



Gulf of Mexico Incidental Take Regulation Annual Report – April 2022–April 2023: Data Reporting and Analysis

August 2023 revised December 2023

TABLE OF CONTENTS

- Acronyms and Abbreviations.....5**
- 1 Introduction6**
 - 1.1 Objectives7
- 2 Methods9**
 - 2.1 Data Collection and Entry9
 - 2.1.1 Database Development 9
 - 2.2 Data Analysis 10
 - 2.2.1 Summary of Geophysical Activity..... 10
 - 2.2.2 Summary of Monitoring Activity..... 12
 - 2.2.3 Summary of Mitigation Measures..... 12
 - 2.2.4 Sighting rates 13
- 3 Results 14**
 - 3.1 Summary of Geophysical Activities 14
 - 3.2 Summary of Monitoring Effort29
 - 3.3 Visibility34
 - 3.4 Summary of Mitigation Measures.....40
 - 3.4.1 Sighting Rate.....74
 - 3.5 Data Quality Management80
- 4 Summary and Conclusions81**
- 5 Recommendations for Adaptive Management83**
- 6 Research Reporting.....84**
 - 6.1 Research Topics84
 - 6.1.1 GOM-PROP Companies’ Research and Development.....84
 - 6.1.2 Monitoring Technology.....85
 - 6.1.3 Research Tools86
 - 6.1.4 Ghost Net Initiative.....86

Table List

Table 2-1	Vessel activity codes reported in the effort data sorted by source activity category.	12
Table 3-1	Survey type and zones for the permits that completed surveys in the first two years.....	15
Table 3-2	Total effort (hours) by survey, zone, month, and ITR year for all vessel activity codes.	16
Table 3-3	Total effort (hours) by survey, zone, month, and ITR year for vessel activity codes indicating the source was powered (i.e., data acquisition, line change or testing) or possibly powered (i.e., other and unknown).....	20
Table 3-4	Total effort (hours) by survey, zone, and month for vessel transit.	23
Table 3-5	Total effort (hours) by survey, zone, and month when the source was likely inactive or status unknown (deploying/retrieving equipment; standby; weather patterns; and no data).	26
Table 3-6	Summary of monitoring effort by zone and source status. Data presented as distance in kilometers.....	30
Table 3-7	Summary of monitoring effort by zone and source status. Data represent time in hours.....	31
Table 3-8	Summary of pre-start clearance zones and delay times by species.	42
Table 3-9	Summary of shutdown zones and shutdown times by species.	42
Table 3-10	Summary of all visual observations by source activity.	43
Table 3-11.	Summary of all visual observations by management zone.	44
Table 3-12.	Summary of observed individuals at any distance while the source was active and take estimations for the year in the ITR.	45
Table 3-13.	Summary of behavior and mitigations for marine mammal observations when the source was active.....	46
Table 3-14.	Summary of behavior and mitigations for marine mammal observations when the source was silent and a delay was incurred.	67
Table 3-15.	Sighting rates per hour by zone and source activity for visual observations for years 1 and 2.....	75
Table 3-16.	Sighting rates per kilometer by zone and source activity for years 1 and 2.	77

Figure List

Figure 2-1.	Gulf of Mexico with the seven management zones used in the ITR highlighted with purple lines.....	11
Figure 3-1	Proportion of time with specific visibility distance for all survey effort for years 1 and 2, and both years combined. ND=no data.....	35
Figure 3-2.	Proportion of time with specified visibility distances when source is active for years 1 and 2, and both years combined. ND = no data.....	37
Figure 3-3.	Proportion of time with each reported Beaufort sea state for all survey effort. ND = no data.	39

Figure 3-4. Proportion of time with each reported Beaufort sea state when the source was active. ND = no data. 40

Figure 3-5. Proportion of observations that occurred in each visibility distance bin for years 1 and 2. ND is no data reported. 79

Figure 3-6. Proportion of observations that occurred at each Beaufort sea state for years 1 and 2. ND is no data reported. 79

Appendix

Appendix A Fields and Drop-down Menu Options for Data Collection Sheets (INFORMED by RPS) 88

ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition
3D	Three Dimensional
4D	Four Dimensional
BF	Beaufort
BOEM	Bureau of Ocean Energy Management
ESA	Endangered Species Act
FR	Federal Regulation
GIS	Geographic Information System
GOM	Gulf of Mexico
GOM-PROP	Gulf of Mexico Proactive Regulatory and Observational Program
hr	hour
ITR	Incidental Take Regulations
km	kilometer
LOA	Letter of Authorization
ND	No Data
NMFS	National Marine Fisheries Service
NTL	Notice to Lessees
OBN	Ocean Bottom Node
PAM	Passive Acoustic Monitoring
PAMO	Passive Acoustic Monitoring Observer
PSO	Protected Species Observer
UTC	Coordinated Universal Time
VSP	Vertical Seismic Profiling

1 INTRODUCTION

Per the Incidental Take Regulation (ITR) for Taking Marine Mammals Incidental to Geophysical Surveys Related to Oil and Gas Activities in the Gulf of Mexico (GOM), an annual research and monitoring report has been developed by industry, detailing and summarizing the research and monitoring conducted by the member companies of the EnerGeo Alliance, American Petroleum Institute, Offshore Operators Committee, and National Ocean Industries Association relevant to potential effects of geophysical surveys on marine mammals in the GOM. To achieve this collective reporting for Letter of Authorization (LOA)-holders, the EnerGeo Alliance and its industry organization collaborators developed the U.S. Gulf of Mexico Proactive Regulatory and Observational Program (GOM-PROP) to collect, manage, and synthesize Protected Species Observer (PSO) data, as described in the ITR. The monitoring portion of this report focuses on the requirements of the ITR (86 Federal Register [FR] 5322).

The requirements include the following for comprehensive, collective reporting by LOA-holders:

- Summary of geophysical activity;
- Summary of monitoring effort by acoustic source status, location, and visibility conditions;
- Summary of mitigation measures implemented by survey type and location;
- Sighting rates of marine mammals and variables that could affect detectability; including
 - Analysis of the effects of various factors influencing the detectability of marine mammals (e.g., wind speed, sea state, swell height, presence of glare or fog)
- Summary of observations, including;
 - Initial sighting distance of marine mammals relative to sound source
 - Closest point of approach of marine mammals relative to source status
 - Observed behaviors and types of movements of marine mammals relative to source status
 - Distribution/presence of marine mammals around the survey vessel relative to source status
- Summary and conclusions from monitoring; and
- Recommendations for adaptive management.

The limitations and uncertainties associated with marine mammal observer data have been taken into consideration. The proposed report will consider the core issues described above and discuss our ability to evaluate these issues in the context of monitoring data, with an emphasis on discussion of processes that can increase confidence in outcomes of analyses. Monitoring data include sightings and passive acoustic monitoring, and both data types will be considered for quantitative and qualitative ways to address questions in the context of validating risk modelling, informing behavioral response science, and evaluating existing mitigation approaches.

1.1 Objectives

The objective of this report was to process and assess the PSO data collected during the first two years of implementation of the ITR by GOM-PROP members. The majority (>76%) of the authorized LOAs were issued to GOM-PROP members which are represented in this report. Other authorizations issued to non-GOM-PROP members are not represented in this report as companies are not required to join GOM-PROP. GOM-PROP members include the following companies (in alphabetical order):

- Beacon Offshore Energy;
- bp;
- CGG/Sercel;
- Chevron;
- Equinor;
- ExxonMobil;
- Hess Corporation;
- Houston Energy LP;
- Kosmos Energy;
- LLOG Exploration;
- Magseis Fairfield;
- Occidental Petroleum Corporation;
- Petroleum Geo-Services;
- PXGEO;
- Quarter North Energy;
- Schlumberger;
- Shell;
- Talos;
- TGS-NOPEC; and
- Woodside, FMA: BHP.

This analysis included processing observer data collected during geophysical surveys conducted in the GOM, statistically analyzing those data, and creating visualizations on multiple spatial and temporal scales. Examples of the types of statistical analyses of interest in reporting include those conducted in Barkaszi et al. (2012, 2019), such as evaluating differences in recorded behavior when the sound source is on or off.

Based on recommendations from Barton et al. (2008), a standard suite of data fields as described in Bureau of Ocean Energy Management (BOEM) Notice to Lessees 2016-G02 was collected aboard geophysical survey

vessels in the GOM, allowing for integration and analysis of datasets for large-scale evaluation across multiple surveys. It is recognized that there is an interest in using monitoring data products as appropriate to address the following questions for each species (or stock) as possible:

- Behavioral response (or lack of response) to geophysical surveys of various types;
- Species/hearing group behavioral sensitivity to geophysical surveys;
- Effectiveness of shutdown, power-down, and soft-start mitigations to reduce potential impacts/take; and
- Quantification as possible of efficacy of mitigation and marine mammal responses with respect to adjustment of take estimates to improve models.

While the extent of observations of marine mammals for the limited number of surveys that occurred in the first two years of the ITR are not adequate to address all of these questions, we use this opportunity to assess data quality and data collection to be able to address these questions in the future as more data are collected and to make recommendations for improvements to data collection methods where necessary.

2 METHODS

2.1 Data Collection and Entry

PSOs and passive acoustic monitoring operators (PAMOs) recorded data on monitoring effort, environmental conditions, source operations, and cetacean and sea turtle sighting/detection events using customized electronic spreadsheets (Microsoft Excel; Table A-1 in Appendix A). The vessel crews provided source operational times from daily logs, which were cross-referenced with data collected by the PSOs and PAMOs while on watch.

For this report, visual sightings of protected species are defined as ‘observations’ and occurrences detected through Passive Acoustic Monitoring (PAM) as ‘detections’. For each observation/detection event, the time (Coordinated Universal Time [UTC]), vessel position, vessel course, water depth, species, number of animals, group age/sex composition, sighting/detection distance and bearing, animals heading and movement, the animal(s) behavior, vessel activity, the source operational status, and environmental data were recorded to the best of the PSO/PAMOs ability (Table A-2 and Table A-3). Distance estimations of marine mammals to the observation platform (i.e., Distance estimations of marine mammals to the observation platform (i.e., observer) were determined by the use of reticle scale binoculars.

Species identification was confirmed where possible, with reference to marine mammal identification guides. Where marine fauna could not be conclusively identified at species level (either due to distance from observer, weather/sea state, glare from the sun or other factors), a record was made of the closest identifiable cetacean group based upon known identifying parameters (Table A-4). If positive species identification could not be made, marine fauna sightings were recorded as unidentified (e.g., unidentified large cetacean; Table A-4).

2.1.1 Database Development

GOM-PROP endeavored to provide a database that would go beyond simply satisfying regulatory objectives and would also provide operational value to GOM-PROP members. Marine Remote Services LLC developed and deployed an independently administered, central PSO database solution to support a comprehensive reporting system across dozens of companies with various contractors and subcontractors. The database was designed to unify PSO sightings collected by multiple PSO service providers and to consider complex industry issues such as: (1) managing confidential business information while facilitating collaboration; (2) achieving consistency in data collection and management; (3) logistics of compiling and storing data; (4) ensuring data collection meets analysis requirements; and (4) achieving participation from LOA holders.

The resulting database, firstKnowledge™, is a standalone, fully functional, and independent web-served PSO time-series database which is designed to contain user-submitted protected species detection data in an industry-supported format. The access portal allows for portal sign-in and a specific database access authentication which determines what functionality is available and which dataset details are accessible to different users. All records entered were scrutinized for duplication and an audit trail established for all subsequent data manipulation performed.

A basic set of use cases was designed and created that describe stakeholder data needs. Use cases incorporated the following:

- Multiple authentication levels addressing the basic and advanced stakeholder requirements;
- A secure data collection portal with secured individual contributor access;
- User dashboard serving metrics from user-specific datasets;
- Basic reporting capability;
- Fulfilling the custom needs of industry analysis; and
- Managing, integrating, and analyzing spatial information using ElasticSearch™ as a geographic information system.

Data integrity refers to the reliability and trustworthiness of data throughout its lifecycle. It can describe the state of the data or the process of ensuring and preserving the validity and accuracy of data. Data security refers to the protection of data, while data integrity refers to the trustworthiness of data. To ensure data integrity, we monitor input and data validation, data security, and backup, as well as access control and audit trail.

Finally, firstKnowledge™ is designed so that specific details of data contributions from system users will be maintained in separate tables, ensuring anonymity while retaining the ability to connect to the relevant record and allow for the use of table and foreign keys during specific data mining and reporting operations.

2.2 Data Analysis

2.2.1 Summary of Geophysical Activity

Data for this report encompasses a two-year timeframe, spanning from April 19, 2021, the date the ITR was issued, to April 19, 2023. Year 1 data is comprised of all surveys that were completed between April 19, 2021, and April 19, 2022. Year 2 data is comprised of all surveys that were completed between April 20, 2022 and April 19, 2023.

To assess effort data, the first step was to map the associated geographic coordinates and overlaid them with the seven management zones identified in the ITR for the GOM (Figure 2-1). A management zone was then assigned to each entry for effort and for each marine mammal observation and detection.

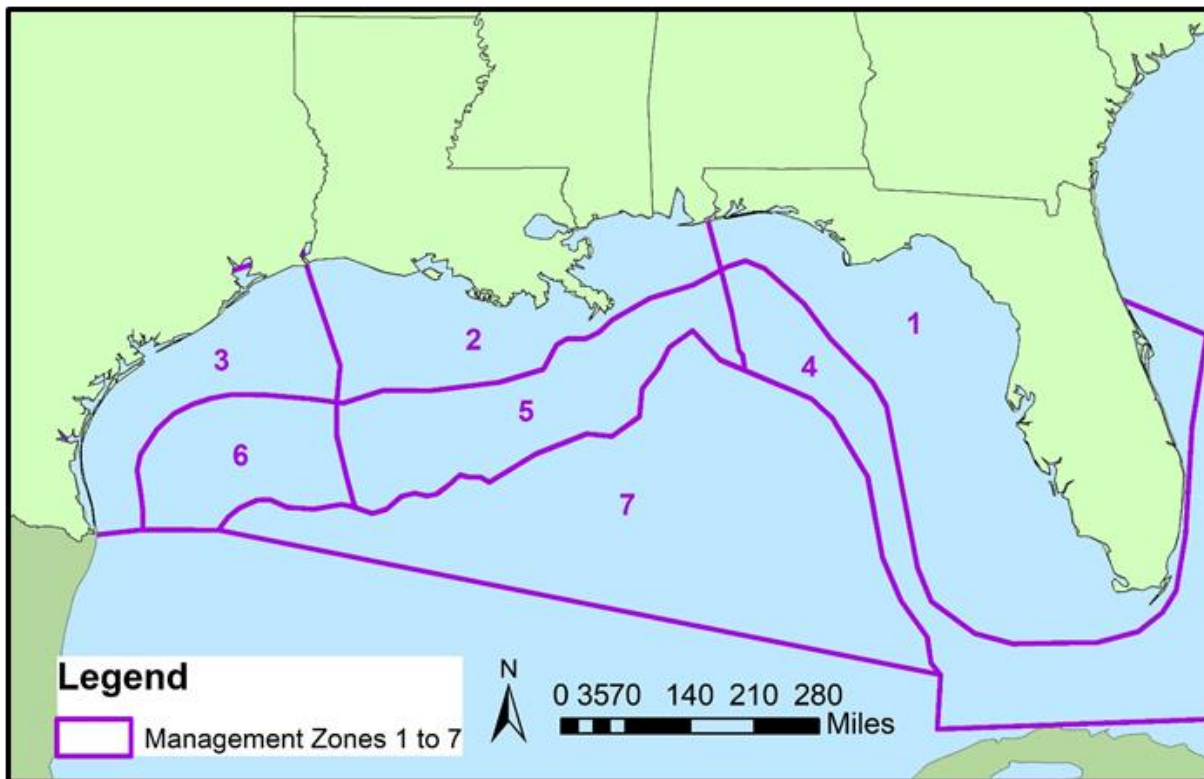


Figure 2-1. Gulf of Mexico with the seven management zones used in the ITR highlighted with purple lines.

The next step was focused on the vessel activity codes (Table 2-1; Appendix A). These codes were sorted into three categories: active source, inactive source, and transit. Transit implies an inactive source; however, it also separates data collected on-site for surveys from time spent traveling to the survey site. The ‘Other’ vessel activity code indicated a variety of special activities, including pre-survey clearance, ramp-up, marine mammal or sea turtle mitigation shutdown or pause, and troubleshooting/maintenance. Given that the active source codes represented more than 76.8% of survey time (see the Results section), conservatively the ‘Other’ code and empty fields (‘No Data’) were both considered as active source even though the data do not confirm the sources were active. In total there were 3.45 hours of effort with no vessel activity code recorded (‘No Data’) in Year 1 and zero hours in Year 2. For the ‘Other’ code, there were 120.2 hours of effort in Year 1 and 197.7 hours in Year 2. Combined these codes represent 1.5% of active source time or 1.2% of all effort time.

The effort data was summarized by total hours/day for each survey permit number by month and zone. For each entry, we determined the total time represented by the entry by subtracting the end time by the start time (see Appendix A for fields in the database). The times were summed across permit number, month, and zone.

Table 2-1 Vessel activity codes reported in the effort data sorted by source activity category.

Vessel Activity Code	Category
Data Acquisition	Active Source
Deploying/Retrieving Equipment	Inactive Source
Line Change	Active Source
Standby	Inactive Source
Testing	Active Source
Transit	Transit
Weather Patterns	Inactive Source
Bunkering	Active Source
Other	Active Source
No Data	Active Source

Effort in the first two years of the ITR is not necessarily reflective of typical or expected effort. LOAs were difficult to obtain. Estimation of future effort should not rely solely on these data.

2.2.2 Summary of Monitoring Activity

Three categories were next applied (Active Source, Inactive Source and Transit), sorting the data by the type of monitoring: PAM only, PAM and visual, and visual only. These data were summarized by both time (hours [hr]) and distance (kilometers [km]) for the time/distance of monitoring for each type and activity category in each zone. Time was calculated as described above. To calculate distance, the average of start vessel speed and end vessel speed for each entry (see Appendix A for fields in database) was taken. Next vessel speed was averaged for each vessel activity code (Table 2-1) and zone. These values were converted from knots to km/hr and multiplied by total time to calculate distance traveled in kilometers.

Next, environmental conditions such as visibility and Beaufort scale were considered. The data was summarized by the amount of time represented by each of the environmental condition codes for all data and for data collected while the source was active.

2.2.3 Summary of Mitigation Measures

Marine mammal observations and detections for both visual and acoustic monitoring methods were summarized. These detections and observations were then summarized by the three activity codes (Active Source, Inactive Source, Transit) and by zone. For observations and detections that occurred while the source

was active, mitigation measures and total mitigation shutdown were summarized. For all summaries both the number of groups (i.e., number of observations) and the total number of estimated individuals are reported.

2.2.4 Sighting rates

Sighting rates for both groups and individuals were calculated by dividing the number of groups/individuals by total monitoring effort. Both hours and kilometers for total monitoring effort in was taken into account for calculations. Sighting rates were calculated for each zone and for each activity code (Active Source, Inactive Source, Transit). The potential impact of visibility and Beaufort scale on sighting rates was considered by comparing visibility and Beaufort scales when there were marine mammal observations with visibility and Beaufort scales for all effort.

3 RESULTS

3.1 Summary of Geophysical Activities

The ITR categorizes surveys into five source categories: two-dimensional (2D), three-dimensional (3D) narrow azimuth (NAZ), 3D wide azimuth (WAZ), coil, and shallow penetration/high resolution geophysical (HRG). For purposes of estimating potential take, NMFS uses the category of survey that best fits the proposed activities. The surveys performed in the Gulf of Mexico during Year 1 and Year 2 included the following: 3D ocean bottom node (OBN), four-dimensional (4D) OBN, vertical seismic profiling (VSP), 3D high resolution survey, and 4D high resolution survey, which were classified as shown in Table 3-1. OBN surveys consist of autonomous recording nodes which are laid on the seabed by remotely operated vehicles while a streamer with the sound source is towed from a vessel over the nodes. VSP surveys consist of a sound source being lowered into the well or borehole and are used to perform seismic profiling. Three-dimensional surveys are carried out by activating the source along closely spaced parallel lines with a towed streamer array. Four-dimensional seismic surveys are time-lapse surveys repeating 3D surveys over time.

During the Year 1 of ITR implementation, data for nine surveys were received and during Year 2 data for seven new surveys were received (Table 3-1). Several surveys spanned both Year 1 and Year 2. Table 3-2 shows the amount of survey effort (in hours) for each survey across zones and months for all vessel activity codes. Most of the active source activity occurred in Zone 5, representing 63.3% over both years, followed by Zone 7, representing 12.8% of all active sources over both years.

No data acquisition was reported for Zone 2 or 3 in Year 1, however there were records for line change and testing which we assumed were active sources. In Year 2, there were a small number of data acquisition activities in Zones 2 and 3, representing 0.03% and 0.01% of all data acquisition recorded, respectively. In addition, there were line change, testing, and “other” activities recorded in those zones in Year 2. No transit monitoring effort was reported for permit A-00005 or N-10171 because the vessel used for the survey performed non-survey-related work in the immediate vicinity of the well that was surveyed before and after the survey. Transits to and from the area were many weeks before and after the survey. The PSO and PAM crew were flown to and from the vessel just for the survey. All other surveys for both years reported transit effort (Table 3-4).

Survey effort when the source was not active (excluding transit) represented 20.3% of all survey time (Table 3-5). For all vessel activities recorded in the database and representing total time on the water, transit represented 3.0% of the total time on water; and source active codes represented 76.8%.

Table 3-1 Survey type and zones for the permits that completed surveys in the first two years.

Permit	Survey Year(s)	Survey Type	ITR Source Category*	Zones of Active Survey
A-00005	1	VSP	2D	5
L20-029	1, 2	4D OBN	Coil	3, 4, 5
L21-014	1	VSP	Coil	5, 7
L21-021	1	4D High-Resolution Survey	3D NAZ	5
L21-024	1	3D OBN	Coil	5, 7
L21-035	2	4D OBN	Coil	2, 5
L21-037	2	4D OBN	Coil	5, 7
L21-038	1, 2	4D OBN	3D NAZ	5, 7
L21-039	2	4D OBN	3D NAZ	3, 5, 7
L22-003	2	3D OBN	Coil	2, 3, 5
L22-004	2	3D OBN	Coil	5, 7
L22-007	1, 2	3D OBN	Coil	2, 5, 7
N-10171	2	VSP	Coil	5
T20-004	1	3D High-Resolution Survey (Tuned Pulse Source [TPS])	3D NAZ	3, 6, 7
T21-001	1	4D High-Resolution Survey	3D NAZ	6, 7
T23-001	2	3D High-Resolution Survey	Coil	6

*If a survey type was not specified in the ITR, an equivalent type of survey was applied to assess potential take estimation in the LOA. Equivalency was based on individual survey characteristics.

Table 3-2 Total effort (hours) by survey, zone, month, and ITR year for all vessel activity codes.

