary approach by dolphins to bow ride, in accordance with IHA. Dolphins were still bow riding at 21:47 when PSO returned to the thermal camera station/survey room. Did not record depth. Not sighted on thermal cameras. Whitecaps/whitewash around bow made species identification difficult, could not clearly see sides of dolphins bodies.	0:11
10/16/2017	22:20	114	Partly Cloudy	NW	6	10	41 05.6	71 08.5	319		Dolphin spp.	70	40	4	porpoising, leaping, following vessel	All HRG equipment active	Sighted briefly on aft thermal camera (unit #1) off starboard stern, porpoising towards vessel. Then sighted again 22:22-22:24, approx 100m from source (sparker active) off starboard stern, porpoising and leaping in same direction as vessel heading. No mitigation required: less than 60 minutes since last sighting/detection within EZ after ramp up at 21:47 (based on voluntary approach of dolphins to bow ride for 10 minutes). Unable to determine if adult/juvenile/calf	0:04
10/16/2017	22:49	113	Partly Cloudy	N	6	10	41 05.7	71 10.8	320		Dolphin spp.		50	1	diving	All HRG equipment active	Sighted briefly on aft thermal camera (unit #1) off port stern. Only saw posterior half of animal, but clearly saw broad side of fluke close to vessel. Did not see again after dive. No mitigation required: less than 60 minutes since last sighting/detection within EZ after ramp up at 21:47 (based on voluntary approach of dolphins to bow ride for 10 minutes). Did not record bearing. Unable to tell if adult/juvenile/calf. Direction of travel unknown	0:00
10/17/2017	0:18	125	Partly Cloudy	N	6	10	41 06.1	71 07.2		714	Dolphin spp.	22	500	8		HRG powered down	A 1.5 second HF click train was observed at 22 degrees at 00:18 followed by multiple HF click trains, lasting between a half and 16 seconds, with bearings from 01 to 178 degrees. The HF click trains were detected until 02:55 and ended with a 1.5 second click train at 99 degrees. Multiple audible LF whistles were detected at 01:27 with sporadic whistles observed at 01:51, 02:34, 02:43, and 02:56 with an inaudible down-sweeping whistle marking the end of the detection. Peak HF dolphin activity occurred from 01:20 to 01:52 and from 02:33 to 02:38. Peak LF dolphin activity occurred from 01:27 to 01:28. Localization calculated the dolphins as close as 58m to the CoS at 02:31. PSO was unable to find the dolphins due to choppy seas. Equipment was already powered down for weather, no mitigation required.	2:38

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
10/17/2017	4:38	115	Partly Cloudy	N	6	10	41 05.5	71 11.5		715	Dolphin spp.	20	500	8		HRG powered down	AD715: Concurrent click trains between bearings of 20 and 110 degrees from 4:38 to final detection in exclusion zone at 4:45. Attempted localization indicated closest approach of 135meters. Not sighted on thermal cameras. PSO monitored with night vision from 04:42-04:57, but could not locate dolphins. Poor weather conditions (wind gusts to 30+ kts, seas 6-8 ft) made visual detection difficult.	0:07
10/17/2017	18:01	151	Clear	N	3	10	41 02.0	71 32.1		716	Dolphin, Short-beaked Common	80	1000	6		All HRG active	Multiple LF whistles were observed at 18:01 that were audible, highlighted, and observed until 18:24; at 18:33 a LF up-sweeping whistles was observed though inaudible and barely highlighted. A 1 second HF click train was observed at 18:08. Multiple HF click trains were observed at 18:34 to 18:36, 18:41 to 19:28, 19:35 to 22:42, lasting between a half and 23 seconds, with bearings from 09 to 178 degrees. Multiple LF whistles were observed again at 18:41 to 18:49, 19:12, 19:31 to 22:42 and were audible and mostly highlighted for the majority of the detection. The detection ended with a LF down-sweeping whistle at 22:48. Peak HF dolphin activity occurred from 18:47 to 18:51, 20:33 to 20:35, 20:48 to 21:10. Peak LF dolphin activity occurred from 18:14 to 18:18, 19:37 to 19:40. Localization calculated the dolphins as close as 74m to the CoS at 22:31. This detection resulted in a power-down with visual confirmation of 10min voluntary approach leading to a soft start at 21:19. Not sighted at time of initial detection in EZ by PSO's on visual watch. PSO's made additional attempts to locate dolphins using night vision from 18:50-19:05, 19:45-19:55, 20:06-20:19, and 20:25-20:48. Dolphins were sighted briefly by PSO 20:30-20:32 using night vision (Visual sighting # 321). Dolphins were again sighted on thermal cameras (Visual sighting # 322) from 20:51-20:53, but were 300m behind sound source and did not approach vessel. Voluntary approach was confirmed during Visual sighting # 323 (21:08-21:35) when 10+ minutes of bow riding/ chasing towed equipment was observed.	4:47
10/17/2017	20:30		Clear	SW	3	10	41 02.5	71 33.9	321	716	Dolphin, Short-beaked Common		60	3	porpoising	Power down	PSO unable to locate dolphins on thermal cameras. Went outside from 20:06-20:19 and searched perimeter of vessel with night vision, but did not see dolphins. Made another attempt with night vision (20:25-20:48), following additional PAM detections within the EZ. Briefly sighted approx 3 dolphins porpoising off the starboard side of vessel near mid ship at 20:30. They fell back towards the stern at 20:32, and were not sighted again. Continued to search around the vessel until 20:48, but could not locate dolphins again. Did not record depth or bearing. Unable to observe 10 minutes of behavior to authorize ramp up based on voluntary approach.	0:02
10/17/2017	20:51	141	Clear	SW	3	10	41 02.7	71 34.7	322	716	Dolphin spp.	110	300	5	milling, porpoising	Power down	Dolphins sighted on aft thermal camera (#1) porpoising and milling approx 300m directly behind vessel. They were not seen approaching the vessel.	0:02
10/17/2017	21:08	144	Clear	SW	3	10	41 02.5	71 33.2	323	716	Dolphin, Short-beaked Common		30	8	Bow riding, chasing towed equipment and vessel, porpoising, swimming with/next to vessel	Power down	Sighted dolphins on aft thermal camera (#1), off starboard stern, porpoising towards and then next to towed equipment (sparker), approaching within 5-10m of equipment. Lost sight of them as they moved forward, between the stern and mid ship (starboard side). PSO then went outside and located the dolphins porpoising alongside the vessel towards the bow (swimming/porpoising within 3-5m of hull). The dolphins then attempted to bow ride, and were sighted moving back and forth between the bow and the equipment. They may have been circling the vessel, and some appeared to stay consistently near (directly next to and behind) the towed equipment. PSO returned to the thermal camera station at 21:19 and authorized ramp up based on 10 min observed behavior, in accordance with IHA: voluntary approach to bow ride and chase towed equipment. Dolphins were sighted again on the aft thermal camera (#1) chasing the towed equipment and porpoising next to/near the sparker (within 3-5m of source) from 21:19-21:35. Lost sight of dolphins on thermal cameras at 21:35, but PAM detections within the EZ continued past end of visual sighting. Several recordings of dolphins near the towed equipment were made. Did not record bearing. Species ID confirmed with night vision.	0:27
10/17/2017	23:33	150	Clear	SW	4	10	41 01.4	71 23.8		717	Dolphin spp.	70	500	6		All HRG active	AD717: Concurrent click trains indicated forward of hydrophone array between bearings of 70 and 90 degrees from initial detection at 23:33 to peak click event at 23:36. Attempted localization indicated the dolphins as close as 190 meter from the source. Click trains registered aft of hydrophone array until final detection in exclusion zone at 23:38. No mitigation required: less than 60 minutes since last sighting/detection within EZ after ramp up at 21:19 (based on voluntary approach of dolphins to chase towed equipment/ bow ride for 10 minutes).	0:05
10/18/2017	0:35	148	Clear	SW	4	10	41 01.4	71 22.7		718	Dolphin spp.	20	500	5		All HRG active	AD718: Click trains indicated forward of hydrophone array near bearing of 20 degrees at 00:35. Peak detection occurred at 00:37 with concurrent click trains indicated between bearings of 20 and 110 degrees. Final detection in exclusion zone at 00:38. No mitigation required: less than 60 minutes since last sighting/detection within EZ after ramp up at 21:19 on 10/17/2017(based on voluntary approach of dolphins to chase towed equipment/ bow ride for 10 minutes).	0:03

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
10/18/2017	2:04	151	Clear	SW	4	10	41 01.5	71 20.6		719	Dolphin, Short-beaked Common	32	500	3		All HRG active	A 1 second HF click train was observed at 32 degrees at 02:04 followed by multiple HF click trains, lasting between a half and 1.4 seconds, with bearings from 16 to 157 degrees. The HF click trains were detected until 02:42 and ended with a half second click train at 90 degrees. An inaudible concave LF whistle was detected at 02:15 and was barely highlighted. At 02:31 three LF whistles were observed and audible but barely highlighted; an inaudible up-sweeping whistle that was barely highlighted marked the end of the LF part of the detection at 02:40. Peak HF dolphin activity occurred from 02:26 to 02:27. Peak LF dolphin activity occurred at 02:31. Localization calculated the dolphins as close as 80m to the CoS at 02:08. This detection resulted in a power-down with visual confirmation of 10min voluntary approach leading to a soft start at 02:24.	0:38
10/18/2017	2:12		Clear	SW	4	10	41 01.6	71 20.7	324	719	Dolphin, Short-beaked Common		100	3	porpoising, bow riding	All HRG active	PAM detected dolphin high frequency click train at 02:04. PSO went up on deck with night vision after being unable to locate dolphins with the thermal cameras. Sighted 3 dolphins bow riding on the port side using night vision. PSO called for ramp up after observing bow riding behavior from 02:12-02:22. Dolphins were still bow riding when PSO returned to thermal camera station. Did not record depth or bearing.	0:10
10/18/2017	3:17	152	Clear	SW	4	10	41 01.6	71 19.6		720	Dolphin spp.	34	500	2		All HRG active	A half second HF click train was observed at 34 degrees at 03:17 followed by multiple HF click trains, lasting between a half and 4 seconds, with bearings from 34 to 115 degrees. The HF click trains were detected until 03:20 and ended with a 3 second click train at 115 degrees. Peak dolphin activity occurred from 03:18 to 03:19. Localization calculated the dolphins as close as 240m to the CoS at 03:17. No mitigation required: less than 60 minutes since last sighting/detection within EZ after ramp up at 02:24 (based on voluntary approach of dolphins to bow ride for 10 minutes)	0:03
10/18/2017	3:54	141	Clear	SW	4	10	41 03.5	71 16.7		721	Dolphin spp.	36	500	3		All HRG active	A 1 second HF click train was observed at 37 degrees at 03:54 followed by multiple HF click trains, lasting between a half and 5 seconds, with bearings from 18 to 115 degrees. The HF click trains were detected until 04:02 and ended with a 1 second click train at 22 degrees. Peak dolphin activity occurred from 03:59 to 04:00. Localization calculated the dolphins as close as 104m to the CoS at 03:54. No mitigation required: less than 60 minutes since last sighting/detection within EZ after ramp up at 02:24 (based on voluntary approach of dolphins to bow ride for 10 minutes)	0:23
10/18/2017	4:48	115	Clear	SW	4	10	41 05.9	71 12.8		722	Dolphin spp.	15	500	3		All HRG active	AD722: Click trains indicated forward of hydrophone array near bearing of 20 degrees at 4:48. Peak detection occurred at 4:52 with concurrent click trains indicated between bearings of 45 and 90 degrees. Attempted localization indicated the dolphins as close as 166 meter from the source. Final detection in exclusion zone at 5:02, with click trains indicated just forward of hyd array. No mitigation required: less than 60 minutes since last sighting/detection within EZ after ramp up at 02:24 (based on voluntary approach of dolphins to bow ride for 10 minutes).	0:14
10/18/2017	6:52	116	Clear	SW	4	10	41 05.2	71 07.2		723	Dolphin spp.	108	500	2		All HRG active	AD723: Brief detection from 6:52 to 6:54 with click train bearings indicating movement from aft to forward of hydrophone array. Between 6:52 and 6:53 at least 5 successive upsweeping whistle contours were audible to the operator and indicated in Panguard Spectrogram, triggering the whistle and moan detector. Final detection in exclusion zone was at 6:54. PSO's on visual watch were unable to locate dolphins, possibly due to weather/sea state (Beaufort 4, Seas 4-6 ft)	0:02
10/18/2017	19:16	115	Clear	W	3	10	41 06.7	71 06.8		724	Dolphin spp.	77	500	2		All HRG active	Multiple audible and highlighted LF whistles, consisting of sinusoidal, down-sweeping, and constant, were observed 19:16 and continued until 19:26. LF whistles returned with multiple up-sweeping whistles at 19:36 and a concave whistle at 19:53, marking the end of the LF part of the detection. A 1.5 second HF click train was observed at 77 degrees at 19:22 followed by multiple HF click trains, lasting between a half and 4 seconds, with bearings from 61 to 130 degrees. The HF click trains were detected from 19:22 to 19:24, 19:33 to 19:34, and from 19:45 until 19:59; ending with a 1 second click train at 122 degrees. Peak HF dolphin activity occurred from 19:53 to 19:54 and peak LF dolphin activity occurred from 19:16 to 19:18. Localization calculated the dolphins as close as 198m to the CoS at 19:23. This detection resulted in a power-down. PSO went on deck and searched the perimeter for dolphins from 1930-1950 using night vision. No dolphins detected within or outside of EZ. Seas of 4-6 feet and many whitecaps made made detection difficult.	0:43

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
10/18/2017	20:30	126	Clear	W	3	10	41 06.7	71 07.0		725	Dolphin, Short-beaked Common	61	500	10		HRG powered down	AD725: Concurrent broadband click trains throughout detection, 20:30 to 1:38, aside from occasional 5-10 minute breaks in registered dolphin clicks. LF whistles noted intermittently throughout, most prominently between 21:00 and 22:00 and between 00:30 and 1:30. Multiple peak click events, with the highest amplitude clicks registering during peak click event at 22:35. Attempted localization indicated the dolphins as close as 68 meters from the source. Final detection in the exclusion zone occurred at 1:05, with final whistles detected at 1:38. PSO searched perimeter of vessel from 20:32-21:14, but was unable to locate dolphins. PSO sighted dolphins behind vessel on thermal camera from 21:20-21:22, but lost sight of them, then attempted to locate dolphins with night vision from 21:22-21:35 but was unsuccessful. Then returned to the deck at 21:42, and sighted dolphins bow riding and circling the vessel from 21:47-21:59, allowing authorization of ramp up based on observed voluntary approach behavior.	5:08
10/18/2017	21:20		Clear	SW	3	10	41 06.9	71 06.5	325	725	Dolphin spp.		10	2	Porpoising next to towed equipment	Power down	Dolphins sighted on aft thermal camera (#1), porpoising next to sparker. Lost sight of them on camera, and PSO searched perimeter of the vessel using night vision from 21:22-21:35, but was unable to locate the dolphins again. Did not record bearing. Unable to determine # adult/juvenile/calf	0:02
10/18/2017	21:47		Clear	SW	3	10	41 06.7	71 07.1	326	725	Dolphin, Short-beaked Common		100	3	Porpoising, Bow riding, swimming with/directly next to vessel	Power down	PAM detection of dolphins within the EZ continued, and PSO was unable to locate dolphins using thermal cameras. Went back outside to search perimeter of the vessel from 21:43-21:59. Sighted one dolphins on port side of bow at 21:47, bow riding within 5 m of hull. Dolphin dove under bow. Multiple dolphins sighted at 21:49 on the starboard side of vessel near mid ship, porpoising toward the bow (within 5m of hull). Dolphins attempted to bow ride, and were sighted swimming underneath the bow, alternating between bow riding and swimming/porpoising along side the vessel, and possible circling the vessel. This behavior continued. PSO returned to thermal camera station at 21:59 to authorize ramp up, based on 10 minutes observed behavior, in accordance with IHA: Voluntary approach to bow ride. Dolphins were still bow riding and porpoising alongside the vessel between bow and mid ship at last time of sighting. Did not record bearing or water depth.	0:12
10/19/2017	2:37	127	Clear	SW	4	10	41 06.2	71 09.1		726	Dolphin, Short-beaked Common	50	500	5		All HRG active	A LF barely highlighted down-sweeping whistle was observed at 02:37 followed by a LF constant whistle at 02:39. LF whistles were observed again at 02:41 and became intermittent at 03:10, abundant LF whistles were observed from 03:20 until 03:32 and from 03:40 until 03:43, ending at 05:10 with a constant whistle. A half second HF click train was observed at 69 degrees at 02:40 followed by multiple HF click trains until 02:47. The HF click trains returned at 03:20 until 04:17. The HF click trains lasted between a half and 24 seconds with bearings from 02 to 161 degrees. The HF click trains ended at 05:00 with a 10 second click train veering from 40 to 110 degrees. Peak HF & LF dolphin activity occurred from 03:43 to 03:48 and from 04:57 to 04:59. Localization calculated the dolphins as close as 125m to the CoS at 03:22. This detection resulted in a power-down. PSO was unable to locate dolphins on thermal cameras. PSO went on deck with night vision from 02:46-03:00, and several times between 03:00-04:00 but was unable to locate dolphins until 03:45. PSO sighted dolphins bow riding/ chasing towed equipment 03:45-03:59 using night vision (Visual sighting # 327), and authorized ramp up based on 10 minutes observed voluntary approach behavior.	2:33
10/19/2017	3:45	115	Clear	SW	4	10	41 06.2	71 09.7	327	726	Dolphin, Short-beaked Common		50	8	Porpoising, bowriding, chasing survey gear	Sarker at full power	PAM detected HF clicks and LF whistles beginning at 02:37, and PSO made several attempts to locate them using night vision. PSO sighted dolphins 100m behind the vessel (approx 50m behind sparker), chasing towed equipment from 03:45-03:52, and bow riding from 03:52-03:59. Because the dolphins had exhibited voluntary approach behavior to bow ride/ chase towed equipment for longer than 10 minutes, PSO gave the all clear to begin ramp up, in accordance with IHA. Dolphins last detected by PAM at 04:17.	0:14
10/19/2017	21:05	123	Partly Cloudy	SW	6	10	41 06.9	71 08.7		727	Dolphin spp.	62	500	4		All HRG active	A 1 second HF click train was observed at 62 degrees at 18:50 followed by multiple HF click trains, lasting between a half and 5 seconds, with bearings from 41 to 143 degrees. The HF click trains were detected until 19:10 and ended with a half second click train at 89 degrees. The detection ended at 19:15 with two faint up-sweeping whistles. Peak dolphin activity occurred from 19:06 to 19:08. Localization calculated the dolphins as close as 114m to the CoS at 19:10. This detection resulted in a power-down. Not sighted by PSO on thermal cameras. Operational shut down for weather at 21:08 (2 minutes after Power down for dolphins within the EZ).	0:10
10/20/2017	7:28	106	Partly Cloudy	SW	5	10	41 07.1	71 09.4	328		Dolphin, Short-beaked Common	335	150	2	traveling toward vessel, bow riding	Deploying survey equipment. All HRG equipment powered off	Spotted 2 common dolphins 100m off the bow on the starboard side. Dolphins traveled towards the vessel, and began bow riding, no the starboard side at 07:29. Quickly lost sight of them one minute later at 07:30, and they were not seen again. No mitigation required. Vessel was in process of deploying survey equipment, but then retrieved it due to weather/ sea state. This sighting did not delay ramp up/ operations.	0:02

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
10/20/2017	20:07	118	Clear	NW	3	10	41 07.0	71 07.2		728	Dolphin spp.	22	500	2		All HRG active	Two LF barely highlighted up-sweeping whistles were observed at 20:07 followed by another up-sweeping whistle and two down-sweeping whistles at 20:10. Multiple HF click trains were observed at 20:10, lasting between a half second and 2.5 seconds, with bearings from 22 to 118 degrees ending with a half second click train at 118 degrees at 20:14. The HF click trains returned at 20:50 with a half second click train at 74 degrees and at 21:20 with a two second detection at 88 degrees which marked the end of the HF part of the detection. LF whistles were observed again from 20:13 to 20:16, from 20:33 to 20:34, 20:45, 21:02, 21:20, and from 21:35 to 21:38. The detection ended with a concave whistle that was inaudible and barely highlighted at 21:38. Peak HF dolphin activity occurred from 20:10 to 20:11 and peak LF dolphin activity occurred from 20:10 to 20:13. Localization calculated the dolphins as close as 73m to the CoS at 20:12. This detection resulted in a power-down. Dolphins were not sighted by PSO on thermal cameras. PSO searched perimeter of vessel with night vision from 20:12-20:29 but could not locate dolphins. PAM detections within the EZ were brief : 20:10-20:14, 20:50 (less than one minute), 21:20 (less than one minute).	1:31
10/20/2017	22:44	118	Clear	NW	4	10	41 06.9	71 07.4		729	Dolphin spp.	69	500	2		All HRG active	AD729: From 22:44 to final detection in exclusion zone at 22:47, brief click trains were indicated between bearings of 69 and 95 degrees. Attempted localization indicated dolphins as close as 226 meters from the source. Final detection was of 4+ successive down-sweeping whistle contours noted at 22:56. Dolphins were not sighted by PSO on thermal cameras. PAM detection within the EZ was brief (ended 21:47) and indicated dolphins were aft of vessel and did not approach. PSO searched perimeter of vessel from 23:48-23:55, but could not locate dolphins.	0:12
10/20/2017	23:37	120	Clear	NW	4	10	41 06.9	71 05.7		730	Dolphin spp.	100	500	2		HRG powered down	AD730: Initial detection of concave and convex whistle contours at 23:37. Initial detection of broadband click trains at 23:44 indicated aft of hydrophone array near a bearing of 100 degrees. LF whistles noted consistently throughout detection. Click trains indicated aft of hydrophone array until final detection in exclusion zone at 23:52. Dolphins were not sighted on thermal cameras. PSO searched perimeter of vessel from 23:48-23:55 (when PAM detection indicated dolphins were closest), but could not locate dolphins.	0:15
10/21/2017	0:54	130	Clear	NW	4	10	41 06.9	71 08.6		731	Dolphin, Short-beaked Common	45	500	5		Ramp-up	AD731: Initial detection of concave and up-sweeping whistle contours at 00:54. Initial detection of broadband click trains at 1:01 indicated forward of hydrophone array near a bearing of 45 degrees. Peak click event at 1:07 corresponded with peak LF event of single, high amplitude convex contour. LF whistles were noted consistently throughout detection. Attempted localization indicated the vocalizing dolphins as close as 72 meters from the source. The vessel initiated source ramp-up at 1:25, after visual confirmation of 10-minute voluntary approach; within seconds of the initiation of source ramp-up from 100 joules there was a noted increase in the quantity and intensity of registered click trains. Concurrent click trains were indicated throughout the detection predominantly forward of hydrophone array, with final detection in exclusion zone at 1:49.	0:55
10/21/2017	1:13		Clear	NW	4	10	41 06.7	71 06.5	329	731	Dolphin, Short-beaked Common		20	3	bow riding	power down	PAM detected high frequency clicks in EZ at 01:01. Not sighted on thermal cameras. PSO went outside to search night vision to search the perimeter of the vessel at 01:08. Observed 2 dolphins (01:13-01:19) on the starboard side, 20 m from sound source (sparker), traveling with the vessel near the towed equipment. They started bow riding at 01:19. PSO was able to observe 3 dolphins bow riding from 01:19-01:25. Authorized ramp up based on 10 minutes observed behavior (voluntary approach to bow ride/chase towed equipment), in accordance with IHA. Depth data unavailable	0:12
10/21/2017	2:21	132	Clear	NW	4	10	41 06.9	71 08.6		732	Dolphin spp.	75	500	3		All HRG active	A half second HF click train was observed at 02:21 at a bearing of 75 degrees followed by a LF concave whistle that was inaudible and barely highlighted. LF whistles were observed sporadically from 02:25 to 02:45. Multiple HF click trains were observed at 02:41, lasting between a half second and 3 seconds, with bearings from 02 to 118 degrees and ended with a half second click train at 83 degrees at 02:49. The detection ended with 2 faint and inaudible LF up-sweeping whistles at 02:54. Peak HF dolphin activity occurred from 02:45 to 02:47 and peak LF dolphin activity occurred from 02:45 to 02:46. Localization calculated the dolphins as close as 119m to the CoS at 02:42. No mitigation required: less than 60 minutes since last sighting/detection within EZ after ramp up at 01:25 (based on voluntary approach of dolphins to bow ride/chase towed equipment for 10 minutes: See Visual Sighting #329, Acoustic Detection # 731).	0:33

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
10/21/2017	3:29	126	Clear	NW	4	10	41 07.1	71 09.2		733	Dolphin spp.	61	500	2		All HRG active	Multiple LF barely highlighted concave whistles were observed at 03:29 followed by multiple concave, constant, and up-sweeping whistles observed until 03:47. A 1 second HF click train was observed at 03:41 with a bearing of 61 degrees and was followed by multiple HF click trains, lasting between a half second and 1.5 seconds, with bearings from 61 to 94 degrees ending with a 1 second click train at 94 degrees at 03:45. The detection ended with an up-sweeping whistle that was inaudible and barely highlighted at 03:57. . Peak HF dolphin activity occurred from 03:42 to 03:43 and peak LF dolphin activity occurred from 03:42 to 03:45. Localization was not able to be calculated. No mitigation required: less than 60 minutes since last sighting/detection within EZ (02:49) after ramp up at 01:25 (based on voluntary approach of dolphins to bow ride/chase towed equipment for 10 minutes: See Visual Sighting #329 , Acoustic Detection #'s 731/732).	0:18
10/21/2017	4:14	131	Clear	NW	4	10	41 06.9	71 07.9		734	Dolphin spp.	20	500	2		All HRG active	AD734: Initial detection of upsweep whistle contours at 4:14. Initial detection of broadband click trains at 4:16 indicated forward of hydrophone array near a bearing of 40 degrees. Click trains indicated between bearings of 20 and 120 degrees until final detection in exclusion zone at 4:27. Final detection at 4:30 with 3 successive concave whistle contours with harmonics. No mitigation required: less than 60 minutes since last sighting/detection within EZ after (03:45) ramp up at 01:25 (based on voluntary approach of dolphins to bow ride/chase towed equipment for 10 minutes: See Visual Sighting #329 , Acoustic Detection #'s 731/732/733).	0:16
10/21/2017	5:25	121	Clear	NW	4	10	41 07.1	71 09.7		735	Dolphin spp.	20	500	3		All HRG active	AD735: Initial detection of concave and sinusoidal whistle contours at 5:25 and broadband click trains indicated forward of hydrophone array near a bearing of 40 degrees. Click trains indicated between bearings of 20 and 100 degrees until final detection in exclusion zone at 5:29. No mitigation required: less than 60 minutes since last sighting/detection within EZ (04:27) after ramp up at 01:25 (based on voluntary approach of dolphins to bow ride/chase towed equipment for 10 minutes: See Visual Sighting #329 , Acoustic Detection #'s 731/732/733/734).	0:04
10/21/2017	10:51	111	Clear	NW	2	10	41 05.4	71 07.1	330		Dolphin spp.	205	575	6	porpoising	All HRG equipment active	A small pod of dolphins was spotted approx 475m off the bow of the vessel (575m from Sparker, distance estimated using reticled binoculars). PSO requested a power down upon entry into the EZ, and vessel immediately complied. Dolphins were approx 450m from the sound source at the time of power down. Dolphins swam directly toward the vessel until they were approx 50 meters off the bow (closest approach to vessel), then turned and swam away to the vessels port side. Dolphins had a tall falcate dorsal fins, and dark bodies and long, slender beaks. Because of their direction of travel towards and away from our vessel, PSOs were unable to see any additional ID characteristics, because the sides of their bodies were never visible. Last sight of dolphins at 10:53, still within EZ swimming away from the vessel.	0:02
10/21/2017	18:45	118	Partly Cloudy	SSW	3	10	41 05.6	71 08.4		736	Dolphin, Short-beaked Common	84	500	10		All HRG active	AD736: The detection spanned an 8-hour period over 21 and 22 October, with no more than 10 minutes between detection of HF clicks or LF whistles. Initial click trains indicated at 18:45 just forward of hyd array. Whistles indicated consistently throughout detection, often multiple overlapping contours, with peak whistle event 20:49. Click trains registered consistently and concurrently throughout detection, at bearings between 0 and 160 degrees, with breaks in detection of delphinid clicks of 2-20 minutes. Peak click event at 22:26 registered click bearings that indicated movement from forward to aft of hyd array. Attempted localizations indicated the vocalizing dolphins as close as 122 meters from the source. Final detection in the exclusion zone was noted at 2:30 and final detection whistles was at 2:44. No sightings on thermal cameras until 22:17. PSO was unable to locate dolphins from the deck using night vision until 20:19-20:30, at which time ramp up was authorized based on 10 minutes observed voluntary approach behavior.	7:59
10/21/2017	20:31		Clear	SW	3	10	unk	unk	331	736	Dolphin, Short-beaked Common	110	50	4	porpoising, bow riding, swimming with/circling vessel	Power down	PSO was unable to locate dolphins on thermal cameras. Made several attempts to locate dolphins by searching the perimeter of the vessel with night vision. (20:31-20:45, 20:53-21:05, 21:16-21:30). Sighted dolphins on starboard side of vessel at 21:19 (within 5 m of hull), porpoising towards bow. Dolphins would briefly attempt to bow ride, and circle back towards the stern, at times swimming next to behind towed equipment (within 10m of sparker). At times it appeared the dolphins may have been circling or swimming underneath the vessel. This behavior continued/repeated, with the dolphins remaining in close proximity (within 20m of hull) to the vessel the entire time. PSO authorized ramp up after 10 minutes of observed behavior (voluntary approach to bow ride / chase towed equipment). Dolphins were still on the starboard side of vessel (within 5m of hull) porpoising near the bow at time of last sighting (PSO returned to thermal camera station at 21:30). Unable to locate dolphins on thermal cameras after 21:30, likely due to their close proximity to the vessel. Did not record depth.	0:59

