Report for:
Ørsted Wind Power North America LLC

Project:
Skipjack Wind Farm (SJW02) 2021 IHA
Geophysical Surveys
BOEM Lease OCS-A 0519

Description:
Protected Species Observer Technical Report

Survey Period:
Apr-06-2021 to Dec-04-2021

Project Number:
11571

Report Status:
Final for Approval (Rev 1)

REPORT AUTHORIZATION AND DISTRIBUTION

Compilation	Environmental Reporting	H McLennan
Authorization	Checked and Approved	S Lines

Revision	Date	Title
0	May-04-2022	Draft
1	Jun-14-2022	Final for Approval

Distribution

PDF

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EXECUTIVE SUMMARY

This report provides a summary of all protected species monitoring and mitigation activities conducted during geophysical surveying under the 2021 Incidental Harassment Authorization (IHA) issued to Skipjack Offshore Energy LLC for the period of Apr-05-2021 to Apr-04-2022 ('the Skipjack IHA'), within and near the Bureau of Ocean Energy Management (BOEM) Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS)-A 0519.

Five vessels carried out activities under the Skipjack IHA over 197 days between Apr-06-2021 and Dec-04-2021. The research vessel (RV) *Ocean Researcher*, RV *Ocean Endeavour*, RV *Leeway Striker*, RV *Brasilis* and RV *Go Liberty* were conducting high resolution geophysical surveys associated with the development of Ørsted offshore wind farms within federal and New Jersey state waters. These surveys were carried out within BOEM Lease Areas OCS-A 0482 (Garden State) and OCS-A 0519 (Skipjack), and under both the Skipjack IHA and a separate IHA issued to Garden State Offshore Energy LLC ('the Garden State IHA') on Jun-11-2021.

This report includes all protected species monitoring data in the survey area after issuance of the Skipjack IHA and prior to commencement of activities under the Garden State IHA (from Apr-06-2021 to Jun-13-2021, inclusive). Following Jun-13-2021, only data from within the OCS-A 0519 Skipjack Lease Area is included within this report. Data collected in the wider survey area after this date will be presented within the Garden State IHA Report and all data from these combined surveys will be presented within the Skipjack Wind Farm (SJW02) Lead PSO Report.

Protected species observers conducted 3514 hours and 26 minutes of monitoring effort during 15020 miles of vessel activity under the Skipack IHA. There were 406 protected species encounters comprising an estimated 1441 individuals. Bottlenose dolphins were the most abundant species. No North Atlantic right whales were seen. Most protected species detections occurred while acoustic sources <200kHz were inactive (81%).

The most frequent reaction behavior of protected species was *none*, regardless of whether the sparker was active (67%), other sources <200kHz were active (89%) or all sources <200kHz were inactive (74%). Where a reaction was observed, *dive* was the most frequently identified behavior when acoustic sources <200kHz were inactive, accounting for 20% of encounters. When the sparker was active, only two behavioral reactions, other than *None*, were noted: *dive* and *change direction*, with *dive* accounting for 30% of encounters. When acoustic sources (<200kHz) other than the sparker were active, *dive* and *change direction* each accounted for 6% of encounters, and no other reaction behaviors were observed.

Mitigation measures were implemented for 143 (35%) of the 406 protected species encounters. *Detection delay* (66%) and *shutdown* (27%) were the most common mitigation measures implemented. Unidentified sea turtles were the primary cause of these mitigation measures. All mitigation requests were implemented quickly and effectively, helping to safeguard protected species from vessel strike and potential physical harm or behavioral disturbance caused by HRG equipment noise.

There were no potential exposures of protected species under the Skipjack IHA, as IHA-regulated sources were shutdown prior to entry of marine mammals into the Level B Harassment Zone.

Beaufort Sea State was commonly favorable; with 83% of monitoring effort conducted during periods of Beaufort 4 or less and swell height for most of the survey (70%) was less than 2m and considered low. Atmospheric conditions were considered favorable for PSO observations during most of the survey activities. Periods of mist, fog or precipitation, where visibility was generally reduced, accounted for 7% of all monitoring effort.

SERVICE WARRANTY

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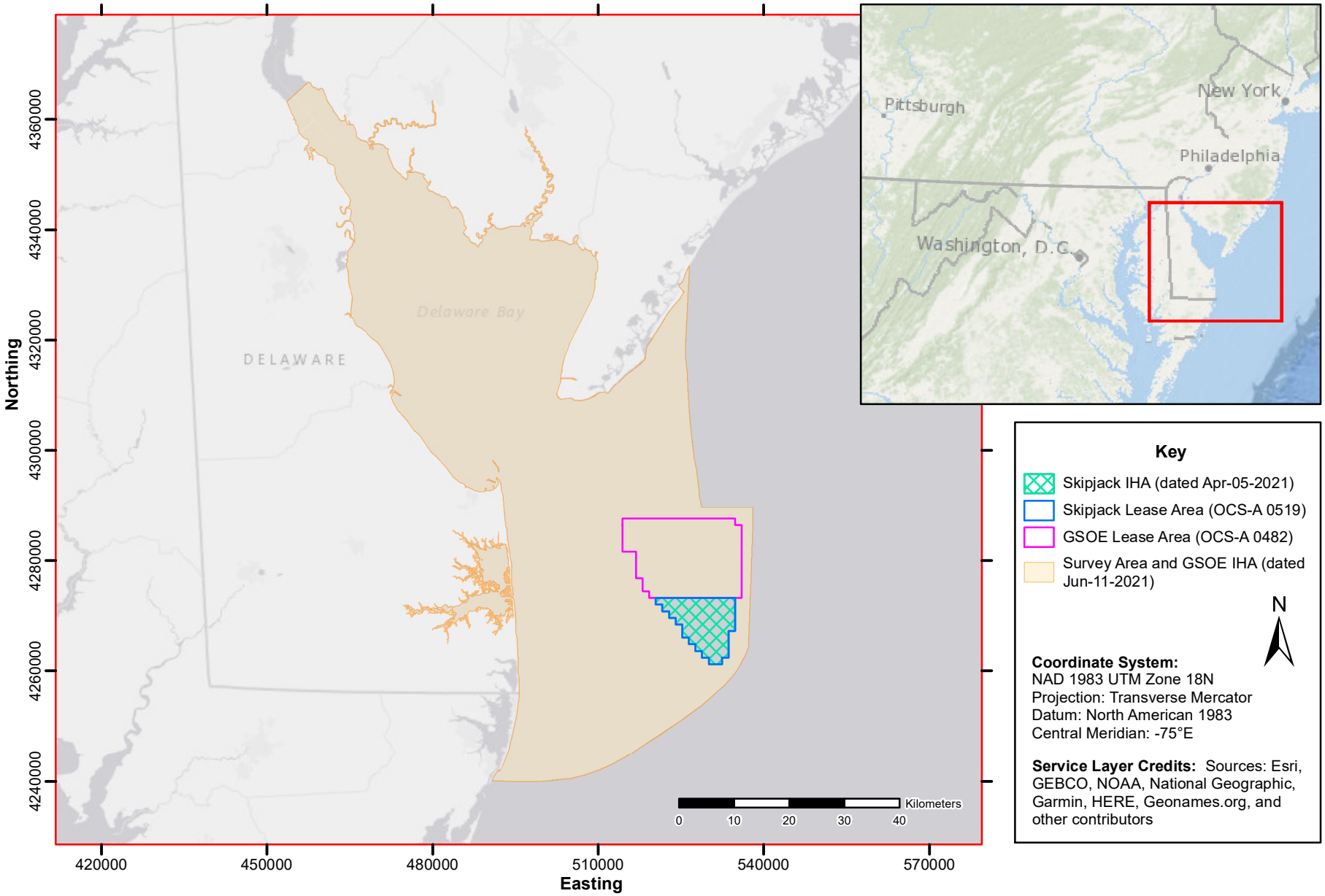
LOCATION MAP



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GLOSSARY OF TERMS AND ABBREVIATIONS

AMP	Alternative Monitoring Plan
BOEM	Bureau for Ocean Energy Management
CPA	Closest Point of Approach
Darkness	Between dusk and dawn, based on civil twilight
Daylight	Between dawn and dusk, based on civil twilight
DMA	Dynamic Management Area
DSLR	Digital Single Lens Reflex
ECR	Export Cable Route
eNGO	Environmental Non-Governmental Organization
ESA	Endangered Species Act
EZ	Exclusion Zone
GPS	Global Positioning System
Harassment	Any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal (Level A harassment); or has the potential to disturb a marine mammal by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment)
HH IR	Handheld InfraRed
HRG	High Resolution Geophysical
HZ	Harassment Zone
Incidental	Not intentional
IHA	Incidental Harassment Authorization
IR	InfraRed
kHz	Kilohertz
Leases	Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf OCS-A 0482, 0519
MD	Maryland
MMPA	Marine Mammal Protection Act
MV	Motor Vessel
NARW	North Atlantic Right Whale
NJ	New Jersey
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
NVD	Night Vision Device
NY	New York
OCS	Outer Continental Shelf
Protected Species	Any listed marine mammals, sea turtles or Atlantic sturgeon
PSO	Protected Species Observer
QA/QC	Quality Control/Quality Assurance
RB	Reticle Binoculars
RMS	Root Mean Square
RV	Research Vessel
SBP	Sub-Bottom Profiler
SJW02	Skipjack 2 Windfarm
SMA	Seasonal Management Area
Take	To harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal
UE	Unaided Eye
UTC	Coordinated Universal Time

1 INTRODUCTION

1.1 Purpose

The following Protected Species Observer (PSO) Technical Lead Report has been compiled by Gardline Limited (hereafter Gardline) for Ørsted Wind Power North America LLC (hereafter Ørsted). It summarizes PSO mitigation activity undertaken by all sub-contractors working on behalf of Ørsted conducting geophysical surveys under the 2021 Skipjack Offshore Energy LLC Incidental Harassment Authorization ('the Skipjack IHA', NMFS, 2021). Survey operations were conducted under Commercial Lease of Submerged Lands for Renewables Energy Development on the Outer Continental Shelf (OCS) Lease Area OCS-A 0519 (BOEM, 2018) granted by the Bureau of Ocean Energy Management (BOEM) and hereafter referred to as the Lease.

The purpose of this report is to summarize information required by the Skipjack IHA for the period Apr-06-2021 to Dec-04-2021.

1.2 Background

The National Marine Fisheries Service (NMFS) approved the 2021-2022 Skipjack IHA to permit high resolution geophysical (HRG) surveys (the Surveys) for the purpose of site characterization prior to offshore windfarm development. The Surveys were conducted within the Lease Area and along potential Skipjack Wind Export Cables (SJEC) to a landfall in Delaware within federal and state waters. The Surveys were conducted by four vessels: the research vessel (RV) *Ocean Researcher*, RV *Ocean Endeavour*, RV *Brasilis* and RV *Go Liberty*, while a fifth vessel, RV *Leeway Striker*, also carried out mobilization activities under the Skipjack IHA. PSOs were provided by Gardline, EPI and Smultea. Marine survey companies and PSO providers for each vessel, and the dates during which the vessels were working under the Skipjack IHA are reported in Table 1.1.

Table 1.1 Details of the Survey Providers, Vessel Owners, PSO Providers and Start and End Dates of Vessels involved in Geophysical Survey Operations under the Skipjack IHA

Survey Vessel	Marine Survey Company	PSO Provider	Start date of operations	End date of operations
RV *Ocean Researcher*	Gardline	Gardline	Apr-04-2021	Nov-04-2021
RV *Ocean Endeavour*	Gardline	Gardline	May-10-2021	Dec-04-2021
RV *Go Liberty*	Fugro	Smultea	Sep-19-2021	Oct-16-2021
RV *Brasilis*	Fugro	Smultea	Oct-15-2021	Nov-15-2021
RV *Leeway Striker*	EGS	EPI	May-03-2021	Jun-03-2021

RV Research Vessel

1.3 Regulatory Documents

Regulatory documents defining mitigation measures for the Surveys were the Skipjack IHA (NMFS, 2021), Lease agreement (BOEM, 2018), North Atlantic right whale (NARW) Agreement (Grybowski *et al.*, 2012), the BOEM approved geophysical survey plan and associated Alternative Monitoring Plan (AMP; Ørsted, 2021). Where different overlapping mitigation measures existed in the regulatory documents, the most conservative measure was typically adopted in the field.

On Jun-12-2018 a portion of BOEM Lease OCS-A 0482 was reassigned from GSOE LLC to Skipjack Offshore Energy LLC, with the effect of segregating the assigned portion into a new lease, BOEM Lease OCS-A 0519 (BOEM, 2018). Lease OCS-A 0519 is subject to all terms and conditions of the original lease, including its amendments. Lease OCS-A 0519 was amended on Sep-14-2018 (BOEM, 2018). Combined Lease OCS-A 0482 and Lease OCS-A 0519 cover the Skipjack 2 Windfarm (SJW02) development area. The Skipjack IHA (NMFS, 2021) was issued to on Apr-05-2021 and was valid for one year from the date of issuance. An IHA was also issued to Garden State, LLC on Jun-11-2021 ('the Garden State IHA', NMFS, 2021), and vessels began conducting survey activities under this on Jun-14-2021. Site characterization surveys for Ørsted were conducted across both lease areas and under both IHAs from Apr-06-2021.

This PSO Technical Report covers the period from Apr-06-2021 to Dec-04-2021. The RV *Ocean Researcher* carried out mobilization from Apr-04-2021 to Apr-24-2021, including equipment testing in port on Apr-04-2021 and Apr-05-2021. Data from these activities will be included in the overall survey Lead PSO Technical Report, but are not covered in this IHA report as they are outside of the IHA period. Equipment testing under the Skipjack IHA began on Apr-06-2021, and survey operations within the lease area began on Apr-25-2021. All survey activity from vessels conducting operations in the Skipjack IHA area between Apr-06-2021 and Jun-13-2021, inclusive, is presented within this report. From Jun-14-2021 to Dec-04-2021, only survey activity within the OCS-A 0519 lease area associated with the Skipjack IHA is presented within this report. Survey activity within the GSOE OCS-A 0482 Lease Area and under the Garden State IHA will be presented in the Garden State IHA PSO Report.

On Dec-12-2012, Deepwater Wind entered into a voluntary NARW Agreement (Grybowski *et al.*, 2012) with environmental non-governmental organizations (eNGOs) to enhance mitigation measures to protect NARW during site assessments in the Mid-Atlantic Wind Energy Areas that was applicable to this Lease Area. Deepwater Wind was acquired by Ørsted in 2018 and with it the adherence to the NARW Agreement. The mitigation measures in the NARW Agreement were in addition to the NMFS minimum separation distance and seasonal operating requirements (NOAA Fisheries, 2021b) and applied to the Skipjack Wind Farm project. Mitigation personnel also monitored the National Oceanic and Atmospheric Administration (NOAA) NARW reporting systems for the species' presence in the vicinity of all survey operations.

Full technical details of protected species monitoring can be found in the Leases (BOEM, 2018).

1.4 BOEM and NMFS Reporting Requirements

This technical report fulfills the requirements of the Skipjack IHA. The Lead PSOs distributed a daily summary report to Ørsted, the marine survey companies and their PSO providers at the end of each coordinated universal time (UTC) calendar day. Assisted by Mysticetus observation reporting software (Mysticetus; see Section 3.5 for further details of software), daily reports detailed protected species observations, mitigation actions carried out and any potential *takes* which occurred within the Level B Harassment Zone (HZ). Incident reports, detailing occasions where an injured or dead protected species was observed during survey operations regardless of whether this was caused by survey activity, were also required.

Table 1.2 Protected Species Reporting Requirements stipulated in BOEM Leases OCS-A 0482 and OCS-A 0519 and the Skipjack IHA

Reporting Requirement	BOEM Leases[1](BOEM, 2018) BOEM Lease Amendments[2] (BOEM, 2018)	IHA (NMFS, 2021)	Location Addressed in Technical Report
The Lessee must ensure that sightings of any injured or dead protected species (*e.g.,* marine mammals, sea turtles or sturgeon) are reported to the Lessor, NMFS and the NMFS Northeast Region's Stranding Hotline (866-755-6622 or current) within 24 hours of sighting, regardless of whether the injury or death is caused by a vessel. In addition, if the injury or death was caused by a collision with a project-related vessel, the Lessee must notify the Lessor of the strike within 24 hours. The Lessee must use the form provided in Appendix A to ADDENDUM "C" to report the sighting or incident. If the Lessee's activity is responsible for the injury or death, the Lessee must ensure that the vessel assists in any salvage effort as requested by NMFS.	Addendum C Section 4.5.1[2]	Section 6(c)	Section 5.5 Protected Species Incident Reports
The Lessee must ensure that the protected species observer record all observations of protected species using standard marine mammal observer data collection protocols. The list of required data elements for these reports is provided in Appendix B to ADDENUM "C".	Addendum C Section 4.5.2[2]		Section 5.6 Protected Species Potential Exposures
If a North Atlantic right whale is observed at any time by PSOs or personnel on any project vessels, during surveys or during vessel transit, Skipjack must immediately report sighting information to the NMFS North Atlantic Right Whale Sighting Advisory System: (866) 755-6622. North Atlantic right whale sightings in any location may also be reported to the U.S. Coast Guard via channel 16.		Section 6(b)	Section 5.1.2 North Atlantic Right Whale Detections
The Lessee must provide the Lessor with a report within 90 days following the commencement of HRG or geotechnical sampling activities that includes a summary of the survey activities and an estimate of the number of listed marine mammals and sea turtles observed and/or Taken during the survey activities	Addendum C Section 4.5.3[2]	Section 6(a)	The entirety of this Technical Report

1 BOEM Leases OCS-A 0482, 0519 (BOEM, 2018)
2 Amendment of Renewable Energy Lease OCS-A 0482 (BOEM, 2018)

2 SUMMARY OF SURVEY ACTIVITIES

Mobilization for the Skipjack Wind 02 geophysical survey began on Apr-04-2021 onboard the RV *Ocean Researcher*, and survey activities were completed on Dec-04-2021 onboard the RV *Ocean Endeavour*. Details of the activites carried out per day by each vessel working on the project are shown in Figure 2.1.

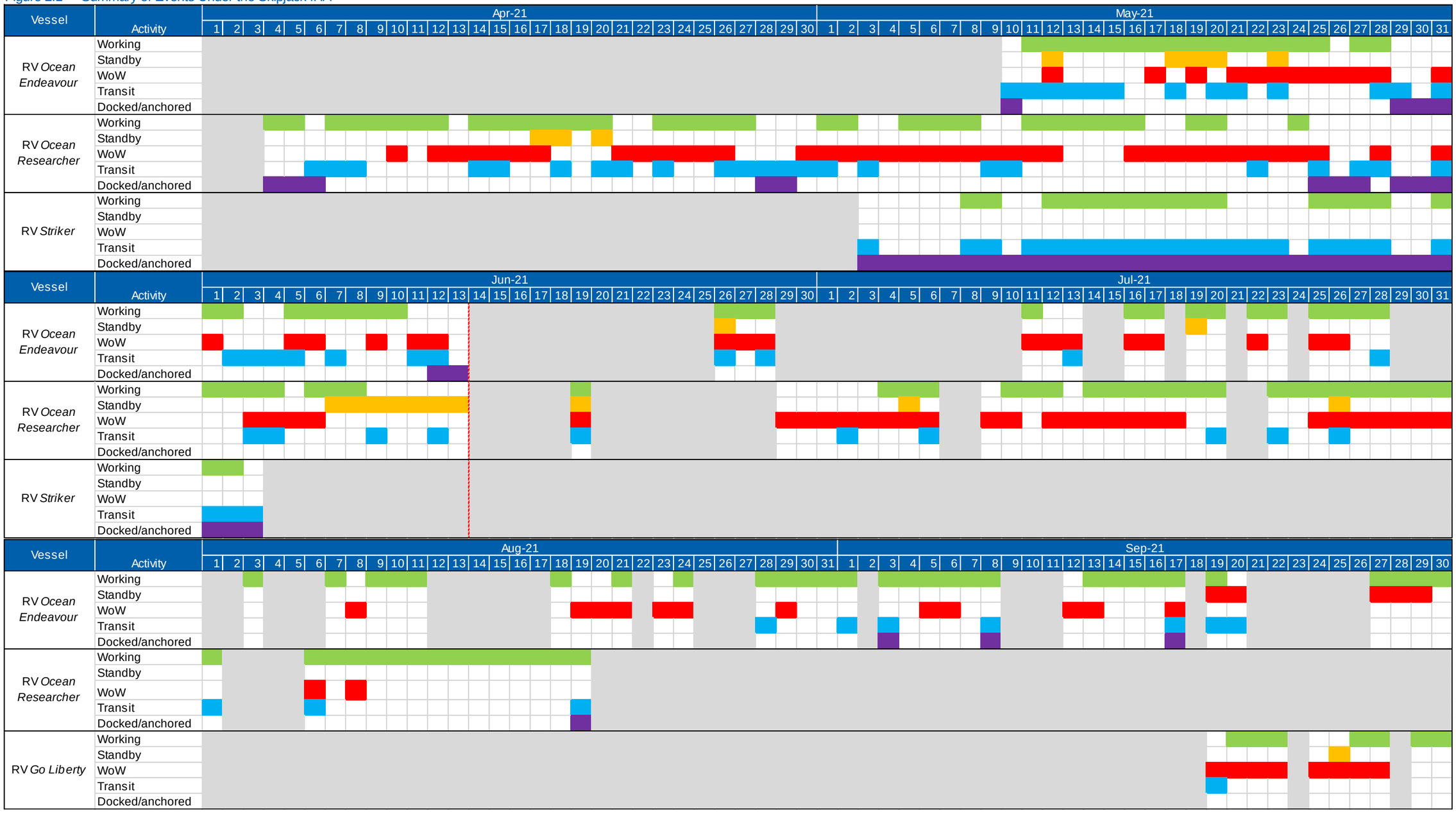
Geophysical survey equipment used during this project comprised USBL beacons, parametric echosounders (Innomar), and single channel sub-bottom profilers (SBP, sparkers). The specifications of the survey equipment used by each vessel are detailed in Table 2.1. The survey conducted a total of 3528 miles of vessel track with acoustic sources below 200kHz active.