Permit	ITR Year 1									ITR Year 2									Total Effort by Month	
	A-00005	L20-029	L21-014	L21-021	L21-024	L21-038	L22-007	T20-004	T21-001	L20-029	L21-035	L21-037	L21-038	L21-039	L22-003	L22-004	L22-007	N-10171		T23-001
Zone 1																				
22-Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.9	-	-	-	1.9
Total Survey Time Zone 1 = 1.9 hrs (0.1 days)																				
Zone 2																				
21-Oct	-	-	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.0
21-Nov	-	-	2.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.8
22-Jan	-	-	-	-	62.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	62.9
22-Feb	-	-	-	-	9.4	-	1.7	-	-	-	-	-	-	-	-	-	-	-	-	11.1
22-Mar	-	3.1	-	4.0	22.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	29.8
22-Apr	-	-	-	-	-	1.1	-	-	-	2.8	-	-	-	-	-	-	-	-	-	3.8
22-May	-	-	-	-	-	-	-	-	-	-	1.1	2.7	5.5	-	-	-	-	-	-	9.2
22-Jun	-	-	-	-	-	-	-	-	-	-	-	-	0.6	0.8	-	-	-	-	-	1.3
22-Jul	-	-	-	-	-	-	-	-	-	-	-	6.9	-	15.1	-	-	-	-	-	22.0
22-Aug	-	-	-	-	-	-	-	-	-	-	-	-	-	10.1	-	-	-	-	-	10.1
22-Sep	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9	7.2	-	-	-	-	8.1
22-Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35.3	-	-	-	-	35.3
22-Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.7	-	-	-	-	6.7
22-Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	52.4	-	-	53.9
23-Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19.1	12.1	-	-	31.2
23-Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.5	-	-	16.5
23-Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0	21.5	-	-	26.5
23-Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18.8	0.4	-	-	19.2
Total Survey Time Zone 2 = 354.5 hrs (14.8 days)																				
Zone 3																				

Permit	ITR Year 1									ITR Year 2									Total Effort by Month	
	A-00005	L20-029	L21-014	L21-021	L21-024	L21-038	L22-007	T20-004	T21-001	L20-029	L21-035	L21-037	L21-038	L21-039	L22-003	L22-004	L22-007	N-10171		T23-001
21-Jul	-	-	-	-	-	-	-	14.7	-	-	-	-	-	-	-	-	-	-	-	14.7
21-Aug	-	-	-	-	-	-	-	2.3	6.3	-	-	-	-	-	-	-	-	-	-	8.6
21-Sep	-	-	-	-	-	-	-	-	33.0	-	-	-	-	-	-	-	-	-	-	33.0
21-Oct	-	-	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5
21-Nov	-	-	2.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.3
22-Feb	-	65.0	-	9.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	74.8
22-Mar	-	-	-	9.9	20.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30.0
22-Apr	-	-	-	-	-	12.6	-	-	-	-	-	-	-	-	-	-	-	-	-	12.6
22-Jun	-	-	-	-	-	-	-	-	-	-	-	-	-	41.1	-	-	-	-	-	41.1
22-Jul	-	-	-	-	-	-	-	-	-	-	-	3.8	-	-	-	-	-	-	-	3.8
22-Sep	-	-	-	-	-	-	-	-	-	-	-	-	-	2.9	27.1	-	-	-	-	30.0
22-Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.3	-	-	-	6.3
23-Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23.5	23.5
Total Survey Time Zone 3 = 282.1 hrs (11.8 days)																				
Zone 4																				
22-Apr	-	-	-	-	-	-	-	-	-	0.8	-	-	-	-	-	-	-	-	-	0.8
22-Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.3	-	-	-	13.3
Total Survey Time Zone 4 = 14.1 hrs (0.6 days)																				
Zone 5																				
21-Oct	-	-	148.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	148.3
21-Nov	-	-	116.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	116.3
22-Jan	-	-	-	-	1058.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1058.6
22-Feb	7.8	190.2	-	12.5	1131.6	-	10.0	-	-	-	-	-	-	-	-	-	-	-	-	1352.2
22-Mar	-	624.5	-	656.8	474.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1755.5
22-Apr	-	449.1	-	4.2	-	105.6	-	-	-	229.2	-	-	171.1	-	-	-	-	-	-	959.1

Permit	ITR Year 1									ITR Year 2									Total Effort by Month	
	A-00005	L20-029	L21-014	L21-021	L21-024	L21-038	L22-007	T20-004	T21-001	L20-029	L21-035	L21-037	L21-038	L21-039	L22-003	L22-004	L22-007	N-10171		T23-001
22-May	-	-	-	-	-	-	-	-	-	263.1	233.7	148.9	485.4	-	-	-	-	-	-	1131.1
22-Jun	-	-	-	-	-	-	-	-	-	-	-	323.2	369.4	13.2	-	-	-	68.3	-	774.0
22-Jul	-	-	-	-	-	-	-	-	-	-	-	94.5	-	1269.9	-	-	-	-	-	1364.5
22-Aug	-	-	-	-	-	-	-	-	-	-	-	-	-	1110.4	-	-	-	-	-	1110.4
22-Sep	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1271.2	-	-	-	-	1271.2
22-Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1365.5	-	-	-	-	1365.5
22-Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	285.8	96.6	-	-	-	382.4
22-Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	583.6	764.3	-	-	1348.0
23-Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	754.7	998.3	-	-	1753.0
23-Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	977.3	1112.0	-	-	2089.2
23-Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1350.8	1266.1	-	-	2617.0
23-Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	274.8	800.9	-	-	1075.7
Total Survey Time Zone 5 = 21672.0 hrs (903.0 days)																				
Zone 6																				
21-Jul	-	-	-	-	-	-	-	85.2	-	-	-	-	-	-	-	-	-	-	-	85.2
21-Aug	-	-	-	-	-	-	-	32.4	26.6	-	-	-	-	-	-	-	-	-	-	59.1
21-Sep	-	-	-	-	-	-	-	-	63.9	-	-	-	-	-	-	-	-	-	-	63.9
21-Oct	-	-	-	-	-	-	-	-	0.7	-	-	-	-	-	-	-	-	-	-	0.7
22-Sep	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.1	-	-	-	-	17.1
23-Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	53.4	53.4
Total Survey Time Zone 6 = 279.4 hrs (11.6 days)																				
Zone 7																				
21-Jul	-	-	-	-	-	-	-	181.6	-	-	-	-	-	-	-	-	-	-	-	181.6
21-Aug	-	-	-	-	-	-	-	40.8	29.5	-	-	-	-	-	-	-	-	-	-	70.3
21-Sep	-	-	-	-	-	-	-	-	340.0	-	-	-	-	-	-	-	-	-	-	340.0

Permit	ITR Year 1									ITR Year 2									Total Effort by Month	
	A-00005	L20-029	L21-014	L21-021	L21-024	L21-038	L22-007	T20-004	T21-001	L20-029	L21-035	L21-037	L21-038	L21-039	L22-003	L22-004	L22-007	N-10171		T23-001
21-Oct	-	-	135.3	-	-	-	-	-	349.2	-	-	-	-	-	-	-	-	-	-	484.5
21-Nov	-	-	63.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63.9
22-Jan	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
22-Feb	-	1.0	-	12.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.0
22-Mar	-	-	-	54.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	54.1
22-Apr	-	-	-	12.6	-	28.2	-	-	-	-	-	-	74.6	-	-	-	-	-	-	115.3
22-May	-	-	-	-	-	-	-	-	-	-	-	45.8	219.9	-	-	-	-	-	-	265.7
22-Jun	-	-	-	-	-	-	-	-	-	-	-	390.2	155.0	-	-	-	-	-	-	545.1
22-Jul	-	-	-	-	-	-	-	-	-	-	-	388.6	-	84.2	-	-	-	-	-	472.8
22-Aug	-	-	-	-	-	-	-	-	-	-	-	-	-	270.7	-	-	-	-	-	270.7
22-Sep	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.6	-	-	-	-	3.6
22-Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	80.5	-	-	-	80.5
22-Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	677.1	-	-	-	677.1
23-Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	527.4	1.0	-	-	528.4
23-Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	339.8	1.5	-	-	341.2
23-Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	81.8	-	-	-	81.8
23-Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.6	-	-	-	16.6
Total Survey Time Zone 7 = 4606.2 hrs (191.9 days)																				
Survey Totals	7.8	1333.0	474.4	775.8	2779.6	147.4	11.7	357.1	849.2	495.9	234.8	1404.6	1481.3	2819.2	3019.3	5827.0	5047.1	68.3	76.9	27210.2
Total Effort Year 1 = 6736.0 hrs																				
Total Effort Year 2 = 20474.3 hrs																				
Total Effort = 27210.2 hrs																				

* Zone totals are reported in hours with days in parentheses. Dashes indicate no effort reported for that combination of permit, month, and zone.

**There were no surveys reported in April-June 2021 and December 2021. Some LOAs were not complete by April 19, 2023, and are therefore not included in the analysis at this time

Table 3-3 Total effort (hours) by survey, zone, month, and ITR year for vessel activity codes indicating the source was powered (i.e., data acquisition, line change or testing) or possibly powered (i.e., other and unknown).

Permit	ITR Year 1									ITR Year 2									Total Effort by Month	
	A-00005	L20-029	L21-014	L21-021	L21-024	L21-038	L22-007	T20-004	T21-001	L20-029	L21-035	L21-037	L21-038	L21-039	L22-003	L22-004	L22-007	N-10171		T23-001
Zone 2																				
22-May	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	0.1
22-Sep	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	-	-	2.0
22-Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.3	-	-	3.3
23-Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.8	-	-	1.8
23-Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.7	-	-	5.7
23-Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4	-	-	0.4
Total Survey Time Zone 2 = 13.2 hrs (0.5 days)																				
Zone 3																				
21-Jul	-	-	-	-	-	-	-	7.5	-	-	-	-	-	-	-	-	-	-	-	7.5
21-Aug	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	0.3
22-Feb	-	20.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.8
22-Jun	-	-	-	-	-	-	-	-	-	-	-	-	-	11.7	-	-	-	-	-	11.7
22-Sep	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.8	-	-	-	-	9.8
Total Survey Time Zone 3 = 50.1 hrs (2.1 days)																				
Zone 4																				
Apr-22	-	-	-	-	-	-	-	-	-	0.8	-	-	-	-	-	-	-	-	-	0.8
Total Survey Time Zone 4 = 0.8 hrs (0.0 days)																				
Zone 5																				
Oct-21	-	-	125.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125.4
Nov-21	-	-	99.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	99.3
Jan-22	-	-	-	-	748.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	748.0
Feb-22	7.3	16.2	-	-	906.6	-	1.0	-	-	-	-	-	-	-	-	-	-	-	-	931.0

Permit	ITR Year 1									ITR Year 2									Total Effort by Month	
	A-00005	L20-029	L21-014	L21-021	L21-024	L21-038	L22-007	T20-004	T21-001	L20-029	L21-035	L21-037	L21-038	L21-039	L22-003	L22-004	L22-007	N-10171		T23-001
Mar-22	-	517.0	-	501.8	407.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1426.2
Apr-22	-	427.4	-	3.0	-	39.6	-	-	-	226.7	-	-	93.2	-	-	-	-	-	-	789.9
May-22	-	-	-	-	-	-	-	-	-	240.7	211.3	122.2	365.9	-	-	-	-	-	-	940.1
Jun-22	-	-	-	-	-	-	-	-	-	-	-	305.2	336.1	-	-	-	-	20.1	-	661.3
Jul-22	-	-	-	-	-	-	-	-	-	-	-	71.3	-	707.9	-	-	-	-	-	779.2
Aug-22	-	-	-	-	-	-	-	-	-	-	-	-	-	1041.2	-	-	-	-	-	1041.2
Sep-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1073.1	-	-	-	-	1073.1
Oct-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1274.2	-	-	-	-	1274.2
Nov-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	267.4	18.8	-	-	-	286.2
Dec-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	240.5	350.3	-	-	590.8
Jan-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	704.3	871.3	-	-	1575.6
Feb-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	839.4	926.9	-	-	1766.2
Mar-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1273.6	1033.1	-	-	2306.6
Apr-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	145.3	656.6	-	-	801.9
Total Survey Time Zone 5 = 17216.2 hrs (717.3 days)																				
Zone 6																				
Jul-21	-	-	-	-	-	-	-	63.0	-	-	-	-	-	-	-	-	-	-	-	63.0
Aug-21	-	-	-	-	-	-	-	23.7	1.2	-	-	-	-	-	-	-	-	-	-	24.9
Sep-21	-	-	-	-	-	-	-	-	11.2	-	-	-	-	-	-	-	-	-	-	11.2
Feb-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26.9	26.9
Total Survey Time Zone 6 = 126.0 hrs (5.3 days)																				
Zone 7																				
Jul-21	-	-	-	-	-	-	-	166.5	-	-	-	-	-	-	-	-	-	-	-	166.5
Aug-21	-	-	-	-	-	-	-	27.7	1.1	-	-	-	-	-	-	-	-	-	-	28.8
Sep-21	-	-	-	-	-	-	-	-	242.0	-	-	-	-	-	-	-	-	-	-	242.0

Permit	ITR Year 1									ITR Year 2									Total Effort by Month	
	A-00005	L20-029	L21-014	L21-021	L21-024	L21-038	L22-007	T20-004	T21-001	L20-029	L21-035	L21-037	L21-038	L21-039	L22-003	L22-004	L22-007	N-10171		T23-001
Oct-21	-	-	113.3	-	-	-	-	-	321.7	-	-	-	-	-	-	-	-	-	-	435.0
Nov-21	-	-	63.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63.9
Jan-22	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
Apr-22	-	-	-	-	-	12.4	-	-	-	-	-	-	48.9	-	-	-	-	-	-	61.3
May-22	-	-	-	-	-	-	-	-	-	-	-	45.2	170.5	-	-	-	-	-	-	215.7
Jun-22	-	-	-	-	-	-	-	-	-	-	-	383.0	135.6	-	-	-	-	-	-	518.6
Jul-22	-	-	-	-	-	-	-	-	-	-	-	377.2	-	18.0	-	-	-	-	-	395.2
Aug-22	-	-	-	-	-	-	-	-	-	-	-	-	-	253.6	-	-	-	-	-	253.6
Nov-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.6	-	-	-	12.6
Dec-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	274.9	-	-	-	274.9
Jan-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	458.2	1.0	-	-	459.2
Feb-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	285.8	1.0	-	-	286.8
Mar-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	66.7	-	-	-	66.7
Apr-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	-	-	-	0.8
Total Survey Time Zone 7 = 3481.7 hrs (145.1 days)																				
Total Effort Year 1 = 4876.3 hrs																				
Total Effort Year 2 = 16011.6 hrs																				
Total Effort = 20887.9 hrs																				

*Zone totals are reported in hours with days in parentheses. Dashes indicate no effort reported for that combination of permit, month, and zone.

**There were no surveys reported in April-June 2021 and December 2021. Some LOAs were not complete by April 19, 2023, and are therefore not included in the analysis at this time

Table 3-4 Total effort (hours) by survey, zone, and month for vessel transit.

Permit	ITR Year 1								ITR Year 2								Total Effort by Month	
	L20-029	L21-014	L21-021	L21-024	L21-038	L22-007	T20-004	T21-001	L20-029	L21-035	L21-037	L21-038	L21-039	L22-003	L22-004	L22-007		T23-001
Zone 1																		
22-Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.9	-	-	1.9
Total Survey Time Zone 1 = 1.9 hrs (0.1 days)																		
Zone 2																		
21-Oct	-	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.0
21-Nov	-	2.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.8
22-Jan	-	-	-	32.4	-	-	-	-	-	-	-	-	-	-	-	-	-	32.4
22-Feb	-	-	-	9.4	-	1.0	-	-	-	-	-	-	-	-	-	-	-	10.4
22-Mar	2.1	-	4.0	11.0	-	-	-	-	-	-	-	-	-	-	-	-	-	17.0
22-Apr	-	-	-	-	1.1	-	-	-	2.8	-	-	-	-	-	-	-	-	3.8
22-May	-	-	-	-	-	-	-	-	-	-	2.7	5.5	-	-	-	-	-	8.2
22-Jun	-	-	-	-	-	-	-	-	-	-	-	0.6	0.8	-	-	-	-	1.3
22-Jul	-	-	-	-	-	-	-	-	-	-	6.9	-	15.1	-	-	-	-	22.0
22-Aug	-	-	-	-	-	-	-	-	-	-	-	-	10.1	-	-	-	-	10.1
22-Sep	-	-	-	-	-	-	-	-	-	-	-	-	0.9	5.0	-	-	-	5.9
22-Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	35.3	-	-	-	35.3
22-Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	6.7	-	-	-	6.7
22-Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	24.5	-	26.0
23-Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19.0	3.4	-	22.4
23-Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.4	-	3.4
23-Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0	15.8	-	20.8
23-Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18.6	-	-	18.6
Total Survey Time Zone 2 = 251.1 hrs (10.5 days)																		
Zone 3																		

Permit	ITR Year 1								ITR Year 2								Total Effort by Month	
	L20-029	L21-014	L21-021	L21-024	L21-038	L22-007	T20-004	T21-001	L20-029	L21-035	L21-037	L21-038	L21-039	L22-003	L22-004	L22-007		T23-001
21-Aug	-	-	-	-	-	-	2.0	6.3	-	-	-	-	-	-	-	-	-	8.3
21-Sep	-	-	-	-	-	-	-	18.7	-	-	-	-	-	-	-	-	-	18.7
21-Oct	-	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5
21-Nov	-	2.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.3
22-Feb	16.3	-	9.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26.1
22-Mar	-	-	9.9	14.0	-	-	-	-	-	-	-	-	-	-	-	-	-	23.9
22-Apr	-	-	-	-	12.6	-	-	-	-	-	-	-	-	-	-	-	-	12.6
22-Jun	-	-	-	-	-	-	-	-	-	-	-	-	12.2	-	-	-	-	12.2
22-Jul	-	-	-	-	-	-	-	-	-	-	3.8	-	-	-	-	-	-	3.8
22-Sep	-	-	-	-	-	-	-	-	-	-	-	-	2.9	5.6	-	-	-	8.5
22-Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.3	-	-	6.3
23-Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.2	9.2
Total Survey Time Zone 3 = 133.3 hrs (5.6 days)																		
Zone 4																		
22-Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.3	-	-	13.3
Total Survey Time Zone 4 = 13.3 hrs (0.6 days)																		
Zone 5																		
21-Oct	-	9.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.0
21-Nov	-	9.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.0
22-Jan	-	-	-	34.3	-	-	-	-	-	-	-	-	-	-	-	-	-	34.3
22-Feb	12.7	-	1.0	16.9	-	2.0	-	-	-	-	-	-	-	-	-	-	-	32.6
22-Mar	1.8	-	14.4	20.4	-	-	-	-	-	-	-	-	-	-	-	-	-	36.6
22-Apr	2.3	-	-	-	11.8	-	-	-	-	-	-	-	-	-	-	-	-	14.1
22-May	-	-	-	-	-	-	-	-	0.3	0.3	19.4	3.2	-	-	-	-	-	23.2
22-Jun	-	-	-	-	-	-	-	-	-	-	-	7.7	11.2	-	-	-	-	18.9
22-Jul	-	-	-	-	-	-	-	-	-	-	16.7	-	26.4	-	-	-	-	43.2

Permit	ITR Year 1								ITR Year 2								Total Effort by Month	
	L20-029	L21-014	L21-021	L21-024	L21-038	L22-007	T20-004	T21-001	L20-029	L21-035	L21-037	L21-038	L21-039	L22-003	L22-004	L22-007		T23-001
22-Aug	-	-	-	-	-	-	-	-	-	-	-	-	22.8	-	-	-	-	22.8
22-Sep	-	-	-	-	-	-	-	-	-	-	-	-	-	4.0	-	-	-	4.0
22-Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	14.0	-	-	-	14.0
22-Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	1.0	-	-	2.5
22-Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.3	3.8	-	12.1
23-Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.6	-	-	2.6
23-Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.5	-	8.5
23-Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.0	3.1	-	7.1
23-Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63.6	-	-	63.6
Total Survey Time Zone 5 = 358.1 hrs (14.9 days)																		
Zone 6																		
21-Jul	-	-	-	-	-	-	7.0	-	-	-	-	-	-	-	-	-	-	7.0
21-Aug	-	-	-	-	-	-	6.8	5.6	-	-	-	-	-	-	-	-	-	12.4
21-Sep	-	-	-	-	-	-	-	14.4	-	-	-	-	-	-	-	-	-	14.4
21-Oct	-	-	-	-	-	-	-	0.7	-	-	-	-	-	-	-	-	-	0.7
Total Survey Time Zone 6 = 34.4 hrs (1.4 days)																		
Zone 7																		
21-Jul	-	-	-	-	-	-	1.0	-	-	-	-	-	-	-	-	-	-	1.0
21-Sep	-	-	-	-	-	-	-	1.0	-	-	-	-	-	-	-	-	-	1.0
22-Jul	-	-	-	-	-	-	-	-	-	-	-	-	1.0	-	-	-	-	1.0
22-Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.3	-	-	12.3
23-Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.9	-	-	3.9
Total Survey Time Zone 7 = 19.2 hrs (0.8 days)																		
Total Effort Year 1 = 333.0 hrs																		
Total Effort Year 2 = 478.2 hrs																		
Total Effort = 811.2 hrs																		

*Zone totals are reported in hours with days in parentheses. Dashes indicate no effort reported for that combination of permit, month, and zone

**There were no surveys reported in April-June 2021 and December 2021. Some LOAs were not complete by April 19, 2023, and are therefore not included in the analysis at this time

Table 3-5 Total effort (hours) by survey, zone, and month when the source was likely inactive or status unknown (deploying/retrieving equipment; standby; weather patterns; and no data).