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
10/21/2017	22:17	115	Clear	SW	3	10	41 04.8	71 08.3	332	736	Dolphin, Short-beaked Common	100	100	5	porpoising, leaping, chasing towed equipment	All HRG equipment active	Sighted dolphins on starboard thermal camera (#3) porpoising and leaping towards vessel. Quickly lost sight of them on camera as they approached the vessel. Went outside and located dolphins and confirmed species id using night vision. Dolphins porpoised towards bow of vessel, then circled back. Observed them porpoising next to and behind towed equipment (10-50m from sparker), occasionally moving further off the starboard side of vessel and forward. Lost sight of dolphins at 22:24 as they began porpoising away off the starboard side of the vessel. Last sighted approx 200m from the sound source. No mitigation required: less than 60 minutes since last sighting/ PAM detection within EZ after ramp up at 21:31 (based on voluntary approach of dolphins to bow ride / chase towed equipment for 10 minutes: Sighting # 331 @ 21:19-21:30). Thermal camera recording made.	0:07
10/22/2017	0:18	123	Clear	SW	3	10	41 06.7	71 09.3	333	736	Dolphin spp.		550	2	porpoising, traveling toward vessel, chasing towed equipment	All HRG equipment active	Saw 2 dolphins on the aft thermal camera (#1), 550 m from the sound source (sparser) and traveling toward the stern of the vessel. Observed dolphins porpoising at the stern and chasing towed equipment until 00:26. Several recordings made (Camera #1). Did not record bearing. No mitigation required: less than 60 minutes since last sighting/ PAM detection within EZ after ramp up at 21:31 (based on voluntary approach of dolphins to bow ride / chase towed equipment for 10 minutes: Sighting # 331 @ 21:19-21:30).	0:08
10/22/2017	3:49	118	Clear	SW	3	10	41 04.4	71 10.7		737	Dolphin spp.	85	500	3		All HRG active	AD737: Initial LF whistles at 3:49, with initial click trains indicated at 3:51 just forward of hyd array. Whistles indicated throughout detection, with peak whistle events at 4:21 of 5+peak sinusoidal contour, and at 4:27 of 7 successive downsweep contours. Click trains registered at bearings between 7 and 150 degrees during detection, with peak click event at 4:42 with registered click bearings indicating movement from forward to aft of hyd array. Attempted localization indicated the vocalizing dolphins as close as 67 meters from the source. Final detection in evision zone was of an upsweep whistle contour and click train indicated at 4:46. No visual sightings on thermal cameras. PSO searched the perimeter of the vessel using night vision from 03:56-04:20, but was unable to locate dolphins, and could not authorize ramp up until EZ was clear for 60 minutes.	0:57
10/22/2017	5:35	119	Clear	SW	3	10	41 03.8	71 11.0		738	Dolphin spp.					HRG powered down	AD738: Upsweep and downsweep whistle contours detected sporadically between 5:35 and 6:09. Absence of successive contours eliminated possibility of localization attempts with the whistle/mean detector.	0:34
10/22/2017	19:46	123	Partly Cloudy	SW	3	10	41 08.8	71 11.0		739	Dolphin, Short-beaked Common	95	500	35		All HRG active	LF convex and constant whistles were observed at 19:46 and continued throughout the over 8 hour detection though at times intermittent. Whistles were often multiple overlapping contours with peak activity from 20:54 to 21:23 and from 21:31 to 21:44. HF click trains were observed at 19:49 and continued throughout the detection with only at most 15 minutes between click detection. The HF click trains lasted between a half and 12 seconds with bearings from 01 to 179 degrees though the majority of click trains were between 15 and 145 degrees. Peak HF activity occurred from 21:06 to 21:13 and from 21:39 to 21:45 peaking at 184dB. The HF part of the detection ended with a half second click train at 155 degrees at 03:52 and the LF part of the detection ended with multiple LF whistles at 03:53. Localization calculated the dolphins as close as 67m to the CoS at 01:17. This detection resulted in a power-down at 19: 51 followed by an operational shutdown at 19:53 due to streamer issues. PSO searched perimeter of the vessel from 19:59-20:16 but was unable to locate dolphins until Visual sighting 334 at 20:39 (over 20 minutes after operational shut down of all equipment had occurred). Visual sightings on thermal cameras and with use of night vision continued until 10/23/2017 @ 02:34, but ramp up could not be authorized based on behavior, due to operational shut down at 19:53. 2 minutes after power down for dolphin detection (all HRG equipment was powered off +20 min for operational reasons/ technical problems with streamer. Equipment was not operational/ready to be powered on until after 23:00. 60 minute clearance of the EZ prior to ramp up was required as a result).	8:06
10/22/2017	20:39		Clear	SSW	2	10	41 11.6	71 11.4	334	739	Dolphin, Short-beaked Common	150	300	8	porpoising, feeding, milling, chasing vessel/towed equipment	All HRG equipment shut down	Sighted dolphins on aft thermal camera(#1) porpoising in variable directions between 300-400m off starboard stern of vessel. At 20:40, the dolphins started porpoising directly towards the vessel. At 20:41, they were approx 25-50m from the hull and towed equipment. Lost sight of dolphins on thermal cameras at 20:43. Sighted dolphins at 20:44 from starboard deck using night vision (species ID confirmed with night vision), milling and swimming with the vessel within 10-20m of the towed equipment and vessel. The dolphins appeared to be feeding, and were last sighted approx 100m off the starboard stern of the vessel at 20:50. Depth data unavailable. All HRG equipment was still shut down for operational reasons/ due to technical issues with streamer.	0:11

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
10/23/2017	4:05		Clear	SW	2	10	41 10.0	71 13.3		740	Dolphin, Short-beaked Common	30	500	5		Silent	AD740: Initial LF whistles at 4:05, with initial click trains indicated at 4:27 forward of hyd array, near bearing of 30 degrees. Whistles indicated throughout detection, with peak whistle event at 4:44 of 7 successive upsweep contours. Click trains registered predominantly forward of hyd, but were noted between 0 and 150 degrees during detection. Peak click event at 5:04 indicated movement from forward to aft of hyd array. Attempted localization indicated the vocalizing dolphins as close as 67 meters from the source. Final downsweep whistle contour noted at 5:13 and final detection in exclusion zone at 5:23. Depth data unavailable.	1:18
10/23/2017	4:29		Clear	SW	2	10	41 09.6	71 10.4	336	740	Dolphin, Short-beaked Common		100	8	Porpoising, feeding behavior, chasing survey gear	All HRG equipment off	PAM detected dolphins within the EZ at 04:27 (AD # 740), but not sighted on thermal cameras. PSO then searched the perimeter of the vessel using night vision, and sighted 6-8 dolphins swimming towards the port side of the vessel. Observed them chasing the towed equipment and feeding (04:30-04:42). Ramp up could not be authorized based on behavior, due to operational shut down at 19:53 (10/22/2017), 2 minutes after power down for dolphin detection [all HRG equipment was powered off +20 min for operational reasons/ technical problems with streamer. Equipment was not operational/ready to be powered on until after 23:00 (10/22/2017). 60 minute clearance of the EZ prior to ramp up was required as a result]. Bearing not recorded. Depth data unavailable.	0:13
10/23/2017	5:10		Clear	SW	2	10	41 09.4	71 09.0	337	740	Dolphin spp.	230	550	5	Porpoising, milling, swimming behind vessel	All HRG equipment off	4-6 dolphins sighted 550m from source, on the aft thermal camera (#3) from 05:10-05:16. They were porpoising, milling and swimming behind the vessel. Last sight of them at 5:16, approximately the same distance from the source. Depth data unavailable.	0:06
10/23/2017	6:10		Clear	SW	2	10	41 09.2	71 13.1		741	Dolphin spp.			2		Silent	AD741: LF whistles initially noted at 6:10 and were detected intermittently until the end of PAM watch at 7:00. Depth data unavailable.	0:50
10/23/2017	18:13	109	Partly Cloudy	SE	3	10	41 08.2	70 57.6		742	Dolphin spp.	66	500	8		All HRG active	A 3 second HF click train was observed at 18:13 at a bearing of 66 degrees followed by multiple HF click trains, lasting between a half and 14 seconds, with bearings from 02 to 136 degrees though the majority of the detection took place between 75 and 100 degrees. Peak HF dolphin activity occurred from 18:38 to 18:39 after which the HF click trains became shorter and intermittent. Multiple LF concave whistles were observed at 18:49 and from 18:56 to 18:57; the whistles were audible and highlighted. The detection ended at 19:13 with a 1 second click train at 90 degrees. Localization calculated the dolphins as close as 97m to the CoS at 18:39. This detection resulted in a power-down at 18:14. 2 PSOs remained on deck on visual watch until 18:30 but did not sight dolphins. PSO went back out on deck after start of thermal camera watch and searched the perimeter of the vessel using night vision from 18:40-18:57, but was unable to locate dolphins. No sightings on thermal cameras. Seas building to 4-5 feet with numerous whitecaps, making visual detection difficult. Last PAM detection within the EZ at 19:13.	1:00
10/23/2017	21:50	121	Partly Cloudy	SE	4	10	41 08.1	71 03.2		743	Dolphin, Short-beaked Common	85	500	10		All HRG active	AD743: Initial click trains indicated at 21:50 just forward of hyd array. Soft start initiated at 22:09, with initial whistles and first peak click event at 22:10. Peak broadband burst pulse event at 22:17 and second peak click event at 22:20, with indication of movement from forward to aft of hyd array. Click trains registered consistently, predominantly forward of hyd, but were noted between 0 and 150 degrees during detection. A third peak click event at 22:55 indicated movement from forward to aft of hyd array, and peak LF whistle event at 23:48, with upsweep, downsweep, sinusoidal and convex contours. Attempted localization indicated the vocalizing dolphins as close as 92 meters from the source. HF and LF components of detection ongoing when the source was silenced and when acoustic monitoring ceased at 00:05. Visual sighting by PSO (using night vision) confirmed species ID. PSO authorized ramp up at 22:09 based on observed behavior (voluntary approach to bow ride for 10 minutes)	3:45
10/23/2017	21:58	115	Partly Cloudy	SE	4	10	41 08.1	71 03.7	338	743	Dolphin, Short-beaked Common		75	8	Bow riding, porpoising	Power down	Was unable to locate dolphins on thermal cameras following PAM detection of dolphins within the EZ. PSO began searching the perimeter of the vessel using night vision at 21:56. Sighted 2 Common Dolphins near mid ship (approx 5m from hull of vessel) porpoising directly toward the bow at 21:58. Approximately 8 dolphins were seen consistently bow riding (both port and starboard) from 21:59-22:09, occasionally swimming underneath the bow or circling around within 25m of the bow, then returning to bow ride. PSO returned to the thermal camera station at 22:09 and authorized ramp up based on 10 min observed behavior after power down (voluntary approach to bow ride), in accordance with IHA. Dolphins were still bow riding at time of last visual sighting (upon return to the thermal camera station). Did not record bearing.	0:11
10/23/2017	22:59	113	Partly Cloudy	SE	4	10	41 08.1	71 04.7	339	743	Dolphin spp.	100	140	2	Porpoising	All HRG equipment active	Briefly sighted dolphins 140m off port stern (aft thermal camera #1), porpoising away from vessel, further off the port side. Able to see dorsal fins/body and portion of tail stock breaking surface. Last sighted approx 180m from source (distance est using RADES). No mitigation required: Less than 60 minutes since last sighting/PAM detection within the EZ, following ramp up at 22:09, based on observed voluntary approach behavior to bow ride (21:59-22:09. Visual sighting # 338). Unable to determine if adult/juvenile/calf. Recording made on aft thermal camera (#1).	0:01

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
10/23/2017	23:54		Partly Cloudy	SE	4	10	41 08.0	71 09.2	340	743	Dolphin spp.	60	30	4	Porpoising, chasing vessel	All HRG equipment active	Dolphins sighted porpoising just off starboard stern, approx 10m behind vessel. Quickly lost sight of dolphins as they appeared to move forward of the stern on the starboard side of the vessel. No mitigation required: Less than 60 minutes since last sighting/PAM detection within the EZ, following ramp up at 22:09, based on observed voluntary approach behavior to bow ride (21:59-22:09, Visual sighting # 338). Unable to determine if adult/juvenile/calf. Did not record depth.	0:01
10/27/2017	9:41	144	Clear	W	6	10	41 13.8	71 09.6	341		Dolphin, Short-beaked Common	0	400	40	Travelling towards vessel, bowriding, porpoising	Weather patterns, no active equipment	A pod of approximately 45 dolphins were sighted at 400 m off the bow. Dolphins approached the vessel and began bow riding both starboard and port. At 9:50 dolphins moved to mid-ship on the starboard side of vessel where they continued to porpoise alongside the vessel, matching its speed. At 10:05 the pod of dolphins moved aft and began swimming away from vessel. No HRG equipment was active at the time of sighting. This sighting did not delay operations or ramp up: survey equipment could not yet be deployed due to weather/ sea state.	0:24
10/27/2017	20:39	111	Clear	SW	4	10	41 08.2	71 13.4		744	Dolphin, Short-beaked Common	66		4		All HRG active	Multiple intermittent LF whistles were observed at 20:39 though inaudible and only partially highlighted. The LF whistles became audible and more abundant at 21:30. Peak LF whistles occurred from 21:43 to 21:44. At 21:34 a 1s HF click train was observed at 66 degrees approximately 106m from the CoS. Peak HF click trains occurred from 21:51 to 21:52 and at 22:50. The HF click trains ended at 23:09 and the LF whistles ended at 23:17. At 22:08 visual confirmation was given to begin soft start after a 10min voluntary approach was verified. *Dolphins were not detected within the EZ until 21:34 (HF click trains), and distance from source at initial detection (faint whistles) was outside the EZ, at an indeterminable distance.	2:38
10/27/2017	21:56		Clear	WSW	4	10	unk	unk	342	744	Dolphin, Short-beaked Common	220	80	5	Bow riding, porpoising	Power down	Was unable to locate dolphins on thermal cameras. Searched the perimeter of the vessel using night vision from 21:38-21:46 and did not see anything. Went back on deck at 21:55 (PAM detection indicated close approach by dolphins at this time), and sighted 2 dolphins at 21:56, on port side of vessel (front 1/3 of ship) approx 5 m from the hull, porpoising toward the bow. Then sighted 3 additional dolphins on the starboard side porpoising toward the bow. The dolphins continued to bow ride on both sides, occasionally circling further back and swimming back to the bow alongside the vessel. PSO then authorized ramp up after 10 minutes observed behavior (voluntary approach to bow ride), in accordance with IHA. The dolphins were still bow riding within 5 -10m of the bow at time of last sighting, when PSO returned to the thermal camera station. Did not record water depth.	0:11
10/27/2017	23:38	118	Clear	SW	4	10	41 08.4	71 10.8		745	Dolphin, Short-beaked Common	49	500	8		All HRG active	AD745: Initial click trains indicated at 23:38, forward of hyd array near a bearing of 50 degrees. Peak click event at 23:41, with indication of movement from forward to aft, and peak LF burst pulse and click burst event at 23:42. Whistles noted intermittently until peak whistle event at 00:16. Concurrent click trains registered consistently forward and aft of hydrophone array during a majority of the detection, with final detection in exclusion zone at 00:53. Final LF whistles noted at 00:56. Attempted localization indicated the vocalizing dolphins as close as 76 meters from the source. No mitigation required: Less than 60 minutes since last sighting (#342)/PAM detection (#744) within the EZ, following ramp up at 22:08, based on observed voluntary approach behavior to bow ride (21:57-22:07, Visual sighting # 342).	1:18
10/28/2017	1:43	132	Clear	WSW	4	10	41 16.1	71 09.4		746	Dolphin spp.	80	500	5		All HRG active	AD746: The detection spanned a near 4-hour period with no more than 10 minutes between detection of HF clicks or LF whistles. Initial click trains indicated at 1:43 just forward of hyd array. Whistles indicated consistently throughout detection, often multiple overlapping contours, with peak whistle event from 2:04 to 2:12. Click trains registered consistently and concurrently throughout detection, at bearings between 0 and 162 degrees. Breaks in detection of dolphin clicks generally less than 10 minutes, however, one break in detection of clicks was longer, from 4:10 to 4:57, with LF whistles consistently detected in this time frame. Peak click event at 4:01 registered click bearings that indicated movement from forward to aft of hyd array. Attempted localizations indicated the vocalizing dolphins as close as 60 meters from the source. Final detection of whistles was at 5:37, and final detection in the exclusion zone was noted at 5:33. No mitigation required: Less than 60 minutes since last PAM detection (#745) within the EZ, following ramp up at 22:08 (10/27/2017), based on observed voluntary approach behavior to bow ride (21:57-22:07 on 10/27/2017, Visual sighting # 342). Dolphins were not sighted on thermal cameras.	3:54
10/28/2017	8:03	121	Clear	WSW	4	10	41 13.4	71 04.3	343		Dolphin spp.	60	850	4	Traveling, porpoising	Full power	Sighted 4 dolphins at 08:03, 850 m away from the sound source (distance estimated using reticle binoculars). Dolphins porpoised towards the vessel's stern, and PSO requested a power down when the dolphins entered the EZ (were approx 475 m from sound source at time of power down). Closest distance of approach was 275 meters off vessel's port stern, and about 225 m from the sound source. No voluntary approach or vessel attraction behaviour was observed. Dolphins had dark, tall, falcate dorsal fins, but PSO could not see a side profile of any individual to record any additional ID characteristics.	0:07

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
10/28/2017	19:06	128	Partly Cloudy	S	4	10	41 11.4	71 10.0		747	Dolphin, Short-beaked Common	80	500	3		All HRG active	A half second HF click train was observed at 69 degrees along with multiple audible and highlighted LF whistles at 19:06. The HF click trains continued through out the detection and lasted between a half and 9 seconds with bearings fro 20 to 167 degrees. The HF part of the detection ended at 19:37 with a half second click train at 134 degrees. LF whistles continued throughout and marked the end of the detection at 20:04 with an inaudible barely highlighted down-sweep. Peak HF activity occurred from 19:23 to 19:25 and peak LF activity occurred from 19:13 to 19:14. Localization calculated the dolphins as close as 70m to the CoS at 19:28. This detection resulted in a power-down at 19:07 with a soft start commencing at 19:30 due to visual confirmation of 10min voluntary approach.	0:58
10/28/2017	19:17	128	Partly Cloudy	S	4	10	41 11.6	71 10.9	344	747	Dolphin, Short-beaked Common	90	350	5	Heading towards vessel, bowriding, porpoising	Reduced power	PSO unable to locate dolphins on thermal cameras following PAM detection of dolphins within the EZ. At 19:10 PSO began search of perimeter of the vessel using night vision. At 19:17, PSO sighted 5 Common Dolphins traveling and porpoising directly toward the bow at 90 degrees off the starboard side of vessel at a distance of approximately 350 meters. 5 dolphins were seen consistently bow riding on the starboard side of vessel from 19:17-19:28. Dolphins would occasionally swim back towards the gear, on the starboard side of vessel, traveling approximately 200m, then return to bow ride. PSO returned to the thermal camera station and authorized ramp up based on 10 min observed behavior after power down (voluntary approach to bow ride), in accordance with IHA. Dolphins were still bow riding at time of last visual sighting (upon return to the thermal camera station).	0:11
10/28/2017	20:31	132	Partly Cloudy	S	4	10	41 11.4	71 12.2		748	Dolphin, Short-beaked Common	74	500	6		All HRG active	A half second HF click train was observed at 74 degrees at 20:31 and was followed by multiple HF click trains lasting between a half and 11 seconds with bearings from 19 to 179 degrees. The HF click trains ended at 21:14 and returned at 21:31, and were intermittent at 21:38 with the final HF click train, lasting a half second at 135 degrees, observed at 21:43. LF whistles that were audible and highlighted were observed at 20:39 and continued throughou, though becoming intermittent after 21:31, and marked the end of the detection at 21:55 with an inaudible barely highlighted down-sweeping whistle. Peak HF activity occurred from 20:38 to 20:41, 20:58 to 21:01, and from 21:06 to 21:08. Peak LF activity occurred at 20:42 and from 20:51 to 20:55. Localization calculated the dolphins as close as 80m to the CoS at 20:38. This detection did not result in a power-down due being within the hour from the end of the previous detection.	1:24
10/28/2017	20:37	135	Partly Cloudy	S	4	10	41 11.3	71 12.9	345	748	Dolphin spp.	30	50	4	porpoising	All HRG equipment active	Sighted dolphins briefly on starboard thermal camera (#3), porpoising directly towards vessel. Lost sight of them on camera after less than 1 minute. PSO went on deck (20:40-20:51) and searched perimeter of the vessel with night vision in attempt to id species and obtain additional sighting info, but was unable to locate them again. No mitigation required: Less than 60 minutes since last visual sighting (#344)/PAM detection (#748) within the EZ, following ramp up at 19:30, based on observed voluntary approach behavior to bow ride (19:17-19:28. Visual sighting # 344). Unable to determine if adult/juvenile/calf.	0:01
10/28/2017	20:56	162	Partly Cloudy	S	4	10	41 11.0	71 14.5	346	748	Dolphin, Short-beaked Common	15	75	7	Porpoising, bow riding, chasing towed equipment	All HRG equipment active	Sighted 3 dolphins briefly on aft thermal camera (#1), porpoising towards towed equipment. Dolphins approached to within 10-15m of sparker, and were chasing the towed gear. Lost sight of them on camera at 20:58, and went on deck. Sighted 6-8 Common Dolphins (species id confirmed) using night vision, porpoising along the starboard side of vessel, between the towed equipment and the bow. Dolphins attempted to bow ride, and circled back towards the aft. This behavior continued, and dolphins stayed within 30m of the vessel and 100m of the sparker throughout the sighting. Dolphins were still porpoising alongside the vessel at time of last sighting (PSO returned to survey room to monitor thermal cameras). No mitigation required: Less than 60 minutes since last visual sighting (#345)/PAM detection (#748) within the EZ, following ramp up at 19:30, based on observed voluntary approach behavior to bow ride (19:17-19:28. Visual sighting # 344). Unable to determine if adult/juvenile/calf. Thermal camera recording made.	0:14
10/28/2017	22:03	127	Partly Cloudy	S	4	10	41 10.9	71 09.5		749	Dolphin, Short-beaked Common	40	500	8		All HRG active	AD749: The detection spanned a 7.3-hour period, over 28 and 29 October, with no more than 10 minutes between detection of HF clicks or LF whistles. Initial click trains indicated at 22:03, forward of hyd array. Whistles indicated throughout detection, with peak whistle event registering overlapping contours from 00:23 to 00:37. Click trains registered consistently and concurrently throughout detection, at bearings between 0 and 160 degrees. Few breaks in detection of delphinid clicks, all less than 10 minutes. Peak click event at between 3:44 and 3:47 registered click bearings that indicated movement from forward to aft of hyd array. Attempted localizations indicated the vocalizing dolphins as close as 70 meters from the source. Final detection in the exclusion zone was noted at 5:21, and final detection of whistles was at 5:23. No mitigation required: Less than 60 minutes since last visual sighting (#346 @ 21:10)/PAM detection (#748 @ 21:43) within the EZ, following ramp up at 19:30 (10/27/2017), based on observed voluntary approach behavior to bow ride (19:17-19:28 on 10/28/2017, Visual sighting # 344). Did not record bearing. Thermal camera recordings made. Did not record bearing or depth.	7:20

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
10/28/2017	22:11	123	Partly Cloudy	S	5	10	41 10.9	71 08.1	347	749	Dolphin spp.	150	60	3	Porpoising	All HRG equipment active	Sighted dolphins briefly on starboard thermal camera (#3), porpoising towards vessel. Lost sight of them as they approached vessel. PSO went on deck (22:15 - 22:25) in attempt to locate dolphins positively id species, but was unable to sight them again with night vision. No mitigation required: Less than 60 minutes since last visual sighting (#346)/PAM detection (#749) within the EZ, following ramp up at 19:30, based on observed voluntary approach behavior to bow ride (19:17-19:28, Visual sighting # 344). Unable to determine if adult/juvenile/calf. Thermal camera recording made.	0:02
10/28/2017	22:41	121	Partly Cloudy	S	5	10	41 10.7	71 05.4	348	749	Dolphin spp.	0	200	3	Porpoising, chasing towed equipment	All HRG equipment active	Sighted approx 200m from sparker, porpoising towards vessel. Dolphins approached within 25 m of sparker, and were observed briefly chasing towed equipment at 22:44-22:45. No mitigation required: Less than 60 minutes since last visual sighting (#347)/PAM detection (#749) within the EZ, following ramp up at 19:30, based on observed voluntary approach behavior to bow ride (19:17-19:28, Visual sighting # 344). Unable to determine if adult/juvenile/calf. Thermal camera recording made.	0:04
10/28/2017	23:27		Partly Cloudy	S	5	10	41 10.4	71 09.5	349	749	Dolphin, Short-beaked Common		20	10	Porpoising, leaping, bow riding, chasing towed equipment/vessel	All HRG equipment active	Sighted 2-3 dolphins on aft thermal camera (#1) porpoising near/behind gear (20m from sparker) for approx 1 min, then lost sight of them. Sighted 8-10 Common Dolphins from the deck using night vision from 22:30-22:37. Observed chasing towed equipment, porpoising and leaping alongside vessel, bow riding. Dolphins stayed mostly between mid ship and 100m aft of vessel, from 5-75m from vessel, approaching within 5m of the sparker at times. PSO returned to thermal camera station and continued to observe dolphins (on aft thermal camera - unit #1) porpoising and chasing towed equipment/vessel within 25m of the starboard stem, consistently until 23:55. No mitigation required: Less than 60 minutes since last visual sighting (#348)/PAM detection (#749) within the EZ, following ramp up at 19:30, based on observed voluntary approach behavior to bow ride (19:17-19:28, Visual sighting # 344). Did not record bearing. Thermal camera recordings made.	0:28
10/29/2017	0:01		Partly Cloudy	S	5	10	41 10.4	71 12.7	350	749	Dolphin, Short-beaked Common	172	20	3	porpoising, chasing equipment	All HRG equipment active	Saw 3 dolphins on thermal camera #1 (aft camera) 20 m from sound source, porpoising and chasing towed equipment. Lost sight of them at 00:02. Didn't have enough time to capture a photo or video. Saw one dolphin again at 00:16, porpoising 115 m behind the vessel, bearing 155. No mitigation required: Less than 60 minutes since last visual sighting (#349)/PAM detection (#749) within the EZ, following ramp up at 19:30, based on observed voluntary approach behavior to bow ride (19:17-19:28, Visual sighting # 344). Did not record bearing. Thermal camera recordings made.	0:15
10/29/2017	6:00	113	Partly Cloudy	SE	5	10	41 09.5	71 05.5		750	Dolphin, Short-beaked Common	125	500	8		All HRG active	AD750: Initial click trains indicated at 6:00, aft of hyd array near a bearing of 125 degrees. Whistles noted intermittently, with peak whistles event at 6:47. Peak click events and 6:47 and between 6:57 and 7:01, with indication of movement from forward to aft. Concurrent click trains registered consistently forward and aft of hydrophone array during a majority of the detection, with final detection in exclusion zone at 7:01. Attempted localization indicated the vocalizing dolphins as close as 121 meters from the source. No mitigation required: Less than 60 minutes since last PAM detection (#749 @ 05:23) within the EZ, following ramp up at 19:30 (10/27/2017), based on observed voluntary approach behavior to bow ride (19:17-19:28 on 10/28/2017, Visual sighting # 344). Did not record bearing. Thermal camera recordings made. Did not record bearing or depth.	1:01
10/29/2017	6:45		Partly Cloudy	SE	5	10	41 09.5	71 09.8	351	750	Dolphin, Short-beaked Common		45	4	porpoising, bow riding	All HRG equipment active	Saw four common dolphins bow riding on the port side and traveling back and forth between the bow and mid-ship. Dolphins were sighted from 06:45-06:49. No mitigation required: Less than 60 minutes since last PAM detection (#748) within the EZ, following ramp up at 19:30 (10/27/2017), based on observed voluntary approach behavior to bow ride (19:17-19:28 on 10/28/2017, Visual sighting # 344). Did not record bearing. Thermal camera recordings made. Did not record bearing or depth.	0:04
10/29/2017	7:56	172	Partly Cloudy	SE	5	10	41 09.4	71 16.7	352		Dolphin, Short-beaked Common	355	250	5	porpoising, bow riding	All HRG equipment active	Dolphins sighted 200 m off the starboard bow (approx 250m from sparker, distance estimated using reticule binoculars) traveling directly toward the vessel. They approached the vessel and began bow riding on both starboard and port at 07:58. Last spotted on the port side bow riding at 08:14. No mitigation required: Less than 60 minutes since last PAM detection within EZ (#750, last detection within the EZ at 07:01), following ramp up at 19:30 (10/28/2017), based on observed voluntary approach behavior to bow ride (19:17-19:28 on 10/28/2017, Visual sighting # 344). Did not record bearing. Thermal camera recordings made.	0:18
10/29/2017	14:12		Continuous layer of clouds	SE	5	10	41 14.5	71 00.2	353		Dolphin, Short-beaked Common	15	300	6	porpoising, traveling toward vessel, bow riding	Transit to New Bedford	Spotted 6 dolphins 300 m off the port bow (distance estimated using reticule binoculars) porpoising directly toward the vessel. Observed bow riding on both sides, within 5m of hull, from 14:14-14:16, then lost sight of the dolphins. Vessel in transit, with no gear deployed/active. No mitigation required. Did not record depth.	0:04