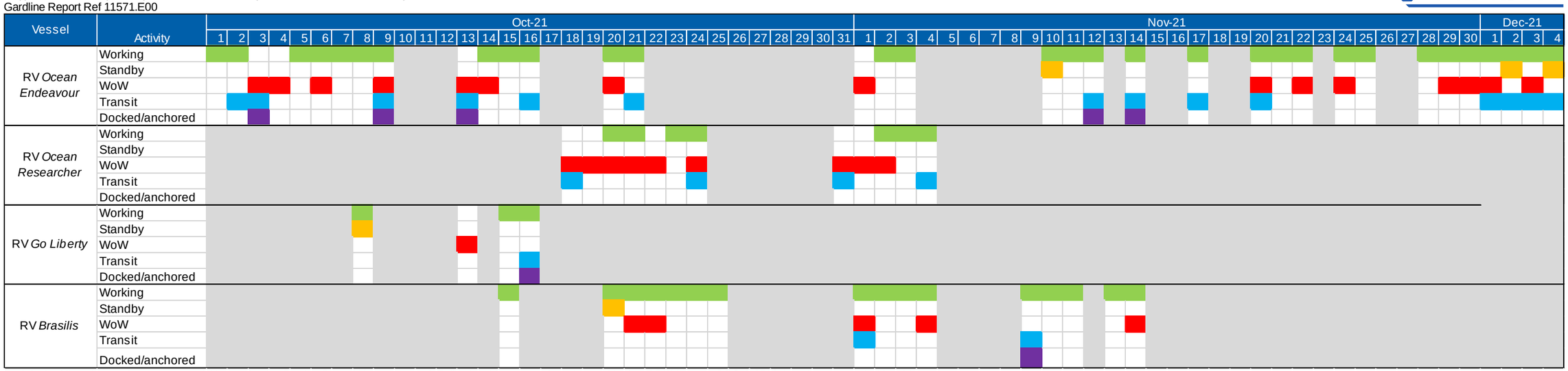
Table 2.1 Survey Equipment Specifications for Mitigatable Equipment (<200kHz) Used

Equipment type	Details	Operating Frequency	Vessels
Single channel sub bottom profiler (Sparker[1])	Applied Acoustics CSP SNv1250 Bang Box, Dura Spark UHD Dual Cat 400 Sparker, Single Channel 8 element streamer, 2.4m active length	0.4-3kHz	RV *Ocean Endeavour*
	Applied Acoustics Geo-Source 400 tip single level sparker with a single channel 8 element streamer.	0.3-3.5kHz, peak at approximately 1.2kHz	RV *Ocean Researcher*
	Kongsberg	<200kHz	RV *Brasilis*, RV *Go Liberty*
	Applied acoustics 301 boomer with an Applied acoustics CSP-P350 350J energy source - typically 215dB at 1 meter below source at 300J	2.5-3kHz	RV *Leeway Striker*
Parametric Echo-Sounder (SBP, Innomar)	Innomar SES-2000 Medium, hull mounted (4.8m). Operational power online is 100%/10kHz.	5-10kHz	RV *Ocean Endeavour*, RV *Ocean Researcher*
	Innomar sub-bottom profiler	1-15kHz	RV *Brasilis*, RV *Go Liberty*
	Innomar SES2000 Compact	85-115kHz	RV *Leeway Striker*
USBLQ	Sonardyne Ranger 2 USBL system, pole mounted	19-34kHz	RV *Ocean Endeavour*, RV *Ocean Researcher*
	Kongsberg HiPAP 502	21-31kHz	RV *Brasilis*
	Sonardyne Miniranger 2 HPT3000	19-34kHz	RV Leeway *Striker* RV *Go LIberty*

1 On RV *Leeway Striker* a boomer was used instead of a Sparker, but was recorded as a Sparker in Mysticetus.

Figure 2.1 Summary of Events Under the Skipjack IHA





Red dashed line shows where survey activities under the Garden State IHA commenced. Following this point, only activity within the BOEM Lease OCS-A 0519 Area is presented within this report.

3 MONITORING AND MITIGATION METHODS

The protected species monitoring and mitigation program for the surveys was established to satisfy requirements outlined in the regulatory documents, as detailed in Section 1.3. Ørsted adopted the following mitigation techniques to avoid harassment of marine species listed under the Endangered Species Act (ESA; U.S. Fish & Wildlife Service, 1973) and the US Marine Mammal Protection Act (MMPA; Marine Mammal Commission, 1972)) in accordance with the Leases (BOEM, 2018). Specifically, the program focused on minimizing disturbance to protected species related to geophysical equipment operating below 200 kHz and reducing the risk of vessel collision with protected species. To achieve this, the following monitoring and mitigation measures were implemented during the Surveys.

3.1 Protected Species Observers

During the survey, a minimum of four PSOs were on board each vessel that operated on a 24-hour basis. The RV *Go Liberty* conducted less than 24 hours of operations per day (night-time only, noon to midnight, or daylight only) and had three PSOs on board. The RV *Striker* conducted daylight operations only, and had two PSOs on board. All PSOs were NMFS certified and BOEM approved to meet the minimum requirements outlined in the regulatory documents.

The PSO teams onboard vessels conducting 24-hour operations provided 24-hour monitoring during the survey. During daylight hours, a minimum of one PSO was required to be on watch during operations in order to provide visual mitigation for geophysical survey equipment. During operations undertaken in the hours of darkness, a minimum of two PSOs conducted visual watches with night vision technology and infrared (IR) devices.

Observers were to conduct a maximum of four hours continuous monitoring on any single discipline with a minimum two-hour break following each four-hour period. In addition, observers were only permitted to work a maximum of 12 hours within each 24-hour period.

PSOs monitored during all vessel operations whilst the vessel was surveying or underway as well as during equipment calibration, and periods when the vessel was maneuvering whilst waiting for favorable weather conditions. The exception to this was during periods of low visibility either caused by fog, precipitation or extreme sea state which reduced visibility so that the pre-agreed exclusion zone surrounding the work area was not visible. No survey operations could begin during these periods of impaired visibility. During periods of transit and survey operations not requiring mitigation, one PSO conducted watches to assist the marine crew in avoiding any potential vessel strike of a protected species.

PSOs always maintained clear and effective communications with the chain of command and surveying departments on the vessel. Onboard, the Lead PSO attended a daily health, safety and environmental meeting with key members of the vessel and survey crew. Any questions arising from survey operations were raised with survey suppliers and Ørsted in real time and relevant information fed back to the PSO team by the Lead PSO.

3.2 PSO Recording Methods

PSOs used Mysticetus to record operational and environmental information. Mysticetus aims to reduce human error by enforcing data standardization across mitigation, collection, and reporting. The data recorded are automatically time stamped, encrypted and stored securely, allowing all changes made to be logged. Sightings can also be communicated across all vessels operating with Mysticetus in the wider area.

If software issues should arise during operations, Mysticetus provided a standardized Microsoft Excel version of the forms as a back-up for PSOs to complete manually.

3.3 Visual Monitoring Methods

During the Surveys, PSOs conducted visual monitoring using several different methods; the unaided eye (UE; which includes the use of reticle binoculars; RBs), handheld NVDs, handheld IR devices, and vessel mounted IR camera systems. Monitoring equipment available is presented in Table 3.1. PSOs on all vessels also had access to a digital single lens reflex (DSLR) camera to document detections and allow for species verification where possible. Utilizing multiple complimentary monitoring methods, depending on the environmental and vessel conditions, allowed for effective monitoring for protected species to be implemented. Technical specifications of monitoring devices used by Gardline PSOs can be found in Appendix A.

Table 3.1 Monitoring Devices Available Onboard Each Survey Vessel

Survey Vessel	HH NVD		HH IR		Vessel-mounted IR		RB[1]
	Rongland GNVY-3	PVS7	BHM-XR (65mm)	HD/IR Camera	NVTS Reliant 640HD	Current Scientific Corporation N2525	
RV *Ocean Endeavour*	X		X		X		X
RV *Ocean Reseacher*	X		X		X		X
RV *Go Liberty*		X		X		X	X
RV *Brasilis*		X		X		X	X
RV *Leeway Striker*[2]							X

1 Various models

2 IR and NVDs were available on board the RV *Striker* for transit, but were not necessary during the project

Distance to the unobstructed horizon at sea can be calculated for each observation location on the vessels using known observer eye height and height above water of the observation position and applying trigonometry and corrections for the curvature of the earth (Table 3.2). All PSO eye heights and deck heights were confirmed prior to the Surveys and entered into Mysticetus which then automatically calculated the distance to visual detections using this information and displayed them on the map.

Table 3.2 Distance to the Horizon from each Observing Location on the Vessels used for Geophysical Surveys

Survey Vessel	Observing Location	Height of Deck (m)	Height of Deck (m) + 1.6m[1]	Distance to Horizon (km)[2]
RV *Ocean Endeavour*	Bridge	12.0	13.6	13.2
	Bridge Wings	12.0	13.6	13.2
RV *Ocean Researcher*	Bridge	10.5	12.1	12.4
	Bridge Wings	10.5	12.1	12.4
RV *Go Liberty*	Bridge	6.2	7.8	10.0
	Bridge Wings	6.2	7.8	10.0
RV *Brasilis*	Bridge	10.7	12.3	12.5
	Bridge Wings	10.7	12.3	12.5
RV *Leeway Striker*	Bridge	1.65	3.25	6.4
	Bridge Wings	1.65	3.25	6.4
	Back Deck	1.60	3.20	6.4

1 Average eye height calculated on the assumption of the average male (5ft 9in) and average female (5ft 4in) height minus 4 inches.
2 Calculated using Pythagoras' theorem, trigonometry and curvature corrections.

3.3.1 Visual Monitoring During Daylight

Daylight for geophysical surveys was defined as the period between local civil twilight rise and set, which is defined as when the sun's geometric center is higher than 6° below the horizon. The times for civil twilight were referenced from available almanac records. PSOs monitored 360° around the vessel with a particular focus on the EZ surrounding all geophysical survey equipment operating at frequencies below 200kHz. PSOs systematically scanned the water, primarily with the unaided eye (UE) and utilized RBs to focus on points of interest when necessary. While transiting, PSOs focused monitoring forward and approximately 90° either side of the vessel heading. Crew aboard each vessel also assisted with protected species monitoring, where possible, and alerted the PSOs in the event of a protected species detection. Selected methods of visual monitoring complement each other and allowed for the PSOs to effectively monitor the applicable EZ.

While on-watch, during daylight, PSOs systematically scanned waters surrounding the vessel in a sweeping pattern as described above, primarily with UE. RBs were used to confirm species' identification, group size, behavior, and distance, and to scan for smaller or less-demonstrative species. Distances were estimated using RBs and UE; however, as a back-up PSOs constructed range-finder sticks (Heinemann, 1981) for measuring distances. Range-finder sticks are a useful tool to validate an observer's judgement of distance to an animal and therefore whether they have been detected within their relevant EZ. Distances can be calculated using trigonometry principles, taking into account the height of the observation platform and observer and how far away in relation to the horizon the animal(s) appear.

3.3.2 Visual Monitoring During Darkness

When operating in darkness, PSOs used NVDs. One PSO undertook monitoring using night vision binoculars and the other used IR thermal imaging technology. PSOs interchanged between both monitoring methods to avoid eye fatigue.

When using the handheld NVDs, watches were conducted from the bridge wings, where feasible, to minimize any visual barriers that may affect visibility *e.g.,* reflectivity from bridge windows. While on watch, the PSOs searched 360° around the vessel, with a focus on the EZ surrounding the geophysical

equipment below 200kHz. Due to the equipment configuration, watches using the vessel mounted IR were conducted from the instrument room on the MV *Ocean Researcher* and MV *Ocean Endeavour*.

3.4 Periods of Reduced Visibility

If visibility was reduced to less than the maximum EZ prior to the commencement of survey operations, then PSOs were not able to conduct visual pre-clearance and survey operations were not permitted to begin. PSOs remained on visual watch to monitor the visibility and once the entire EZ could be visually monitored and confirmed free of protected species for the duration of the 60-minute pre-clearance, operations could commence with a ramp-up (when applicable).

If equipment below 200kHz were active (including during line turns which Ørsted considered part of active survey) and the visibility was reduced meaning the EZ was no longer visible, operations could continue if an alternative monitoring method was implemented.

Should an equipment shutdown occur due to protected species incursion or equipment failure, PSOs would have to wait until the entire EZ could be visually monitored again to conduct a 60-minute pre-clearance to confirm the EZ is clear before operations could recommence with a ramp-up (when applicable).

3.5 Mysticetus Observation Software

During the surveys, PSOs utilized Mysticetus observation software to record all visual monitoring effort, protected species visual detection details, mitigation actions required and operational and environmental conditions in real time. The use of Mysticetus aims to increase efficiency of data recording and to reduce human error by enforcing standardization across data collection and reporting. It also displays vessel position, protected species detections, seasonal management areas (SMAs) and dynamic management areas (DMAs) in real time using a global positioning system (GPS).

Data were recorded by PSOs using a standardized Ørsted Mysticetus data collection template. The template contained fields relating to BOEM and NMFS data requirements (see Section 1.4). At the end of each watch period, PSOs were required to review their data entry and at end of each day the Lead PSO reviewed all the data prior to submission for an onshore quality check. The onshore PSO Project Manager reviewed this data and performed the daily quality control/quality assurance (QA/QC) within 24 hours when feasible. The purpose of the daily onshore QA/QC was to allow timely feedback to be provided to the PSO team to improve the overall data quality. The data would be signed-off within 72 hours when feasible. Mysticetus recorded all original data entry and subsequent edits using an encryption, allowing all changes made to be logged. Mysticetus also stored and backed up data securely in the Mysticetus cloud for retrieval to allow for QA/QC, data aggregation and further analysis in numerous file formats. Data were also backed up on an external hard drive.

In order to coordinate detections between PSOs working on different vessels, Mysticetus notified PSOs on other vessels using Mysticetus through an automated detection alert if vessels were within 20km of each other. This feature helped alert PSOs on nearby vessels of any known protected species in the area. Live communications between the PSOs on different vessels were possible via VHF radio when in range

and by telephone when the vessels are out of range should Mysticetus not be operational, or additional information was required to be relayed.

If software issues should arise during operations, Mysticetus provided a standardized Microsoft Excel version of the forms as a backup for PSOs to complete manually. All Mysticetus data were recorded in UTC.

3.6 Mitigation Measures

Mitigation measures for the Surveys are presented below. The HRG equipment operating at frequencies below 200kHz and therefore requiring mitigation measures were the Innomar, sparker/boomer and USBL. Mitigation measures were identified in the Regulatory Documents and were implemented during the Surveys. Where regulations differed among documents the more conservative measure was implemented.

3.6.1 Vessel Strike Avoidance

The geophysical survey complied with the requirements for vessel strike avoidance as stipulated in the Leases and IHA. In order to avoid causing injury or death to protected species, the following measures were implemented:

- A minimum of one PSO shall be on watch during transit.
- Vessel speed shall be reduced to 10 knots or less when any large whale species, mother/calf pairs, whale or dolphin pods, or larger assemblages of non-delphinoid cetaceans are observed within 100m of the underway vessel.
- Vessel shall comply with 10 knot or less speed restriction in any SMA or DMA per NMFS guidance, and within non-DMA slow zones as detailed in Section 1.3. In addition, all vessels operating from Nov-01 to Apr-30 must always operate at speeds of 10 knots or less.
- All vessels must maintain a separation distance of 500m (1,640ft) or greater from any sighted NARW. If a whale is observed but cannot be confirmed as a species other than a NARW, the vessel operator must assume that it is a NARW and take appropriate action.
- If the vessel is stationary, the vessel must not engage engines until the NARW has moved beyond 100 meters.

Underway vessel that is neither towing gear nor navigationally constrained – NARW:

- If a NARW is sighted in the vessel's path or within 500m, the vessel must reduce speed and shift its engines into neutral.[1] Engines must not be engaged until the NARW has moved outside of the vessel's path and beyond 100m.

[1] Shifting to neutral: primary concern is safety of lives of all those at sea. Gear loss is not a safety risk if only associated with cost. If dropping gear would result in an action that could lose control of the vessel, and thus become a safety risk, then revert to the primary concern.

Underway vessel towing gear – NARW:

- If a NARW is spotted within 500m, but outside of the vessel's path. Steer away at 10 knots or less and shift to neutral.
- If a NARW is detected in the vessel's path or within 100m, reduce speed to 10 knots or less and shift to neutral.
- Engines must not be engaged until the NARW has moved outside of the vessel's path and beyond 100m.

Other Species:

- If any non-delphinoid cetacean (other than the NARW) is sighted, a minimum 100m distance shall be maintained between the individual(s) and the vessel. If sighted within 100m, the vessel underway shall immediately reduce speed and shift the engine into neutral. Engines shall not be engaged until the animal has moved outside of the vessel's path and beyond 100m. If stationary, the vessel must not engage engines until animal/s have moved out of the vessel's path and beyond 100m.
- If any delphinoid cetaceans or pinnipeds approach the vessel underway, the vessel must maintain a separation distance of 50m or more with an understanding that this may not always be possible, *e.g.,* for animals that approach the vessel.
- Any vessel underway should remain parallel to an observed delphinoid cetacean's course whenever possible and avoid excessive speed or abrupt changes in direction to avoid injury. Course and speed should not be adjusted until the delphinoid cetacean has moved beyond 50m of the vessel.
- Reduce speed to 10 knots or less when pods (including mother/calf pairs) or large assemblages observed.
- All vessels underway will not divert or alter course to approach any whale, delphinoid cetacean or pinniped.
- If sea turtles are detected, a distance of 50m between the vessel and the individual(s) shall be maintained.

To avoid vessel strikes, the Early Warning System (a network of observers that disseminates right whale location information to mariners via the typical marine communication channels), Sighting Advisory System (sighting locations can be checked at http://www.nefsc.noaa.gov/psb/surveys/) and the Mandatory Ship Recording System (MSRS) notifying mariners of NARW presence will be monitored regularly. Ørsted shall be notified of all NARW sightings immediately and these shall also be reported to the NMFS on 866-755-6622 or using the whale alert app where available. A follow up detailed report shall be provided to Ørsted within 24 hours. The monitoring team will consult NMFS NARW reporting systems for the presence of NARWs throughout survey operations (as outlined above) and can also report to the US Coast Guard on VHF Channel 16.

3.6.2 Exclusion Zone

As per BOEM Lease Stipulation 4.3.7.1 (BOEM, 2018), Skipjack IHA Section 4(c) (NMFS, 2021) and NARW Agreement (Grybowski *et al.*, 2012), PSOs established an EZ of surrounding the center point of the geophysical equipment where mitigation measures were implemented following an incursion of a protected species. The radius of the EZ varied based on protected species identity, whether the vessel was inside or outside the lease area, whether impulsive sources (*i.e.,* sparkers) were active, and whether

the allowable number of *takes* had yet been reached. Details of the radius of each EZ can be seen in Table 3.3 below.

Table 3.3 Summary of Exclusion Zones used for Protected Species Monitoring During Survey Activities

Protected Species	In Lease Area		Outside Lease Area	
	Sparker	No sparker	Sparker	No sparker
NARW or unidentified whale	1000m	500m	1000m	500m
Turtles	500m	200m	200m	200m
Other whales	500m	100m (or 141m - whales without *takes*)	100m (or 141m - whales without *takes*)	100m
Dolphins **without** *takes*	141m	100m	141m	100m
Dolphins/seals **with** *takes**	100m*	100m*	100m*	100m*

3.6.3 Pre-Clearance and Soft Start

A pre-shooting search (PSS) of 60 minutes was required before the activation of any equipment <200kHz if such sources had been inactive for the preceding >20 minutes where not related to protected species incursion; see Section 3.6.5).

If a protected species was observed within the EZ during a pre-clearance period, the PSO called a delay to the survey crew and the pre-clearance clock was paused. A Detection Delay was then implemented whilst the protected species was within the EZ. If the protected species was observed leaving the EZ, then the pre-clearance clock was restarted and operations could commence once the remainder of the 60-minute pre-clearance was completed. If the protected species was not tracked leaving the EZ, then, as well as completing the remainder of the 60-minute pre-clearance, an additional delay period was required to ensure the EZ was clear of protected species:

- 60 minutes for sea turtles.
- 30 minutes for all large whale species (all other marine mammals).
- 15 minutes for small cetaceans and pinnipeds.

It should be noted that the remaining pre-clearance and delay period could be run simultaneously. PSOs maintained clear communication with bridge and survey crews so HRG operations using equipment below 200kHz could begin immediately following the completion of the pre-clearance.

After the PSS a 20 minute soft start was required for the sparker and the Innomar. The sparker was soft started by gradually decreasing the source point interval; the Innomar was soft started by gradually increasing the power. As the USBL could not be soft started, best practice was to activate the USBL at the end of the soft start procedure of other equipment when it was being used simultaneously. No soft start was possible when the USBL was active without the sparker or Innomar.

Dedicated monitoring was also continued for 30 minutes after the use of survey equipment ceased in the form of a post-shooting search.

3.6.4 Shut-Down Procedures for Marine Animal Incursion

If a marine animal was seen entering the relevant EZ duration operations while acoustic sources were operational, the sources were required to be shut down immediately. Any PSO on duty had the authority to call for a shutdown, and when called for, the shutdown had to occur. Any dispute was only to be settled following the implementation of the shutdown. Survey equipment could be reactivated when the marine animal(s) that triggered the shutdown was confirmed by visual observation to have left the EZ, or an additional time period had elapsed without further sighting of the animal(s) (15 minutes for small odontocetes and seals, 30 minutes for all other marine mammals and 60 minutes for turtles).

If delphinids from the genera *Delphinus*, *Lagenorhynchus*, or *Tursiops*, or the species *Stenella frontalis*, were visually detected approaching the vessel or towed acoustic sources, no shutdown was required.

Shutdown was required when species for which no incidental *takes* were authorized, or species where the authorized number of *takes* had been met, entered or were seen within the Level B harassment zone.