Permit	ITR Year 1									ITR Year 2									Total Effort by Month	
	A-00005	L20-029	L21-014	L21-021	L21-024	L21-038	L22-007	T20-004	T21-001	L20-029	L21-035	L21-037	L21-038	L21-039	L22-003	L22-004	L22-007	N-10171		T23-001
Zone 2																				
Jan-22	-	-	-	-	30.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30.5
Feb-22	-	-	-	-	-	-	0.7	-	-	-	-	-	-	-	-	-	-	-	-	0.7
Mar-22	-	1.0	-	-	11.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.8
May-22	-	-	-	-	-	-	-	-	-	-	1.0	-	-	-	-	-	-	-	-	1.0
Sep-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	0.2
Dec-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.7	-	-	24.7
Jan-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	7.0	-	-	7.0
Feb-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.4	-	-	7.4
Mar-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.7	-	-	5.7
Apr-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	0.3
Total Survey Time Zone 2 = 90.2 hrs (3.8 days)																				
Zone 3																				
Jul-21	-	-	-	-	-	-	-	7.3	-	-	-	-	-	-	-	-	-	-	-	7.3
Sep-21	-	-	-	-	-	-	-	-	14.3	-	-	-	-	-	-	-	-	-	-	14.3
Feb-22	-	28.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28.0
Mar-22	-	-	-	-	6.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.2
Jun-22	-	-	-	-	-	-	-	-	-	-	-	-	-	17.2	-	-	-	-	-	17.2
Sep-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.7	-	-	-	-	11.7
Feb-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.3	14.3

Permit	ITR Year 1									ITR Year 2									Total Effort by Month	
	A-00005	L20-029	L21-014	L21-021	L21-024	L21-038	L22-007	T20-004	T21-001	L20-029	L21-035	L21-037	L21-038	L21-039	L22-003	L22-004	L22-007	N-10171		T23-001
Total Survey Time Zone 3 = 98.8 hrs (4.1 days)																				
Zone 5																				
Oct-21	-	-	13.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.9
Nov-21	-	-	8.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.0
Jan-22	-	-	-	-	276.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	276.3
Feb-22	0.6	161.4	-	11.5	208.1	-	7.0	-	-	-	-	-	-	-	-	-	-	-	-	388.5
Mar-22	-	105.7	-	140.6	46.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	292.7
Apr-22	-	19.4	-	1.2	-	54.2	-	-	-	2.5	-	-	77.9	-	-	-	-	-	-	155.1
May-22	-	-	-	-	-	-	-	-	-	22.1	22.1	7.3	116.3	-	-	-	-	-	-	167.8
Jun-22	-	-	-	-	-	-	-	-	-	-	-	18.0	25.6	2.0	-	-	-	48.2	-	93.8
Jul-22	-	-	-	-	-	-	-	-	-	-	-	6.5	-	535.7	-	-	-	-	-	542.2
Aug-22	-	-	-	-	-	-	-	-	-	-	-	-	-	46.4	-	-	-	-	-	46.4
Sep-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	194.1	-	-	-	-	194.1
Oct-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	77.3	-	-	-	-	77.3
Nov-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.0	76.8	-	-	-	93.7
Dec-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	334.8	410.3	-	-	745.1
Jan-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47.9	127.0	-	-	174.8
Feb-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	137.9	176.6	-	-	314.6
Mar-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	73.3	229.9	-	-	303.2
Apr-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	65.8	144.3	-	-	210.1
Total Survey Time Zone 5 = 4097.6 hrs (170.7 days)																				
Zone 6																				
Jul-21	-	-	-	-	-	-	-	15.3	-	-	-	-	-	-	-	-	-	-	-	15.3
Aug-21	-	-	-	-	-	-	-	2.0	19.8	-	-	-	-	-	-	-	-	-	-	21.8
Sep-21	-	-	-	-	-	-	-	-	38.3	-	-	-	-	-	-	-	-	-	-	38.3

Permit	ITR Year 1									ITR Year 2									Total Effort by Month	
	A-00005	L20-029	L21-014	L21-021	L21-024	L21-038	L22-007	T20-004	T21-001	L20-029	L21-035	L21-037	L21-038	L21-039	L22-003	L22-004	L22-007	N-10171		T23-001
Sep-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.1	-	-	-	-	17.1
Feb-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26.6	26.6
Total Survey Time Zone 6 = 119.0 hrs (5.0 days)																				
Zone 7																				
Jul-21	-	-	-	-	-	-	-	14.1	-	-	-	-	-	-	-	-	-	-	-	14.1
Aug-21	-	-	-	-	-	-	-	13.0	28.4	-	-	-	-	-	-	-	-	-	-	41.4
Sep-21	-	-	-	-	-	-	-	-	97.1	-	-	-	-	-	-	-	-	-	-	97.1
Oct-21	-	-	22.0	-	-	-	-	-	27.5	-	-	-	-	-	-	-	-	-	-	49.5
Feb-22	-	1.0	-	12.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.0
Mar-22	-	-	-	54.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	54.1
Apr-22	-	-	-	12.6	-	15.8	-	-	-	-	-	-	25.7	-	-	-	-	-	-	54.0
May-22	-	-	-	-	-	-	-	-	-	-	-	0.7	49.4	-	-	-	-	-	-	50.0
Jun-22	-	-	-	-	-	-	-	-	-	-	-	7.2	19.4	-	-	-	-	-	-	26.6
Jul-22	-	-	-	-	-	-	-	-	-	-	-	11.4	-	65.3	-	-	-	-	-	76.6
Aug-22	-	-	-	-	-	-	-	-	-	-	-	-	-	17.1	-	-	-	-	-	17.1
Sep-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.6	-	-	-	-	3.6
Nov-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	67.9	-	-	-	67.9
Dec-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	390.0	-	-	-	390.0
Jan-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	69.1	-	-	-	69.1
Feb-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	53.9	0.5	-	-	54.4
Mar-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.3	-	-	-	11.3
Apr-23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.8	-	-	-	15.8
Total Survey Time Zone 7 = 1105.4 hrs (4.61 days)																				
Total Effort Year 1 = 1526.6 hrs																				
Total Effort Year 2 = 3984.5 hrs																				

Permit	ITR Year 1									ITR Year 2									Total Effort by Month
	A-00005	L20-029	L21-014	L21-021	L21-024	L21-038	L22-007	T20-004	T21-001	L20-029	L21-035	L21-037	L21-038	L21-039	L22-003	L22-004	L22-007	N-10171	
Total Effort = 5511.1 hrs																			

*Dashes indicate no effort reported for that combination of permit, month, and zone.

**There were no surveys reported in April-June 2021 and December 2021. Some LOAs were not complete by April 19, 2023, and are therefore not included in the analysis at this time

3.2 Summary of Monitoring Effort

General Monitoring Effort

See Table 3-6.

Table 3-6 Summary of monitoring effort by zone and source status. Data presented as distance in kilometers.

Monitoring Type	ITR Year 1			Year 1 Total	ITR Year 2			Year 2 Total	Combined Total
	Active (km)	Inactive (km)	Transit (km)		Active (km)	Inactive (km)	Transit (km)		
Zone 1									
PAM only (night)	0.0	0.0	0.0	0.0	0.0	0.0	27.9	27.9	27.9
Zone 1 Totals	0.0	0.0	0.0	0.0	0.0	0.0	27.9	27.9	27.9
Zone 2									
PAM only (night)	0.0	0.0	0.0	0.0	64.4	0.0	0.0	64.4	64.4
Visual and PAM (day)	0.0	6.8	0.0	6.8	26.2	1.1	0.0	27.3	34.1
Visual only (day)	0.0	346.5	948.9	1295.4	27.6	203.5	2146.2	2377.4	3672.8
Zone 2 Totals	0.0	353.3	948.9	1302.2	118.3	204.6	2146.2	2469.1	3771.3
Zone 3									
PAM only (night)	2.2	0.0	0.0	2.2	57.7	15.0	0.0	72.7	74.9
Visual and PAM (day)	44.3	2.2	0.0	46.5	81.3	59.4	0.0	140.7	187.2
Visual only (day)	159.0	342.0	1423.7	1924.8	0.0	189.2	576.2	765.4	2690.2
Zone 3 Totals	205.6	344.2	1423.7	1973.5	139.0	263.6	576.2	978.8	2952.3
Zone 4									
Visual and PAM (day)	0.0	0.0	0.0	0.0	6.0	0.0	0.0	6.0	6.0
visual only (day)	0.0	0.0	0.0	0.0	0.0	0.0	262.8	262.8	262.8
Zone 4 Totals	0.0	0.0	0.0	0.0	6.0	0.0	262.8	268.8	268.8
Zone 5									
PAM only (night)	13822.1	1745.9	22.8	15590.8	49847.7	5455.5	59.0	55362.2	70953.0
Visual and PAM (day)	14764.0	1709.1	0.0	16473.1	58591.6	6373.6	108.2	65073.5	81546.6
Visual and PAM (night)	0.0	0.0	0.0	0.0	52.6	0.0	0.0	52.6	52.6

Monitoring Type	ITR Year 1			Year 1 Total	ITR Year 2			Year 2 Total	Combined Total
	Active (km)	Inactive (km)	Transit (km)		Active (km)	Inactive (km)	Transit (km)		
Visual only (day)	285.1	3960.8	1990.5	6236.4	284.9	8594.8	3208.9	12088.6	18325.0
Visual only (night)	0.0	0.0	0.0	0.0	0.0	3.4	0.0	3.4	3.4
Zone 5 Totals	28871.2	7415.8	2013.3	38300.3	108776.8	20427.4	3376.2	132580.3	170880.6
Zone 6									
PAM only (night)	310.9	30.6	0.0	341.5	112.2	13.2	0.0	125.4	466.9
Visual and PAM (day)	262.5	46.2	0.0	308.7	104.1	0.3	0.0	104.4	413.1
Visual only (day)	65.9	397.9	545.5	1009.3	0.0	341.9	0.0	341.9	1351.2
Zone 6 Totals	639.3	474.7	545.5	1659.5	216.3	355.4	0.0	571.7	2231.2
Zone 7									
PAM only (night)	2833.3	213.5	0.0	3046.8	9882.8	2195.1		12077.9	15124.7
Visual and PAM (day)	3308.5	325.3	0.0	3633.7	11051.1	2387.5	35.8	13474.4	17108.1
Visual only (day)	94.4	1325.8	26.8	1447.0	14.8	1241.1	257.1	1513.0	2960.1
Zone 7 Totals	6236.3	1864.6	26.8	8127.6	20948.7	5823.7	292.9	27065.3	35192.9
Total	35952.4	10452.6	4958.2	51363.1	130205.1	27074.7	6682.2	163961.9	215325.0

Table 3-7 Summary of monitoring effort by zone and source status. Data represent time in hours.

Monitoring Type	ITR Year 1			Year 1 Total	ITR Year 2			Year 2 Total	Combined Total
	Active (hrs)	Inactive (hrs)	Transit (hrs)		Active (hrs)	Inactive (hrs)	Transit (hrs)		
Zone 1									
Visual only (day)	0.0	0.0	0.0	0.0	0.0	0.0	1.9	1.9	1.9

Monitoring Type	ITR Year 1			Year 1 Total	ITR Year 2			Year 2 Total	Combined Total
	Active (hrs)	Inactive (hrs)	Transit (hrs)		Active (hrs)	Inactive (hrs)	Transit (hrs)		
Zone 1 Totals	0.0	0.0	0.0	0.0	0.0	0.0	1.9	1.9	1.9
Zone 2									
PAM only (night)	0.0	0.0	0.0	0.0	6.5	0.0	0.0	6.5	6.5
Visual and PAM (day)	0.0	1.0	0.0	1.0	3.4	0.2	0.0	3.6	4.6
Visual only (day)	0.0	42.9	67.7	110.7	3.3	46.1	183.4	232.8	343.4
Zone 2 Totals	0.0	43.9	67.7	111.7	13.2	46.3	183.4	242.8	354.5
Zone 3									
PAM only (night)	0.3	0.0	0.0	0.3	7.9	2.2	0.0	10.1	10.4
Visual and PAM (day)	7.1	0.4	0.0	7.6	13.6	9.9	0.0	23.5	31.0
Visual only (day)	21.1	55.3	93.3	169.6	0.0	31.1	40.0	71.1	240.7
Zone 3 Totals	28.6	55.7	93.3	177.5	21.5	43.2	40.0	104.6	282.1
Zone 4									
Visual and PAM (day)	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.8	0.8
Visual only (day)	0.0	0.0	0.0	0.0	0.0	0.0	13.3	13.3	13.3
Zone 4 Totals	0.0	0.0	0.0	0.0	0.8	0.0	13.3	14.1	14.1
Zone 5									
PAM only (night)	1805.4	247.0	3.3	2055.7	6106.1	780.3	6.7	6893.1	8948.8
Visual and PAM (day)	1958.0	249.0	0.0	2207.0	7263.2	905.2	12.5	8180.9	10387.9
Visual and PAM (night)	0.0	0.0	0.0	0.0	5.8	0.0	0.0	5.8	5.8
Visual only (day)	36.5	558.2	132.3	727.0	41.3	1357.5	203.3	1602.0	2329.0
Visual only (night)	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	0.5
Zone 5 Totals	3799.9	1054.2	135.6	4989.7	13416.3	3043.5	222.5	16682.3	21672.0
Zone 6									

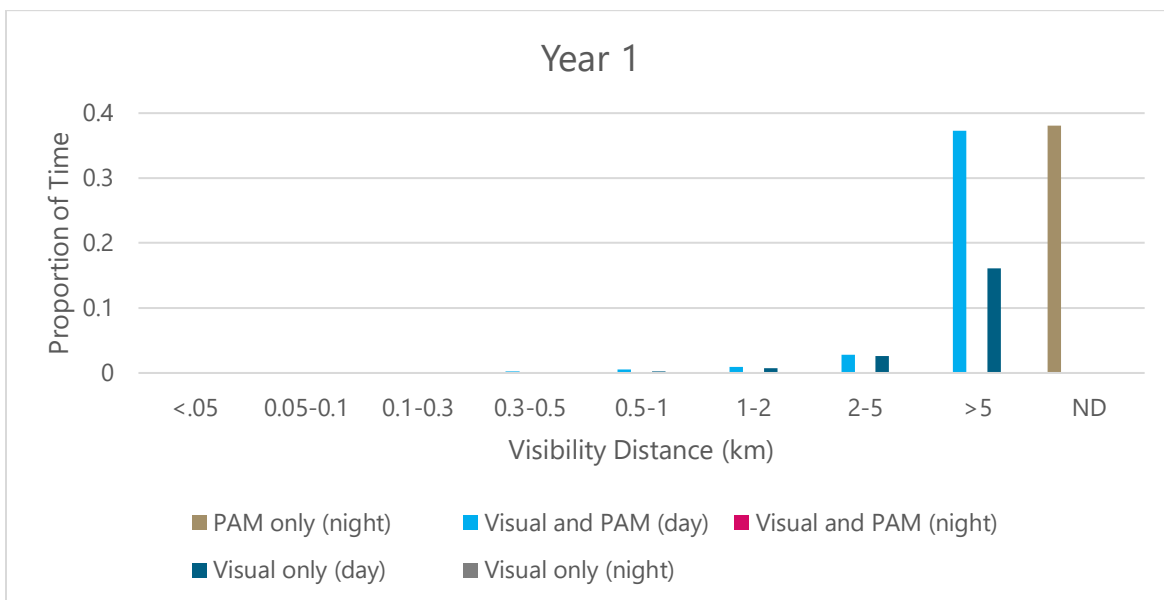
Monitoring Type	ITR Year 1			Year 1 Total	ITR Year 2			Year 2 Total	Combined Total
	Active (hrs)	Inactive (hrs)	Transit (hrs)		Active (hrs)	Inactive (hrs)	Transit (hrs)		
PAM only (night)	46.9	4.9	0.0	51.7	14.5	1.8	0.0	16.3	68.1
Visual and PAM (day)	40.3	8.1	0.0	48.4	12.4	0.1	0.0	12.4	60.8
Visual only (day)	12.0	62.4	34.4	108.8	0.0	41.8	0.0	41.8	150.5
Zone 6 Totals	99.1	75.4	34.4	208.9	26.9	43.6	0.0	70.5	279.4
Zone 7									
PAM only (night)	427.9	33.1	0.0	460.9	1172.2	300.9	0.0	1473.1	1934.1
Visual and PAM (day)	504.4	54.3	0.0	558.7	1358.6	329.5	3.9	1691.9	2250.6
Visual only (day)	16.5	210.1	2.0	228.6	2.2	177.5	13.3	193.0	421.6
Zone 7 Totals	948.7	297.5	2.0	1248.2	2532.9	807.9	17.2	3358.0	4606.2
Total	4876.3	1526.6	333.0	6736.0	16011.6	3984.5	478.2	20474.2	27210.2

Environmental conditions may have an impact on the probability of detecting protected species in a survey area. The environmental conditions present during observations undertaken during the three survey programs within the GOM are outlined below for Year 2.

3.3 Visibility

Visibility conditions were only recorded during daytime operations (Figure 3-1). When visibility was recorded, 85% of records indicate visibility was greater than 5 km. Visibility was between 2 and 5 km 9% of the time, between 0.5 and 2 km 4% of the time, and less than 500 meters 2% of the time.

For effort only when the source was active, the pattern is similar; however, PAM (either PAM only or PAM and visual) detection was used 99.6% of the time, 98.2% in Year 1 and 99.7% in Year 2 (Figure 3-2). When visibility was recorded, 85.9% of records indicate visibility was greater than 5 km, 90.6% in Year 1 and 84.5% in Year 2. Visibility was between 2 and 5 km 8.4% of the time (5.2% in Year 1 and 9.4% in Year 2), between 0.5 and 2 km 4.0% of the time (3.4% in Year 1 and 4.2% in Year 2), and less than 500 meters 1.4% of the time (0.8% in Year 1 and 1.6% in Year 2). Visibility data was not collected during nighttime operations when PAM was the only monitoring method.



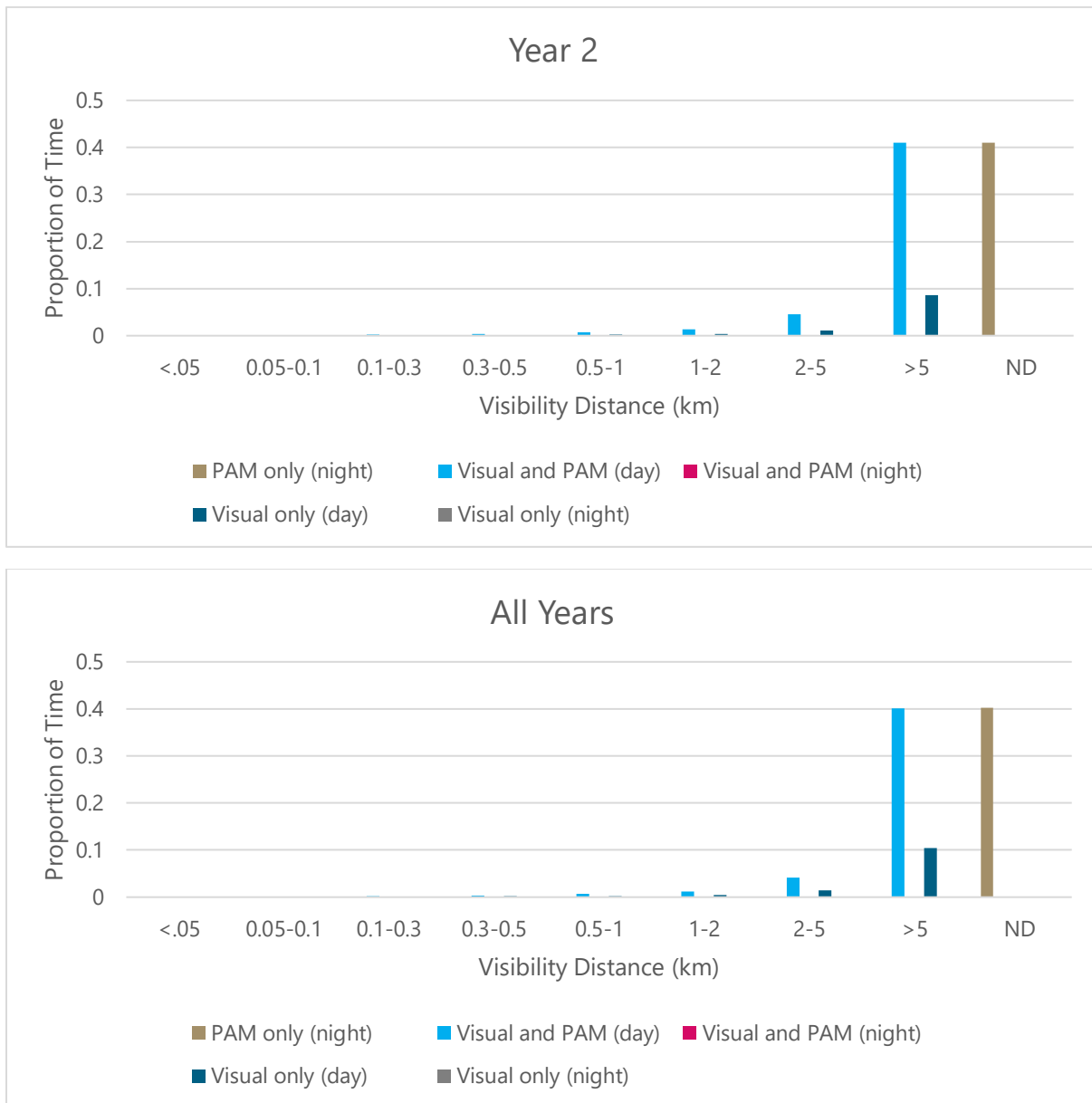
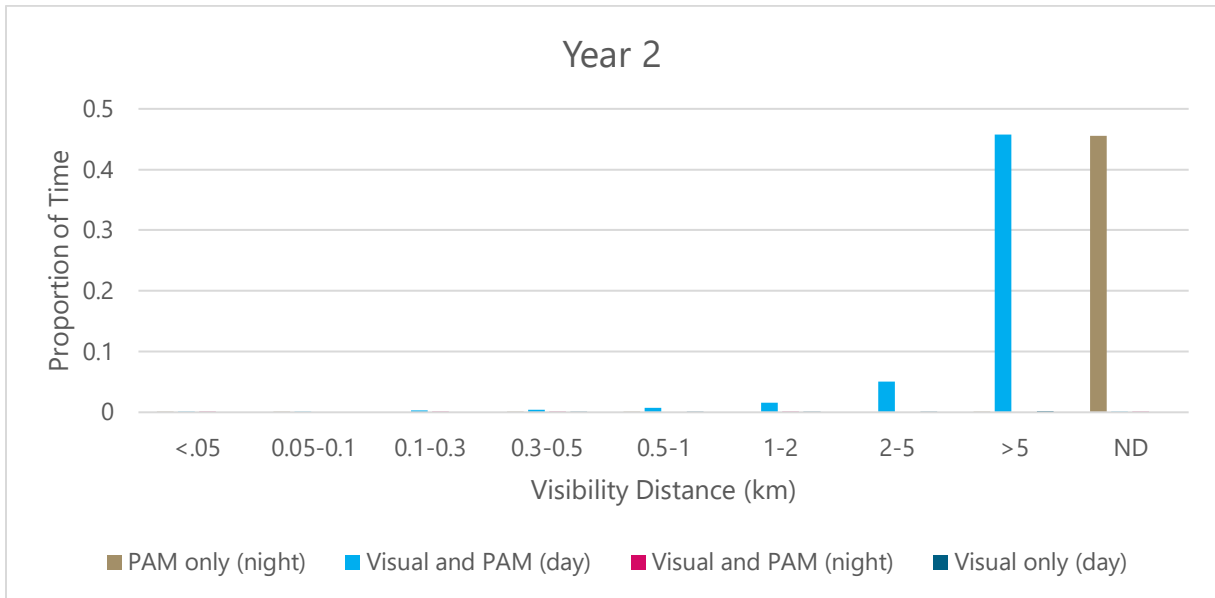
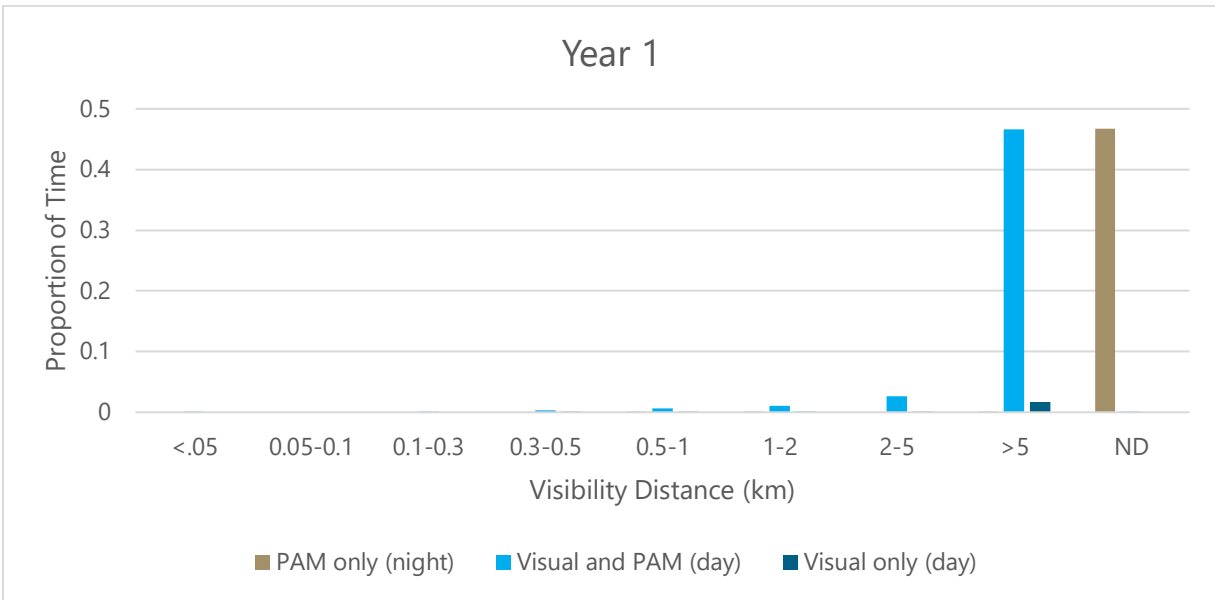