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
11/1/2017	22:13	110	Partly Cloudy	SE	5	10	41 09.6	71 02.6		752	Dolphin spp.	80	500	6		HRG powered down	AD752: Initial click trains indicated at 22:13, just forward of hyd array near a bearing of 80 degrees. Peak click event between 22:18 and 22:19, with indication of movement from forward to aft. Initial burst pulses noted at 22:19 and whistles noted between 22:20 and 22:21. Concurrent click trains, between bearings of 40 and 180 degrees, registered consistently from initial detection until 22:20; thereafter click events were noted intermittently until final detection in exclusion zone at 22:26. Attempted localization indicated the vocalizing dolphins as close as 209 meters from the source. Not sighted on thermal cameras or with night vision by PSO (PAM detections primarily behind the vessel, over 200m from source). Increasing sea state and # of whitecaps made visual detection difficult.	0:13
11/1/2017	22:52	109	Partly Cloudy	SE	5	10	41 09.3	71 02.4		753	Dolphin spp.	100	500	3		HRG powered down	AD753: Initial click trains indicated at 22:52, just aft of hyd array near a bearing of 100 degrees. Click trains indicated aft of hydrophone array until just after the single whistle of the detection was noted at 22:56. No clicks were noted between 22:57 and 23:07. At 23:10 concurrent click trains noted near 110 and 20 degrees. Peak click event at 23:13 with indication of movement of a portion of the pod from forward to aft, in addition to consistent click trains near 20 degrees. A second break in HF click detection from 23:15 until 23:21, and final detection in exclusion zone at 23:25, aft of hyd array. Attempted localization indicated the vocalizing dolphins as close as 130 meters from the source. Not sighted on thermal cameras or with night vision (searched perimeter of vessel 23:11-23:22) by PSO. Increasing sea state and # of whitecaps made visual detection difficult.	0:33
11/2/2017	0:36	112	Partly Cloudy	SE	6	10	41 12.0	71 02.2		754	Dolphin spp.	120		2		All HRG active	AD754: Initial MF clicks indicated at 00:36, aft of hyd array near a bearing of 120 degrees. Brief MF click trains registered intermittently aft of hydrophone array. At 00:42 HF click trains indicated forward of hydrophone array, near a bearing of 50 degrees, and were localized within 500 meters of the source. Source powered down at 00:43 and final detection occurred at 00:43. Not sighted by PSO on thermal cameras. Increased sea state and # of whitecaps made visual detection more difficult, and PAM detection within the EZ lasted only one minute.	0:07
11/2/2017	3:49	110	Partly Cloudy	SE	6	10	41 04.1	71 01.3		755	Dolphin spp.	95	740	1		All HRG active	Multiple LF concave, convex, and up-sweeping whistles were observed at 03:49, though inaudible and barely highlighted, and lasted until 03:54 marking the end of the detection. A HF click train was observed at 03:52 and lasted 1.5s with a bearing of 95 degrees and was determined that the dolphin was not in the exclusion zone. Localization calculated the dolphins as close as 740m to the CoS at 03:52. This detection did not result in a mitigation action. Dolphins were not sighted on thermal cameras, most likely due to distance from vessel and sea state.	0:05
11/2/2017	6:07	118	Partly Cloudy	SE	6	10	41 10.5	71 00.2		756	Dolphin spp.	45	500	3		All HRG active	AD756: Initial click trains indicated at 6:07, forward of hyd array near a bearing of 45 degrees. Click trains registered intermittently forward of hydrophone array. Peak detection occurred between 6:15 and 6:16 with click trains indicated between 80 and 100 degrees. 6:16 was final detection. PSO was unable to detect dolphins on thermal cameras. PSO went on deck to search the perimeter of the vessel (using night vision) from 6:10-6:30, but was unable to locate dolphins. Seas of 2-2.5 meters and numerous whitecaps made visual detection more difficult.	0:09
11/2/2017	6:59	125	Partly Cloudy	SE	6	10	41 09.8	71 00.8		757	Dolphin spp.	35	500	10		HRG powered down	AD757: Initial click trains indicated at 6:59, forward of hyd array near a bearing of 35 degrees. From 7:02 to 7:06 click trains noted consistently aft of hydrophone array followed by a brief break in click events. At 7:08 click trains registered consistently forward of hyd array near a bearing of 20 degrees. Initial whistles noted between 7:10 and 7:11, corresponding with an increase in HF clicks trains at concurrent bearings between 20 and 120 degrees. Peak click event between 7:13 and 7:14, indicating movement from forward to aft, corresponded with peak LF whistle event that included 6+ successive upsweep whistle contours (10-14 kHz). Final detection in exclusion zone at 7:15, with final whistle event of 6+ successive downsweep whistle contours (10-16kHz) at 7:21. Attempted localization indicated the vocalizing dolphins as close as 130 meters from the source. PSOs on visual watch were unable to locate dolphins. Seas of 2-2.5 meters and numerous whitecaps made visual detection more difficult.	0:16
11/2/2017	13:23		Partly Cloudy	SE	3	10	41 11.4	70 58.2	355		Dolphin spp.	120	1600	10	Porpoising, leaping	All HRG equipment active	Sighted dolphins off starboard bow, approx 1600m ahead of vessel. Appeared to be moving in variable direction at first, then porpoised further to starboard, approx 800-1000m from the bow at 13:27. Closest approach was approx 575-600m from the sound source at 13:30. The pod then turned again and began porpoising back to port and ahead of the ship, then began travelling the same direction of the ship, directly off the bow (approx 1000m) at 13:32. Lost sight of the dolphins at 13:33, approx 1500m ahead of the vessel and moving further away. Depth data unavailable. Unable to determine # adult/juvenile/calf, or determine exact species due to distance from vessel.	0:10

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
11/2/2017	17:13	125	Partly Cloudy	SE	4	10	41 05.7	70 58.0	356		Dolphin, Short-beaked Common	25	425	2	Porpoising, bowriding	All HRG equipment active	2 Dolphins sighted 425 meters off vessels starboard side approaching the vessel (distance estimated using reticled binoculars). PSO called for a powerdown immediately. Dolphins approached the vessel at 17:14 and circled the bow, sometimes bow riding from 17:14-17:17 within 5m of the hull, then swam away from the vessel (off the port stern) and moved outside of the EZ at 17:20. At 17:27 (after vessel had turned around), 3 dolphins were sighted (T. Horwell) 800m ahead of the vessel off the port bow, bearing 215. The dolphins porpoised across the bow (port to starboard, 150m ahead of the vessel) and continued travelling the opposite direction of the vessel at high speed. They showed no interest in the vessel during this second approach, and came no closer than 200m to the sound source. Quickly lost sight of them off the port stern, approximately 300m from the source.	0:17
11/2/2017	18:20	134	Partly Cloudy	SE	4	10	41 03.7	70 58.5		758	Dolphin, Short-beaked Common	72	500	6		HRG powered down	Two LF up-sweeping whistles were observed at 18:20 along with a one second HF click train observed at 72 degrees. This was followed by multiple HF click trains lasting between a half and 5 seconds with bearings from 0 to 158 degrees. The HF click trains stopped at 18:38 and return at 18:42 and at 18:44; though intermittent, begore becoming more abundant at 18:50. A single sinusoidal LF whistle was observed, though inaudible and barely highlighted, at 18:55 and marked the end of the LF part of the detection. The HF click trains ended at 19:05 and marked the end of the detection. Peak HF activity occurred at 18:30, and from 18:54 to 18:57; depicting at least 6 dolphins vocalizing. Localization calculated the dolphins as close as 130m to the CoS at 18:21. This detection resulted in a continuation of a power-down. Visual confirmation of a 10min voluntary approach allowed for soft start at 18:32.	0:45
11/2/2017	18:21	123	Partly Cloudy	SE	4	10	41 03.0	70 58.2	357	758	Dolphin, Short-beaked Common	45	10	3	Porpoising, bowriding, milling	Sparker reduced to minimum output (100 joules). All other HRG equipment powered off.	PSO unable to locate dolphins on thermal cameras following PAM detection of dolphins within the EZ. At 18:20 PSO began search of perimeter of the vessel using night vision. At 18:21, PSO sighted approximately 3 Common Dolphins bowriding, porpoising, and milling at 45 degrees off the starboard bow, at approximately 10 meters distance. Dolphins would bowride parallel to the vessel and then travel towards the stern, stopping mid-ship on the starboard side to dive and return bowriding. PSO observed the dolphins continue this behavior until returning to thermal camera station at 18:32. PSO authorized ramp up based on 10 min observed behavior after power down (voluntary approach to bow ride), in accordance with IHA. Dolphins were still bow riding at time of last visual sighting (upon return to the thermal camera station).	0:11
11/2/2017	19:00	121	Partly Cloudy	SE	4	10	41 04.6	70 58.1	358	758	Dolphin spp.	180	120	5	Porpoising, trailing gear, variable porpoising	Full power	4-6 dolphins sighted 120 meters from source, on the aft thermal camera (#3) from 19:00-19:06. They were porpoising, milling and swimming behind the vessel, trailing the gear. No mitigation required: Less than 60 minutes since last visual sighting (#357)/PAM detection (#758) within the EZ, following ramp up at 18:32, based on observed voluntary approach behavior to bow ride (18:21-18:32. Visual sighting # 357).	0:06
11/3/2017	0:48	118	Fog or Thick Haze	SE	3	0.5	41 05.5	70 56.2		759	Dolphin spp.	70	700	8		All HRG active	AD759: Initial MF clicks indicated forward of hydrophone array near a bearing of 70 degrees. Initial localization in exclusion zone at 00:51. Peak HF click event at 00:59, indicating movement from forward to aft of hydrophone array. Click trains registered predominantly aft until final detection at 1:04. Attempted localization indicated the vocalizing dolphins as close as 160 meters from the source. Dolphins were not sighted on thermal cameras. Thick fog was present throughout the PAM detection, making visual detection (using thermal camera or night vision) difficult.	0:16
11/3/2017	1:33	130	Fog or Thick Haze	SSW	3	0.2	41 02.7	70 56.1		760	Dolphin spp.	72	500	6		HRG powered down	A half second HF click train was observed at 72 degrees at 01:33 and was followed by multiple HF click trains lasting between a half and five seconds with bearings from 33 to 159 degrees, though, the majority of the HF activity occurred from 55 to 115 degrees. The HF part of the detection ended at 02:06 with a one second HF click train at 68 degrees. Two LF whistles were observed at 01:35, consisting of a constant and down-sweeping whistle, followed by burst pulses and another constant whistle at 01:37. The detection ended at 02:08 with two sinusoidal and one up-sweeping whistle. Peak HF activity occurred from 01:36 to 01:40 depicting at least 6 dolphins vocalizing. Localization calculated the dolphins as close as 113m to the CoS at 01:36. This detection resulted in a continuation of a power-down. Dolphins were not sighted on thermal cameras. PSO searched perimeter of the vessel using night vision (01:14-01:22/01:55-02:04) when PAM detection indicated possible close approach, but was unable to locate dolphins. Thick fog was present throughout the PAM detection, making visual detection (using thermal camera or night vision) difficult.	0:35

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
11/3/2017	2:27	122	Fog or Thick Haze	SSW	3	0.2	41 05.0	70 55.5		761	Dolphin spp.	22	500	8		HRG powered down	A half second click train was observed at 22 degrees followed by multiple HF click trains lasting between one and 16 seconds with bearings from 0 to 180 degrees with the majority of the HF activity taking place between 18-59 degrees. The HF click trains stopped at 02:35 and returned at 02:46 and became intermittent from 02:54 to 03:06 where the click trains became more abundant until 03:16 and then ending at 03:22. The HF click trains returned at 03:26 and became more abundant at 03:30 and at 03:43 before becoming intermittent again and ending at 04:04. A single up-sweeping LF whistles was observed at 02:51 with multiple LF whistles observed from 03:59 to 03:02 before becoming intermittent until 03:40 where the whistles were abundant until 03:43 and ending at 03:44. The LF whistles returned at 03:55 and were abundant from 03:48 until 04:00 before marking the end of the detection at 04:08. Peak HF activity occurred at 02:31 and from 03:11 to 03:13, depicting at least 8 dolphins vocalizing, and peak LF activity occurred from 02:59 to 03:02. Localization calculated the dolphins as close as 100m to the CoS at 02:50. This detection resulted in a continuation of a power-down. PSO searched perimeter of the vessel using night vision (02:31-02:40) when PAM detection indicated possible close approach, but was unable to locate dolphins. Thick fog was present throughout the PAM detection, making visual detection (using thermal camera or night vision) difficult.	1:41
11/3/2017	4:45	131	Fog or Thick Haze	SSW	3	0.2	41 03.2	70 54.9		762	Dolphin spp.	45	500	8		HRG powered down	AD762: Initial LF up-sweep and convex whistle contours at 4:45, with initial click trains indicated at 4:46 forward of hyd array at a bearing of 45 degrees. At 4:47 eight up-sweeping contours indicated. Peak HF click event at 4:59, indicating movement from forward to aft of hyd array. From 5:15 whistles and HF click events registered intermittently (predominantly aft of hyd array between 80 and 120 degrees) until peak whistle event at 5:52 and a peak HF click event at 6:13. Final LF burst pulse noted at 6:21 and final detection in exclusion zone at 6:31. Attempted localization indicated the vocalizing dolphins as close as 139 meters from the source. Dolphins were not sighted by PSO on thermal cameras. PSO also searched perimeter of the vessel using night vision but was unable to locate dolphins. Thick fog was present throughout the PAM detection, making visual detection (using thermal camera or night vision) difficult.	1:46
11/3/2017	6:49	120	Fog or Thick Haze	SSW	3	0.3	41 02.2	70 55.3		763	Dolphin, Short-beaked Common	65	500	6		HRG powered down	AD763: Initial click trains indicated at 6:49, forward of hyd array near a bearing of 65 degrees. Initial whistles indicated at 7:01, while clicks were indicated predominantly near a bearing of 20 degrees. Peak click event at 7:07, with indication of movement from forward to aft of hyd array. From 7:16 click events were noted intermittently, predominantly forward of hyd array. Peak HF click event from 7:44 to 7:45, indicating movement from forward to aft of hyd array. Final whistles noted at 7:45 and final detection in exclusion zone at 7:46. Attempted localization indicated the vocalizing dolphins as close as 127 meters from the source. PSOs on visual watch sighted dolphins at 07:03, and were able to authorize ramp up based on 10 minutes observed behavior: voluntary approach to chase towed equipment.	0:57
11/3/2017	7:03	131	Fog or Thick Haze	SSW	3	10	41 02.6	70 55.3	359	763	Dolphin, Short-beaked Common	142	20	10	porpoising, chasing equipment	power down	Dolphins were spotted at 07:03 chasing towed survey equipment, porpoising and swimming along side the vessel on both port and starboard. PSOs able to observe this behavior from 07:03-07:13. PSO authorized ramp up based on 10 min observed behavior after power down (voluntary approach to chase towed equipment), in accordance with IHA. Dolphins were seen again from 07:36-07:44 chasing equipment and swimming along side the starboard side of the vessel toward the stern.	0:41
11/3/2017	19:16	112	Partly Cloudy	S	4	6	41 07.6	71 06.5		764	Dolphin spp.	71	500	1		All HRG active	A 4s HF click train was observed at 71 degrees veering to 73 degrees at 19:16. This was followed by a one second HF click train at a bearing of 104 degrees which marked the end of the detection at 19:17. Localization calculated the dolphins as close as 185m to the CoS at 19:16. This detection resulted in a power down. PSO unable to locate dolphins on thermal cameras following PAM detection of dolphins within the EZ. From 19:20-19:35 PSO searched perimeter of the vessel using night vision. PSO unable to locate dolphins. Seas 3-4 feet with numerous whitecaps. PAM detection lasted less than one minute	0:01
11/3/2017	21:41	135	Partly Cloudy	W	4	10	41 07.4	71 08.5		765	Dolphin spp.	44	500	4		All HRG active		0:12
11/3/2017	22:17	120	Partly cloudy	W	5	10	41 06.4	71 09.6		766	Dolphin spp.	80	500	2		HRG powered down	AD766: Initial MF click trains indicated just ahead of hyd array near bearing of 80 degrees. By 22:19 HF click trains indicated aft of hyd array near 100d. Final HF clicks near 120 degrees at 22:21. Attempted localization indicated the vocalizing dolphins as close as 239 meters from the source. Dolphins not sighted on thermal cameras. Increasing sea state and # of whitecaps made detection more difficult. PAM detection was likely too far behind vessel to see on cameras due to sea state.	0:04
11/4/2017	0:12	128	partly cloudy	N	5	10	41 08.8	71 09.1		767	Dolphin spp.	80	500	4		All HRG active	AD767: Initial MF click trains indicated at 00:12 just ahead of hyd array near bearing of 80 degrees. HF click trains indicated by 00:14 aft of hyd array near 100 degrees. Peak HF click event at 00:18 indicated between bearings of 60 and 90 degrees. Final HF clicks at 00:29 indicated forward of hyd array between bearings of 20 and 50 degrees. Attempted localization indicated the vocalizing dolphins as close as 227 meters from the source. Dolphins were not seen on thermal cameras. Current sea state is affecting visibility. 25 kt winds, 5 - 7 ft seas with many whitecaps made visual detection more difficult.	0:17

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
11/4/2017	1:07	135	partly cloudy	N	5	10	41 09.4	71 09.6		768	Dolphin spp.	45	500	4		HRG powered down	AD768: Initial HF click trains registered at 1:07, indicating the dolphins ahead of hyd array near bearing of 45 degrees. Click trains registered consistently and ahead of hyd array until 1:11. Thereafter, click trains registered intermittently, predominantly astern. Final HF clicks at 1:18 indicated aft of hyd array at a bearing of 110 degrees. Attempted localization indicated the vocalizing dolphins as close as 71 meters from the source.	0:11
11/4/2017	1:41	135	Partly Cloudy	N	6	10	41 07.8	71 09.5		769	Dolphin spp.	44	500	5		HRG powered down		0:51
11/4/2017	3:32	140	Partly Cloudy	N	6	10	41 09.5	71 10.0		770	Dolphin spp.	79	500	2		HRG powered down	A half second click train was observed at 79 degrees followed by multiple HF click trains lasting between a half second and three and a half seconds seconds with bearings from 74 to 106 degrees. The HF click trains ended at 03:37 with a half second click train at 106 degrees marking the end of the detection. Localization calculated the dolphins as close as 110m to the CoS at 03:34. This detection resulted in a continuation of a power-down. Dolphins were not sighted on thermal cameras following PAM detection. PSO searched perimeter of vessel using night vision but was unable to locate dolphins. Current sea state is effecting visibility. 25 kt winds, 5-7 ft seas with many whitecaps made visual detection more difficult.	0:05
11/4/2017	4:22	130	Partly Cloudy	N	6	10	41 06.7	71 09.5		771	Dolphin spp.	70	500	4		HRG powered down	AD771: Initial MF click trains registered at 4:22, indicating the dolphins ahead of hyd array near bearing of 70 degrees. HF click trains indicated by 4:23 between 70 and 90degrees. Peak HF click event at 4:28 indicated movement from forward to aft of hyd array. After 4:45 click trains predominantly registered intermittently and aft of hyd array, with final clicks registered at 5:32. Attempted localization indicated the vocalizing dolphins as close as 67 meters from the source. PSO unable to locate dolphins on thermal cameras following PAM detection of dolphins within the EZ. From 5:20-5:35 PSO searched perimeter of the vessel using night vision, but was unable to locate dolphins. Seas 5-6 feet with numerous whitecaps made visual detection difficult.	1:10
11/4/2017	6:05	128	Partly Cloudy	N	6	10	41 08.0	71 09.4		772	Dolphin spp.	110	500	3		HRG powered down	AD772: MF and HF click train indicated between 6:05 and 6:10, aft of hydrophone array between bearings of 110 and 140 degrees. Attempted localization indicated the vocalizing dolphins as close as 355 meters from the source. No dolphin sightings by PSO on thermal cameras. From 6:10-6:20 PSO searched perimeter of the vessel using night vision, but was unable to locate dolphins. Seas 4-5 feet with numerous whitecaps made visual detection difficult.	0:05
11/4/2017	20:41	113	Partly Cloudy	NE	4	10	41 09.6	70 59.5		774	Dolphin, Short-beaked Common	71	500	3		All HRG active	A half second HF click train was observed at 20:41 at a bearing of 71 degrees and was followed by multiple HF click trains lasting between a half and 6 seconds with bearings from 18 to 142 degrees though the majority of the detection was observed between 20 and 70 degrees. Peak HF activity occurred at 20:46; depicting at least 3 dolphins vocalizing. The HF click trains became intermittent at 20:47 before booming more abundant from 21:04 to 21:06. Multiple LF whistles were observed from 21:06 to 21:07. The detection ended at 21:11 with a two second HF click train at a bearing of 113 degrees. Localization calculated the dolphins as close as 52m to the CoS at 20:44. Visual sighting by PSO (# 361, 20:47-20:59) allowed for ramp up based on observed behavior (voluntary approach to bow ride/ chase towed equipment).	0:30
11/4/2017	20:47		Partly Cloudy	NE	4	10	41 09.2	70 59.1	361	774	Dolphin, Short-beaked Common	330	150	3	porpoising, chasing towed equipment, bow riding	All HRG equipment active	Following PAM detection and power down, sighted dolphins on aft thermal camera (#1) at 20:47, off starboard stern, porpoising directly towards vessel. Observed 2-3 dolphins briefly chasing the towed equipment (20:48-20:49), then lost sight of them on cameras. At 20:49, using night vision, sighted 3 Common Dolphins porpoising along the starboard side of vessel, within 5-10m of hull, toward the bow. The dolphins were observed bow riding on both sides of the vessel, occasionally turning and swimming back towards mid ship, then diving and swimming back to the bow and continuing to bow ride. This behavior continued, and PSO authorized ramp up at 20:48, based on 10 minutes observed behavior (voluntary approach to bow ride and chase towed equipment) in accordance with IHA. The dolphins were still bow riding at 20:48 when PSO returned to the thermal camera station. PAM detection of dolphins within the EZ continued until 21:11. Did not record water depth	0:12

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Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
11/4/2017	21:54	119	Partly Cloudy	NE	4	10	41 11.5	70 57.3		775	Dolphin spp.	24	500	5		Silent	AD775: Initial detection of HF click trains at 21:45 forward of hydrophone array near a bearing of 24 degrees. Click trains continued to register regularly near a bearing of 25 degrees until peak detection between 22:46 and 22:48, with and indication of movement from forward to aft of hydrophone array. Whistles were detected between 22:48 and 22:49, 10+ successive upsweep contours. Intermittent click train activity was noted thereafter, predominantly aft of hydrophone array. Final detection in exclusion zone at 22:54. Attempted localizations indicated the vocalizing dolphins as close as 76 meters from the source. Survey was not ready to ramp up until after 22:10 (over 50 minutes after operational shut down of all HRG equipment, and over 20 minutes since end of sparker testing). 60 minute EZ clearance required from time of last PAM detection/ visual detection within the EZ, regardless of any observed behavior. No additional thermal camera sightings following PAM detection (21:53-22:54). Increasing sea state/ # of whitecaps made visual detection more difficult. Still waiting for 60 min clearance of EZ (regardless of behavioral observation due to complete HRG equipment shut down).	1:00
11/4/2017	23:34	108	Partly Cloudy	E	5	10	41 11.4	70 59.1		776	Dolphin spp.	30	500	5		Silent	AD776: Initial detection of HF click trains at 23:34 forward of hydrophone array near a bearing of 30 degrees. Intermittent click trains register until 23:41, with click trains then registering regularly between bearings of 20 and 70 degrees. Peak click event at 23:48, with an indication of movement from forward to aft of hydrophone array; a sinusoidal whistle contour and burst pulse were also detected at 23:48. Final LF activity noted at 23:54 and final detection in exclusion zone at 00:15. Attempted localizations indicated the vocalizing dolphins as close as 114 meters from the source. No sightings by PSO using thermal cameras or night vision. Increased sea state made visual detection more difficult. Still waiting for 60 min clearance of EZ (regardless of behavioral observation due to complete HRG equipment shut down).	0:41
11/5/2017	0:34		Partly Cloudy	E	4	10	41 10.1	71 03.3		777	Dolphin spp.					Silent	AD777: Two convex whistle contours at 00:34, 8+ successive downsweep contours between 00:35 and 00:37, convex at 00:39, two constant (9kHz) at 00:42. No sightings on thermal cameras (detection not localized/ outside of the EZ)	0:08
11/5/2017	1:04		Partly Cloudy	E	4	10	41 10.6	71 10.6		778	Dolphin spp.	21	500	4		Silent	A one second HF click train was observed at 01:04 at a bearing of 44 degrees and was followed by multiple HF click trains lasting between a half and 8 seconds with bearings from 02 to 178 degrees though the majority of the detection was observed between 18 and 146 degrees. A single LF constant whistle was observed at 01:52 along with a sinusoidal whistle at 01:53. More LF whistles were detected after daylight savings time, though intermittent, until 03:35; marking the end of the LF part of the detection. HF click trains continued until after daylight savings time at 02:07 and returned at 02:18 and becoming intermittent at 02:47 before marking the end of the detection at 03:35. Peak HF activity occurred from 01:58 to 02:03, after daylight savings time; depicting at least 5 dolphins vocalizing. Peak LF activity occurred from 03:32 until 03:35. Localization calculated the dolphins as close as 60m to the CoS at 01:40. This detection resulted in a continuation of a delay of soft start. Water depth unavailable. Not sighted by PSOs using thermal cameras or night vision. Still waiting for 60 min clearance of EZ (regardless of behavioral observation due to complete HRG equipment shut down). ***PLEASE NOTE THAT DAYLIGHT SAVINGS TIME OCCURRED DURING THIS DETECTION: DETECTION LASTED 3HRS 31 MIN. END TIME OF 03:35 REFLECTS THE TIME CHANGE THAT OCCURRED AT 02:00***	2:31
11/5/2017	4:42	118	Partly Cloudy	E	4	10	41 11.8	70 58.8		779	Dolphin spp.	45	500	4		Ramp-up	AD779: Initial detection of HF click trains at 4:42 forward of hydrophone array near a bearing of 45 degrees. A burst pulse and intermittent click trains register near a bearing of 20 degrees until 4:59. Two convex whistle signatures are noted at 5:08 and HF click trains are again noted from 5:09 to final detection at 5:14. Attempted localizations indicated the vocalizing dolphins as close as 136 meters from the source. Not sighted by PSO on thermal cameras. PSO searched the perimeter of the vessel using night vision from 04:43-04:53 but was unable to locate dolphins. Sea state/ # of white caps made visual detection more difficult	0:32
11/5/2017	18:12	110	Drizzle	SE	5	10	41 09.1	71 02.4		780	Dolphin, Short-beaked Common	79	500	5		All HRG active	A half second HF click train was observed at 18:12 at a bearing of 79 degrees and was followed by multiple HF click trains lasting between a half and 18 seconds with bearings from 17 to 136 degrees. The HF click trains became sparse from 18:21 to 18:27 and 18:37 to 19:10 where they ceased until 19:17. Multiple LF whistles were observed from 18:32 to 18:33 and became intermittent before ending at 18:56. The detection ended at 19:22 with a one second HF click train observed at 93 degrees. Peak HF activity occurred at 18:20 and peak LF activity occurred from 18:32 to 18:33; depicting at least 5 dolphins vocalizing. Localization calculated the dolphins as close as 113m to the CoS at 18:17. This detection resulted in a power-down with visual confirmation of a 10 min voluntary approach leading to soft start at 18:34.	1:10