3.6.5 Breaks in Geophysical Survey Activity (not for Mitigation)

If acoustic sources were shut down for less than twenty minutes for reasons other than marine mammal mitigation, they could be re-activated at full operational power as soon as practicable, provided PSOs had maintained constant visual effort and no marine animals were sighted in the EZ during that time. For shutdowns longer than twenty minutes or where visual monitoring was not continuously maintained, a full PSS and ramp-up were required before re-starting the sources.

Therefore, during line turns between HRG lines (typically <80 minutes) or other breaks in geophysical survey activity a one-minute periodic activation (PA) was required within a maximum of twenty minutes of the last activity. This allowed for equipment settings to be checked and preparations made to continue survey operations for the next line. This procedure meant that HRG sources were not inactive for more than 20 minutes and therefore negated the need to conduct a 60 minute preclearance and ramp up procedure in between each survey line.

3.6.6 North Atlantic Right Whale Mitigation Measures

Mitigation measures specific to NARWs were implemented during the Surveys. PSOs monitored online for the presence of any NMFS established DMAs and/or the presence of NARWs in or near transit corridors and the Survey Area every 4 hours (NOAA Fisheries, 2021b). A DMA is an area temporarily designated by NOAA and NMFS based on the visual sighting of three or more right whales within 2 to 3 miles of each other outside a designated SMA and are in place for a 15-day period (NOAA Fisheries, 2021b). Each time a DMA check was undertaken by the PSO a column was marked in the Mysticetus data entry form and was automatically associated with a date, time, GPS position and any relevant comments. **I**f a DMA was established in or near the Survey Area, the Lead PSO would immediately inform the Ørsted Client Representative and ensure that Ørsted were notified, as well as informing the PSO team and all relevant personnel onboard the vessel to ensure extra vigilance was maintained for NARWs. The DMA would be avoided where feasible or if operations necessitated the vessel to be within the DMA, then the required speed restriction of 10 knots was adhered to.

PSOs were also aware of any NARW SMAs within transit corridors or the Survey Area. All vessels more than 65ft long must not exceed 10 knots when within these areas to reduce the threat of ship collisions with NARWs and this restriction was adhered to.

In addition, PSOs on the vessel were to prepare a summary of sighting details for any NARW detections, including photographs, in order that Ørsted could submit this information to NMFS. A NARW report template was available to PSOs on the vessels for this purpose. The Lead PSO also entered sighting data for any NARW sighting into the NMFS Whale Alert application where available, and Mysticetus automatically sent out an alert text and email notifications to the project point of contact, Ørsted, and Gardline's onshore team notifying them of the time and location of the sighting.

The Surveys were also required to be run in accordance with the additional measures stated in the NARW Agreement (Grybowski *et al.*, 2012) where these were more conservative. This included submitting a NARW Risk Assessment to eNGOs, NMFS, and BOEM, prior to surveying during the 'Yellow Period' for sub-bottom profiling from Mar-22 to Apr-30 and from Nov-01 to Nov-22. From Nov-23, the survey entered the NARW Agreement 'Red Period' for sub-bottom profiling which meant that the use of SBPs was prohibited.

3.7 Data Collection and Analysis Methods

Data collection protocols were applied to all operations and analysis during the Surveys. PSOs documented all protected species detections, effort and survey activity throughout all project operations. Required data, identified in the Regulatory Documents (see Section 1.3), were collected in a pre-determined template on a laptop using Mysticetus. Restricted fields were used in data entry to reduce data variability between different PSO providers on other vessels. Specific terminology used for data collection and analysis is detailed in Table 3.4.

Effort data were generally recorded every 30 minutes or whenever operational or environmental monitoring conditions changed. Effort data can be categorized broadly into two categories: Monitoring Effort and PSO Effort.

Monitoring Effort was categorized as any period when at least one PSO was on watch. Monitoring Effort could not exceed 24 hours in a single day, regardless of how many PSOs were conducting monitoring. Monitoring Effort is presented across a range of environmental and operational conditions.

PSO Effort was categorized as the total number of PSO hours during the day across all monitoring methods. Therefore, PSO Effort could exceed 24 hours in a single day if PSOs were conducting monitoring simultaneously. PSO Effort is presented across different monitoring methods to compare the effectiveness of different detection methods. PSO Effort is also analyzed based on minutes conducted in Daylight versus Darkness, inside versus outside the Lease Area and acoustic sources (<200kHz) Active/On versus Inactive/Off.

Table 3.4 Definitions of Data Collection and Analysis Terminology

Term	Definition
Monitoring Effort	Active use of visual monitoring methods. Cannot exceed 24 hours in a day
PSO Effort	Total PSO person hours allocated to monitoring for protected species. Can exceed 24 hours in a day
Darkness	Period between civil twilight set and civil twilight rise
Daylight	Period between civil twilight rise and civil twilight set
Inside	Within BOEM Lease Area OCS-A 0482, OCS-A 0519
Outside	Outside BOEM Lease Area OCS-A 0482, OCS-A 0519
Active/On	Period of time when acoustic sources (<200kHz) are active
Inactive/Off	Period of time when acoustic sources (<200kHz) are inactive
Detection	A protected species group observed by a PSO
Group	One or more protected species individuals seen close together or conducting similar behavior

For each detection, PSOs recorded the lowest taxonomic level of animal identification for which they were confident, down to species when possible. Detection distances, including CPA, were measured or estimated from the animal to the PSO and to sound sources (both active and/or inactive) for every detection. Protected species movements relative to the vessel, initial and secondary behaviors and any behavior reaction were recorded for each detection based on a pre-defined list.

PSOs recorded the observed behavior of species detected in Mysticetus. Behaviors included: *blow, bow ride, breach, chase fish, dead, feed, fluke up, injured, look, mill, none, other* (defined in Mysticetus notes), *porpoise, rest, socialize, splash, surface-active mill, surface-active travel, swim, tail slap, travel* and *unknown* (when behavior could not be determined). Any protected species observed change in behavior as a potential reaction to the vessel and/or Survey operations was also recorded including: *change direction, dive, look, none, slow down, speed up, splash and other* (defined in Mysticetus notes).

3.8 Estimating Number of Exposures

All marine mammals are protected under the MMPA (Marine Mammal Commission, 1972). As per the MMPA, any operation that emits noise into the marine environment must consult with NMFS if sound levels produced by the activity may disturb or injure marine mammals by exceeding pre-determined sound exposure thresholds and frequencies that may result in an NMFS-determined level of '*take'*.

NMFS defines a Level B harassment of marine mammals as any exposure that could potentially result in the temporary threshold shift or behavioral disturbance. NMFS considers a Level B *take* to occur at ≥120dB re 1µPa root mean square (RMS) for continuous and non-impulsive anthropogenic noise and at ≥160dB re 1 µPa RMS for impulsive noise (NOAA, 2016). To determine the potential for Level B *take*, the *take* criteria for impulsive noise was applied. Level A harassment is defined as injury or mortality to marine mammals that occurs as a result of exposure to high noise levels. Level A harassment may result in permanent threshold shift.

Ørsted assessed the Level A and Level B HZs for marine mammals for the equipment below 200kHz that was planned to be used during the Surveys as part of the IHA application (NMFS, 2021). The maximum Level A HZ calculated was <4m for high-frequency cetaceans and therefore the risk of Level A harassment during the Surveys was considered unlikely and Level A *take* is not typically granted by NMFS. The

maximum Level B HZ calculated was 141m for the sparker (Table 3.5).The Level B isopleth was set at 141m for the sparker in the Skipjack IHA (NMFS, 2021), while the USBL and Innomar were considered *de minimus* sources.

Table 3.5 Applicable Level B Harassment Zones for Equipment Operating Below 200kHz

Survey Period (Local Date)	Level B Harassment Zone (m)		
	Sparker	SBP (Innomar)	USBL
Apr-06-2021 to Nov-22-2021	141	N/A[1]	N/A[1]
Nov-23-2021 to Dec-04-2021[2]		N/A[1]	N/A[1]

1 Aside from the 141m Level B for sparker, a 48m Level B harassment zone applied to non-impulsive, non-parametric SBPs, therefore the USBL and Innomar were exempt.

2 Gray cells denote use of source no longer permitted due to NARW Agreement 'Red Period' (Grybowski *et al.*, 2012).

The Skipjack IHA grants permission for potential non-lethal '*take*' of small numbers of marine mammals to allow for the incidental harassment resulting from HRG survey activities (Table 3.6), although it is assumed that mitigation measures implemented will protect marine mammals from the risk of Level A and Level B harassment. A potential exposure was considered to have occurred when a marine mammal was observed within the Level B HZ of equipment below 200kHz operating at that time, based on the direct observations of the PSO. A tick box was available in Mysticetus to allow PSOs to flag and report when a potential exposure to an acoustic sound source below 200kHz had occurred. However, what is considered a Level B '*take*' is assessed and determined by NMFS on a case-by-case basis.

Table 3.6 Number of Level B Incidental *Takes* Authorized by the Skipjack IHA

Common Name	Latin Name	Authorized '*Takes*' by Level B Harassment (NMFS, 2021)
North Atlantic right whale	*Eubalaena glacialis*	3
Humpback whale	*Megaptera novaeangliae*	2
Fin whale	*Balaenoptera physalus*	2
Sei whale	*Balaenoptera borealis*	1
Minke whale	*Balaenoptera acutorostrata*	2
Sperm whale	*Physeter macrocephalus*	3
Short-finned pilot whale	*Globicephala macrorhynchus*	10
Long-finned pilot whale	*Globicephala melas*	10
Bottlenose dolphin (Offshore stock)	*Tursiops truncatus*	135
Bottlenose dolphin (Migratory stock)	*Tursiops truncatus*	516
Common dolphin	*Delphinus delphis*	70
Atlantic white-sided dolphin	*Lagenorhynchus acutus*	4
Atlantic spotted dolphin	*Stenella frontalis*	2000
Risso's dolphin	*Grampus griseus*	30
Harbor porpoise	*Phocoena phocoena*	22
Harbor seal	*Phoca vitulina*	10
Gray seal	*Halichoerus grypus*	10

4 EFFORT SUMMARY

4.1 Monitoring Effort

While the survey vessels were conducting work under the Skipjack IHA, visual monitoring was carried out on 197 days between Apr-06-2021 and Dec-04-2021. There were 3514 hours and 26 minutes of monitoring effort, during which time vessels covered approximately 15020 miles (see Table 4.1). During periods of data acquisition, the IHA-regulated sparker was active for 502 hours and 4 minutes over 2381 miles of vessel track, and other sources <200kHz were active for 276 hours and 8 minutes over 1147 miles of vessel track.

Table 4.1 Summary of Monitoring Effort Conducted

Vessel	Monitoring Effort (miles)				Monitoring Effort ([h]:mm)			
	Sparker On	Other Sources <200kHz On[1]	All Sources <200kHz Off	Total	Sparker On	Other Sources <200kHz On[1]	All Sources <200kHz Off	Total
RV *Brasilis*	223	73	38	**333**	50:07	16:49	12:02	**78:59**
RV *Go Liberty*	81	19	110	**211**	20:12	6:11	29:30	**55:55**
RV *Leeway Striker*	91	288	851	**1229**	21:14	67:54	83:39	**172:48**
RV *Ocean Endeavour*	928	368	3654	**4949**	194:03	94:10	857:46	**1146:00**
RV Ocean Researcher	1059	398	6840	**8298**	216:26	91:02	1753:13	**2060:42**
Total	**2381**	**1147**	**11492**	**15020**	**502:04**	**276:08**	**2736:13**	**3514:26**

During the Surveys, waiting on weather (WOW) and surveying were the most common survey activities, accounting for 37% and 15% of the total survey time, respectively (see Figure 4.1). Monitoring requiring no mitigation was the most common monitoring activity (see Figure 4.2), accounting for 79% of the total survey time. Table 4.2 to Table 4.6 detail the vessel activity and monitoring state inside the lease area and the wider survey area for each vessel.

Figure 4.1 Overview of Vessel Activity Under the Skipjack IHA

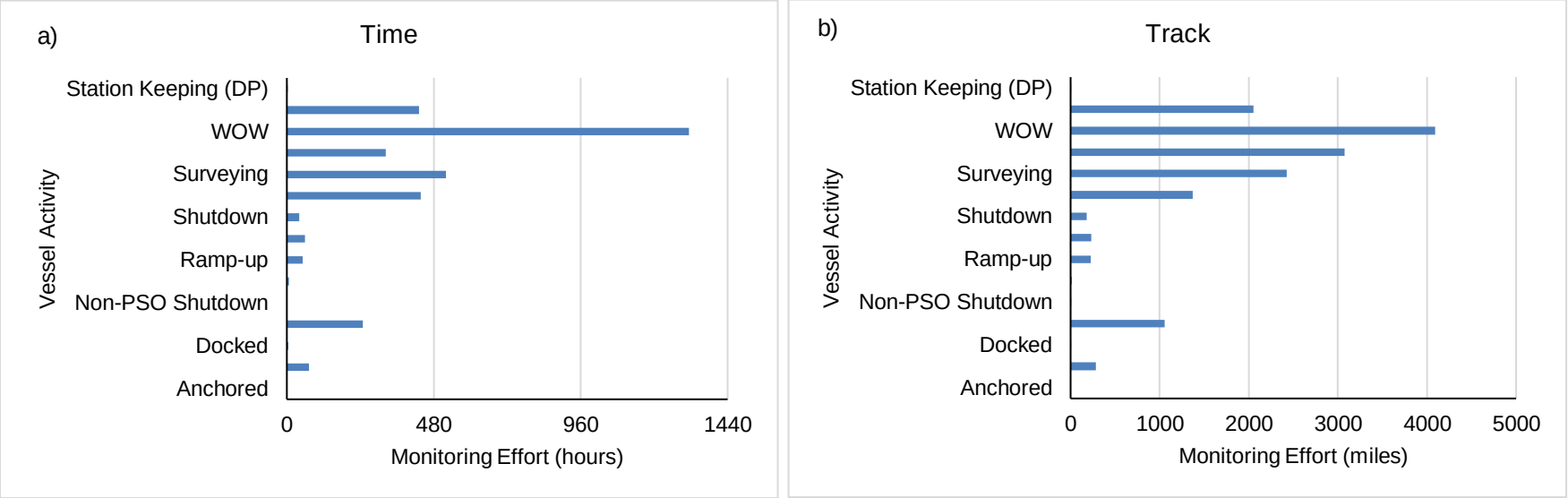
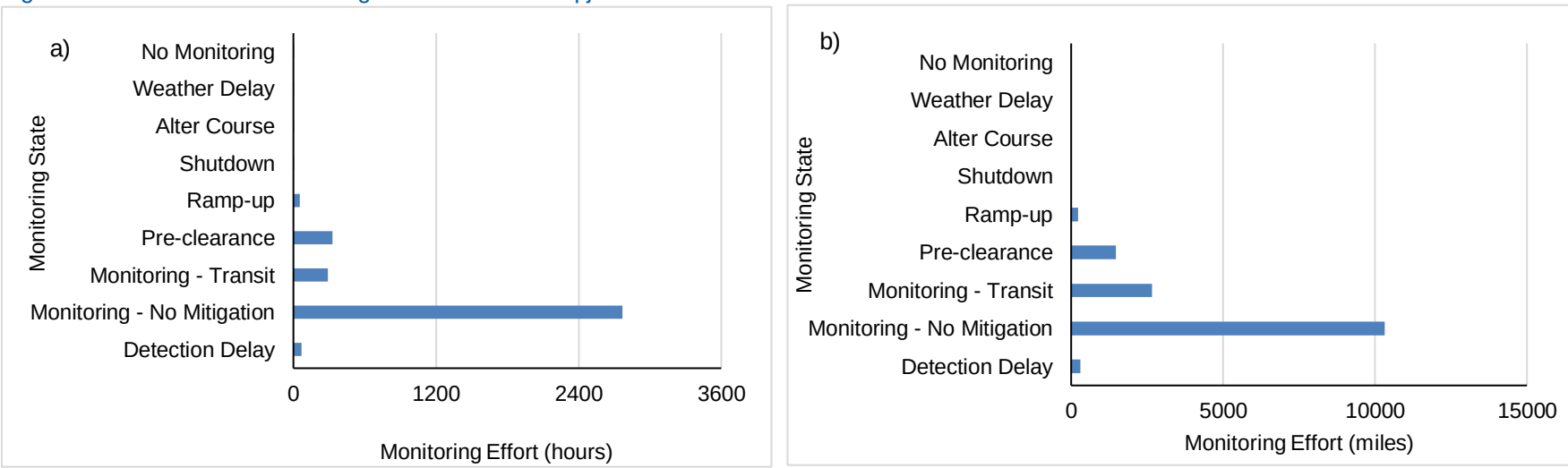


Figure 4.2 Overview of Monitoring State Under the Skipjack IHA



4.1.1 Monitoring Effort by Area and Vessel

Table 4.2 Vessel and Monitoring Activity on RV *Brasilis* under the Skipjack IHA

Vessel Activity	OCS-A 0519 Lease Area		Survey Area[1]		Overall	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Deploying Equipment	3:00	9			3:00	9
Equipment Test	19:54	79			19:54	79
Non-PSO Shutdown	0:01	<1			0:01	<1
Ramp-up	1:00	4			1:00	4
Retrieving Equipment	1:18	4			1:18	4
Standby	5:18	19			5:18	19
Surveying	46:46	210			46:46	210
Transit	0:44	6			0:44	6
WOW	0:52	2			0:52	2
Total	**78:59**	**333**			**78:59**	**333**
Monitoring State	**OCS-A 0519 Lease Area**		**Survey Area**		**Overall**	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Detection Delay	1:40	7			1:40	7
Monitoring - No Mitigation	73:05	309			73:05	309
Monitoring - Transit	0:44	6			0:44	6
Pre-clearance	2:04	5			2:04	5
Ramp-up	1:23	6			1:23	6
Total	**78:59**	**333**			**78:59**	**333**

1 The RV *Brasilis* only worked after issuance of the Garden State IHA, therefore all activity in the wider survey area will be reported in the Garden State IHA Report

Table 4.3 Vessel and Monitoring Activity on RV *Go Liberty* under the Skipjack IHA

Vessel Activity	OCS-A 0519 Lease Area		Survey Area[1]		Overall	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Deploying Equipment	1:04	4			1:04	4
Equipment Test	1:30	5			1:30	5
Line Change	7:31	31			7:31	31
Ramp-up	0:36	3			0:36	3
Retrieving Equipment	1:51	6			1:51	6
Standby	15:06	54			15:06	54
Surveying	10:06	41			10:06	41
Transit	0:32	1			0:32	1
WOW	17:36	67			17:36	67
Total	**55:55**	**211**			**55:55**	**211**
Monitoring State	**OCS-A 0519 Lease Area**		**Survey Area**		**Overall**	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Detection Delay	0:12	1			0:12	1
Monitoring - No Mitigation	50:41	192			50:41	192
Pre-clearance	5:01	18			5:01	18
Total	**55:55**	**211**			**55:55**	**211**

1 The RV *Go Liberty* only worked after issuance of the Garden State IHA, therefore all activity in the wider survey area will be reported in the Garden State IHA Report

Table 4.4 Vessel and Monitoring Activity on RV *Leeway Striker* under the Skipjack IHA

Vessel Activity	OCS-A 0519 Lease Area[1]		Survey Area		Overall	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Deploying Equipment	NA	NA	4:55	13	4:55	13
Docked	NA	NA	0:00	0	1:14	<1
Equipment Test*	NA	NA	94:48	405	95:07	407
Other (see notes)	NA	NA	5:02	9	5:02	9
Retrieving Equipment	NA	NA	7:44	34	7:44	34
Transit	NA	NA	35:29	561	58:44	766
Total	N/A	N/A	**148:01**	**1023**	**172:48**	**1229**
Monitoring State	**OCS-A 0519 Lease Area**		**Survey Area**		**Overall**	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Monitoring - No Mitigation	NA	NA	106:23	446	107:23	450
Monitoring - Transit	NA	NA	23:25	362	43:05	540
Pre-clearance	NA	NA	18:12	214	22:19	239
Total	N/A	N/A	**148:01**	**1023**	**172:48**	**1229**

1 The RV *Leeway Striker* conducted equipment testing under the Skipjack IHA before issuance of the Garden State IHA, but did not enter the OCS-A -519 Lease Area.

Table 4.5 Vessel and Monitoring Activity on RV *Ocean Endeavour* under the Skipjack IHA

Vessel Activity	OCS-A 0519 Lease Area[1]		Survey Area[2]		Overall[3]	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Deploying Equipment	17:02	65	2:22	10	23:32	93
Docked	0:00	0	0:00	0	1:45	0
Equipment Test	8:48	42	1:30	7	18:43	74
Line Change	154:53	740	21:54	102	206:51	973
Non-PSO Shutdown	0:30	2	0:00	0	0:30	2
Other (see notes)	0:16	1	0:00	0	1:33	7
Ramp-up	16:25	75	2:07	10	21:21	97
Retrieving Equipment	17:32	68	1:28	6	21:14	82
Shutdown	12:27	58	1:01	5	14:30	67
Standby	68:38	291	9:32	42	103:14	412
Station Keeping (DP)	0:00	0	0:00	0	2:47	2
Surveying	224:22	1076	3:26	16	274:32	1238
Transit	15:32	86	40:49	317	115:01	904
WOW	277:03	783	59:07	199	340:21	999
Total	**813:33**	**3287**	**143:20**	**715**	**1146:00**	**4949**

Monitoring State	OCS-A 0519 Lease Area[1]		Survey Area[2]		Overall[3]	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Detection Delay	18:22	85	1:04	5	22:55	106
Monitoring - No Mitigation	690:25	2738	86:12	325	882:11	3511
Monitoring - Transit	18:51	99	41:06	318	100:17	755
No Monitoring	0:00	0	0:00	0	1:45	0
Pre-clearance	68:57	287	12:27	56	116:35	475
Ramp-up	16:35	76	2:07	10	21:32	98
Shutdown	0:11	1	0:00	0	0:11	1
Weather Delay	0:10	1	0:22	2	0:32	3
Total	**813:33**	**3287**	**143:20**	**715**	**1146:00**	**4949**

1 Represents total activity in the OCS-A 0519 Lease Area

2 Represents activity in the survey area prior to beginning work under the Garden State IHA

3 Represents total activity prior to beginning work under the Garden State IHA plus activity in the OCS-A 0519 Lease Area subsequent to this.

