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Ørsted Wind Power North America LLC

Project:
Garden State 2021 IHA
Skipjack Wind Farm and Export Cable
Geophysical Surveys
BOEM Lease OCS-A 0482

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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 Garden State Offshore Energy LLC (GSOE) for the period of Jun-11-2021 to Jun-10-2022 ('the Garden State 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 0482.

Six vessels carried out activities under the Garden State IHA over 319 days between Jun-14-2021 and May-06-2022. The research vessels (RV) *Ocean Researcher,* RV *Brasilis and* RV *Time and Tide*, motor vessel (MV) *Ocean Endeavour*, high-speed craft (HSC) *LeeWay Striker*, and offshore support vessel (OSV) *Go Liberty* conducted high resolution geophysical (HRG) surveys associated with the development of Ørsted offshore wind farms within federal and Delaware/New Jersey state waters. These surveys were carried out within BOEM Lease Area OCS-A 0482 (Garden State) and wider survey area under the Garden State IHA issued to GSOE on Jun-11-2021.

This report includes all protected species monitoring data in the survey area after issuance of the Garden State IHA (from Jun-14-2021 to May-06-2022, inclusive). Prior to 14-Jun-2021, activities were carried out under the Skipjack IHA only, and are the subject of a separate report (Gardline, 2022a). All data from these combined surveys are presented within the Skipjack Wind Farm (SJW02) and GSOE Lead PSO Report (Gardline, 2022b).

Protected species observers conducted 7589 hours and 46 minutes of monitoring effort during 39961 miles of vessel activity under the Garden State IHA. There were 854 protected species encounters comprising an estimated 2971 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 (72%).

The most frequent reaction behavior of protected species was *none*, regardless of whether the sparker was active (59%), other sources <200kHz were active (71%) or all sources <200kHz were inactive (71%). Where a reaction was observed, *dive* was the most frequently identified behavior when acoustic sources <200kHz were inactive, accounting for 28% of encounters. When the sparker was active, four behavioral reactions, other than *None*, were noted: *dive, change direction*, *look* and *other*, with *dive* accounting for 37% of encounters. When acoustic sources (<200kHz) other than the sparker were active, *dive* and *change direction* respectively accounted for 25% and 3% of encounters, and no other reaction behaviors were observed.

Mitigation measures were implemented for 344 (40%) of the 854 protected species encounters. *Detection delay* (56%) and *shutdown* (34%) were the most common mitigation measures implemented. Leatherback and loggerhead 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 18 encounters with dolphins observed within the Level B Harassment Zone of active acoustic sources <200kHz. Of the 18 sightings, there were 17 groups of bottlenose dolphins (214 individuals) and one group of unidentified dolphins (3 individuals). Of these, 9 groups did not come within <100m of active equipment and did not require a shutdown. Of the remaining 9 groups that did enter within 100m of active equipment, *powerdowns* rather than *shutdowns* were implemented in the case of 4 encounters, (bottlenose dolphin, 67 individuals) and no mitigation actions were implemented for the remaining 5 encounters (bottlenose dolphin, 72 individuals). In the case of 3 of these sightings where no mitigation was implemented (36 individuals), it was recorded explicitly by the PSOs that

they considered the animals approach to be voluntarily. The remaining 2 sightings consisted of 36 individuals and the notes included with both sightings state that the animals approached and passed by or under the vessel.

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 (86%) 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 5% of all monitoring effort.

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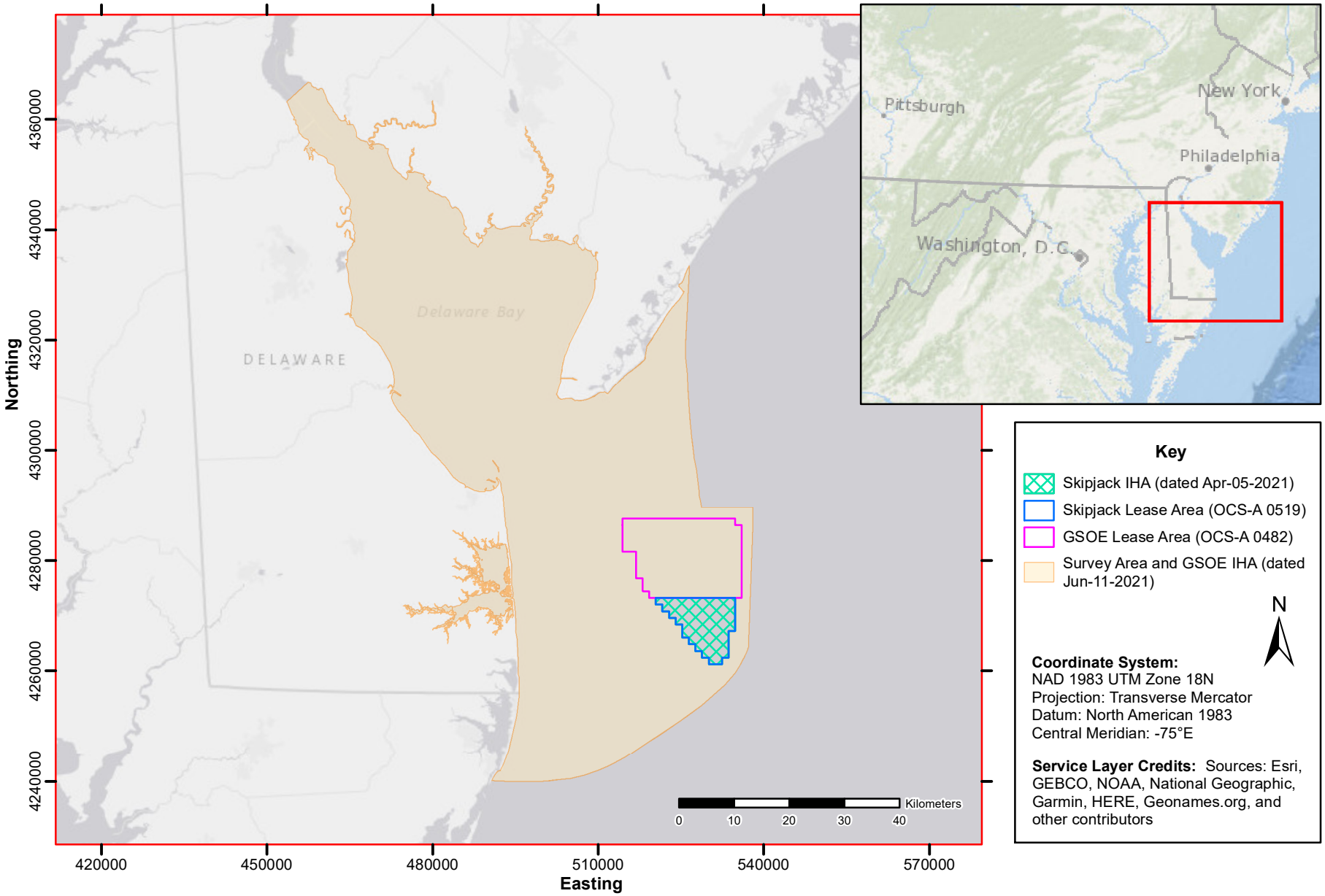
LOCATION MAP



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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
eNGO	Environmental Non-Governmental Organization
ESA	Endangered Species Act
EZ	Exclusion Zone
GPS	Global Positioning System
GSOE	Garden State Offshore Energy
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
HSC	High-speed Craft
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
OSV	Offshore Support Vessel
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
SJEC	Skipjack Wind Export Cable
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 Garden State LLC Incidental Harassment Authorization ('the Garden State IHA', NMFS, 2021a). Survey operations were conducted under Commercial Lease of Submerged Lands for Renewables Energy Development on the Outer Continental Shelf (OCS) Lease Area OCS-A 0482 (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 Garden State IHA for the period Jun-14-2021 to May-06-2022.

1.2 Background

The National Marine Fisheries Service (NMFS) approved the 2021-2022 Garden State IHA to permit high resolution geophysical (HRG) surveys (the Surveys) for the purpose of site characterization prior to offshore windfarm development. The Surveys covered by this report were conducted within the OCS-A 0482 part of the Skipjack 2 Windfarm (SJW02) development area and along potential Skipjack Wind Export Cables (SJEC) to a landfall in Delaware within federal and Delaware/New Jersey state waters.

The Surveys were conducted from six vessels: the research vessel (RV) *Ocean Researcher*, RV *Brasilis*, RV *Time and Tide*, motor vessel (MV) *Ocean Endeavour*, high-speed craft (HSC) *LeeWay Striker*, and offshore support vessel (OSV) *Go Liberty.* PSOs were provided by Gardline, EPI, RPS and Smultea. Marine survey companies and PSO providers for each vessel, and the dates during which the vessels were working under the Garden State 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 Garden State IHA

Survey Vessel	Marine Survey Company	PSO Provider	Start date of operations	End date of operations
MV *Ocean Endeavour*	Gardline	Gardline	Jun-14-2021	Dec-05-2021
RV *Ocean Researcher*	Gardline	Gardline	Jun-14-2021	Nov-05-2021
HSC *LeeWay Striker*	EGS	EPI	Jun-21-2021	Dec-10-2021
RV *Time and Tide*	EGS	EPI	Jun-27-2021C	May-06-2022
OSV *Go Liberty*	Fugro	Smultea	Sep-19-2021	Dec-27-2021
RV *Brasilis*	Fugro	Smultea	Oct-10-2021	Nov-27-2021

1.3 Regulatory Documents

Regulatory documents defining mitigation measures for the Surveys were the Garden State IHA (NMFS, 2021a), 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, 2021b) 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, 2021a), and vessels began conducting survey activities under this on Jun-14-2021. Site characterization surveys for Ørsted were conducted across both lease areas from Apr-06-2021.

This PSO Technical Report covers the period from Jun-11-2021 to May-06-2022. The RV *Ocean Researcher* commenced survey operations under the Garden State IHA from Jun-14-2021. Survey activity within the GSOE OCS-A 0482 Lease Area and under the Garden State IHA is presented within this report. All survey activity from vessels conducting operations in the Skipjack IHA area between Apr-06-2021 and Jun-13-2021, inclusive, is presented within the Skipjack IHA PSO Report (Gardline, 2022a).

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, 2021) 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 fulfils the requirements of the Garden State 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 Garden State IHA

Reporting Requirement	BOEM Leases[1] and Amendments[2] (BOEM, 2018)	IHA (NMFS, 2021a)	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 observers 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 ADDENDUM "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, the Lessee 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 [or, as per waiver request, *90 calendar days following the demobilization 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

Operations for the Surveys began under the Garden IHA on Jun-14-2021 onboard the RV *Ocean Researcher* and MV *Ocean Endeavour*, and survey activities were completed on May-06-2022 onboard the RV *Time and Tide*. Details of the activities carried out per day by each vessel working on the Surveys 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, sparker/boomer). The specifications of the survey equipment used by each vessel are detailed in Table 2.1. The survey conducted a total of 10726 miles of vessel track with acoustic sources below 200kHz active.

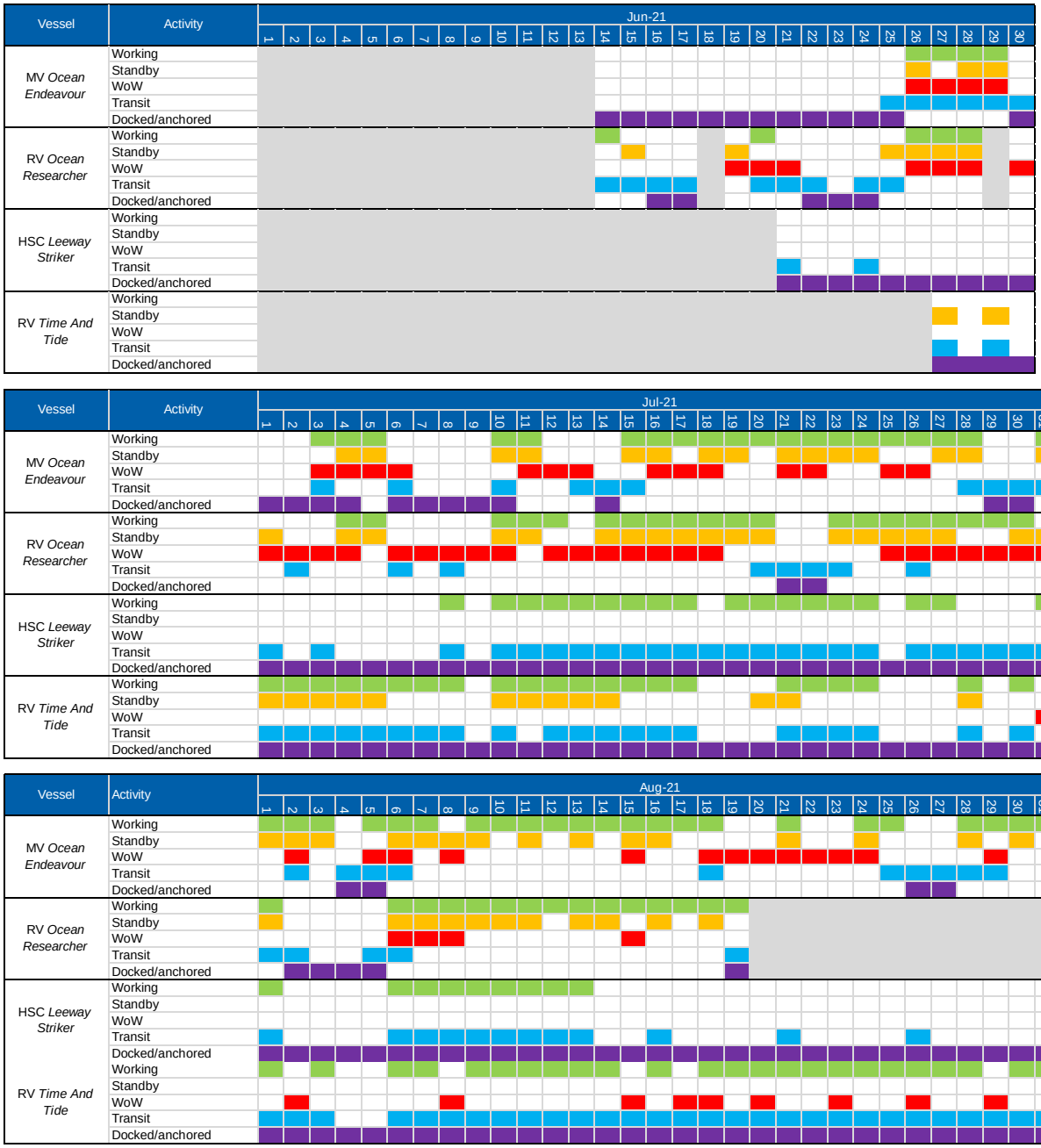
Table 2.1 Survey Equipment Specifications for Mitigatable Equipment (<200kHz) Used

Equipment type	Details	Operating Frequency	Vessels
Single channel sub bottom profiler (Sparker/ Boomer)	Applied Acoustics CSP SNv1250 Bang Box, Dura Spark UHD Dual Cat 400 Sparker, Single Channel 8 element streamer, 2.4m active length	0.4-3.0kHz	MV *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*, OSV *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	HSC *LeeWay Striker*[1] RV *Time and Tide*[1]
Innomar or Parametric Echo Sounder (PES)	Innomar SES-2000 Medium, hull mounted (4.8m). Operational power online is 100%/10kHz.	5-10kHz	MV *Ocean Endeavour*, RV *Ocean Researcher*
	Innomar SES-200 Compact	85-115kHz	HSC *LeeWay Striker* RV *Time and Tide*[2]
	Innomar sub-bottom profiler	1-15kHz	RV *Brasilis*, OSV *Go Liberty*
USBL	Sonardyne Ranger 2 USBL system, pole mounted	19-34kHz	MV *Ocean Endeavour*, RV *Ocean Researcher*
	Sonardyne Mini-Ranger 2	19-34kHz	OSV *Go Liberty* *RV Time and Tide* HSC *LeeWay Striker*
	Kongsberg HiPAP 502	21-31kHz	RV *Brasilis*

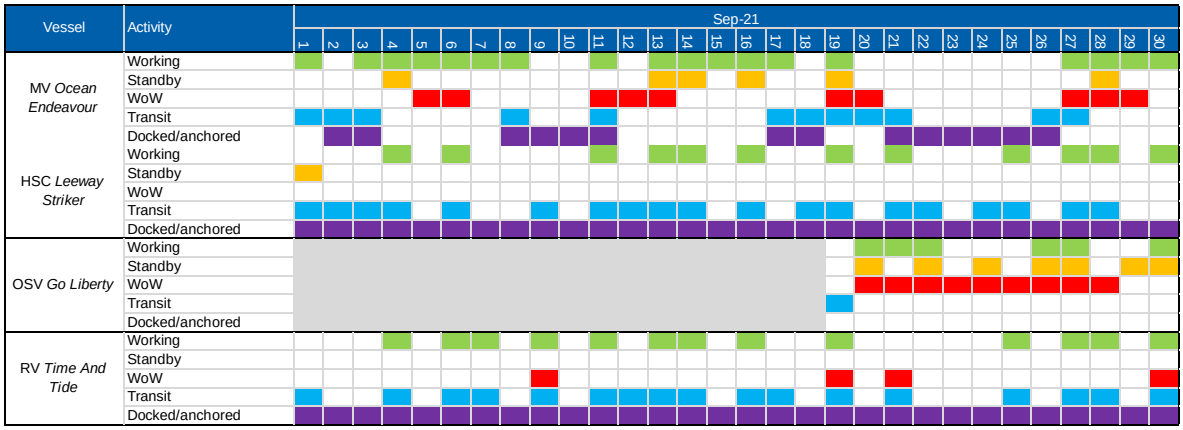
1 On HSC *LeeWay Striker* and RV *Time and Tide* a boomer was used instead of a Sparker but has been recorded as Sparker in Mysticetus as there was no check-box option for boomer.

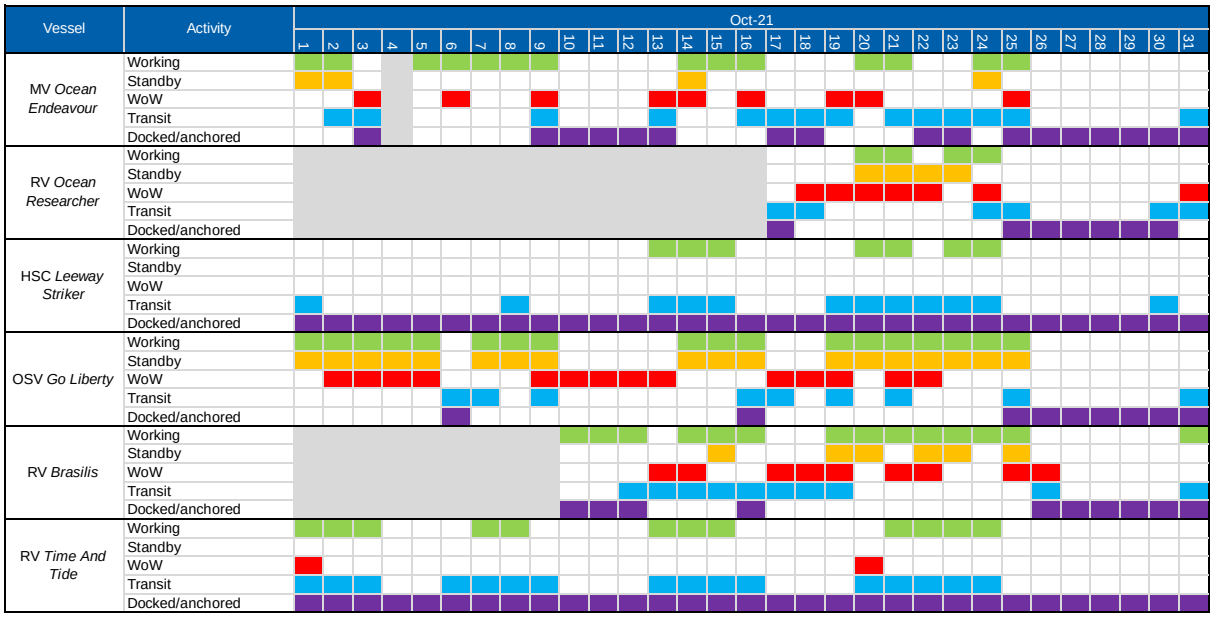
2 On RV *Time and Tide* an Innomar was used, but this was recorded as Chirps in Mysticetus.