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
11/5/2017	18:20	108	Drizzle	SE	3	10	41 09.0	71 04.1	364	780	Dolphin, Short-beaked Common	270	10	5	porpoising, bowriding, milling	Power down	PSO unable to locate dolphins on thermal cameras following PAM detection of dolphins within the EZ. At 18:18 PSO began search of perimeter of the vessel using night vision. At 18:20 PSO detected Short-beaked common dolphins on the port side of vessel, approximately 10 meters from the sparker. Dolphins were seen milling parallel to the vessel, swimming in the same direction. Dolphins would swim to the bow to bow ride, then back alongside the vessel to mid-ship (port side) before returning to the bow. Dolphins continued/ repeated this behavior until PSO went inside at 18:33. PSO authorized ramp up at 18:33, based on 10 minutes observed behavior (voluntary approach to bow ride) in accordance with IHA.	0:13
11/5/2017	20:42	156	Rain	SE	3	10	41 09.0	71 10.9		781	Dolphin spp.	26		4		All HRG active	Multiple LF whistles were observed at 20:42 and were highlighted but inaudible and continued throughout the detection. A one second HF click train was observed at 26 degrees followed by multiple HF click trains lasting between a half and eight seconds with bearings from 00 to 137 degrees. The LF whistles ended along with a half second HF click train at 111 degrees marking the end of the detection at 20:58. Peak HF activity was observed at 20:55 and 20:58 with peak LF activity observed at 20:50 and 20:56. Localization calculated the dolphins as close as 158m to the CoS at 20:51. This detection resulted in a power-down [over 60 min since last dolphin detection within the EZ following ramp up @ 18:34, based on voluntary approach to bow ride]. No sightings by PSO on thermal cameras. PSO searched perimeter of vessel using night vision from 20:53-21:14, but was unable to locate dolphins. Brief period of heavy rain greatly reduced effectiveness of both thermal cameras and night vision.	0:16
11/5/2017	21:00	132	Showers	S	4	10	41 08.9	71 11.2		782	Dolphin spp.	20	500	4		HRG powered down	AD782: Initial detection of HF click trains at 21:00 forward of hydrophone array near a bearing of 20 degrees. Initial whistles, sinusoidal and constant contours, noted at 21:05. Peak click event at 21:09, with an indication of movement from forward to aft of hydrophone array; this is also final detection in exclusion zone. Final LF activity of 5+ successive downswEEP whistles at 21:10. Attempted localizations indicated the vocalizing dolphins as close as 169 meters from the source. Not sighted by PSO on thermal cameras. PSO searched the perimeter of the vessel using night vision from 21:05-21:15, but was unable to locate dolphins.	0:10
11/5/2017	22:21	124	Continuous layer of clouds	S	5	10	41 09.2	71 09.9		783	Dolphin spp.	25	500	4		Ramp-up	AD783: Brief detection from 22:21 to 22:34 with HF click trains predominantly indicated forward of hydrophone array between bearings of 15 and 80 degrees. Attempted localizations indicated the vocalizing dolphins as close as 61 meters from the source. Not sighted by PSO on thermal cameras. PSO searched the perimeter of the vessel using night vision from 22:24-22:41, but was unable to locate dolphins. Wind and sea state increasing, making visual detection more difficult.	0:13
11/5/2017	23:04	118	Continuous layer of clouds	S	5	10	41 08.9	71 05.8		784	Dolphin spp.	70	500	3		HRG powered down	AD784: Brief detection from 23:04 to 23:12 with HF click trains predominantly indicated between bearings of 70 and 110 degrees. Attempted localizations indicated the vocalizing dolphins as close as 239 meters from the source. Not sighted by PSO on thermal cameras. PSO searched perimeter of vessel using night vision (23:07-23:15), but was unable to locate dolphins. Increased wind/sea state made visual detection more difficult.	0:08
11/6/2017	0:33	110	Continuous layer of clouds	S	5	10	41 06.2	71 06.4		785	Dolphin spp.	100	500	2		All HRG active	A half second HF click train was observed at 00:33 at a bearing of 100 degrees and was followed by multiple HF click trains lasting between a half and two seconds with bearings from 100 to 115 degrees. The detection ended at 00:42 with a half second click train at 115 degrees. Localization calculated the dolphins as close as 168m to the CoS at 00:38. This detection resulted in a power-down. Dolphins were not seen on thermal cameras. PSO searched perimeter of vessel with night vision after detection, but was unable to locate dolphins. Strong winds/ sea state/ numerous white caps made visual detection more difficult.	0:09
11/6/2017	1:25	109	Continuous layer of clouds	S	5	10	41 03.6	71 03.4		786	Dolphin spp.	34	500	2		HRG powered down	A one second HF click train was observed at 01:25 at a bearing of 34 degrees and was followed by multiple HF click trains lasting between a half and 4 seconds with bearings from 18 to 138 degrees. The detection ended at 01:28 with a one second HF click train observed at 101 degrees. Localization calculated the dolphins as close as 88m to the CoS at 01:27. This detection resulted in a continuation of power-down. No sightings by PSO on thermal cameras. PAM detection was brief, and current sea state (25kts wind, 4-6 ft seas) made visual detection more difficult.	0:03

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
11/6/2017	2:00	136	Continuous layer of clouds	S	5	10	41 02.3	71 01.0		787	Dolphin spp.	101	500	5		HRG powered down	A one second HF click train was observed at 02:00 at a bearing of 101 degrees and was followed by multiple HF click trains lasting between a half and 12 seconds with bearings from 15 to 155 degrees though the majority of the detection was observed between 51 and 106 degrees. The HF click trains were observed until 02:38 and return at 02:46 before marking the end of the detection at 02:57 with a one second click train at 105 degrees. Multiple LF whistles were observed from 02:28 until 02:30. Peak HF activity occurred from 02:08 to 02:09 and from 02:28 to 02:31; depicting at least 5 dolphins vocalizing. Localization calculated the dolphins as close as 60m to the CoS at 02:20. This detection resulted in a continuation of power-down. No sightings by PSO on thermal cameras. PSO searched the perimeter of the vessel using night vision from 02:20-02:33 but was only able to locate dolphins for approximately one minute, and could not authorize ramp up. Current sea state (25kts wind, 4-6 ft seas) made visual detection more difficult	0:57
11/6/2017	2:23		Continuous layer of clouds	S	5	10	unk	unk	365		Dolphin spp.		40	1	porpoising	reduces power output	Following PAM detection, dolphins were not sighted on thermal cameras. PSO searched the perimeter of the vessel using night vision from 02:20-02:33, after acoustic detection indicated dolphins were close to the vessel (may have been bow riding). Briefly saw one dolphin porpoising on the port side and swimming alongside the vessel, mid-ship at 02:23. Visual sighting lasted less than one minute, and PSO was unable to observe 10 minutes behavior in attempt to authorize ramp up. 60 minute EZ clearance required from time of last PAM detection within the EZ (02:33).	0:00
11/6/2017	3:45	148	Fog or Thick Haze	S	5	1	41 03.5	71 00.3		788	Dolphin spp.	60	500	2		HRG powered down	AD788: Initial detection of HF click trains at 3:45 forward of hydrophone array near a bearing of 60 degrees, then noted intermittently near a bearing of 20 degrees. Initial whistles, downsweeping contours, noted at 3:54. Peak click event and burst pulse at 3:59, with downsweeping whistle contours noted at 4:00 and remaining click trains intermittent and aft of hydrophone array until final detection in exclusion zone at 4:06. Attempted localizations indicated the vocalizing dolphins as close as 69 meters from the source. PSO attempted to locate dolphins with night vision from 03:54-04:07, but was unsuccessful. Dolphins were not sighted on thermal cameras. Heavy winds and 4-6 ft seas made visual detection more difficult.	0:21
11/6/2017	4:35	141	Fog or Thick Haze	S	5	1	41 00.9	70 59.8		789	Dolphin spp.	100		2		HRG powered down	AD789: Mid-frequency click trains detected from 4:35 to 4:40 between bearings of 100 and 135 degrees, aft of the hydrophone array. Click trains were too brief for localization purposes. Due to the lack of registered higher frequency click content and the relatively low amplitude of clicks, the dolphins were not estimated to be within the 500 meter exclusion zone. Not sighted by PSO on thermal cameras, likely due to distance from vessel and current sea state.	0:05
11/6/2017	5:11	138	Continuous layer of clouds	SW	5	10	41 01.1	70 59.3		790	Dolphin spp.	42	500	2		Ramp-up	AD790: Initial detection of HF click trains at 5:11 indicated forward of hydrophone array near a bearing of 42 degrees, then noted predominantly near a bearing of 20 degrees. Peak click event at 5:15, with indication of movement from forward to aft of hydrophone array. Final detection in exclusion zone at 5:20. Attempted localizations indicated the vocalizing dolphins as close as 117 meters from the source. PSO unable to locate dolphins on thermal cameras following PAM detection of dolphins within the EZ. PSO searched the perimeter of the vessel using night vision from 5:15-5:36, but was unable to locate dolphins. Sea state (4-5 feet with numerous whitecaps) made visual detection more difficult.	0:09
11/6/2017	6:37	139	Continuous layer of clouds	SW	5	10	41 02.0	71 01.2	366		Dolphin, Short-beaked Common		100	15	porpoising, bow riding	ramp up	A group of 15 dolphins were seen traveling toward the vessel off the port bow and started bow riding on both port and starboard at 06:37. Lost sight of them at 06:43 after the vessel made a turn. Dolphins were briefly seen again, bow riding on the port side, at 06:59. Last sighted at 07:01, travelling along the starboard side of the vessel near midship. Ramp up was not yet complete at time of initial sighting/ power down (not an incidental take). Unable to observe 10 minutes voluntary approach behavior, and could not authorize ramp up until EZ clear for 60 minutes.	0:24
11/6/2017	12:56		Continuous layer of clouds	SW	5	10	41 03.8	70 59.3	368		Dolphin, Short-beaked Common	60	500	30	porpoising, bow riding, chasing towed equipment, leaping, circling/swimming alongside vessel	Power down	Following power down, a larger pod of dolphins was sighted off the port bow, and porpoised directly towards the vessel, joining the group of dolphins from the previous sighting (# 367). Total # of individuals was estimated at 35 for the two groups combined, with several noticeably smaller juveniles. The pod stayed in close proximity to the vessel throughout the sighting (within 100m) and displayed various behaviors. Extensive bow riding (within a 3-5m of the hull) and chasing the towed equipment (within 10-20m of the sparker) were observed throughout the sighting, as well as circling/ swimming alongside the vessel, leaping, and at times briefly milling up to 100m away from the vessel before returning. This behavior continued, and the last remaining dolphins were sighted bow riding near the bow (port side) before diving out of sight at 13:32, after completion of ramp up. The number of dolphins visible near the vessel gradually decreased after 13:20. PSO authorized ramp up at 13:06, after 10 minutes observed voluntary approach behavior (bow riding & chasing towed equipment) following power down, in accordance with IHA. Depth data unavailable.	0:36

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Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
11/6/2017	18:03	123	Continuous layer of clouds	SW	5	10	41 09.2	71 09.2		792	Dolphin spp.			5		HRG powered down	Multiple LF down-sweeping whistles were observed from 18:03 to 18:04 and were inaudible and barely highlighted. A one second HF click train was observed at 18:05 at a bearing of 76 degrees and was followed by multiple HF click trains lasting between a half and eight seconds with bearings from 00 to 180 degrees though the majority of the detection was observed between 22 and 137 degrees. The HF click trains were observed until 18:09 after which a LF down-sweeping whistle was observed at 18:17 followed by the return of HF click trains at 18:20 that were observed until 19:04. Multiple LF whistles were observed from 18:20 to 18:24 and from 18:39 to 19:35 after which the LF part of the detection ended with a LF up-sweeping whistle at 20:00. The HF click trains returned at 19:11 and continued until a three second click train at 85 degrees marked the end of the detection at 20:02. Peak HF activity occurred from 18:24 to 18:27 and from from 19:36 to 19:38, depicting at least 5 dolphins vocalizing; peak LF activity occurred from 18:20 to 18:24. Localization calculated the dolphins as close as 73m to the CoS at 18:44. This detection resulted in a continuation of power-down. PSO was unable to locate dolphins on thermal cameras following PAM detection of dolphins within the EZ. PSO searched the perimeter of the vessel using night vision from 18:08-18:34, but was unable to detect dolphins. At 18:44, PSO located dolphins bow riding, and authorized ramp up at 18:56 based on observed behavior (10 min voluntary approach to bow ride).	1:59
11/6/2017	18:44	129	Continuous layer of clouds	SW	5	10	41 08.1	71 08.9	369	792	Dolphin spp.	0	10	2	Porpoising, milling, bowriding	Power down	PSO unable to locate dolphins on thermal cameras following PAM detection of dolphins within the EZ. At 18:37 PSO began search of perimeter of the vessel using night vision. At 18:44 PSO detected Short-beaked common dolphins approx 10m off the port bow of vessel. Dolphins were observed swimming alongside the vessel to the bow, bow riding, then swimming back to mid-ship on the port-side of the vessel, before returning to bow ride. This behavior continued, and PSO returned to the survey room/thermal camera station to authorize ramp up at 18:56, based on 10 minutes observed behavior (voluntary approach to bow ride) in accordance with IHA.	0:12
11/6/2017	21:00	123	Continuous layer of clouds	W	5	10	41 05.1	71 14.2		793	Dolphin spp.	82	500	5		Chirp, Sidescan Sonar, Multibeam Sounder active	AD793: Initial detection of HF click trains at 5:11 indicated just forward of hydrophone array near a bearing of 80 degrees, then noted predominantly aft of hydrophone array. Initial whistle, upsweep contour, noted at 21:21. Ramp-up at 21:58 corresponded with peak LF event of 5+ successive sinusoidal whistles. A burst pulse as well as successive sinusoidal and upsweep whistles noted between 22:05 and 22:06. Peak click events between 22:07 and 22:11 with initial indication of movement from forward to aft of hydrophone array, then movement from aft to forward of hydrophone array. Following a third peak click event at 22:19, aft of hydrophone array there was a break in HF click trains detection at 22:22. HF clicks were again noted at 22:33, two minutes after the vessel reached full power. Final detection in exclusion zone at 22:39. Attempted localizations indicated the vocalizing dolphins as close as 101 meters from the source. No mitigation required- Less than 60 minutes since last PAM detection within the EZ (20:02 AD # 792), following ramp up based on observed voluntary approach to bow ride (Visual sighting #369, 18:44-18:56). Not sighted by PSO using thermal cameras or after attempt with night vision. Sea state (4-6 ft, 25kts wind) made visual detection more difficult.	1:39
11/6/2017	23:39	118	Continuous layer of clouds	NW	5	10	41 04.7	71 04.0		794	Dolphin spp.	110	500	4		All HRG active	AD794: Initial detection of HF click trains at 23:39 indicated just aft of hydrophone array near a bearing of 110 degrees, then noted predominantly forward of hydrophone array near a bearing of 20 degrees. Peak click event between 23:57 and 0:00, with indication of movement from forward to aft of hydrophone array. Final detection in exclusion zone at 0:12. Attempted localizations indicated the vocalizing dolphins as close as 120 meters from the source. No mitigation required- Less than 60 minutes since last PAM detection within the EZ (22:39 AD # 793), following ramp up based on observed voluntary approach to bow ride (Visual sighting #369, 18:44-18:56). Not sighted by PSO using thermal cameras or after attempt with night vision. Sea state (4-6 ft seas, 25 kts wind) made visual detection more difficult.	0:33
11/7/2017	3:26	120	Continuous layer of clouds	NW	5	10	41 05.2	71 05.4		795	Dolphin spp.	72	500	2		All HRG active	AD795: Brief detection from 3:26 to 3:31 with HF click trains predominantly indicated between bearings of 70 and 110 degrees. Attempted localizations indicated the vocalizing dolphins as close as 257 meters from the source. No sightings on thermal cameras. PSO went outside using night vision to search for dolphins near the vessel, but wasn't able to locate them. Detection lasted only 5 minutes. Sea state (4-6 ft seas, 25 kts wind) made visual detection more difficult.	0:05
11/7/2017	18:13	125	Continuous layer of clouds	NE	4	10	41 06.2	71 10.0		796	Dolphin spp.	21	500	2		All HRG active	A one second HF click train was observed at 18:13 at a bearing of 20 degrees and was followed by multiple HF click trains lasting between a one and four seconds with bearings from 18 to 163 degrees. The HF click trains were observed until 18:16 when a four second click train at 163 degrees marked the end of the detection. Localization calculated the dolphins as close as 149m to the CoS at 18:15. This detection resulted in a power-down. Dolphins were not sighted on thermal cameras by PSO. From 18:16-18:33 PSO searched the perimeter of the vessel using night vision, but was unable to locate dolphins. Seas 5-6 feet with numerous whitecaps made detection difficult.	0:03

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Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
11/7/2017	19:54	125	Continuous layer of clouds	NE	5	10	41 06.6	71 07.6		797	Dolphin spp.	22	500	2		All HRG active	A half second HF click train was observed at 19:54 at a bearing of 22 degrees and was followed by multiple HF click trains lasting between a half and 14 seconds with bearings from 22 to 164 degrees. The HF click trains ended at 19:57 and returned from 20:13 to 20:15 and from 20:33 until 20:48 when a half second HF click train at a bearing of 115 degrees marked the end of the detection. Two LF up-sweeping whistles were observed at 20:43 followed by a single LF constant whistle at 20:45. Peak HF activity occurred at 19:56; depicting at least 2 dolphins vocalizing. Localization calculated the dolphins as close as 120m to the CoS at 20:42. This detection resulted in a power-down	0:54
11/7/2017	20:59	120	Rain	NE	5	10	41 06.4	71 10.4		798	Dolphin spp.	47	500	2		HRG powered down	AD798: Brief detection from 20:59 to 21:03 with HF click trains predominantly indicated forward of hydrophone array between bearings of 30 and 90 degrees. Attempted localizations indicated the vocalizing dolphins as close as 182 meters from the source. PSO unable to locate dolphins on thermal cameras. Rain, wind 25 kts, seas 4-6 ft made visual detection more difficult.	0:04
11/7/2017	21:45	122	Rain	NE	5	10	41 06.5	71 10.5		799	Dolphin spp.	22	500	2		HRG powered down	AD799: Brief detection from 21:45 to 21:49 with HF click trains predominantly indicated between bearings of 15 and 30 degrees. Peak detection at 21:47 indicated movement from forward to aft. Attempted localizations indicated the vocalizing dolphins as close as 80 meters from the source. PSO unable to locate dolphins on thermal cameras. PAM detections intermittent and primarily 200-300m behind vessel. PSO searched perimeter of vessel using night vision from 21:46-21:58, but was unable to locate dolphins. Weather/ sea state (rain, wind 25-30 kts, seas 5-7 ft) made visual detection more difficult.	0:04
11/7/2017	22:12	125	Rain	NE	5	10	41 06.4	71 08.5		800	Dolphin, Short-beaked Common	45	500	2		HRG powered down	AD800: Initial detection of HF click trains at 22:12 forward of hydrophone array near a bearing of 45 degrees. By 22:20 concurrent click trains indicated forward and aft of hydrophone array, predominantly near bearings of 20 and 140 degrees. Initial whistles, concave and downsweeping contours, noted at 22:22. Burst pulses at 22:39 and 22:48. Peak click event and burst pulse at 3:59, with downsweeping whistle contours noted at 4:00 and remaining click trains intermittent and aft of hydrophone array until final detection in exclusion zone at 4:06. Attempted localizations indicated the vocalizing dolphins as close as 69 meters from the source. PSO searched perimeter of vessel using night vision, and sighted Short-beaked Common Dolphins bow riding (22:24-22:35), and authorized ramp up based on observed voluntary approach behavior.	1:42
11/7/2017	22:24		Rain	NE	5	10	41 06.3	71 07.5	371	800	Dolphin, Short-beaked Common		90	4	porpoising, bow riding	Power down	Dolphins were not sighted on thermal cameras. PSO began to search perimeter of vessel with night vision at 22:22 (PAM detection indicated possible close approach by dolphins). Sighted 3 dolphins at 22:24, porpoising towards the port bow (within 5m of hull). Dolphins were observed consistently bow riding, occasionally circling back towards mid ship before diving and returning to the bow. Also sighted them briefly porpoising approx 25m ahead of the bow before returning to within 5m of the hull. PSO authorized ramp up at 22:35, based on 10 minutes observed behavior (voluntary approach to bow ride) following power down, in accordance with IHA. Dolphins were still bow riding at time of last sighting (PSO returned to the survey room/ thermal camera station, and dolphins were not sighted on thermal cameras. Seas of 4-7 ft & 25kts wind made visual detection on cameras more difficult). Did not record water depth or bearing.	0:11
11/8/2017	0:07	118	Continuous layer of clouds	NE	6	10	41 08.8	71 04.4		801	Dolphin spp.	85	500	6		HRG powered down	A half second HF click train was observed at 00:07 at a bearing of 85 degrees and was followed by multiple HF click trains lasting between a half and 14 seconds with bearings from 17 to 147 degrees. Multiple LF whistles were observed from 00:22 until 00:31. The HF click trains became intermittent at 00:52 and ended at 00:57 with a one second HF click train at 85 degrees; marking the end of the detection. Peak HF activity occurred at 00:40 and from 00:47 to 00:51; depicting at least 6 dolphins vocalizing. Localization calculated the dolphins as close as 112m to the CoS at 00:18. No mitigation required, equipment already powered down due to weather. Dolphins were not sighted by PSO on thermal cameras. Sea state (30+ kts wind, seas 5-8 ft) made visual detection more difficult.	0:50
11/8/2017	2:56	115	Drizzle	NE	6	10	41 08.6	71 06.4		802	Dolphin spp.	70	500	2		HRG powered down	AD802: Brief detection from 2:56 to 3:40 with a mixture of MF and HF click trains indicated between bearings of 70 and 115 degrees. Attempted localizations indicated the vocalizing dolphins as close as 159 meters from the source. No mitigation required, HRG equipment already in powered down state for weather. Not sighted on thermal cameras/ night vision by PSO.	0:08

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
11/8/2017	20:43		Partly Cloudy	NE	5	10	41 08.7	71 12.1		803	Dolphin, Short-beaked Common	84	500	8		Silent	AD803: The detection spanned a 5+hour period, over 08 and 09 November, with no more than 2 minutes between detection of HF click trains from initial detection at 20:43 until 1:28. Initial click trains indicated just forward of hyd array, initial whistle at 20:55 and initial broadband burst pulse at 20:58. Whistles and burst pulses indicated sporadically throughout detection, with peak whistle event at 21:41 and peak burst pulse event at 23:25. Click trains registered consistently and concurrently throughout detection, predominantly near bearings of 20 and 110 degrees. Peak click events at between 21:45 and 23:45, both times indicated movement from forward to aft of hydrophone array. From 1:28 to 1:42 there was a break in detected HF click trains and from 1:42 to final detection in exclusion zone at 1:56, brief HF click trains were detected intermittently. Attempted localizations indicated the vocalizing dolphins as close as 70 meters from the source. Multiple sightings by PSO (night vision, thermal cameras) positively identified species as Short-beaked Common Dolphin. 60 minute EZ clearance required prior to ramp up, regardless of observed behavior bc gear was just deployed/had not been powered on prior to sighting.	5:13
11/8/2017	21:26		Partly Cloudy	NNE	5	10	41 07.5	71 11.9	372	803	Dolphin, Short-beaked Common	200	75	7	porpoising, bow riding	All HRG equipment powered off, waiting for EZ clearance	No sightings on thermal cameras following PAM detection. PSO searched perimeter of vessel using night vision 21:20-21:35. Sighted dolphins porpoising along the starboard side of the vessel near mid ship (approx 10-15m from hull) towards the bow. Observed dolphins bow riding then diving out of sight, possibly circling the vessel, then porpoising alongside the vessel again (both sides) towards the bow. This behavior repeated, and dolphins were still visible within 10m of the vessel when PSO returned to the thermal camera station. Estimated 6-8 individuals total. 60 min EZ clearance required regardless of observed behavior, as sighting/PAM detection occurred during pre-survey clearance, prior to initial ramp up. Depth data unavailable.	0:09
11/8/2017	23:26		Partly Cloudy	NE	5	10	41 08.0	71 12.7	373	803	Dolphin spp.	290	50	3	porpoising	All HRG equipment powered off	Briefly sighted dolphins off starboard stern on aft thermal camera (#1), porpoising towards stern of vessel. Water depth unavailable. Recording made.	0:01
11/9/2017	3:00		Partly Cloudy	NE	5	10	41 07.3	71 10.6		804	Dolphin spp.	45	500	3		Ramp-up	AD804: Brief detection from 3:00 to 3:04 of consistent HF click trains indicating movement from forward to aft of hydrophone array. Attempted localizations indicated the vocalizing dolphins as close as 100 meters from the source. Ramp up was not yet complete at time of power down/ detection. Dolphins were not sighted by PSOs on thermal cameras. Using night vision, PSO located dolphins bow riding /chasing towed equipment from 04:47-04:57, and authorized ramp up at that time, in accordance with IHA. Depth data unavailable.	0:04
11/9/2017	3:42	115	Partly Cloudy	NE	5	10	41 04.9	71 11.7		805	Dolphin, Short-beaked Common	65	500	7		HRG powered down	AD805: Initial detection of HF click trains at 3:42 forward of hydrophone array near a bearing of 65 degrees, then registered predominantly aft of hydrophone array until break in HF click train detections at 3:57. HF click trains again detected near bearing of 65 degrees at 4:16. Initial whistle, convex contour, noted at 4:22 and concurrent click trains registered between bearings of 30 and 110 degrees. Peak HF click event between 4:23 and 4:26, with indication of movement from forward to aft of hydrophone array, corresponded with peak LF whistle event of 8+ burst pulses and whistles. Final LF detection of 6+ burst pulses at 4:54 and final detection in in exclusion zone at 5:08. Attempted localizations indicated the vocalizing dolphins as close as 80 meters from the source. Dolphins were not sighted by PSOs on thermal cameras. Using night vision, PSO located dolphins bow riding /chasing towed equipment from 04:47-04:57, and authorized ramp up at that time, in accordance with IHA. Depth data unavailable.	1:26
11/9/2017	4:47		Partly Cloudy	NE	5	10	41 05.7	41 10.7	374	805	Dolphin, Short-beaked Common		25	7	porpoising, chasing towed equipment, bow riding	Power down	6 - 8 dolphins were observed chasing towed survey equipment, and bow riding from 04:47-04:57. PSO authorized ramp up after 10 minutes observed voluntary approach to bow ride and chase towed equipment by dolphins, in accordance with IHA. Dolphins had tall falcate dorsal fins and hourglass patterns on lateral side of bodies. Closest approach to vessel was approximately 5 meters (distance estimated with naked eye). Did not record water depth or bearing.	0:10
11/9/2017	5:58	120	Partly Cloudy	NE	5	10	41 06.5	71 09.1		806	Dolphin spp.	105	500	5		All HRG active	AD806: Initial detection of MF click trains at 5:58 indicated just aft of hydrophone array near a bearing of 105 degrees. Peak HF click event between 6:14 and 6:15, with indication of movement from forward to aft of hydrophone array, corresponded with peak LF whistle event of 6+ upsweep contours and a burst pulse. A second peak HF click event at 6:17 again indicated movement from forward to aft of hydrophone array. Final detection in in exclusion zone at 6:22. Attempted localizations indicated the vocalizing dolphins as close as 182 meters from the source. No mitigation required- less than 60 minutes since last PAM detection (AD805 @ 05:08) within the EZ, following ramp up authorized on observed voluntary approach of dolphins to bow ride/ chase towed equipment (Visual sighting 374, 04:47-04:57).	0:24