Figure 3-1 Proportion of time with specific visibility distance for all survey effort for years 1 and 2, and both years combined. ND=no data



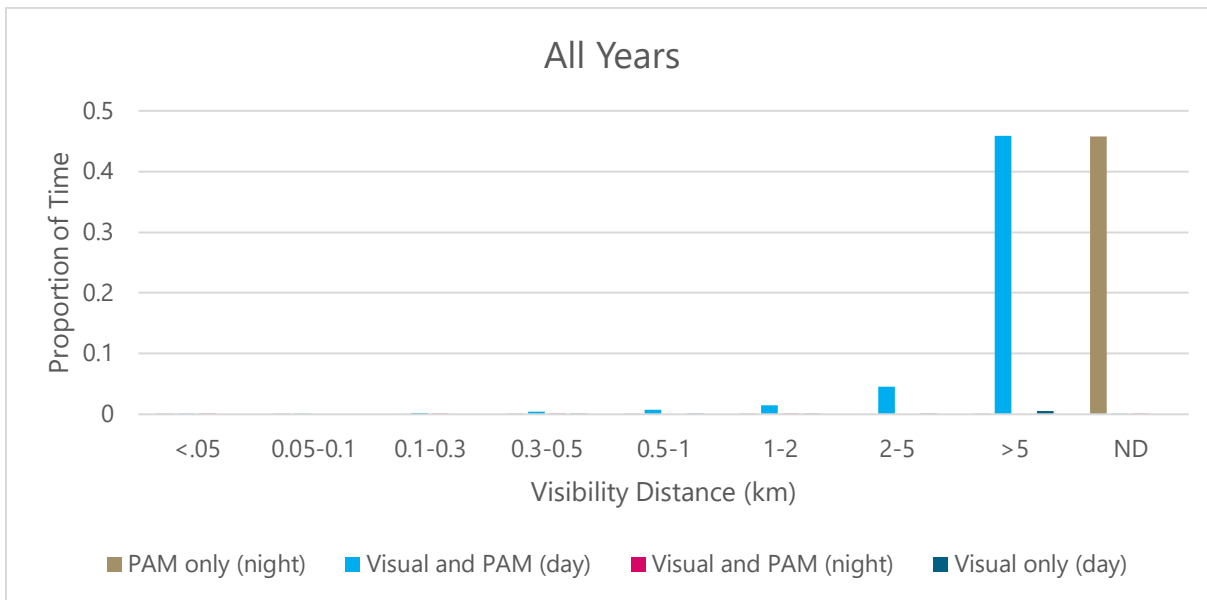
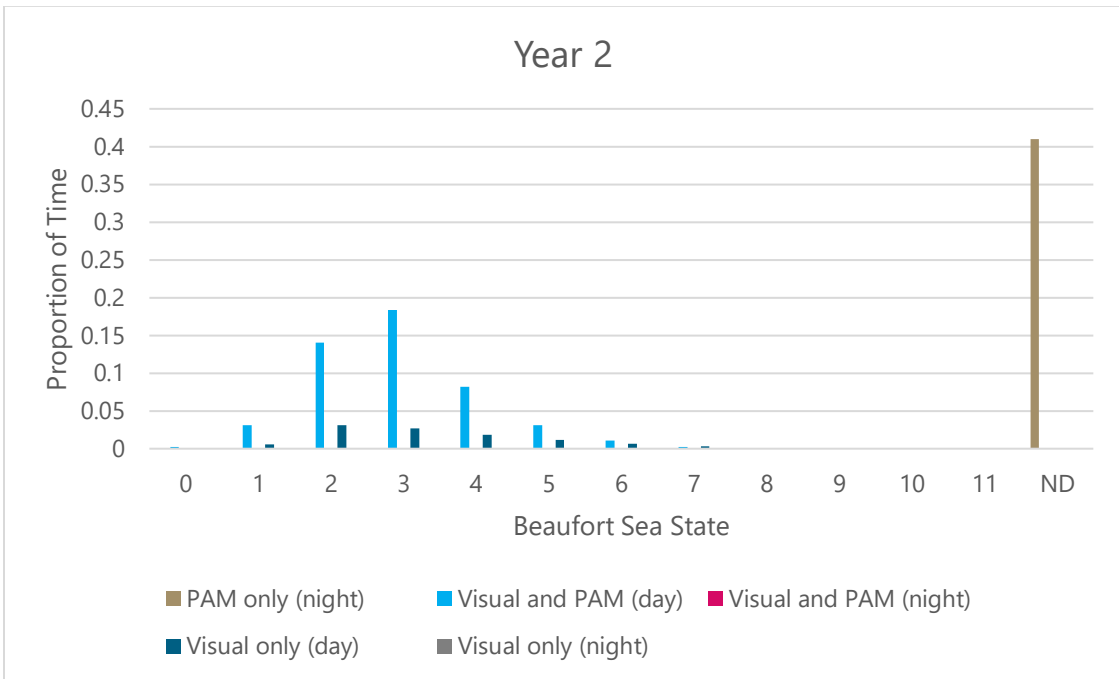
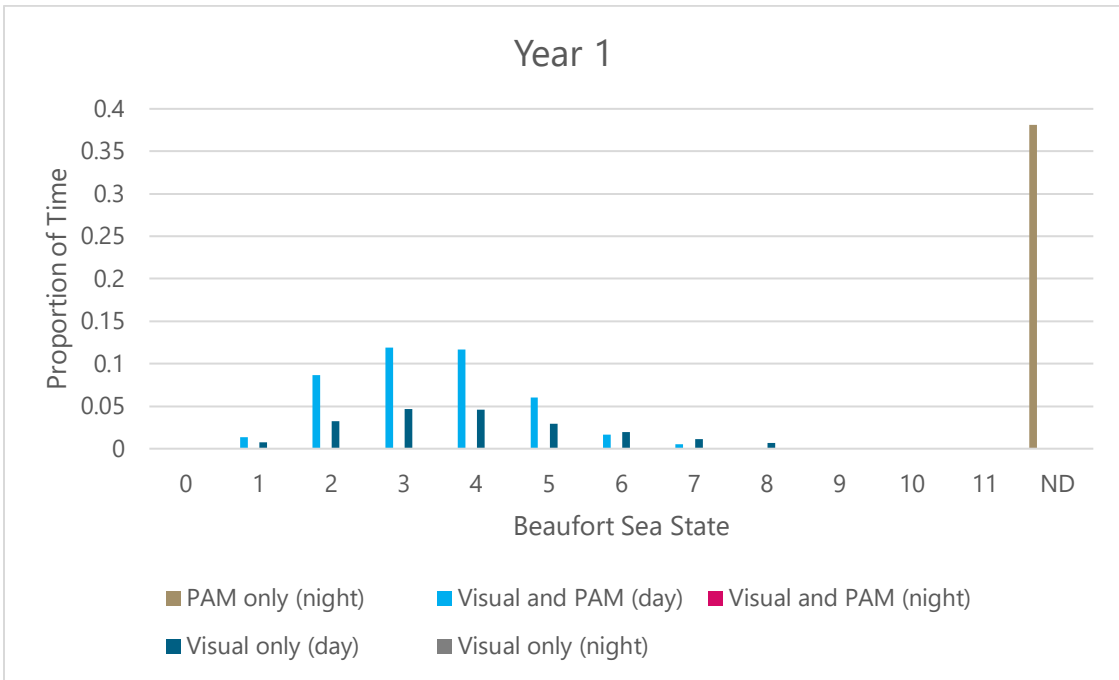


Figure 3-2. Proportion of time with specified visibility distances when source is active for years 1 and 2, and both years combined. ND = no data.

Beaufort sea state

Marine mammal detectability can be impacted by Beaufort scale according to studies (e.g., Barlow, 2015). Sea conditions and wind speed combine to create the Beaufort scale which goes from 0 (calm) to 12 (hurricane). Some marine mammal species' detectability decreases substantively with an increase in Beaufort state, especially above Beaufort 5, such as beaked whales (Barlow, 2013; Barlow, 2015).

The Beaufort scale recorded during visual monitoring ranged from Beaufort (BF) 1 to BF11 over the course of the survey programs. There were no BF data collected for PAM-only survey periods, as demonstrated in Figure 3-3 and Figure 3-4. A majority of the surveys were at BF2, BF3, and BF4 which represented 26.7%, 36.1%, and 19.9% of active source surveys respectively when BF data were collected (i.e., excluding PAM only), or 82.6% of active survey time overall when BF data were collected (Figure 3-4). BF values for the remainder of the surveys were BF1 or BF5-BF11, and the pattern was similar for all effort data (Figure 3-3) as with the active survey data (Figure 3-4). In Year 1, BF2, BF3, and BF4 represented 72.3% of all visual survey effort and 77.2% of visual survey effort with an active source (Figure 3-3 and Figure 3-4). In Year 2, BF2, BF3, and BF4 represented 82.0% of all visual survey effort and 84.2% of visual survey effort with an active source (Figure 3-3 and Figure 3-4). Beaufort sea state BF8, BF9, BF10, and BF11 accounted for 0.4% of all survey effort. Beaufort sea state data was not collected during nighttime operations when PAM was the only monitoring method.



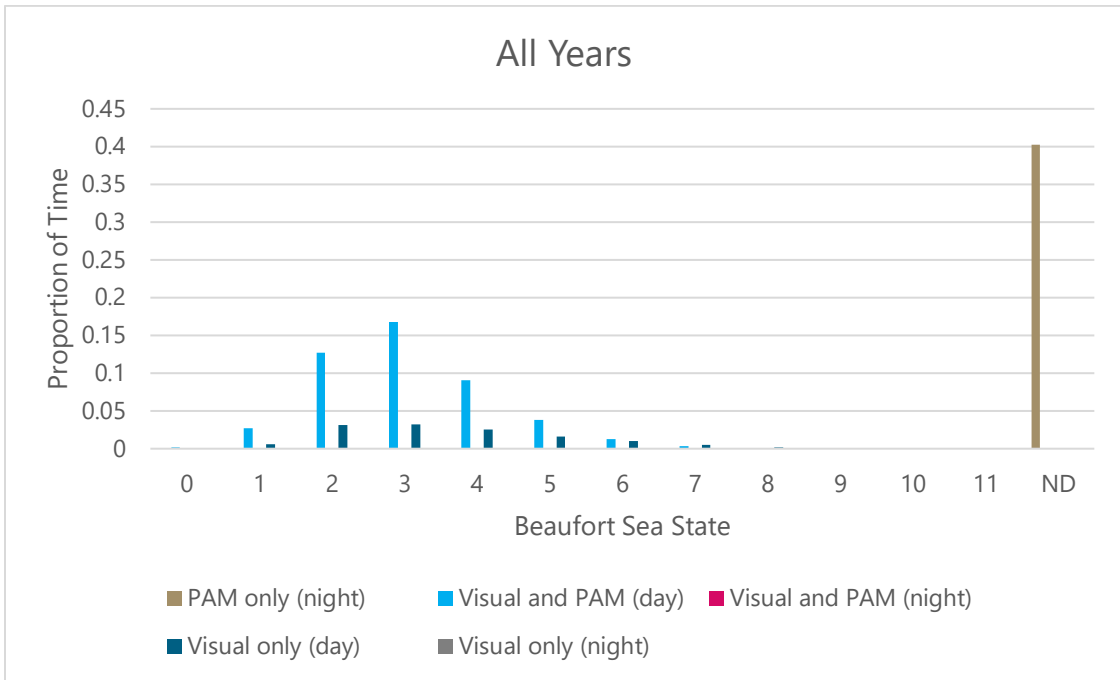
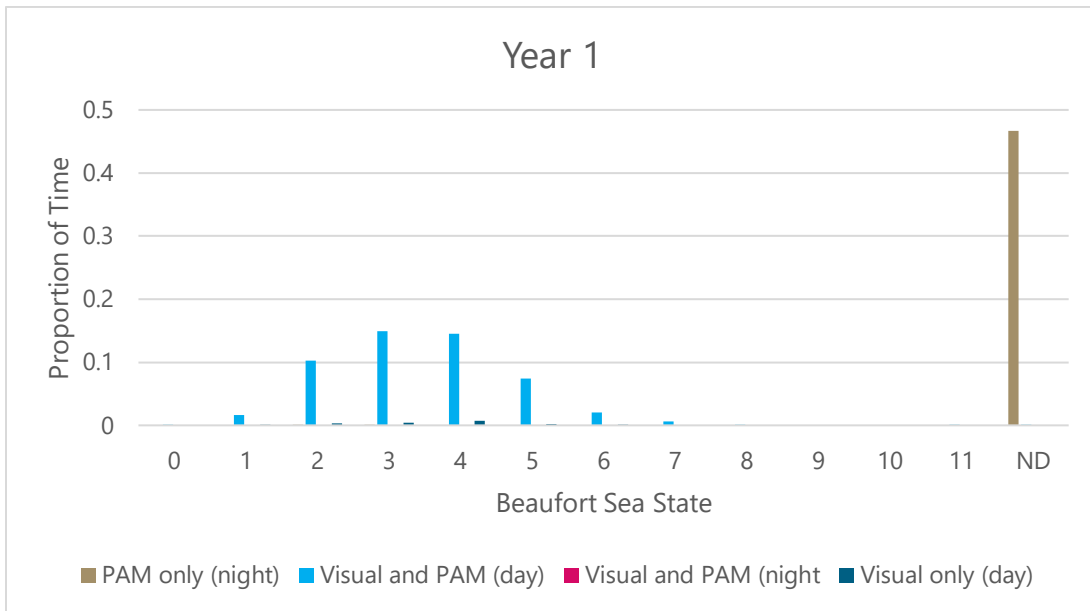


Figure 3-3. Proportion of time with each reported Beaufort sea state for all survey effort. ND = no data.



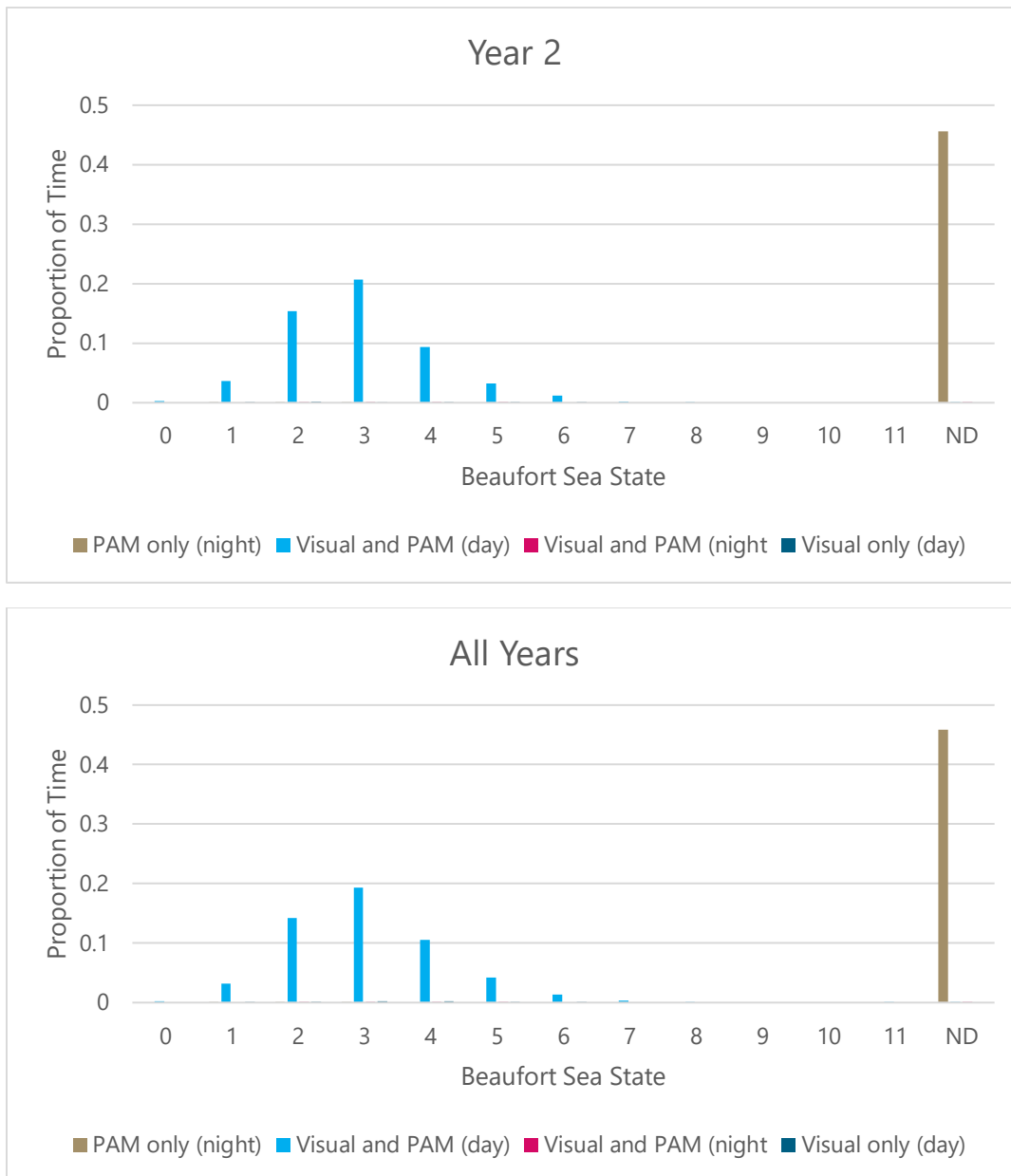


Figure 3-4. Proportion of time with each reported Beaufort sea state when the source was active. ND = no data.

3.4 Summary of Mitigation Measures

Across year one and year two, in total there were 413 instances of marine mammal visual observations representing an estimated 3,025 individuals (Table 3-10; Table 3-11). One hundred forty-seven of the observations (representing 908 individuals) occurred while the source was powered: two Atlantic spotted dolphin (30 individuals), three Clymene dolphin (48 individuals), 16 common bottlenose dolphin (96 individuals), one false killer whale (five individuals), two melon-headed whale (64 individuals), 12 pantropical spotted dolphin

(152 individuals), one pygmy killer whale (30 individuals), 2 Risso's dolphin (18 individuals), six rough-tooth dolphin (55 individuals), two short-finned pilot whale (34 individuals), 51 sperm whale (131 individuals), one spinner dolphin (four individuals), one unidentifiable cetacean (two individuals), 36 unidentifiable dolphins (203 individuals), and ten unidentifiable whales (eight individuals). Visual sightings occurred during the Permit L20-029, L21-021, L21-024, L21-037, L21-038, L21-039, L22-003, L22-004, L22-007, T20-004, T21-001, and T23-001 surveys. There was significantly more observer effort in year two which could explain the increase in sightings.

In total there were 325 acoustic detections representing an estimated 1,133 individuals. One hundred seventy-three of the detections (representing 536 individuals) occurred while the source was powered, 152 detections (representing 597 individuals) when the source was not powered. Fifty-five acoustic detections occurred concurrently with a visual observation. Acoustically detected species include Atlantic spotted dolphin, Clymene dolphin, common bottlenose dolphin, melon-headed whale, pantropical spotted dolphin, rough-toothed dolphin, short-finned pilot whale, sperm whale, spinner dolphin, unidentifiable dolphin, and unidentifiable pilot whale. Acoustic detections occurred during the Permit T21-001, L20-029, L21-024, L21-037, L21-038, L21-039, L21-021, L22-003, L22-004, L22-007 surveys.

The remaining three surveys (Permits L21-014, N-10171, and A-00005) did not report any marine mammal observations/detections.

Throughout the two years of survey activities, four species for which Level B Harassment was authorized were not observed. Species not observed included Bryde's (Rice's) whale, pygmy sperm whale, striped dolphin, and killer whale. Number of observed individuals at any distance while the source was active were well below ITR-estimated Take values (

Table 3-12), though total effort in each year was also lower than assumed for take estimates in the ITR.

One hundred seventeen mitigation actions were initiated throughout the surveys, consisting of 73 delays to the initiation of the source and 44 shutdowns of the active source. Source shutdowns occurred for observations of Clymene dolphin, common bottlenose dolphin, melon-headed whale, pantropical spotted dolphin, pygmy killer whale, short-finned pilot whale, sperm whale, and unidentifiable cetaceans, dolphins, and whales with a total mitigation time of 28 hours and 32 minutes (time ranged from two minutes to 1 hour 39 minutes; Table 3-13). Delays to the initiation of the source occurred for observations of Clymene dolphin, common bottlenose dolphin, pantropical spotted dolphin, rough-toothed dolphin, sperm whale, and unidentifiable dolphin with a total mitigation time of 58 hours 32 minutes (time ranged from two minutes to five hours twenty minutes; Table 3-14).

From the ITR § 217.184 Mitigation Requirements, the requirements for shutdown durations are:

Upon implementation of shutdown, the source may be reactivated after the animal(s) has been observed exiting the exclusion zone or following a 30-minute clearance period with no further observation of the animal(s).

For the shutdowns lasting less than 30 minutes (Table 3-13), the animals were observed exiting the exclusion zones, and therefore the source was powered back up. For the shutdowns lasting more than 30 minutes and distance at last sighting within the exclusion zone, those distances represent the last location where the animal was seen, and a 30-minute clearance period ensued during which the animals were not resighted. Pre-clearance and shutdown zones and timing are summarized in Table 3-8 and Table 3-9.