Table 4.6 Vessel and Monitoring Activity on RV *Ocean Researcher* under the Skipjack IHA

Vessel Activity	OCS-A 0519 Lease Area[1]		Survey Area[2]		Overall[3]	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Anchored	0:00	0	0:33	0	0:33	0
Deploying Equipment	32:49	132	4:15	17	40:36	166
Docked	0:00	0	0:00	0	2:11	0
Equipment Test	65:15	289	7:57	39	112:28	492
Line Change	124:14	582	63:31	308	216:29	1047
Non-PSO Shutdown	0:32	2	0:41	3	1:13	5
Ramp-up	20:42	92	5:29	25	27:59	124
Retrieving Equipment	23:18	89	3:49	15	27:36	108
Shutdown	23:04	103	2:41	12	26:21	115
Standby	136:08	467	115:31	244	313:22	889
Surveying	185:23	887	5:09	46	187:33	935
Transit	18:18	124	83:40	726	148:49	1395
WOW	645:13	2047	259:13	863	955:27	3020
Total	**1275:01**	**4814**	**552:34**	**2297**	**2060:42**	**8298**
Monitoring State	**OCS-A 0519 Lease Area[1]**		**Survey Area[2]**		**Overall[3]**	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Alter Course	1:09	4	0:29	3	1:39	7
Detection Delay	37:47	167	3:43	16	43:04	187
Monitoring - No Mitigation	1059:29	3877	433:46	1435	1653:14	5863
Monitoring - Transit	17:52	118	86:29	712	147:22	1354
No Monitoring	0:00	0	0:00	0	1:44	0
Pre-clearance	133:55	540	22:33	107	181:02	744
Ramp-up	21:23	96	5:28	24	28:51	128
Shutdown	0:46	4	0:02	<1	1:06	6
Weather Delay	2:37	9	0:00	0	2:37	9
Total	**1275:01**	**4814**	**552:34**	**2297**	**2060:42**	**8298**

1 Represents total activity in the OCS-A 0519 Lease Area

2 Represents activity in the survey area prior to beginning work under the Garden State IHA

3 Represents total activity prior to beginning work under the Garden State IHA plus activity in the OCS-A 0519 Lease Area subsequent to this.

4.1.2 PSO Effort

PSO effort using each piece of monitoring equipment, during operations conducted in daylight and darkness is presented in Table 4.7 and by geophysical acoustic sources <200kHz being Active and Inactive in Table 4.8. This activity reflects each PSO's effort individually and therefore can exceed 24hours within any given day.

A total of 5127 hours and 25 minutes of PSO effort were conducted by designated PSOs. The dominant method of assessment during daylight operations was UE, accounting for 99% of daylight PSO effort. In daylight, all other equipment was used for brief periods of lower visibility to enable monitoring to continue.

During hours of darkness, NVD and vessel-mounted IR were the most used detection methods accounting for 66% and 34%, respectively, of the total PSO effort conducted in the darkness. Handheld IR was only used onboard the RV *Brasilis* as Effort Type 1 and on the MV *Ocean Researcher* as Effort Type 2.

Most of the PSO effort (72%) was conducted whilst the acoustic sources <200kHz were inactive.

Table 4.7 PSO Effort for each Monitoring Device used during Daylight and Darkness

	PSO Effort ([h]:mm)				
	UE	NVD	IR - Mounted	IR - Handheld	Total
Daylight	3133:10	8:19	15:51	0:00	**3157:21**
Darkness	0:27	1301:55	666:18	1:21	**1970:03**
Total	**3133:38**	**1310:14**	**682:09**	**1:21**	**5127:25**
% Total	61%	26%	13%	<1%	

Table 4.8 PSO Effort for each Monitoring Device when Acoustic Sources <200 kHz were Active or Inactive

	PSO Effort ([h]:mm)				
	UE	NVD	IR - Mounted	IR - Handheld	Total
Below 200kHz Active	799:50	313:08	315:27	0:01	**1428:27**
Below 200kHz Inactive	2233:47	997:06	366:42	1:20	**3698:57**
Total	**3133:38**	**1310:14**	**682:09**	**1:21**	**5127:25**
% Total	61%	26%	13%	<1%	

4.2 Weather Conditions During Monitoring

As would be expected with survey operations spanning eight months, environmental conditions varied throughout the Surveys. Beaufort Sea state was commonly favorable throughout the Surveys; with 83% of Monitoring Effort conducted during periods in Beaufort 4 or less (Figure 4.3). The Beaufort scale is an empirical measurement that accounts for several environmental factors, one of which, and that with the most influence on PSO mitigation activities, is wave height. Swell height for most of the survey (70%) was less than 2m and considered low.

Atmospheric conditions were considered favorable for PSO observations during most of the survey activities. Periods of mist, fog or precipitation, where visibility was generally reduced, accounted for 7% of all Monitoring Effort (Figure 4.4).

Figure 4.3 Monitoring Effort by Beaufort Sea State

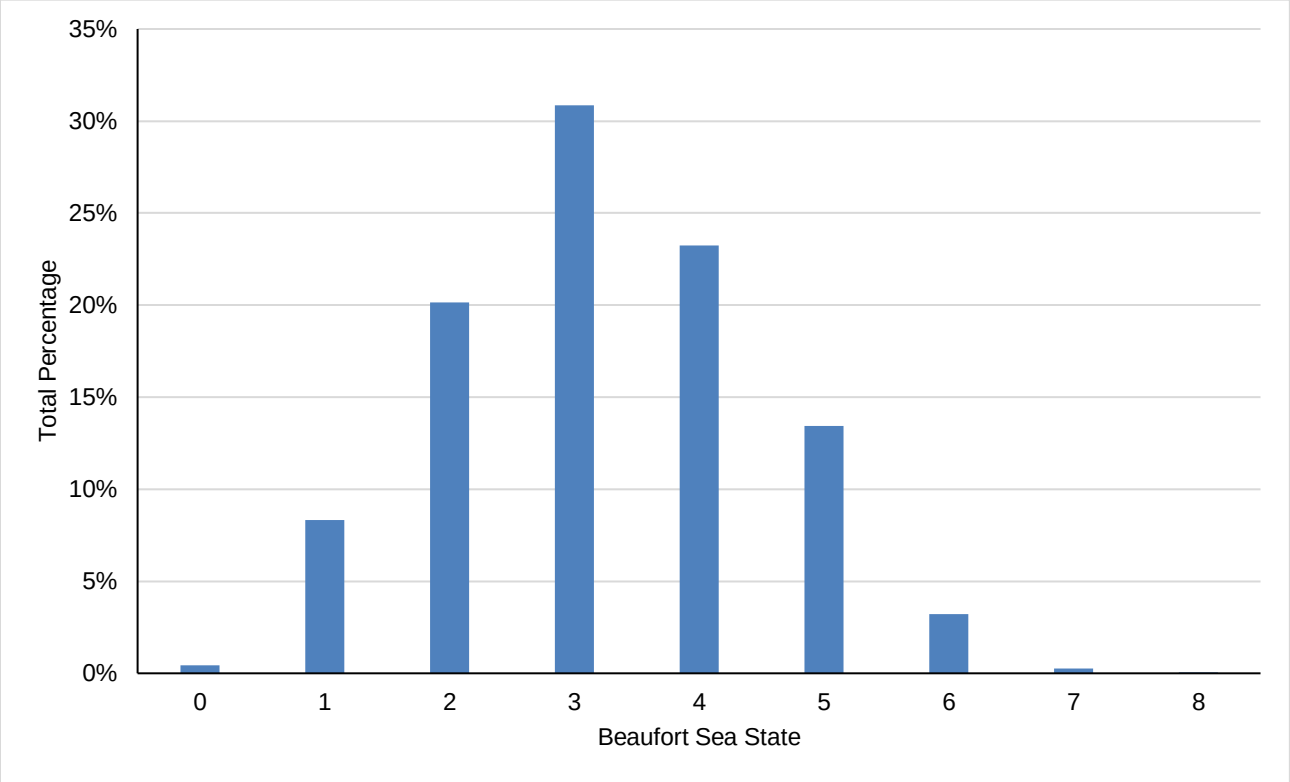
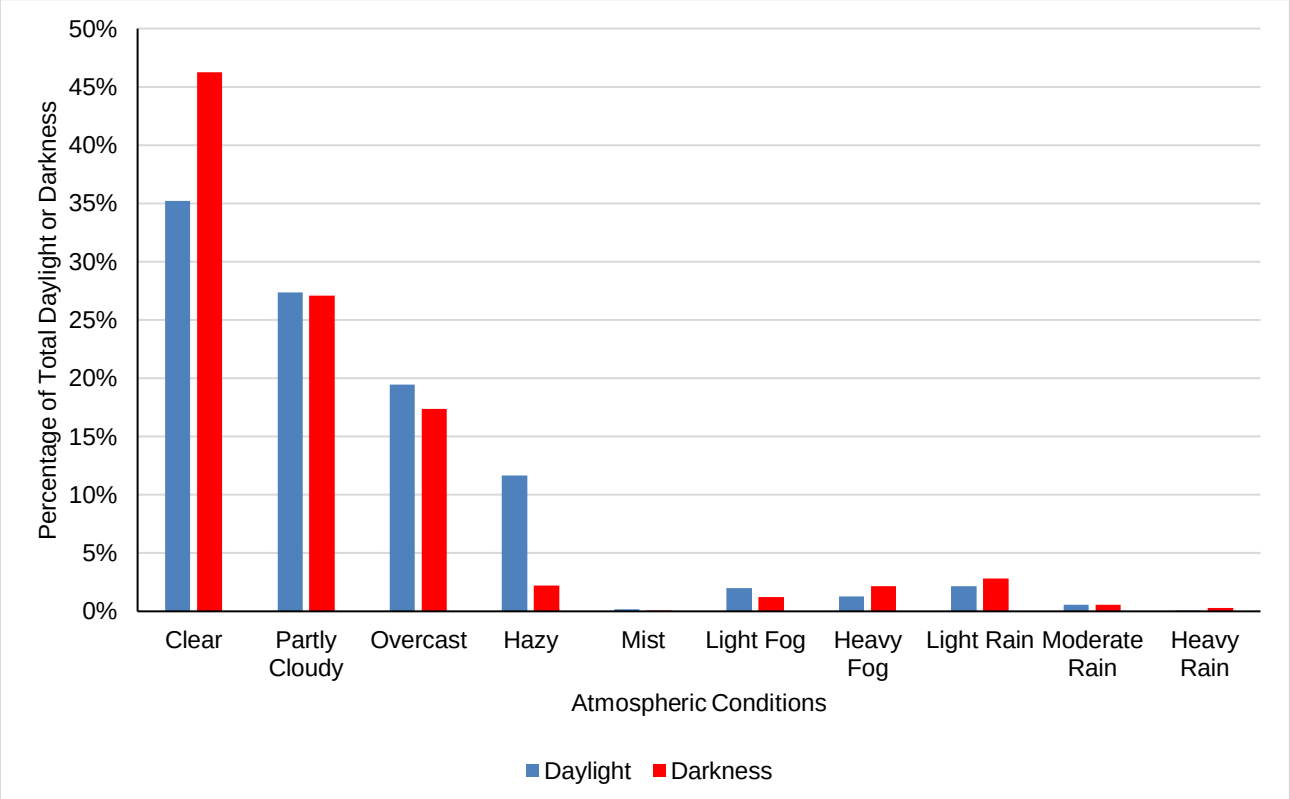


Figure 4.4 Percentage of Monitoring Effort by Atmospheric Conditions during Daylight and Darkness

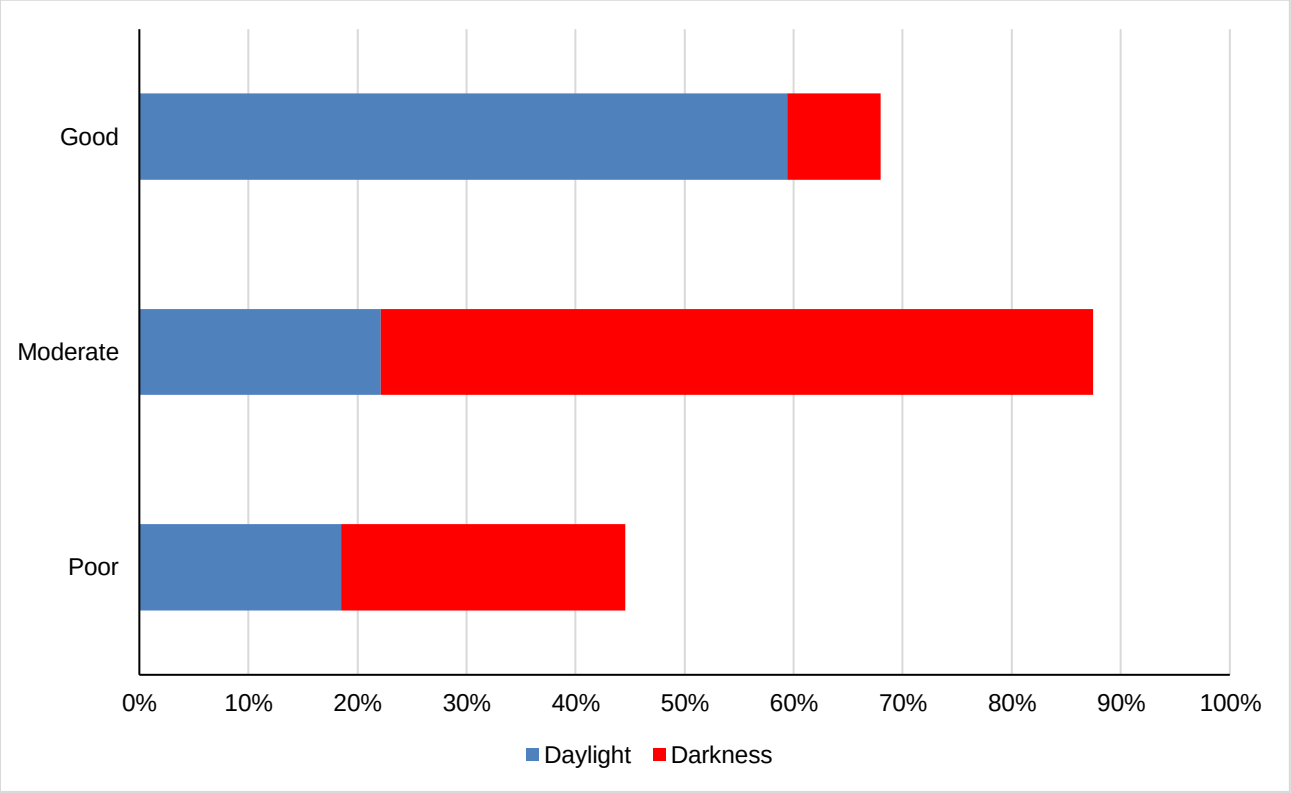


The visibility quality during Monitoring Effort is presented in Figure 4.5 and was defined by Mysticetus as follows:

- Good: Beaufort sea state ≤3 and visibility distance >1km
- Moderate: Beaufort sea state 4 and/or visibility distance 0.5-1km
- Poor: Beaufort sea state >4 and/or visibility distance <0.5km

Visibility quality was considered *good* or *moderate* during the majority (79%) of monitoring effort. *Good* visibility was much more common during Daylight (59%) than during Darkness (9%). *Poor* visibility quality was recorded less often during Daylight than Darkness (18% and 26%, respectively).

Figure 4.5 Percentage of Monitoring Effort by Visibility Quality during Daylight and Darkness



5 PROTECTED SPECIES DETECTION SUMMARY

5.1 Protected Species Detections

There were 399 initial detections of protected species under the Skipjack IHA, comprising an estimated 1382 individuals. An additional seven encounters were considered subsequent sightings of previously encountered individuals, giving an overall total of 406 encounters comprising 1441 individuals during the survey.

These sightings comprised 300 sightings when the vessels were within the wider IHA area from Apr-06-2021 to Jun-13-2021, of which 82 were when the vessels were within the Lease area, and 106 sightings when the vessels were within the Lease area from Jun-14-2021 to Nov-13-2021. There was also one sighting of an otter while the RV *Ocean Researcher* was equipment testing in port on Apr-04-2021, which has not been included in further analysis for this report as the vessel was not working under the IHA.

Of the 406 encounters, 49% (representing 935 individuals) were identified to species level. Two encounters, of two individuals, could only be identified as 'unidentified marine mammals', while the remaining 51% (representing 506 individuals) encounters were identified to taxonomic family level. Of the protected species identified to species level, most encounters were of bottlenose dolphins (77) and they were the most abundant species (approximately 617 individuals).

Of the 406 encounters, 95% occurred during Daylight, whilst 5% occurred during Darkness (Table 5.1). Daylight encounters were initially detected visually, using UE, RB, or mounted IR camera when the vessel was under pilotage. Darkness encounters were initially detected by UE, NVD or mounted IR camera. A summary of all detections during daylight and darkness is tabulated in Table 5.1.

Of the 406 encounters, 81% occurred when sources under 200kHz were inactive, and 19% when sources under 200kHz were active. A summary of all detections when sources were active and inactive is tabulated in Table 5.2.

Table 5.1 Protected Species Detection In Daylight and Darkness During The Geophysical Survey Conducted Under The Skipjack IHA (NMFS, 2021)

Species	Scientific Name	Daylight		Darkness		Total	
		Number of Encounters	Estimated Number of Individuals	Number of Encounters	Estimated Number of Individuals	Number of Encounters	Estimated Number of Individuals
Odontocete							
Bottlenose Dolphin	*Tursiops truncatus*	77	617	0	0	77	617
Short-beaked Common Dolphin	*Delphinus delphis*	12	190	6	16	18	206
Atlantic Spotted Dolphin	*Stenella frontalis*	1	3	0	0	1	3
Risso's Dolphin	*Grampus griseus*	1	3	0	0	1	3
Unidentified Dolphin	NA	63	331	8	31	71	362
Total for group		**154**	**1144**	**14**	**47**	**168**	**1191**
Mysticete							
Fin Whale	*Balaenoptera physalus*	12	16	0	0	12	16
Humpback Whale	*Megaptera novaeangliae*	6	8	0	0	6	8
Unidentified Mysticete Whale	NA	22	27	1	1	23	28
Total for group		**40**	**51**	**1**	**1**	**41**	**52**
Testudine							
Leatherback Sea Turtle	*Dermochelys coriacea*	54	54	0	0	54	54
Loggerhead Sea Turtle	*Caretta caretta*	18	18	1	1	19	19
Green Sea Turtle	*Chelonia mydas*	9	9	0	0	9	9
Unidentified Sea Turtle	NA	107	108	5	5	112	113
Total for group		**188**	**189**	**6**	**6**	**194**	**195**
Pinniped							
Unidentified Pinniped	NA	1	1	0	0	1	1
Other							
Unidentified Marine Mammal	NA	2	2	0	0	2	2
Total		**385**	**1387**	**21**	**54**	**406**	**1441**
Total (%)		**95%**	**96%**	**5%**	**4%**		

Table 5.2 Protected Species Dectections During Geophysical Survey Activities under the Skipjack IHA When Acoustic Sources Below 200kHz were Active and Inactive

Species	Scientific Name	Sources <200kHz Active	Sources <200kHz Inactive	Total
Odontocete				
Bottlenose Dolphin	*Tursiops truncatus*	4	73	77
Short-beaked Common Dolphin	*Delphinus delphis*	5	13	18
Atlantic Spotted Dolphin	*Stenella frontalis*	0	1	1
Risso's Dolphin	*Grampus griseus*	1	0	1
Unidentified Dolphin	NA	11	60	71
Total for group		**21**	**147**	**168**
Mysticete				
Fin Whale	*Balaenoptera physalus*	5	7	12
Humpback Whale	*Megaptera novaeangliae*	2	4	6
Unidentified Mysticete Whale	NA	10	13	23
Total for group		**17**	**24**	**41**
Testudine				
Leatherback Sea Turtle	*Dermochelys coriacea*	10	44	54
Loggerhead Sea Turtle	*Caretta caretta*	6	13	19
Green Sea Turtle	*Chelonia mydas*	2	7	9
Unidentified Sea Turtle	NA	21	91	112
Total for group		**39**	**155**	**194**
Pinniped				
Unidentified Pinniped	NA	1	0	1
Other				
Unidentified Marine Mammal	NA	0	2	2
Total		**78**	**328**	**406**
Total (%)		**19%**	**81%**	

Figure 5.1 Protected Species Sightings Recorded During Survey Activities Under the Skipjack IHA by RV *Ocean Researcher*