Attachment 3 - R/V Fugro Enterprise Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
11/9/2017	6:20	120	Partly Cloudy	NE	4	10	41 06.6	71 07.3	375	806	Dolphin, Short-beaked Common	0	10	2	porpoising, bow riding	All HRG equipment active	At 6:20, 2 Common dolphins were sighted 10 meters off starboard bow of the vessel, porpoising and bow riding. Dolphins would swim with the vessel towards the bow, then turn 90 degrees away from vessel and fall back towards mid-ship. Dolphins continued this bow riding behavior until 6:24, when they were last seen. No mitigation required- less than 60 minutes since last PAM detection (AD806 ongoing, beginning at 05:58) within the EZ, following ramp up authorized on observed voluntary approach of dolphins to bow ride/ chase towed equipment (Visual sighting 374, 04:47-04:57).	0:04
11/9/2017	17:02	116	Partly Cloudy	E	3	10	41 05.7	71 10.4		807	Dolphin spp.	69	500	7		All HRG active	A one second HF click train was observed at 17:02 at a bearing of 69 degrees and was followed by multiple HF click trains lasting between a half and 13 seconds with bearings from 17 to 151 degrees. Multiple sporadic LF whistles were observed at 17:28, 17:51, 18:02 to 18:03 and from 18:10 until 18:16. The HF click trains ended at 17:18 and returned at 17:24 ending again at 17:36 and returning at 17:50 until 18:21; marking the end of the detection with a two second HF click train at 106 degrees. Peak HF activity occurred at 18:01 and peak LF activity occurred at 18:10; depicting at least 6 dolphins vocalizing. Localization calculated the dolphins as close as 30m to the CoS at 17:26. This detection resulted in a power-down. PSO unable to locate dolphins on thermal cameras following PAM detection of dolphins within the EZ. From 18:02-18:15 PSO searched perimeter of the vessel using night vision, but was unable to locate dolphins.	1:19
11/9/2017	19:04	117	Partly Cloudy	E	3	10	41 05.5	71 09.1		808	Dolphin spp.	106	500	1		HRG powered down	A four second HF click train was observed at 19:04 at a bearing of 86 degrees and was followed by multiple HF click trains lasting between a half and 02 seconds with bearings from 86 to 110 degrees. The HF click trains ended at 19:05 marking the end of the detection with a half second HF click train at 110 degrees. This detection resulted in a continuation of power-down.	0:01
11/9/2017	19:27	115	Partly Cloudy	E	3	10	41 05.7	71 12.5		809	Dolphin spp.	87	500	4		HRG powered down	A half second HF click train was observed at 19:27 at a bearing of 87 degrees and was followed by multiple HF click trains lasting between a half and 14 seconds with bearings from 17 to 153 degrees. The HF click trains ended at 19:39 and returned at 19:44 until 20:17 and again at 20:33 before ending at 20:42 with a 20:51 four second HF click train at 107 degrees; marking the end of the detection. Multiple sporadic LF whistles were also observed throughout the detection though inaudible and barely highlighted. Peak HF activity occurred from 19:30-19:31; depicting at least 4 dolphins vocalizing. Localisation calculated the dolphins as close as 220m from the CoS at 19:33. This detection resulted in a continuation of power-down.	1:24
11/9/2017	21:45	118	Partly Cloudy	S	3	10	41 04.3	71 10.1		810	Dolphin, Short-beaked Common	65	500	8		HRG powered down	AD810: Initial detection of sinusoidal whistle contour at 21:45. HF click trains at 21:46 indicated forward of hydrophone array near a bearing of 20 degrees. Whistles and burst pulses detected prominently throughout detection, with peak LF of overlapping upswEEP, downswEEP and convex contours from 22:32 to 22:37. HF click trains detected between bearings of 0 and 160degrees. Peak HF click event from 22:37 to 22:38, with indication of movement from forward to aft of hydrophone array. Second peak HF click event from 23:36 to 23:38, again indicated movement from forward to aft of hydrophone array. Between 23:39 to 23:45 over 100+ successive sinusoidal contours indicated, while HF click detection ongoing near a bearing of 20 degrees. Dolphins still in exclusion zone at the end of acoustic watch at 23:47. Attempted localizations indicated the vocalizing dolphins as close as 63 meters from the source.	2:02

Attachment 4

R/V Harry Miller Sighting Summary

Attachment 4 - R/V Harry Miller Geophysical Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	How first detected?	Method of Detection	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (hrs)
7/26/2017	13:32	Partly Cloudy	NE	2	10	4059.8	7160.0	1	n/a	v	Naked Eye	Dolphin, Risso's	300	400	8	swimming at the surface	Holding position while PSOs clear area	1-2 animals sighted initially swimming at surface, 500m off the vessel bow, heading in a SE direction (toward vessel port side). One animal was seen to have jumped clear out of the water. The animals swam nearer to the vessel getting about 400m at the nearest point. More and more individuals materialized as they swam past the vessel and they lingered for a few minutes. The vessel decided to head closer to shore outside of the 500m range of the animals so that work could proceed. Animals disappeared from sight.	0:20
8/2/2017	6:50	Partly Cloudy	SW	3	10	4102.8	7152.4	1	n/a	v	Naked Eye	Dolphin spp.	90	600	6	Dolphin spp. Seen feeding at surface, some individuals showed quick movements with dorsal fin showing above the water. Behavior not synchronized, individuals moved in random directions.	Transit to work site at approximately 9 knts	Saw 5-7 Dolphin spp at a distance of approximately 600m as we were transiting to work site. Only dorsal fins and upper portions of torso were above water. Appeared to be feeding. Vessel traveling at 9 knots away from dolphins. Photos taken. Dolphins disappeared from sight.	0:05
8/3/2017	6:18	Partly Cloudy	SW	2	10	4050.0	7227.1	3	n/a	v	Naked Eye	Dolphin spp.	320	600	3	transiting	Steaming	3-5 dolphin spp. Seen on steam out to work site approximately 600 meters from the survey vessel. The survey vessel was traveling at 9.6 knots and the dolphins were swimming in the opposite direction. No successful photos were taken as the dolphins distance and the speed of the vessel made it difficult to capture a clear photo.	0:05
8/3/2017	6:53	Partly Cloudy	SW	2	10	4053.2	7219.2	4	n/a	v	Naked Eye	Whale, Humpback	115	650	1	transiting	Steaming	No dorsal fin was observed but dark body silhouette showed knuckles that were clearly visible separating it from a smooth backed whale. The whale was only seen once while the vessel was steaming at a speed of 8.4 knots towards the work site. No photos were taken as the whale was not seen after initial sighting.	0:01
8/3/2017	11:30	Partly Cloudy	SW	1	10	4055.7	7213.6	5	n/a	v	Naked Eye	Whale spp.	110	1000	1	transiting	Surveying	Saw a blow in the distance and part of the tail stock for only a few seconds. The whale was far off in the distance about 1000 meters while the vessel was surveying at 4.2 knots moving in the direction of the whale. The whale itself appeared to be swimming out towards deeper water rather than towards the vessel or parallel to the beach. No photos were taken due to how short the sighting was.	0:05
8/4/2017	7:50	Partly Cloudy	S	3	10	4052.2	7219.3	6	n/a	v	Naked Eye	Whale, Humpback	95	100	1	Diving	Steaming	Starboard side about 100 meters ahead of the vessel a humpback whale was seen diving. The vessel was traveling at 8.7 knots and we quickly passed the area of initial sighting so no pictures were taken. The whale was not seen again after we passed by.	0:05

Attachment 5

R/V Fugro Enterprise Take Summary

Attachment 5 - R/V Fugro Enterprise Take Summary



Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
7/19/2017	10:00		Clear	SSW	3	10	41 05.5	71 14.5	4		Dolphin, Short-beaked Common	45	20	30	traveling	survey line	shutdown dolphins approached, coming towards us from the south, the starboard side of the vessel. They swam around the vessel at times within 5 m of the hull/bow/towed equipment. Asked for shutdown when dolphins entered the exclusion zone. Dolphins did not appear to be in distress or exhibiting abnormal behavior as a result of the sound source. This was determined to be a voluntary approach based on the animals behavior, and clearance for ramp up was given 10 minutes after power down occurred.	unk
7/20/2017	18:05	145	Fog or Thick Haze	SW	3	2	41 03.0	71 22.6	15		Dolphin, Short-beaked Common	180	800	35	jumping, vessel attraction, attempted bow riding	in between lines		0:25
7/21/2017	5:09		Partly Cloudy	SW	3	10	40 58.4	71 47.1	17		Whale, Humpback	45	375	1	2 blows st 05:09, dive at 05:17 whale fluke was visible	running survey line	Spotted on camera #2 at 0509 (port side bow). Distinct(shorter, bushy) blow 450-300 m away. PSO requested 60 m in shut down and went up top to ID the whale. At 05:17 spotted again, visually on port side 320 m away. Whale dove, and whole fule was visible- had distinct white patches on both sides of fluke. Blow was last spotted at 0537, port side bow 400m. Ramp up began at 0637	1:28
7/21/2017	19:32	137	Partly Cloudy	SW	3	10	41 02.304	71 32.680	21	520	Dolphin, Short-beaked Common	60/90				survey line, sources active	PSOs call for power down at 20:02	1:02
7/21/2017	20:02	140	Partly Cloudy	SW	3	10	41 03.1	71 29.7	21	520	Dolphin, Short-beaked Common	155	150	6	traveling/porpoising, bow riding, leaping	mid survey line	First seen off Starboard bow traveling/porpoising directly toward bow of ship. Then circled the vessel/attempted to bow ride. Did not appear to be disturbed by the equipment or in distress. General vessel attraction. Swam within 1 meter of vessel and deployed equipment. Called for power down immediately upon sighting, power down complete 6 minutes later. Once powered down, dolphins continued the same behavior. milling around vessel and attempting to bow ride for over 10 minutes. Based on behaviour this was interpreted as a voluntary approach, and clearance for ramp up was given at 20:19. Sighting ended just before ramp up began.	0:18
7/26/2017	19:23	164	Partly Cloudy	SW	2	10	41 05.6	71 21.9	26		Dolphin, Short-beaked Common	250	267	12	porpoising, leaping, chasing towed equipment, vessel attraction	All HRG equipment powered on, transit to survey site	First sighted off port bow heading towards vessel, then sighted behind vessel, chasing towed equipment at close range. Swam within 1-2 meters of HRG equipment. Dolphins did not seem in distress or adversely affected by sound sources. Requested power down at 1925. Last sighted approx 1935 off port stern, approximately 1200 meters from vessel.	0:12
7/27/2017	1:01	120	Partly Cloudy	SW	2	10	41 03.2	71 30.2	27	531	Dolphin spp.	0-90/270-0	300			All HRG survey equipment powered on	whistles and clicks gradually increased, then animals spotted on thermal camera and powerdown requested.	4:13
7/27/2017	1:01	123	Partly Cloudy	SW	2	10	41 03.1	71 30.1	27	531	Dolphin spp.		250	5	transiting, porpoising, leaping. Saw porpoising/leaping across aft of vessel (port to starboard) at 250 m. Then swam in variable direction and eventually away from vessel. Did not seem in distress or bothered by sound source. Vessel attraction.	All HRG equipment powered on, preparing to start survey line	Bearing of vessel to animal unknown/not recorded. Dolphins sighted on aft thermal imaging camera (#1)	0:07
7/27/2017	9:10	101	Partly Cloudy	S	2	10	40 56.6	71 55.2	31		Whale, Humpback	260	267	1	Transiting, Blows, fluking/diving. Crossing perpendicular to vessel path in front of bow (starboard to port)	All HRG equipment powered on, mid survey line	PSO called for shutdown at 09:10. HRG equipment shutdown confirmed at 09:13. Last sighted at 09:16 seen over 500m from vessel (port/aft of vessel), dove exposing full fluke.	0:06

Attachment 5 - R/V Fugro Enterprise Take Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
7/29/2017	3:48	96	Continuous layer of clouds	SE	1	10	40 54.9	71 01.2	43		Whale spp.		131	1	Blows, breached 3 times	Survel line, chirp/sidescan sonar/multibeam sounder powered on	camera 3 and then a breach measured at 133m from the sound source off of the bow. The length of pectoral fins seemed to indicate that it was a humpback (may have been exaggerated on thermal imaging by water sliding off the fin), but a gunshot-like call was recorded on PAM after breach indicating that it may have been a right whale. A bright white spot on the body and possibly on tip of the rostrum could be callosities indicating NARW; Called for shut-down at 03:48, whale not seen since 03:48. Vessel turned to the port side after shut-down and neither PSO or PAM operator could not localise it.	0:00
7/29/2017	3:49	88	Continuous layer of clouds	SE	1	10	40 54.9	72 01.2		533	Whale, North Atlantic Right	253	100	1	blow, breach, gunshot	chirper+sonar+multi-beam	several blows seen on thermal camera no.3, followed by three breaches in succession, and a few seconds later a gun shot type sound heard on PAM	0:11
8/3/2017	11:09		Partly Cloudy		2	10	41 04.8	71 44.4	51		Sea Turtle spp.	250	50	1	Swimming under water, close to surface	Survey line. Chirp, sidescan sonar, magnetometer powered on	Sea turtle sighted off port side of vessel 3m from hull. Appeared brownish in color, definitely not a leatherback. Turtle was below the surface; Could not see head or scutes very well; Turtle was estimated to not be larger than 2 feet in length from head to posterior end of carapace; Last seen at 11:10 swimming parallel to vessel in opposite direction of vessel travel.	0:01
8/5/2017	2:22	92	Partly Cloudy	S	3	10	40 55.2	72 00.1	60	551	Dolphin spp.	203	200			power-down	source was powered down from previous dolphin detection so no mitigation action necessary this time, but reset ramp-up time to 03:49, entered zone again and reset ramp up time to 04:40	2:34
8/5/2017	2:51	96	Partly Cloudy	S	3	10	40 54.3	72 02.5	60	551	Dolphin spp.		200	3	Porpoising on port side of vessel. Traveling toward the stern and away from the vessel.	Survey line, sparker powered on	Saw 3 dolphins porpoising at 02:51 before they swam away from the vessel. Whistles and clicks detected on PAM starting at 02:22. Faint whistle on PAM until 03:03. Bearing of vessel to animal unknown.	0:00
8/5/2017	6:47	108	Partly Cloudy	S	3	10	40 54.1	72 04.7	63		Dolphin spp.	70	225	15	porpoising/splashing, swimming at surface, traveling toward stern, then away from vessel	Survey line, Sparker powered on	Dolphins sighted porpoising approximately 250 m away from stern and approaching closer. At 06:48 observed them traveling away from vessel, behind the vessel. Last sight of dolphins at 06:49.	0:02
8/7/2017	3:34	118	Partly Cloudy	W	3	10	41 04.5	71 10.6	67	562	Dolphin spp.	190	334	10	Milling	Survey line. Sparker, chirp, sidescan sonar and multibeam sounder powered on	Small delphinid species first seen on thermal camera 1 behind vessel (recording made but RADES crashed while doing so-file may be corrupted) at 3:34 at 334m, requested powerdown at 3:36 once animals were visually determined via thermal camera to be dolphins and distance was estimated from RADES; dolphins appeared to be milling about, neither approaching or swimming away from the survey vessel, last seen at 3:37. Visual detection coincided with PAM detection (03:18-03:53. PAM detection did not confirm animals inside the 500m mitigation zone until visually sighted at 03:34) of dolphin whistles/clicks. #Adult/Juvenile/Calf unknown	0:03

Attachment 5 - R/V Fugro Enterprise Take Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
8/7/2017	9:44	118					41 05.5	71 11.9	68		Whale spp.	230	400	1	traveling	Survey line. sparker, chirp, sidescan sonar, multibeam sounder powered on	Sighted whale crossing in front of vessel 350 m off bow, then closer (was less than 400m from sparker prior to equipment shut down) as vessel moved forward. Last sighted inside mitigation zone at 09:47. Surfaced 3 times in the 7 minute sighting. Did not see obvious blows. Last seen at 09:51 at about 1500m away. Most likely a Fin or Minke Whale based on observation, but could not make a definitive species ID.	0:07
8/7/2017	18:59	130	Drizzle	SSW	3	10	41 02.9	71 11.1	69		Whale, Humpback	225	275	1	blows, surfacing	Ramping up sparker. Chirp, sidescan sonar powered on	Whale first sighted swimming perpendicularly across the bow 200m in front of vessel (distance estimated using reticule binoculars); Saw two large, plume-like blows as whale surfaced. Probably a humpback whale based on body size and blow shape but not certain as we didn't get a good look at dorsal fin/dorsal area. Sighting brief (less than 1 minute). Vessel turned after shutdown was called for at 18:59 and whale was not seen again; Sparker was at 300 Joules prior to shutdown.	0:00
8/12/2017	12:56		Continuous layer of clouds	S	2	10	41 01.8	71 36.1	80		Sea Turtle, Loggerhead	190	100	1	surfacing, pectoral flipper slapping	Survey line. Chirp, Sidescan sonar, multibeam sounder powered on (Sparker was turned off prior to sighting)	Turtle first sighted approximately 80 m off port bow. PSO requested shutdown upon sighting at 12:56 (occurred immediately). Turtle surfaced, then turned sideways and slapped its right pectoral flipper several times, and moved along with the boat, then swam the opposite direction and away from the vessel. Lost sight of it briefly, then it resurfaced when behind the vessel, and was last seen approximately 275m off the port stern of vessel (13:01) Closest approach to vessel was approximately 30m (post shutdown).	0:05
8/14/2017	2:23		Partly Cloudy	WSW	2	10	40 52.3	72 11.2		576	Whale, Sperm	210/370	238	2		Survey line. Sparker, chirp, sidescan sonar and multibeam sounder powered on.	At 2:23 two click trains arose at bearings 21 and 37 and were tracked inside mitigation zone at 238 meters. Shut down was requested. Depth not recorded.	0:01
8/14/2017	13:31	92	Partly Cloudy	ENE	2	10	40 52.9	72 11.8	89		Sea Turtle, Loggerhead	126	20	1	swimming, diving	Survey line, sparker, chirp, sidescan sonar, multibeam sounder powered on	Juvenile turtle spotted swimming opposite the direction of the vessel at bearing 126 degrees. Turtle was brown in coloration. Turtle dove shortly after sighting, making additional ID characteristics difficult to spot.	0:02
8/20/2017	12:05	131	Clear	W	2	10	40 57.5	71 46.0	119		Whale, Humpback	300	400	1	transit, dive/fluke, blow	Survey line. Sparker, chirp, sidescan sonar, multibeam sounder powered on	Sighted whale 325 off starboard bow (approx 400m from sparker). PSO called for shutdown immediately. Sighted whale diving/fluking at 12:06, approximately 200m in front of vessel (shutdown occurred at this time) Whale was not sighted again. Humpback likely same whale sighted at 11:54.	0:01
8/21/2017	5:32	130	Partly Cloudy	SW	2	10	40 58.0	71 45.0	131		Dolphin spp.		300	5	porpoising, traveling toward vessel	Survey line. All HRG equipment powered on.	Sighted dolphins 300m from sound source on camera #3 (starboard side) and heading towards the bow of the vessel. Based on thermal camera sighting, they seemed to have traveled perpendicular to us and crossed in front of our bow (100 m off the bow) before swimming away. Called for shut down at 05:33. Went up to bridge right after shut down, but never saw them again with naked eye. Last PAM detection was at 05:41. Did not record bearing.	0:01

Attachment 5 - R/V Fugro Enterprise Take Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
8/21/2017	10:26	140	Clear	W	1	10	40 57.3	71 46.1	135		Whale, Minke	220	275	1	Surfaced twice in front of bow, no blows observed, did not fluke	Survey line. All HRG equipment powered on	Small baleen whale seen at 10:26 off the port side of the bow, crossing perpendicularly in front of the vessel at 200m towards the starboard side (estimated using reticule binoculars, estimated to be 275m from sound source); A small, dark body was observed with a dark, falcate dorsal fin about 2/3 of the way down the back; no blows seen; surfaced twice at 10:26 and not seen again	0:00
8/22/2017	11:40	125	Continuous layer of clouds	S	3	10			147		Whale, Minke	155	50	1	transit	Survey lines. All HRG equipment powered on.	Sighted off port side of vessel, mid ship. Very close. Distance was visual estimate, sighting was only 2-3 seconds, unable/too close to use binoculars/reticles. Only broke surface once, no blows sighted.	0:00
8/22/2017	13:44		Fog or Thick Haze	S	4	7	41 00.0	71 40.3	148		Dolphin, Short-beaked Common	85	400	3	porpoising, travelling towards bow of vessel	Survey line. All HRG equipment powered on.	Dolphins sighted off port side of vessel (mid ship) porpoising toward vessel. Then turned towards and traveled toward bow and across it. Did not see dolphins again after they reached the bow.	0:01
8/26/2017	8:22	148	Partly Cloudy	NW	2	10	41 01.9	71 26.2	181		Dolphin, Short-beaked Common	280	500	20	porpoising, bow riding, swimming with vessel	Survey lines (all HRG)	Dolphins sighted 500 m off starboard side. PSO requested powerdown once sighted. Dolphins were traveling towards vessel rapidly and were approx 320m from the sound source at time of power down (estimated using reticule binoculars). They remained in close proximity to the vessel, bow riding, porpoising, and crossing in front of the vessel consistently until 08:45. Dolphins moved away from vessel at 08:45, but remained inside the EZ until 08:55	0:33
8/26/2017	10:34	147	Partly Cloudy	NE	2	10	41 01.9	71 25.2	183		Whale, Humpback	275	115	1	diving, fluking, lunge feeding	Survey lines (all HRG)	At 10:34 one humpback surfaced at 115m off the bow (slightly to the starboard side) and crossed the bow; Shut down was called for at 10:34	0:20
8/28/2017	9:07	151	Clear	NE	4	10	41 01.2	71 33.8	217		Dolphin, Short-beaked Common	197	75	7	porpoising, swimming underneath vessel	Survey lines (All HRG equipment)	Tall/falcate/dark dorsal fin first seen 10 m off port bow (approx 75m from sound source) swimming under vessel at (distance estimated visually by PSO). PSO called for immediate powering down. A group of 6-8 dolphins were seen repeatedly swimming underneath mid-section of vessel. Time of last sighting within the exclusion zone and final sighting were at 09:12.	0:05
8/28/2017	13:07		Partly Cloudy	NE	4	10	41 02.1	71 31.0	224		Whale, Humpback		300	1	Transit, diving, fluking	Survey line. All HRG equipment active	Alerted of whale off stern by vessel crew. Whale sighted briefly off starboard stern, approx 300m from sparker. PSO requested shutdown. Sighted again at 13:14 off port stern, approx 500m from sound source (non-active), followed by several blows and a dive. Sighted again at 13:22, approx 750 m from sound source (non-active), bearing 200. Saw 3 broad bush shaped blows followed by a dive/fluke. Sighted again at 13:29 (last sighting in EZ), approx 425 m from sound source (non-active). Sighted again (blows/dive/fluke) at 13:37, approx 600m from sound source (non-active), directly behind vessel. At 13:41, whale surfaced off stern and blew several times, then dove approx 1000 m from sound source(non-active). Last sighted approx 1800m from sound source, off stern at 13:48. Bearing of initial sighting unknown. Did not record depth.	0:42

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Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
8/28/2017	17:41	147	Clear	ENE	5	10	41 01.9	71 26.7	228		Dolphin, Short-beaked Common		100	25	porpoising, bow riding	Survey lines (All HRG equipment)	Dolphins sighted off port bow, porpoising toward vessel. Then swam along portside of vessel to aft, chasing towed equipment. 17:44-17:46: Dolphins swam alongside vessel, 200-300m off port side, then crossed in front of vessel, 200m off bow, to the starboard side. At 17:47, Dolphins swam back to bow and began to bow ride, circle the vessel at close range (2-4 m from hull), and chase the towed equipment. This behavior continued, and PSO gave clearance for ramp up at 17:52. Dolphins continued to bow ride and chase equipment until 18:00, then remained within 300m of vessel until 18:10, last seen on the starboard side 300m from sound source, swimming in same direction as vessel heading. (T. Horwell briefly covering watch for C. Brooks at time of sighting). Bearing not recorded. # Adult/Juvenile/Calf unknown.	1:02
8/28/2017	19:35	151	Partly Cloudy	ENE	5	10	41 01.4	71 30.1	229	604	Dolphin, Short-beaked Common	46	150	9		All HRG active	Multiple LF faint whistles observed on the LF Spectrogram and slightly highlighted by the Whistle-Moan Detector at 19:35. This was followed by multiple HF click train lasting between a half and three seconds with bearings from 02 to 46 degrees. Triangulation calculated the pod approximately 150m from the center of the exclusion zone at 19:37. More abundant HF click trains were observed lasting between a half and five seconds at bearings from 03 to 82 degrees. LF whistles were observed throughout this time and were highlighted by the Whistle-Moan Detector until 19:38. The detection ended at 19:39 with one second click train at 33 degrees. This detection was correlated with a visual detection.	0:04
8/28/2017	19:35	132	Partly Cloudy	ENE	5	10	41 01.4	71 20.3	229	604	Dolphin, Short-beaked Common	80	125	8	Porpoising, attempted bow riding	Survey line. All HRG active	Dolphins sighted off port side of vessel, porpoising toward bow. PSO requested powerdown upon sighting. Dolphins attempted to bow ride for approximately 4 minutes, then left the area, and were not sighted again. # Adult/Juvenile/Calf unknown.	0:05
9/2/2017	15:34		Partly Cloudy	SSE	1	10	41 00.8	71 18.0	235		Dolphin, Short-beaked Common	72	50	5	porpoising	Operational shutdown, at time of sighting only chirp on	5-8 common dolphins seen at 15:34 swimming towards starboard side bow approx 50m from sound source; at time of incidental take, survey equipment was being shutdown and brought on board--only chirp was running at time of take and requested power down; survey crew said all equipment was being shutdown so no power down occurred; dolphins were last seen in EZ at 15:43. Depth data unavailable. # Adult/Juvenile/Calf not recorded.	0:09
9/4/2017	17:12		Clear	SW	5	10	41 01.9	71 18.1	241		Whale, Fin	168	50	1	transit, milling, apparent vessel attraction	Survey line. All HRG equipment active	Sighted whale (dorsal body/fin) approx 50 m off port side of vessel. PSO called for an immediate shut down. Whale swam in a circle around vessel (port to bow, bow to starboard, starboard to stern), and then held position near our stern, about 50 m from towed survey equipment. Blows were difficult to characterize or see because of strong winds. Depth data unavailable.	0:09

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Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
9/10/2017	12:57	118	Clear				41 06.7	71 10.7	251		Dolphin, Short-beaked Common		150	9	porpoising, chasing equipment, transit	Survey line. All HRG equipment active.	Dolphins sighted off bow, swimming port to starboard. Then porpoising opposite direction of vessel along the starboard side. Then swam behind/chased towed equipment for about 1 minute. Continued to follow the vessel at a greater distance. Dolphins approx 1600m off starboard stern at end of sighting. Last sighting in EZ at 13:00. Did not record bearing.	0:11
9/13/2017	23:02	121	Partly Cloudy	SW	4	10	41 03.8	71 11.5		627	Dolphin spp.	22	96	2		All HRG Active	Dolphins tracked to an initial range of 96 meters from the center of the source while the sparker was active	unk
9/14/2017	22:55	121	Continuous layer of clouds	SSW	3	10	41 03.4	71 08.2		638	Dolphin spp.	35	190	3		All HRG active	Dolphins were tracked within 190 meters of the CoS before a power down could be requested	unk
9/16/2017	7:11	118	Fog or Thick Haze	SSW	1	0.3	41 06.7	71 10.8	274	649	Dolphin spp.	31	500	4		Survey line. All HRG equipment active	At 07:11, a few faint whistles 10-22 kHz and a few HF clicks at a bearing of 31 degrees with amplitudes up to 144 dB were detected. At 07:12, PSOs called for a power down for dolphins detected off the bow of the vessel, and multiple HF click trains from 4-5 dolphins were detected between bearings of 20 and 50 degrees with amplitudes up to 171 dB. Approximately 20 seconds of LF clicks were observed on the spectrogram, and the HF click trains quickly trailed astern to a final bearing of 125 degrees, ending at 07:13. Last visual sighting of the dolphins occurred at 07:14. Due to how steeply and quickly the HF click trains trailed astern, the dolphins exact range and location could not be tracked with the PAM system.	0:02
9/16/2017	7:12	116	Fog or Thick Haze	SSW	1	0.03	41 06.5	71 10.8	274	649	Dolphin, Short-beaked Common	230	125	8	porpoising, transit, milling	Survey line. All HRG equipment active	Sighted dolphins off starboard stern. 4 approached vessel (1 mother calf pair visible), swimming towards the bow, then to the stern of the vessel, and quickly fell behind the vessel into the fog and were not seen again. The other 4 dolphins remained in the same area, approx 100m off the starboard side of vessel, and PSOs quickly lost sight of them due to fog. Last sighting in EZ at 07:14.	0:02
9/24/2017	22:11	154	Clear	NW	2	10	41 01.7	71 18.5	278	655	Dolphin, Short-beaked Common	60	500	12		All HRG active	Initial concurrent HF click trains registered between 60 and 120 degrees. Peak HF detection between 22:32 and 22:36, with a majority of click trains indicated parallel and aft of hydrophone array, between 80 and 110 degrees, and attempted localization indicating vocalizing dolphin(s) as close as 59m from the source. Peak LF detection from 22:29 to 22:33. Acoustic detection confirmed by visual detection	1:04
9/24/2017	22:14	143	Clear	NW	2	10	41 01.7	71 18.4	278	655	Dolphin, Short-beaked Common		300	12		All HRG active		1:01
10/4/2017	2:10	122	Clear	SSW	4	10	41 06.6	71 07.6		684	Dolphin spp.	25	500	4		All HRG active	A half second click train was observed at 83 degrees at 02:47 followed by multiple HF click trains, lasting between a half and 5 seconds, with bearings from 73 to 134 degrees and observed until 03:12, ending with a 1s click train at 105 degrees. LF whistles were observed at 03:05, 03:16, and from 03:31 to 03:51, marking the end of the detection. Peak dolphin activity occurred from 02:49 to 02:52. Localization calculated the dolphins as close as 169m to the CoS at 02:51. This detection resulted in a power-down.	0:27