Table 3-8 Summary of pre-start clearance zones and delay times by species.

Species	Pre-start Clearance Zones	Pre-start Clearance Delay Times
Baleen whales, sperm whales, beaked whales, and <i>Kogia</i> species	0-1500 m	Delay until the animal is observed exiting the applicable zone or following an additional time of 30-minutes.
All other species	0-1000 m *inclusive of all small delphinids	Delay until the animal is observed exiting the applicable zone or following an additional time of 15-minutes for small delphinids or 30-minutes for all other species.

Table 3-9 Summary of shutdown zones and shutdown times by species.

Species	Shutdown Zones	Shutdown Times
Baleen whales, sperm whales, beaked whales, and <i>Kogia</i> species	0-1500 m	Reactivate source after the animal is observed exiting the applicable zone or following a 30-minute clearance period.
All other species	0-500 m *excluding <i>Tursiops</i> , <i>Stenella</i> , <i>Steno</i> , and <i>Lagenodelphis</i> species	Reactivate source after the animal is observed exiting the applicable zone or following a 30-minute clearance period.

Table 3-10 Summary of all visual observations by source activity.

Species	ITR Year 1				ITR Year 2				Totals	
	Active Source		Inactive Source		Active Source		Inactive Source			
	Groups	Individuals	Groups	Individuals	Groups	Individuals	Groups	Individuals	Total Groups	Total Individuals
Atlantic spotted dolphin	0	0	4	64	2	30	0	0	6	94
Clymene dolphin	0	0	1	3	3	48	9	63	13	114
Common bottlenose dolphin	3	11	17	70	13	85	92	639	125	805
Cuvier's beaked whale	0	0	1	1	0	0	0	0	1	1
Dwarf sperm whale	0	0	0	0	0	0	1	1	1	1
False killer whale	0	0	0	0	1	5	0	0	1	5
Fraser's dolphin	0	0	0	0	0	0	1	47	1	47
Gervais' beaked whale	0	0	1	2	0	0	0	0	1	2
Melon-headed whale	1	4	1	20	1	60	2	80	5	164
Pantropical spotted dolphin	0	0	18	350	12	154	12	263	42	767
Pygmy killer whale	0	0	0	0	1	30	0	0	1	30
Risso's dolphin	0	0	2	20	2	18	2	12	6	50
Rough-toothed dolphin	0	0	0	0	6	55	8	76	14	131
Short-finned pilot whale	0	0	1	15	2	35	5	65	8	115
Sperm whale	7	21	9	17	44	110	22	46	82	194
Spinner dolphin	0	0	0	0	3	26	3	24	6	50
Unidentifiable cetacean	1	2	0	0	0	0	0	0	1	2
Unidentifiable dolphin	4	17	15	48	32	186	32	179	83	430
Unidentifiable whale	1	1	1	2	7	9	7	11	16	23
Total	17	56	71	612	129	851	196	1506	413	3025

Table 3-11. Summary of all visual observations by management zone.

Species	Zone										Totals	
	2		3		5		6		7		Total Groups	Total Individuals
	Groups	Individuals	Groups	Individuals	Groups	Individuals	Groups	Individuals	Groups	Individuals		
Atlantic spotted dolphin	3	58	1	6	1	15	0	0	1	15	6	94
Clymene dolphin	2	4	0	0	9	92	1	3	1	15	13	114
Common bottlenose dolphin	41	315	45	232	38	238	0	0	1	20	125	805
Cuvier's beaked whale	0	0	0	0	1	1	0	0	0	0	1	1
Dwarf sperm whale	0	0	0	0	1	1	0	0	0	0	1	1
False killer whale	0	0	0	0	1	5	0	0	0	0	1	5
Fraser's dolphin	0	0	0	0	1	47	0	0	0	0	1	47
Gervais' beaked whale	0	0	0	0	0	0	0	0	1	2	1	2
Melon-headed whale	0	0	0	0	4	144	0	0	1	20	5	164
Pantropical spotted dolphin	2	11	1	7	32	631	0	0	7	118	42	767
Pygmy killer whale	0	0	0	0	1	30	0	0	0	0	1	30
Risso's dolphin	0	0	0	0	4	30	2	20	0	0	6	50
Rough-toothed dolphin	1	1	0	0	11	100	0	0	2	30	14	131
Short-finned pilot whale	0	0	0	0	5	87	1	10	2	18	8	115
Sperm whale	0	0	0	0	51	123	0	0	31	71	82	194
Spinner dolphin	0	0	0	0	6	50	0	0	0	0	6	50
Unidentifiable cetacean	0	0	0	0	0	0	1	2	0	0	1	2
Unidentifiable dolphin	7	22	9	25	58	356	1	4	8	23	83	430
Unidentifiable whale	0	0	0	0	11	15	0	0	5	8	16	23
Total	56	411	56	270	235	1965	6	39	60	340	413	3025

Table 3-12. Summary of observed individuals at any distance while the source was active and take estimations for the year in the ITR.

Species	Year 1		Year 2		Cumulative	
	Observed Individuals	ITR Estimation	Observed Individuals	ITR Estimation	Observed Individuals	ITR Estimation
Bryde's (Rice's) whale	0	2	0	2	0	4
Sperm whale	21	6939	110	6009	131	12948
Kogia species	0	3452	0	3098	0	6550
Beaked whale	0	19348	0	16392	0	35740
Rough-toothed dolphin	0	8794	66	7756	66	16550
Bottlenose dolphin	11	173247	85	279357	96	452604
Clymene dolphin	0	24633	48	19492	48	44125
Atlantic spotted dolphin	0	36822	30	52727	30	89549
Pantropical spotted dolphin	0	137327	154	125145	154	262472
Spinner dolphin	0	21799	26	20628	26	42427
Striped dolphin	0	9635	0	8402	0	18037
Fraser's dolphin	0	1298	0	1103	0	2401
Risso's dolphin	0	6448	18	5536	18	11984
Melon-headed whale	4	16456	60	14096	64	30552
Pygmy killer whale	0	2383	30	2054	30	4437
False killer whale	0	4769	5	4044	5	8813
Killer whale	0	18	0	17	0	35
Short-finned pilot whale	0	4438	35	2898	35	7336
Unidentifiable cetacean	2	0	0	0	2	0
Unidentifiable dolphin	63	0	532	0	595	0
Unidentifiable whale	1	0	9	0	10	0
Total	102	477808	1208	568756	1310	1046564

Table 3-13. Summary of behavior and mitigations for marine mammal observations when the source was active

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	2	Rough-toothed dolphin	Swimming below surface	Surfacing	Bow riding	Diving	0	210	308	None	0:00
3D NAZ	3	Common bottlenose dolphin	Porpoising	Diving	--	--	0	SNA	SNA	None	0:00
Coil	3	Common bottlenose dolphin	Surfacing	Porpoising	--	--	0	650	20	Shutdown of source	0:47
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Common bottlenose dolphin	Swimming	--	--	--	0	740	740	None	0:00
Coil	5	Sperm whale	Blowing	Surfacing	--	--	1500	1850	3460	None	0:00
Coil	5	Pantropical spotted dolphin	Breaching / Jumping / Acrobatic behaviour	Fast travel	Porpoising	Swimming below surface	0	2240	2240	None	0:00
Coil	5	Unidentifiable Dolphin	Feeding	Diving	--	--	500	2700	3200	None	0:00
3D NAZ	5	Unidentifiable Dolphin	Milling	Swimming	--	--	500	650	1000	None	0:00
3D NAZ	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	262	N/A - AD	None	0:00
3D NAZ	5	Melon-headed whale	Fast travel	Diving	--	--	500	2000	2500	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	150	N/A - AD	None	0:00
Coil	5	Unidentifiable whale	Blowing	--	--	--	1500	2850	2850	None	0:00

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	5	Sperm whale	Surfacing	Blowing	Swimming	--	1500	200	3150	Shutdown of source	0:51
Coil	5	Sperm whale	Blowing	Swimming	Spy hopping	--	1500	700	1600	Shutdown of source	0:50
Coil	5	Common bottlenose dolphin	Bow riding	Swimming	Porpoising	--	0	323	323	None	0:00
Coil	5	Common bottlenose dolphin	Swimming	Porpoising	--	--	0	50	50	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	30	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	230	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	280	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	40	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	350	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	Swimming	--	--	--	500	100	100	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	300	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	300	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	100	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	100	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	450	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	5	Unidentifiable Whale	Swimming	Blowing	--	--	1500	3740	3740	None	0:00
Coil	5	Unidentifiable dolphin	Swimming	Breaching / Jumping / Acrobatic behaviour	Fast travel	--	500	4882	4882	None	0:00
Coil	5	Sperm whale	Swimming	Blowing	Fast travel	--	1500	1780	1780	None	0:00
Coil	5	Sperm whale	Blowing	Resting at surface / Logging	--	--	1500	2000	3600	None	0:00
Coil	5	Sperm whale	Resting at surface / Logging	Blowing	--	--	1500	3800	3800	None	0:00
Coil	5	Sperm whale	Resting at surface / Logging	Blowing	Diving	--	1500	2000	3100	None	0:00
Coil	5	False killer whale	Swimming	Milling	Diving	--	500	1850	2661	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	130	N/A - AD	None	0:00
Coil	5	Atlantic spotted dolphin	Breaching / Jumping / Acrobatic behaviour	Feeding	Spy hopping	Fast travel	0	1300	1750	None	0:00
Coil	5	Pantropical spotted dolphin	Swimming	Fast travel	Breaching / Jumping / Acrobatic behaviour	--	0	228	1350	None	0:00
Coil	5	Unidentifiable dolphin	Swimming below surface	Swimming	Porpoising	Diving	500	845	900	None	0:00
Coil	5	Sperm whale	Blowing	Swimming	Diving with flukes / Fluking	Diving	1500	1140	1700	Shutdown of source	0:39

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	5	Unidentifiable dolphin	Blowing	Breaching / Jumping / Acrobatic behaviour	Swimming	Diving	500	2100	2700	None	0:00
3D NAZ	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	200	N/A - AD	None	0:00
3D NAZ	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	918	N/A - AD	None	0:00
3D NAZ	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	700	N/A - AD	None	0:00
3D NAZ	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	489	N/A - AD	None	0:00
3D NAZ	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	639	N/A - AD	None	0:00
3D NAZ	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	489	N/A - AD	None	0:00
3D NAZ	5	Sperm whale	Resting at surface / Logging	Swimming	Blowing	Diving with flukes / Fluking	1500	950	750	Shutdown of source	0:47
3D NAZ	5	Pantropical spotted dolphin	Fast travel	--	--	--	0	250	1000	None	0:00
3D NAZ	5	Sperm whale	Swimming	Fast travel	--	--	1500	909	1286	Shutdown of source	0:32
3D NAZ	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	489	N/A - AD	None	0:00
3D NAZ	5	Unidentifiable Dolphin	Porpoising	Diving	--	--	500	1994	2024	None	0:00
3D NAZ	5	Sperm whale	Surfacing	Blowing	Stationary	Diving with flukes / Fluking	1500	1500	2160	Shutdown of source	1:02
3D NAZ	5	sperm whale	Blowing	Surfacing	--	--	1500	7470	7200	None	0:00
3D NAZ	5	Short-finned pilot whale	Surfacing	Swimming below surface	--	--	500	635	1050	None	0:00

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
3D NAZ	5	Sperm whale	Blowing	--	--	--	1500	2500	3500	None	0:00
3D NAZ	5	Unidentifiable dolphin	Fast travel	--	--	--	500	1450	1450	None	0:00
3D NAZ	5	Sperm whale	Blowing	Resting at surface / Logging	Stationary	--	1500	2000	3845	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	100	N/A - AD	None	0:00
Coil	5	Sperm whale	Blowing	Resting at surface / Logging	Stationary	--	1500	1500	3460	Shutdown of source	1:36
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	150	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	200	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	400	N/A - AD	None	0:00
Coil	5	Rough-toothed dolphin	Bow riding	Breaching / Jumping / Acrobatic behaviour	--	--	0	255	255	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	100	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	Surfacing	--	--	--	500	270	270	None	0:00
Coil	5	Sperm whale	Blowing	Surfacing	--	--	1500	1500	2226	Shutdown of source	0:51
Coil	5	Sperm whale	Blowing	--	--	--	1500	1309	1400	Shutdown of source	0:41
Coil	5	Sperm whale	Blowing	Surfacing	Diving	Diving with flukes / Fluking	1500	657	3340	Shutdown of source	0:41

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	600	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	Breaching / Jumping / Acrobatic behaviour	Surfacing	--	--	500	250	275	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	>500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	>500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	Breaching / Jumping / Acrobatic behaviour	--	--	--	500	550	600	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	1000	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	600	N/A - AD	None	0:00
Coil	5	Sperm whale	Blowing	Fast travel	Surfacing	Swimming below surface	1500	250	3500	Shutdown of source	0:08
Coil	5	Sperm whale	Blowing	Surfacing	Swimming	--	1500	3000	5000	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	800	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	200	N/A - AD	None	0:00
Coil	5	Sperm whale	Blowing	Swimming	--	--	1500	3300	3300	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	350	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	450	N/A - AD	None	0:00

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	55	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	Swimming	Swimming below surface	--	--	500	454	1069	None	0:00
Coil	5	Unidentifiable dolphin	Surfacing	Breaching / Jumping / Acrobatic behaviour	Fast travel	--	500	1000	1050	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable whale	Blowing	Other (Describe in Detection Description)	--	--	1500	3300	4000	None	0:00
Coil	5	Sperm whale	Blowing	Feeding	Surfacing	Diving with flukes / Fluking	1500	2700	3100	None	0:00
Coil	5	Spinner dolphin	Swimming	Swimming below surface	Porpoising	Bow riding	0	200	1000	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	300	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	400	N/A - AD	None	0:00

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	200	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	150	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	300	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	150	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	200	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	200	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	800	N/A - AD	None	0:00
Coil	5	Spinner dolphin	Fast travel	Porpoising	Breaching / Jumping / Acrobatic behaviour	--	0	480	720	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	35	N/A - AD	Shutdown of source	0:20
Coil	5	Unidentifiable dolphin	Swimming below surface	--	--	--	500	340	340	None	0:00
Coil	5	Unidentifiable dolphin	Porpoising	Breaching / Jumping / Acrobatic behaviour	Fast travel	Swimming	500	1230	1230	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	49	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	70	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	27	N/A - AD	None	0:00

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	5	Pantropical spotted dolphin	Porpoising	Swimming below surface	Feeding	--	0	300	600	None	0:00
Coil	5	Pantropical spotted dolphin	Swimming below surface	Breaching / Jumping / Acrobatic behaviour	Bow riding	Porpoising	0	305	330	Shutdown of source	0:26
Coil	5	Risso's dolphin	Milling	Porpoising	Feeding	Tail or pectoral fin slapping	500	600	2400	None	0:00
Coil	5	Pantropical spotted dolphin	Feeding	Swimming	Tail or pectoral fin slapping	Breaching / Jumping / Acrobatic behaviour	0	250	2700	None	0:00
Coil	5	Risso's dolphin	Porpoising	Swimming	Diving	--	500	680	800	None	0:00
Coil	5	Pantropical spotted dolphin	Porpoising	Feeding	Breaching / Jumping / Acrobatic behaviour	Fast travel	0	800	2680	None	0:00
Coil	5	Pantropical spotted dolphin	Porpoising	--	--	--	0	1920	2400	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	270	N/A - AD	None	0:00
Coil	5	Pantropical spotted dolphin	Swimming below surface	Breaching / Jumping / Acrobatic behaviour	Fast travel	Surfacing	0	250	900	None	0:00
Coil	5	Unidentifiable dolphin	Fast travel	Swimming	--	--	500	420	700	None	0:00
Coil	5	Clymene dolphin	Breaching / Jumping / Acrobatic behaviour	Porpoising	Milling	Swimming	500	400	1519	Shutdown of source	00:11

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	5	Sperm whale	Blowing	Fast travel	Diving	Diving with flukes / Fluking	1500	1055	2105	Shutdown of source	0:15
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	100	N/A - AD	Shutdown of source	0:02
Coil	5	Sperm whale	Blowing	--	--	--	1500	4310	4710	None	0:00
Coil	5	Rough-toothed dolphin	N/A - AD	--	--	--	0	500	N/A - AD	None	0:00
Coil	5	Rough-toothed dolphin	Feeding	Breaching / Jumping / Acrobatic behaviour	Swimming below surface	--	0	311	308	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	600	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	200	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	375	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	<500	N/A - AD	Shutdown of source	0:30
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	<500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	Swimming	Porpoising	Breaching / Jumping / Acrobatic behaviour	Diving	500	380	380	None	0:00
Coil	5	Unidentifiable dolphin	Swimming	Feeding	Breaching / Jumping / Acrobatic behaviour	--	500	600	1200	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	Shutdown of source	0:30

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Common bottlenose dolphin	Breaching / Jumping / Acrobatic behaviour	--	--	--	0	600	650	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	Breaching / Jumping / Acrobatic behaviour	Surfacing	Diving	--	500	600	600	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Common bottlenose dolphin	Surfacing	Swimming	Swimming below surface	Diving with flukes / Fluking	0	100	740	Shutdown of source	0:30
Coil	5	Unidentifiable dolphin	Surfacing	Swimming	Diving	--	500	580	1280	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Clymene dolphin	Swimming below surface	Porpoising	Bow riding	--	0	200	700	None	0:00
Coil	5	Unidentifiable Dolphin	Porpoising	Diving	--	--	500	640	1400	None	0:00
Coil	5	Unidentifiable dolphin	Porpoising	Swimming	--	--	500	700	1900	None	0:00
Coil	5	Common bottlenose dolphin	Breaching / Jumping /	Fast travel	Porpoising	Swimming	0	750	1400	None	0:00

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
			Acrobatic behaviour								
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Clymene dolphin	Breaching / Jumping / Acrobatic behaviour	Fast travel	Porpoising	--	0	1100	1500	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Rough-toothed dolphin	Blowing	Bow riding	Swimming	--	0	150	150	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Common bottlenose dolphin	Swimming	Porpoising	Breaching / Jumping / Acrobatic behaviour	--	0	490	50	Shutdown of source	0:32
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	Swimming	Breaching / Jumping / Acrobatic behaviour	Porpoising	--	500	560	560	None	0:00

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Pantropical spotted dolphin	Swimming	Feeding	Breaching / Jumping / Acrobatic behaviour	--	0	240	450	None	0:00
Coil	5	Rough-toothed dolphin	Swimming	Bow riding	--	--	0	260	260	None	0:00
Coil	5	Rough-toothed dolphin	Swimming	Porpoising	Bow riding	--	0	50	100	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	Swimming	--	--	--	500	100	400	None	0:00
Coil	5	Melon-headed whale	Swimming	Surfacing	--	--	500	500	5000	Shutdown of source	0:16
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	Surfacing	Swimming	--	--	500	150	1800	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Common bottlenose dolphin	Bow riding	Swimming	--	--	0	250	250	None	0:00
Coil	5	Unidentifiable whale	Swimming below surface	--	--	--	1500	350	330	Shutdown of source	0:30
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	322	N/A - AD	None	0:00
Coil	5	Unidentifiable whale	Blowing	Swimming	--	--	1500	3200	3400	None	0:00
Coil	5	Unidentifiable whale	Blowing	Swimming	--	--	1500	1850	2150	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	97	N/A - AD	None	0:00
Coil	5	Sperm whale	Blowing	Resting at surface / Logging	--	--	1500	640	100	Shutdown of source	0:32
Coil	5	Sperm whale	Blowing	Feeding	Milling	Diving with flukes / Fluking	1500	690	410	Shutdown of source	0:38
Coil	5	Sperm whale	Blowing	Resting at surface / Logging	Diving with flukes / Fluking	--	1500	1150	1100	Shutdown of source	0:39
Coil	5	Pygmy killer whale	Porpoising	Breaching / Jumping / Acrobatic behaviour	Feeding	Milling	500	520	590	Shutdown of source	0:42

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	5	Sperm whale	Blowing	Diving with flukes / Fluking	--	--	1500	890	1890	Shutdown of source	0:55
Coil	5	Sperm whale	Blowing	Diving with flukes / Fluking	Resting at surface / Logging	--	1500	1200	800	Shutdown of source	0:42
Coil	5	Common bottlenose dolphin	Porpoising	Bow riding	Breaching / Jumping / Acrobatic behaviour	Diving	0	334	334	None	0:00
Coil	5	Sperm whale	Blowing	--	--	--	1500	1450	1300	Shutdown of source	0:33
Coil	5	Common bottlenose dolphin	Feeding	Breaching / Jumping / Acrobatic behaviour	Porpoising	--	0	480	1950	None	0:00
Coil	5	Sperm whale	Blowing	Surfacing	Resting at surface / Logging	Diving with flukes / Fluking	1500	1500	1700	Shutdown of source	0:08
Coil	5	Sperm whale	Blowing	Resting at surface / Logging	--	--	1500	2974	2974	None	0:00
Coil	5	Spinner dolphin	Feeding	Breaching / Jumping / Acrobatic behaviour	--	--	0	275	1503	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	131	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	132	N/A - AD	None	0:00

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	182	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Common bottlenose dolphin	Breaching / Jumping / Acrobatic behaviour	Diving	--	--	0	785	785	None	0:00
Coil	5	Common bottlenose dolphin	Porpoising	Swimming below surface	Diving	--	0	50	50	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	Feeding	Breaching / Jumping / Acrobatic behaviour	Diving	--	500	1085	1085	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	600	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	Swimming below surface	Surfacing	Breaching / Jumping / Acrobatic behaviour	Diving	500	800	800	None	0:00

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	300	N/A - AD	None	0:00
Coil	5	Common bottlenose dolphin	Breaching / Jumping / Acrobatic behaviour	Swimming below surface	Bow riding	Diving	0	400	400	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	150	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	132	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	Swimming	Breaching / Jumping / Acrobatic behaviour	--	--	500	1300	1300	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	134	N/A - AD	None	0:00

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	155	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	205	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	Breaching / Jumping / Acrobatic behaviour	Swimming below surface	--	--	500	1700	2700	None	0:00
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	5	Unidentifiable dolphin	Swimming below surface	Diving	--	--	500	600	600	None	0:00
3D NAZ	6	Unidentifiable cetacean	Blowing	Swimming below surface	Fast travel	--	1500	1250	1950	Shutdown of source	0:12
Coil	6	Unidentifiable Dolphin	Undetermined	Blowing	--	--	500	915	1500	None	0:00
Coil	6	Short-finned pilot whale	Resting at surface / Logging	Stationary	Milling	Diving	500	300	260	Shutdown of source	0:34
Coil	7	Unidentifiable Whale	Swimming	Blowing	--	--	1500	2500	3500	None	0:00
Coil	7	Sperm whale	Surfacing	Blowing	--	--	1500	1600	3700	None	0:00
Coil	7	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	7	Unidentifiable Dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
Coil	7	Sperm whale	Blowing	Fast travel	Resting at surface / Logging	Diving with flukes / Fluking	1500	1444	844	Shutdown of source	1:39
Coil	7	Sperm whale	Blowing	Stationary	--	--	1500	3800	3800	None	0:00