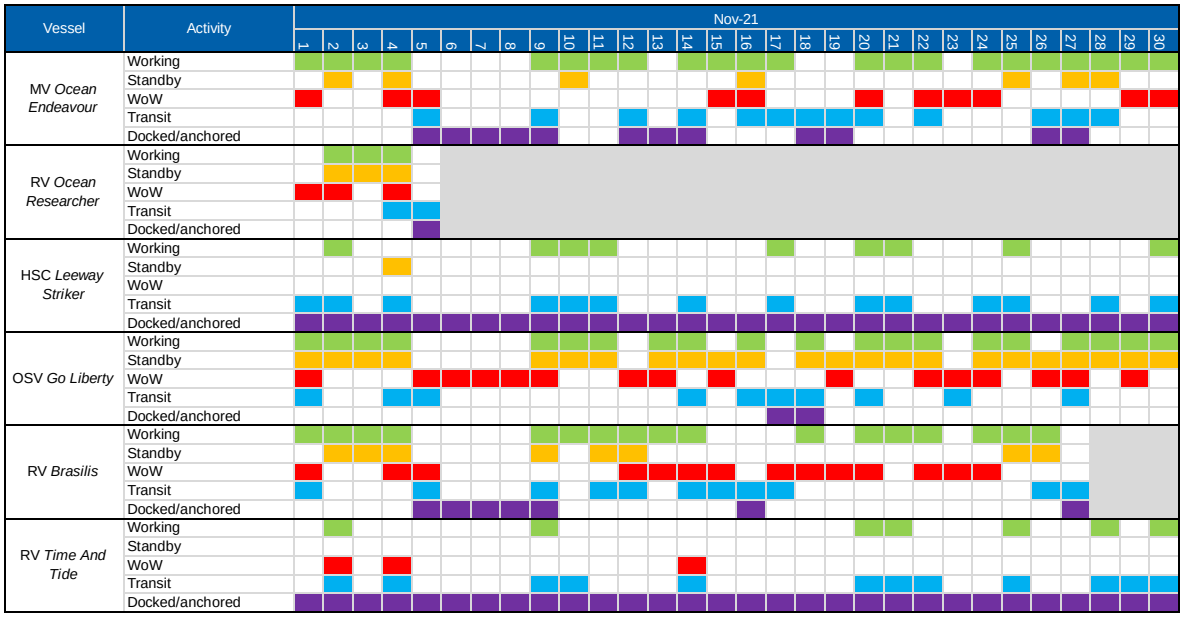
Figure 2.1 Summary of Events Under the Garden State IHA

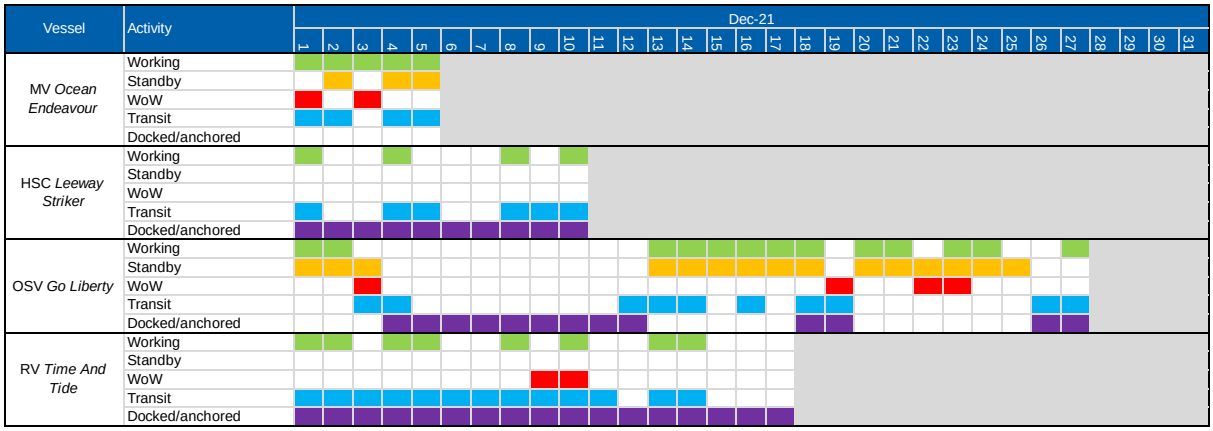


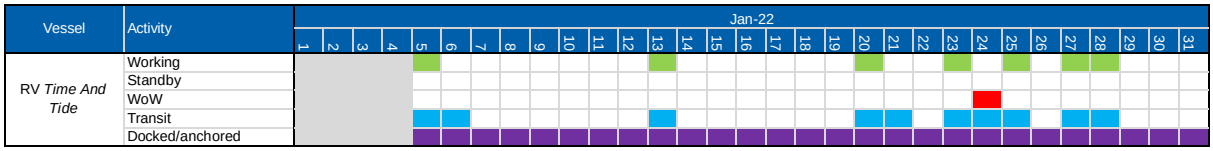
Prior to Jun-14-2022, the Surveys were undertaken under the Skipjack IHA (Gardline, 2022a). From Jun-14-2022 only activity within the BOEM Lease OCS-A 0482 Area and under the Garden State IHA are presented within this report.

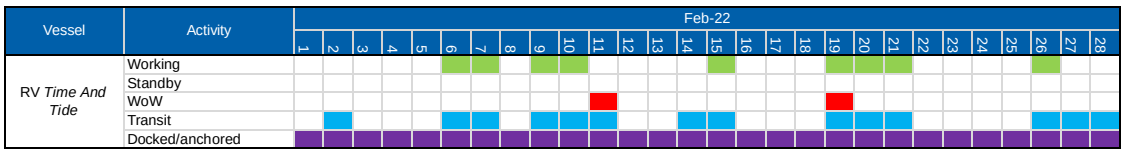

Vessel
Activity
Sep-21
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
MV Ocean Endeavour
HSC Leeway Striker
OSV Go Liberty
RV Time And Tide
Working
Standby
WoW
Transit
Docked/anchored


Vessel
Activity
Oct-21
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
MV Ocean Endeavour
RV Ocean Researcher
HSC Leeway Striker
OSV Go Liberty
RV Brasilis
RV Time And Tide
Working
Standby
WoW
Transit
Docked/anchored


Vessel
Activity
Nov-21
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
MV Ocean Endeavour
RV Ocean Researcher
HSC Leeway Striker
OSV Go Liberty
RV Brasilis
RV Time And Tide
Working
Standby
WoW
Transit
Docked/anchored


Vessel
Activity
Dec-21
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
MV Ocean Endeavour
HSC Leeway Striker
OSV Go Liberty
RV Time And Tide
Working
Standby
WoW
Transit
Docked/anchored


Vessel
Activity
Jan-22
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
RV Time And Tide
Working
Standby
WoW
Transit
Docked/anchored


Vessel
Activity
Feb-22
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
RV Time And Tide
Working
Standby
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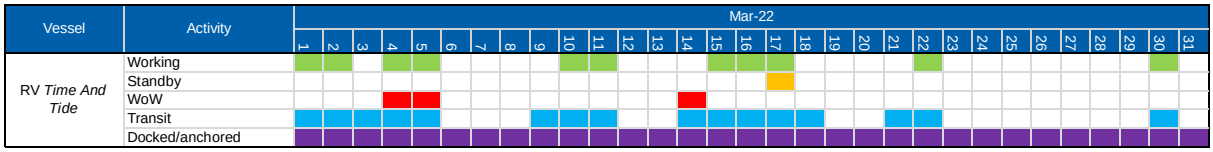
Transit
Docked/anchored


Vessel
Activity
Mar-22
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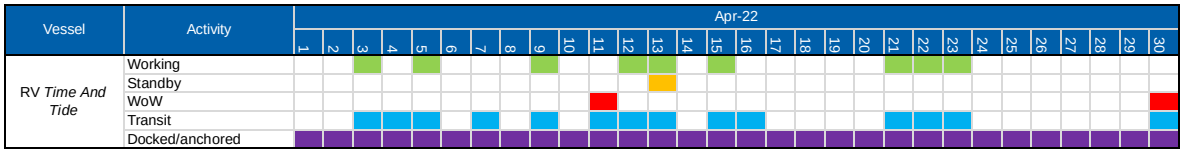
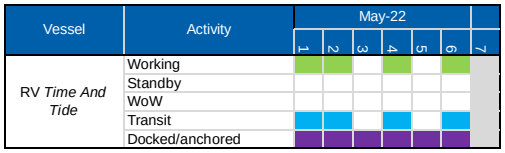
RV Time And Tide
Working
Standby
WoW
Transit
Docked/anchored


Vessel
Activity
Apr-22
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
RV Time And Tide
Working
Standby
WoW
Transit
Docked/anchored


Vessel
Activity
May-22
1 2 3 4 5 6 7
RV Time And Tide
Working
Standby
WoW
Transit
Docked/anchored

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 (MV Ocean Endeavour, RV Ocean Researcher and RV Brasilis). The OSV *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 HSC *LeeWay Striker* and RV *Time and Tide* 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 devices (NVDs) 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 meetings 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	ATN PVS7	BHM-XR (65mm)	Scout 640 IR Monocular	Cobra TB75-640 Thermal Imaging Bi-Ocular	NVTS Reliant 640HD	Current Scientific Corporation N2525	
RV *Ocean Endeavour*	X		X			X		X
RV *Ocean Researcher*	X		X			X		X
HSC *LeeWay Striker*[2]								X
RV *Time and Tide*[2]		X			X			X
OSV *Go Liberty*		X		X			X	X
RV *Brasilis*		X		X			X	X

1 Various models

2 IR and NVDs were available on board for transit if needed.

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)	Estimated Eye height (Height of Deck (m) + 1.6m[1])	Distance to Horizon (km)[2]
MV *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
HSC *LeeWay Striker*	Bridge	1.65	3.25	6.44
	Bridge Wings	1.65	3.25	6.44
	Back Deck	1.60	3.20	6.39
RV *Time and Tide*	Bridge	3.0	4.6	7.7
OSV *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

1 Average eye height calculated on the assumption of the average male (5ft 10in, or 1.77m) and average female (5ft 4in, or 1.63m) height minus 4 inches (10cm).

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 was 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), Garden State IHA Section 4(c) (NMFS, 2021a) 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 resumed, 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 HZ.

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 pre-clearance 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, 2021). 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, 2021). 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
Outside	Outside BOEM Lease Area OCS-A 0482
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 1µPa 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, 2021b). 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/boomer in the Garden State IHA (NMFS, 2021a), 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)		
	Impulsive SBP (*i.e.,* Sparker/boomer)	Parametric SBP (*i.e.,* Innomar)	USBL
Jun-11-2021 to Nov-22-2021	141	N/A[1]	N/A[1]
Nov-23-2021 to Mar-21-2022[2]		N/A[1]	N/A[1]
Mar-22-2022 to May-06-2022	141	N/A[1]	N/A[1]

1 Aside from the 141m Level B for sparker, a 36m Level B harassment zone applied to non-impulsive, non-parametric SBPs, therefore the USBL and parametric SBP (Innomar) were exempt.

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

The Garden State 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 Garden State IHA

Common Name	Latin Name	Authorized '*Takes*' by Level B Harassment (NMFS, 2021b)
North Atlantic right whale	*Eubalaena glacialis*	14
Humpback whale	*Megaptera novaeangliae*	4
Fin whale	*Balaenoptera physalus*	9
Sei whale	*Balaenoptera borealis*	1
Minke whale	*Balaenoptera acutorostrata*	3
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*	437
Bottlenose dolphin (Migratory stock)	*Tursiops truncatus*	1192
Common dolphin	*Delphinus delphis*	112
Atlantic white-sided dolphin	*Lagenorhynchus acutus*	15
Atlantic spotted dolphin	*Stenella frontalis*	9
Risso's dolphin	*Grampus griseus*	30
Harbor porpoise	*Phocoena phocoena*	98
Harbor seal	*Phoca vitulina*	9
Gray seal	*Halichoerus grypus*	9

4 EFFORT SUMMARY

4.1 Monitoring Effort

While the survey vessels were conducting work under the Garden State IHA, visual monitoring was carried on 319 days between Jun-14-2021 and May-06-2022. There were 7589 hours and 46 minutes of monitoring effort, during which time vessels covered approximately 39961 miles (see Table 4.1). During periods of data acquisition, the IHA-regulated sparker/boomer was active for 1807 hours and 45 minutes over 8228 miles of vessel track, and other sources <200kHz were active for 533 hours and 56 minutes over 4302 miles of vessel track.

Table 4.1 Summary of Monitoring Effort Conducted

Vessel	Monitoring Effort (miles)				Monitoring Effort ([h]:mm)			
	IHA-Regulated Sources Active	Other Sources <200kHz On[1]	All Sources <200kHz Off	Total	IHA-Regulated Sources Active	Other Sources <200kHz On[1]	All Sources <200kHz Off	Total
RV *Ocean Endeavour*	1823	387	10120	**12330**	380:46	82:54	2063:39	**2527:20**
RV *Ocean Researcher*	932	130	4896	**5958**	202:01	30:15	987:08	**1219:24**
HSC *LeeWay Striker*	968	205	3316	**4489**	210:30	49:08	378:04	**637:43**
RV *Time and Tide*	2206	2978	4812	**9995**	468:55	219:51	726:04	**1414:50**
OSV *Go Liberty*	1461	287	2520	**4267**	351:01	76:41	549:55	**977:38**
RV *Brasilis*	838	315	1769	**2922**	194:30	75:05	543:12	**812:48**
Total	**8228**	**4302**	**27432**	**39961**	**1807:45**	**533:56**	**5248:04**	**7589:46**

During the Surveys, surveying, transit and waiting on weather (WoW) were the most common survey activities, accounting for 24%, 24% and 22% of the total survey time, respectively (see Figure 4.1). Monitoring requiring no mitigation was the most common monitoring activity (see
Figure 4.3), accounting for 65% of the total survey time. Table 4.7 to Table 4.7 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 Hours Under the Garden State IHA