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Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
10/8/2017	8:35	141	Partly Cloudy	SSW	5	10	41 14.6	71 06.0	290		Dolphin, Short-beaked Common	295	100	4	Porpoising, travelling	All HRG equipment active	Dolphins sighted 100 m off the starboard side of the vessel (distance estimated using reticled binoculars), porpoising and travelling towards vessel, until swimming underneath the vessel, and were not sighted again. PSO notified survey crew and immediately requested a power down flow power of HRG equipment. Closest approach to vessel was 5 m. Last sighting within the EZ at 08:36.	0:01
10/10/2017	21:14	115	Partly Cloudy	W	2	10	41 11.3	71 04.7	296	696	Dolphin, Short-beaked Common	26	500	4		All HRG active	A 1 second HF click train was observed at 26 degrees at 21:14 followed by multiple HF click trains, lasting between a half and 8 seconds, with bearings from 19 to 140 degrees. The HF click trains were detected until 21:25 and ended with a 2 second click train at 140 degrees. Peak dolphin activity occurred from 21:23 to 21:25. Localization calculated the dolphins as close as 124m to the CoS at 21:19. This detection resulted in a power down followed by visual confirmation of a voluntary 10min approach with ramp-up commencing at 21:29.	0:11
10/10/2017	21:15	115	Partly Cloudy	W	2	10	41 11.2	71 04.7	296	696	Dolphin, Short-beaked Common		150	4	porpoising, bow riding, swimming with vessel	All HRG equipment active	Dolphins sighted porpoising alongside vessel toward bow on port thermal camera (#2), approx 150m from sound source prior to power down (distance estimated with RADES software). Lost sight of dolphins on camera and went on deck with night vision. Confirmed 4 dolphins bow riding (within 5m of hull), alternating between port and starboard sides of the bow until 21:25. Sighted again at 21:27 on port side of vessel near mid ship, approx 75 m from sound source (5-10m from hull). 2 adults, each paired with one smaller dolphin (one very small: calf, one med sized: juvenile). The group stayed together, with the adults occasionally separating and the juvenile/calf staying directly next to their paired adult. Returned to survey room and authorized ramp up based on 10 minutes observed behavior (voluntary approach to bow ride) in accordance with IHA. Not sighted again on thermal cameras. Did not record bearing	0:12
10/11/2017	8:11	135	Clear	W	3	10	41 15.3	71 06.4	300		Dolphin, Short-beaked Common	190	450	5	porpoising, travelling toward vessel	All HRG equipment active	Sighted dolphins 450 m (from active source) off the port side bow, porpoising directly toward the vessel. PSO requested power down upon sighting. Dolphins were approx 200m from the sparker at time of power down. They approached the vessel on the port side and began bow riding at 08:12, then continued to bow ride and chase towed equipment until 08:29. PSO authorized ramp up after 10 minutes observed behavior (voluntary approach to bow ride and chase towed equipment) in accordance with IHA.	0:18

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10/11/2017	12:35	135	Continuous layer of clouds	NE	3	10	41 15.6	71 09.5	302		Dolphin, Short-beaked Common	45	300	30	porpoising, travelling	All HRG equipment running	Large pod of dolphins sighted 300 m off the starboard side of vessel (distance estimated using reticled binoculars). PSO requested a power down upon sighting (all animals were already within 150m of the active sound source at time of power down). Dolphins travelled towards and across the bow, crossing directly in front of the vessel within 5-10 m of the hull. Approx 4-5 dolphins remained with the vessel, and porpoised along the starboard side of the vessel, near mid-ship, until 12:38, then left the area. The rest of the pod continued porpoising at high speed away from the vessel (heading SE) after crossing the bow, and were last sighted within the EZ at 12:41. Last sighted outside of the EZ at 12:42.	0:07
10/11/2017	14:56		Partly Cloudy	NE	3	10	41 09.3	71 14.1	303		Dolphin, Short-beaked Common	125	100	2	swimming under surface	All HRG equipment	2 dolphins sighted less than 10 m off starboard bow (approx 100m from active source). Circled near the bow for approx 1 minute, then swam along starboard side of vessel to about mid ship and turned away from the vessel. PSO requested power down upon sighting, which occurred immediately. Dolphins did not break the surface of the water and PSO lost sight of them quickly after heading away from the vessel. Did not record depth.	0:02
10/13/2017	13:51		Partly Cloudy	E	5	10	41 01.4	71 17.1	308		Dolphin, Short-beaked Common	45	150	20	porpoising, leaping, bow riding, chasing towed equipment, swimming with/circling vessel	All HRG equipment active	Pod of dolphins sighted swimming under the surface, 150m from sound source (sparker at full power) off the starboard aft of vessel. They swam directly toward the bow and began to porpoise, leap and bow ride close to the hull. Continued to swim/porpoise with the vessel (as close as 3m from hull); bow riding, circling vessel, chasing towed equipment. At 14:10, approx half the group porpoised away from the vessel off the starboard side, and were sighted milling, porpoising and leaping until lost sight of them at 14:13, approx 500m from the source. The rest of the group continued bow riding and swimming alongside the vessel until 14:23. PSO authorized ramp up at 14:02, based on 10 minutes of observed behavior (voluntary approach to bow ride/chase towed equipment) in accordance with IHA. Last sighting within EZ at 14:23. Depth data unavailable	0:32
10/13/2017	15:33		Partly Cloudy	E	5	10	41 02.3	71 19.7	309		Dolphin, Short-beaked Common	290	100	2	Porpoising, bowriding	All HRG equipment running	2 Dolphins sighted travelling towards vessel, 100 m from source on the starboard side (distance estimated using reticled binoculars). Dolphins were seen bow riding from 15:33-15:55, then left the area and were seen again. PSO requested and received an immediate power down upon sighting. Depth data unavailable.	0:02

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Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
11/1/2017	20:54	116	Continuous layer of clouds	SE	4	10	41 10.2	71 02.2	354	751	Dolphin spp.	22	500	6		All HRG active	observed at 22 degrees at 20:54 and was followed by multiple HF click trains lasting between a half and 04 seconds with bearings from 0 to 164 degrees. A single concave LF whistle was observed at 21:16 that was inaudible and barely highlighted. A LF up-sweeping whistle was observed at 21:42 and at 21:45 marking the end of the LF part of the detection; these whistles were also inaudible and barely highlighted. The HF click trains ended at 20:56, returned at 21:12 to 21:17, at 21:36 to 21:39, and at 21: 43 to 21:46 when a half second click train at 104 degrees marked the end of the detection. Peak HF activity occurred at 21:14, and from 21:16 to 21:17; depicting at least 5 dolphins vocalizing. Localization calculated the dolphins as close as 105m to the CoS at 20:55. This detection resulted in a power-down. PSO sighted dolphins on thermal cameras from 20:54-20:56, but was unable to observe 10 minutes of behavior/ could not establish voluntary approach to bow ride or chase towed equipment. Dolphins were not sighted again on thermal cameras, or using night vision despite repeated	0:52
11/1/2017	20:54	116	Continuous layer of clouds	SE	4	10	41 10.2	71 02.2	354	751	Dolphin spp.	210	150	5	porpoising	All HRG equipment active	aft thermal camera (#1) suspected to be dolphins just prior to PAM detection of dolphins within the EZ. At 20:55, prior to power down, sighted dolphins porpoising across stern (port to starboard) and towards the vessel. Observed them briefly chasing the tail buoy, then dolphins continued to porpoise away from the vessel off the starboard side. Last sighted approx 200m from the sound source. Thermal camera recording made. PSO searched perimeter of vessel using night vision from 21:14-21:28, and again from 23:11-23:22 following an additional PAM detections (indicated close approach by dolphins), but was unable to locate them. Continued/additional PAM detections (post power down) were intermittent, and primarily behind the vessel (200-500m: did not indicate close approach). Unable to observe 10 minutes of behavior, and could not authorize ramp up (voluntary approach to bow ride/chase towed equipment could not be established in accordance with IHA), therefore 60 minute clearance of the EZ was required prior to ramp up (final PAM detection within EZ at 23:25, AD # 753).	0:02

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Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
11/4/2017	17:45	112	Partly Cloudy	NE	4	10	41 04.1	71 01.7	360	773	Dolphin, Short-beaked Common	38	500	5		HRG powered down	operator had been advised by the PSO of a visual sighting occurring at the time. Upon starting the PAM system at 17:45, a one second HF click train was observed with a bearing of 38 degrees and was followed by multiple HF click trains lasting between a half and 13 seconds with bearings from 0 to 148 degrees. The HF click trains continued throughout the detection until 18:27 when a half second click train at 124 degrees marked the end of the HF part of the detection. Multiple LF whistles were observed from 17:49 to 17:55 along with a LF down-sweeping whistle observed at 18:01. LF whistles returned at 18:08 until 18:10, after which, a concave whistle was observed at 18:28 and marked the end of the detection. Peak HF activity occurred from 18:06 to 18:08 and peak LF activity occurred at 18:08; depicting at least 5 dolphins vocalizing. Localization calculated the dolphins as close as 125m to the CoS at 17:46. This detection resulted in a visual power-down with a visual confirmation of 10min voluntary approach leading to commencing a soft start before the PAM operator started their shift.	0:43
11/4/2017	17:23		Partly Cloudy	NE	4	10	41 03.5	71 01.3	360	773	Dolphin, Short-beaked Common		35	8	porpoising, leaping, bow riding, chasing towed equipment	All HRG equipment active	Sighted dolphins approx 150m off starboard bow, porpoising directly toward bow. PSO requested power down immediately upon sighting. Following power down, dolphins approached starboard side of vessel (within 5-10m of hull) and were observed alternating between bow riding, circling the bow, and falling back to chase the towed equipment (within 10m of sound source). This behavior was continuous for over 10 minutes, and PSO authorized ramp up based on observed voluntary approach by dolphins to bow ride and chase the towed equipment, in accordance with IHA. Dolphins continued to bow ride during ramp up and after vessel was at full power (until last sighted at 18:10) with no noticeable change in behavior. (T. Horwell temporarily covering watch during sighting). Did not record bearing or water depth	0:47
11/5/2017	7:13	108	Partly Cloudy	NE	5	10	41 11.0	70 57.2	362		Dolphin, Short-beaked Common	125	50	5	bow riding, porpoising	All HRG equipment active	Saw 5 common dolphins bow riding on the port side. PSOs able to observe dolphins bow riding on both port and starboard from 07:13-07:28. Last time of sighting 07:28. PSO authorized ramp up based on 10+ minutes observed behavior (voluntary approach to bow ride), in accordance with IHA.	0:15

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Date Started MM/DD/YYYY	Time Started (24hr)	Depth (ft)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing of vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
11/5/2017	11:41		Partly Cloudy	NE	5	10	41 09.8	71 17.3	363		Dolphin, Short-beaked Common		200	18	porpoising, bow riding, chasing towed equipment, leaping	All HRG equipment active	bow (200m from sparker) porpoising directly towards bow. PSO requested power down immediately upon sighting. Dolphins circled bow (approx 100m from source at time of power down), then moved to the stern and were observed chasing the towed equipment (11:43-11:48). Dolphins then briefly swam away from the vessel (11:48-11:50), approx 300m off the port stern (stayed within the EZ). At 11:50, the pod began porpoising directly towards the port stern, and were within 50m of the source by 11:51, then moved back to the bow and began bow riding from 11:53-11:55, then moved to the stern to chase equipment (11:55-11:59), then swam back to the bow to bow ride (11:59- 12:03). From 12:04-12:06, the pod swam approximately 300m off the starboard side of the vessel, and were travelling in the same direction as the vessel (stayed within the EZ), then swam directly back to the vessel, and continued to chase the towed equipment (12:07-12:13), and moved away from the vessel at 12:14, sighted 250m off the port stern. Last sighted trailing vessel at 12:25, approximately 200-300m from	0:34
11/6/2017	12:54		Continuous layer of clouds	SW	5	10	41 04.0	70 59.3	367		Dolphin, Short-beaked Common	75	300	5	porpoising,	All HRG equipment active	Sighted 4-6 dolphins off starboard bow, porpoising directly towards vessel. PSO requested power down immediately upon sighting (animals were approx 100m from the sparker at the time of power down). Dolphins crossed the bow (port to starboard) and immediately began to bow ride, and swim alongside the vessel on the starboard side. Following power down, a larger pod of dolphins was sighted porpoising directly towards the vessel from the same direction (sighting # 368). Did not record water depth.	0:38
11/6/2017	17:21	125	Continuous layer of clouds	SW	5	10	41 09.0	71 10.6		791	Dolphin spp.	70	165	1		All HRG active	A single three second HF click train was observed at 17:21 at a bearing of 70 degrees. Localization (first and only click train detected) calculated the dolphin at 165m to the CoS at 17:21. This detection resulted in a power-down and an incidental take.	0:00
11/7/2017	11:32	121	Continuous layer of clouds	NE	4	10	41 05.4	71 03.1	370		Dolphin, Short-beaked Common	150	250	6	porpoising, bow riding	All HRG equipment active	Dolphins sighted off starboard side of vessel, porpoising directly towards bow. PSO requested power down upon sighting. Dolphins crossed the bow (starboard to port) and were briefly observed bow riding on the port side bow (within 5m of hull). At 11:34, the dolphins dove and were not seen again. Sighting lasted less than 3 minutes, unable to authorize ramp up based on observed behavior.	0:02

Attachment 6

R/V James Miller Sighting Summary

Attachment 6 - R/V James Miller Sighting Summary



Date Started MM/DD/YYYY	Time Started (24hr)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing from PSO vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
10/21/2017	7:11	Clear	NNW	2	10	40 59.4	72 59.9	1		Dolphin spp.	80	617	3	porpoising, milling	vibracore not running	Animals first observed as sun was rising, not able to identify to species due to glare. Animals were slowly surfacing, porpoising staying at continuous distance from vessels. Last observed at 300m from James Miller at 7:17. Distance estimated with reticle binoculars	0:06
10/21/2017	8:10	Clear	NNW	2	10	40 59.7	71 00.2	2		Whale, Humpback	220	933	3	blowing, breaching, feeding	vibracore not running	Animals first observed breaching, and blowing. Observed at intervals of 2-5min between breaching. No long dives observed with fluke exposed. Animals continued to mill and stay in area blowing and occasionally breaching until 9:16 maintaining distance from vessel. Closest approach at 8:18 at a distance of 700 m from Megan Miller. Distance estimated with reticle binoculars	1:06
10/21/2017	9:27	Clear	SW	2	10	40 00.0	72 00.1	3		Seal, Harbor	355	300	1	swimming at surface	vibracore not running	One harbor seal seen at 0927 at about 300m (estimated using reticle binoculars) swimming away from the R/V Megan Miller. Seal was only seen briefly at surface, swam about two body lengths and then dove; Seal was not seen again after diving.	0:00
10/21/2017	10:20	Clear	SE	1	10	40 59.9	72 00.2	4		Whale, Humpback	230	697	2	blowing, breaching	vibracore not running	Animals first observed blowing at 10:20, then breaching at 10:27. First observed about 297 m away from R/V James. Animals were moving parallel of R/V James and moving offshore away from R/V James and R/V Megyn	0:25
10/21/2017	11:50	Clear	S	1	10	41 00.1	71 59.8	5		Whale, Humpback	162	750	1	lunge feeding at surface, breaching	vibracore not running	One humpback whale first spotted at 11:50 at about 750m, estimated using reticle binoculars. Whale appeared to be lunge feeding at surface and breaching. The whale's direction was variable as it was swimming/feeding at the surface. Last seen at 1631 at 1100m.	4:41
10/22/2017	7:24	Partly Cloudy	SW	2	10	40 59.8	71 59.9	6		Whale, Humpback		600	2	Blow, breach, lunge feeding, dive	vibracore not running	First observed one whale blow at 7:24, then a breach at 7:26 approximately 300 m from R/V James Miller and 600 M from R/V Megyn Miller, estimated using range finder since animal was close to the beach. Animal observed lunge feeding at 7:30 before diving at 7:36, later seen at 7:51 with another whale. Animals traveling along the beach, parallel to the Megyn about 1000 m away. One of the whales breached at 7:53 and were last seen together at 8:08. One whale was seen at 145 degrees (estimated using binoculars) and last seen at 8:08, 2nd whale remained close to shore about 1.5 km away from Megyn (visual estimation/range finder) at a bearing of 60 degrees and last seen at 8:14.	3:31
10/22/2017	8:49	Clear	SW	2	10	40 59.5	71 59.8	8		Whale, Sperm	185	1400	1	Blow, fluke/dive	vibracore not running	Observed whale blow at 8:49 at about 1400 m from R/V Megyn Miller, distance estimated using reticle. Animal appeared to be heading away from the Megyn toward offshore and fluked/dove shortly after we detected it.	0:01
10/22/2017	17:38	Partly Cloudy	SW	2	10	40 51.7	71 20.8	9		Whale, Humpback	260	1852	3	Blow, fluke, fin slap.	Transit	Three animals swimming along shore between vessel and shore. One ahead, two about 400m behind. Blowing frequently, then one fin slapped the surface and at least one animal turned and headed back East.	0:17

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10/23/2017	11:57	Partly Cloudy	SE	2	10	40 54.5	72 13.1	10		Whale, Humpback	44	673	1	blows, fluking	vibracore not running	One humpback whale was first seen at 11:57 at 673m (estimated using reticle binoculars), a large busy blow was seen first and then it fluked up and dove; surfaced at 12:02 at 450m off stern of the Megan Miller; seen again at 12:04 at 550m, and at 12:10 it fluked up and dove at about 800m away from the Megan Miller; the whale was last seen at 12:17 at about 2000m swimming away from the Megan Miller	0:20
10/23/2017	18:15	Partly Cloudy	S	3	10	40 53.4	72 12.4	11		Dolphin, Short-beaked Common	0	1000	20	bow riding, blowing	vibracore not running	Animals were bow riding PSO vessel while steaming around survey vessel, finishing up pulling up anchors. Coming up in groups then turning off.	0:12
10/28/2017	7:37	Partly Cloudy	W	2	10	40 52.4	72 11.2	12		Dolphin, Short-beaked Common		438	10	bow riding the James Miller, porpoising	vibracore not running	At 07:37, 8-12 common dolphins were seen approaching the James Miller (at 438m from the Megan Miller estimated using reticle binoculars) during the 60 minute pre-watch period, the dolphins were attempting to bow ride the James Miller and were milling about the vessel; the dolphins closest approach to the Megan Miller was estimated to be 375m (using reticle binoculars); at no point to any of the dolphins enter the 200m EZ of the Megan Miller during the EZ clearance; the dolphin were last seen at 07:42 swimming away from the Megan Miller offshore at a distance of 850m.	0:05
11/2/2017	4:39					40 56.8	71 57.5		501	Dolphin spp.		200	6		Anchored, no equipment active	Unid delphinid spp. Detected on HF click detector, LF spectrogram. Unable to localize.	0:19
11/2/2017	5:24					40 56.8	71 57.5		502	Dolphin spp.		500	1		Anchored, no equipment active	Short detection, unable to localize	0:00
11/3/2017	0:02					40 56.9	71 53.5		504	Dolphin spp.		600	3		Anchored, no equipment active	The low amplitude of the detection indicates the pod did not enter the exclusion zone.	0:22
11/3/2017	0:54					40 56.9	71 53.5		505	Dolphin, Short-beaked Common		15	4		Anchored, no equipment active	Initial detection showed faint HF click trains low in amplitude and not within the exclusion zone. At 02:00, after vibracore operations were complete amplitude greatly increased and pod was established inside the exclusion zone.	1:31
11/3/2017	2:10					40 57.1	71 53.4	13		Dolphin spp.		300	4	feeding, swimming at surface	vibracore not running	First detected by PAM operators, then seen splashing at the surface 300 m from the stern of R/V Megan. Group size between 4-5 individuals. PAM operator sighted dolphins off port side of bow at 2:16, moving variably around the bow about 5 m from boat, visually confirmed species as Common Dolphin based on the hourglass/saddle pattern on its sides. At 2:23 dolphins were seen feeding at the surface within 100 m. Seen again at 2:45 10 - 50 m on the starboard side of R/V James. Last seen at 2:49 within 240 m of R/V Megan, 10 m off port side of James.	0:39
11/3/2017	3:03					40 57.3	71 52.3	14		Dolphin spp.		200	5	swimming at surface	vibracore not running	Seen via night vision by PSOs at 3:03, about 180 - 200 m off port side stern of R/V Megan. There were 5 - 7 dolphins seen splashing and swimming at the surface and were ID'd as common dolphins based on the saddle/hourglass pattern on their sides (tan front, light grey back). They were not seen after 3:05	0:02
11/3/2017	6:07					40 57.6	71 52.0	16	507	Dolphin spp.		5	8		Anchored, no equipment active	Delayed vibracore operations due to delphinid presence within the exclusion zone. Dolphins visually confirmed by onboard PAM operator and crew as well as PSOs on neighboring vessel. Last acoustic detection within exclusion zone was at 7:32, though dolphins were detected for the entirety of the acoustic	1:38

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11/3/2017	6:18	Partly Cloudy	SW	2	10	40 57.7	71 51.2	16	507	Dolphin, Short-beaked Common	90	500	15	porpoising, milling	vibracore not running	Animals first detected by PAM, visual confirmed sighting at 6:18 when animals were alongside James. Animals continued to be observed bow riding and porpoising alongside James outside of Megan EZ until 6:50 when animals were detected acoustically inside Megan EZ and a delay was initiated. Animals were continuously observed alongside James and at 7:25 were observed inside Megan EZ at 150m heading towards Megan and came as close as 20 meters to Megan. Animals were observed leaving Megan EZ at 7:28, and were observed around James until 7:37 when observers lost sight of animals travelling to the north. Ranges were determined by range finder, and reticle binoculars.	1:19
11/3/2017	17:48					40 58.0	71 47.5		508	Dolphin spp.		500	5		Anchored, no equipment active	Clicks with spectral peaks ~100 kHz exceeded a received amplitude of 174 dB likely within exclusion zone - prompted the operator to call for a mitigation action in the form of a delay in vibracore initialization at 18:36. Dolphins were not detected in EZ at 1800 when vibracore was at full power. Additional high frequency high amplitude click vocalizations at 18:49 (>165 dB) and 19:30 (>176 dB) extended the delay. Final detection in the form of discreet yet	1:56
11/4/2017	8:11	Partly Cloudy	NE	3	10	40 58.6	71 47.6	17		Dolphin, Short-beaked Common	25	350	8	bow riding, porpoising	In transit to survey site	About 8 common dolphins were observed approaching the James Miller as we transited out to the survey site (dolphins were estimated to be about 350m from the Megan Miller using reticle binoculars). Dolphins were bowriding and porpoising around the James Miller until they appeared to be swimming away from the James and the Megan at a distance of about 500m from the stern of Megan at 0818; The dolphins remained in the area until they were last sighted at 0839, but did never enter the 200m EZ during the 60 minute EZ clearance. The closest approach to the Megan was about 275 m at 0835.	0:28
11/9/2017	15:25		SE			40 57.7	71 50.7	18		Dolphin spp.		220	7	Swimming at surface, attempting to bowride the R/V James	Anchored, CPT on bottom but not running	Common Dolphins first observed at 15:25 following R/V James about 220 m from R/V Megan. There were 5-7 dolphins and were identified based on the hourglass pattern along their sides (tan front, light grey back), long beaks, and thin caudal peduncle. Dolphins were swimming at the surface approximately 220 m from the Megan while 1 dolphin was visually observed within 15 m of the Megan's port bow by both the PSO and PAM operator at 15:32. Dolphins were last seen in the 200m EZ at 15:34. CPT operations were delayed from 15:34 to 16:34. The dolphins near the James continued to follow along both sides of the boat within 5-10 m of the boat, swimming at the surface and attempting to bow ride the vessel. Dolphins were last seen by PSOs at 16:27 swimming away from the James at a distance of about 600m from the Megan.	1:02
11/9/2017	15:42					40 57.6	71 50.8		509	Dolphin spp.		500	5		Anchored, no equipment active	Correlated with visual sighting; acoustic detection began after mitigation action in the form of a delay had been initiated visually (hydrophone had not yet been deployed).	0:52
11/9/2017	18:08					40 56.7	71 54.4		510	Dolphin spp.		400	3		Anchored, no equipment active	Dolphins were detected for the duration of the 60-minute prewatch and through out CPT ops. Amplitude remained low, never reaching more than 130 dB. Based on amplitude and frequency, the closest approach is estimated at 400 meters from the source. No mitigation action was needed.	1:38

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11/9/2017	21:17					40 56.2	71 56.9	19	511	Dolphin spp.		500	8		Anchored, no equipment active	Delphinid vocalizations were recorded for the duration of the initial prewatch. Mitigation delay implemented at 21:37 and 21:47 when frequency (>100 kHz) and amplitude (164, 169 dB) indicated high likelihood that vocalizing individuals were within the exclusion zone. Last detection in EZ at 21:51, delaying CPT until 22:51. Dolphins remained in area but outside EZ during first CPT (23:02-23:04). Final detection at 23:07. Second CPT test at 23:11 did not require mitigation action.	1:50
11/9/2017	21:26	Partly Cloudy	W	2	10	40 56.3	71 57.2	19	511	Dolphin, Short-beaked Common	90	500	10	bow riding, swimming alongside PSO vessel	Circling survey vessel	PAM operator delayed CPT at 21:37, 21:47	unk
11/11/2017	17:01				10	4106.5	7109.4		512	Dolphin spp.		600	1		Anchored, no equipment active	Delphinids were detected for the duration of PAM watch and CPT test. Click trains were not picked up on the HF click detector module and whistles were at times aural only. The closest distance to source is estimated at 600 meters; no mitigation action was necessary.	0:07
11/11/2017	18:14				10	41 06.7	71 10.2		513	Dolphin spp.		600	1		Anchored, no equipment active	Delphinids were detected on LF modules only and did not enter the exclusion zone.	0:13
11/11/2017	18:49				10	41 06.7	71 10.2		514	Dolphin, Short-beaked Common		500	8		Anchored, no equipment active	Continuous detection from 18:48 to 05:30 the next day. Equipment maintenance was complete at 02:07. Delphinids from AD514 entered the EZ repeatedly during 60-minute prewatch, resulting in delays until 04:55.	10:06
11/11/2017	19:56	clear	N	2	10	4106.5	7110	20		Dolphin spp.	150	250	4	Swimming from Megan Miller towards James Miller. Proceeded to bow ride and swim along side JM	Mechanical Maintenance	PAM detected dolphins inside EZ at 19:41, possibly same group	0:06
11/11/2017	20:16	clear	N	2	10	4106.5	7110.1	21		Dolphin, Short-beaked Common	90	450	3	Swimming along side of James Miller, swimming under boat to opposite sides	Mechanical Maintenance	Possibly same group as sighting #20. PAM detected dolphins in EZ at 20:24	0:04
11/12/2017	0:29	Partly Cloudy	NW	2	10	4106.9	7110.2	22	514	Dolphin, Short-beaked Common	220	400	2	wake riding, playing	Circling survey vessel	first heard by PAM at 00:02, but not sighted in the area until 00:29, stayed in area until 00:58. Common dolphins about 5-10 m from port, moving toward the bow of the R/V James Miller. ID'd as Common dolphins based on the saddleback pattern on their sides (tan front, light grey back), long narrow beaks, and small caudal peduncle. Dolphins stayed around R/V James bowriding, playing	0:29
11/12/2017	3:48	Partly Cloudy	NW	2	10	4106.8	7110	25		Dolphin, Short-beaked Common	90	530	2	wake riding, swimming parallel	Circling survey vessel	Common dolphins first seen at 03:48 about 5-10 m from starboard bow of the R/V James Miller. ID'd as Common dolphins based on the saddleback pattern on their sides (tan front, light grey back), long narrow beaks, and small caudal peduncle. Dolphins approximately 275 m away from R/V Megan. Last seen in area at 03:57	0:09
11/12/2017	18:55	Partly Cloudy	S	1	10	4105.7	7107.9	27	515	Dolphin, Short-beaked Common	170	450	2	bowriding, swimming alongside vessel, eating/playing with fish	Middle of core test	Notified of presence in EZ by PAM at 1905, last seen until 1934	0:39
11/12/2017	20:19				10	4105.3	7111.3		516	Dolphin, Short-beaked Common		500	8		Anchored, no equipment active	60-minute prewatch began at 20:19, delphinids (identified by the visual observers as common dolphins) were present the entire PAM watch. The pod entered the exclusion zone from 21:11-21:13. CPT operations were delayed until 22:13.	2:19
11/12/2017	21:09	Partly Cloudy	S	1	10	4105.5	7111	28	516	Dolphin, Short-beaked Common	180	425	3	bowriding	on pre-watch	Delayed core testing by extending prewatch due to PAM detection in EZ	0:17