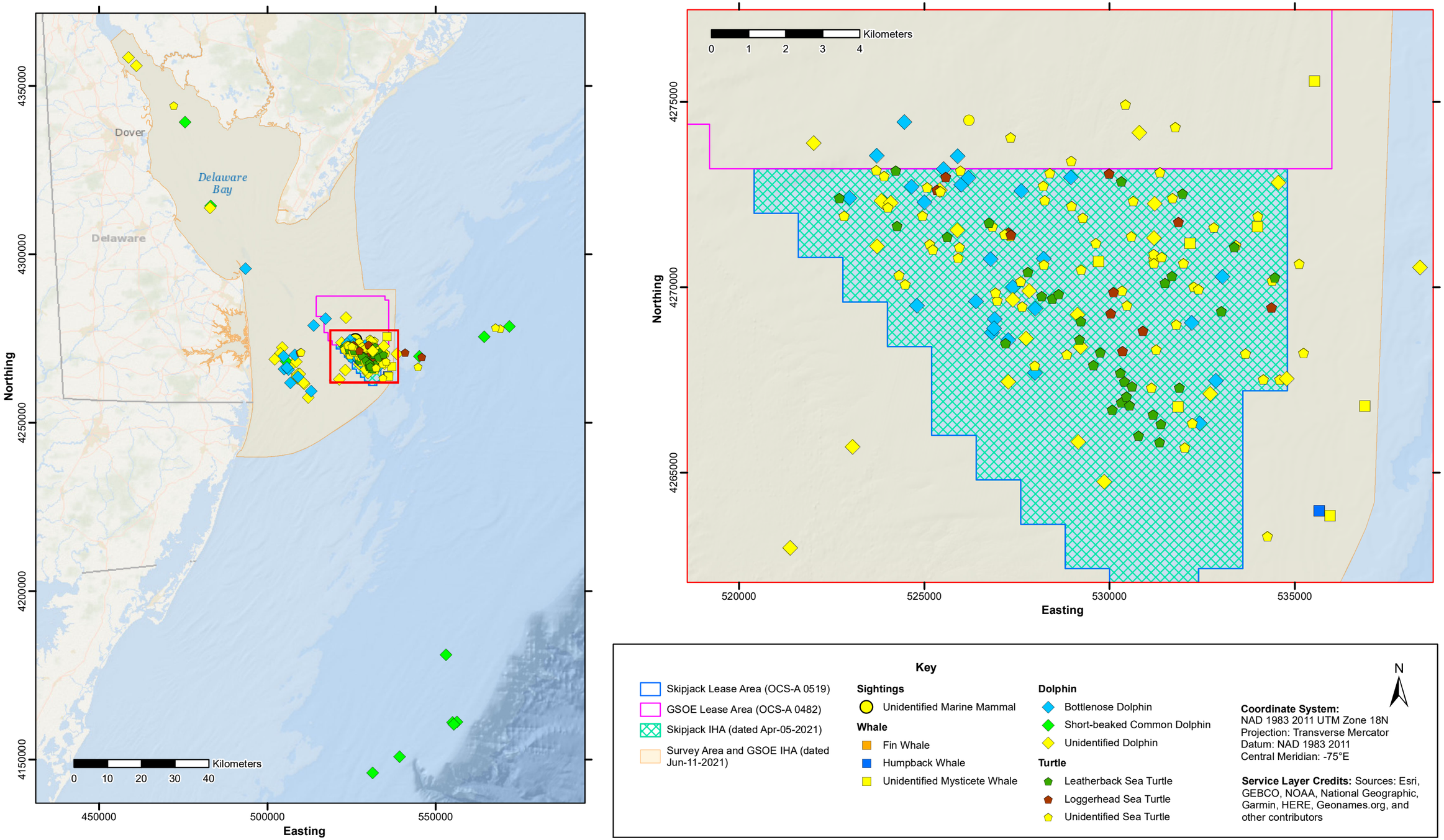


Figure 5.2 Protected Species Sightings Recorded During Survey Activities Under the Skipjack IHA by RV *Ocean Endeavour*

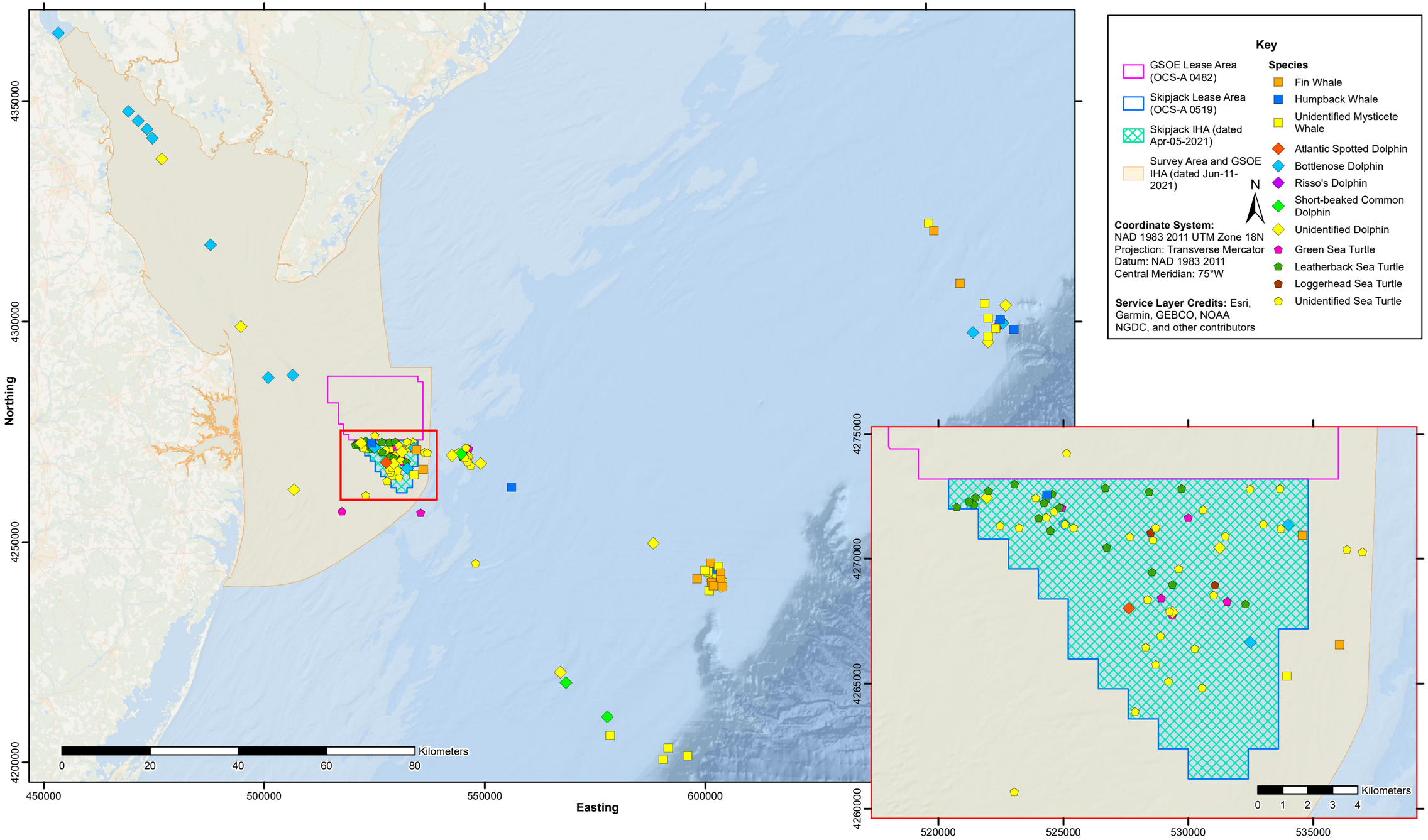


Figure 5.3 Protected Species Sightings Recorded During Survey Activities Under the Skipjack IHA by RV *Leeway Striker*

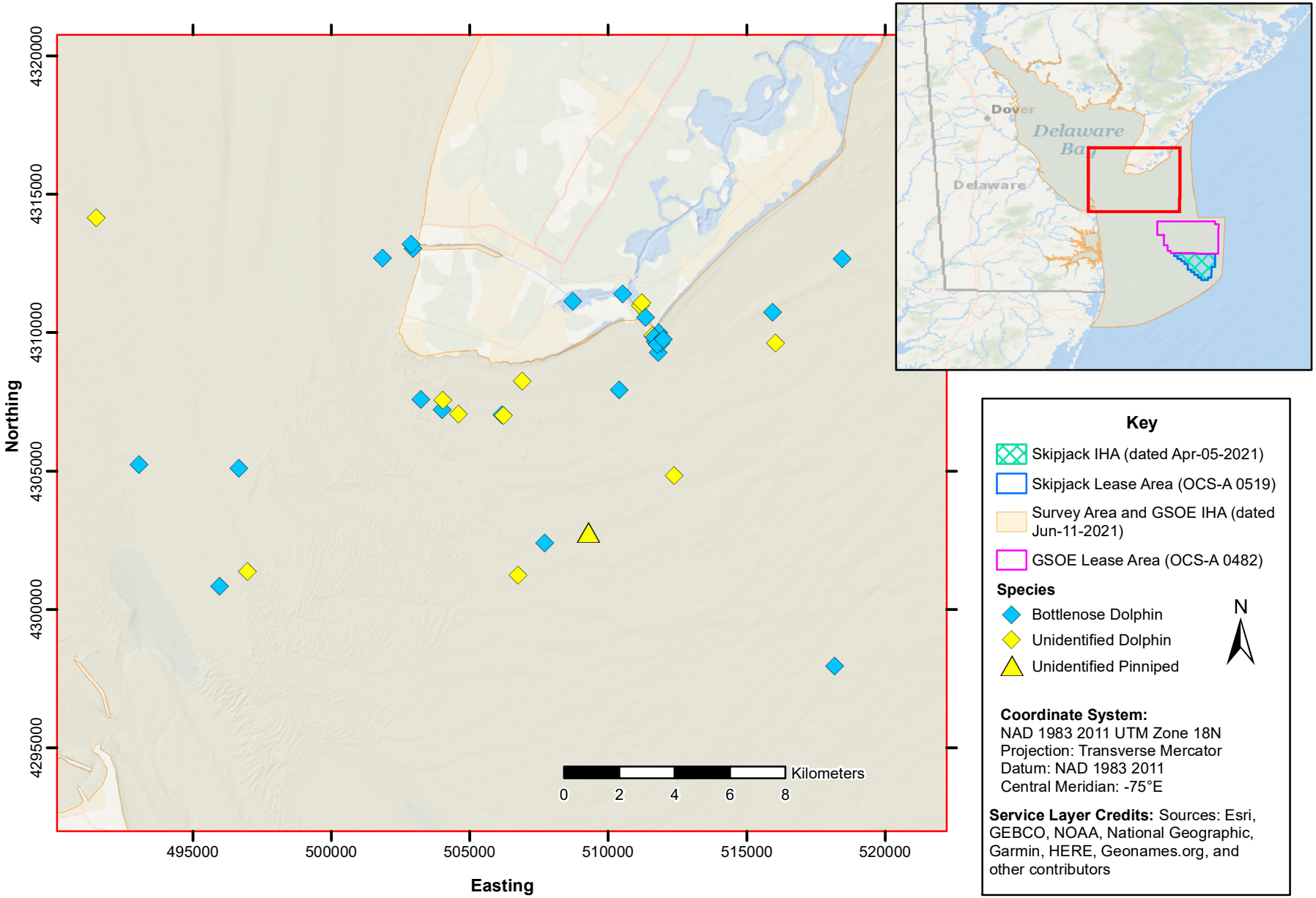


Figure 5.4 Protected Species Sightings Recorded During Survey Activities Under the Skipjack IHA by RV *Brasilis*

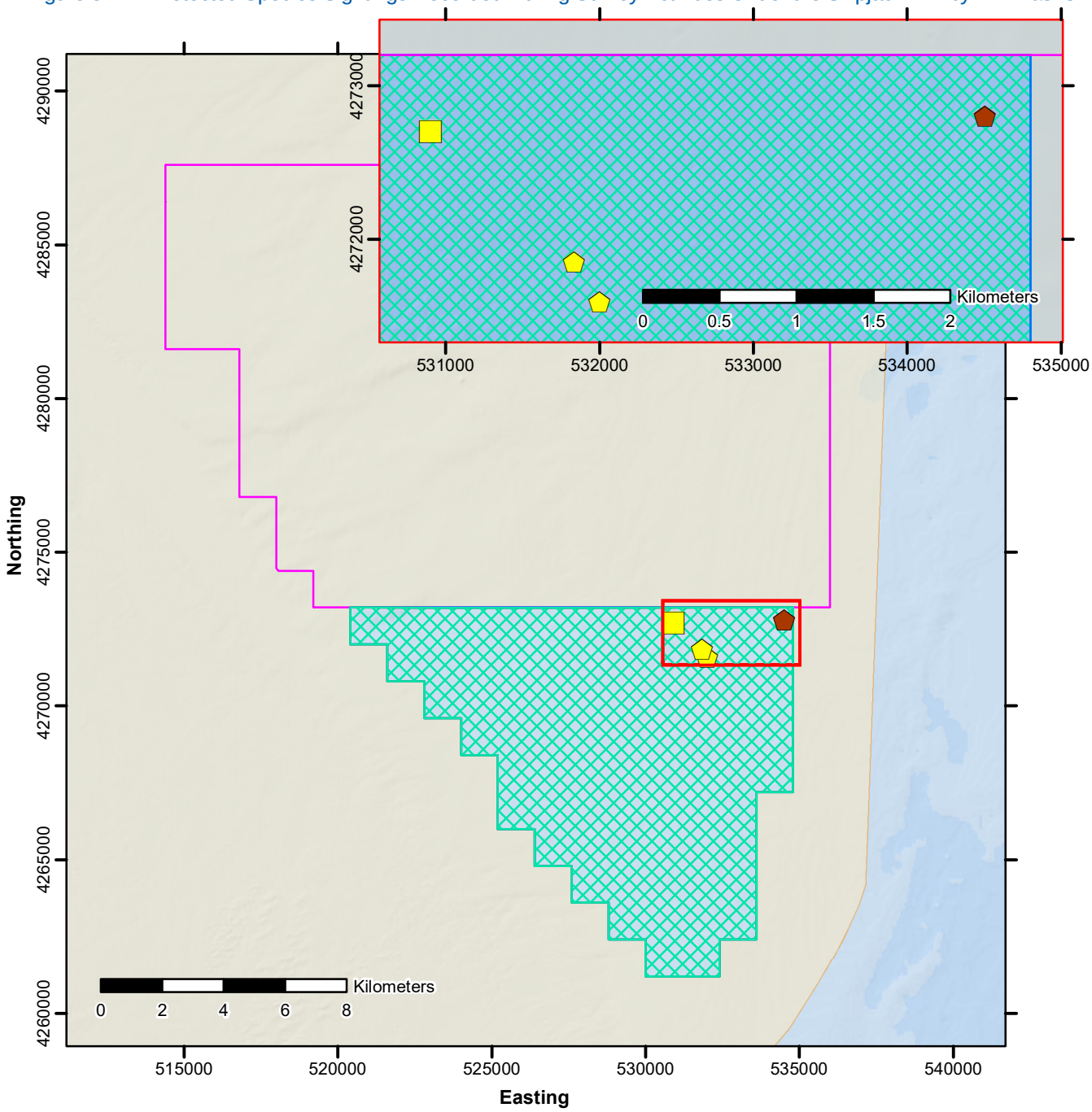
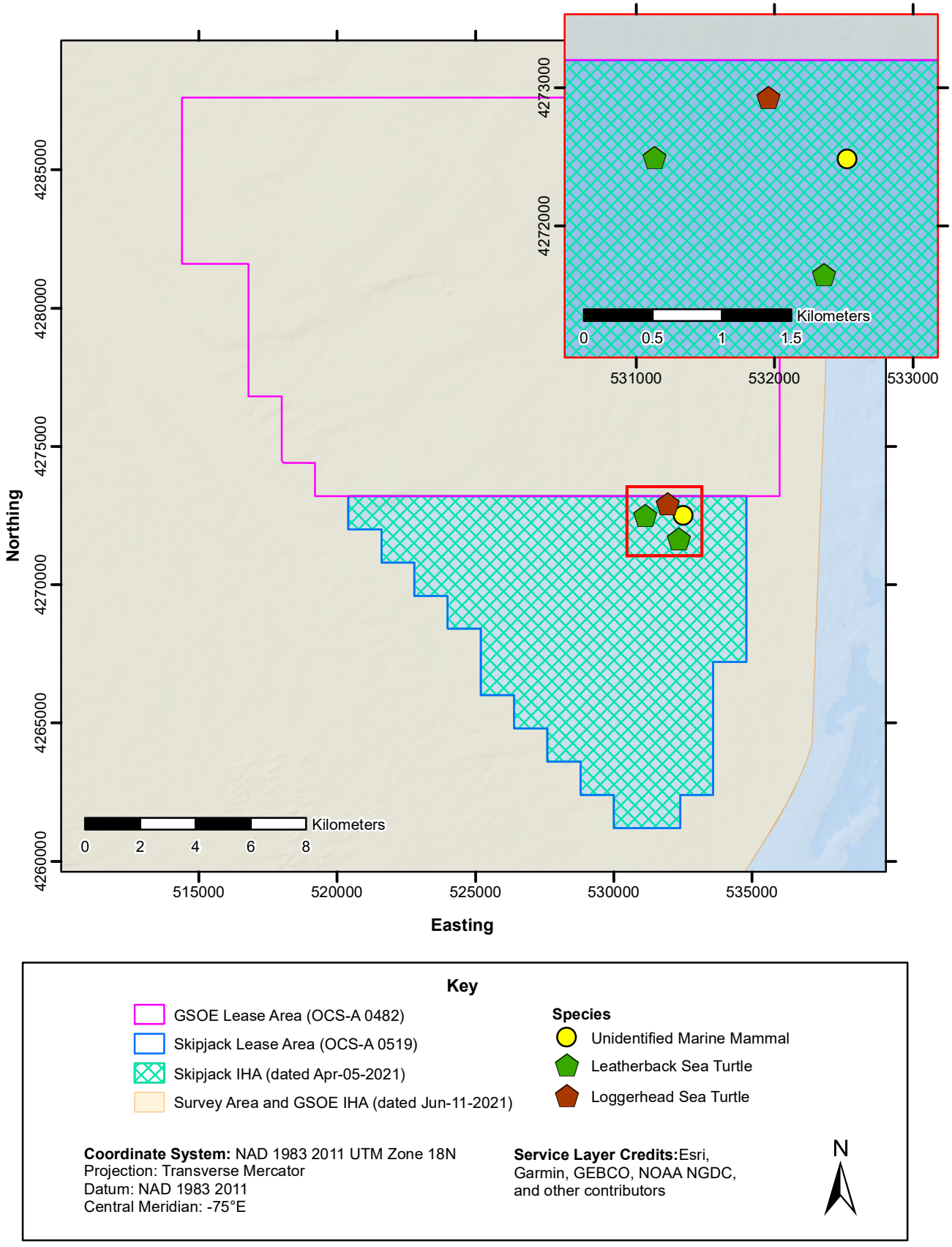


Figure 5.5 Protected Species Sightings Recorded During Survey Activities Under the Skipjack IHA by RV *Go Liberty*



5.1.1 North Atlantic Right Whale Monitoring

From Nov-01 to Apr-30, three Mid-Atlantic SMAs were in effect in the vicinity of the Lease Areas; the Delaware Bay SMA, New York/New Jersey SMA and the Chesapeake SMA (Figure 5.6). PSOs kept the crew informed of speed restrictions in SMAs.

PSOs maintained monitoring of the NMFS NARW Reporting Systems (the Mandatory Ship Reporting system, the Whale Alert app and the Interactive NARW Sightings Map (available at https://www.nefsc.noaa.gov/psb/surveys/), checking approximately every four hours to monitor the presence of any NARWs in the area and to be aware of the establishment of a DMA.

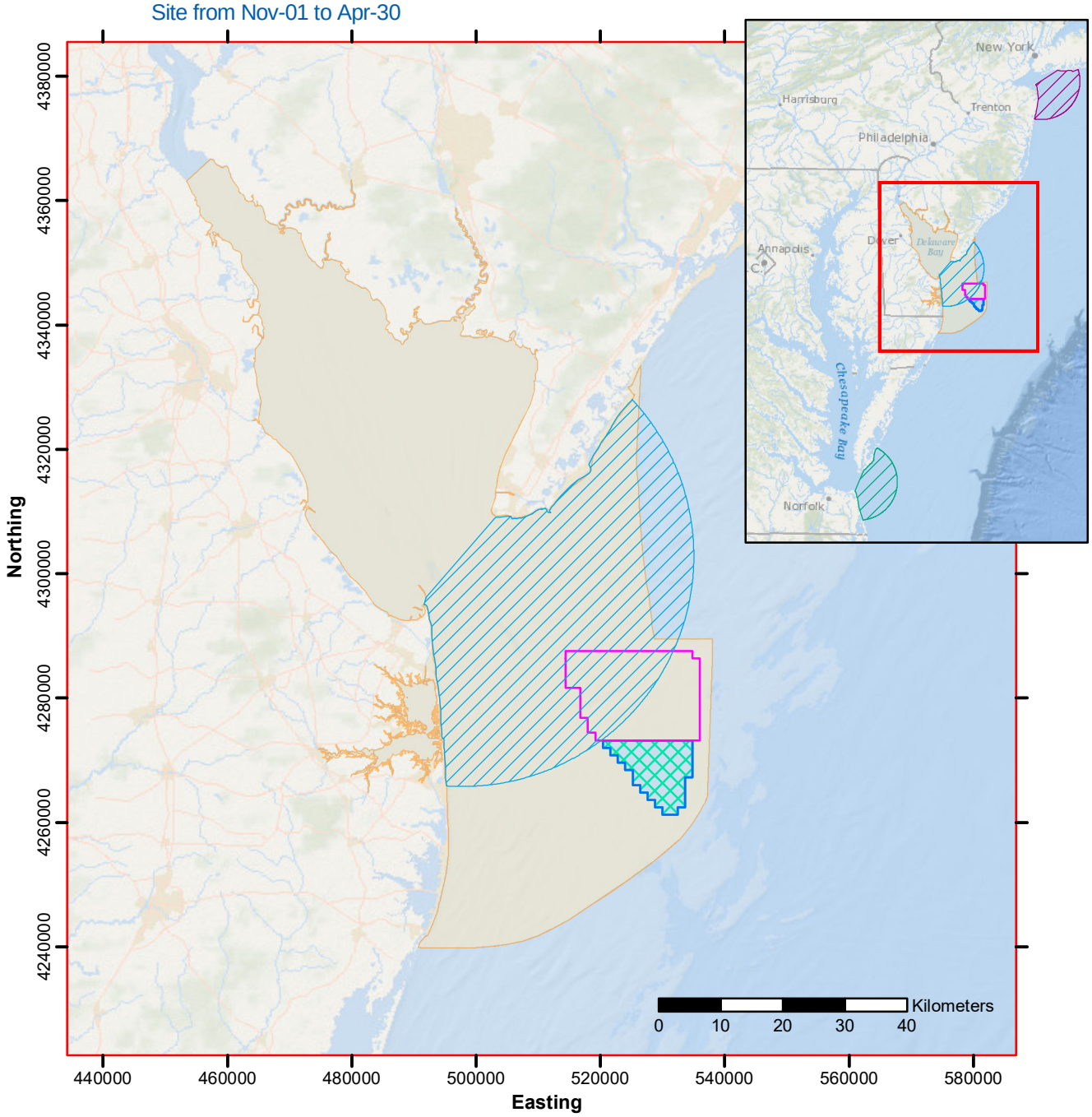
During the survey, three Slow Zones were established in or near the Lease Area, each with several renewals throughout the survey. The 10-knot speed restriction per NOAA guidance was adhered to when the vessel was within a Slow Zone but no cessation of survey activities was required when the Slow Zones were established within the Lease Area. See Table 5.3 and Figure 5.7 for details of the Slow Zones.