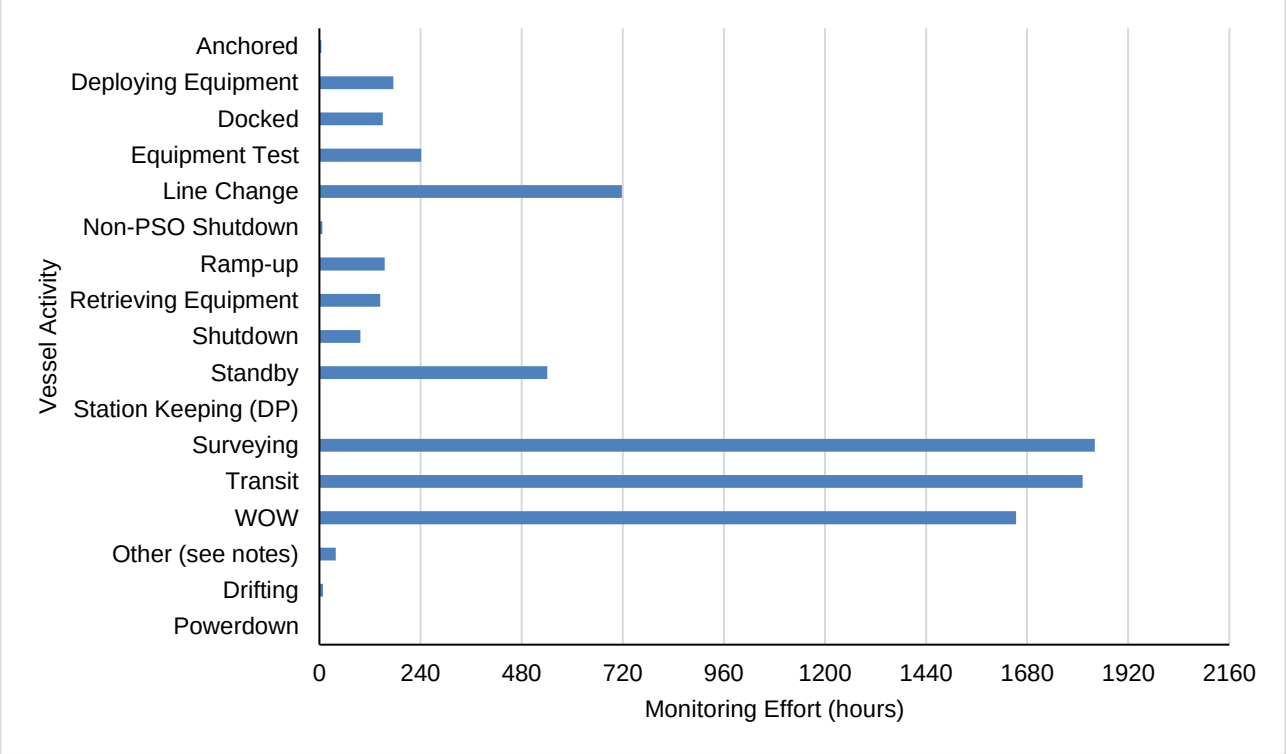


Figure 4.2 Overview of Vessel Activity Miles Under the Garden State IHA

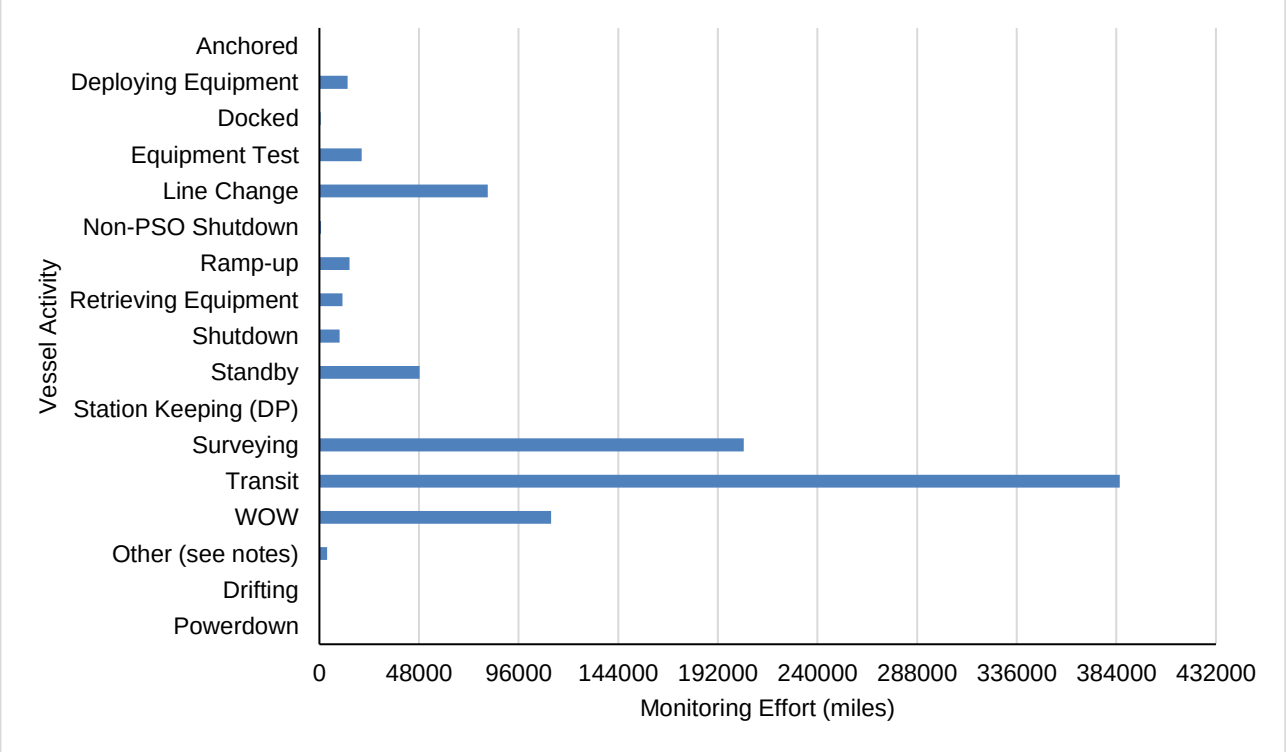


Figure 4.3 Overview of Monitoring State Hours Under the Garden State IHA

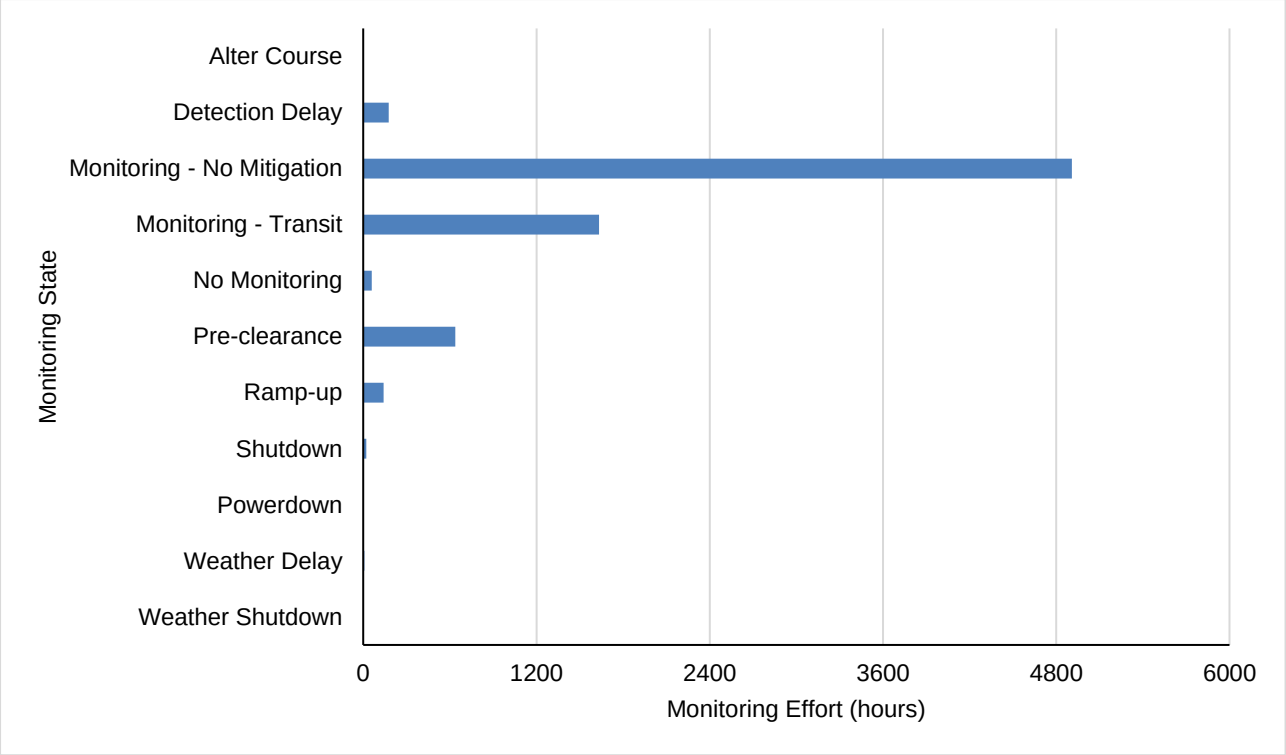
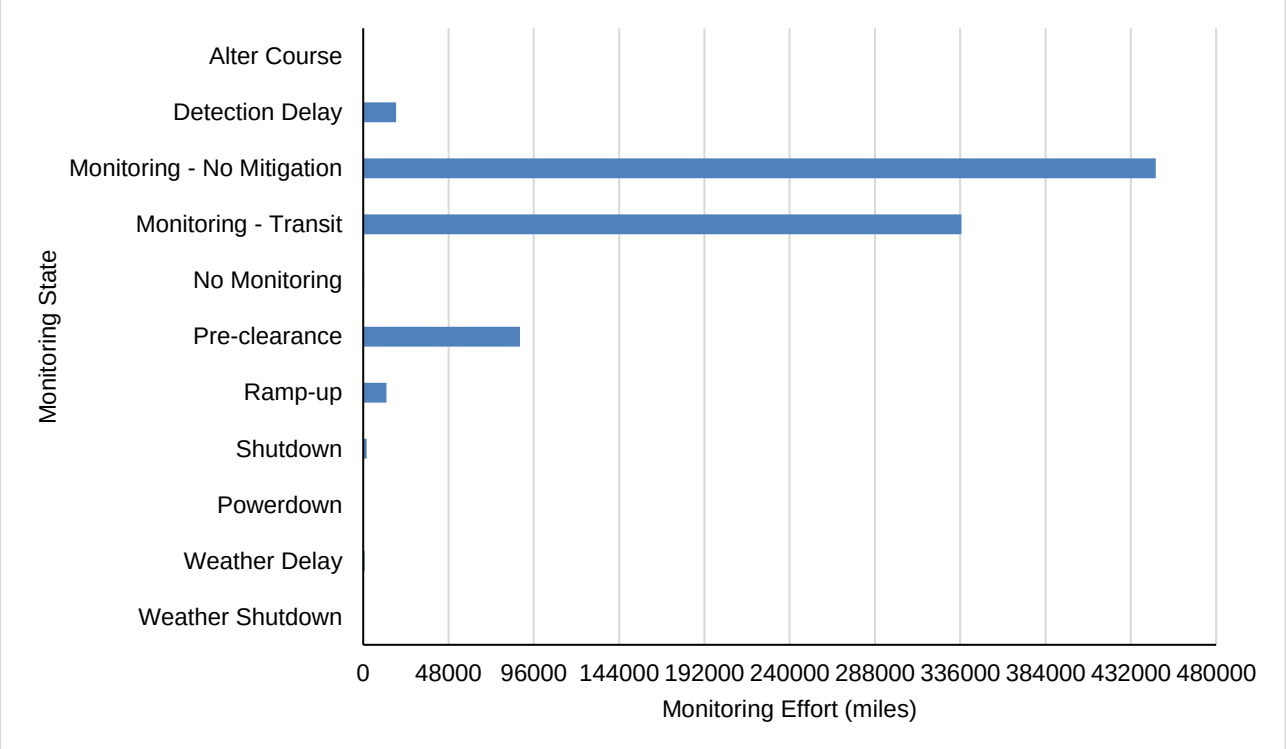


Figure 4.4 Overview of Monitoring State Miles Under the Garden State IHA



4.1.1 Monitoring Effort by Area and Vessel

Table 4.2 Vessel and Monitoring Activity on RV *Ocean Endeavour* under the Garden State IHA

Vessel Activity	OCS-A 0482 Lease Area		Survey Area		Overall	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Anchored	0:17	0	0:00	0	2:36	0
Deploying Equipment	29:35	118	5:53	22	62:42	245
Docked	0:00	0	0:00	0	3:06	0
Equipment Test	12:10	59	5:49	28	26:00	123
Line Change	244:54	1199	115:12	560	477:05	2275
N/A	0:00	0	0:00	0	0:00	0
Non-PSO Shutdown	0:29	2	0:00	0	1:37	8
Other (see notes)	3:47	19	0:16	1	15:57	53
Ramp-up	22:00	105	7:01	33	40:20	191
Retrieving Equipment	17:01	68	9:30	38	33:35	134
Shutdown	19:51	91	11:07	51	29:41	139
Standby	90:46	390	27:38	113	187:47	778
Station Keeping (DP)	0:00	0	0:00	0	0:00	0
Surveying	285:27	1390	152:54	749	437:09	2096
Transit	35:28	189	6:27	36	523:44	4267
WOW	337:19	977	120:02	308	685:41	2019
Total	**1099:08**	**4609**	**461:53**	**1940**	**2527:07**	**12329**
Monitoring State	OCS-A 0482 Lease Area		Survey Area		Overall	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Alter Course	<0:01	0.1	0:00	0	<0:01	0.1
Detection Delay	49:41	228	15:52	74	80:06	368
Monitoring - No Mitigation	903:00	3690	407:13	1688	1699:07	6753
Monitoring - Transit	31:15	169	7:18	45	511:53	4170
No Monitoring	0:17	0	0:00	0	3:03	0
Pre-clearance	92:04	412	24:22	99	190:29	836
Ramp-up	22:09	106	7:01	33	40:29	192
Shutdown	0:18	1	0:05	0	0:44	4
Weather Delay	0:21	2	0:00	0	0:41	3
Weather Shutdown	0:00	0	0:00	0	0:30	2
Total	**1099:08**	**4609**	**461:53**	**1940**	**2527:07**	**12329**

Table 4.3 Vessel and Monitoring Activity on RV *Ocean Researcher* under the Garden State IHA

Vessel Activity	OCS-A 0482 Lease Area		Survey Area		Overall	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Deploying Equipment	15:59	63	17:24	68	18:02	69
Docked	0:00	0	0:00	0	2:58	0
Equipment Test	5:54	27	7:17	33	9:51	41
Line Change	110:15	506	132:47	621	144:32	668
Non-PSO Shutdown	0:07	1	0:15	1	0:15	1
Ramp-up	22:12	101	25:34	116	26:05	116
Retrieving Equipment	15:58	65	17:48	72	20:37	80
Shutdown	26:13	118	27:18	123	27:30	123
Standby	119:28	495	129:44	534	152:21	582
Surveying	191:58	886	195:01	905	195:41	905
Transit	8:46	60	67:06	675	257:27	2265
WOW	284:29	858	348:07	994	364:01	1109
Total	**801:24**	**3179**	**968:28**	**4143**	**1219:24**	**5958**
Monitoring State	OCS-A 0482 Lease Area		Survey Area		Overall	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Detection Delay	51:41	224	56:22	245	57:33	249
Monitoring - No Mitigation	610:23	2322	705:54	2614	757:11	2824
Monitoring - Transit	8:46	60	67:06	675	257:27	2265
No Monitoring	0:00	0	0:00	0	2:45	0
Pre-clearance	107:58	470	113:07	493	117:59	504
Ramp-up	22:13	101	25:36	116	26:07	116
Shutdown	0:20	2	0:20	2	0:20	2
Total	**801:24**	**3179**	**968:28**	**4143**	**1219:24**	**5958**

Table 4.4 Vessel and Monitoring Activity on HSC *LeeWay Striker* under the Skipjack IHA

Vessel Activity	OCS-A 0482 Lease Area		Survey Area		Overall	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Deploying Equipment	0:00	0	4:26	11	12:43	34
Docked	0:00	0	27:42	12	32:24	13
Drifting	0:00	0	0:00	0	7:54	6
Equipment Test	0:00	0	14:07	48	16:41	70
Line Change	0:00	0	12:33	58	48:46	229
Non-PSO Shutdown	0:00	0	0:00	0	0:35	5
Other (see notes)	0:00	0	0:00	0	1:16	4
Powerdown	0:00	0	0:19	1	0:57	4
Ramp-up	0:00	0	5:11	16	21:46	75
Retrieving Equipment	0:00	0	3:44	9	15:14	42
Shutdown	0:00	0	0:41	2	13:33	50
Standby	0:00	0	4:58	16	21:14	73
Surveying	0:00	0	26:52	131	171:33	809
Transit	0:00	0	68:28	648	273:02	3074
Total	**0:00**	**0**	**169:05**	**953**	**637:43**	**4489**
Monitoring State	OCS-A 0482 Lease Area		Survey Area		Overall	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Detection Delay	0:00	0	5:06	20	14:12	52
Monitoring - No Mitigation	0:00	0	67:29	266	286:59	1246
Monitoring - Transit	0:00	0	58:40	535	215:05	2342
No Monitoring	0:00	0	20:42	10	23:48	12
Powerdown	0:00	0	0:19	1	0:58	4
Pre-clearance	0:00	0	13:57	112	68:03	712
Ramp-up	0:00	0	2:06	6	18:34	65
Shutdown	0:00	0	0:41	2	7:39	33
Weather Delay	0:00	0	0:00	0	2:12	22
Weather Shutdown	0:00	0	0:00	0	0:08	1
Total	**0:00**	**0**	**169:05**	**954**	**637:43**	**4489**

1 The HSC *LeeWay Striker* conducted equipment testing under the Skipjack IHA (Gardline, 2022a) 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 *Time and Tide* under the Garden State IHA

Vessel Activity	OCS-A 0482 Lease Area		Survey Area		Overall	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Deploying Equipment	0:04	0.2	22:11	63	27:09	66
Docked	0:00	0	0:05	1	94:26	10
Drifting	0:00	0	0:21	1	0:21	1
Equipment Test	0:00	0	99:12	345	117:49	354
Non-PSO Shutdown	0:00	0	0:13	1	0:17	1
Powerdown	0:00	0	0:04	0.3	0:04	0.3
Ramp-up	0:20	2	42:21	138	45:46	139
Retrieving Equipment	0:06	0.4	36:22	98	38:36	100
Shutdown	0:00	0	26:04	91	26:04	93
Standby	0:00	0	6:39	22	22:04	23
Surveying	1:28	7	531:36	2539	533:43	2546
Transit	0:50	8	344:56	3373	492:44	4399
WOW	0:00	0	3:42	16	4:03	16
Other (see notes)	0:00	0	11:41	41	11:41	41
Total	**2:48**	**18**	**1125:30**	**6729**	**1414:50**	**7788**
Monitoring State	OCS-A 0482 Lease Area		Survey Area		Overall	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Detection Delay	0:00	0	16:30	60	16:30	60
Monitoring - No Mitigation	1:34	8	680:26	3023	787:31	3053
Monitoring - Transit	0:26	4	227:56	2230	366:51	3191
No Monitoring	0:00	0	0:00	0	21:39	4
Pre-clearance	0:29	4	138:54	1214	156:20	1277
Ramp-up	0:20	2	46:16	145	48:50	145
Shutdown	0:00	0	12:24	43	12:24	43
Weather Delay	0:00	0	2:55	14	4:35	14
Weather Shutdown	0:00	0	0:05	0.4	0:09	0.4
Total	**2:49**	**18**	**1125:29**	**6731**	**1414:52**	**7788**

Table 4.6 Vessel and Monitoring Activity on OSV *Go Liberty* under the Garden State IHA

Vessel Activity	OCS-A 0482 Lease Area		Survey Area		Overall	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Deploying Equipment	5:16	17	39:10	116	38:16	113
Docked	0:00	0	0:00	0	3:55	0
Equipment Test	1:36	7	8:20	36	9:56	30
Line Change	9:14	38	50:49	220	47:23	206
Non-PSO Shutdown	0:00	0	3:28	14	3:28	14
Ramp-up	3:02	12	17:28	70	16:52	67
Retrieving Equipment	5:08	16	26:20	83	25:49	83
Shutdown	<0:01	<0.1	0:31	2	0:31	2
Standby	41:51	152	135:12	509	127:43	485
Surveying	36:52	152	294:18	1229	286:04	1195
Transit	2:32	13	39:26	263	102:59	736
WOW	16:47	72	307:18	1302	312:32	1325
Other (see notes)	0:00	0	2:05	10	2:05	10
Total	**122:22**	**478**	**924:33**	**3853**	**977:38**	**4267**
Monitoring State	OCS-A 0482 Lease Area		Survey Area		Overall	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Detection Delay	0:43	3	1:19	6	1:07	5
Monitoring - No Mitigation	106:54	415	802:51	3288	793:49	3243
Monitoring - Transit	2:04	11	36:11	247	100:16	721
Pre-clearance	12:38	49	80:25	297	78:39	283
Ramp-up	0:00	0	3:45	15	3:45	15
Total	**122:22**	**478**	**924:33**	**3853**	**977:38**	**4267**

Table 4.7 Vessel and Monitoring Activity on RV *Brasilis* under the Garden State IHA

Vessel Activity	OCS-A 0482 Lease Area		Survey Area		Overall	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Anchored	0:00	0	1:44	1	1:44	1
Deploying Equipment	6:19	15	18:21	46	16:34	39
Docked	0:00	0	0:00	0	13:31	5
Equipment Test	14:56	65	41:04	164	61:31	231
Non-PSO Shutdown	0:28	2	0:30	2	0:30	2
Ramp-up	2:51	12	5:12	21	4:11	17
Retrieving Equipment	4:29	9	10:10	24	10:29	24
Shutdown	0:01	0.1	0:02	0.2	0:02	0.2
Standby	18:27	50	33:25	85	29:42	72
Surveying	119:50	540	263:30	1180	216:43	969
Transit	12:31	95	40:50	332	161:54	1327
WOW	88:18	60	222:44	135	287:51	185
Other (see notes)	0:00	0	8:00	50	8:00	50
Total	**268:16**	**849**	**645:39**	**2041**	**812:48**	**2922**
Monitoring State	OCS-A 0482 Lease Area		Survey Area		Overall	
	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles	Duration ([h]:mm)	Miles
Detection Delay	5:44	25	8:44	37	8:10	34
Monitoring - No Mitigation	236:44	688	571:27	1600	584:28	1464
Monitoring - Transit	11:56	90	40:15	327	181:02	1341
No Monitoring	0:00	0	0:05	0.3	8:05	1
Pre-clearance	11:10	35	20:01	55	26:36	66
Ramp-up	2:38	11	5:01	21	4:22	15
Shutdown	0:01	0.1	0:02	0.2	0:02	0.2
Total	**268:16**	**849**	**645:39**	**2041**	**812:48**	**2922**

4.1.2 PSO Effort

PSO effort using each piece of monitoring equipment, during operations conducted in daylight and darkness is presented in Table 4.8 and by geophysical acoustic sources <200kHz being Active and Inactive in Table 4.9. This activity reflects each PSO's effort individually and therefore can exceed 24hours within any given day.

A total of 10657 hours and 15 minutes of PSO effort were conducted by designated PSOs. The dominant method of assessment during daylight operations was UE, accounting for 99.6% 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 58% and 41%, respectively, of the total PSO effort conducted in the darkness.

Most of the PSO effort (67%) was conducted whilst the acoustic sources <200kHz were inactive.

Table 4.8 PSO Effort for each Monitoring Device used during Daylight and Darkness

	PSO Effort ([h]:mm:ss)					
	UE	NVD	IR - Mounted	IR - Handheld	NVD w IR	Total
Daylight	6824:26	0:20	24:11	0:00	1:25	6850:24
Darkness	15:09	2215:37	1547:31	13:37	14:54	3806:50
Total	**6839:36**	**2215:58**	**1571:43**	**13:37**	**16:20**	**10657:15**
% Total	**64%**	**21%**	**15%**	**<1%**	**<1%**	

Table 4.9 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	NVD w IR	Total
Below 200kHz Active	2385:05	580:51	587:57	3:16	0:00	3557:10
Below 200kHz Inactive	4454:31	1635:06	983:46	10:20	16:20	7100:04
Total	**6839:36**	**2215:57**	**1571:43**	**13:37**	**16:20**	**10657:15**
% Total	**64%**	**21%**	**15%**	**<1%**	**<1%**	

4.2 Weather Conditions During Monitoring

As would be expected with survey operations spanning eleven 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 4.5). 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 (86%) 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 5% of all Monitoring Effort (Figure 4.6).

Figure 4.5 Monitoring Effort by Beaufort Sea State

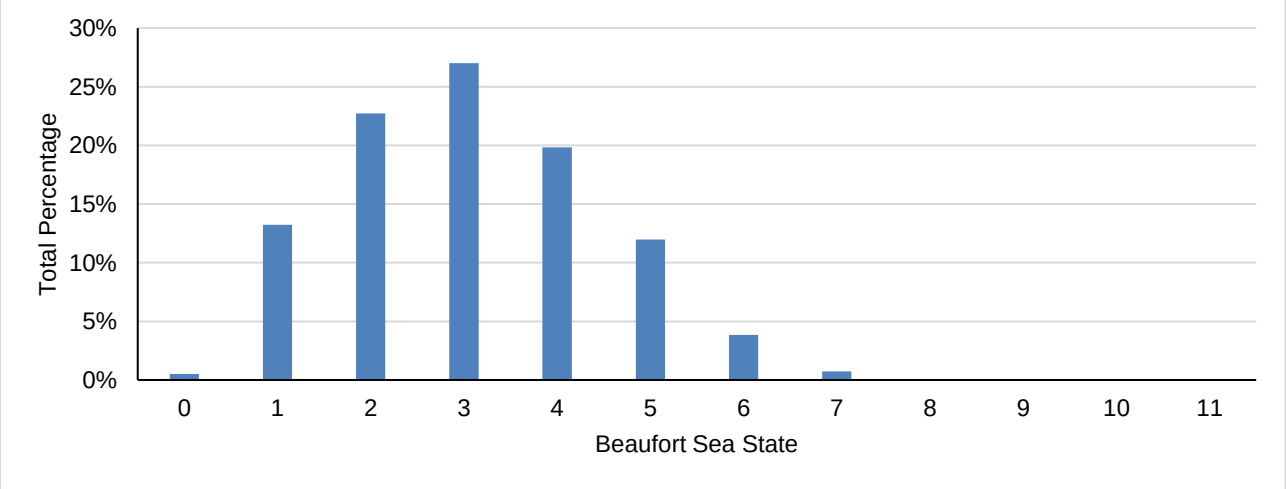
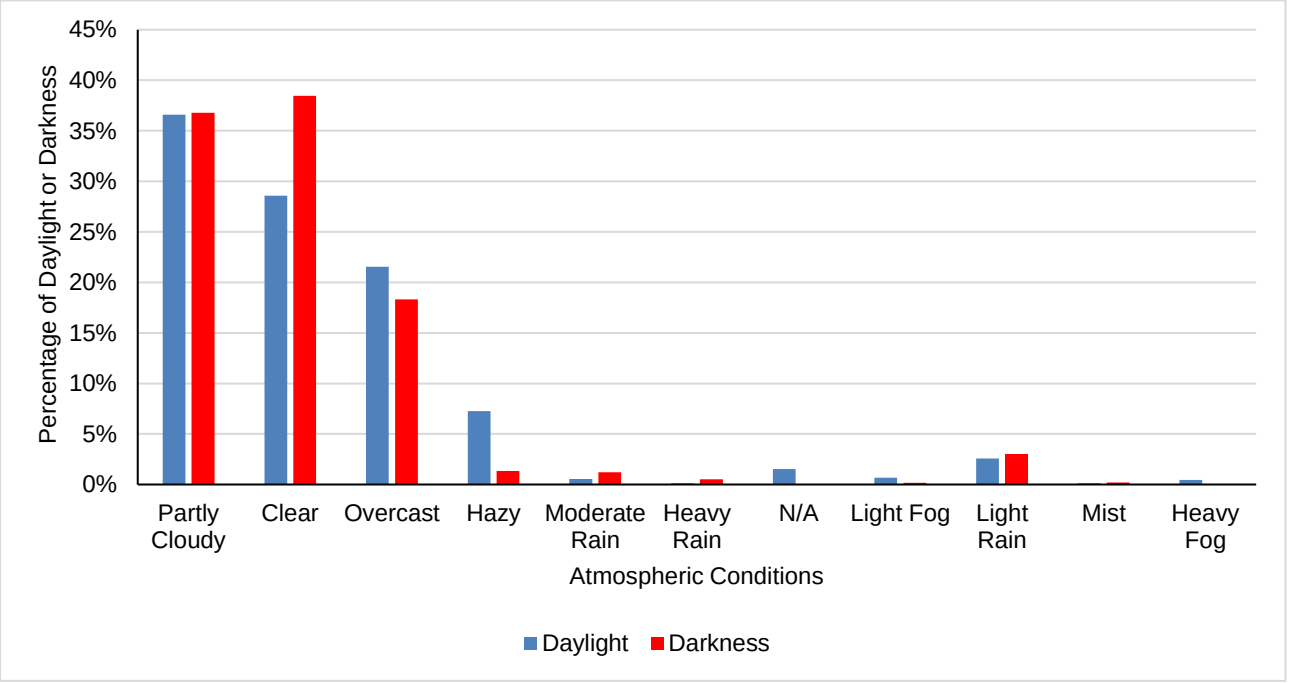


Figure 4.6 Percentage of Monitoring Effort by Atmospheric Conditions during Daylight and Darkness

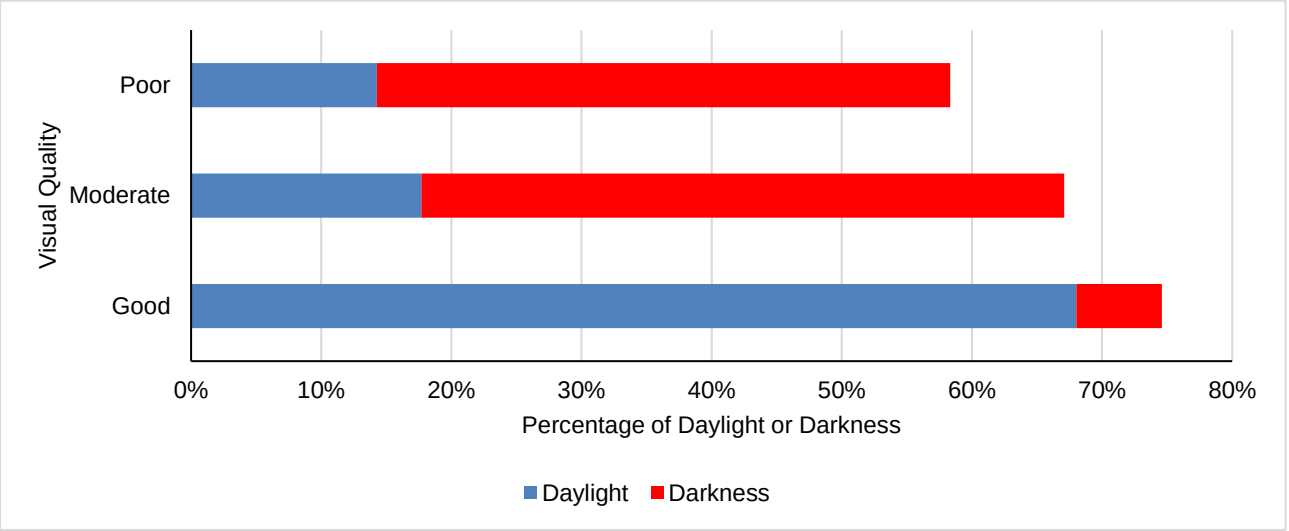


The visibility quality during Monitoring Effort is presented in Figure 4.7 and was defined by Mysticetus as follows:

- 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 (76%) of monitoring effort. *Good* visibility was much more common during Daylight (68%) than during Darkness (7%). *Poor* visibility quality was recorded less often during Daylight than Darkness (14% and 44%, respectively).