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11/12/2017	23:04	Partly Cloudy	S	1	10	41 05.2	71 11.2	29		Dolphin, Short-beaked Common	0	400	3	swimming at surface, bowriding	Stationary, after CPT test	Common dolphins first seen at 23:04 about 5-10 m from starboard stern, moving toward the bow of the R/V James Miller. ID'd as Common dolphins based on the saddleback pattern on their sides (tan front, light grey back), long narrow beaks, and small caudal peduncle. Dolphins approximately 400 m away from R/V Megan. R/V James was stationary, waiting for R/V Megan to haul anchors. At 23:09 R/V James began steaming toward the next location and dolphins began bowriding, but they did not follow for long and were not seen after 23:09.	0:05
11/12/2017	23:30				10	4105.3	7110.4		517	Dolphin, Short-beaked Common		400	9		Anchored, no equipment active	Initial detection within exclusion zone took place at 00:41, after first CPT test. Last detection within exclusion zone at 01:26, delaying second CPT test until 02:26. Final detection at 01:44 in the form of faint whistles. Species visually confirmed by off duty PAM operator.	3:00
11/12/2017	23:40	Partly Cloudy	S	1	10	41 05.4	71 10.2	30	517	Dolphin, Short-beaked Common	45	400	4	swimming at surface, porpoising, bow riding	Circling R/V Megan, no gear in the water	Common dolphins first seen at 23:40 about 5-10 m from starboard stern, moving toward the bow of the R/V James Miller. ID'd as Common dolphins based on the saddleback pattern on their sides (tan front, light grey back), long narrow beaks, and small caudal peduncle. Dolphins approximately 400 m away from R/V Megan. R/V James was circling around R/V Megan and dolphins were following, swimming at the surface, porpoising, and bowriding. Dolphin whistles could be heard when they came above the surface of the water. Last sighted 00:23	0:43
11/13/2017	0:44	Partly Cloudy	S	1	10	4105.2	7110.4	31	517	Dolphin, Short-beaked Common	135	240	5	swimming at surface, porpoising, bow riding, feeding	Circling R/V Megan, gear in the water	Common dolphins first seen at 00:44 about 5-10 m from port side, moving toward the bow of the R/V James Miller. ID'd as Common dolphins based on the saddleback pattern on their sides (tan front, light grey back), long narrow beaks, and small caudal peduncle. Dolphins approximately 240m away from R/V Megan. R/V James was circling around R/V Megan and dolphins were following, swimming at the surface, porpoising, feeding, and bowriding. Dolphin whistles could be heard when they came above the surface of the water. Last sighted 01:31, PAM last heard at 01:28. The vessel completed the first test, which ended up being a refusal. During the middle of the second test the dolphins came into the EZ operations were able to shut down before a take could occur. equipment on ocean floor, but shutdown	
11/13/2017	3:25				10	4105.2	71 09.3		518	Dolphin, Short-beaked Common		500	9		Anchored, no equipment active	Delphinids entered the exclusion zone at 03:48 causing CPT testing delays. The final detection within the exclusion zone occurred at 04:51. The final detection was at 05:15.	1:50
11/13/2017	3:52	Partly Cloudy	S	1	10	4105.1	7109.3	32	518	Dolphin, Short-beaked Common	180	274	5	swimming at surface, porpoising, bow riding	Circling R/V Megan, gear in the water	Two groups of dolphins first heard at 03:52 and then seen at 03:55 about 5-10 m from starboard stern, moving toward the bow of the R/V James Miller. ID'd as Common dolphins based on the saddleback pattern on their sides (tan front, light grey back), long narrow beaks, and small caudal peduncle. Dolphins approximately 270 m away from R/V Megan. R/V James was circling around R/V Megan and dolphins were following, swimming at the surface, porpoising, and bowriding. Dolphin whistles could be heard when they came above the surface of the water. At 4:24 dolphins were seen swimming in variable directions in front of the R/V James, possibly feeding. Last seen at 4:39.	0:47

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11/15/2017	16:38	Partly Cloudy	NE	2	10	40 52.3	72 11.6	33		Dolphin, Short-beaked Common	200	260	14	bowriding	circling M/V megan t miller	Dolphins were first sighted alongside the James Miller. They were swimming with the vessel and bowriding on it. They were identified by the saddleback pattern on their sides. They were approximately 310m from the M/V Megan T. Miller. Dolphins were last seen at 1651. Beginning of 60 minute exclusion zone watch. Dolphins did not enter the exclusion zone.	0:13
11/15/2017	18:53	Partly Cloudy	NE	2	10	4952.7	7211.3	34		Dolphin, Short-beaked Common	30	350	3	swimming along vessel, bowriding, porpoising	Megan Miller hauling anchors	First sighted along starboard side of James Miller, swimming ~3m from boat and porpoising. Next seen bowriding James Miller for ~7mins until 1902, watched with both naked eye and night vision. ID'd as Common dolphins based on the saddleback pattern on their sides (tan front, light grey back), long narrow beaks, and small caudal peduncle.	0:09
11/15/2017	19:30	Partly Cloudy	NE	2	10	4053.6	7212.6	35		Dolphin, Short-beaked Common	90	450	1	porpoising	Both vessels steaming to next site	Saw animal porpoise fully out of water next to James Miller ~3m from starboard side. Only saw individual once during that instance. ID'd as Common dolphins based on the saddleback pattern on their sides (tan front, light grey back), long narrow beaks, and small caudal peduncle.	0:00
11/15/2017	20:20	Partly Cloudy	SE	2	10	4055.4	7213.9		519	Dolphin spp.		400	4		Anchored, no equipment active	Dolphins detected within the exclusion zone (HF clicks in excess of 162 dB) at 20:32-20:35, delaying operations until 21:35.	0:54
11/15/2017	20:31	Partly Cloudy	SE	2	10	4035.3	7215.7	36		Dolphin, Short-beaked Common	300	400	3	Feeding/playing	MM on anchor, JM circling waiting on 60 min pre-watch	First seen up by bow of JM on port side with naked eye. Looked through night vision to see very erratic movements; unsure if they were feeding or playing because fish were never seen. PAM radioed at 2032 that they were heard within the EZ, 60-min pre-watch extended to 2135. Not seen back by JM after call from PAM.	0:01
11/15/2017	23:06	Continuous layer of clouds	SE	3	10	40 56.3	72 07.6	37		Dolphin, Short-beaked Common	270	700	5	swimming at surface, bowriding	Transiting to next survey site	5 dolphins were seen 5-10 m on the port side stern of R/V James, which was traveling approximately 700 m away and to the starboard side of R/V Megan. Dolphins then moved toward the front of R/V James and began bow-riding. Identified as Common Dolphins based on their saddleback pattern on their sides, long narrow beaks, and thin caudal peduncles. Animals last seen at 23:15.	0:09
11/24/2017	0:20	Partly Cloudy	NW	3	10	41 00.6	71 39.6	38		Dolphin, Short-beaked Common	90	200	10	bow riding, blowing, breaching, feeding	circling Megan Miller	First seen off starboard, animals mostly going with the R/V James Miller in circles around Megan Miller. Seen continuously until. Surfacing frequently very close to James Miller in groups of 2-6 at a time. PAM also heard dolphins within EZ. Delayed equipment usage. Identified as Common Dolphins based on their saddleback pattern on their sides, long narrow beaks, and thin caudal peduncles.	5:23
11/24/2017	0:20	Partly Cloudy	NW	3	10	41 00.5	71 40.0	38	520	Dolphin, Short-beaked Common		10	8		Anchored, no equipment active	Delphinids were detected within exclusion zone upon beginning watch at 0:20. CPT testing was delayed until 07:02. Eight simultaneous click trains were discerned suggesting the presence of at least eight individuals. They were visually identified as Common dolphin, one juvenile was noted.	7:12
11/24/2017	8:27	Partly Cloudy	W	2	10	4100.4	7137.4	39		Dolphin, Short-beaked Common	45	50	2	milling at surface, swam under James miller bow.	transit to site alongside Megan Miller	Saw the back/dorsal fin at first between the Megan and James. Then saw one close to the bow of the James Miller, passed under and not seen again. Sighting duration maybe 3 minutes. Identified as Common Dolphins based on their saddleback pattern on their sides, long narrow beaks, and thin caudal peduncles.	0:03

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Date Started MM/DD/YYYY	Time Started (24hr)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing from PSO vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
11/24/2017	8:50	Partly Cloudy	W	2	10	4101.3	7132.3	40		Dolphin, Short-beaked Common	150	10	15	bow riding, milling between vessels, possible feeding activity after reaching site.	transit to site alongside Megan Miller	Bow riding group later joined by another group. Once the Megan Miller dropped anchor, the dolphins milled around, moving between the two vessels. Last seen at 09:18. Identified as Common Dolphins based on their saddleback pattern on their sides , long narrow beaks, and thin caudal peduncles.	0:28
11/24/2017	11:55	Partly Cloudy	W	2	10	4101.9	7131.3	41		Dolphin, Short-beaked Common	315	1000	7	transiting	pulling up achors	7 dolphins were seen 1000 m to the starboard side of R/V Megan. Dolphins transiting near the area. Identified as Common Dolphins based on their saddleback pattern on their sides , long narrow beaks, and thin caudal peduncles. Animals last seen at 12:00.	0:05
11/24/2017	12:38	Partly Cloudy	W	2	10	4101.7	7130.2	42		Dolphin, Short-beaked Common	140	350	15	transiting, bow riding	transiting to site	Saw dorsal fins break water as they made way directly toward the James Miller, remained with the vessel to the site riding the bow. Identified as Common Dolphins based on their saddleback pattern on their sides , long narrow beaks, and thin caudal peduncles.	0:26
11/24/2017	13:42	Partly Cloudy	W	2	10	4102	7129.9	43		Dolphin, Short-beaked Common		300	25	feeding, transiting, bow riding	Preparing to perform testing	following a shrimp dragger in its wake and on the bow. A few small groups parted off to investigate the James miller, but remained outside the EZ. All but a few parted ways to return to the fishing vessel. Identified as Common Dolphins based on their saddleback pattern on their sides , long narrow beaks, and thin caudal peduncles.	unk
11/24/2017	14:50	Partly Cloudy	SW	2	10	4101.8	7129.3	45		Dolphin, Short-beaked Common	102	300	10	feeding, traveling	transiting to site	Dolphins seen feeding around transiting vessel. Transiting to new site. Dolphins were seen traveling towards the James Miller, passed us and went to bow ride the Megan Miller. Identified as Common Dolphins based on their saddleback pattern on their sides , long narrow beaks, and thin caudal peduncles.	unk
11/24/2017	15:04	Partly Cloudy	SW	2	10	4101.9	7127.9	46		Dolphin, Short-beaked Common	90	270	5	feeding, traveling	transiting to site	Another pod of dolphins were spotted transiting towards the James Miller from the starboard side but did not stay with the vessel. Identified as Common Dolphins based on their saddleback pattern on their sides , long narrow beaks, and thin caudal peduncles.	unk
11/24/2017	15:55	Partly Cloudy	SW	2	10	4101.9	7124.2	47		Dolphin, Short-beaked Common	45	120	3	traveling	at sight waiting for marine mammal clearance	Dolphins were spotted traveling through the exclusion zone and crossed in front of the James Miller and continued on. Pre- watch start begins anew. Identified as Common Dolphins based on their saddleback pattern on their sides , long narrow beaks, and thin caudal peduncles.	0:01
11/24/2017	16:03	Partly Cloudy	SW	2	10	4101.9	71 24.5		521	Dolphin spp.		400	2		Anchored, no equipment active	Dolphins from AD523 remained outside the exclusion zone and did not require mitigation action.	unk
11/24/2017	22:44	clear	W	4	10	4101.8	7119.5	48	522	Dolphin, Short-beaked Common	200	400	6	Milling around the James Miller	Had gear in the water but were delayed due to dolphin detection by PAM	Dolphins were seen swimming around the James Miller for about 45 minutes. Identified as Common Dolphins based on their saddleback pattern on their sides , long narrow beaks, and thin caudal peduncles.	0:45
11/25/2017	1:03	Partly Cloudy	E	4	10	41 02.3	71 17.3	49	523	Dolphin, Short-beaked Common	180	500	14	bow riding, following James Miller	First sighted while Megan Miller setting anchors, James Miller circling	Delayed due to sighting and PAM acoustics	unk
11/25/2017	1:13	Partly Cloudy	E	4	10	41 02.3	71 17.7	49	523	Dolphin spp.		50	6		Anchored, no equipment active	PAM notified of dolphins in area by PSO, immediate detection once hydrophones in water. Initially close to Megan Miller inside EZ, detected farther and farther away skirting boundaries of MZ, 60 min prewatch for CPT extended but then clearance given for CPT at 0329.	2:16
11/25/2017	6:41	Partly Cloudy	E	2	10	4102.1	7117.6	50	525	Dolphin, Short-beaked Common	90	150	5	bow riding	about to test	PAM notified PSO of sighting at same time as visual. Prewatch restarted, PAM turned watch over to PSO. Dolphins remained around the James for a bit after leaving the EZ.	0:29

Attachment 6 - R/V James Miller Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing from PSO vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
11/25/2017	9:56	Partly Cloudy	E	2	10	4102.6	7116.6	51		Dolphin spp.	60	10	5	bow riding	transiting to new site	Noticed after large cargo ship passed. Did not remain long.	0:04
11/25/2017	16:16	Partly Cloudy	W	3	10	4104.6	7110.6	52		Dolphin, Short-beaked Common	180	400	6	bow riding, transiting through area	preparing to pull anchor	Saw two dolphins at first on the starboard side, then quite a few more as the group approached the James' stern. Watched as they moved to the bow, rode the bow for a few minutes and moved on. Did not enter EZ or approach the Megan Miller. Identified as Common Dolphins based on their saddleback pattern on their sides, long narrow beaks, and thin caudal peduncles.	0:12
11/25/2017	16:35	Partly Cloudy	W	3	10	4104.5	7110.5	53		Dolphin, Short-beaked Common	180	400	2	Transiting through area	Pulling anchor	Seemed to be a separate event from previous sighting. Only 1 identified as Common Dolphins based on their saddleback pattern on their sides, long narrow beaks, and thin caudal peduncles. wo, perhaps three individuals swimming alongside the James Miller. Did not even stop to bow ride, kept on moving. Did not approach Megan Miller.	0:05
11/28/2017	8:13	Partly Cloudy	SW	3	10	4104.2	7109.2	54		Dolphin, Short-beaked Common	315	578	6	swimming at surface, transiting through	Waiting to prewatch to end to start test.	Saw two individuals at first between James Miller and Megan Miller. About 10m from James Miller. They passed under us headed away from the Megan. Saw a handful more off the James' stern which also passed under us and off the bow. Later saw ganets feeding about 200 m away (roughly 600m from Megan Miller) which may be the target of the pod.	
11/28/2017	12:40	Partly Cloudy	SE	3	10	4106.1	7109.6	55		Dolphin, Short-beaked Common	237	200	6	bow riding, feeding	traveling	We started to clear the area at 12:27. 6 dolphins were spotted from near the James Miller while we were pre-clearing the next site. The Megan was pulling up the anchor at the previous site and the dolphins stayed with the James for awhile and then went over towards the Megan. As the Megan transited to the site we were clearing the dolphins joined a second group of about 5 dolphins and were feeding.	
11/28/2017	15:23	Partly Cloudy	SE	3	10	4106.6	7110	56		Dolphin, Short-beaked Common	285		4	bow riding, milling	traveling	Saw dolphins off of James Miller's port side while in transit to next site. They stayed with us bowriding and milling until about 15:47. We arrived at the site to start clearing at 15:28. The dolphins stayed with the James and left while the Megan was in transit to site.	
11/28/2017	17:51	Partly Cloudy	SE	3	10	41 06.659	71 10.209		526	Dolphin, spp.		400	2		Anchored, waiting on 60 min watch	Delphinids detected at 17:51, about 400m away at 138dB. Two individual click trains were detected, suggesting at least 2 dolphins. First detected on high frequency click detector, then by one solitary LF whistle at 17:57 on the spectrogram. Dolphins approached 150dB at 18:05, low frequency burst pulses, clicks, buzzes, and harmonics were detected. Detections at 162dB occurred at 18:07 and the pre-watch was extended to 19:07, detections inside EZ occurred until 18:09 and were not detected afterwards. CPT started 19:08 and ended 19:14.	
12/2/2017	6:15	Partly Cloudy	NW	2	10	4104.1	7113.6	57		Dolphin, Short-beaked Common	180	5	7	bow riding, transiting through	Steaming to first site of the day ahead of the Megan Miller to start prewatch.	Saw a small group bow riding the James Miller just before reaching the first site of the day. Not sure what direction they came from or what direction they left. Did not see them when we slowed to circle the site. Started prewatch immediately.	
12/2/2017	15:16	Partly Cloudy	N	1	10	4105.8	7111	58		Dolphin, Short-beaked Common	230	860	5	Feeding, traveling, milling, bow riding	preparing to pull up anchors	Sighting of 3-5 dolphins between the James and the Megan while the Megan was still pulling up anchor at the previous site. Initial sighting at 15:16. They moved towards the Megan for a bit then were sighted within the EZ at 15:33, stayed with the James for a short while and were seen continuously in and around the James and the Megan. Continuous sightings.	

Attachment 6 - R/V James Miller Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing from PSO vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
12/3/2017	0:40				10	41 06.600	71 09.195		527	Dolphin spp.		250	5		Anchored, no equipment active	Amplitude peaked at 153 dB. The pod did not enter the exclusion zone. No mitigation was needed.	
12/3/2017	3:24				10	41 06.654	71 10.286		528	Dolphin, Short-beaked Common		250	5		Anchored, no equipment active	Delphinid vocalizations detected immediately upon start of PAM watch at 0324, initially detected at 150dB and up to 183dB. 5 individual click trains were identified, suggesting at least 5 individuals. Off-watch PAM visually confirmed as common dolphins and could see 2 adults and 1 calf. Initial detection had very few LF whistles, mostly MF buzzes, clicks, and some harmonics. Dolphins first moved out of EZ at 0342, some LF whistles were detected after 0342 but nothing detected on HF click detector. Dolphins detected back in the MZ at 0358 at 140-150dB, and then back inside the EZ from 0431-0433, right after anthropogenic noise from Megan Miller started while crew was readying gear for deployment; pre-watch was extended to 0533, dolphins not detected in area since 04:36.	
12/3/2017	6:21	Partly Cloudy	NW	2	10	4106.9	7110.5	59		Dolphin, Short-beaked Common	0	550	16	bow riding, breaching on animals side along vessel	Doing circles around Megan Miller	4 animals first seen at 6:21, more and more showed up until max around 16. Megan Miller was still at previous test location while animals continuously hung around the James Miller until 7:12. Never seen within the EZ. 2 animals briefly appeared again around the James Miller from 7:38-7:41 approximately 300 meters from the Megan Miller and then left the area.	
12/3/2017	9:07	Continuous layer of clouds	NW	2	10	4106.8	7110.8	60		Dolphin, Short-beaked Common	270	385	3	bow riding, breaching on animals side along vessel, swimming at surface	Doing circles around Megan Miller	3 animals were first seen at 09:07, headed directly towards the Megan and James, and started bowriding the James until 09:46	9:46
12/3/2017	9:18	Continuous layer of clouds	NW	2	10	4106.4	7110.7	61		Dolphin, Short-beaked Common	135	865	5	bow riding, breaching on animals side along vessel, swimming at surface	Doing circles around Megan Miller	5 animals came into the area and joined the other 3 individuals in bowriding the James last seen at 09:46	9:46
12/3/2017	13:50	Partly Cloudy	NW	1	10	4106.9	7111	62		Dolphin, Short-beaked Common	315	450	7	bow riding	Circling Megan Miller	3 individuals spotted close to James miller travelling toward it mid-ship while testing. Thought they might head under and straight into EZ, but turned toward the bow and remained with the James Miller at a distance of about 450 meters from the Megan. More joined and two smaller dolphins were seen occasionally with a larger adult.	

Attachment 6 - R/V James Miller Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing from PSO vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
12/3/2017	17:39	Partly Cloudy	NW	2	10	4106.5	7110.5	63		Dolphin, Short-beaked Common	225	5	2	Transiting through area	Transit to next site	Headed to next site, saw two individuals very close to the Megan while transiting travelling directly toward it. One seemed to nearly run into the boat, turning very sharply to the stern. Did not see them after.	
12/3/2017	22:07				10	41 06.578	71 08.143		531	Dolphin spp.		250	3		Anchored, no equipment active	Delphinid vocalizations detected at 2207 once interference from depth sounder ended, detected at 150dB on HF click detector. 3 individual click trains identified , suggesting at least 3 dolphins. Detections inside the MZ appeared in the form of clicks, buzzes, and harmonics on the spectrogram, as well as burst pulses. There were very few whistles detected. First delay occurred at 2210, when detections passed 160dB inside the EZ, and again shortly after crew started readying gear to be deployed at 2307- 2318. At 0018, the okay was given to start vibro core, but crew had to reposition twice before starting test due to ocean bottom incompatibility, at which point pre-watch was extended again at 0038 when dolphins were once again detected on the HF click detector above 160dB, having increased from 135dB. The final detection inside the exclusion zone was at 01:58. Vocalizations became increasingly sporadic and lower in amplitude until the final detection at 02:25.	
12/4/2017	1:46	Partly Cloudy	NW	2	10	41 06.5	71 08.5	65		Dolphin, Short-beaked Common	315	850	3	Bow riding	Circling Megan Miller	3 dolphins sighted bow riding James Miller, first seen 850m from Megan Miller, followed as James Miller moved closer to approximately 500m. Last sighted 01:58.	
12/4/2017	3:27				10	41 06.578	71 08.143		532	Dolphin spp.		500	2		Anchored, no equipment active	2 click trains visible, between 128-137dB. Detection above 160dB occurred at 0405, with 3 click trains detected, and numerous clicks and buzzes on the spectrogram. 0417-0419 lots of interference on LF click detector due to fishing boat nearby	
12/4/2017	3:50				10	41 06.577	71 08.133		532	Dolphin spp.			3		Anchored, no equipment active	Continuous detection 532 from previous PAM watch. 2 click trains visible, between 128-137dB. Detection above 160dB occurred at 0405, with 3 click trains detected, and numerous clicks and buzzes on the spectrogram. 0417-0419 lots of interference on LF click detector due to fishing boat nearby, followed by no detections until 0430, when dolphins were detected at 130dB, building to over 160dB at 0445 and pre-watch was delayed.	
12/4/2017	6:16				10	41 05.869	71 08.167		533	Dolphin spp.		500	2		Anchored, no equipment active	Delphinids detected at 0616 after depth sounder was turned off, detected on HF click detector at 132dB. Clicks, buzzes, and faint harmonics were visible on spectrogram, and 2 click trains were visible, suggesting at least two individuals.	
12/4/2017	6:47	Partly Cloudy	E	2	10	41 05.6	71 08.0	66		Dolphin, Short-beaked Common	0	455	12	Bow riding, breaching, transiting through area	Circling Megan Miller	5 animal first sighted bow riding James Miller at 6:47. Continual breaching and bow riding, 3 animals seen in the EZ at 7:00, leaving the EZ swimming towards James Miller. Delayed deployment of vibracore. Then around 12-15 animals circling James Miller about 450m from Megan Miller until 7:26 last seen heading NW away from both vessels.	

Attachment 6 - R/V James Miller Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing from PSO vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
12/4/2017	10:30	Partly Cloudy	E	2	10	41 13.3	71 28.7	67		Dolphin, Short-beaked Common	350	2000	10	Bow riding, surfacing	Steaming to Block Island	Pod came at the boat from Block Island and bow rode for 5 minutes and swam away. Megan Miller was behind James Miller, pod headed in their direction. Last sighted 10:35.	
12/4/2017	11:29	Partly Cloudy	E	1	10	41 11.7	71 35.2	68		Seal, Grey	270		1	Sitting on the beach, moved about 5 feet as vessel passed.	Entering Block Island inlet	One animal sitting on the shore of the north side of block island inlet. Very small. Moved a bit as vessel passed. Could not see Megan Miller when sighting occurred.	
12/5/2017	0:32	Partly Cloudy	E	1	10	41 05.863	71 08.159		534	Dolphin spp.		450	2		Anchored, no equipment active	Delphinid clicks detected on HF click detector at 0046 at 140dB. Faint LF whistles seen but not heard on the spectrogram at 0056. 2 click trains appeared on HF click detector 130dB to 137dB, concurrent with crew readying gear to start test; whistles were audible and clear on spectrogram, left range of detection at 0129. Vibrocore started at 0132 and ended at 0146, no dolphins detected during or after test.	
12/5/2017	3:59	Continuous layer of clouds	E	2	10	41 05.863	71 08.159		535	Dolphin spp.		300	4		Anchored, no equipment active	Faint LF whistles registered on the spectrogram followed by HF clicks gradually increasing from 130 dB to 150 dB. Four distinct click trains were discerned indicating four individuals. The pod did not enter the exclusion zone and no mitigation was needed. The detection ended when the PAM cable was recovered in order to transit to Block Island for equipment maintenance.	
12/5/2017	7:45	Continuous layer of clouds	E	2	10	4111.6	7135.1	69		Seal spp.	210	100	10	resting, hauled out	Entering Block Island	Passed by a floating dock platform completely covered in a group of hauled out seals. Did not see any in the water. They watched the vessel pass by, seemingly unfazed by its proximity. None made a move to enter the water. Out of eyesight by 7:50.	
12/5/2017	13:41	Continuous layer of clouds	SE	5	10	4111.5	7134.8	70		Dolphin, Short-beaked Common		5	6	porpoising, bow riding	Transiting to Quonset, RI	Saw a small dolphin porpoise just off the port bow, didn't see others for a while. One adult surfaced directly off the bow, then a row of four off the port side. They remained for only a few minutes. Did not see them return.	
12/8/2017	6:39	Continuous layer of clouds	NW	4	10	4115.8	7116.5	71		Dolphin, Short-beaked Common	290	5	3	bow riding	Transit to site	saw one off the port bow, then two more surfacing simultaneously after that remained with the vessel until 06:41. Saw no sign of them after that.	

Attachment 6 - R/V James Miller Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing from PSO vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
12/8/2017	16:59	Continuous layer of clouds	NW	3	10	41 05.216	71 08.203		536	Dolphin spp.		1000	2		Anchored, no equipment deployed	Whistles detected on spectrogram at 1659 approx. 1 kilometer away, not audible initially. 2 click trains visible on HF click detector, suggesting at least 2 individual dolphins. Buzzes and harmonics added to spectrogram, in addition to whistles, at 1730. Dolphins approached closer, coming within 500-450m from the Megan Miller, clicks detected on HF click detector from 120 to 137dB. Did not approach closer once vibrocore started, but remained visible as whistles on spectrogram until end of watch.	
12/11/2017	19:55	Partly Cloudy	NW	2	10	41 05.899	71 09.372		538	Dolphin, Short-beaked Common		500	6		Anchored, no equipment deployed	Dolphin entered the exclusion zone at 2010 causing production delays. Delphinid vocalizations detected again at 2305-2309 inside the EZ, going from 140dB to 182dB on the HF click detector, with numerous clicks, buzzes, harmonics, and some burst pulses. Faint whistles were seen on the spectrogram at 2313. Dolphins entered the EZ again at 2319-2324, with at least 8 click trains on the HF click detector. Dolphins once again entered the EZ from 2334-2338; faint whistles could be seen on the spectrogram for the rest of the watch, but no vocalizations detected on the HF click detector; clearance was given at 0038, and vibrocore went from 0039-0059.	
12/11/2017	21:21	Partly Cloudy	NW	2	10	41 06.0	71 09.1	73	538	Dolphin, Short-beaked Common	90	450	6	Bow riding	Circling Megan Miller	First detected by PAM at 20:10, then seen by PSOs bow riding James Miller. At least two juveniles riding closely next to adults. Bow riding and doing small circles away and returning. Last sighting at 23:40.	
12/12/2017	2:22	Partly Cloudy	NW	2	10	41 05.889	71 10.302		539	Dolphin spp.		500	4		Anchored, no equipment deployed	Faint whistles, buzzes and clicks were detected on the LF spectrogram. At least four simultaneous click trains were noted. Click amplitude remained well below 160 dB and averaged between 130-140 dB. The pod did not enter the exclusion zone. No mitigation was needed.	
12/12/2017	3:43	Continuous layer of clouds	NW	2	10	4105.8	7110.6	74	539	Dolphin, Short-beaked Common	205	450	2	bowing riding, playing	vibrocore testing	2 dolphins sighted off the starboard side of the James approximately 450 m away from the Megan. ID based on saddle pattern on dorsal and hour glass pattern. Individuals were bow riding the James. Last sighted 03:50	
12/12/2017	5:02	Continuous layer of clouds	NW	2	10	41 05.968	71 11.214		540	Dolphin spp.		450	5		Anchored, no equipment active	Dolphins detected at 0502 at 138dB with 5 click trains and burst pulses visible on the HF click detector; Buzzes, clicks, and a few whistles could be seen on the spectrogram. Vocalizations reached 160dB at 0514-0515, and again from 0522-0524, resulting in an extended prewatch. Dolphins were completely outside of the MZ by 0538. Vibrocore started 0627 and ended 0638.	
12/15/2017	8:32	Partly Cloudy	NW	2	10	4058.5	7144.5	75		Dolphin, Short-beaked Common	110	150	7	Transiting, bow riding	Circling, waiting for clearance	Both PSO's sighted dolphins on either side of the James Miller. One group came from the Megan's opposite side, through the EZ and toward the James to bow ride for a moment. The others remained with the James for a few minutes and left.	