Table 5.3 Slow Zones Established Within or Near the Survey Area During Survey Activities

Slow Zone Name (Indicative of Location)	ID(s)	Start Date	Expiry Date
64nm S Atlantic City NJ[1]	3478	Sep-30-2021	Oct-15-2021
21nm E Ocean City MD[1]	3485	Nov-15-2021	Nov-27-2021
20nm SE Atlantic City NJ	3488	Nov-30-2021	Dec-09-2021
	3490	Dec-02-2021	Dec-18-2021
46nm SE New York NY	3487	Nov-23-2021	Dec-06-2021
	3489	Dec-01-2021	Dec-15-2021

1 64nm S Atlantic City NJ and 21nm E Ocean City MD had the same boundary but different periods of effect.

Figure 5.6 The Extent of the Mid-Atlantic Seasonal Management Areas Established in Effect Near the Survey Site from Nov-01 to Apr-30



Key

- Skipjack IHA (dated Apr-05-2021)
- Skipjack Lease Area (OCS-A 0519)
- GSOE Lease Area (OCS-A 0482)
- Survey Area and GSOE IHA (dated Jun-11-2021)

Right Whale SMA

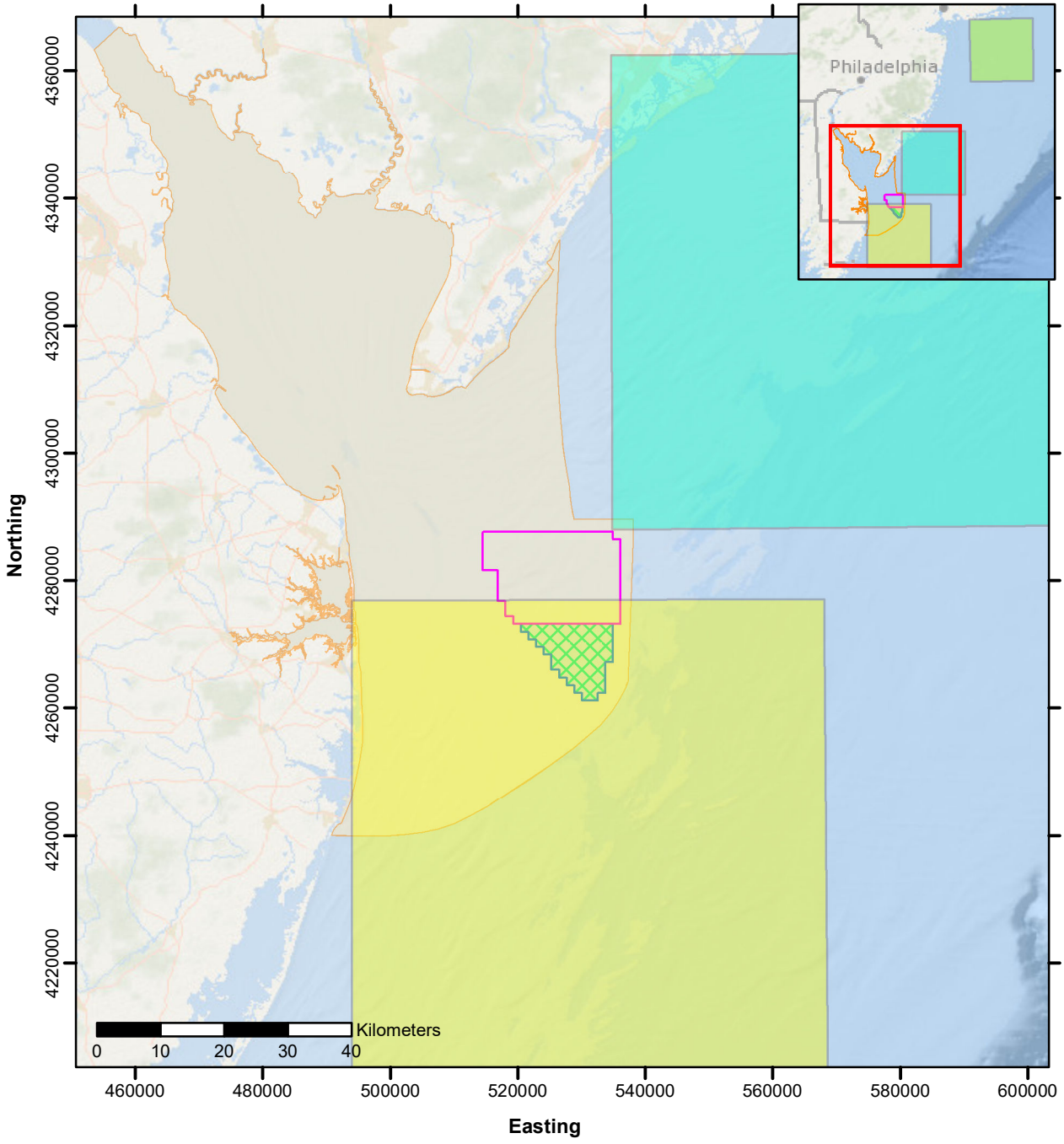
- Mid-Atlantic Chesapeake Bay
- Mid-Atlantic Delaware Bay
- Mid-Atlantic New York/New Jersey

Coordinate System: NAD 1983 UTM Zone 18N
Projection: Transverse Mercator
Datum: North American 1983
Central Meridian: -75°E

N

Service Layer Credits: Sources: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors

Figure 5.7 Slow Zones Established During Survey Activities Under the Skipjack IHA



Key

- Skipjack IHA (dated Apr-05-2021)
- Skipjack Lease Area (OCS-A 0519)
- GSOE Lease Area (OCS-A 0482)
- Survey Area and GSOE IHA (dated Jun-11-2021)

Slow Zones

- 21nm E Ocean City, MD and 64nm S Atlantic City, NJ
- 20nm SE Atlantic City NJ
- 46nm SE New York, NY

Service Layer Credits: Sources: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors

N

Coordinate System: NAD 1983 UTM Zone 18N
Projection: Transverse Mercator Datum: North American 1983
Central Meridian: -75.0°E

5.1.2 North Atlantic Right Whale Detections

During the survey period between Apr-06-2021 and Dec-04-2021, there were no detections of NARW.

5.2 Protected Species Behavior

The difficulty associated with vessel-based observations of marine mammal and sea turtle behaviors should be noted, particularly when behavioral study is not a primary objective of PSOs. A PSO's primary responsibility upon detection of a protected species is to assess the need for appropriate mitigation measures. Only after all mitigation measures have been assessed and implemented, where needed, do PSOs dedicate additional observation effort to assess animal behavior and potential reactions to the vessel or operations.

The observed initial behavior as recorded by PSOs varied between species group and were generally consistent with known behavior of broad species groups:

- mysticete cetaceans were predominantly observed exhibiting *blow* and *travel* behavior.
- odontocete cetaceans predominantly exhibited *travel*, *swim* and *mill* behavior.
- testudines were mainly noted to exhibit *swim* behavior.

Details of noted initial behavior is tabulated for periods when acoustic sources (<200kHz) were considered inactive in Table 5.4, for periods when the IHA-regulated sparker was active in Table 5.5 and for periods when other acoustic sources (<200kHz) were considered active in Table 5.6.

The PSOs also recorded any behavioral reactions where these were noted for each encounter. Behavioral reactions are defined as perceived changes in protected species behavior as a result of the vessel or its operations, relative to the initial or secondary observed behaviors. Details of noted reaction behavior is tabulated for periods when acoustic sources (<200kHz) were considered Inactive in Table 5.7, for periods were the IHA-regulated sparker was active in Table 5.8 and for periods when other acoustic sources (<200kHz) were considered active in Table 5.9.

The most frequently noted behavior reaction of protected species was *none*, regardless of whether the sparker was active (67%), other acoustic sources <200kHz were active (89%) or all sources <200kHz were inactive (74%). Where a reaction was observed, *dive* was the most frequently identified behavior when acoustic sources <200kHz were inactive, accounting for 20% of encounters. When the sparker was active, only two behavioral reactions, other than *None*, were noted: *dive* and *change direction*, with *dive* accounting for 30% of encounters. When acoustic sources (<200kHz) other than the sparker were active, *dive* and *change direction* each accounted for 6% of encounters, and no other reaction behaviors were observed.

Table 5.4 Observed Initial Behavious When Acoustic Sources <200kHz Were Inactive

Species	Scientific Name	Source Frequency <200kHz Inactive																
		Mill	Travel	Surface-active Travel	Breach	Surface-active Mill	Splash	Swim	Rest	Blow	Feed	Tail Slap	Bow Ride	None	Unknown	Socialize	Look	Porpoise	Other (see notes)
Odontocete																			
Bottlenose Dolphin	*Tursiops truncatus*	13	25	7	2	7	0	9	0	0	8	0	0	0	0	1	0	1	0
Short-beaked Common Dolphin	*Delphinus delphis*	1	4	1	1	0	0	2	0	0	2	0	0	0	0	0	0	2	0
Atlantic Spotted Dolphin	*Stenella frontalis*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Risso's Dolphin	*Grampus griseus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Dolphin	NA	6	18	2	0	3	3	19	2	0	3	0	0	0	0	1	0	3	0
Total for group		**20**	**47**	**10**	**3**	**10**	**3**	**31**	**2**	**0**	**13**	**0**	**0**	**0**	**0**	**2**	**0**	**6**	**0**
Mysticete																			
Fin Whale	*Balaenoptera physalus*	0	1	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0
Humpback Whale	*Megaptera novaeangliae*	0	1	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
Unidentified Mysticete Whale	NA	0	1	0	0	0	0	0	0	11	0	0	0	0	1	0	0	0	0
Total for group		**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**20**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
Testudine																			
Leatherback Sea Turtle	*Dermochelys coriacea*	4	0	0	0	0	0	34	3	0	0	0	0	0	1	0	2	0	0
Loggerhead Sea Turtle	*Caretta caretta*	2	1	0	0	2	0	3	3	0	0	0	0	0	2	0	0	0	0
Green Sea Turtle	*Chelonia mydas*	0	1	0	0	0	0	5	1	0	0	0	0	0	0	0	0	0	0
Unidentified Sea Turtle	NA	9	2	0	0	0	1	39	25	0	0	0	0	7	2	0	4	0	2
Total for group		**15**	**4**	**0**	**0**	**2**	**1**	**81**	**32**	**0**	**0**	**0**	**0**	**7**	**5**	**0**	**6**	**0**	**2**
Pinniped																			
Unidentified Pinniped	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other																			
Unidentified Marine Mammal	NA	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Total		**35**	**54**	**10**	**4**	**12**	**4**	**113**	**34**	**20**	**13**	**0**	**0**	**7**	**6**	**2**	**6**	**6**	**2**

Behaviors include initial and subsequent encounters.

Table 5.5 Observed Initial Behaviors When The IHA-Regulated Sparker Was Active

Species	Scientific Name	Sparker Active																	
		Mill	Travel	Surface-active Travel	Breach	Surface-active Mill	Splash	Swim	Rest	Blow	Feed	Tail Slap	Bow Ride	None	Unknown	Socialize	Look	Porpoise	Other (see notes)
Odontocete																			
Bottlenose Dolphin	*Tursiops truncatus*	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Short-beaked Common Dolphin	*Delphinus delphis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atlantic Spotted Dolphin	*Stenella frontalis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Risso's Dolphin	*Grampus griseus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Dolphin	NA	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Total for group		**1**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mysticete																			
Fin Whale	*Balaenoptera physalus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Humpback Whale	*Megaptera novaeangliae*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Mysticete Whale	NA	0	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0
Total for group		**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
Testudine																			
Leatherback Sea Turtle	*Dermochelys coriacea*	2	0	0	0	0	2	5	0	0	0	0	0	1	0	0	0	0	0
Loggerhead Sea Turtle	*Caretta caretta*	1	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Green Sea Turtle	*Chelonia mydas*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Unidentified Sea Turtle	NA	1	0	1	0	0	1	10	3	0	0	0	0	0	1	0	1	0	0
Total for group		**4**	**0**	**1**	**0**	**0**	**3**	**21**	**3**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**1**	**0**	**0**
Pinniped																			
Unidentified Pinniped	NA	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other																			
Unidentified Marine Mammal	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		**5**	**2**	**2**	**0**	**0**	**4**	**21**	**3**	**1**	**1**	**0**	**0**	**1**	**2**	**0**	**1**	**0**	**0**

Behaviors include initial and subsequent encounters.

Table 5.6 Observed Initial Behaviors When Acoustic Sources <200kHz Other Than The Sparker Were Active

Species	Scientific Name	Source Frequency <200kHz Active (Excluding Sparker)																
		Mill	Travel	Surface-active Travel	Breach	Surface-active Mill	Splash	Swim	Rest	Blow	Feed	Tail Slap	Bow Ride	None	Unknown	Socialize	Look	Porpoise	Other (see notes)
Odontocete																			
Bottlenose Dolphin	*Tursiops truncatus*	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Short-beaked Common Dolphin	*Delphinus delphis*	0	0	1	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0
Atlantic Spotted Dolphin	*Stenella frontalis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Risso's Dolphin	*Grampus griseus*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Dolphin	NA	1	6	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
Total for group		**1**	**8**	**1**	**0**	**0**	**2**	**0**	**0**	**0**	**2**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**
Mysticete																			
Fin Whale	*Balaenoptera physalus*	0	3	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Humpback Whale	*Megaptera novaeangliae*	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Unidentified Mysticete Whale	NA	0	0	0	0	0	0	0	1	6	0	0	0	0	0	0	0	0	0
Total for group		**0**	**4**	**0**	**1**	**0**	**0**	**0**	**1**	**7**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Testudine																			
Leatherback Sea Turtle	*Dermochelys coriacea*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Loggerhead Sea Turtle	*Caretta caretta*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green Sea Turtle	*Chelonia mydas*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Unidentified Sea Turtle	NA	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Total for group		**1**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Pinniped																			
Unidentified Pinniped	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other																			
Unidentified Marine Mammal	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		**2**	**12**	**1**	**1**	**0**	**2**	**3**	**1**	**7**	**2**	**1**	**3**	**0**	**0**	**0**	**0**	**0**	**0**

Behaviors include initial and subsequent encounters.

Table 5.7 Reaction Behaviors Of Protected Species When Acoustic Sources <200kHz Were Inactive

Species	Scientific Name	Source Frequency <200kHz Inactive					
		None	Change Direction	Dive	Look	Speed Up	Other (see notes)
Odontocete							
Bottlenose Dolphin	*Tursiops truncatus*	68	4	0	0	0	1
Short-beaked Common Dolphin	*Delphinus delphis*	10	1	0	1	0	1
Atlantic Spotted Dolphin	*Stenella frontalis*	1	0	0	0	0	0
Risso's Dolphin	*Grampus griseus*	0	0	0	0	0	0
Unidentified Dolphin	NA	58	0	0	0	0	2
Total for group		**137**	**5**	**0**	**1**	**0**	**4**
Mysticete							
Fin Whale	*Balaenoptera physalus*	7	0	0	0	0	0
Humpback Whale	*Megaptera novaeangliae*	4	0	0	0	0	0
Unidentified Mysticete Whale	NA	13	0	0	0	0	0
Total for group		**24**	**0**	**0**	**0**	**0**	**0**
Testudine							
Leatherback Sea Turtle	*Dermochelys coriacea*	32	0	11	1	0	0
Loggerhead Sea Turtle	*Caretta caretta*	5	1	6	0	1	0
Green Sea Turtle	*Chelonia mydas*	4	0	3	0	0	0
Unidentified Sea Turtle	NA	40	2	47	0	2	0
Total for group		**81**	**3**	**67**	**1**	**3**	**0**
Pinniped							
Unidentified Pinniped	NA	0	0	0	0	0	0
Other							
Unidentified Marine Mammal	NA	2	0	0	0	0	0
Total		**244**	**8**	**67**	**2**	**3**	**4**

Reaction behaviors include initial and subsequent encounters

Table 5.8 Reaction Behaviors of Protected Species When The IHA-Regulated Sparker Was Active

Species	Scientific Name	Sparker Active		
		None	Change Direction	Dive
Odontocete				
Bottlenose Dolphin	*Tursiops truncatus*	2	0	0
Short-beaked Common Dolphin	*Delphinus delphis*	0	0	0
Atlantic Spotted Dolphin	*Stenella frontalis*	0	0	0
Risso's Dolphin	*Grampus griseus*	0	0	0
Unidentified Dolphin	NA	2	0	0
Total for group		**4**	**0**	**0**
Mysticete				
Fin Whale	*Balaenoptera physalus*	0	0	0
Humpback Whale	*Megaptera novaeangliae*	0	0	0
Unidentified Mysticete Whale	NA	3	0	0
Total for group		**3**	**0**	**0**
Testudine				
Leatherback Sea Turtle	*Dermochelys coriacea*	6	1	3
Loggerhead Sea Turtle	*Caretta caretta*	5	0	1
Green Sea Turtle	*Chelonia mydas*	1	0	0
Unidentified Sea Turtle	NA	9	0	9
Total for group		**21**	**1**	**13**
Pinniped				
Unidentified Pinniped	NA	1	0	0
Other				
Unidentified Marine Mammal	NA	0	0	0
Total		**29**	**1**	**13**

Reaction behaviors include initial and subsequent encounters

Table 5.9 Reaction Behaviors of Protected Species When Sources <200kHz Other Than The Sparker Were Active

Species	Scientific Name	Sources <200kHz Active (Excluding Sparker)		
		None	Change Direction	Dive
Odontocete				
Bottlenose Dolphin	*Tursiops truncatus*	2	0	0
Short-beaked Common Dolphin	*Delphinus delphis*	4	1	0
Atlantic Spotted Dolphin	*Stenella frontalis*	0	0	0
Risso's Dolphin	*Grampus griseus*	1	0	0
Unidentified Dolphin	NA	8	1	0
Total for group		**15**	**2**	**0**
Mysticete				
Fin Whale	*Balaenoptera physalus*	5	0	0
Humpback Whale	*Megaptera novaeangliae*	2	0	0
Unidentified Mysticete Whale	NA	7	0	0
Total for group		**14**	**0**	**0**
Testudine				
Leatherback Sea Turtle	*Dermochelys coriacea*	0	0	0
Loggerhead Sea Turtle	*Caretta caretta*	0	0	0
Green Sea Turtle	*Chelonia mydas*	1	0	0
Unidentified Sea Turtle	NA	1	0	2
Total for group		**2**	**0**	**2**
Pinniped				
Unidentified Pinniped	NA	0	0	0
Other				
Unidentified Marine Mammal	NA	0	0	0
Total		**31**	**2**	**2**

Reaction behaviors include initial and subsequent encounters

5.3 Closest Observed Point of Approach

The CPA was estimated by PSOs for all visual detections. There were more encounters of mysticete species when HRG sources (<200kHz) were Inactive, as displayed in Figure 5.8; however, this reflects the greater proportion of PSO Effort (72%). Mysticete cetaceans never approached the vessel within 100m; with 73% of all CPAs at a distance greater than 1km. Conversely, the majority of delphinoid encounters approached the vessel within 200m (58%;Figure 5.9). Most testudine encounters occurred at a CPA distance of less than 50m and all encounters were within 1000m (Figure 5.10). Figure 5.11 Box and Whisker plot of Closest Point of Approach of Protected Species Detections Observed when Acoustic Sources <200kHz were Inactive

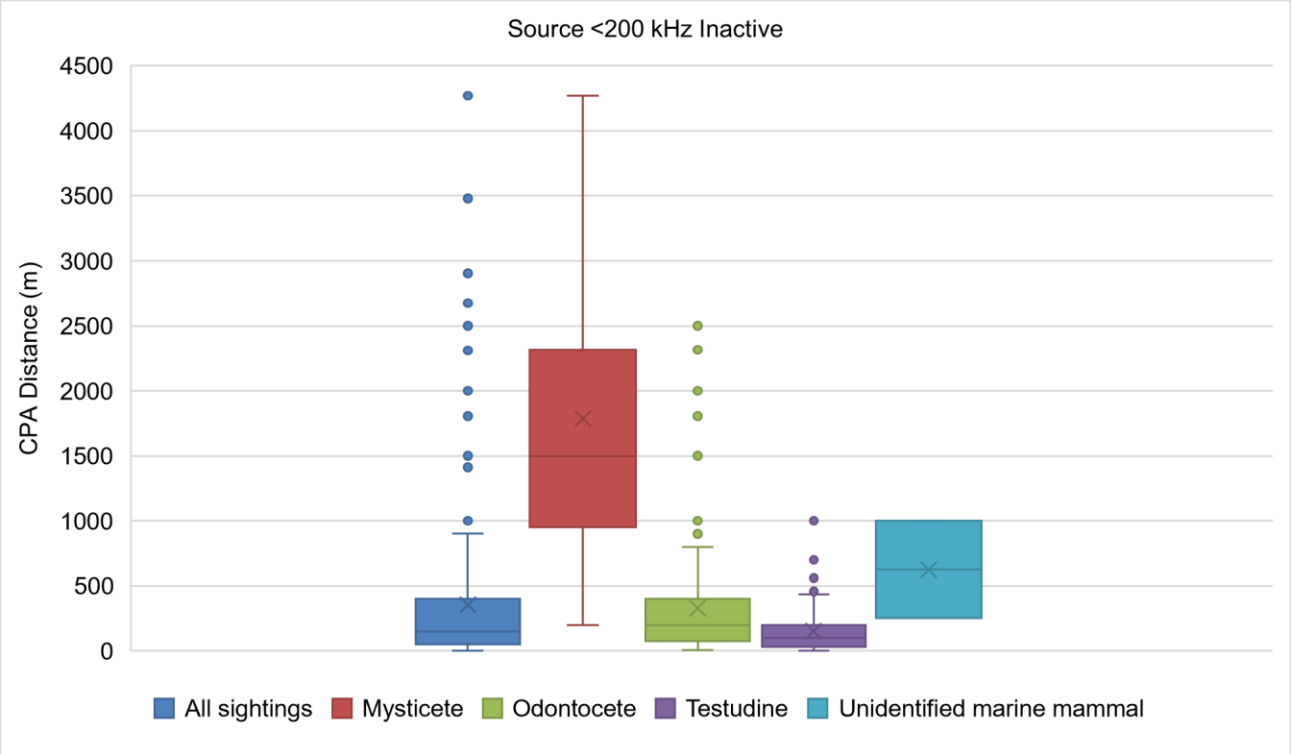


Figure 5.12 to Figure 5.11 further indicate that the median CPA differs by species group.