Figure 4.7 Percentage of Monitoring Effort by Visibility Quality during Daylight and Darkness



5 PROTECTED SPECIES DETECTION SUMMARY

5.1 Protected Species Detections

There were 846 initial detections of protected species under the Garden State IHA, comprising an estimated 2971 individuals. An additional eight encounters were considered subsequent sightings of previously encountered individuals, giving an overall total of 854 encounters comprising 2984 individuals during the Surveys. Off these 854 encounters, 664 (78%) occurred when the vessels were within the Garden State IHA area.

Of the 854 encounters, 77% (representing 2288 individuals) were identified to species level. Two encounters of three individuals, could only be identified as 'unidentified marine mammals', while the remaining 23% (representing 693 individuals) were identified to taxonomic family level. Of the protected species identified to species level, most encounters were of bottlenose dolphins (207, 24%) and they were the most abundant species (approximately 1694 individuals, 57%).

Of the 854 encounters, 96% occurred during Daylight, whilst 4% 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 NVD, UE or handheld IR. A summary of all detections during daylight and darkness is tabulated in Table 5.1.

Of the 854 encounters, 72% occurred when sources <200kHz were Inactive, reflecting the greater proportion of PSO Effort (66%) conducted under such conditions. A summary of all detections when sources <200kHz 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 Garden State IHA (NMFS, 2021a)

Species	Scientific Name	Daylight		Darkness		Total	
		Estimated number of encounters	Estimated number of individuals	Estimated number of encounters	Estimated number of individuals	Estimated number of encounters	Estimated number of individuals
Odontocete							
Bottlenose Dolphin	*Tursiops truncatus*	207	1694	0	0	207	1694
Short-beaked Common Dolphin	*Delphinus delphis*	6	216	1	10	7	226
Unidentified Dolphin	NA	103	472	16	35	119	507
Unidentified Porpoise	NA	1	6	0	0	1	6
Unidentified Dolphin or Porpoise	NA	6	18	0	0	6	18
Total for group		**323**	**2406**	**17**	**45**	**340**	**2451**
Mysticete							
Humpback Whale	*Megaptera novaeangliae*	26	34	0	0	26	34
Minke Whale		1	1	0	0	1	1
Unidentified Mysticete Whale	NA	26	28	0	0	26	28
Total for group		**53**	**63**	**0**	**0**	**53**	**63**
Testudine							
Leatherback Sea Turtle	*Dermochelys coriacea*	166	169	2	2	168	171
Loggerhead Sea Turtle	*Caretta caretta*	148	149	0	0	148	149
Green Sea Turtle	*Chelonia mydas*	6	6	0	0	6	6
Kemp's Ridley Sea Turtle		1	1	0	0	1	1
Unidentified Sea Turtle	NA	113	117	12	12	125	129
Total for group		**434**	**442**	**14**	**14**	**448**	**456**
Pinniped							
Gray Seal		3	3	0	0	3	3
Harbor Seal		1	1	0	0	1	1
Unidentified Pinniped	NA	4	4	0	0	4	4
Total for group		**8**	**8**	**0**	**0**	**8**	**8**
Other							
Unidentified Marine Mammal	NA	2	3	0	0	2	3
Atlantic Sturgeon		2	2	0	0	2	2
Other (see notes)		1	1	0	0	1	1
Total		**823**	**2925**	**31**	**59**	**854**	**2984**
Total (%)		**96%**	**98%**	**4%**	**2%**		

Table 5.2 Protected Species Detections During Geophysical Survey Activities under the Garden State IHA When Acoustic Sources <200kHz were Active and Inactive

Species	Scientific Name	Sources <200kHz Active	Sources <200kHz Inactive	Total
Odontocete				
Bottlenose Dolphin	*Tursiops truncatus*	46	161	207
Short-beaked Common Dolphin	*Delphinus delphis*	2	5	7
Unidentified Dolphin	NA	24	95	119
Unidentified Porpoise	NA	0	1	1
Unidentified Dolphin or Porpoise	NA	1	5	6
Total for group		**73**	**267**	**340**
Mysticete				
Humpback Whale	*Megaptera novaeangliae*	10	16	26
Minke Whale		0	1	1
Unidentified Mysticete Whale	NA	8	18	26
Total for group		**18**	**35**	**53**
Testudine				
Leatherback Sea Turtle	*Dermochelys coriacea*	26	142	168
Loggerhead Sea Turtle	*Caretta caretta*	79	69	148
Green Sea Turtle	*Chelonia mydas*	0	6	6
Kemp's Ridley Sea Turtle		0	1	1
Unidentified Sea Turtle	NA	37	88	125
Total for group		**142**	**306**	**448**
Pinniped				
Gray Seal		2	1	3
Harbor Seal		1	0	1
Unidentified Pinniped	NA	3	1	4
Total for group		**6**	**2**	**8**
Other				
Unidentified Marine Mammal	NA	1	1	2
Atlantic Sturgeon		2	0	2
Other (see notes)		0	1	1
Total		**242**	**612**	**854**
Total (%)		**28%**	**72%**	

Figure 5.1 Protected Species Sightings Recorded During Survey Activities Under the Garden State IHA by MV *Ocean Endeavour*

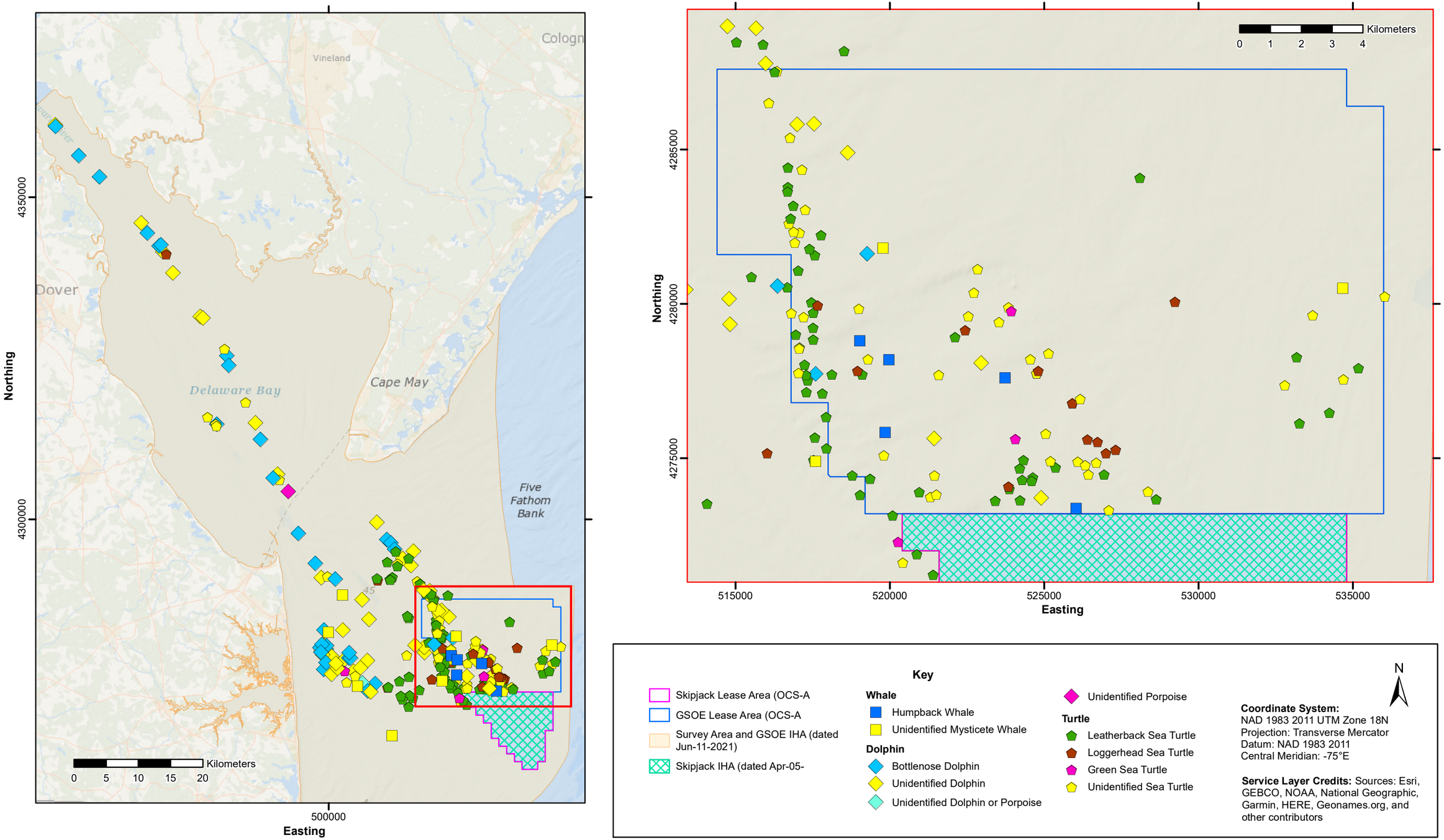


Figure 5.2 Protected Species Sightings Recorded During Survey Activities Under the Garden State IHA by RV *Ocean Researcher*

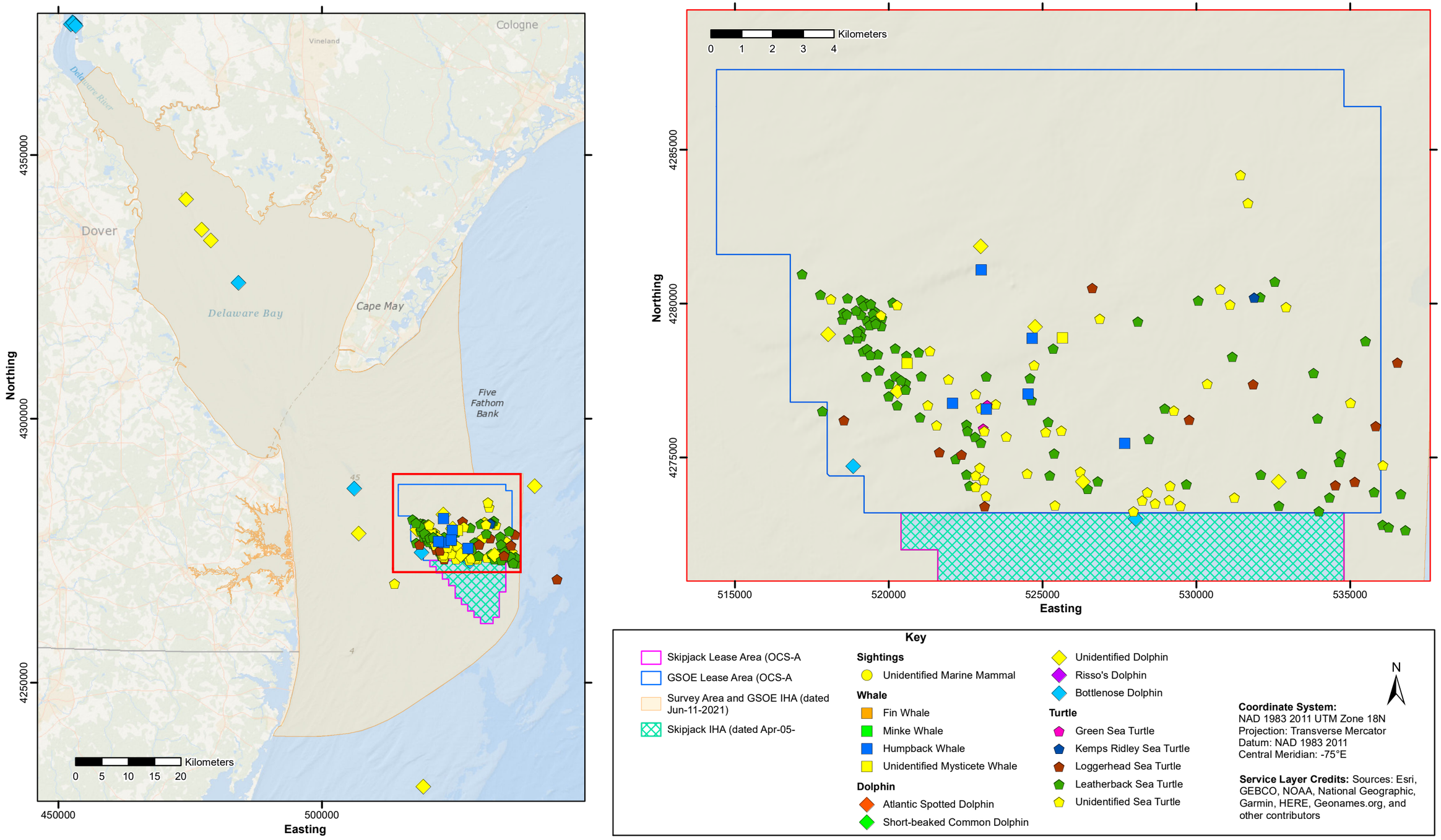


Figure 5.3 Protected Species Sightings Recorded During Survey Activities Under the Garden State IHA by HSC *LeeWay Striker*

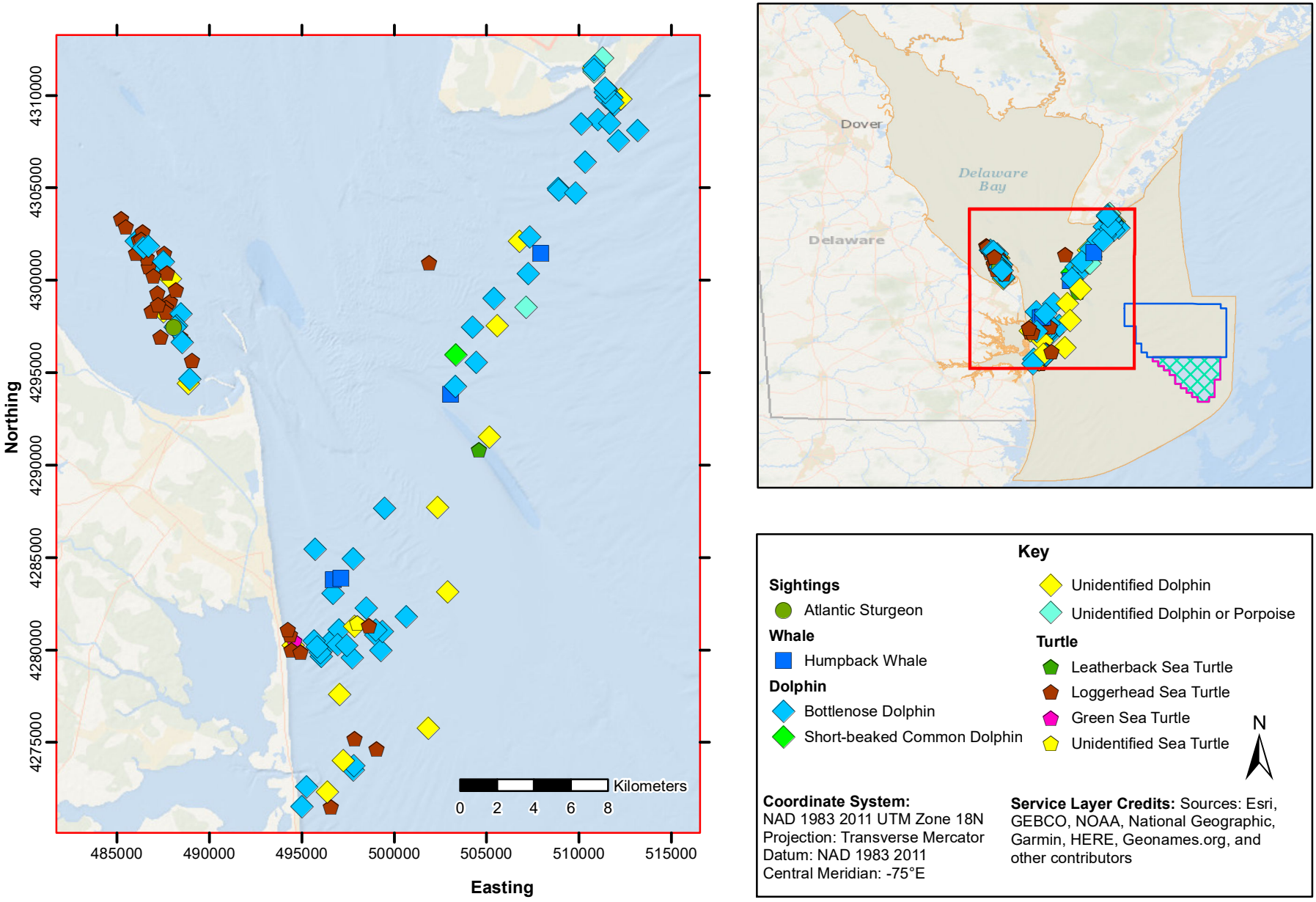
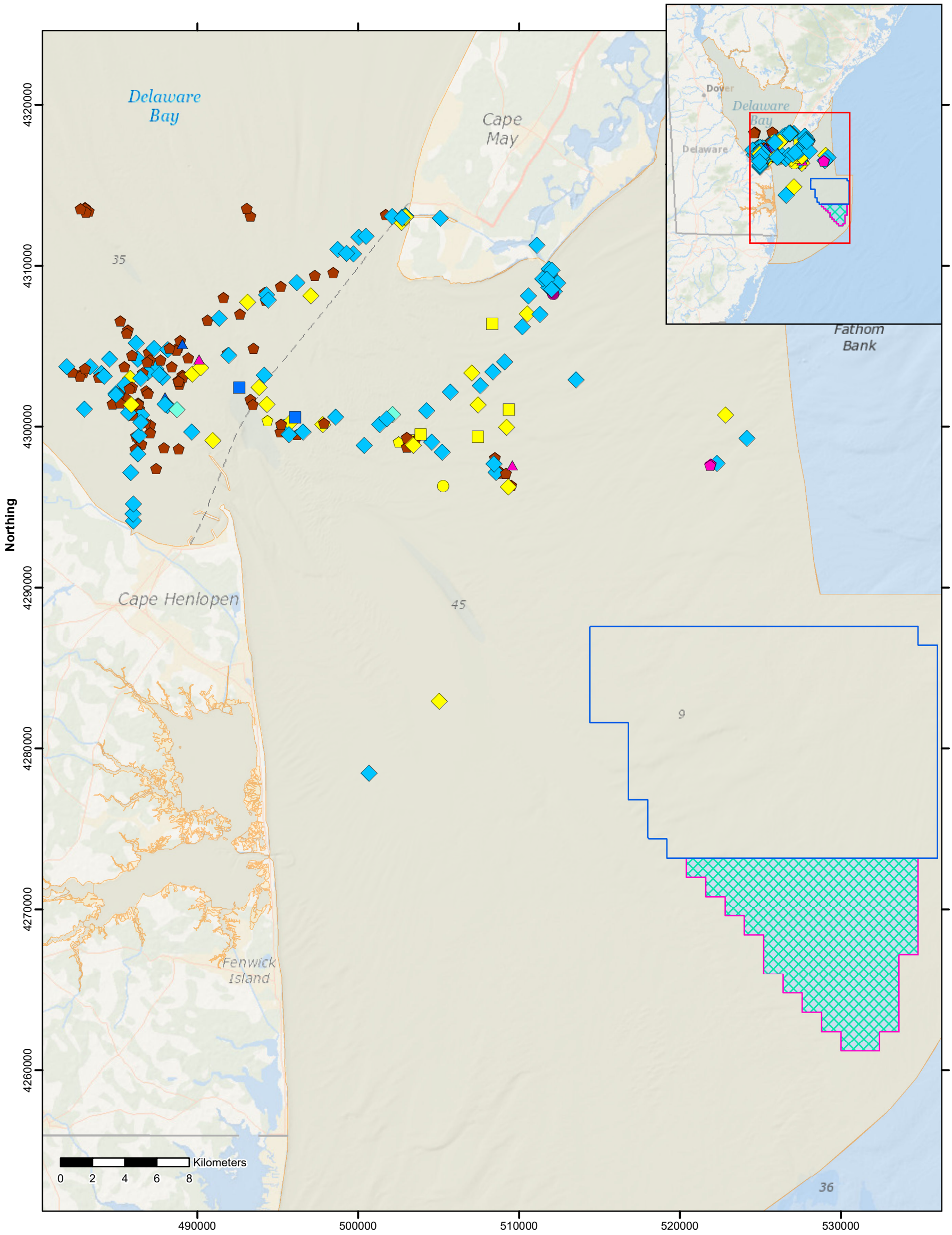