Attachment 6 - R/V James Miller Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing from PSO vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
12/15/2017	14:30	Continuous layer of clouds	NW	1	10	4100.2	7142.1	76		Porpoise, Harbour	300	700	2	swimming at surface	vibracore running at full power	A small group of 2-3 dolphins were seen at 14:30 in the middle of the vibracore test about 700 m from R/V Megan Miller. Animals appeared to be heading toward the Megan but veered off to the side and did not approach the EZ. The dolphins surfaced infrequently and did not come up much past the surface of the water. No porpoising behavior was observed. Based on this and the triangular shape of their fins, we ID'd them as possible harbor porpoises but they were too far away from R/V James Miller for us to get a positive ID. Animals were last sighted at 14:50 after the vibracore test was complete and the gear was being pulled up from the ocean bottom.	
12/15/2017	16:52	Snow	NW	2	0.25	4100.22	7141.049		541	Dolphin spp.		300	2		Anchored, no equipment active	Delphinids were detected during prewatch. Whistles were detected aurally and on the spectrogram. HF click amplitude remained below 150 dB. They did not enter the exclusion zone at any time before or after vibracore testing and no mitigation was needed.	
12/15/2017	19:00	Snow	NW	2	0.25	4060	7141	77		Dolphin, Short-beaked Common	120	400	7	bow riding, porpoising, possibly feeding	Waiting to retest, circling Megan Miller	Saw a small group arrive at the James, but no delay was relayed by PAMs from the Megan Miller. Remained with the James as it circled the Megan. Possibly feeding as they occasionally whipped into tight circles or jetted off as though pursuing something. Remained until the James moved to the next location	
12/15/2017	20:48	Snow	NW	2	0.25	4100.622	7139.484		542	Dolphin spp.		200	5		Anchored, no equipment deployed	Delphinids detected at 2048 after boat depth sounder was turned off. 3 click trains were identified on the HF click detector, which also showed burst pulses. Whistles, clicks, buzzes, and harmonics could be seen on the spectrogram. Initial detections were at 161dB, increasing to 183dB by 2113; 5 click trains identified. Detected inside the EZ until 2115, at which point delphinids were not detected by hydrophones until 2123 with faint whistles on the spectrogram but not detected on click detector. Reappeared inside MZ at 2136 at 141dB, 2 click trains identified. Continued delay past pre-watch clearance time due to mechanical failures with deck generator, prohibiting vibrocore work.	
12/15/2017	22:27	Snow	NW	3	0.25	4100.622	7139.484		543	Dolphin spp.		1000	1		Anchored, no equipment deployed	Whistles detected on spectrogram, and aurally, at 2227; click detector showed extraneous noise from passing boat. Detected again on spectrogram at 2238.	
12/17/2017	19:09	Partly Cloudy	N	3	10	41 01.952	71 22.456	79	544	Dolphin, Short-beaked Common		500	8		Anchored, no equipment deployed	Delphinids were detected upon start of PAM watch. At least eight simultaneous click trains were discerned indicating the presence of at least eight individuals. The pod entered the exclusion zone at 19:17 and production was delayed until 21:05. The pod approached the port stern and were visually identified as Common dolphin. The final detection within the exclusion zone was at 20:05 and the final acoustic detection occurred at 20:34.	

Attachment 6 - R/V James Miller Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing from PSO vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
12/17/2017	19:12	Partly Cloudy	N	3	10	4101.9	7122.1	79	544	Dolphin, Short-beaked Common		10	4	travelling alongside vessel, feeding behavior, porpoising, swimming at surface	Circling Megan	Saw two alongside James, then PAM relayed detection and delay. Milled around the James, saw a mother/juvenile pair and few more adults. Sighting and delays ongoing. Last sighting at 20:40, start time delayed to 21:05	
12/18/2017	0:00	Continuous layer of clouds	N	2	10	4104.5	7122.6	80		Dolphin, Short-beaked Common	180	1000	2	traveling alongside R/V James	Megan pulling anchors	About 2 dolphins were spotted on the starboard side of R/V James Miller near the stern, about 10 m away from boat and 1000 m away from R/V Megan. Animals were swimming at surface and porpoising.	
12/18/2017	0:31	Continuous layer of clouds	N	2	10	41 01.947	71 22.724		546	Dolphin spp.		1000	2		Anchored, no equipment active	Delphinid sinusoidal whistle first detected on spectrogram at 0031, but did not register on HF click detector until 0038 at 131dB. 2 click trains visible. Clicks and upsweeps were detected, and reached 155dB. Dolphins left the MZ at 0108, but were still detected on spectrogram throughout vibrocore test.	
12/18/2017	3:27	Continuous layer of clouds	S	1	10	41 01.908	71 25.908		547	Dolphin spp.		500	2		Anchored, no equipment deployed	LF whistles and HF clicks remained low in amplitude, averaging 130-140 dB. Two simultaneous click trains suggest two individuals present. Vocalizations remained continuous throughout the PAM watch however, the delphinids did not enter the exclusion zone at any time and no mitigation was necessary.	
12/18/2017	6:15	Continuous layer of clouds	S	2	10	41 01.876	71 28.560		548	Dolphin spp.		1000	2		Anchored, no equipment active	LF upsweeping whistles detected faintly on LF spectrogram at 0615. Continued faint detection on spectrogram (but not HF click detector) throughout pre-watch.	
12/18/2017	8:53	Continuous layer of clouds	S	3	10	4101.9	7132.8	81		Whale, Fin	135	200	1	traveling	Megan pulling anchors	First noticed blow 200 m off the James, then subsequent blows and dorsal fin sightings progressively further from the work site. Moved too quickly to obtain definite identification. Only saw blow, dorsal fin and dorsal surface of the head. Did not fluke.	

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12/21/2017	7:52	Partly Cloudy	NW	2	10	4103.7	7112.1	82		Whale, Fin	330	500	1	Preparing to dive. Transiting through area.	Sending down testing equipment	Saw a blow near the James Miller as it circled the Megan Miller. Distance was over 500m from the Megan, so the first blow was seen on the opposite side of the James, which was about 300m from the Megan. Saw many subsequent blows, never a fluke or dorsal fin and seemed to be swimming away from both vessels. Did not need to restart watch or stop operations.	
12/21/2017	14:10	Partly Cloudy	NW	2	10	4103.7	7115.7	83		Whale, Fin	290	250	1	blow, dive	F/V Megan arrived on site, beginning to set anchors	Fin whale first seen at 14:10 approximately 250 m away from F/V Megan as it arrived on site and was beginning to set its anchors. Animal was headed south toward the wind mills away from the Megan. ID characteristics included a small, curved dorsal fin and smooth back with no distinct marks or colorations and a tall blow. Whale gave several blows before diving (did not show flukes). Observers were behind the whale (which was at least 700 m from F/V James) and could not see the animal from the side. Animal dove at 14:14 and did not resurface, so we could not confirm its species but based on its ID characteristics believe this was a probable fin whale.	
12/21/2017	18:23	Partly Cloudy	NW	2	10	4102.4	7117	84		Dolphin, Short-beaked Common	220	300	1	Transiting through area	Waiting for Megan to anchor	Saw one individual swimming parallel to the James. Did not see again nor any others.	
12/21/2017	18:35	Partly Cloudy	NW	2	10	41 02.703	71 17.356		549	Dolphin spp.		1000	6		Anchored, no equipment active	Whistles were faint and not aural. High frequency clicks were low in amplitude, averaging 140 dB indicating they were not within the exclusion zone. Clearance for testing was given and the pod did not enter the EZ while the equipment was active. Once testing was complete, amplitude gradually increased until the pod came within 200 meters at 19:50. Amplitude peaked at 184 dB. No mitigation action was needed.	

Attachment 6 - R/V James Miller Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing from PSO vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
12/21/2017	20:56	Partly Cloudy	NE	2	10	41 01.995	71 18.519	85	550	Dolphin, Short-beaked Common		450	6		Anchored, no equipment active	at 138dB; 3 click trains on HF click detector and faint whistles seen on spectrogram. 2107 first delay; vocalizations reached 162-182dB; clicks, buzzes, harmonics, and upsweep & downsweep whistles detected. Continually detected inside MZ between 140 and 150dB. Second delay at 2222-2226, at which point Common Dolphins were visually confirmed with dark v-saddle on dorsal side, swimming at surface and porpoising. Third delay at 2242-2244, reaching 176dB. Fourth delay at 2310-2316, reaching 182dB. Fifth delay when dolphins entered EZ from 2325-2327, reaching 165dB. Sixth delay 2337-2340. Not seen on HF click detector since 2342 but whistles still detected on spectrogram until shift rotation. Click trains were noted once again on the HF click detector module at 00:00. Amplitude remained relatively low and outside of the exclusion zone. Clearance for vibrocore testing was given at 00:40. Shortly after testing began, click amplitude increased until the pod entered the exclusion zone at 00:50. Five click trains were discerned, indicating a take of at least five individuals. The pod remained active inside the exclusion zone for seven minutes. At 00:57 click amplitude decreased below 150 dB and could no longer be distinguished from	
12/21/2017	21:31	Partly Cloudy	NE	2	10	4101.8	7118.7	85	550	Dolphin, Short-beaked Common	90	800	10	porpoising, swim at surface, feeding, bow-riding, breach (full body out of water), whistling	Anchored, testing delayed	Dolphins first observed at 21:31 by deck hand on portside bow of R/V James, about 800 m from R/V Megan. Animals were ID'd based on their characteristic saddle patch pattern (tan front, grey back), long narrow beaks and thin caudal peduncle. Some dolphins were swimming parallel and alongside the James while others were swimming in variable directions around the James and appeared to be feeding. At least 9 adults and 1 juvenile were seen. There were two dolphins with injuries on their dorsal fins; one had a rounded off dorsal fin that appeared to be fully healed, another had the tip of its dorsal fin hanging off but the skin was grey and there was no blood, likely a healing injury. Whistling could be heard at the surface. Last seen 23:37.	
12/22/2017	1:42	Partly Cloudy	NE	2	10	4101.8	7118.6	86	550	Dolphin, Short-beaked Common	0	600	4	porpoising; bow riding	between tests	dolphins first observed at starboard side of James Miller vessel; dolphins were within 10m of James Miller	
12/22/2017	3:07	Continuous layer of clouds	NE	2	10	41 01.969	71 21.019		551	Dolphin spp.		500	10		Anchored, no equipment active	Delphinid whistles first detected on LF spectrogram at 0307; 2 click trains visible on HF click detector, clicks between 125 and 132dB. Click trains increased to 5 at 0356, and stayed below 140dB. Vibrocore test started at 0407, dolphins detected at 147dB, increasing to 156dB by 0443. Vocalizations detected at 160+dB at 0444, with 6 click trains visible, resulting in a take of 6 dolphin spp. Vibrocore test ended at 0448, and dolphins exited EZ at 0508, after discerning at least 10 click trains; spectrogram showed sinusoidal and sweeping whistles and numerous clicks. Vocalizations still detected within MZ at end of watch at 0520.	
12/22/2017	4:59	Continuous layer of clouds	E	2	10	4101.9	7120.6	88		Dolphin, Short-beaked Common	45	700	4	porpoising; swimming; bowriding	test just ended		

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Date Started MM/DD/YYYY	Time Started (24hr)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing from PSO vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
12/22/2017	7:01	Continuous layer of clouds	E	2	10	41 01.894	71 27.167		552	Dolphin spp.		500	2		Anchored, no equipment active	Faint whistles and HF clicks from two delphinids registered low in amplitude approximately 500 meters from the vessel. The pod did not enter the exclusion zone during the watch.	
12/22/2017	7:51	Continuous layer of clouds	E	2	10	4102.1	7126.9	89		Whale, Fin	320	800	1	Preparing for dive, transiting	Test already begun	Saw two blows about 800m from Megan, 200m from James. Was unable to definitively identify as fin or sei whale, but saw back and head briefly. Did not roll to dive. Did not fluke. Subsequent surfacing at greater and greater distance from site.	
12/22/2017	8:55	Continuous layer of clouds	E	2	10	4101.7	7129.8	90		Dolphin, Short-beaked Common	340	20	1	transiting alongside vessel, bowriding	Moving to next site	Saw one individual only. First a dorsal fin cutting through the water pushed by the bow, then entire body clearly visible as it surfaced again. Did not see again. Saw in transit to next site didn't get depth	
12/22/2017	19:43	Continuous layer of clouds	SE	4	10	41 01.719	71 35.157	91	554	Dolphin, Short-beaked Common		1000	11		Anchored, no equipment active	Vocalizations detected on LF spectrogram at 1943, showing upsweeps, downsweeps, and tonal whistles. By 1959, vocalizations had reached 160dB, up to 183dB. At least 11 click trains could be discerned, and buzzes, whistles, and harmonics could be seen on the spectrogram, as well as burst pulses on the HF click detector. Pre-watch before the re-test was delayed. PAM visual confirmation of common dolphins based on dark dorsal coming to V point under dorsal fin. Delay ongoing during PAM rotation.	
12/22/2017	20:00	Continuous layer of clouds	SE	4	10	4101.5	7135	91	554	Dolphin, Short-beaked Common		10	4	Swimming next to boat, bow riding	Circling Megan, just completed testing	Saw a small group bow riding the James as it circled the Megan. Remained for only a few minutes, then not seen again. Did not take bearing.	
12/22/2017	20:25	Continuous layer of clouds	SE	4	10	4101.8	7135.6	92		Dolphin, Short-beaked Common	240	800	3	porpoising, bow riding, swimming at surface	Megan anchored, waiting for EZ to be cleared for re-test	Dolphins were first seen traveling alongside R/V James Miller approximately 800 m from R/V Megan Miller. Animals first observed bowriding and traveling alongside the James. Were swimming at surface and porpoising, then left the area and were not seen again. Last seen at 20:33	
12/22/2017	22:25	Continuous layer of clouds	SE	4	10	4101.5	7134.9	93		Dolphin, Short-beaked Common	330	600	3	bowriding, swimming at surface, porpoising, feeding	Megan anchored, re- test complete	Three dolphins were observed swimming at the surface alongside R/V James Miller. They were later observed swimming in variable directions around the James, possibly feeding. Two dolphins swam closely together, possibly a mom/calf or mom/juvenile pair, although both dolphins were similar in size. The third dolphin was nearby but did not swim with the pair. Dolphins stayed with the James until we began transiting to the next test site at 23:19	
12/27/2017	11:01	Partly Cloudy	NW	1	10	4111.4	7135	94		Seal, Harbor	235	100	1	head above water; diving	transiting	One seal, about 100ft off the bow of the James Miller, dove under the water after a very brief surfacing. A couldn't get depths	

Attachment 6 - R/V James Miller Sighting Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Sighting Number	Acoustic Detection Number	Species/ Species Group	Bearing from PSO vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals first detected	Comments	Duration (HH:MM)
12/27/2017	12:00	Partly Cloudy	NW	2	10	4106.2	7134.2	95		Whale spp.	147	200	1	swimming at surface	transiting	While steaming to site, one blow was seen off the Megan's bow. The Megan had already altered course before the sighting, so no mitigation was required and we passed the individual at a greater distance than initially spotted. Subsequent blows seemed be headed the opposite way the vessels were travelling. Did not see more than two blows, no dorsal fin, no fluke.	
12/27/2017	13:41	Partly Cloudy	NW	3	10	4101.7	7133.6	96		Dolphin, Short-beaked Common	90	350	45	Passing through	preparing for test	Saw large group of dolphins headed straight toward the James, pass under the vessel and pop up on the other side between the Megan and James. Saw at least 4 calf/juveniles porpoising. The majority of the group maintained a distance of 300 to 400 m from the Megan headed directly toward a much larger moving vessel that had just passed the test site. A small group of around 3 broke off to remain with the James for a few minutes before taking off in the direction of the larger group. Did not enter EZ.	
12/29/2017	5:14	Fog or Thick Haze	NW	1	1	4103.6	7115.6	97		Dolphin, Short-beaked Common	100	1000	4	Bow riding, porpoising, swimming at surface (poss. Feeding)	Megan setting anchor, James driving around Megan	A group of 4 common dolphins were seen porpoising and bowriding off the R/V James' port side bow at 5:14. Animals were ID'd based on the distinct saddle patch pattern on their sides. Animals were swimming alongside the James and a couple appeared to splash at the surface, possibly feeding. Dolphins last seen at 5:22	
12/29/2017	5:54	Fog or Thick Haze	NW	1	1	4103.9	7114.9	98		Dolphin, Short-beaked Common		650	2	Bow riding, porpoising, swimming at surface (poss. Feeding)	on site; Megan setting anchors		
12/30/2017	14:48	Fog or Thick Haze	W	1	1	4104	7108.3	99		Seal, Grey	120	310	1	Head above surface, looked around area, dove back down into water	Megan pulling up anchors, James nearby	Seal appeared on the starboard port side of the R/V James. Only its head was visible out of the surface of the water, but it could be ID'd based on its head shape and the length of its snout. Seal was only at the surface for a brief time before diving back down into the water and was not seen again	

Attachment 7

R/V James Miller Take Summary

Attachmetn 7 - R/V James Miller Take Summary



Date Started MM/DD/YYYY	Time Started (24hr)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Vessel Speed (knots)	Sighting Number	Acoustic Detection Number	How first detected?	Method of Detection	Species/ Species Group	Bearing from PSO vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals last detected	Comments	Duration (HH:MM)
11/3/2017	3:23					40 57.2	71 52.4	0		506	a	PAM	Dolphin, Short-beaked Common		30	8		Anchored, no equipment active	Delphinid vocalizations detected for entirety of PAM shift, including vibracore operations. No localization possible within Panguard, but assumed (and visually confirmed) within 200m exclusion zone.	1:41
11/3/2017	4:31	Partly Cloudy	SW	2	10	40 57.2	71 52.3	3.1	15	506	a	PAM	Dolphin, Short-beaked Common		30	8		Anchored, no equipment active	Delphinid vocalizations detected for entirety of PAM shift, including vibracore operations. No localization possible within Panguard, but assumed (and visually confirmed) within 200m exclusion zone.	0:33
11/3/2017	4:51	Partly Cloudy	SW	2	10	40 57.3	71 52.3	3.6	15	506	a	night vision	Dolphin spp.		200	2	Bow riding, swimming at surface, feeding at surface	vibracore not running	Dolphins were first detected acoustically before they were seen at 4:51 via night vision. Dolphins ID'd as Common Dolphins based on the saddle patch/hourglass pattern on their sides and slender beaks. Were first seen bow riding on the port side of R/V James within 5 m of boat. They were seen at 4:57 swimming and feeding at the surface within 10 m port side of R/V James. Last sighting was at 5:17.	0:26
11/12/2017	17:18				10	41 05.872	71 08.174	0	26	515	a		Dolphin, Short-beaked Common		400	7		Anchored, no equipment active	Detected within the exclusion zone at 17:33-17:37 (HF clicks >160 dB), delaying CPT until after 18:37. Dolphins again detected within exclusion zone at 18:58-19:01, during CPT activity, resulting in a take. Continuous detection from start of watch to end of watch. Species visually confirmed by off-duty PAM.	
11/12/2017	17:22	Continuous layer of clouds	NE	1	10	41 05.6	71 08.2	5.9	26	515	b	Naked eye	Dolphin, Short-beaked Common	270	500	5	bowriding	Anchored, no equipment active	The vessel completed the first test, which ended up being a refusal. During the middle of the second test the dolphins came into the EZ operations were unable to shut down before a take could occur, last seen at 18:12. Dolphins were seen swimming out of the EZ toward the R/V James Miller and proceeded to bowride until 18:12. ID'd as Common dolphins based on the saddleback pattern on their sides (tan front, light grey back), long narrow beaks, and A small group of dolphins remained with the James Miller edging closer to the EZ. Notified captains when they entered, but testing had begun already. Unable to stop.	0:50
11/24/2017	14:04	Partly Cloudy	SW	2	10	4102	7130.2	3.4	44		v	naked eye	Dolphin, Short-beaked Common	45	10	4	travelling directly toward Megan Miller	completed testing		unk
11/24/2017	21:29	clear	W	4	10	41 01.971	71 19.629	0		522	a		Dolphin spp.		500	6		Anchored, no equipment active	Initial delphinid detection occurred outside of the exclusion zone and clearance for CPT test was given at 21:15. Amplitude increased to above 160 dB, indicating the pod entered the exclusion zone at 22:17, before testing was complete and resulting in a take. The pod left the exclusion zone at 22:47. The CPT was not successful and the next attempt was delayed until 60-minute clearance could be given at 23:47. Vocalizations were still detected on the LF spectrogram and HF click detector modules	1:18
11/25/2017	3:30	Partly Cloudy	E	4	10	41 02.309	71 17.666	0	49	524	a		Dolphin spp.		200	6		Anchored, equipment on ocean bottom waiting to retest	Initial delphinid detection occurred outside EZ and clearance for CPT was given, but delphinids were detected inside EZ at 1600db and above one minute after CPT was started, indicating that the pod had entered the EZ and was considered a take. Test was not successful and another 60 min prewatch was started for the retest. Delphinids were still detected in and	0:45
12/3/2017	5:40				10	41 06.654	71 10.286	0		529	a	a	Dolphin, Short-beaked Common		205	2		Anchored, vibro core equipment onboard	Vibro core test started at 0535, dolphins detected at 140db at 0537, increasing to 156dB. 160dB threshold crossed at 0540, increasing to 173 dB. MF clicks and buzzes could be seen on spectrogram and 2 individual click trains were detected, suggesting at least 2 individuals. Unable to stop vibro core test once in use. Off-watch PAM was able to visually identify as Common Dolphins, and saw 1 adult. Dolphins exited EZ but remained inside MZ until PAM	

Attachmetn 7 - R/V James Miller Take Summary

Date Started MM/DD/YYYY	Time Started (24hr)	Weather	Wind Direction	Beaufort Scale	Visibility (nautical miles)	Latitude (N)	Longitude (W)	Vessel Speed (knots)	Sighting Number	Acoustic Detection Number	How first detected?	Method of Detection	Species/ Species Group	Bearing from PSO vessel to animal	Distance of animal to source (m)	Best Est. (#)	Behaviour	Vessel activity when animals last detected	Comments	Duration (HH:MM)
12/3/2017	18:24				10	41 06.529	71 09.393	0	64	530	a	a	Dolphin, Short-beaked Common		500	6		Anchored, no equipment active	A pod of six Short-beaked common dolphins were detected immediately upon start of the PAM watch. They remained outside of the exclusion zone until 19:03, at which time a delay of production was required. They were visually identified when they approached the port side of the vessel, approximately 30 feet from the source. One calf was observed. At 19:12 HF click amplitude decreased to below 160 dB, indicating the pod left the exclusion zone and a 60-minute prewatch began. Vocalizations were still being detected at low amplitudes and outside of the exclusion zone consistently on the HF click detector and LF spectrogram. Clearance was given for vibrocore testing to begin at 20:12. Click amplitudes on the HF click detector modules gradually increased once coring began, reaching 160-185 dB. It was established the pod entered the exclusion zone at 20:19, resulting in a take. The dolphins remained inside the exclusion zone	
12/3/2017	20:38	Partly Cloudy	NW	2	10	4106.6	7109.1	4.1	64	530	v	naked eye	Dolphin, Short-beaked Common	85	5	6	Milling, bow riding	Seen my MMO's just after test was run, then they followed us to the next site.	Dolphins sighted around James Miller. Last sighted at 23:25.	
12/8/2017	19:39	Continuous layer of clouds	NW	2	10	41 05.861	71 08.182	0	72	537	a	acoustic	Dolphin, Short-beaked Common		500	5	bow riding, porpoising, feeding	Anchored, equipment recovered & on deck	AD 537 resulted in two mitigation actions: one delay and an incidental take of four common dolphins. Dolphins were detected immediately upon beginning watch at 19:38. Seven individuals were discerned on the high frequency click detector module. The off duty PAM operator was able to visually identify common dolphins approximately 10 feet off the port side of the vessel. The pod entered the exclusion zone repeatedly from 20:00 to 23:47 causing production delays. Clearance for vibrocore testing was given at 00:47, after a 60 minute prewatch cleared the exclusion zone, though vocalizations were still being detected on the HF and LF modules. Vibrocore testing began at 00:47. HF click amplitude gradually increased to 160 dB and four dolphins entered the exclusion zone at 00:49, resulting in a take. The dolphins remained above 160dB until 10 minutes into vibrocore testing, at which point they left the EZ but remained visible at around	
12/9/2017	0:47	Continuous layer of clouds	NW	2	10	41 05.861	71 08.182	0	72	537	a	acoustic	Dolphin, Short-beaked Common		500	5	bow riding, porpoising, feeding	Anchored, equipment recovered & on deck	AD 537 resulted in two mitigation actions: one delay and an incidental take of four common dolphins. Dolphins were detected immediately upon beginning watch at 19:38. Seven individuals were discerned on the high frequency click detector module. The off duty PAM operator was able to visually identify common dolphins approximately 10 feet off the port side of the vessel. The pod entered the exclusion zone repeatedly from 20:00 to 23:47 causing production delays. Clearance for vibrocore testing was given at 00:47, after a 60 minute prewatch cleared the exclusion zone, though vocalizations were still being detected on the HF and LF modules. Vibrocore testing began at 00:47. HF click amplitude gradually increased to 160 dB and four dolphins entered the exclusion zone at 00:49, resulting in a take. The dolphins remained above 160dB until 10 minutes into vibrocore testing, at which point they left the EZ but remained visible at around	
12/17/2017	16:40	Partly Cloudy	N	3	10	4101.9	7122.5	3.6	78		v	naked eye	Dolphin, Short-beaked Common	290	150	5	travelling alongside vessel.	circling Megan	Saw two individuals swimming away from the Megan Miller's bow towards the James Miller. Saw a few more following and they passed under the James' bow and continued on.	
12/17/2017	22:44	Continuous layer of clouds	N	3	10	41 01.948	71 22.456	0		545	a	acoustic	Dolphin spp.		325	3		anchored, no equipment active	No dolphins detected in area since 2034, vibrocore test (re-do) started at 2244. Delphinid vocalizations detected at 2312, with 3 click trains, and clicks on the HF click detector registering 144-156dB. Reached 160dB, to 165dB, from 2316-2318, resulting in 3 takes. LF whistles (sinusoidal, upsweeps, downsweeps, and tonal), clickz and buzzes were seen on the spectrogram, in addition to HF clicks and burst pulses on the HF click detector. Dolphins returned to the EZ at 2323, reaching 182dB.	

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12/22/2017	0:47	Partly Cloudy	NE	2	10	41 01.995	71 18.519	0	85	550	a	hydrophone	Dolphin, Short-beaked Common		450	6		Anchored, no equipment active	Delphinid vocalizations detected at 2056 at 138dB; 3 click trains on HF click detector and faint whistles seen on spectrogram. 2107 first delay, vocalizations reached 162-182dB; clicks, buzzes, harmonics, and upsweep & downsweep whistles detected. Continually detected inside MZ between 140 and 150dB. Second delay at 2222-2226, at which point Common Dolphins were visually confirmed with dark v-saddle on dorsal side, swimming at surface and porpoising. Third delay at 2242-2244, reaching 176dB. Fourth delay at 2310-2316, reaching 182dB. Fifth delay when dolphins entered EZ from 2325-2327, reaching 165dB. Sixth delay 2337-2340. Not seen on HF click detector since 2342 but whistles still detected on spectrogram until shift rotation. Click trains were noted once again on the HF click detector module at 00:00. Amplitude remained relatively low and outside of the exclusion zone. Clearance for vibrocore testing was given at 00:40. Shortly after testing began, click amplitude increased until the pod entered the exclusion zone at 00:50. Five click trains were discerned, indicating a take of at least five individuals. The pod remained active inside the exclusion zone for seven minutes. At 00:57 click amplitude decreased below 150 dB and could no longer be distinguished from mechanical sounds generated by the vibrocore. Testing was completed at 01:19. Faint whistles and click trains were detected by the	
12/22/2017	4:12	Continuous layer of clouds	NE	2	10	4101.9	7121.9	4.0	87	551	v	naked eye	Dolphin, Short-beaked Common	205	650	2	porpoising; bow riding, swimming	testing	two adult dolphins spotted next to the James Miller; dolphins stayed near to the James Miller until peeling off in the general direction of the Megan Miller; last spotted by the James Miller around 0435; Megan Miller had 6 incidental	
12/22/2017	4:43	Continuous layer of clouds	NE	2	10	41 01.969	71 21.019	0	87	551	a	hydrophone	Dolphin spp.		500	10		Anchored, no equipment active	Delphinid whistles first detected on LF spectrogram at 0307; 2 click trains visible on HF click detector, clicks between 125 and 132dB. Click trains increased to 5 at 0356, and stayed below 140dB. Vibrocore test started at 0407, dolphins detected at 147dB, increasing to 156dB by 0443. Vocalizations detected at 160+dB at 0444, with 6 click trains visible, resulting in a take of 6 dolphin spp. Vibrocore test ended at 0448, and dolphins exited EZ at 0508, after discerning at least 10 click trains; spectrogram showed sinusoidal and sweeping whistles and numerous clicks. Vocalizations still	
12/22/2017	17:53	Continuous layer of clouds	SE	4	10	41 01.719	71 35.157	0		553	a	hydrophone	Dolphin spp.		475	3		Anchored, vibrocore test active	2 initial click trains detected on HF click detector at 1753 at 135dB, growing to 3 click trains and 149dB. Downsweeping and upsweeping whistles seen on LF spectrogram at 1803 through 1820. Vibrocore test started at 1826, and 6 HF click trains were noted at 1849, starting at 159dB and growing to 183dB, resulting in a take. Vocalizations not detected since 1902, and vibrocore test ended at 1915. Continued PAM monitoring while crew	