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	7	Unidentifiable dolphin	Swimming	Fast travel	--	--	500	2600	2800	None	0:00
Coil	7	Unidentifiable Dolphin	Swimming	Swimming below surface	Diving	--	500	750	1200	None	0:00
Coil	7	Sperm whale	Diving with flukes / Fluking	Blowing	Breaching / Jumping / Acrobatic behaviour	Surfacing	1500	750	2200	Shutdown of source	0:50
Coil	7	Atlantic spotted dolphin	Swimming	Surfacing	Breaching / Jumping / Acrobatic behaviour	Diving	0	440	600	None	0:00
Coil	7	Pantropical spotted dolphin	Breaching / Jumping / Acrobatic behaviour	Surfacing	Swimming below surface	--	0	600	850	None	0:00
Coil	7	Unidentifiable dolphin	Breaching / Jumping / Acrobatic behaviour	Surfacing	Swimming	--	500	4000	4000	None	0:00
Coil	7	Sperm whale	Blowing	Surfacing	Swimming	Swimming below surface	1500	1120	1950	Shutdown of source	0:15
Coil	7	Sperm whale	Blowing	Swimming	Surfacing	Diving	1500	3650	3850	None	0:00
Coil	7	Sperm whale	Blowing	Swimming	Fast travel	Porpoising	1500	1500	3700	Shutdown of source	0:48
Coil	7	Sperm whale	Spy hopping	Blowing	Diving with flukes / Fluking	Diving	1500	700	450	Shutdown of source	1:05
Coil	7	Sperm whale	Blowing	Swimming	Stationary	Diving	1500	1940	1940	None	0:00
Coil	7	Clymene dolphin	Breaching / Jumping /	Surfacing	Swimming	--	0	900	900	None	0:00

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
			Acrobatic behaviour								
Coil	7	Sperm whale	Blowing	Surfacing	Swimming	Swimming below surface	1500	2000	2000	None	0:00
3D NAZ	7	Unidentifiable dolphin	N/A - AD	--	--	--	500	489	N/A - AD	None	0:00
3D NAZ	7	Unidentifiable dolphin	N/A - AD	--	--	--	500	489	N/A - AD	None	0:00
3D NAZ	7	Unidentifiable dolphin	N/A - AD	--	--	--	500	489	N/A - AD	None	0:00
3D NAZ	7	Unidentifiable dolphin	N/A - AD	--	--	--	500	489	N/A - AD	None	0:00
3D NAZ	7	Unidentifiable dolphin	N/A - AD	--	--	--	500	230	N/A - AD	None	0:00
3D NAZ	7	Unidentifiable dolphin	N/A - AD	--	--	--	500	489	N/A - AD	None	0:00
Coil	7	Sperm whale	Blowing	Swimming	Diving	Diving with flukes / Fluking	1500	1500	1177	Shutdown of source	0:44
Coil	7	Sperm whale	Blowing	Swimming	Swimming below surface	--	1500	2227	3261	None	0:00
Coil	7	Unidentifiable dolphin	N/A - AD	--	--	--	500	100	N/A - AD	None	0:00
Coil	7	Sperm whale	Blowing	Fast travel	Diving with flukes / Fluking	--	1500	3200	6250	None	0:00
Coil	7	Unidentifiable Whale	Blowing	--	--	--	1500	2500	2500	None	0:00
Coil	7	Unidentifiable dolphin	N/A - AD	--	--	--	500	38	N/A - AD	None	0:00
Coil	7	Sperm whale	Blowing	Surfacing	Swimming	Diving	1500	670	670	Shutdown of source	1:09

ITR Survey Type	Zone	Species	Behavior1	Behavior2	Behavior3	Behavior4	Shutdown Zone (m)	Closest Approach to Active Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	7	Common bottlenose dolphin	Feeding	Swimming	Porpoising	Fast travel	0	550	2400	None	0:00
Coil	7	Unidentifiable dolphin	N/A - AD	--	--	--	500	24	N/A - AD	None	0:00
Coil	7	Unidentifiable dolphin	N/A - AD	--	--	--	500	21	N/A - AD	Shutdown of source	1:32
3D NAZ	7	Sperm Whale	Blowing	Stationary	Surfacing	Diving	1500	702	511	Shutdown of source	0:36
3D NAZ	7	Sperm whale	Blowing	Surfacing	Swimming	Diving with flukes / Fluking	1500	2049	2049	None	0:00
3D NAZ	7	Sperm Whale	Blowing	Swimming below surface	Fast travel	Diving with flukes / Fluking	1500	1331	1068	Shutdown of source	0:35
3D NAZ	7	Sperm whale	Blowing	Surfacing	Swimming below surface	Breaching / Jumping / Acrobatic behaviour	1500	1409	3353	Shutdown of source	0:17
3D NAZ	7	Unidentifiable Dolphin	Swimming	Diving	--	--	500	316	366	None	0:00
3D NAZ	7	Unidentifiable dolphin	N/A - AD	--	--	--	500	300	N/A - AD	None	0:00
3D NAZ	7	Unidentifiable dolphin	N/A - AD	--	--	--	500	400	N/A - AD	None	0:00
3D NAZ	7	Unidentifiable dolphin	N/A - AD	--	--	--	500	500	N/A - AD	None	0:00
3D NAZ	7	Unidentifiable Dolphin	N/A - AD	--	--	--	500	300	N/A - AD	None	0:00
3D NAZ	7	Unidentifiable Dolphin	N/A - AD	--	--	--	500	100	N/A - AD	None	0:00
3D NAZ	7	Unidentifiable Dolphin	N/A - AD	--	--	--	500	100	N/A - AD	None	0:00

*Distance at last observation, 30-minute waiting period ensued before source was restarted.

*SNA = Source Not Active

*AD = Acoustic Detection

Table 3-14. Summary of behavior and mitigations for marine mammal observations when the source was silent and a delay was incurred.

ITR Source Type	Zone	Species	Behavior 1	Behavior2	Behavior3	Behavior4	Pre-start Clearance Zone (m)	Closest Approach to Inactive Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	5	Pantropical spotted dolphin	Fast travel	Blowing	Bow riding	Breaching / Jumping / Acrobatic behaviour	1000	193	393	Delay to initiation of source	0:50
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	137	Unknown	Delay to initiation of source	0:07
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	37	Unknown	Delay to initiation of source	0:32
3D NAZ	5	Pantropical spotted dolphin	Fast travel	Bow riding	Porpoising	Swimming below surface	1000	500	800	Delay to initiation of source	0:15
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	1000	<500	Unknown	Delay to initiation of source	2:25
Coil	5	Pantropical spotted dolphin	Breaching / Jumping / Acrobatic behaviour	Swimming	--	--	1000	50	50	Delay to initiation of source	0:57
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	500	Unknown	Delay to initiation of source	0:38
Coil	5	Pantropical spotted dolphin	Bow riding	Diving	Breaching / Jumping / Acrobatic behaviour	Fast travel	1000	318	600	Delay to initiation of source	0:30

ITR Source Type	Zone	Species	Behavior 1	Behavior2	Behavior3	Behavior4	Pre-start Clearance Zone (m)	Closest Approach to Inactive Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	50	Unknown	Delay to initiation of source	0:36
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	1000	0	Unknown	Delay to initiation of source	0:20
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	100	Unknown	Delay to initiation of source	0:50
Coil	5	Pantropical spotted dolphin	Swimming below surface	Bow riding	Swimming	Breaching / Jumping / Acrobatic behaviour	1000	386	390	Delay to initiation of source	1:06
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	100	N/A - AD	Delay to initiation of source	0:08
3D NAZ	5	Unidentifiable dolphin	Surfacing	Milling	Feeding	Swimming	500	500	900	Delay to initiation of source	0:19
3D NAZ	5	Unidentifiable dolphin	N/A - AD	--	--	--	1000	500	Unknown	Delay to initiation of source	0:35
3D NAZ	5	Sperm whale	N/A - AD	--	--	--	1500	300	Unknown	Delay to initiation of source	0:41
3D NAZ	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	500	Unknown	Delay to initiation of source	0:30
3D NAZ	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	100	Unknown	Delay to initiation of source	0:30
3D NAZ	5	Unidentifiable dolphin	N/A - AD	--	--	--	1000	300	Unknown	Delay to initiation of source	0:30

ITR Source Type	Zone	Species	Behavior 1	Behavior2	Behavior3	Behavior4	Pre-start Clearance Zone (m)	Closest Approach to Inactive Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
3D NAZ	5	Pantropical spotted dolphin	Fast travel	Porpoising	Bow riding	--	0	285	680	Delay to initiation of source	0:27
3D NAZ	5	Unidentifiable Dolphin	N/A - AD	--	--	--	500	300	N/A - AD	Delay to initiation of source	0:38
Coil	5	Rough-toothed dolphin	N/A - AD	--	--	--	0	100	N/A - AD	Delay to initiation of source	1:36
Coil	3	Common bottlenose dolphin	Porpoising	Diving	--	--	1000	2	8	Delay to initiation of source	0:20
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	170	Unknown	Delay to initiation of source	0:53
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	200	Unknown	Delay to initiation of source	0:34
Coil	5	Rough-toothed dolphin	Milling	Swimming below surface	Bow riding	Breaching / Jumping / Acrobatic behaviour	1000	7	10	Delay to initiation of source	5:20
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	200	Unknown	Delay to initiation of source	0:33
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	400	Unknown	Delay to initiation of source	2:26
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	1000	200	Unknown	Delay to initiation of source	0:32
Coil	7	Unidentifiable dolphin	N/A - AD	--	--	--	1000	430	Unknown	Delay to initiation of source	1:02

ITR Source Type	Zone	Species	Behavior 1	Behavior2	Behavior3	Behavior4	Pre-start Clearance Zone (m)	Closest Approach to Inactive Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	7	Sperm whale	Blowing	Swimming	Diving	--	1500	950	1512	Delay to initiation of source	0:11
Coil	5	Clymene dolphin	Breaching / Jumping / Acrobatic behaviour	Milling	Swimming	Swimming below surface	1000	290	300	Delay to initiation of source	0:15
Coil	7	Unidentifiable dolphin	N/A - AD	--	--	--	1000	125	Unknown	Delay to initiation of source	0:19
Coil	7	Unidentifiable dolphin	N/A - AD	--	--	--	1000	30	Unknown	Delay to initiation of source	3:35
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	1000	500	Unknown	Delay to initiation of source	0:46
Coil	5	Unidentifiable dolphin	Surfacing	swimming	Fast travel	--	1000	110	110	Delay to initiation of source	1:34
Coil	7	Unidentifiable dolphin	N/A - AD	--	--	--	1000	500	Unknown	Delay to initiation of source	1:05
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	1000	34	Unknown	Delay to initiation of source	0:59
Coil	7	Unidentifiable dolphin	N/A - AD	--	--	--	1000	73	Unknown	Delay to initiation of source	1:24
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	1000	500	Unknown	Delay to initiation of source	0:12
Coil	7	Pantropical spotted dolphin	Porpoising	Bow riding	Breaching / Jumping / Acrobatic behaviour	Swimming	1000	310	310	Delay to initiation of source	0:21

ITR Source Type	Zone	Species	Behavior 1	Behavior2	Behavior3	Behavior4	Pre-start Clearance Zone (m)	Closest Approach to Inactive Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	7	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	320	Unknown	Delay to initiation of source	0:31
Coil	7	Unidentifiable dolphin	N/A - AD	--	--	--	1000	300	Unknown	Delay to initiation of source	0:31
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	100	Unknown	Delay to initiation of source	0:14
Coil	5	Rough-toothed dolphin	N/A - AD	--	--	--	1000	10	Unknown	Delay to initiation of source	3:05
Coil	5	Sperm whale	Blowing	Swimming	Diving	Diving with flukes / Fluking	1500	1200	3130	Delay to initiation of source	1:35
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	50	Unknown	Delay to initiation of source	0:30
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	1000	Unknown	Delay to initiation of source	0:30
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	500	Unknown	Delay to initiation of source	0:30
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	500	Unknown	Delay to initiation of source	0:30
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	500	Unknown	Delay to initiation of source	0:02
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	1000	500	Unknown	Delay to initiation of source	0:26

ITR Source Type	Zone	Species	Behavior 1	Behavior2	Behavior3	Behavior4	Pre-start Clearance Zone (m)	Closest Approach to Inactive Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	5	Sperm whale	N/A - AD	--	--	--	1500	1300	Unknown	Delay to initiation of source	0:30
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	500	Unknown	Delay to initiation of source	1:50
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	500	Unknown	Delay to initiation of source	1:06
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	1000	460	Unknown	Delay to initiation of source	0:30
Coil	5	Unidentifiable dolphin	N/A - AD	--	--	--	1000	10	Unknown	Delay to initiation of source	0:30
Coil	5	Rough-toothed dolphin	Swimming	Bow riding	Swimming below surface	--	1000	362	162	Delay to initiation of source	0:30
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	69	Unknown	Delay to initiation of source	0:15
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	96	Unknown	Delay to initiation of source	0:30
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	42	Unknown	Delay to initiation of source	0:30
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	500	Unknown	Delay to initiation of source	0:12
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	500	Unknown	Delay to initiation of source	0:32

ITR Source Type	Zone	Species	Behavior 1	Behavior2	Behavior3	Behavior4	Pre-start Clearance Zone (m)	Closest Approach to Inactive Source (m)	Distance at Last Sighting (m)	Mitigation	Mitigation Downtime (HH:MM)
Coil	5	Common bottlenose dolphin	Porpoising	Blowing	--	--	1000	20	20	Delay to initiation of source	0:24
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	500	Unknown	Delay to initiation of source	0:33
Coil	5	Pantropical spotted dolphin	Swimming below surface	Milling	Diving	--	1000	316	321	Delay to initiation of source	0:43
Coil	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	500	Unknown	Delay to initiation of source	0:23
3D NAZ	5	Unidentifiable dolphin	N/A - AD	--	--	--	1000	217	Unknown	Delay to initiation of source	0:40
3D NAZ	5	Unidentifiable dolphin	N/A - AD	--	--	--	1000	400	Unknown	Delay to initiation of source	0:38
3D NAZ	5	Unidentifiable dolphin	N/A - AD	--	--	--	1000	500	Unknown	Delay to initiation of source	1:01
3D NAZ	5	Unidentifiable Dolphin	N/A - AD	--	--	--	1000	300	Unknown	Delay to initiation of source	0:09
3D NAZ	7	Unidentifiable dolphin	N/A - AD	--	--	--	1000	100	Unknown	Delay to initiation of source	0:38
3D NAZ	7	Sperm whale	Blowing	Swimming	Swimming below surface	Diving	1500	1600	1250	Delay to initiation of source	0:43

3.4.1 Sighting Rate

We summarize visual observations per hour in Table 3-15 across the two-year period and detections per kilometer in Table 3-16. Dolphins were most commonly sighted in Zone 2 and 3 with common bottlenose dolphins being the most frequently sighted at 0.889 and 0.822 individuals/hr respectively (Table 3-15) or 0.084 and 0.079 individuals/km (Table 3-16) for all effort. In Zone 5, pantropical spotted dolphins were the most commonly sighted delphinids at 0.029 individuals/hr (Table 3-15). Sperm whales were the most commonly sighted whale in Zone 5 at 0.006 individuals/hr (Table 3-15). Sperm whales were the most commonly sighted whale in Zone 7 with 0.015 individuals/hr and were visually detected in Zones 5, 6, and 7 (Table 3-15).

With so few observations reported in the first two years of surveys, we cannot make any inferences regarding environmental factors that may affect visual observations. We looked at the number of observations (groups) at the range of reported visibility distances (Figure 3-5) and Beaufort sea states (Figure 3-6) and found patterns similar to those of all effort (Figure 3-1, Figure 3-3). Excluding effort and observations with no data reported for visibility, 85% of effort reported visibility greater than 5 km. As would be expected with 85% of visibility reported to be greater than 5 km, 92% of whales and 82% of dolphins were detected when visibility was greater than 5 km (these values exclude the single record for an unidentifiable cetacean). The most common Beaufort sea states for all survey effort were 3.0 and 2.0 (33.4% and 26.7% of effort respectively), while the Beaufort sea state for all observations was 2.0 and 3.0 (28% and 26% of sightings respectively). Again, with so few visual observations across sea states, it is not possible to make inferences about this difference but as more data are collected, Beaufort sea state may be found to impact sightings with fewer visual observations at higher sea states, consistent with the findings in other studies (Barlow, 2013; Barlow, 2015).

Table 3-15. Sighting rates per hour by zone and source activity for visual observations for years 1 and 2.

Species	Active Source		Inactive Source		All Effort	
	Groups/ Hr	Individuals/ Hr	Groups/ Hr	Individuals/ Hr	Groups/ Hr	Individuals/ Hr
Zone 2	Total Hours: 13.2		Total Hours: 341.3		Total Hours: 354.4	
Atlantic spotted dolphin	0	0	0.00879	0.16994	0.00847	0.16366
Clymene dolphin	0	0	0.00586	0.01172	0.00564	0.01129
Common bottlenose dolphin	0	0	0.12013	0.92294	0.11569	0.88883
Pantropical spotted dolphin	0	0	0.00586	0.03223	0.00564	0.03104
Rough-toothed dolphin	0.07576	0.07576	0.00000	0.00000	0.00282	0.00282
Unidentifiable Dolphin	0	0	0.02051	0.06446	0.01975	0.06208
Zone 3	Total Hours: 50.1		Total Hours: 232.1		Total Hours: 282.1	
Atlantic spotted dolphin	0	0	0.00431	0.02585	0.00354	0.02127
Common bottlenose dolphin	0.03992	0.27944	0.18526	0.93925	0.15952	0.82240
Pantropical spotted dolphin	0	0	0.00431	0.03016	0.00354	0.02481
Unidentifiable dolphin	0	0	0.03878	0.10771	0.03190	0.08862
Zone 5	Total Hours: 17216.2		Total Hours: 4455.7		Total Hours: 21672	
Atlantic spotted dolphin	0.00006	0.00087	0	0	0.00005	0.00069
Clymene dolphin	0.00012	0.00192	0.00157	0.01324	0.00042	0.00425
Common bottlenose dolphin	0.00076	0.00360	0.00561	0.03950	0.00175	0.01098
Cuvier's beaked whale	0	0	0.00022	0.00022	0.00005	0.00005
Dwarf sperm whale	0	0	0.00022	0.00022	0.00005	0.00005
False killer whale	0.00006	0.00029	0	0	0.00005	0.00023
Fraser's dolphin	0	0	0.00022	0.01055	0.00005	0.00217
Melon-headed whale	0.00012	0.00372	0.00045	0.01795	0.00018	0.00664
Pantropical spotted dolphin	0.00064	0.00836	0.00471	0.10930	0.00148	0.02912
Pygmy killer whale	0.00006	0.00174	0	0	0.00005	0.00138
Risso's dolphin	0.00012	0.00105	0.00045	0.00269	0.00018	0.00138
Rough-toothed dolphin	0.00029	0.00314	0.00135	0.01032	0.00051	0.00461
Short-finned pilot whale	0.00006	0.00145	0.00090	0.01391	0.00023	0.00401
Sperm whale	0.00186	0.00482	0.00426	0.00898	0.00235	0.00568
Spinner dolphin	0.00017	0.00151	0.00067	0.00539	0.00028	0.00231
Unidentifiable dolphin	0.00180	0.01069	0.00606	0.03860	0.00268	0.01643
Unidentifiable Whale	0.00035	0.00046	0.00112	0.00157	0.00051	0.00069
Zone 6	Total Hours: 126		Total Hours: 153.4		Total Hours: 279.4	

Species	Active Source		Inactive Source		All Effort	
	Groups/ Hr	Individuals/ Hr	Groups/ Hr	Individuals/ Hr	Groups/ Hr	Individuals/ Hr
Clymene dolphin	0	0	0.00652	0.01956	0.00358	0.01074
Risso's dolphin	0	0	0.01304	0.13038	0.00716	0.07158
Short-finned pilot whale	0.00794	0.07937	0	0	0.00358	0.03579
Unidentifiable cetacean	0.00794	0.01587	0	0	0.00358	0.00716
Unidentifiable dolphin	0.00794	0.03175	0	0	0.00358	0.01432
Zone 7	Total Hours: 3481.7		Total Hours: 1124.6		Total Hours: 4606.2	
Atlantic spotted dolphin	0.00029	0.00431	0	0	0.00022	0.00326
Clymene dolphin	0.00029	0.00431	0	0	0.00022	0.00326
Common bottlenose dolphin	0.00029	0.00574	0	0	0.00022	0.00434
Gervais' beaked whale	0	0	0.00089	0.00178	0.00022	0.00043
Melon-headed whale	0	0	0.00089	0.01778	0.00022	0.00434
Pantropical spotted dolphin	0.00029	0.00287	0.00534	0.09603	0.00152	0.02562
Rough-toothed dolphin	0	0	0.00178	0.02668	0.00043	0.00651
Short-finned pilot whale	0	0	0.00178	0.01601	0.00043	0.00391
Sperm whale	0.00546	0.01379	0.01067	0.02045	0.00673	0.01541
Unidentifiable dolphin	0.00115	0.00431	0.00356	0.00711	0.00174	0.00499
Unidentifiable whale	0.00057	0.00057	0.00267	0.00534	0.00109	0.00174

*Zeros indicate there was effort but no sightings.

*There were no detections of protected species in Zone 1 or Zone 4

Table 3-16. Sighting rates per kilometer by zone and source activity for years 1 and 2.