Figure 5.4 Protected Species Sightings Recorded During Survey Activities Under the Garden State IHA by RV *Time and Tide*



Key

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

Sightings
- Unidentified Marine Mammal
- Other

Whale
- Humpback Whale
- Unidentified Mysticete Whale

Dolphin
- Bottlenose Dolphin
- Unidentified Dolphin
- Unidentified Dolphin or Porpoise

Pinniped
- Gray Seal
- Unidentified Pinniped

Turtle
- Loggerhead Sea Turtle
- Green Sea Turtle
- Unidentified Sea Turtle

N

Coordinate System:
NAD 1983 2011 UTM Zone 18N
Projection: Transverse Mercator
Datum: NAD 1983 2011
Central Meridian: -75°E

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

Figure 5.5 Protected Species Sightings Recorded During Survey Activities Under the Garden State IHA by OSV *Go Liberty*

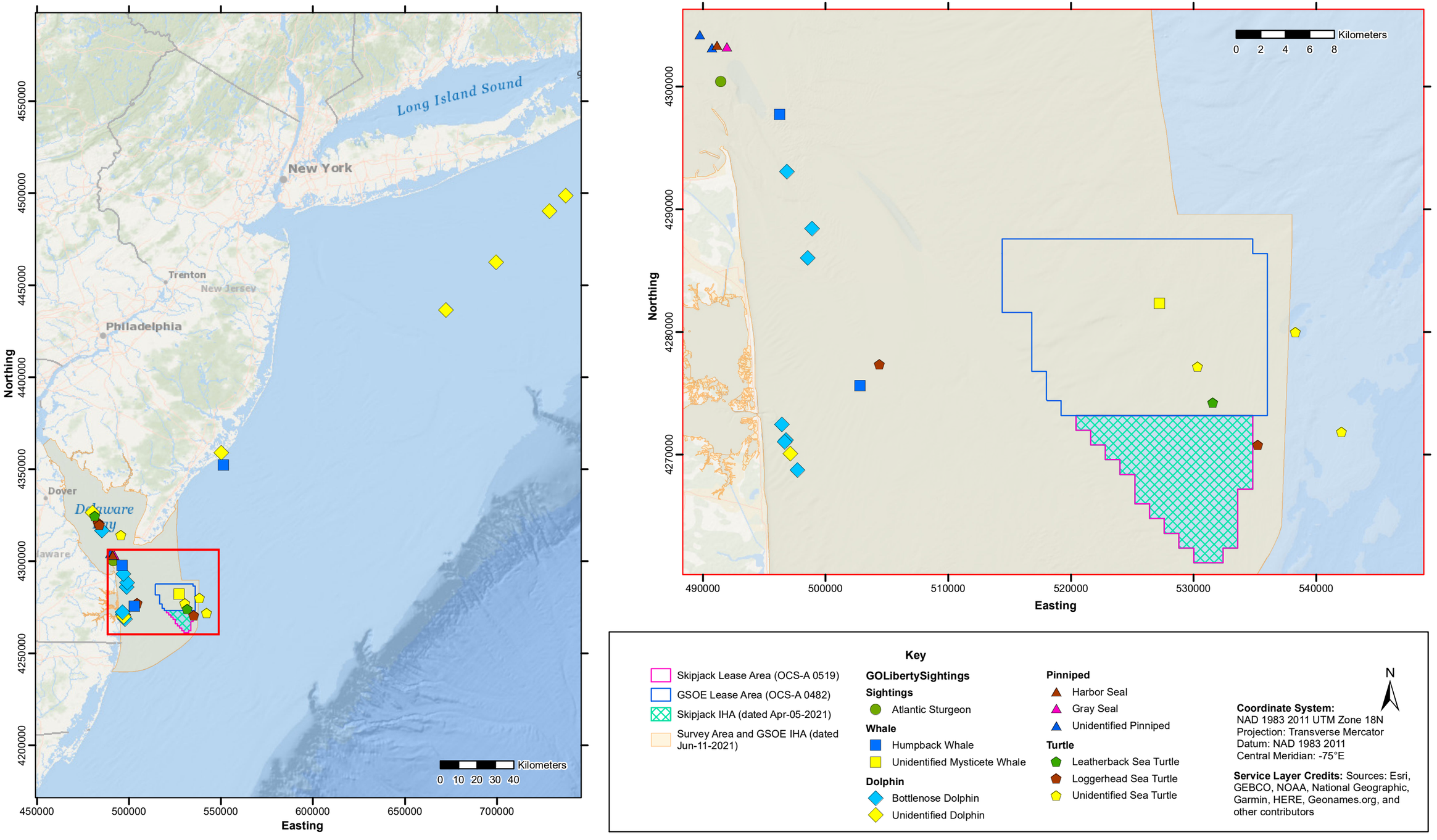
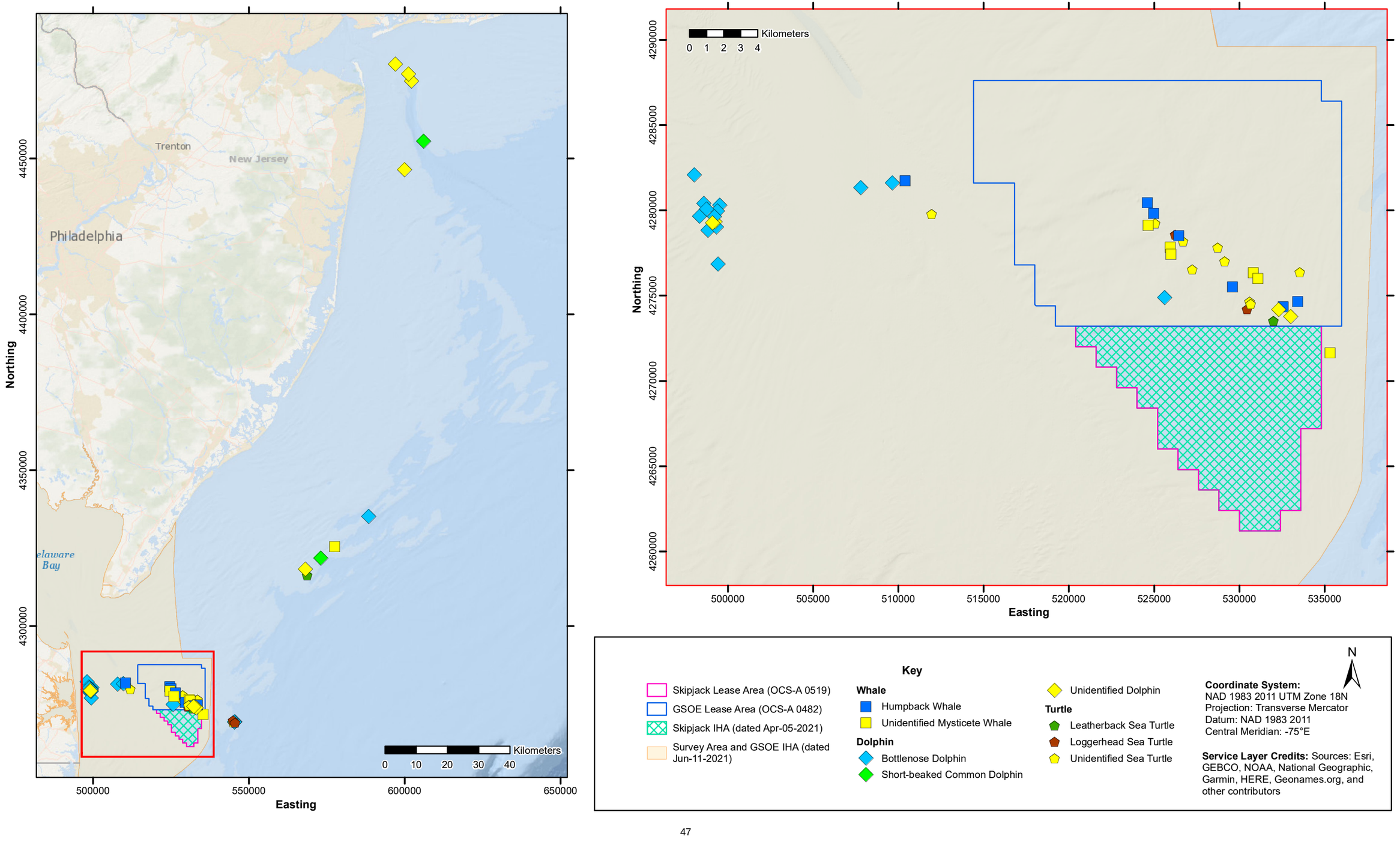


Figure 5.6 Protected Species Sightings Recorded During Survey Activities Under the Garden State IHA by RV *Brasilis*



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 5.7). 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.

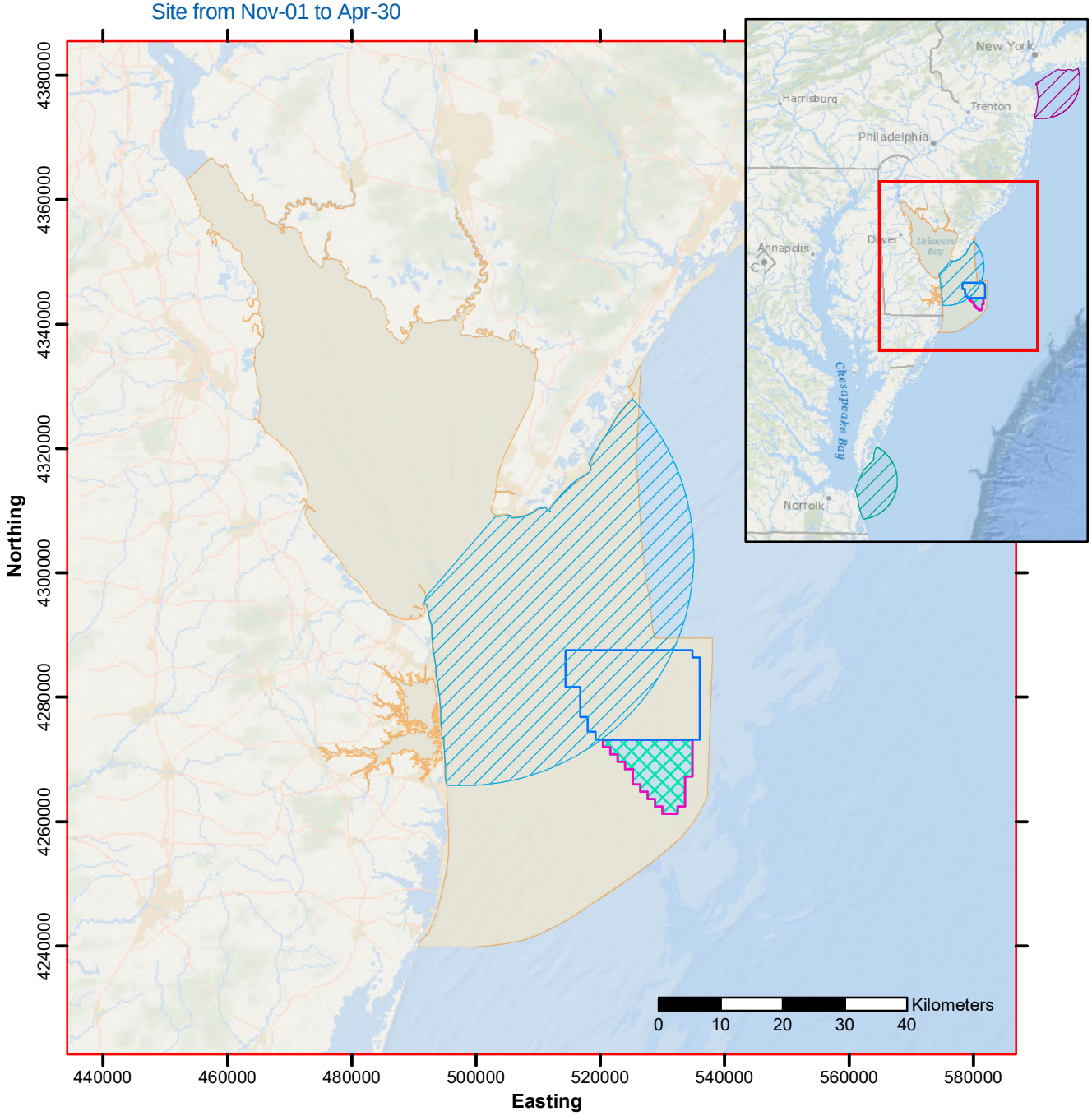
During the Surveys, five Slow Zones were established in or near the Lease Area, each with several renewals throughout the survey. The 10-knot speed restriction per NOAA guidance was adhered to when the vessel was within a Slow Zone, but no cessation of survey activities was required when the Slow Zones were established within the Lease Area. See Table 5.3 and Figure 5.8 for details of the Slow Zones.

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

Slow Zone Name (Indicative of Location)	ID(s)	Start Date	Expiry Date
20nm SE Atlantic City NJ	3488	Nov-24-2021	Dec-09-2021
	3490	Dec-02-2021	Dec-18-2021
	3492	Dec-12-2021	Dec-27-2021
	3494	Dec-21-2021	Jan-05-2022
	3499	Dec-30-2021	Jan-14-2022
	3501	Jan-09-2022	Jan-24-2022
	NA	Jan-20-2022	Feb-04-2022
	NA	Feb-01-2022	Feb-16-2022
	NA	Feb-12-2022	Feb-27-2022
	NA	Feb-21-2022	Mar-08-2022
	NA	Mar-24-2022	Apr-08-2022
64nm S Atlantic City NJ[1]	3478	Sep-30-2021	Oct-15-2021
21nm E Ocean City MD[1]	3485	Nov-12-2021	Nov-27-2021
	3493	Dec-12-2021	Dec-27-2021
	3495	Dec-21-2021	Jan-05-2022
	3500	Jan-01-2022	Jan-16-2022
	NA	Jan-10-2022	Jan-25-2022
	NA	Feb-09-2022	Feb-24-2022
	NA	Feb-24-2022	Mar-11-2022
	NA	Mar-17-2022	Apr-01-2022
46nm SE New York NY	3487	Nov-21-2021	Dec-06-2021
	3489	Dec-30-2021	Dec-15-2021
	3491	Dec-12-2021	Dec-27-2021
	3496	Dec-22-2021	Jan-06-2022
	NA	Feb-07-2022	Feb-22-2022
	NA	Mar-28-2022	Apr-12-2022
34nm SE New York NY	NA	Jan-09-2022	Jan-24-2022
	NA	Jan-18-2022	Feb-02-2022
47nm SE Atlantic City NJ	NA	Mar-01-2022	Mar-16-2022

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

Figure 5.7 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

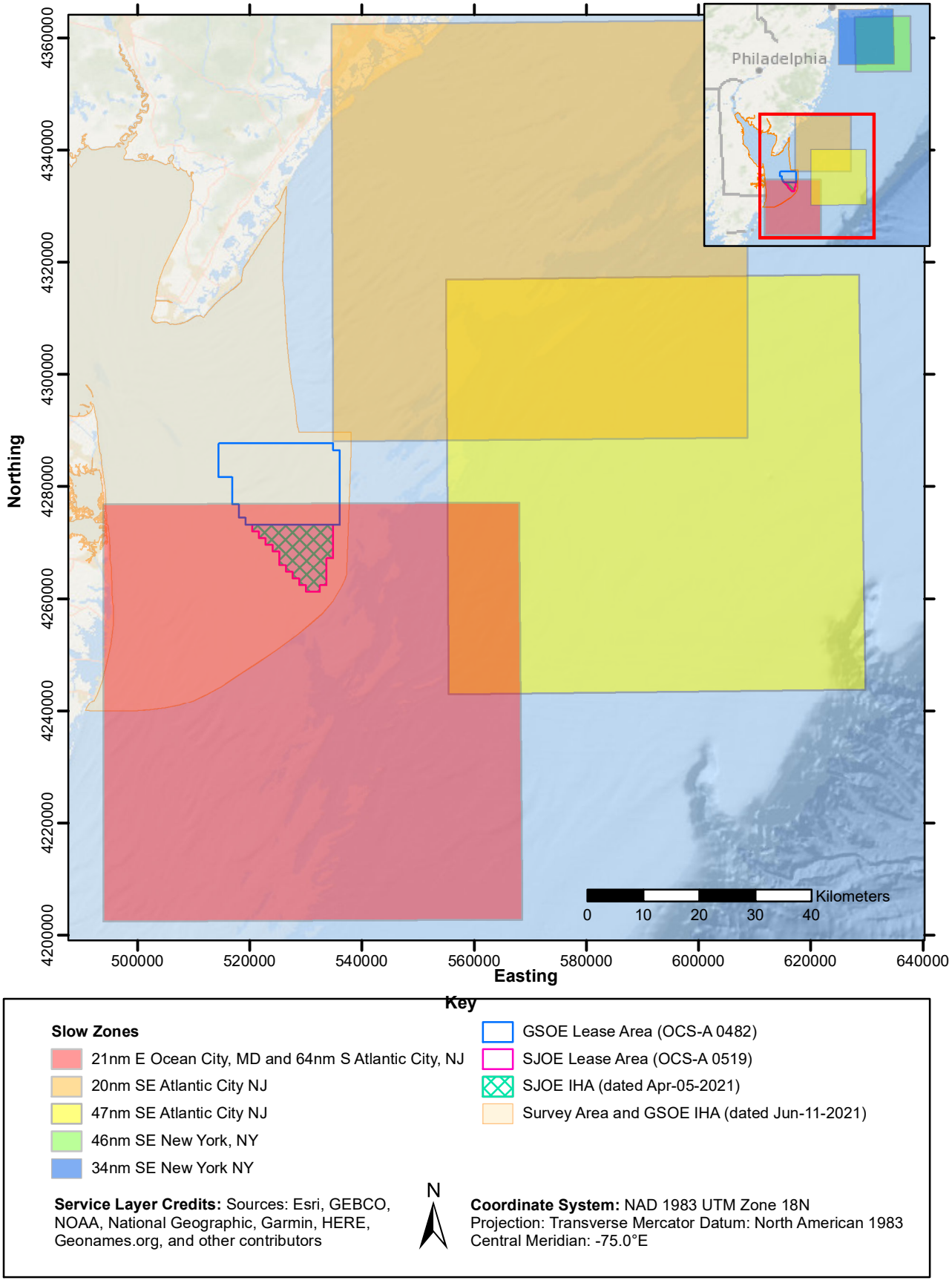
- Mid-Atlantic Chesapeake Bay
- Mid-Atlantic Delaware Bay
- Mid-Atlantic New York/New Jersey

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 5.8 Slow Zones Established During Survey Activities Under the Garden State IHA



5.1.2 North Atlantic Right Whale Detections

During the survey period between Jun-14-2021 and May-06-2022, 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.
- pinnipeds were principally noted to exhibit *mill* and *look* 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/boomer 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/boomer was active (59%), other acoustic sources <200kHz were active (71%) or all sources <200kHz were inactive (71%). Where a reaction was observed, *dive* was the most frequently identified behavior when acoustic sources <200kHz were inactive, accounting for 28% of encounters. When the sparker/boomer was active, four behavioral reactions, other than *None*, were noted: *dive, change direction*, *look* and *other* with *dive* accounting for 37% of encounters. When acoustic sources (<200kHz) other than the sparker/boomer were active, *dive* and *change direction* respectively accounted for 25% and 3% of encounters, and no other reaction behaviors were observed.

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

Species	Scientific Name	Sources <200kHz Inactive																		
		Swim	Travel	Mill	Feed	Surface-active Travel	Unknown	Blow	Porpoise	Surface-active Mill	Rest	Splash	Look	None	Socialize	Breach	Other (see notes)	Bow Ride	Dead	Tail Slap
Odontocete																				
Bottlenose Dolphin	*Tursiops truncatus*	17	25	19	3	52	0	2	13	23	0	4	0	0	0	1	0	2	0	0
Short-beaked Common Dolphin	*Delphinus delphis*	1	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	1	0	0
Unidentified Dolphin	NA	22	17	5	4	18	0	0	6	11	0	6	0	0	0	5	0	1	0	0
Unidentified Porpoise	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Unidentified Dolphin or Porpoise	NA	0	1	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total for group		**40**	**43**	**25**	**7**	**74**	**0**	**2**	**21**	**34**	**0**	**10**	**0**	**0**	**0**	**6**	**0**	**4**	**0**	**1**
Mysticete																				
Humpback Whale	*Megaptera novaeangliae*	1	1	1	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0
Minke Whale		0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Mysticete Whale	NA	1	1	0	0	5	1	6	0	1	0	1	0	0	0	2	0	0	0	0
Total for group		**2**	**3**	**1**	**0**	**5**	**1**	**19**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**
Testudine																				
Leatherback Sea Turtle	*Dermochelys coriacea*	95	7	8	0	3	1	0	0	2	16	3	5	0	0	1	1	0	0	0
Loggerhead Sea Turtle	*Caretta caretta*	8	3	1	0	14	0	0	0	2	14	0	24	0	1	0	2	0	0	0
Green Sea Turtle	*Chelonia mydas*	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kemp's Ridley Sea Turtle		1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Sea Turtle	NA	55	3	0	0	4	0	0	0	2	7	1	9	2	1	0	1	0	3	0
Total for group		**164**	**13**	**9**	**0**	**22**	**1**	**0**	**0**	**6**	**37**	**4**	**38**	**2**	**2**	**1**	**4**	**0**	**3**	**0**
Pinniped																				
Gray Seal		0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Harbor Seal		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Pinniped	NA	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total for group		**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Other																				
Unidentified Marine Mammal	NA	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Atlantic Sturgeon		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other (see notes)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Total		**206**	**59**	**36**	**7**	**101**	**2**	**21**	**22**	**41**	**37**	**15**	**39**	**2**	**2**	**10**	**4**	**4**	**3**	**1**

Behaviors include initial and subsequent encounters.