Figure 5.8 Closest Point of Approach of Mysticete Cetacean Encounters when IHA Regulated Sources were Active and Inactive

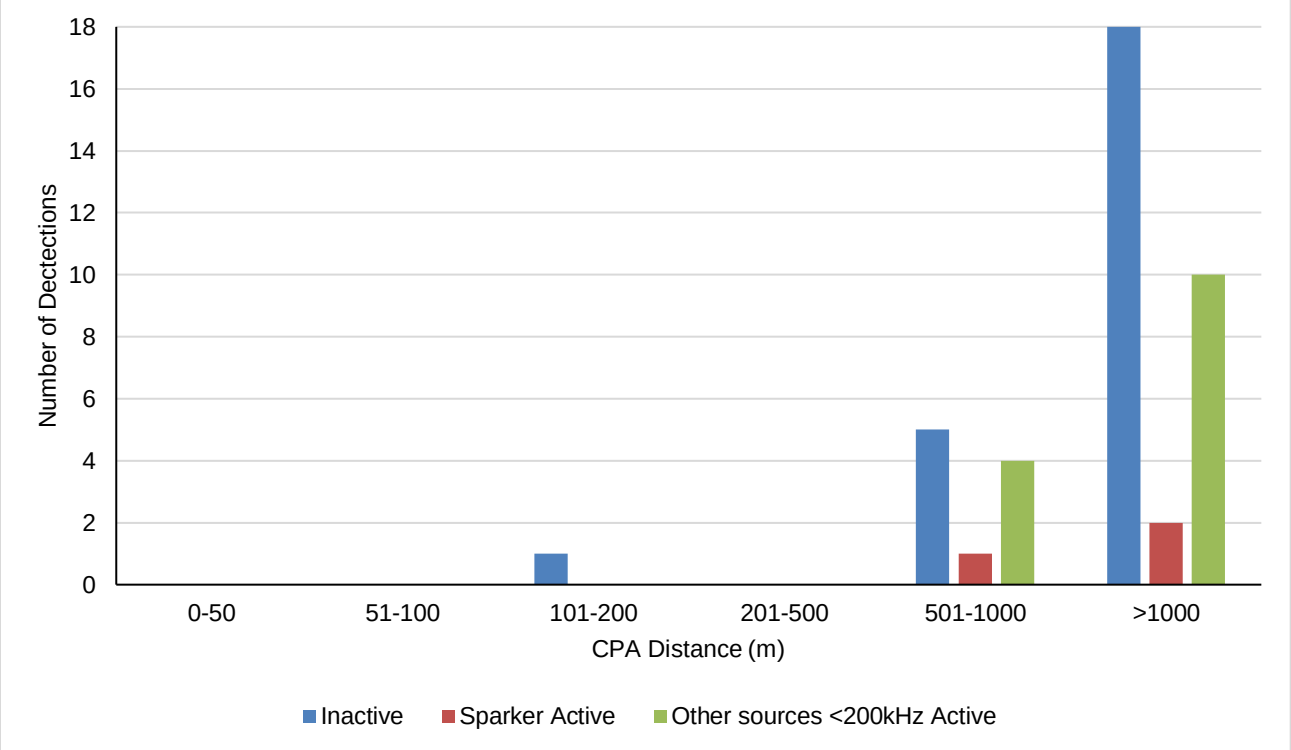


Figure 5.9 Closest Point of Approach of Odontocete Cetacean Encounters when IHA Regulated Sources were Active and Inactive

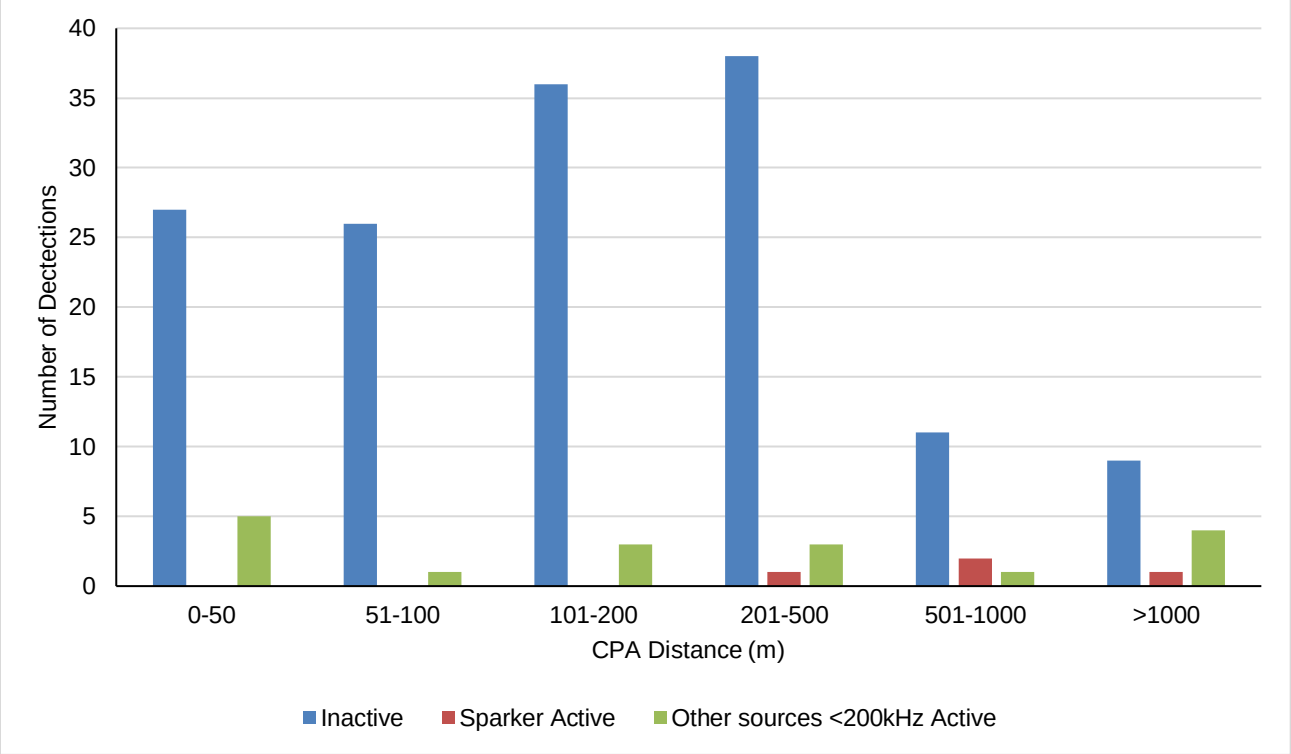


Figure 5.10 Closest Point of Approach of Testudine Encounters when IHA Regulated Sources were Active and Inactive

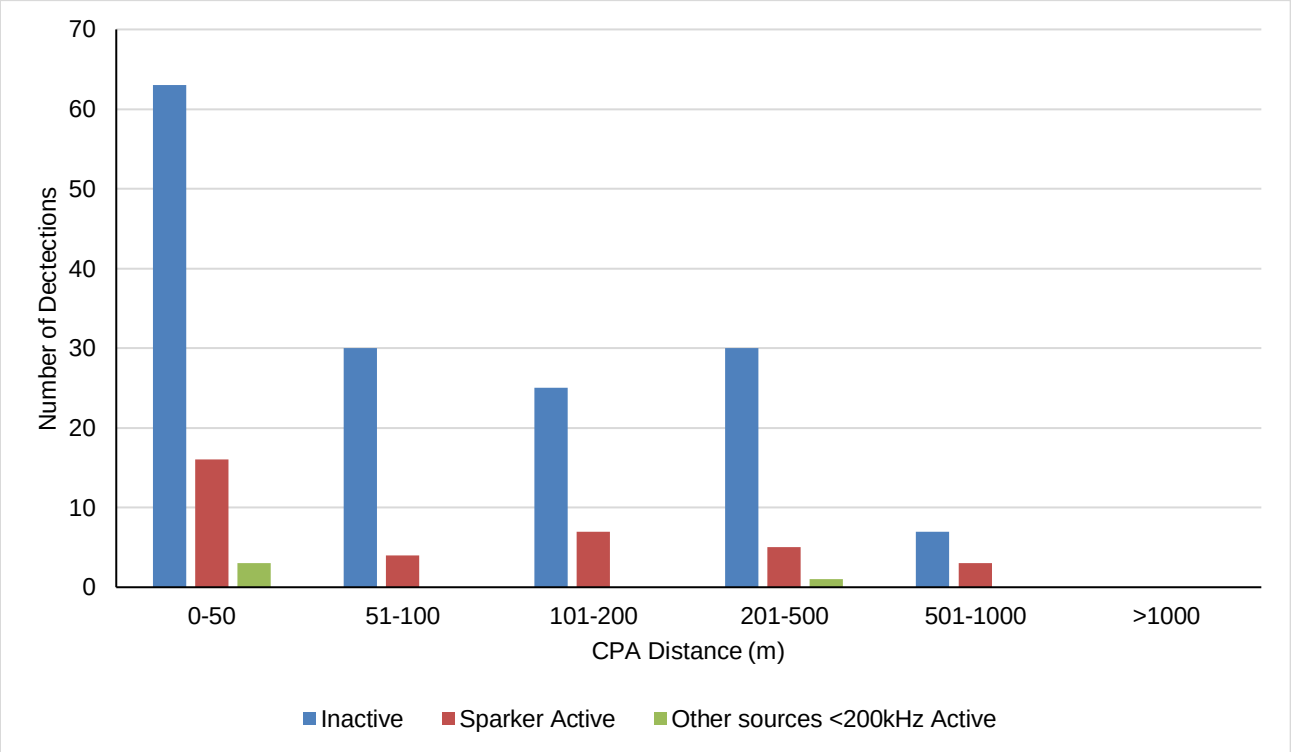


Figure 5.11 Box and Whisker plot of Closest Point of Approach of Protected Species Detections Observed when Acoustic Sources <200kHz were Inactive

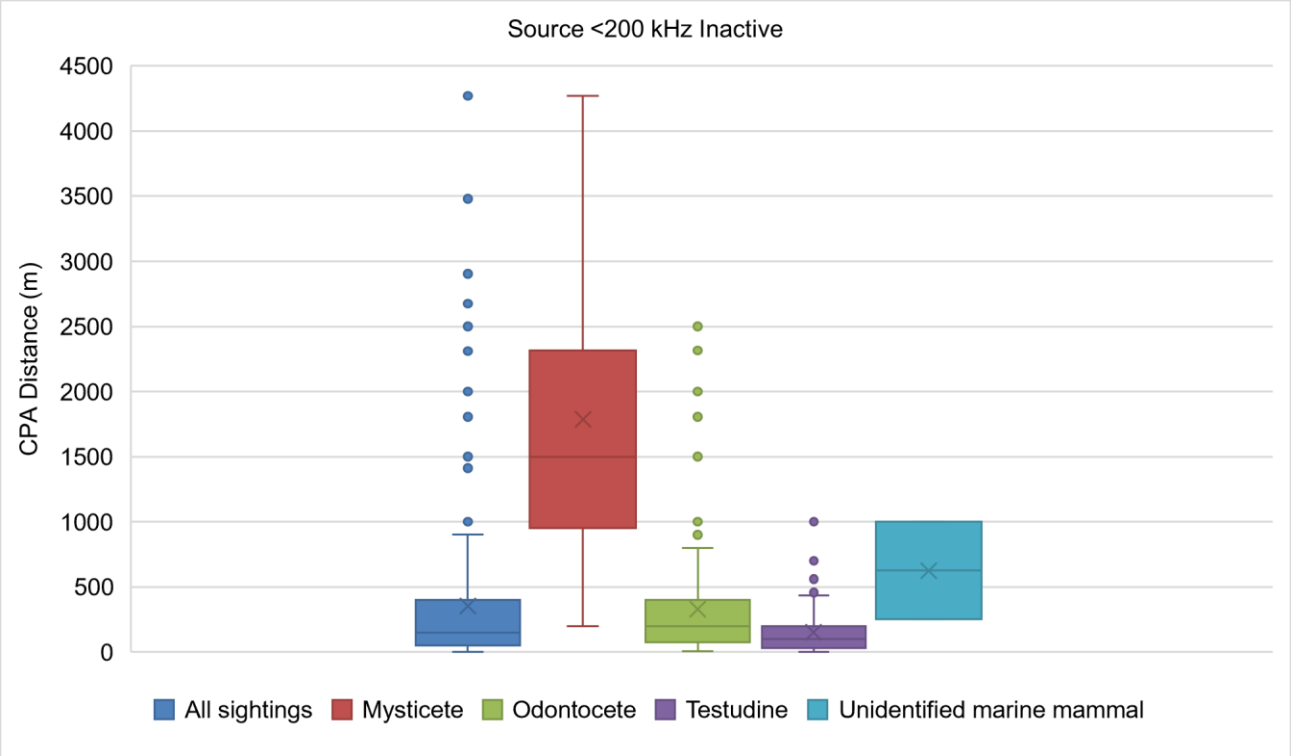


Figure 5.12 Box and Whisker plot of Closest Point of Approach of Protected Species Detections Observed when the Sparker was Active

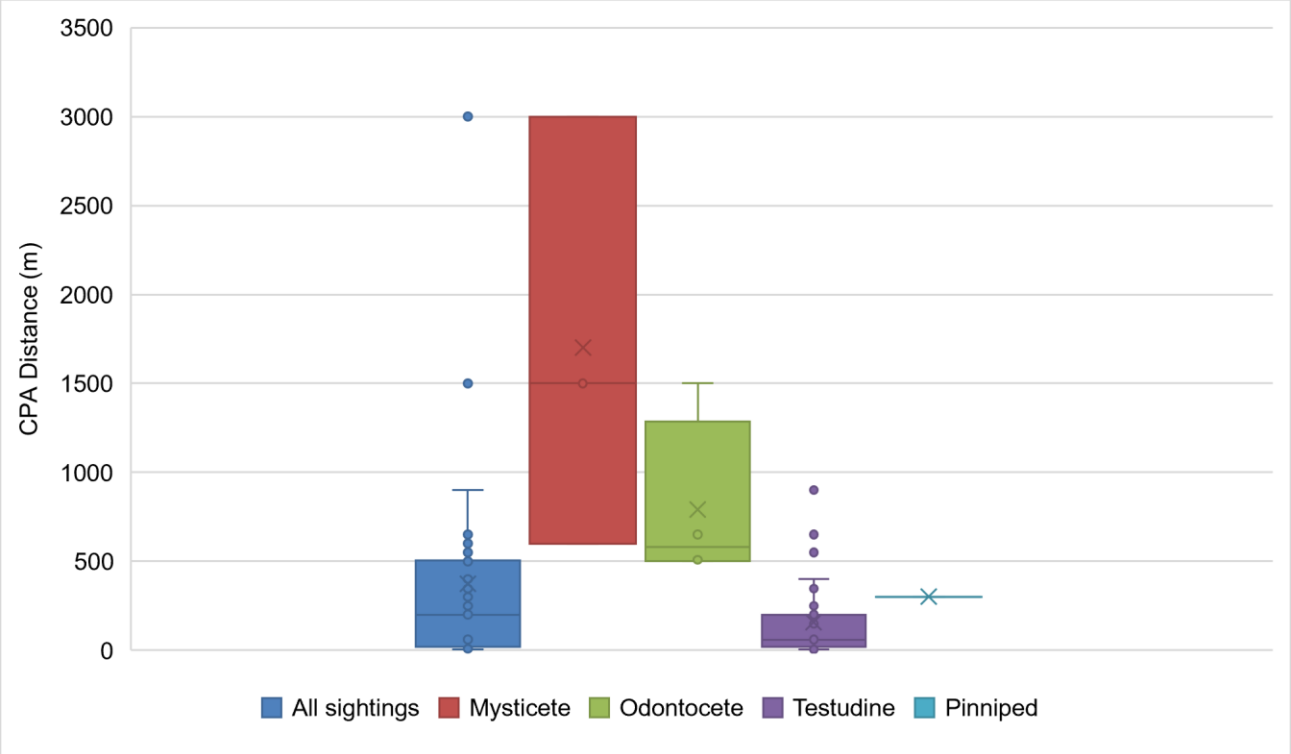
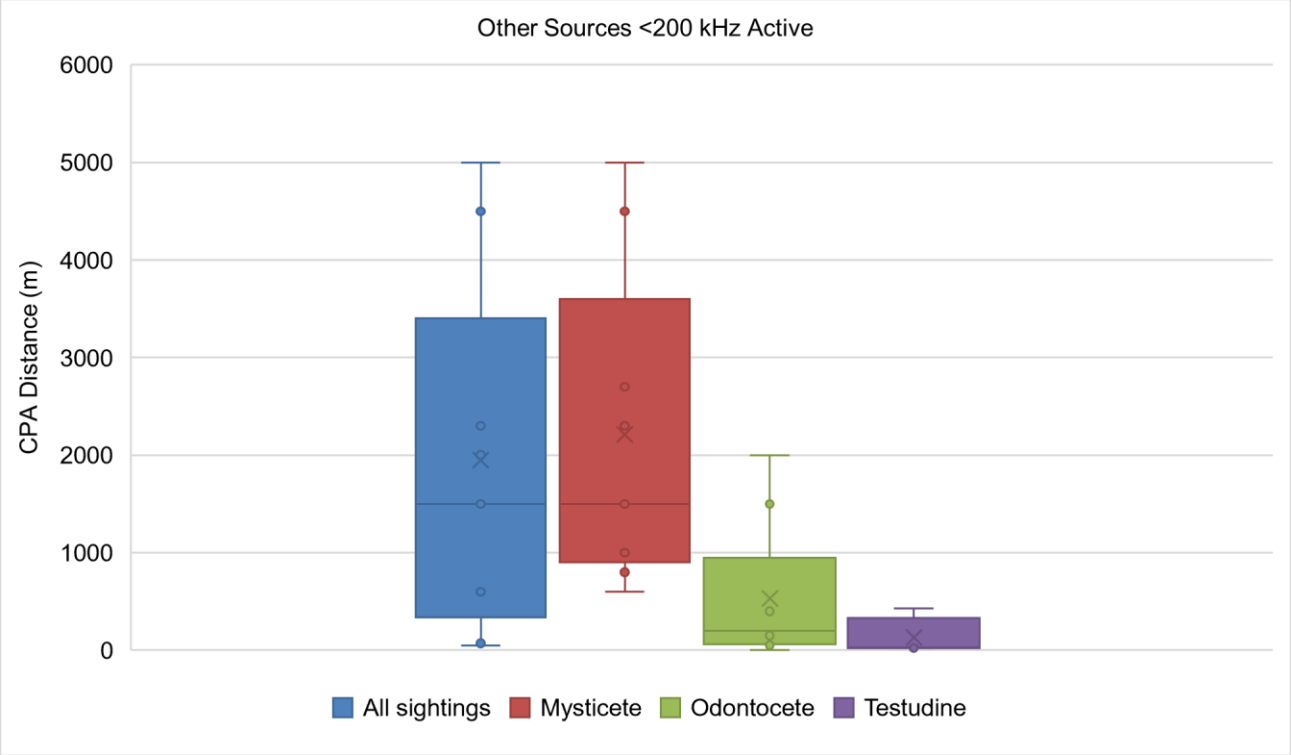


Figure 5.13 Box and Whisker plot of Closest Point of Approach of Protected Species Detections Observed when Acoustic Sources <200kHz, other than the Sparker, were Active



5.4 Summary of Mitigation Measures

Mitigation measures were implemented for 143 (35%) of the 406 protected species encounters. *Detection delay* (66%) and *shutdown* (27%) were the most common mitigation measures implemented. Unidentified sea turtles were the primary cause of these mitigation measures. A summary of the mitigation measures that occurred during the Surveys is given in Table 5.10.

Table 5.10 Summary of Mitigation Measures Implemented during the Survey Activities

Species	Scientific Name	Mitigation Response				Total Mitigation Measures	No Mitigation Measures
		Detection Delay	Shutdown	Other (see notes)	Alter Course		
Odontocete							
Bottlenose Dolphin	*Tursiops truncatus*	1	0	0	1	2	75
Short-beaked Common Dolphin	*Delphinus delphis*	2	2	0	0	4	14
Atlantic Spotted Dolphin	*Stenella frontalis*	0	0	0	0	0	1
Risso's Dolphin	*Grampus griseus*	0	0	0	0	0	1
Unidentified Dolphin	NA	2	0	2	1	5	66
Total for group		**5**	**2**	**2**	**2**	**11**	**157**
Mysticete							
Fin Whale	*Balaenoptera physalus*	0	0	0	1	1	11
Humpback Whale	*Megaptera novaeangliae*	0	0	0	0	0	6
Unidentified Mysticete Whale	NA	0	0	0	0	0	23
Total for group		**0**	**0**	**0**	**1**	**1**	**40**
Testudine							
Leatherback Sea Turtle	*Dermochelys coriacea*	38	9	0	0	47	7
Loggerhead Sea Turtle	*Caretta caretta*	3	6	0	2	11	8
Green Sea Turtle	*Chelonia mydas*	4	2	0	0	6	3
Unidentified Sea Turtle	NA	45	20	0	2	67	45
Total for group		**90**	**37**	**0**	**4**	**131**	**63**
Pinniped							
Unidentified Pinniped	NA	0	0	0	0	0	1
Other							
Unidentified Marine Mammal	NA	0	0	0	0	0	2
Total		**95**	**39**	**2**	**7**	**143**	**263**
% Total		**66%**	**27%**	**1%**	**5%**	**35%**	**65%**

Mitigation measures include initial and subsequent encounters.