Species	Active Source		Inactive Source		All Effort	
	Groups/ km	Individuals/ km	Groups/ km	Individuals/ km	Groups/ km	Individuals/ km
Zone 2	Total km: 118.3		Total km: 3653.1		Total km: 3771.3	
Atlantic spotted dolphin	0	0	0.00082	0.01588	0.00080	0.01538
Clymene dolphin	0	0	0.00055	0.00109	0.00053	0.00106
Common bottlenose dolphin	0	0	0.01122	0.08623	0.01087	0.08353
Pantropical spotted dolphin	0	0	0.00055	0.00301	0.00053	0.00292
Rough-toothed dolphin	0.00845	0.00845	0	0	0.00027	0.00027
Unidentifiable Dolphin	0	0	0.00192	0.00602	0.00186	0.00583
Zone 3	Total km: 344.6		Total km: 2607.7		Total km: 2952.3	
Atlantic spotted dolphin	0	0	0.00038	0.00230	0.00034	0.00203
Common bottlenose dolphin	0.00580	0.04063	0.01649	0.08360	0.01524	0.07858
Pantropical spotted dolphin	0	0	0.00038	0.00268	0.00034	0.00237
Unidentifiable dolphin	0	0	0.00345	0.00959	0.00305	0.00847
Zone 5	Total km: 137648		Total km: 33232.7		Total km: 170880.6	
Atlantic spotted dolphin	0.00001	0.00011	0	0	0.00001	0.00009
Clymene dolphin	0.00001	0.00024	0.00021	0.00178	0.00005	0.00054
Common bottlenose dolphin	0.00009	0.00045	0.00075	0.00530	0.00022	0.00139
Cuvier's beaked whale	0	0	0.00003	0.00003	0.00001	0.00001
Dwarf sperm whale	0	0	0.00003	0.00003	0.00001	0.00001
False killer whale	0.00001	0.00004	0	0	0.00001	0.00003
Fraser's dolphin	0	0	0.00003	0.00141	0.00001	0.00028
Melon-headed whale	0.00001	0.00046	0.00006	0.00241	0.00002	0.00084
Pantropical spotted dolphin	0.00008	0.00105	0.00063	0.01465	0.00019	0.00369
Pygmy killer whale	0.00001	0.00022	0	0	0.00001	0.00018
Risso's dolphin	0.00001	0.00013	0.00006	0.00036	0.00002	0.00018
Rough-toothed dolphin	0.00004	0.00039	0.00018	0.00138	0.00006	0.00059
Short-finned pilot whale	0.00001	0.00018	0.00012	0.00187	0.00003	0.00051
Sperm whale	0.00023	0.00060	0.00057	0.00120	0.00030	0.00072
Spinner dolphin	0.00002	0.00019	0.00009	0.00072	0.00004	0.00029
Unidentifiable dolphin	0.00023	0.00134	0.00081	0.00518	0.00034	0.00208
Unidentifiable Whale	0.00004	0.00006	0.00015	0.00021	0.00006	0.00009
Zone 6	Total km: 885.6		Total km: 1375.6		Total km: 2231.2	

Species	Active Source		Inactive Source		All Effort	
	Groups/ km	Individuals/ km	Groups/ km	Individuals/ km	Groups/ km	Individuals/ km
Clymene dolphin	0	0	0.00073	0.00218	0.00045	0.00134
Risso's dolphin	0	0	0.00145	0.01454	0.00090	0.00896
Short-finned pilot whale	0.00113	0.01129	0	0	0.00045	0.00448
Unidentifiable cetacean	0.00113	0.00226	0	0	0.00045	0.00090
Unidentifiable dolphin	0.00113	0.00452	0	0	0.00045	0.00179
Zone 7	Total km: 27185		Total km: 49167.6		Total km: 215325	
Atlantic spotted dolphin	0.00004	0.00055	0	0	0.00000	0.00007
Clymene dolphin	0.00004	0.00055	0	0	0.00000	0.00007
Common bottlenose dolphin	0.00004	0.00074	0	0	0.00000	0.00009
Gervais' beaked whale	0	0	0.00002	0.00004	0.00000	0.00001
Melon-headed whale	0	0	0.00002	0.00041	0.00000	0.00009
Pantropical spotted dolphin	0.00004	0.00037	0.00012	0.00220	0.00003	0.00055
Rough-toothed dolphin	0	0	0.00004	0.00061	0.00001	0.00014
Short-finned pilot whale	0	0	0.00004	0.00037	0.00001	0.00008
Sperm whale	0.00070	0.00177	0.00024	0.00047	0.00014	0.00033
Unidentifiable dolphin	0.00015	0.00055	0.00008	0.00016	0.00004	0.00011
Unidentifiable whale	0.00007	0.00007	0.00006	0.00012	0.00002	0.00004

*Zeros indicate there was effort but no sightings.

*There were no detections of protected species in Zone 1 or Zone 4

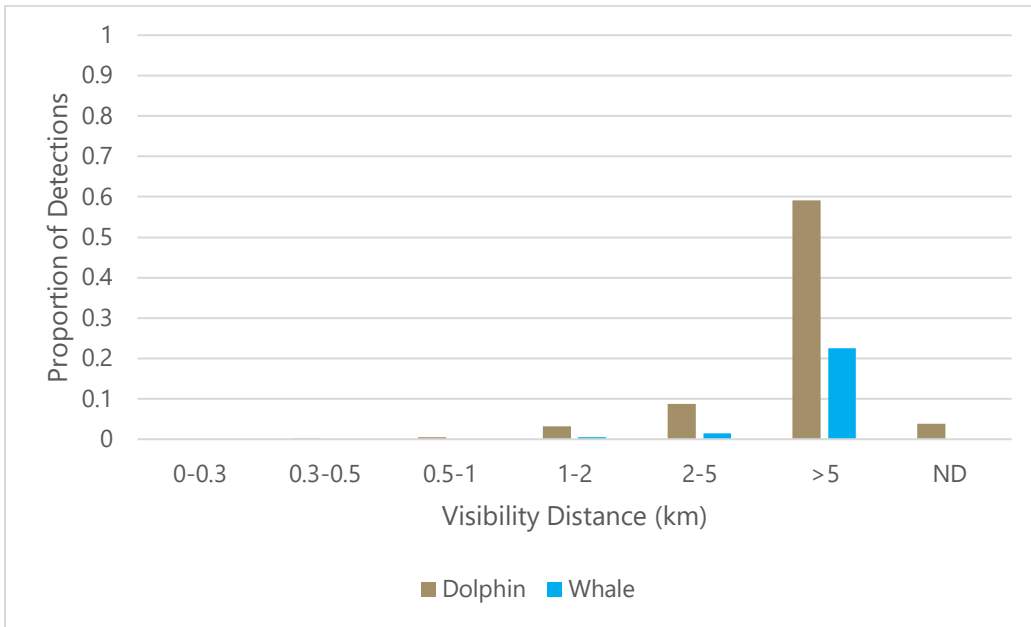


Figure 3-5. Proportion of observations that occurred in each visibility distance bin for years 1 and 2. ND is no data reported.

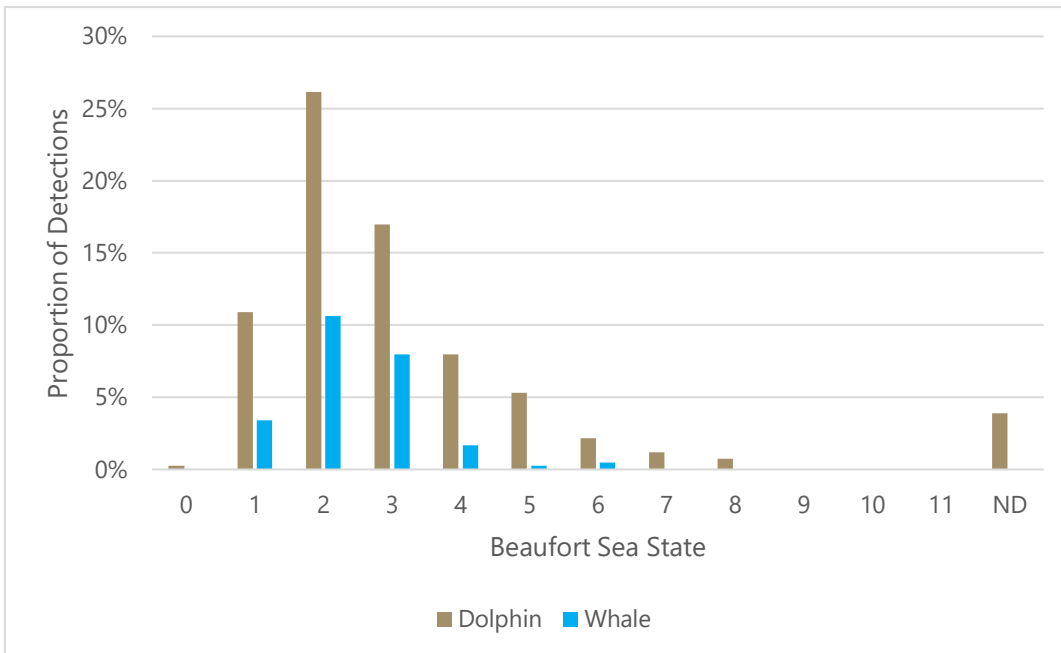


Figure 3-6. Proportion of observations that occurred at each Beaufort sea state for years 1 and 2. ND is no data reported.

3.5 Data Quality Management

The following challenges were encountered during data analysis:

Determining when the source is active from the provided codes is not entirely clear. For example, for several of the marine mammal visual observations, the effort table indicated the vessel activity was Data Acquisition at the time of the observation, implying active source; however, the Visual Observations table had the source recorded as Not Firing. Additionally, several corresponding Effort entries contained multiple source operational levels, as noted in the observer comments. A clear code that is consistent between Effort and Observations/Detections and new Effort entries at the time of a source change would improve the accuracy of the provided effort data and the ease with which the data can be summarized.

While we can estimate distance from time and vessel speed, we cannot know the actual area covered, or whether it was a straight line or involved turns. Therefore, it would be helpful if tracklines accompanied the data. We made this comment in the Year 1 report and it remains a recommendation for Year 2. See below for additional details.

- Issues with accuracy of geographical positions entered into data forms:
 - Data quality issues involving geographical positions seem to be attributed to manual entry. A recommended action would be a geospatial enabled application for capturing the different PSO required activities, minimizing possible manual errors in 6-10 digit latitude/longitude data points.
 - Time entries were not consistent throughout the data. Standardized time entries and consistency in how time format is entered will assist with future data analysis. The same is applicable for date entries.

4 SUMMARY AND CONCLUSIONS

Based on the data collected, and subsequent analysis presented in this report, the following conclusions include:

1. Most of the monitoring effort occurred while the source was active (76.8%) and not all surveys collected data when the source was not active. Collecting effort data during all phases of the surveys when the vessel is on the water would be helpful for understanding factors that affect observation/detection rates, and ideally this can be addressed in future years. In the second year of data collection, effort data were reported for transit for all surveys. In Year 1, all active survey activity (i.e., with the source powered) occurred in zones 5 and 7; of the active surveys, 14% occurred in zone 5 and 3.5% in zone 7. There were records for active surveys in zone 3 in Year 1 based on effort data with vessel activity codes we consider to represent active sources, but there were no 'data acquisition' codes that would represent survey activity. In Year 2, active surveys, inclusive of data acquisition codes, were reported in zones 2, 3, 4, 5, 6 and 7, with 0.1% of active survey time occurring in zone 2 and 3, 49.3% in zone 5, 0.1% in zone 6, and 9.3% in zone 7. Over both years, 1.3% of active survey codes occurred in zone 2, 1.0% in zone 3, 0.1% in zone 4, 79.6% in zone 5, 1.0% in zone 6, and 16.9% in zone 7.
2. With only nine surveys completed in the first year of the ITR and seven surveys in the second year, we have limited data on which to make inferences regarding our key objectives:
 - a. Behavioral response (or lack of response) to seismic and other geophysical survey types;
 - b. Species/hearing group behavioral sensitivity to seismic and other geophysical surveys;
 - c. Effectiveness of shutdown, power-down, and soft-start mitigations to reduce potential impacts/take; and
 - d. Quantification as possible of impact of mitigation and marine mammal responses with respect to adjustment of take estimates to improve models.

Data are insufficient to assess behavioral responses at this time.

3. Of the 44 instances in which a shutdown was implemented, animals were already within the exclusion zone when first detected in at least 24 of them. Of the 20 sightings in which animals were first observed outside the exclusion zone, nine shutdowns were implemented prior to the animals entering the exclusion zone and 11 were implemented after the animals entered the exclusion zone. In the nine instances in which shutdowns were implemented prior to animals entering the exclusion zone, PSOs were generally able to consistently monitor the animals' movements (surface travel or similar). In the 11 instances in which animals (sperm whales) were initially observed outside the exclusion zone and a shutdown was called for once the animal was within the exclusion zone, the animals submerged outside the exclusion zone and then resurfaced several minutes later within the exclusion zone. Observation time outside the exclusion zone prior to a source shutdown ranged from one minute to 1 hour and 9 minutes, with a majority observed outside the exclusion zone for 10 minutes or less before entering. From this we can infer the shutdowns likely minimized impacts to the animals in terms of

reducing time of exposure to sound levels in exceedance of National Marine Fisheries Service (NMFS) criteria for behavioral harassment; however, observations of a group of sperm whales in the area of the vessel for over an hour suggests the whales were not avoiding the seismic survey.

4. For environmental conditions that may affect sightings rates, again, there are not sufficient data to make statistical inferences. Similar to other studies (Barlow 2013, 2015), we found that the Beaufort sea states were lower when sightings occurred than sea states reported across all effort, suggesting sightings may be negatively affected (i.e., animals are harder to see) at higher sea states.

There were zero detections of Rice's whales or unknown baleen whales during the survey effort within the 100-400 m isopleths along the northern GOM.

5 RECOMMENDATIONS FOR ADAPTIVE MANAGEMENT

As noted previously, the limited survey data and marine mammal sightings/detections do not allow us to make detailed assessments regarding our key objectives for assessing behavioral responses/sensitivity and the impact of mitigation on reducing potential take. We have outlined some areas of focus for adaptive management below based on the ITR and provide recommendations for data collection methods and data analysis approaches that will allow us to better focus on these objectives in future years.

Areas of focus for adaptive management will be:

- Identifying environmental conditions that affect sighting rates and employing methods to improve sighting rates under those conditions. GOM-PROP initiatives for improved PAM systems may provide methods to enhance detection rates.
- Assessment of species-specific behavioral responses to sound produced by seismic sources with recommendations for refining exclusion zones and distances that constitute take. Ideally this will incorporate new information from GOM-PROP sound source research and development initiatives from Sound and Marine Life Joint Industry Programme studies on behavioral reactions to sound.
- Assessment of the effectiveness of current mitigation for minimizing take and recommendations for changes to mitigation for improved minimization of take.

Identifying alternative methods for monitoring marine fauna such as thermal imaging unmanned vehicles which is being investigated through the Sound and Marine Life Joint Industry Programme research projects.

Please refer to the Annual Report from April 2021 to April 2022 submitted by EnerGeo Alliance and the GOM-PROP to NMFS for data recommendations.

6 RESEARCH REPORTING

The research section of the annual report is meant to provide a better understanding of the tremendous volume of research undertaken by GOM-PROP members. Research initiative updates for the current year include the following:

- Alternative source technology development;
- Sound source characterization and propagation;
- Mitigation and monitoring tools;
- Research tools;
- Biodiversity initiatives; and
- Updates to EnerGeo Alliance's Ghost Net Initiative.

Research in the Gulf of Mexico is emphasized when applicable, but examples of relevant initiatives outside of Gulf of Mexico are also included, such as Sound and Marine Life Joint Industry Programme (SML JIP) initiatives. Initiatives that generally affect marine mammal conservation were also included, such as the Ghost Net Initiative and Biodiversity.

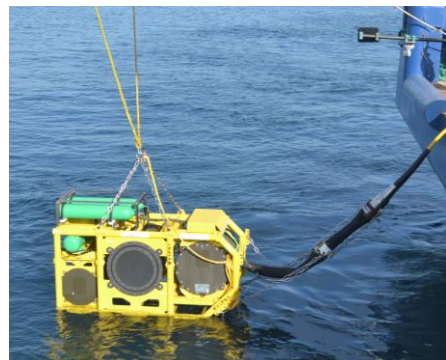
6.1 Research Topics

6.1.1 GOM-PROP Companies' Research and Development

6.1.1.1 *Examples of Sound Source Research and Innovation*

In 2021, Sercel conducted sea trials for its Tuned Pulse Source technology which was highlighted in the previous annual report. This new technology is addressing two objectives: to achieve a lower frequency sound output than conventional sources and to reduce the sound emitted during a seismic survey. Sercel continued research on this technology in 2022 performing additional sea trials to calibrate the Tuned Pulse Source. They have also now developed models for both sources in order to better estimate the size of exclusion zones for different cetacean groups.

The Marine Vibrator Joint Industry Project (MVJIP) sponsors, ExxonMobil, Shell and TotalEnergies, in association with the Texas A&M Engineering Experimentation Station (TEES) successfully completed an open water offshore pilot of a Marine Vibrator system which has been designed and built by General Dynamics Applied Physical Sciences. This project successfully acquired over 300km of lines performing nearly 14,000 sweeps in both stationery and towing modes. The MVJIP has now shifted attention to processing these data and comparing with a coincident, similarly sized air gun survey. To characterize impact



to marine life MVJIP is working in collaboration with the Sound and Marine Life JIP who are planning a behavioral response study of marine mammals offshore California in 2024.

PXGEO recently developed an ocean bottom node system called MantaRay which uses Hovering Autonomous Underwater Vehicles capable of deploying and recovering nodes significantly faster and with better precision than traditional methods. The system is autonomous with a tether-less operation which minimizes seabed impact and reduces crew and operational risks.

6.1.2 Monitoring Technology

Monitoring technology systems for marine mammals continue to be improved, and the seismic industry continues to incorporate new technologies into operations to better detect marine mammals. Recent technology improvements and research have revolved around the use of real-time autonomous passive acoustic monitoring systems and the use of infrared thermal technology for detecting marine mammals. Two companies within the GOM-PROP group have recently worked on advances in these technologies.

Sercel's most recent acoustics innovation, an autonomous buoy with their QuietSea technology designed to detect marine mammals in real time, was tested this year in Europe. This technological innovation is terminal-based (smartphone, tablet, personal computer) and sends real-time alerts on the presence of porpoises. Sercel implemented the QuietSea buoy using the nautical resources of its Lorient site and its vocalization simulator. The results of the testing have been successful with one hundred percent of expected vocalizations detected and sent via email in real time. The buoy is continuing to be tested and is currently deployed in the United Kingdom. QuietSea has been developed to aid in the implementation of marine mammal protection tools in offshore construction industries. This innovation offers a real-time solution that can be easily deployed while drifting or anchored at sea.

ExxonMobil, Equinor and Toyon partnered in the development of an infrared (IR) camera with artificial intelligence capabilities to semi-autonomously detect whales during low light conditions. This system was deployed during offshore operations to detect whales in 2022 and the data processing algorithms have been trained to enable semi-automation. The infrared system allows for the detection of whales in low light, high visible glare, and complete darkness; thereby, enhancing monitoring capabilities in situations where a Marine Mammal Observer (MMO) would have limited or no chance to visually detect a whale. The IR system is designed to detect surfaced whales making it a complementary tool for a passive acoustic monitoring (PAM) system, especially in conditions where the whales are not vocalizing often. Using data collected on three deployments, the system automatically detected sperm, humpback, fin, killer, and possibly sei whales. Detection ranges reliably included up to ~2.5 km, with possible detections as far as 3-4 km. Dolphins and pinnipeds can be detected as well, but at a reduced range. Ongoing work funded by a NOAA grant will improve the automatic detection capabilities in the coming



months and more of the data in training the algorithm. Funding was through Hibernia Management and Development Company, Equinor Canada, Fisheries and Oceans Canada (DFO), with in-kind support by PGS.

6.1.3 Research Tools

ExxonMobil and bp are also leading work through the SML JIP to develop a population consequences of disturbance model. This is a computer-based modeling tool that is intended to predict potential long term impacts to marine mammal populations from marine sound disturbances. The model focuses on harbor porpoise in the North Sea but has potentially universal learnings. Both DHI and UCSC worked with ExxonMobil and bp to develop the technology.

bp have partnered with Fauna & Flora International to support bp's Sustainability Aim 16: Enhancing Biodiversity to develop a methodology to quantify biodiversity baselines around bp's major operating areas, biodiversity impacts from projects, mitigation effectiveness, and provide ecological compensation measures and supplementary transformative actions to ensure that a Net Positive Impact is achieved for bp's projects that screen for having a potential impact to biodiversity going forward.

6.1.4 Ghost Net Initiative

The Ghost Net Initiative, started in 2016 by EnerGeo Alliance, employs a collaborative effort for removal of marine debris and derelict fishing gear (often referred to as ghost gear). The geophysical industry has been removing marine debris for decades, and this initiative provides an opportunity to quantify the benefit of that work. This program demonstrates EnerGeo Alliance's members' commitment to creating a healthier ocean environment by clearing marine debris, which is among the greatest dangers to marine life. Recently the seismic vessel Sanco Spirit removed a ghost net on a project for bp.

7 LITERATURE CITED

- Barkaszi, M.J., M. Butler, R. Compton, A. Unietis, and B. Bennet. 2012. Seismic survey mitigation measures and marine mammal observer reports. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study BOEM 2012-015. 28 pp + apps.
- Barkaszi, M.J. and C.J. Kelly. 2018. Seismic survey mitigation measures and protected species observer reports: synthesis report. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, LA. Contract No.: M17PD00004. OCS Study BOEM 2019-012. 220 p.
- Barlow, J. 2013. Inferring trackline detection probabilities from differences in apparent densities of beaked whales and dwarf & pygmy sperm whale in different survey conditions. NOAA-TM-NMSF-SWTSC-508. National Marine Fisheries Service, Southwest Fisheries Science Center, USA.
- Barlow J. 2015. Inferring trackline detection probabilities, $g(0)$, for cetaceans from apparent densities in different survey conditions. *Mar Mammal Sci.* 31(3):923-943.
- Barton, C.J.S., Jaques, R., and Mason, M. 2008. Identification of potential utility and collation of existing marine mammal observer data. Report to the Joint Industry Programme Sound and Marine Life Programme, 109pp. Available from: https://gissserver.intertek.com/JIP/DMS/ProjectReports/Cat4/Other/JIP-Proj4.4_JIPreportMMOdata_RSK_2008.pdf
- Farmer NA, Powell JR, Morris JA, Jr., Soldevilla MS, Wickliffe LC, Jossart JA, et al. (2022) Modeling protected species distributions and habitats to inform siting and management of pioneering ocean industries: A case study for Gulf of Mexico aquaculture. *PLoS ONE* 17(9): e0267333. <https://doi.org/10.1371/journal.pone.0267333>
- RPS. 2019. International Protected Species Observer Data Analysis Report. Report to the Joint Industry Programme Sound and Marine Life Programme, 109pp. Available from: https://gissserver.intertek.com/JIP/DMS/ProjectReports/Cat3/JIP-Proj3.10_InternationalProtectedSpeciesObserverDataAnalysisReport.pdf

APPENDIX A FIELDS AND DROP-DOWN MENU OPTIONS FOR DATA COLLECTION SHEETS (INFORMED BY RPS)



Table A-1. Fields and drop-down menu options for the effort data collection sheet.