Table 5.5 Observed Initial Behaviors When The IHA-Regulated Sources Were Active

Species	Scientific Name	IHA-Regulated Sources Active																		
		Swim	Travel	Mill	Feed	Surface-active Travel	Unknown	Blow	Porpoise	Surface-active Mill	Rest	Splash	Look	None	Socialize	Breach	Other (see notes)	Bow Ride	Dead	Tail Slap
Odontocete																				
Bottlenose Dolphin	*Tursiops truncatus*	0	7	5	0	15	0	0	0	2	0	0	0	0	0	1	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	0
Unidentified Dolphin	NA	2	5	2	1	6	0	1	0	0	0	1	0	0	0	1	0	0	0	0
Unidentified Porpoise	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Dolphin or Porpoise	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total for group		**2**	**12**	**7**	**1**	**21**	**0**	**1**	**0**	**2**	**0**	**1**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**
Mysticete																				
Humpback Whale	*Megaptera novaeangliae*	2	0	0	0	0	0	3	0	0	0	0	0	0	0	1	0	0	0	0
Minke Whale		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Mysticete Whale	NA	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0
Total for group		**2**	**0**	**0**	**0**	**0**	**1**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**
Testudine																				
Leatherback Sea Turtle	*Dermochelys coriacea*	14	0	2	0	3	0	0	0	4	1	0	0	0	0	0	1	0	0	0
Loggerhead Sea Turtle	*Caretta caretta*	7	1	0	0	21	0	0	0	3	4	0	21	0	0	0	2	0	0	0
Green Sea Turtle	*Chelonia mydas*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kemp's Ridley Sea Turtle		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Sea Turtle	NA	18	0	1	0	3	1	0	0	3	4	0	2	0	0	0	1	0	0	0
Total for group		**39**	**1**	**3**	**0**	**27**	**1**	**0**	**0**	**10**	**9**	**0**	**23**	**0**	**0**	**0**	**4**	**0**	**0**	**0**
Pinniped																				
Gray Seal		0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Harbor Seal		0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Pinniped	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total for group		**0**	**0**	**1**	**1**	**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	0
Atlantic Sturgeon		0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Other (see notes)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		**43**	**13**	**11**	**2**	**48**	**2**	**5**	**0**	**12**	**9**	**1**	**23**	**0**	**0**	**5**	**4**	**0**	**1**	**0**

Behaviors include initial and subsequent encounters.

Table 5.6 Observed Initial Behaviors When Acoustic Sources <200kHz Were Active (excluding IHA-regulated sources)

Species	Scientific Name	Sources <200kHz Active (excluding IHA-regulated sources)																		
		Swim	Travel	Mill	Feed	Surface-active Travel	Unknown	Blow	Porpoise	Surface-active Mill	Rest	Splash	Look	None	Socialize	Breach	Other (see notes)	Bow Ride	Dead	Tail Slap
Odontocete																				
Bottlenose Dolphin	*Tursiops truncatus*	1	2	2	0	7	0	0	0	4	0	0	0	0	0	0	0	0	0	0
Short-beaked Common Dolphin	*Delphinus delphis*	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Unidentified Dolphin	NA	0	0	0	0	2	0	0	0	0	0	1	0	0	0	2	0	0	0	0
Unidentified Porpoise	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Dolphin or Porpoise	NA	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total for group		**1**	**3**	**2**	**0**	**10**	**0**	**0**	**0**	**5**	**0**	**1**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**
Mysticete																				
Humpback Whale	*Megaptera novaeangliae*	0	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Minke Whale		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Mysticete Whale	NA	0	0	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0	0
Total for group		**0**	**1**	**0**	**0**	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
Testudine																				
Leatherback Sea Turtle	*Dermochelys coriacea*	0	0	0	0	0	1	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	4	0	16	0	0	0	0	0	0	0
Green Sea Turtle	*Chelonia mydas*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kemp's Ridley Sea Turtle		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Sea Turtle	NA	0	0	0	0	1	0	0	0	1	0	0	2	0	0	0	0	0	0	0
Total for group		**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**1**	**4**	**0**	**18**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Pinniped																				
Gray Seal		0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Harbor Seal		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Pinniped	NA	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
Total for group		**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Other																				
Unidentified Marine Mammal	NA	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Atlantic Sturgeon		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other (see notes)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		**1**	**4**	**3**	**0**	**11**	**2**	**8**	**0**	**6**	**5**	**1**	**19**	**0**	**0**	**3**	**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	Sources <200kHz Inactive						
		None	Change Direction	Dive	Look	Speed Up	Other (see notes)	Splash
Odontocete								
Bottlenose Dolphin	*Tursiops truncatus*	150	10	1	0	0	0	0
Short-beaked Common Dolphin	*Delphinus delphis*	5	0	0	0	0	0	0
Unidentified Dolphin	NA	90	3	1	0	0	0	1
Unidentified Porpoise	NA	1	0	0	0	0	0	0
Unidentified Dolphin or Porpoise	NA	5	0	0	0	0	0	0
Total for group		**251**	**13**	**2**	**0**	**0**	**0**	**1**
Mysticete								
Humpback Whale	*Megaptera novaeangliae*	16	0	0	0	0	0	0
Minke Whale		1	0	0	0	0	0	0
Unidentified Mysticete Whale	NA	18	0	0	0	0	0	0
Total for group		**35**	**0**	**0**	**0**	**0**	**0**	**0**
Testudine								
Leatherback Sea Turtle	*Dermochelys coriacea*	60	1	79	1	0	1	0
Loggerhead Sea Turtle	*Caretta caretta*	34	0	33	2	0	0	0
Green Sea Turtle	*Chelonia mydas*	3	0	3	0	0	0	0
Kemp's Ridley Sea Turtle		0	1	0	0	0	0	0
Unidentified Sea Turtle	NA	47	1	39	0	0	1	0
Total for group		**144**	**3**	**154**	**3**	**0**	**2**	**0**
Pinniped								
Gray Seal		1	0	0	0	0	0	0
Harbor Seal		0	0	0	0	0	0	0
Unidentified Pinniped	NA	0	0	0	1	0	0	0
Total for group		**1**	**0**	**0**	**1**	**0**	**0**	**0**
Other								
Unidentified Marine Mammal	NA	1	0	0	0	0	0	0
Atlantic Sturgeon		0	0	0	0	0	0	0
Other (see notes)		1	0	0	0	0	0	0
Total		**433**	**16**	**156**	**4**	**0**	**2**	**1**

Reaction behaviors include initial and subsequent encounters

Table 5.8 Reaction Behaviors of Protected Species When The IHA-Regulated Sources Were Active

Species	Scientific Name	IHA-Regulated Sources Active						
		None	Change Direction	Dive	Look	Speed Up	Other (see notes)	Splash
Odontocete								
Bottlenose Dolphin	*Tursiops truncatus*	29	1	0	0	0	0	0
Short-beaked Common Dolphin	*Delphinus delphis*	0	0	0	0	0	0	0
Unidentified Dolphin	NA	16	2	1	0	0	0	0
Unidentified Porpoise	NA	0	0	0	0	0	0	0
Unidentified Dolphin or Porpoise	NA	0	0	0	0	0	0	0
Total for group		**45**	**3**	**1**	**0**	**0**	**0**	**0**
Mysticete								
Humpback Whale	*Megaptera novaeangliae*	6	0	0	0	0	0	0
Minke Whale		0	0	0	0	0	0	0
Unidentified Mysticete Whale	NA	3	0	0	0	0	0	0
Total for group		**9**	**0**	**0**	**0**	**0**	**0**	**0**
Testudine								
Leatherback Sea Turtle	*Dermochelys coriacea*	12	1	11	1	0	0	0
Loggerhead Sea Turtle	*Caretta caretta*	22	0	36	1	0	0	0
Green Sea Turtle	*Chelonia mydas*	0	0	0	0	0	0	0
Kemp's Ridley Sea Turtle		0	0	0	0	0	0	0
Unidentified Sea Turtle	NA	14	0	17	1	0	1	0
Total for group		**48**	**1**	**64**	**3**	**0**	**1**	**0**
Pinniped								
Gray Seal		1	0	0	0	0	0	0
Harbor Seal		0	0	1	0	0	0	0
Unidentified Pinniped	NA	0	0	0	0	0	0	0
Total for group		**1**	**0**	**1**	**0**	**0**	**0**	**0**
Other								
Unidentified Marine Mammal	NA	0	0	0	0	0	0	0
Atlantic Sturgeon		2	0	0	0	0	0	0
Other (see notes)		0	0	0	0	0	0	0
Total		**105**	**4**	**66**	**3**	**0**	**1**	**0**

Reaction behaviors include initial and subsequent encounters

Table 5.9 Reaction Behaviors of Protected Species When Acoustic Sources <200kHz Were Active (excluding IHA-regulated sources)

Species	Scientific Name	Sources <200kHz Active (excluding IHA-regulated sources)						
		None	Change Direction	Dive	Look	Speed Up	Other (see notes)	Splash
Odontocete								
Bottlenose Dolphin	*Tursiops truncatus*	16	0	0	0	0	0	0
Short-beaked Common Dolphin	*Delphinus delphis*	0	2	0	0	0	0	0
Unidentified Dolphin	NA	5	0	0	0	0	0	0
Unidentified Porpoise	NA	0	0	0	0	0	0	0
Unidentified Dolphin or Porpoise	NA	1	0	0	0	0	0	0
Total for group		**22**	**2**	**0**	**0**	**0**	**0**	**0**
Mysticete								
Humpback Whale	*Megaptera novaeangliae*	4	0	0	0	0	0	0
Minke Whale		0	0	0	0	0	0	0
Unidentified Mysticete Whale	NA	5	0	0	0	0	0	0
Total for group		**9**	**0**	**0**	**0**	**0**	**0**	**0**
Testudine								
Leatherback Sea Turtle	*Dermochelys coriacea*	0	0	1	0	0	0	0
Loggerhead Sea Turtle	*Caretta caretta*	8	0	12	0	0	0	0
Green Sea Turtle	*Chelonia mydas*	0	0	0	0	0	0	0
Kemp's Ridley Sea Turtle		0	0	0	0	0	0	0
Unidentified Sea Turtle	NA	2	0	2	0	0	0	0
Total for group		**10**	**0**	**15**	**0**	**0**	**0**	**0**
Pinniped								
Gray Seal		1	0	0	0	0	0	0
Harbor Seal		0	0	0	0	0	0	0
Unidentified Pinniped	NA	2	0	1	0	0	0	0
Total for group		**3**	**0**	**1**	**0**	**0**	**0**	**0**
Other								
Unidentified Marine Mammal	NA	1	0	0	0	0	0	0
Atlantic Sturgeon		0	0	0	0	0	0	0
Other (see notes)		0	0	0	0	0	0	0
Total		**45**	**2**	**16**	**0**	**0**	**0**	**0**

Reaction behaviors include initial and subsequent encounters

5.3 Closest Observed Point of Approach

The CPA to Active or Inactive sources <200kHz was estimated by PSOs for all visual detections.

As displayed in Figure 5.9, there were no mysticete encounters with a CPA of <500m when the IHA regulated sources were Active and none with a CPA <200m when other sources <500kHz were Active. With a single exception, Mysticete cetaceans did not approach within 100m of the vessel; with 47% of all encounters recording a CPA of >1km.

Conversely, the majority of odontocete encounters approached within 200m of the Inactive or Active sources (70%; Figure 5.10). However, the proportion of encounters with a CPA <200m was lower when IHA regulated sources were Active (58%), compared with when other sources <200kHz were Active (79%) or when sources <200kHz were Inactive (72%).

Most testudines encounters occurred at a CPA distance of less than 50m (35%) and all encounters with the exception of two, were within 1000m (Figure 5.11). The proportion of encounters with a CPA <50m was lower when IHA regulated sources were Active (31%), compared with when other sources <200kHz were Active (52%) but similar to when sources <200kHz were Inactive (35%).

Figure 5.12 to Figure 5.14 further indicate that the median CPA differs by species group.

Figure 5.9 Closest Point of Approach of Mysticete Cetacean Encounters to Active or Inactive Sources <200kHz

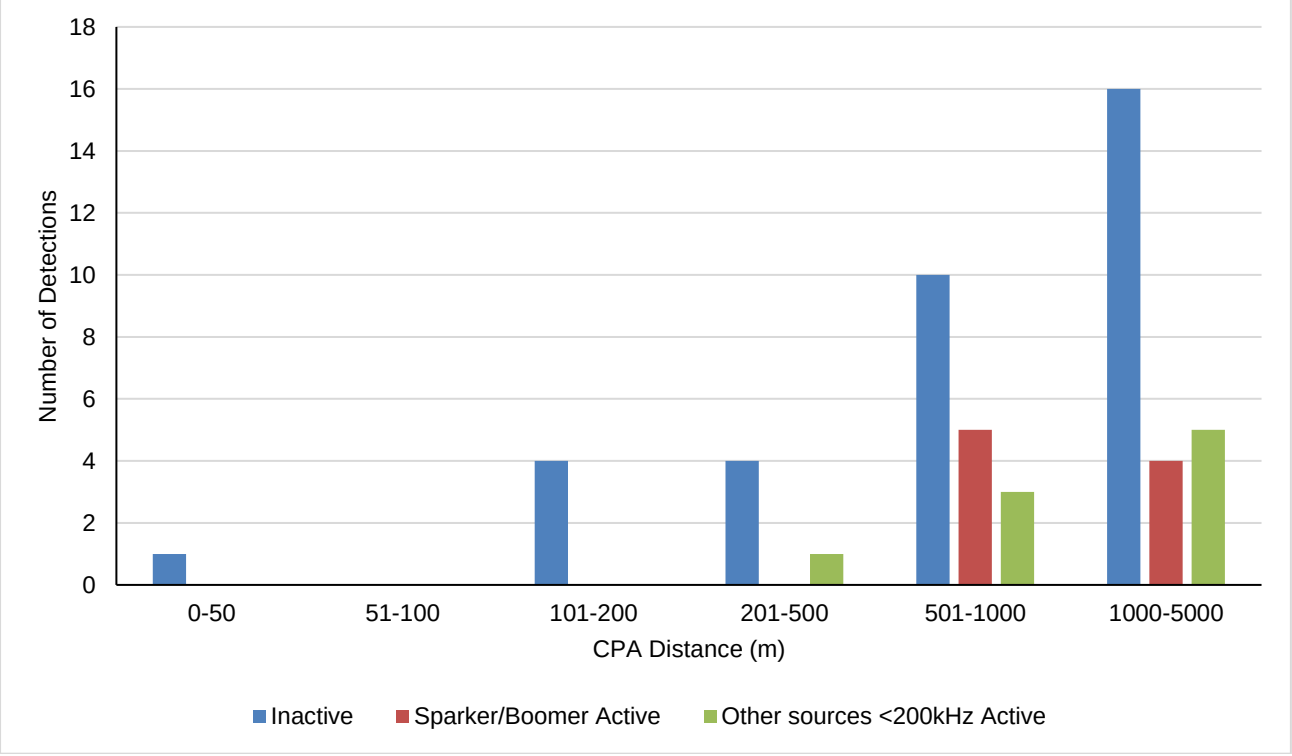


Figure 5.10 Closest Point of Approach of Odontocete Cetacean Encounters to Active or Inactive Sources <200kHz

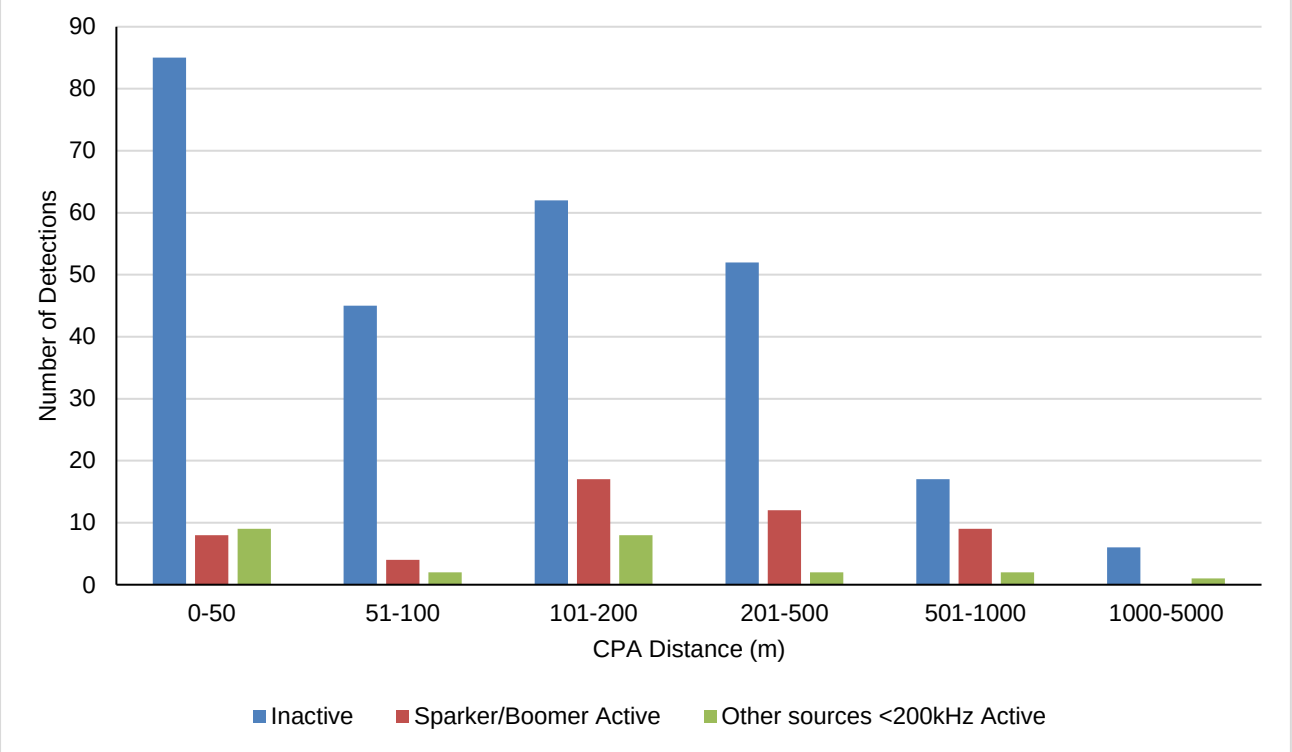


Figure 5.11 Closest Point of Approach of Testudine Encounters to Active or Inactive Sources <200kHz

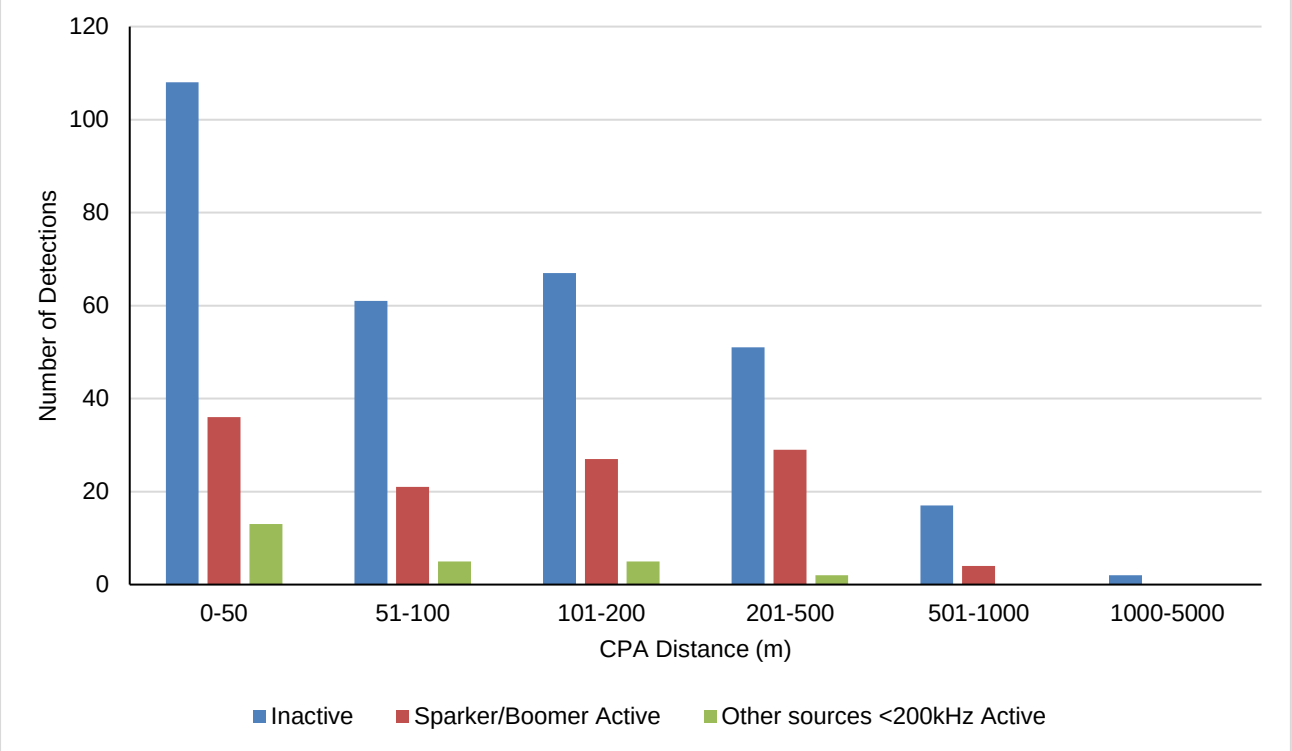


Figure 5.12 Box and Whisker plot of Closest Point of Approach to Inactive Acoustic Sources <200kHz by Protected Species Groups