5.5 Protected Species Incident Reports

During the Projects there were two protected species incident reports for injury or mortality as per Addendum C of the Lease (BOEM, 2018).

On May-26-2021, five to ten dead fish were seen floating near the RV *Ocean Researcher* while it was in port. No significant events were on record before the observation.

On Aug-09-2021 a leatherback sea turtle with a propeller injury was observed within the OCS-A 0519 Lease area. The vessel was on shutdown at the time of the sighting due to a previous sea turtle detection and remained on shutdown for the following five hours.

Both incidents were recorded using the required BOEM incident report forms presented in Appendix B.

5.6 Protected Species Potential Exposures

A potential exposure was considered to have occurred when a marine mammal was observed within the Level B HZ of an active acoustic sources operating at <200kHz, based on the direct observations of the PSO. In accordance with the IHA, HRG sound sources with the potential to result in Level B exposures to marine mammals were the sparker SBPs. Although there was not a requirement to shutdown operations involving the Innomar and/or USBL for marine mammals, shutdown of this equipment was still required for any turtles observed within the EZ as per initial survey requirements.

There were no potential exposures of protected species under the Skipjack IHA as mitigation measures were taken promptly when required.

6 MONITORING DEVICE EFFECTIVENESS

It should be noted that detections took place over a eight-month period and therefore different environmental conditions which may have influenced the effectiveness of the detection method used. All results presented below should be interpreted as a relative assessment of the effectiveness of each monitoring device, as required by regulatory reporting stipulations.

6.1 Monitoring Technique Overview

During the offshore surveys, five complementary methods were used to monitor for protected species, some of which were used simultaneously (see Section 3 for monitoring methods):

- Unaided Eye
  - During Daylight: UE (with systematic use of reticle binoculars)
  - During Darkness: UE via artificial illumination from vessel light
- Handheld NVD during Darkness, occasionally continuing into the first hour of Daylight. Use of this equipment was regularly alternated with IR to avoid eye strain without it necessarily being reported as such in Mysticetus.
- HH IR devices during Darkness, occasionally continuing into the first hour of Daylight or during periods of reduced visibility. Use of this equipment was regularly alternated with NVD to avoid eye strain without it necessarily being reported as such in Mysticetus.
- Vessel mounted IR device during Darkness, occasionally continuing into the first hour of Daylight or during periods of reduced visibility. Vessel mounted IR was also used when the pilot was onboard, as PSOs were not allowed on the bridge at these times for Covid-19 mitigation purposes.

The monitoring method in use when a marine mammal was first detected was recorded by PSOs, as well as any subsequent methods used to confirm the initial detection. All detection rates presented are based on the initial monitoring method used at the time of the initial detection.

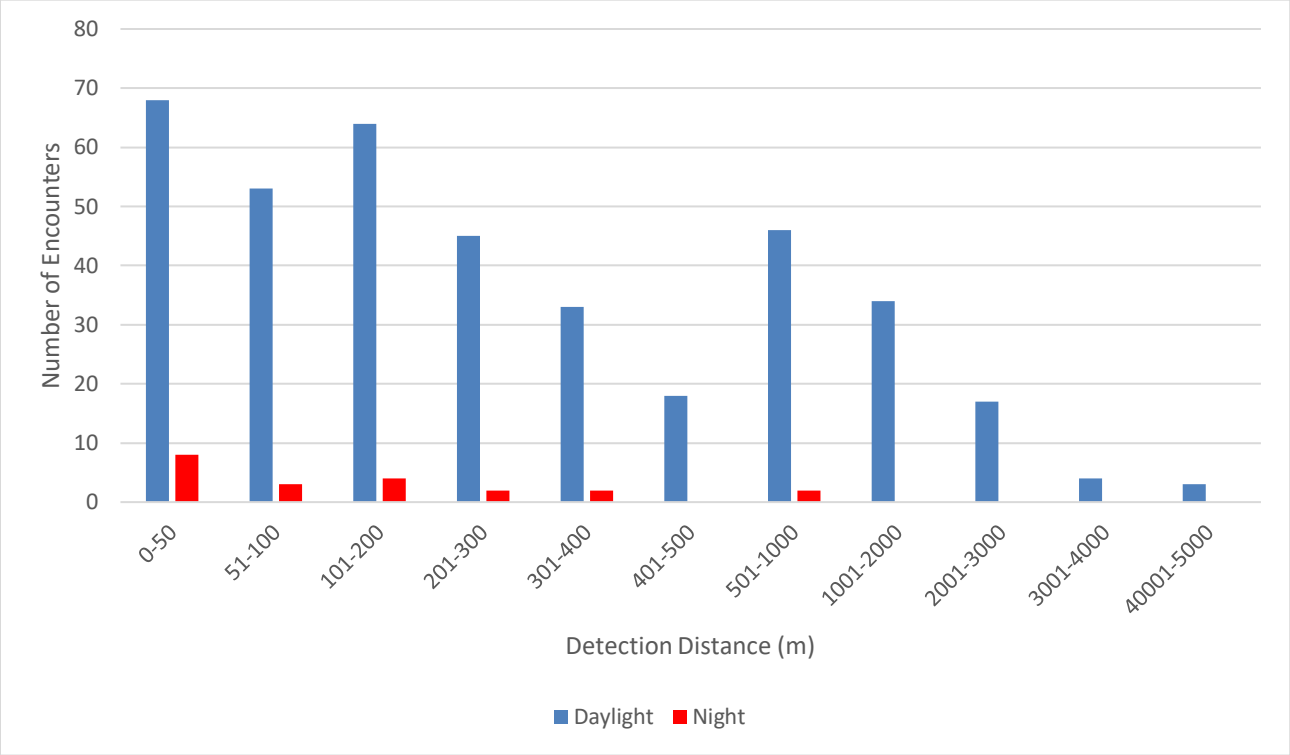
6.2 Initial Detection Distance

A wide range of factors are known to influence the ‘detectability’ of, and distance from which, a marine mammal is most likely to be detected. These include environmental and operational variables, animal behavior and the type of monitoring method.

Most initial encounters (92%) were detected with UE. This is consistent with UE being the most widely used technique, accounting for 62% of all PSO effort and reflects the fact that visibility quality was generally greater during daylight hours, increasing the likelihood of detection. It therefore follows, that when combining all detection methods, the mean distance at which marine mammals were initially detected was lower (189m) during darkness, compared with daylight (539m).

Detection distances of protected species are illustrated in Figure 6.1 and ranged from 3m to 5000m. Most detections (74%) occurred at a detection distance of less than or equal to 500m.

Figure 6.1 Detection Distance of Protected Species



6.3 Comparison of Detection Method Effectiveness

A wide range of factors are known to influence the 'detectability' of and distance from which protected species are most likely to be detected. These include environmental and operational variables, animal behavior and the type of monitoring method.

UE was the most effective monitoring method overall, with an everage of 0.12 detections per hour of PSO effort (based on UE and RB combined). UE was particularly effective during Daylight, but less effective during Darkness, as it is easier to see marine animals and at farther distances in Daylight. There were 13 occasions where RB was the initial detection method, often used for scanning large areas or investigating unusual ripples or splashes in the water in the distance. There were three occasions where mounted IR was the initial detection method for during daylight, as the PSO was using mounted IR in the instrument room due to the pilot being being on the bridge. RBs were often used as a subsequent detection method (29% of the time) after initially detecting a sighting using UE, due to the usefulness of RBs for obtaining more detail on detections, including taxonomic identification, group size and behavior, as well as providing an accurate method of calculating distance.

Both NVDs and HH IR devices were compromised by adverse weather conditions (moisture in the air). The larger field of view of the NVDs was considered more effective than the narrower field of view of the HH IR devices. The HH IR worked better than the NVDs in areas lit by the vessel's floodlights; where the ambient lights rendered the NVDs ineffective. Therefore, for optimal use of the NVDs bridge and deck lights were preferred to be switched off. The HH IR only worked outside due to heat sensitivity, whereas the NVDs did work inside but were dependent on the amount of reflection from the window; however, they were most effective when used outside. It was also reported that NVDs work most effectively during clear

skies with no or minimal clouds and with a full moon, whereas overcast skies were considered less effective conditions. IR cameras were considered useful for supplementing NVDs to account for vessel lights or extreme darkness. Overall, there were 0.01 detections per hour of PSO effort for mounted IRs and for NVDs and none with the HH IR.

Although the Surveys highlighted the effectiveness of UE, previous surveys have shown vessel mounted IR camera to be effective to monitor marine animals in Darkness (Gauthier-Barette *et al.*, 2019) with effective monitoring of marine animals at much farther distances than other methods.

Unfortunately, distances cannot be accurately determined using reticle binoculars at night; therefore, it is recommended that night vision range finders be required on future projects and evaluated for effectiveness. In addition, it is recommended that further development into the thermal imaging distance estimation and auto-detection software be pursued in order to increase the effectiveness of detections using thermal imaging.

In general, a combination of detection methods would be advisable during HRG surveys to effectively monitor the EZ in order to cope with varying survey conditions and distances of protected species from the vessel.

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APPENDICES

APPENDIX A MONITORING EQUIPMENT SPECIFICATIONS

A.1.1 Night Vision Device Specifications

Model	GNVY-3 (Rongland)
Generation Image Intensifier Tube	3
Resolution (lp/mm)	57 - 64
Optical magnification	1x
FOV	40°
Lens system	26.8mm: F 1.2
Detection quarter moon	up to 275 m
Detection cloud cover	up to 240 m
Recognition quarter moon	up to 225 m
Recognition cloud cover	up to 150 m
Identification	up to 90 m
Weight	510g
Eye relief	15mm
Dimensions	160x150x75mm
Focus range, m	0.25 to ∞
Diopter Adjustment	-6 to +5
Signal to Noise	>23
Supply voltage, V (CR123A)	3
Automatic Brightness Control	Yes
Automatic Light Cut-Off	Yes
Automatic Shut-off System	Yes
IR effective distance (m)	30
Interpupillary Adjustment, mm	57÷73
Output pupil diameter, mm	15
Operating resource, hours	10000
Operating Temperature Range °C	-40 to 55
Shock resistance	5g

A.1.2 Vessel Mounted IR Specifications

Model	NVTS Reliant 640HD
Sensor type	Uncooled LWIR FPA
Working band	8μm~14μm
Resolution	640 x 480
Sensor	17μm
NETD (300K)	≤60mK
FOV	40mm: 15.5 x 11.6°
Image enhancement	Support
Video display	Black Hot/White Hot
Digital zoom	1x, 2x, 4x
Video sensor	Full HD 1920 x 1080/60p (2.14MP)
Signal system (NET)	1080P/30, 1080P/25, 720P/60, 720P/50, 720P/30, 720P/25
Signal system (SDI)	1080P30, 1080I60, 720P60, 720P30, 1080P25, 1080I50, 720P50m 720P25
Zoom	30x optical zoom (12x digital)
Lens	4.3mm to 129mm F1.6 to F4.7
HFOV	65,0° (wide) to 2.3° (tele)
Min illumination	Color: 0.0013Lux; Mono: 0.0008Lux
WB	Auto
Focus	Auto/Manual
S/N Ratio	Not less than 50dB
WDR	Yes
BLC	On/Off
Image stabilization	On/Off
DNR	1-5 Steps/Off
Day/Night	Auto/Manual
Pan range	360° continuous
Pan speed	Control speed: 0.04°~100°/s adjustable. Preset speed: 100°/s
Tilt range	-15°~90° (auto flip)
Tilt speed	Control speed: 0.04°~90°/s adjustable. Preset speed: 90°/s
Preset	256
Preset precision	±0.2°
Stabilization	Gyro and Digital
Image resolution	1920 x 1080@30fps
Image compression	H.264
Audio compression	AAC
Protocols	HTTP, RTSP, TCP, UDP, ONVIF
Simultaneous Live View	Up to 10
Dual stream	Yes
Ethernet interface	10/100M

Model	NVTS Reliant 640HD
Control interface	RS-485
Address	0~255
Common protocol	PELCO-P/PELCO-D (self-adaptive)
Baud rate	2400bps, 4800bps, 9600bps, 19200bps (self-adaptive)
Voltage	DC 10.8~28V
Power	35W/50W (heater on)
Working temperature	-35°C~+55°C
IP Index	IP67
Dimension	Ø190mm x 275mm (7.48” x 10.83”)
Weight	6.3±0.1kg (13.89±0.22lb)

A.1.3 Hand-held IR Specifications

System	BHM-XR (65mm)
FOV	10° × 8° NTSC
Start-op from Standby	< 1.5 seconds
Waveband	7.5 - 13.5µm
Thermal Sensitivity	<50mK @ f/1.0
Detector Type	640 × 480 VOx Microbolometer
Image Processing	FLIR Proprietary Digital Detail Enhancement
Power Button	On/Off/Standby
Picture Button	Still & Video image capture to SD card
Zoom Button	2× & 4× E-zoom
Polarity	Black Hot/White Hot/Marine Red/InstAlert
Brightness	Adjusts Display Brightness
Built-In Display	LCD Display
Video Output	NTSC or PAL composite video; RCA jack
Video Refresh Rate	<9Hz or 30Hz (NTSC and PAL)
Image Polarity	White Hot/Black Hot/Marine Red/InstAlert; Selectable
On-Screen Symbology	Standard
SD Card	Stores still images and video
Battery Type	4 AA Batteries; NiMH, Li-Ion, or Alkaline
Battery Life (Operating)	>5 hours on NiMH batteries
Battery Life (Stand-By)	120 hours on NiMH batteries
Rating	IP-67, Submersible
Operating Temp.	-4°F to +140°F (-20°C to +50°C)
Drop	1m drop (camera body only)
Physical Dimensions	11.5” x 6.5” x 2.6”
Weight (incl. lens)	3.05 lb (1380 g) with batteries

APPENDIX B PROTECTED SPECIES INCIDENT REPORTS

INCIDENT REPORT: PROTECTED SPECIES INJURY OR MORTALITY

Photographs and/or video footage should be taken of all injured or dead animals, if possible

Observer's full name and/or Reporter's full name: Isara Edgar and Gemma Rashley

Date and Time animal observed: 26th May 2021 9am

Date and Time animal/samples collected: N/A

Location of Incident (Latitude/Longitude): 39°15'45.32 N 76°35'56.55 W

Species Identification (closest taxonomic level possible): Actinopterygii

Photograph/Video footage collected: YES

If Yes, was the data provided to NMFS? No

Name of vessel, vessel speed at the times of incident, and activity ongoing at the time of observation (e.g. transit, survey, pile driving): Ocean Researcher, 0 knots, docked.

Environmental conditions at time of observation (i.e. Beaufort sea state, cloud cover, wind speed, glare):
Sea state 1, cloud cover 80-90%, precipitation heavy, glare slight

Water temperature (°C) and depth at site of observation: 8.8m depth

Describe location of animal and events leading up to, including, and after, the incident: Around 5-10 floating, dead fish around the vessel in the harbour. No significant events on record before observation, however, there is other floating debris (plastics, wood, etc.)

Status of all sound-source use in the 24 hours preceding the incident: N/A

Describe all marine mammal, sea turtle, and sturgeon observations in the 24 hours preceding the incident:
None

Marine Mammal Information: N/A

Injuries observed: _____

Condition/description of animal: _____

Other remarks: _____

Date and time of incident reported to NMFS Stranding Hotline: _____

Sturgeon Information: N/A

Fork length (or total length): _____

Weight: _____

Condition of specimen/description of animal: _____

Fish Decomposed: NO SLIGHTLY MODERATELY SEVERLY

Fish tagged: YES / NO *Please record all tag numbers. Tag #:* _____
Photograph taken: YES / NO
(Please label *species, date, geographic site* and *vessel name* when transmitting photo)
Genetics sample taken: YES / NO
Genetics sample transmitted to: _____ on (mm/dd/yyyy) _____
_____

Sea Turtle Species Information (*Please designate cm/m or inches*): N/A
Weight (kg or lbs): _____
Sex (circle): MALE FEMALE UNKNOWN How was sex determined? _____
Straight carapace length: _____ Straight carapace width: _____
Curved carapace length: _____ Curved carapace width: _____
Plastron length: _____ Plastron width: _____
Tail length: _____ Head width: _____
Condition of specimen/description of animal: _____
_____

Existing Flipper Tag Information: N/A
Left: _____ Right: _____
PIT Tag #: _____
Miscellaneous:
Genetic biopsy taken: YES / NO
Photos taken: YES / NO
Turtle Release Information
Date: _____ Time: _____
Latitude: _____ Longitude: _____
State: _____ County: _____

Remarks: (note if turtle was involved with tar or oil, gear or debris entanglement, wounds or mutilations, propeller damage, papillomas, old tag locations, etc.):

_____

_____

_____

INCIDENT REPORT: PROTECTED SPECIES INJURY OR MORTALITY

Photographs and/or video footage should be taken of all injured or dead animals, if possible

Observer's full name and/or Reporter's full name: Melissa Goulton / Kerri Sanders

Date and Time animal observed: 09 August 2021 14:36UTC

Date and Time animal/samples collected: NA

Location of Incident (Latitude/Longitude): 38º 33' 43.8" N 74º 39' 30.7W

Species Identification (closest taxonomic level possible): Leatherback Sea Turtle

Photograph/Video footage collected: Yes

If Yes, was the data provided to NMFS? Yes

Name of vessel, vessel speed at the times of incident, and activity ongoing at the time of observation (e.g. transit, survey, pile driving): RV Ocean Researcher, Speed 3.8 knots, Vessel on detection delay during geophysical survey operations.

Environmental conditions at time of observation (i.e. Beaufort sea state, cloud cover, wind speed, glare):
Beaufort Sea State 3, 70% Cloud cover with slight haze on the horizon, Windspeed 6Knots, with slight glare.

Water temperature (°C) and depth at site of observation: depth 24.3m Temp not recorded

Describe location of animal and events leading up to, including, and after, the incident: Vessel had been conducting survey operations overnight, and observed 8 sea turtles prior to the injured one. The two hours prior to the observation only above 200 kHz sources active. Vessel remained on detection delay with above 200 kHz sources only for the next 5 hours .

Status of all sound-source use in the 24 hours preceding the incident: Between 14:00 and 22:04 UTC on the 8th August the vessel was on weather standby on site with only above 200kHz sources active. PSO's on duty 24 hours per day. At 19:30UTC PSOs began pre-clearance watches prior to operations. Between 22:04 and 23:05UTC a sub bottom profiler operating at below 200kHz was active. At 23:20UTC towed Gradiometer and Sidescan sonars were deployed with USBL beacons attached. Preclearance watches were conducted between 23:05 and 00:05UTC prior to a 20minute ramp up of survey equipment operating below 200kHz.

Survey lines were run until 10:35UTC when a turtle was observed within the exclusion zone and all sources below 200kHz were shutdown. Vessel remained on shutdown until 60mins after the last observation and a ramp up started at 11:46UTC. The survey equipment was shutdown again at 12:13UTC due to a sea turtle within the EZ. Vessel then remained shutdown until 20:00UTC.

Describe all marine mammal, sea turtle, and sturgeon observations in the 24 hours preceding the incident:

ID Number	Date/Time	Species	Detection Distance	Count
V354	2021-08-08T19:20:10.1	Leatherback Sea Turtle	50	1
V355	2021-08-09T10:35:56.2	Leatherback Sea Turtle	220	1
V356	2021-08-09T10:44:26.5	Leatherback Sea Turtle	150	1
V357	2021-08-09T12:13:46.1	Leatherback Sea Turtle	140	1
V358	2021-08-09T12:52:21.1	Leatherback Sea Turtle	200	1
V359	2021-08-09T12:58:32.8	Leatherback Sea Turtle	300	1
V360	2021-08-09T13:25:13.7	Leatherback Sea Turtle	30	1
V361	2021-08-09T14:04:28.1	Unidentified Sea Turtle	350	1
V362	2021-08-09T14:18:34.7	Leatherback Sea Turtle	150	1

Marine Mammal Information:

Injuries observed: _____

Condition/description of animal: _____

_____

Other remarks: _____

_____

Date and time of incident reported to NMFS Stranding Hotline: _____

_____

Sturgeon Information: N/A

Fork length (or total length): _____

Weight: _____

Condition of specimen/description of animal:_____

_____

Fish Decomposed: NO SLIGHTLY MODERATELY SEVERLY

Fish tagged: YES / NO *Please record all tag numbers. Tag #:* _____

Photograph taken: YES / NO

(Please label *species, date, geographic site* and *vessel name* when transmitting photo)

Genetics sample taken: YES / NO

Genetics sample transmitted to: _____ on (mm/dd/yyyy) _____

_____

Sea Turtle Species Information (*Please designate cm/m or inches*): N/A

Weight (kg or lbs): NA

Sex (circle): ~~MALE FEMALE~~ UNKNOWN How was sex determined? _____

Straight carapace length: _____ Straight carapace width: _____

Curved carapace length: _____ Curved carapace width: _____

Plastron length: _____ Plastron width: _____

Tail length:_____ Head width: _____

Condition of specimen/description of animal: _____

Propeller wounds visible on the back of the carapace, and possible wounds on the left front flipper.

Existing Flipper Tag Information: _____

Left: _____ Right: _____

PIT Tag #: _____

Miscellaneous:

Genetic biopsy taken: YES / NO

Photos taken: YES / ~~NO~~

Turtle Release Information

Date: _____ Time: _____

Latitude: _____ Longitude: _____
State: _____ County: _____

Remarks: (note if turtle was involved with tar or oil, gear or debris entanglement, wounds or mutilations, propeller damage, papillomas, old tag locations, etc.):

Propeller damage to carapace and left front flipper, as seen in attached images.