Database Headings		Drop-down Menu Options																	
Date																			
Type (visual, acoustic, or both VS day or night)		Visual Only (Day)	Visual Only (Night)	PAM Only (Day)	PAM Only (Night)	Visual and PAM (Day)	Visual and PAM (Night)												
Number PSOs on Visual Watch		1	2	3	4	5													
If acoustic, location of monitoring		Remote	Vessel																
PAM Operator Initials																			
PSO Initials																			
Vessel Activity		Data Acquisition	Line Change	Testing	Weather Patterns	Deploying/Retrieving Equipment	Transit	Docked	At Anchor	Bunkering	Standby	Other							
Start of Observations	Time																		
	Latitude																		
	Longitude																		
	Vessel Heading in degrees																		
	Vessel Speed in Knots																		
	GIS Latitude																		
	GIS Longitude																		
	Water depth (meters)																		
End of Observations	Time																		
	Latitude																		
	Longitude																		



Database Headings		Drop-down Menu Options																	
	Vessel Heading in degrees																		
	Vessel Speed in Knots																		
	GIS Latitude																		
	GIS Longitude																		
	Water depth (meters)																		
	Duration of visual only (day) observation																		
	Duration of source activity during visual only (day) observations																		
	Duration of visual only (night) observation																		
	Duration of source activity during visual only (night) observations																		
	Duration of PAM only (day) monitoring																		
	Duration of source activity during PAM only (day) monitoring																		
	Duration of PAM only (night) observation																		
	Duration of source activity during PAM only (night) observations																		
	Duration of visual and PAM (day) monitoring																		
	Duration of source activity during visual and PAM (day) monitoring																		



Database Headings	Drop-down Menu Options															
Duration of visual and PAM (night) monitoring																
Duration of source activity during visual and PAM (night) monitoring																
For acoustic, hydrophone depth (m)																
Wind Speed (knots)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
Wind Direction	0	1	2	3	4	5	6	7	8	9	10	11	12			
Beaufort Scale	<2	2-4	>4													
Swell (meters)	<0.05	0.05-0.1	0.1-0.3	0.3-0.5	0.5-1	1-2	2-5	>5								
Visibility (km)																
Cloud Coverage (%)	None	Mild	Moderate	Severe												
Glare	Clear	Haze	Light Rain	Heavy Rain	Thin Fog	Heavy Fog	Sleet	Snow								
Precipitation	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
Comments																



Table A-2. Fields and dropdown lists for visual sightings data collection sheet.

Database Headings	Drop-down Menu Options										
Date											
Visual detection number											
Acoustic detection number if detection was correlated											
Time at first detection (HH:MM)											
Time at last detection (HH:MM)											
Visual observer(s)											
Detection was first made	visually by observer keeping a continuous watch	incidentally by visual observer or someone else	acoustically by PAM	both visually and acoustically before observers informed each other							
Detection Cue - Visual Detections	Blow	Dorsal Fin	Body	Splash	Breach	Other Wildlife Nearby	Other (describe in comments)				
Latitude											
Longitude											
GIS Latitude											
GIS Longitude											
Compass heading of vessel (degrees)											
Water depth (meters)											



Database Headings		Drop-down Menu Options									
Common name		NOTE: See Table A-4 for the common name, scientific name and family drop down lists									
Scientific name											
Family											
Certainty of identification		Definite	Probable	Possible							
Number of Adults	High Estimate										
	Low Estimate										
	Best Estimate										
Number of Juveniles	High Estimate										
	Low Estimate										
	Best Estimate										
Total number of animals											
Visual Description (include features such as overall size; shape of head; color and pattern; size, shape, and position of dorsal fin; height, direction, shape of blow, sex/age if determinable, etc.)											
Select behaviors observed during the detection event. You do not need to complete all six columns if six	Behavior 1	NOTE: See Table A-5 for a list of the behavior options									
	Behavior 2										
	Behavior 3										
	Behavior 4										

Database Headings		Drop-down Menu Options											
different behaviors were not observed. If more than six behaviors were observed, select the five behaviors after the initial behavior that were observed most often or by the most animals.	Behavior 5												
	Behavior 6												
If any bow-riding behavior observed, record total duration during detection (HH:MM)													
	Bearing to animal(s) at first detection (degrees)												
	Range of animals to vessel at first detection (meters)												
	Range of animals to source at first detection (meters)												
	Bearing to animal(s) at first detection (degrees)												

Database Headings		Drop-down Menu Options										
	Method of Distance Determination	Eyeball estimate	Reticule	Laser range finder	Range stick							
	Initial heading of animal(s) (degrees)											
	Animal(s) Pace at Initial Detection											
	Direction of travel (relative to vessel) at Initial Detection	towards vessel	away from vessel	parallel in same direction as vessel	parallel in opposite direction as vessel	crossing ahead of vessel	crossing astern of vessel	variable	milling	stationary	other	unknown
	Location/direction of travel (relative to the Exclusion Zone) at Initial Detection	Outside	Approaching	Entering	Within							
	Bearing to animal(s) at last detection (degrees)											
	Range of animals to											

Database Headings		Drop-down Menu Options											
	vessel at last detection (meters)												
	Range of animals to source at last detection (meters)												
	Method of Distance Determination												
	Final heading of animal(s) (degrees)												
	Animal(s) Pace at Final Detection												
	Direction of travel (relative to vessel) at Final Detection												
	Location/ direction of travel (relative to the Exclusion Zone) at Final Detection												

Database Headings		Drop-down Menu Options											
Source activity at initial detection													
Source activity at final detection													
	Applicable mitigation zone (meters)												
	Did the animal enter the mitigation zone during the detection event?												
	Number of animals during the detection event observed inside the mitigation zone												
	Was the source active when the animals entered the mitigation zone?												
	Closest distance of animals to												

Database Headings		Drop-down Menu Options											
	active source (meters)												
	Power level of source (cu inches)												
	Time at closest approach to active source (hh:mm)												
	Closest distance of animals to silent source (meters)												
	Time at closest approach to silent source (hh:mm)												
	Source mitigation action required	shutdown of source	delay to initiation of source followed by shutdown of source	powerdown of source	delay to initiation of source followed by powerdown of source	powerdown of source followed by shutdown of source	voluntary turtle pause						
	Mitigation Downtime (HH:MM)												
	Total duration of silence between mitigation shutdown and soft start (HH:MM)												



Database Headings	Drop-down Menu Options										
Avoidance maneuvers required	alter course	speed reduction and alter course	shift in to neutral								
Visual Detection Narrative (be as detailed as possible - include all information relevant to the detection, especially any changes in relation to source activity and distances from the source and EZ - times, distances, behaviors, locations, headings, mitigation actions, etc.)											
Photographs (list file names)											
Other notes or comments											

Table A-3. Fields and dropdown list for acoustic detections data collection sheet.

Database Headings	Drop-down Menu Options										
Date											
Visual detection number if detection was correlated											
Acoustic detection number											
Time at first detection (HH:MM)											
Time at last detection (HH:MM)											
Acoustic observer(s)											
Detection was first made	visually by observer keeping a continuous watch	incidentally by visual observer or someone else	acoustically by PAM	both visually and acoustically before observers informed each other							



Database Headings		Drop-down Menu Options							
Detection Cue - Acoustic Detection		Aurally by PAM Operator	Visually by Operator on a Spectrogram	Visually by Operator on a Click Detector	Visually by Operator on a different module	Aurally and visually detected simultaneously			
Latitude									
Longitude									
GIS Latitude									
GIS Longitude									
Compass heading of vessel (degrees)									
Water depth (meters)									
Common name		NOTE: See Table A-4 for the common name, scientific name and family drop down lists							
Scientific name									
Family									
Certainty of identification		Definite	Probable	Possible					
Number of Animals	High Estimate								
	Low Estimate								
	Best Estimate								
Acoustic Description (include features of detection, such as type(s) and nature of vocalizations, registered amplitudes, etc.)									
Acoustic Detections: Select from the drop-down list the	1	Aural detection of clicks and/or pulsed sounds	Aural detection of tonal sounds	Visual detection of clicks and/or pulsed sounds on a spectrogram	Visual detection of tonal sounds on a spectrogram	Detection of tonal sounds by an automated Whistle Moan Detector	Detection of clicks by an automated Click Detector	Other (described in detection description)	

Database Headings		Drop-down Menu Options							
methods/modules on which vocalizations were detected during the event. You do not need to complete all six columns.	2	Aural detection of clicks and/or pulsed sounds	Aural detection of tonal sounds	Visual detection of clicks and/or pulsed sounds on a spectrogram	Visual detection of tonal sounds on a spectrogram	Detection of tonal sounds by an automated Whistle Moan Detector	Detection of clicks by an automated Click Detector	Other (described in detection description)	
	3	Aural detection of clicks and/or pulsed sounds	Aural detection of tonal sounds	Visual detection of clicks and/or pulsed sounds on a spectrogram	Visual detection of tonal sounds on a spectrogram	Detection of tonal sounds by an automated Whistle Moan Detector	Detection of clicks by an automated Click Detector	Other (described in detection description)	
	4	Aural detection of clicks and/or pulsed sounds	Aural detection of tonal sounds	Visual detection of clicks and/or pulsed sounds on a spectrogram	Visual detection of tonal sounds on a spectrogram	Detection of tonal sounds by an automated Whistle Moan Detector	Detection of clicks by an automated Click Detector	Other (described in detection description)	
	5	Aural detection of clicks and/or pulsed sounds	Aural detection of tonal sounds	Visual detection of clicks and/or pulsed sounds on a spectrogram	Visual detection of tonal sounds on a spectrogram	Detection of tonal sounds by an automated Whistle Moan Detector	Detection of clicks by an automated Click Detector	Other (described in detection description)	
	6	Aural detection of clicks and/or pulsed sounds	Aural detection of tonal sounds	Visual detection of clicks and/or pulsed sounds on a spectrogram	Visual detection of tonal sounds on a spectrogram	Detection of tonal sounds by an automated Whistle Moan Detector	Detection of clicks by an automated Click Detector	Other (described in detection description)	
Initial Detection Information	Bearing to animal(s) at first detection (degrees)								
	Range of animals to hydrophones at first detection (meters)								
	Range of animals to source at first detection (meters)								
	Method of Distance Determination	Operator estimation	PAMGuard localization	Other software utilized					

Database Headings		Drop-down Menu Options							
Final Detection Information	Bearing to animal(s) at last detection (degrees)								
	Range of animals to hydrophones at last detection (meters)								
	Range of animals to source at last detection (meters)								
	Method of Distance Determination								
Source activity at initial detection									
Source activity at final detection									
Mitigation Zone (Exclusion or Buffer)	Applicable mitigation zone (meters)								
	Did the animal enter the mitigation zone during the detection event?								
	Was the source active when the animals entered the mitigation zone?								
Active source only	Closest distance of animals to active source (meters)								



Database Headings		Drop-down Menu Options							
	Power level of source (cu inches)								
	Time at closest approach to active source (hh:mm)								
Silent Source Only	Closest distance of animals to silent source (meters)								
	Time at closest approach to silent source (hh:mm)								
Source mitigation action required		none	delay to initiation of source	shutdown of source	delay to initiation of source followed by shutdown of source	powerdown of source	delay to initiation of source followed by powerdown of source	powerdown of source followed by shutdown of source	voluntary turtle pause
Mitigation Downtime (HH:MM)		none	delay to initiation of source	shutdown of source	delay to initiation of source followed by shutdown of source	powerdown of source	delay to initiation of source followed by powerdown of source	powerdown of source followed by shutdown of source	voluntary turtle pause
Total duration of silence between marine mammal mitigation shutdown and soft start (HH:MM)									
Acoustic Detection Narrative (be as detailed as possible - include all information relevant to the detection, especially any changes in relation to source activity and distances from the source and EZ - times, distances, bearings, tow depth of the hydrophone cable, mitigation actions, etc.)									
Screengrabs and recordings (list file names)									
Other notes or comments									



Table A-4. Species list for the dropdown menus in Table A-2.

Common Name	Scientific Name	Family
Andrews' beaked whale	<i>Mesoplodon bowdoini</i>	Ziphiidae
Antarctic Fur Seal	<i>Arctocephalus gazella</i>	Otariidae
Antarctic minke whale	<i>Balaenoptera bonaerensis</i>	Balaenopteridae
Arnoux's beaked whale	<i>Berardius arnuxii</i>	Ziphiidae
Atlantic humpback dolphin	<i>Sousa teuszii</i>	Delphinidae
Atlantic spotted dolphin	<i>Stenella frontalis</i>	Delphinidae
Atlantic white-sided dolphin	<i>Lagenorhynchus acutus</i>	Delphinidae
Australian Fur Seal	<i>Arctocephalus pusillus doriferus</i>	Otariidae
Australian Sea Lion	<i>Neophoca cinerea</i>	Otariidae
Bahamonde's beaked whale	<i>Mesoplodon bahamondi</i>	Ziphiidae
Baikal Seal or Nerpa	<i>Phoca sibirica</i>	Phocidae
Baird's beaked whale	<i>Berardius bairdii</i>	Ziphiidae
Bearded Seal	<i>Erignathus barbatus</i>	Phocidae
Beluga whale	<i>Delphinapterus leucas</i>	Monodontidae
Blainville's beaked whale	<i>Mesoplodon densirostris</i>	Ziphiidae
Blue whale	<i>Balaenoptera musculus</i>	Balaenopteridae
Boto	<i>Inia geoffrensis</i>	Iniidae
Bowhead whale	<i>Balaena mysticetus</i>	Balaenidae
Bryde's whale	<i>Balaenoptera edeni</i>	Balaenopteridae
Burmeister's porpoise	<i>Phocoena spinipinnis</i>	Phocoenidae
California Sea Lion	<i>Zalophus californianus</i>	Otariidae
Caspian Seal	<i>Phoca caspica</i>	Phocidae
Chilean dolphin	<i>Cephalorhynchus eutropia</i>	Delphinidae
Clymene dolphin	<i>Stenella clymene</i>	Delphinidae
Commerson's dolphin	<i>Cephalorhynchus commersonii</i>	Delphinidae
Common bottlenose dolphin	<i>Tursiops truncatus</i>	Delphinidae
Common dolphin	<i>Delphinus delphis</i>	Delphinidae

Common Name	Scientific Name	Family
Common minke whale	<i>Balaenoptera acutorostrata</i>	Balaenopteridae
Cook Inlet beluga whale	<i>Delphinapterus leucas</i>	Monodontidae
Crabeater Seal	<i>Lobodon carcinophagus</i>	Phocidae
Cuvier's beaked whale	<i>Ziphius cavirostris</i>	Ziphiidae
Dall's porpoise	<i>Phocoenoides dalli</i>	Phocoenidae
Dugong	<i>Dugong dugon</i>	Dugongidae
Dusky dolphin	<i>Lagenorhynchus obscurus</i>	Delphinidae
Dwarf sperm whale	<i>Kogia sima</i>	Kogiidae
False killer whale	<i>Pseudorca crassidens</i>	Delphinidae
Fin whale	<i>Balaenoptera physalus</i>	Balaenopteridae
Finless porpoise	<i>Neophocaena phocaenoides</i>	Phocoenidae
Flatback sea turtle	<i>Natator depressus</i>	Cheloniidae
Florida Manatee	<i>Trichechus manatus latirostris</i>	Trichechidae
Franciscana	<i>Pontoporia blainvillei</i>	Pontoporiidae
Fraser's dolphin	<i>Lagenodelphis hosei</i>	Delphinidae
Galapagos Sea Lion	<i>Zalophus californianus wollebaeki</i>	Otariidae
Gervais' beaked whale	<i>Mesoplodon europaeus</i>	Ziphiidae
Ginkgo-toothed beaked whale	<i>Mesoplodon ginkgodens</i>	Ziphiidae
Gray Seal	<i>Halichoerus grypus</i>	Phocidae
Gray whale	<i>Eschrichtius robustus</i>	Eschrichtiidae
Gray's beaked whale	<i>Mesoplodon grayi</i>	Ziphiidae
Green sea turtle	<i>Chelonia mydas</i>	Cheloniidae
Guadalupe Fur Seal	<i>Arctocephalus townsendi</i>	Otariidae
Harbor porpoise	<i>Phocoena</i>	Phocoenidae
Harbor Seal	<i>Phoca vitulina</i>	Phocidae
Harp Seal	<i>Phoca groenlandica</i>	Phocidae
Hawaiian Monk Seal	<i>Monachus schauinslandi</i>	Phocidae
Hawksbill sea turtle	<i>Eretmochelys imbricata</i>	Cheloniidae
Heaviside's dolphin	<i>Cephalorhynchus heavisidii</i>	Delphinidae

Common Name	Scientific Name	Family
Hector's beaked whale	<i>Mesoplodon hectori</i>	Ziphiidae
Hector's dolphin	<i>Cephalorhynchus hectori</i>	Delphinidae
Hooded Seal	<i>Cystophora cristata</i>	Phocidae
Hourglass dolphin	<i>Lagenorhynchus cruciger</i>	Delphinidae
Hubbs' beaked whale	<i>Mesoplodon carlhubbsi</i>	Ziphiidae
Humpback whale	<i>Megaptera novaeangliae</i>	Balaenopteridae
Indo-Pacific bottlenose dolphin	<i>Tursiops aduncus</i>	Delphinidae
Indo-Pacific humpback dolphin	<i>Sousa chinensis</i>	Delphinidae
Irrawaddy dolphin	<i>Orcaella brevirostris</i>	Delphinidae
Juan Fernandez Fur Seal	<i>Arctocephalus philippi</i>	Otariidae
Kemp's Ridley sea turtle	<i>Lepidochelys kempii</i>	Cheloniidae
Killer whale	<i>Orcinus orca</i>	Delphinidae
Leatherback sea turtle	<i>Dermochelys coriacea</i>	Dermochelyidae
Leopard Seal	<i>Hydrurga leptonyx</i>	Phocidae
Loggerhead sea turtle	<i>Caretta</i>	Cheloniidae
Long-beaked common dolphin	<i>Delphinus capensis</i>	Delphinidae
Long-finned pilot whale	<i>Globicephala melas</i>	Delphinidae
Longman's beaked whale	<i>Mesoplodon pacificus</i>	Ziphiidae
Marine Otter	<i>Lutra felina</i>	Mustelidae
Mediterranean Monk Seal	<i>Monachus</i>	Phocidae
Melon-headed whale	<i>Peponocephala electra</i>	Delphinidae
Narwhal	<i>Monodon monoceros</i>	Monodontidae
New Zealand Fur Seal	<i>Arctocephalus forsteri</i>	Otariidae
New Zealand Sea Lion	<i>Phocarctos hookeri</i>	Otariidae
North Atlantic right whale	<i>Eubalaena glacialis</i>	Balaenidae
North Pacific right whale	<i>Eubalaena japonica</i>	Balaenidae
Northern bottlenose whale	<i>Hyperoodon ampullatus</i>	Ziphiidae
Northern Elephant Seal	<i>Mirounga angustirostris</i>	Phocidae
Northern Fur Seal	<i>Callorhinus ursinus</i>	Otariidae

Common Name	Scientific Name	Family
Northern right whale dolphin	<i>Lissodelphis borealis</i>	Delphinidae
Olive Ridley sea turtle	<i>Lepidochelys olivacea</i>	Cheloniidae
Pacific white-sided dolphin	<i>Lagenorhynchus obliquidens</i>	Delphinidae
Pantropical spotted dolphin	<i>Stenella attenuata</i>	Delphinidae
Peale's dolphin	<i>Lagenorhynchus australis</i>	Delphinidae
Polar Bear	<i>Ursus maritimus</i>	Ursidae
Pygmy beaked whale	<i>Mesoplodon peruvianus</i>	Ziphiidae
Pygmy killer whale	<i>Feresa attenuata</i>	Delphinidae
Pygmy right whale	<i>Caperea marginata</i>	Neobalaenidae
Pygmy sperm whale	<i>Kogia breviceps</i>	Kogiidae
Ribbon Seal	<i>Histiophoca fasciata</i>	Phocidae
Ringed Seal	<i>Phoca hispida</i>	Phocidae
Risso's dolphin	<i>Grampus griseus</i>	Delphinidae
Ross Seal	<i>Ommatophoca rossii</i>	Phocidae
Rough-toothed dolphin	<i>Steno bredanensis</i>	Delphinidae
Sea Otter	<i>Enhydra lutris</i>	Mustelidae
Sei whale	<i>Balaenoptera borealis</i>	Balaenopteridae
Shepherd's beaked whale	<i>Tasmacetus shepherdi</i>	Ziphiidae
Short-finned pilot whale	<i>Globicephala macrorhynchus</i>	Delphinidae
South African Fur Seal	<i>Arctocephalus pusillus</i>	Otariidae
South American Fur Seal	<i>Arctocephalus australis</i>	Otariidae
South American Sea Lion	<i>Otaria byronia</i>	Otariidae
South Asian river dolphin	<i>Platanista gangetica</i>	Platanistidae
Southern bottlenose whale	<i>Hyperoodon planifrons</i>	Ziphiidae
Southern Elephant Seal	<i>Mirounga leonina</i>	Phocidae
Southern right whale	<i>Eubalaena australis</i>	Balaenidae
Southern right whale dolphin	<i>Lissodelphis peronii</i>	Delphinidae
Sowerby's beaked whale	<i>Mesoplodon bidens</i>	Ziphiidae
Spectacled porpoise	<i>Phocoena dioptrica</i>	Phocoenidae

Common Name	Scientific Name	Family
Sperm whale	<i>Physeter macrocephalus</i>	Physeteridae
Spinner dolphin	<i>Stenella longirostris</i>	Delphinidae
Spotted Seal	<i>Phoca largha</i>	Phocidae
Stejneger's beaked whale	<i>Mesoplodon stejnegeri</i>	Ziphiidae
Stellar Sea Lion	<i>Eumetopias jubatus</i>	Otariidae
Strap-toothed whale	<i>Mesoplodon layardii</i>	Ziphiidae
Striped dolphin	<i>Stenella coeruleoalba</i>	Delphinidae
Subantarctic Fur Seal	<i>Arctocephalus tropicalis</i>	Otariidae
True's beaked whale	<i>Mesoplodon mirus</i>	Ziphiidae
Tucuxi	<i>Sotalia fluviatilis</i>	Delphinidae
Unidentifiable baleen whale	n/a	Balaenopteridae
Unidentifiable beaked whale	n/a	Ziphiidae
Unidentifiable cetacean	n/a	
Unidentifiable dolphin	n/a	Delphinidae
Unidentifiable Kogia whale	n/a	Kogiidae
Unidentifiable porpoise	n/a	Phocoenidae
Unidentifiable right whale	n/a	Balaenidae
Unidentifiable Sea Lion	n/a	Otariidae
Unidentifiable Seal	n/a	Phocidae
Unidentifiable shelled sea turtle	n/a	Cheloniidae
Unidentifiable whale	n/a	
Vaquita	<i>Phocoena sinus</i>	Phocoenidae
Walrus	<i>Odobenus rosmarus</i>	Odobenidae
Weddell Seal	<i>Leptonychotes weddellii</i>	Phocidae
West African Manatee	<i>Trichechus senegalensis</i>	Trichechidae
West Indian Manatee	<i>Trichechus manatus</i>	Trichechidae
Whale shark	<i>Rhincodon typus</i>	Rhincodontidae
White-beaked dolphin	<i>Lagenorhynchus albirostris</i>	Delphinidae
Yangtze Finless Porpoise	<i>Neophocaena asiaeorientalis</i>	Phocoenidae



Common Name	Scientific Name	Family
Yangtze River Dolphin	<i>Lipotes vexillifer</i>	Lipotidae

Table A-5. Behavior options for the dropdown menu in Table A-2.

Behavior
Blowing
Bow riding
Breaching / Jumping / Acrobatic behavior
Dead / Injured
Diving
Diving with flukes / Fluking
Fast travel
Feeding
Hauling out
Mating
Milling
Porpoising
Resting at surface / Logging
Spy hopping
Stationary
Surfacing
Swimming
Swimming below surface
Tail or pectoral fin slapping
Other (Describe in Detection Description)
Undetermined