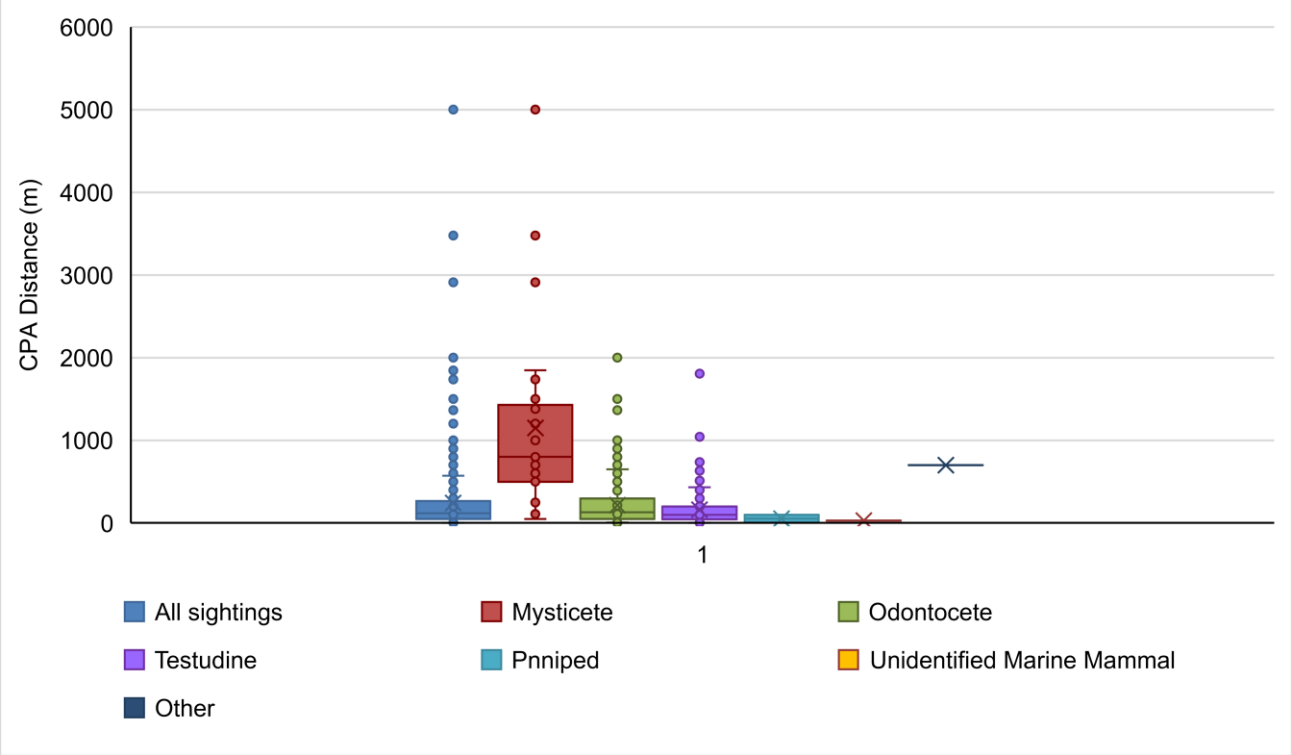


Figure 5.13 Box and Whisker plot of Closest Point of Approach to Active Sparker/Boomer by Protected Species Groups

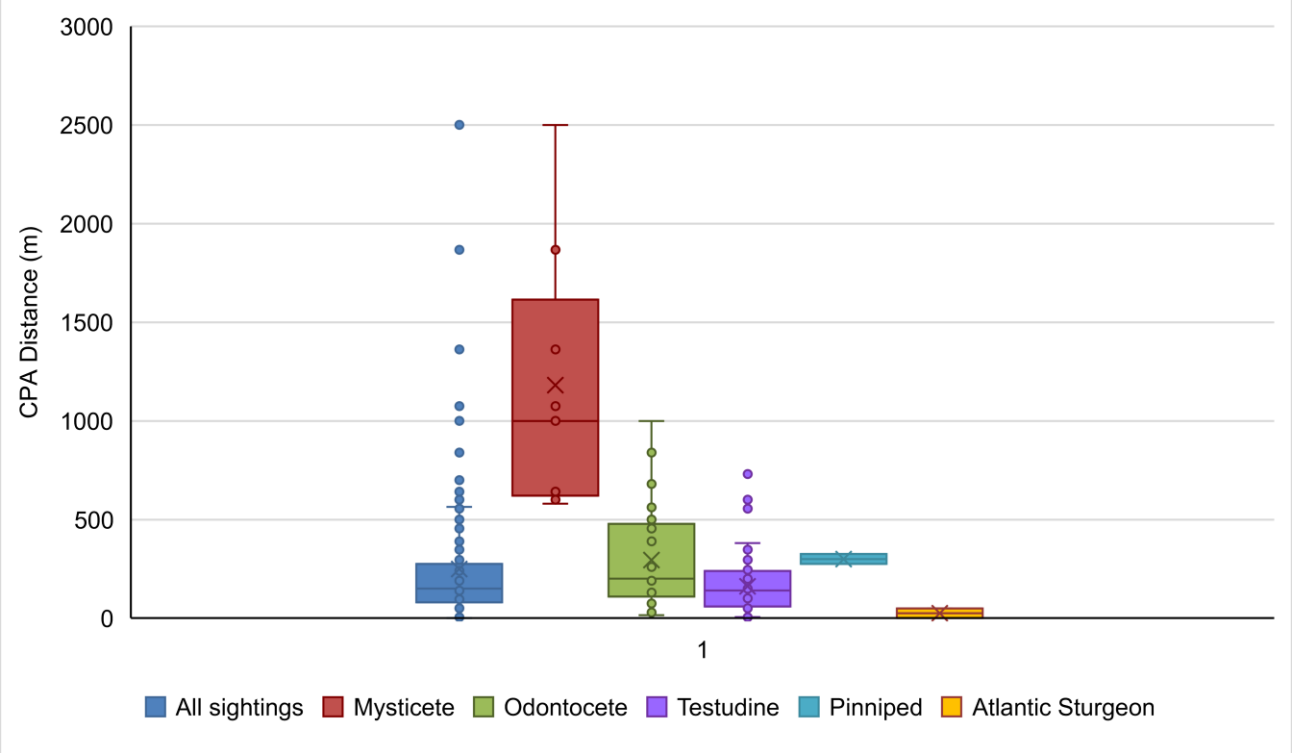
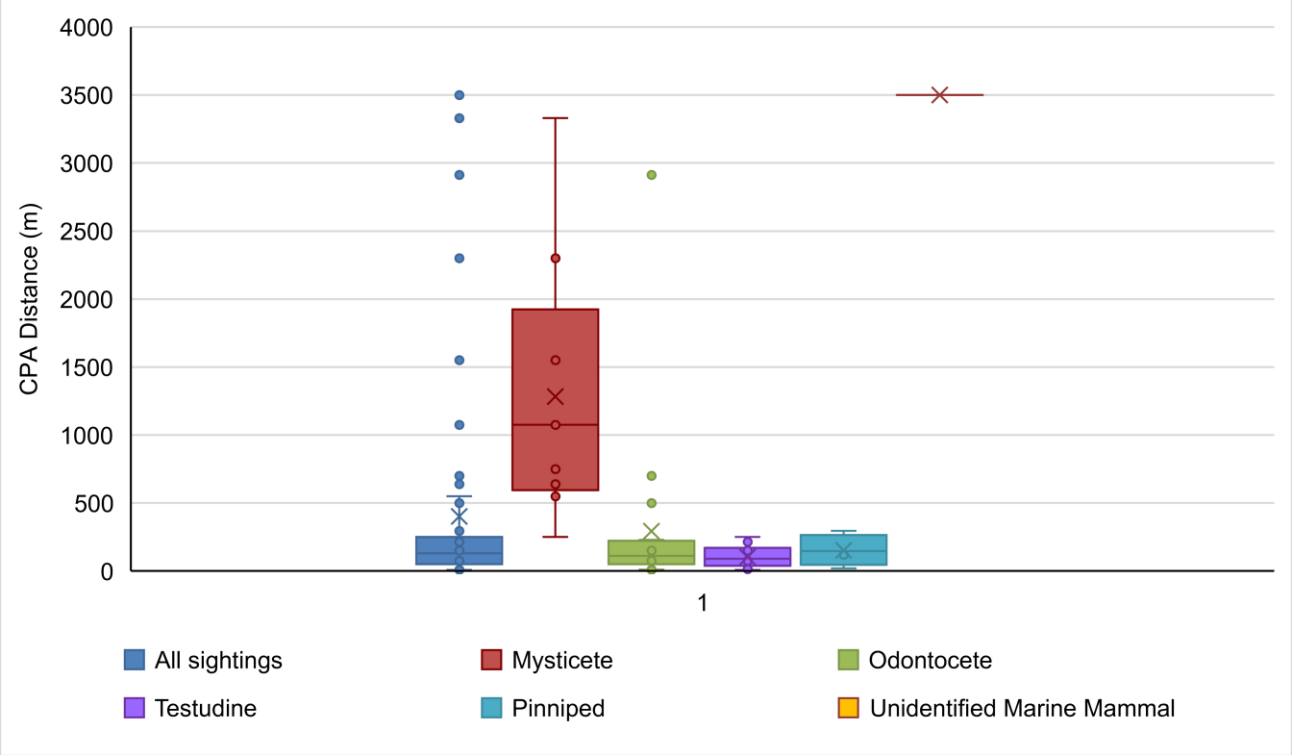


Figure 5.14 Box and Whisker plot of Closest Point of Approach to Other Active Sources <200kHz by Protected Species Groups



5.4 Summary of Mitigation Measures

Mitigation measures were implemented for 344 (40%) of the 854 protected species encounters. *Detection delay* (56%) and *shutdown* (34%) were the most common mitigation measures implemented. Leatherback and loggerhead sea turtles were the primary cause of these mitigation measures, which is consistent with their tendency for close approach discussed above. 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 Request						Total	None
		Detection Delay	Shutdown	Other (see notes)	Alter Course	Reduce Speed	Powerdown		
Odontocete									
Bottlenose Dolphin	*Tursiops truncatus*	14	0	0	1	0	5	20	187
Short-beaked Common Dolphin	*Delphinus delphis*	0	0	3	0	0	0	3	4
Unidentified Dolphin	NA	1	0	1	0	0	0	2	117
Unidentified Porpoise	NA	0	0	0	0	0	0	0	1
Unidentified Dolphin or Porpoise	NA	0	0	0	0	0	0	0	6
Total for group		**15**	**0**	**4**	**1**	**0**	**5**	**25**	**308**
Mysticete									
Humpback Whale	*Megaptera novaeangliae*	1	0	0	1	0	0	2	24
Minke Whale		0	0	0	0	0	0	0	1
Unidentified Mysticete Whale	NA	1	0	0	1	0	0	2	24
Total for group		**2**	**0**	**0**	**2**	**0**	**0**	**4**	**49**
Testudine									
Leatherback Sea Turtle	*Dermochelys coriacea*	94	25	10	3	1	0	133	35
Loggerhead Sea Turtle	*Caretta caretta*	30	60	2	1	0	0	93	55
Green Sea Turtle	*Chelonia mydas*	4	0	0	0	0	0	4	2
Kemp's Ridley Sea Turtle		1	0	0	0	0	0	1	0
Unidentified Sea Turtle	NA	46	33	3	0	0	0	82	43
Total for group		**175**	**118**	**15**	**4**	**1**	**0**	**313**	**135**
Pinniped									
Gray Seal		0	0	0	0	0	0	0	3
Harbor Seal		0	0	0	0	0	0	0	1
Unidentified Pinniped	NA	2	0	0	0	0	0	2	2
Total for group		**2**	**0**	**0**	**0**	**0**	**0**	**2**	**6**
Other									
Unidentified Marine Mammal	NA	0	0	0	0	0	0	0	2
Atlantic Sturgeon		0	0	0	0	0	0	0	2
Other (see notes)		0	0	0	0	0	0	0	1
Total		**194**	**118**	**19**	**7**	**1**	**5**	**344**	**510**

Mitigation measures include initial and subsequent encounters.

5.5 Protected Species Incident Reports

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

- On Jun-27-2021 a dead unidentified turtle was sighted by PSOs on the RV *Ocean Researcher*. The turtle was observed floating high in the water and not moving. It was not considered to be associated with survey activities.
- On Jul-22-2021 a dead unidentified sea turtle was sighted by PSOs on the RV *Ocean Researcher* floating as the vessel returned to site from a period alongside. It was not considered to be associated with survey activities.
- On Aug-21-2021 a dead unidentified sea turtle was sighted by PSOs on the MV *Ocean Endeavour.* This turtle was moderately decomposed upon sighting and not considered to be associated with survey activities.
- On Sep-04-2021 a dead unidentified sea turtle was sighted by PSOs on the MV *Ocean Endeavour*. The turtle was decomposing and being eaten by scavenging birds and was not considered to be associated with survey activities.
- On Nov-02-2021an injured humpback whale was sighted by PSOs on the MV *Ocean Researcher.* This animal had several well-healed shark-bites on its back and fins, and a small fresh wound on its dorsal fin. None were associated with survey activities.
- On Nov-16-2021 a dead sturgeon was sighted by PSOs on the OSV *Go Liberty*. The sturgeon was missing a third of its body and drifted past while the vessel was moving slowly. It was not considered to be associated with survey activities.

All incidents were recorded using the required BOEM incident report forms and are 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 source 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 and boomer 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.

Of the 854 encounters, 81 (9.5%) occurred within the 141m HZ while the IHA regulated sources <200kHz were active. Of these, 61 were turtles, 18 were dolphins and 2 were sturgeon. In all 61 encounters of turtles, a shutdown was implemented. Of the 2 sturgeon sightings, one was of a dead individual and there was no requirement to shut down for the live individual. The requirement to shut down operations when a marine mammal was observed within the Level B HZ of active acoustic sources <200kHz did not apply to bottlenose dolphins, if the PSO on watch deemed their approach to be voluntary. Of the 18 dolphin sightings with a CPA to Active IHA regulated source of <141m, there were 17 groups of bottlenose dolphins (214 individuals) and one group of unidentified dolphins (3 individuals). Nine of these 18 dolphin groups did not come within 100m of an Active IHA regulated source and did not require a shutdown. Of

those nine remaining dolphin groups that did enter within 100m of an Active IHA regulated source, *powerdowns* rather than *shutdowns* were implemented in the case of 4 encounters, (bottlenose dolphin, 67 individuals) and no mitigation actions were implemented for the remaining 5 encounters (bottlenose dolphin, 72 individuals). In the case of 3 of these sightings where no mitigation was implemented (36 individuals), it was recorded explicitly by the PSOs that they considered the animals approach to be voluntarily. The remaining 2 sightings consisted of 36 individuals and the notes included with both sightings state that the animals approached and passed by or under the vessel.

6 MONITORING DEVICE EFFECTIVENESS

It should be noted that detections took place over an eleven-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 and UE 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 and UE 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 the RV *Ocean Researcher*, 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.

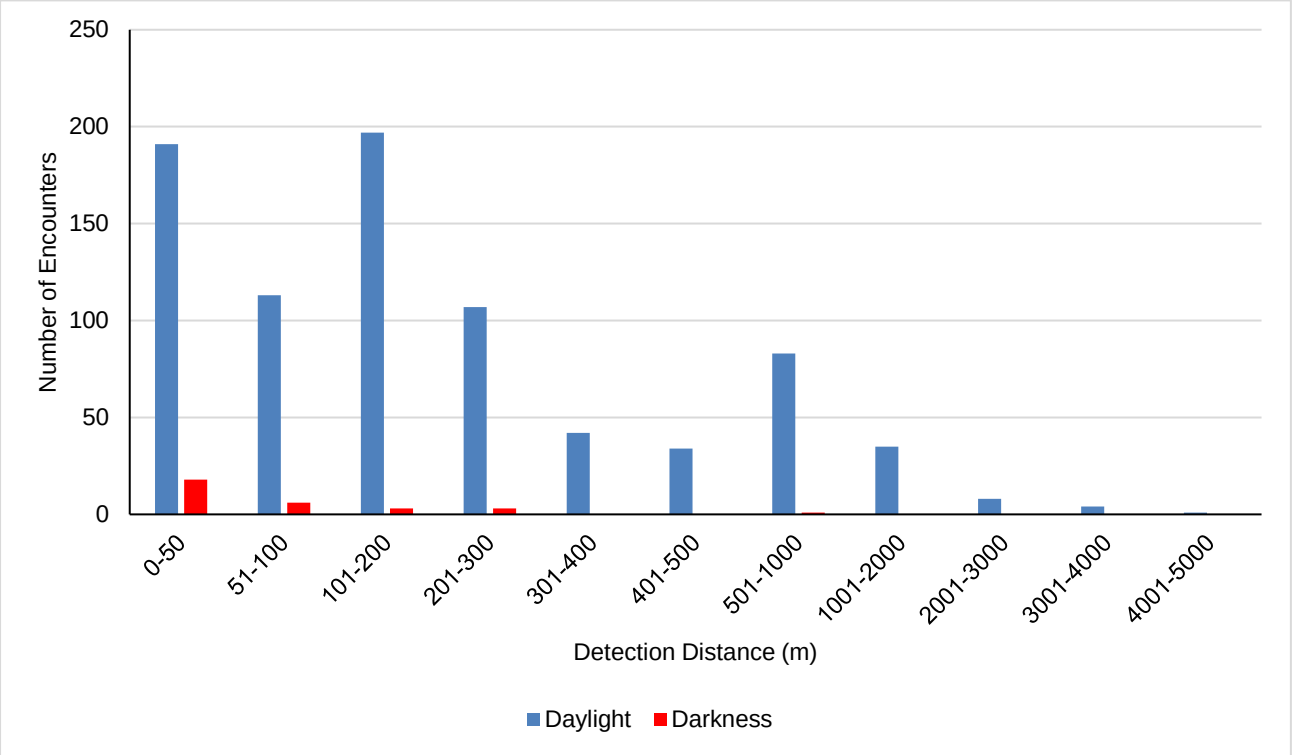
6.2 Initial Detection Distance

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 of the 846 initial encounters (94%) were detected with UE and/or RB. This is consistent with UE (including RB) being the most widely used technique, accounting for 64% 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 (96m) during darkness, compared with daylight (312m, Figure 6.1).

Detection distances of protected species groups are illustrated in Figure 6.1 and ranged from 1m to 5000m, with the maximum detection distance during darkness being 600m. Most detections (62%) occurred at a detection distance of ≤200m.

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 average of 101 detections per 1000 hours of PSO effort (based on UE and RB combined and the assumption that a third of NVD and IR PSO Effort during darkness involved UE as per the AMP (Ørsted, 2021) to minimize potential eye strain). UE was particularly effective during Daylight (119 detections per 1000 hours of PSO effort), but less effective during Darkness (2 detections per 1000 hours of PSO Effort). Within this category, there were 18 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. RBs were often used as a subsequent detection method (20% 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.

Albeit rarely used during Daylight (24 hours), vessel-mounted IR was also an effective device, with an average of 41 Daylight detections per 1000 hours of Daylight PSO Effort, relating to periods when the bridge was inaccessible due to Covid restrictions whilst under pilotage. The effectiveness of vessel-mounted IR during Darkness was 12 detections per 1000 hours of PSO Effort.

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 and this is reflected in the detection rates with the NVD averaging 12 detections per 1000 hours of PSO Effort in Darkness, whereas there were no detections attributed to the HH IR. 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.

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 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 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)	PVS7-2 (ATN)
Generation Image Intensifier Tube	3	
Resolution (lp/mm)	57 - 64	
Optical magnification	1x	1x
FOV	40°	40°
Lens system	26.8mm: F 1.2	27mm: 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	680g
Eye relief	15mm	
Dimensions	160x150x75mm	162x152x76mm
Focus range, m	0.25 to ∞	0.2 to ∞
Diopter Adjustment	-6 to +5	-6 to +2
Signal to Noise	>23	12-20
Supply voltage, V (CR123A)	3	3
Automatic Brightness Control	Yes	Yes
Automatic Light Cut-Off	Yes	Yes
Automatic Shut-off System	Yes	Yes
IR effective distance (m)	30	
Interpupillary Adjustment, mm	57÷73	51÷72
Output pupil diameter, mm	15	
Operating resource, hours	10000	5000 (60 hours battery life)
Operating Temperature Range °C	-40 to 55	-51 to 49
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)	Cobra TB75-640
FOV	10° × 8° NTSC	8.3° × 6.6°
Lens system		75mm, F1.0
Start-up from Standby	< 1.5 seconds	3 seconds
Waveband	7.5 - 13.5µm	
Thermal Sensitivity	<50mK @ f/1.0	
Detector Type	640 × 480 VOx Microbolometer	640 x 512 FLIR Tau 2 17µm Uncooled 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	2.6× (2x, 4x 8x digital)
Diopter Adjustment Range		-5 to +5 diopters
Focusing range		5m to ∞
Display resolution		800 x 600 pixels
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	NTSC (640x480 pixels) or PAL (768x574 pixels)
Video Refresh Rate	<9Hz or 30Hz (NTSC and PAL)	30Hz
Image Polarity	White Hot/Black Hot/Marine Red/InstAlert; Selectable	White Hot/Black Hot/Fusion/Rainbow/ Globow/Ironbow1/Ironbox2/Sepia/Color1/ Color2/Ice-Fire/Rain/OEM
On-Screen Symbology	Standard	
SD Card	Stores still images and video	
Battery Type	4 AA Batteries; NiMH, Li-Ion, or Alkaline	2x CR123A 3V Li-Ion or CR123 type rechargeable batteries 3V to 3.7V
Battery Life (Operating)	>5 hours on NiMH batteries	<4 hours (optional up to 12 hours)
Battery Life (Stand-By)	120 hours on NiMH batteries	
Rating	IP-67, Submersible	Waterproof
Operating Temperature	-4°F to +140°F (-20°C to +50°C)	-40°F to +122°F (-40°C to +50°C)
Drop	1m drop (camera body only)	
Physical Dimensions	11.5” x 6.5” x 2.6”	12.2x4.2x3.5in (312x109x89mm)
Weight (incl. lens)	3.05 lb. (1380 g) with batteries	2.5 lb. (1140 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: Kerri-Louise Sanders

Date and Time animal observed: 27/06/2021 19:42 UTC

Date and Time animal/samples collected: N/A

Location of Incident (Latitude/Longitude): 38° 36' 44.3N 74° 38' 35.3W

Species Identification (closest taxonomic level possible): Unidentified 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, 4.1knots speed, on a line change with MBES, SSS and USBL equipment in the water. USBL was no active.

Environmental conditions at time of observation (i.e. Beaufort sea state, cloud cover, wind speed, glare):
Beaufort Sea State 4, wind speed 11knots from 200°, 50% cloud cover, partially cloud, moderate glare.

Water temperature (°C) and depth at site of observation: 29m water depth

Describe location of animal and events leading up to, including, and after, the incident: Turtle was observed outside the 200m exclusion zone at a range of approximately 200m from the PSO, floating on the surface. PSO observed the turtle for 10mins, prepared to call a detection delay if required. During this time there seemed to be no independent movement from the animal, other than movement caused by wave action. The head did not raise above the surface of the water for breathing behaviour.

Status of all sound-source use in the 24 hours preceding the incident: MBES used for the previous 24hours, Sparker used, and USBL used

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

- **26/06/2021 12:40 UTC Unidentified Turtle, Observed at 200m with CPA 100m, MBES Active, 38° 38' 40.7"N 74° 39' 4.1"W, looked, swam and dove. Sighting ended 12:48 UTC.**
- **26/06/2021 17:03 UTC Unidentified Turtle, Observed at 30m with CPA 30m, MBES Active, 38° 38' 12.8"N 74° 39' 49.2"W, Swam, travelled. Detection delay to operations. Sighting ended 17:04UTC.**
- **26/06/2021 21:25 UTC Leatherback Turtle, Observed at 50m with CPA 80m, MBES Active, 38° 38' 14.7"N 74° 40' 1.5"W, Swam. Detection delay to operations. Sighting ended 21:27UTC.**

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): _____

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: Good condition, no obvious injuries, just floating high in the water and no apparent independent movement.

_____

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.):

No obvious injuries or entanglement observed at detection distance.

_____

_____

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: Felix Smith

Date and Time animal observed: 19:13 UTC, 22 July 2021

Date and Time animal/samples collected: N/A

Location of Incident (Latitude/Longitude): 39°14' 30.84"W 75° 18' 56.0"N

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

Photograph/Video footage collected:

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, 11.9Kn, Transit to survey area under pilotage.

Environmental conditions at time of observation (i.e. Beaufort sea state, cloud cover, wind speed, glare):
Beaufort: 2, Cloud cover: 50%, Wind Speed: Light Airs, Glare: Slight.

Water temperature (°C) and depth at site of observation: Temp N/A, Depth 15.1m

Describe location of animal and events leading up to, including, and after, the incident: Turtle seen floating in a glassy patch of sea, ahead and starboard of the vessels bow, at a range of 500m.

Status of all sound-source use in the 24 hours preceding the incident: None

Describe all marine mammal, sea turtle, and sturgeon observations in the 24 hours preceding the incident:
Bottlenose Dolphin sighting at 18:19UTC, consisting of two individuals, observed at a range of 100m milling around the border between water currents. They came towards the vessel slightly before swimming parallel to the vessel and then milling behind the vessel. CPA to observer was 80m.
Bottlenose Dolphin sighting at 18:43UTC, consisting of two adults and a juvenile, observed at a range of 200m, milling with many changes of direction. Mother and juvenile remained in close proximity to each other while the 2nd adult roamed further away. CPA to observer was 200m.

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*):
Weight (kg or lbs): N/A
Sex (circle): ~~MALE FEMALE~~ UNKNOWN How was sex determined? _____
Straight carapace length: Unknown Straight carapace width: _____
Curved carapace length: _____ Curved carapace width: _____
Plastron length: _____ Plastron width: _____
Tail length: _____ Head width: _____
Condition of specimen/description of animal: large turtle, heavily encrusted, some swelling on the neck region, no visible wounds. Birds circling above the carcass.
_____

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.):

No entanglement / visible wounds. No interaction with vessel, vessel had been alongside Baltimore Harbour for the preceding 24hour period.
_____

_____

Gardline

APPENDIX D INCIDENT REPORT FORM: PROTECTED SPECIES INJURY OR MORTALITY

Incident Report: Protected Species Injury or Mortality

Photographs/Video should be taken of all injured or dead animals.

Observer's full name: RODRIGO AMIGHINI ROSA

Reporter's full name: RODRIGO AMIGHINI ROSA

Species Identification: UNIDENTIFIED SEA TURTLE

Name and type of platform: OCEAN ENDEAVOUR

Date animal observed: 21/08/2021 Time animal observed: 18:20 (UTC)

Date animal collected: N/A Time animal collected: N/A

Environmental conditions at time of observation (i.e. tidal stage, Beaufort Sea State, weather):
1.5 meters wave. Beaufort 3. overcast. 6 knots (E).

Water temperature (°C) and depth (m/ft) at site: 18m depth

Describe location of animal and events 24 hours leading up to, including and after, the incident (incl. vessel speeds, vessel activity and status of all sound source use):
38° 37' 52.9" N / 74° 57.0'9" W. Innomar, gradiometer, MBES, Side scan sonar and USBL been used since 14:49 (UTC) for running infill lines. Before the start of the infill lines the vessel was waiting on weather to start surveying

Photograph/Video taken: YES / NO If Yes, was the data provided to NMFS? YES / NO
(Please label *species, date, geographic site* and *vessel name* when transmitting photo and/or video)

Date and Time reported to NMFS Stranding
Hotline: 19:42 (UTC) 21 AUGUST 2021 - NMFS STRANDING COORDINATOR CALLED
19:47 (UTC) 21 AUGUST 2021 - NMFS OFFICE OF PROTECTED RESOURCES CALLED

<u>Sturgeon Information</u>: *(please designate cm/m or inches and kg or lbs)*

Species: ______

Fork length (or total length): ______ Weight: ______

Condition of specimen/description of animal: ______

Fish Decomposed: NO SLIGHTLY MODERATELY SEVERELY

Fish tagged: YES / NO If Yes, p*lease record all tag numbers.*

Tag #(s):_____

Genetic samples collected: YES / NO

Genetics samples transmitted to:_____on____/_____/20___

Sea Turtle Species Information: *(please designate cm/m or inches)*

Species: Unidentified Sea turtle Weight (kg or lbs):_____

Sex: 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: The sea turtle was on moderately decomposed stage, with gas distention and with carapace and skin in moderate stages of sloughing. * CONTINUED DESCRIPTION BELOW

Existing Flipper Tag Information

Left:_____ Right:_____

PIT Tag#:_____

Miscellaneous:

Genetic biopsy collected: YES NO Photographs 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.)_____

* THE SEA TURTLE WAS MOTIONLESS THROUGHOUT THE SIGHTING AND FLOATING UNCHARACTERISTICALLY HIGH IN THE WATER, WITH THE ENTIRITY OF THE TOP OF ITS SHELL EXPOSED ABOVE THE WATER SURFACE. ITS NECK WAS SWOLLEN TO A SIZE TYPICALLY MUCH LARGER THAN A LIVE INDIVIDUAL. NO IMPACT MARKS WERE OBSERVED ON THE INDIVIDUAL, AT LEAST NOT ON THE REGIONS OF THE BODY AND SHELL VISIBLE TO THE PSO.

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF OCEAN ENERGY MANAGEMENT

APPENDIX "A" TO ADDENDUM C

Lease Number OCS-A 0482

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: KIMIKO HAMILTON

Date and Time animal observed: 04 SEPTEMBER 2021 12:53 UTC

Date and Time animal/samples collected: N/A

Location of Incident (Latitude/Longitude): 38°38"53.0'N 74°44"36.8'W

Species Identification (closest taxonomic level possible): TURTLE SPECIES

Photograph/Video footage collected: (YES)/NO If Yes, was the data provided to NMFS? YES/NO

Name of vessel, vessel speed at time of incident, and activity ongoing at time of observation (e.g., transit, survey, pile driving): OCEAN ENDEAVOUR, 4 knots, SURVEY - running geophysical survey lines

Environmental conditions at time of observation (i.e., Beaufort sea state, cloud cover, wind speed, glare): Sea state 2, 60% cloud, wind 7 knots, slight glare.

Water temperature (°C) and depth at site of observation: Depth: 19.5M

Describe location of animal and events leading up to, including, and after, the incident: Animal spotted 500m from vessel - lost from view a few minutes late

Status of all sound-source use in the 24 hours preceding the incident: INTERMITTENTLY ACTIVE

Describe all marine mammal, sea turtle, and sturgeon observations in the 24 hours preceding the incident: Two sightings previous day: 03/09/21
1. 17:20(UTC) Bottlenose dolphin x3 38°54'24.2N/75°05'57.5W
2. 20:43(UTC) Unidentified sea turtle x1 38°40'2.7N/74°43 33.5W

NOTE: Sighting was reported to the NOAA Fisheries Northeast stranding hotline on 866-755-6622 at 16:30 UTC (12:30 local time). Although the person on the line took the information on the sighting he also asked us to call NMFS on 609-292-2083. Attempted to call but did not get through.

Marine Mammal information:

Injuries observed: _____

Condition/description of animal: _____

_____

_____

Other remarks: _____

Date and time incident reported to NMFS Stranding Hotline: _____

Sturgeon Information:

Fork length (or total length): _____ Weight: _____

Condition of specimen/description of animal: _____

_____

_____

Fish Decomposed: NO SLIGHTLY MODERATELY SEVERELY

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)*

Weight (kg or lbs): N/A

Sex: Male Female (Unknown) How was sex determined? —

Straight carapace length: N/A Straight carapace width: N/A

Curved carapace length: N/A Curved carapace width: N/A

Plastron length: N/A Plastron width: N/A

Tail length: N/A Head width: N/A

Condition of specimen/description of animal: See below.

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.):

TURTLE LOOKED BLOATED AND IN A DECOMPOSING STATE. A LOT OF BIRDS WERE PRESENT AND FEEDING. Appeared to be lying on its back, difficult to see the full condition of the corpse due to the distance from the vessel.

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: Observer: Felix Smith, Reporter: Holly Bateman
Date and Time animal observed: 2nd November 2021 19:58 – 20:25 UTC
Date and Time animal/samples collected: N/A
Location of Incident (Latitude/Longitude): 38"38'20.9N 74"44'47.1W
Species Identification (closest taxonomic level possible): Humpback whale
Photograph/Video footage collected: Yes - photos
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): Ocean Researcher, 3.9kts vessel speed, surveying – no sources below 200KHz activated

Environmental conditions at time of observation (i.e. Beaufort sea state, cloud cover, wind speed, glare):
Beaufort 5, 100% cloud cover overcast, 18 kts wind speed, no glare, 1m swell

Water temperature (°C) and depth at site of observation: Temp: N/A; depth: 18.7m
Describe location of animal and events leading up to, including, and after, the incident: Injured humpback whale was first observed on site (Garden State IHA - Garden State IHA Area 1 - Mid-Atl Delaware Bay SMA - Garden State (GSOE) Lease Area) at 19:58 UTC at 1811m via a bushy blow observed on the horizon. Bearing to was 140 degrees + 02:00 travelling to 140 degrees + 05:00. Multiple blows and flukes were subsequently observed between 19:58 UTC and 20:10 UTC - all outside 1000m from the vessel. At 20:11 UTC the humpback breached within 500m of the survey vessel. All acoustic sources operating below 200KHz were off at the time the humpback was observed within the exclusion zone (EZ) and the PSOs requested that the next source activation to be delayed. The source activation delay request was accepted. The humpback was next observed at 20:16 UTC at 200m from the vessel. This was the last sighting for some time, at which point the PSOs began the 30 min detection delay. At 20:25:27.8 the humpback whale was observed outside the EZ at 1041m and therefore ramp-up of sources below 200KHz could begin. Ramp up was initiated at 20:25:55.7. The humpback was not seen again after this point.

Prior to the sighting, the vessel had been waiting on weather and conducting some seismic surveying (for further details see below). When the humpback was observed outside of the EZ the vessel continued survey operations. All survey operations were paused whilst the humpback was within EZ. After the sighting, survey operations continued as normal.

Status of all sound-source use in the 24 hours preceding the incident: 19:58 UTC on 1st November 2021 – 02:43 UTC 2nd November 2021 the vessel waited on weather on site. During this point MBES was on (above 200KHz). Between 05:03 UTC and 19:34 UTC 2nd November 2021 the vessel conducted 12 seismic survey lines acquiring MUHRS and innomar data. The MBES (below 200KHz) was also on during these hours. 1 minute periodic activations (MUHRS and innomar) were conducted between 19:50 – 19:51 UTC and 20:06 – 20:07 UTC.

Describe all marine mammal, sea turtle, and sturgeon observations in the 24 hours preceding the incident:
There were four sightings within the 24h prior to observing the injured humpback. All were observed on 2nd November 2021. 1 sighting of 2 unidentified mysticete whales (not NARW) between 14:04 – 14:05 UTC with closest point of approach (CPA) at 3000m. 1 sighting of a humpback at 15:23 – 15:45 UTC with CPA of 560m. Another humpback whale at 16:24 – 16:36 UTC with CPA of 600m. Plus one more humpback at 17:28 – 17:30 with CPA of 1500m.

Marine Mammal Information:

Injuries observed: Shark bite scarring was observed on the dorsal back behind the fin, these were very well healed. Similar scarring was evident on the dorsal fin with a distinct crescent shape indicative of shark bites. A small open wound was also observed on top of the dorsal fin. Injury was not caused due to vessel.

Condition/description of animal: Individual seemed otherwise healthy, normal behaviour was observed. Injuries were only noticed through inputting photographic data subsequent to sighting.

Other remarks: None

Date and time of incident reported to NMFS Stranding Hotline: 2nd November 2021 23:30 UTC spoke to Ainsley Smith

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.):

N/A

U.S. DEPARTMENT OF
THE INTERIOR BUREAU OF
OCEAN ENERGY
MANAGEMENT

APPENDIX "A" TO ADDENDUM C

Lease Number: Skipjack HRG Survey (Export Cable Route / Delaware Bay)

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:

John R Cooney III

Date and Time animal observed:

19:26 UTC 16 November, 2021

Date and Time animal/samples collected: N/A

Location of Incident (Latitude/Longitude):

Delaware Bay 38°51' 10.1'' N 75° 05' 55.7'' W

Species Identification (closest taxonomic level possible):

Atlantic Sturgeon

Photograph/Video footage collected: YES/NO If Yes, was the data provided to NMFS? YES/NO

The Lead PSO notified the NOAA Fisheries Greater Atlantic Regional 24-hour Hotline of the detection at 18:11 UTC (1:11 PM EST) on 17 November 2021.

Name of vessel, vessel speed at time of incident, and activity ongoing at time of observation (e.g., transit, survey, pile driving):

Survey vessel Go Liberty was towing geophysical survey gear at 3.6kts during sighting. Mitigated sound sources were turned on, but the survey was shutdown due to multi-beam ecosounder issues being investigated on deck.

Environmental conditions at time of observation (i.e., Beaufort Sea state, cloud cover, wind speed, glare):

Beaufort 3, clear skies, less than 10% cloud cover, winds 5kts from WNW, extreme glare

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

11.1°C water temperature, 24m depth

Describe location of animal and events leading up to, including, and after, the incident:

The animal was floating on the surface of the water dead in Lower Delaware Bay. The vessel was slowly holding course troubleshooting survey gear on deck, with two PSOs on visual watch when the dead animal was sighted. During the brief incident both PSOs observed the dead animal. With towed gear in the water plus strong tides and currents from a full moon it was not possible to try to stop the vessel or maneuver to better observe the dead protected species. Both PSOs noticed the animal was missing the last third of its body, it was sliced behind the pelvic fins, the caudal fin was completely gone. Possible vessel strike.

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

The vessel was not surveying on 15, November 2021 due to foul weather, only the multibeam ecosounder was on during this period. The vessel was using mitigated and non- mitigated sound sources for a geophysical survey on 16, November 2021 when the incident occurred. The multibeam was on for the entire 24 hours leading up to the incident. The other sound sources were started at 12:30 UTC and on for the seven hours leading up to the incident. Sources on only in the seven hours prior include the Side Scan Sonar, Magnetometer, Inomar (Sub- Bottom Profiler), Sparker (Sub- Bottom Profiler), and the USBL.

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

There were no protected species sightings in the 24 hours preceding the incident.

Marine Mammal information: N/A

Length of marine mammal (note direct or estimated): _____

Weight (*if possible, kg or lbs*): _____

Sex of marine mammal (if possible): _____

How was sex determined?: _____

Confidence of Species Identification: SURE UNSURE BEST GUESS

Description of Identification characteristics of marine mammal: _____

_____

_____

Genetic samples collected: YES / NO

Genetic samples transmitted to: _____on /XX/XX/2019

Fate of marine mammal: _____

Injuries observed: _____

_____

_____

Condition/description of animal: _____

_____

Other remarks: _____

Date and time incident reported to NMFS Stranding Hotline: _____

Sturgeon Information:

Fork length (or total length): N/A **Weight:** N/A

Condition of specimen/description of animal:

Animal was dead, floating on the surface. Rigor mortis had set in and fish had lost color, appearing pale white. The fish was missing about 1/3 of its body, the section from behind the pelvic fins to the caudal fin.

The dead fish (Atlantic Sturgeon) was floating upside down with the following characteristics visible. 1) elongated, slightly pointed conical snout with a wide base. 2) chin barbels 3) small inferior mouth 4) short triangular shaped pectoral and pelvic fins 5) multiple rows of dermal scutes or bony plates

Based on head shape this could be identified as Atlantic Sturgeon and not Shortnose Sturgeon

Fish Decomposed: NO SLIGHTLY MODERATELY SEVERELY

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

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: N/A on (mm/dd/yyyy)

Sea Turtle Species Information: *(please designate cm/m or inches)*

Weight (kg or lbs): _____

Sex: 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

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.):

The dead fish (Atlantic Sturgeon) was floating upside down with the following characteristics visible. 1) elongated, slightly pointed conical snout with a wide base. 2) chin barbels 3) small inferior mouth 4) short triangular shaped pectoral and pelvic fins 5) multiple rows of dermal scutes or bony plates

Based on head shape this could be identified as Atlantic Sturgeon and not Shortnose Sturgeon

While on watch outside on the port bridge wing of the vessel PSO1 saw a dead fish floating on the surface approximately 30m away in the 11:30 direction relative to the vessel course of 143 degrees at 19:26:39 UTC. PSO1 then called PSO2 over to observe something interesting.

When the animal was about 10m in front of the vessel PSO1 realized it was a dead Atlantic Sturgeon. This fish was quickly and easily identified by the head and body shape, rows of bony plates, and chin barbels. At this point, when it was identified as a sturgeon the dead animal was directly below the PSOs, 3m off the port side.

Being so close it made photos with a zoom lens difficult. To get the photos PSO1 hurried down to a lower deck. When the animal was finally sighted with the camera it was in the whitewater created by the pole, making the dead, white or pale discolored fish blend with its surroundings. The animal passed 1- 2m from the pole. The animal was last seen at 19:26:55 UTC floating a few meters behind the stern in the prop wash.

The animal was notably dead, over 24 hours. From best estimate it was 2- 2.5m long. The last third of the animal was either missing or not visible. It appeared to be sliced in half right past the pelvic fins.

Both PSO1 and PSO2 saw the exact same thing. Both are confident it was a dead sturgeon. Before the dead fish was in the whitewater behind the pole, its outline and shape were visible against the dark green water with the light white body and darker yellow bony plates standing out, and the conical head obvious.

The Lead PSO notified the NOAA Fisheries Greater Atlantic Regional 24-hour Hotline of the detection at 18:11 UTC (1:11 PM EST) on 17 November 2021.