NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

APEM

Environmental Imaging Solutions

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# Year 2 Digital Aerial Wildlife Survey of BOEM Lease Area OCS-A 520

## Quarterly Report: March 2021 to June 2021

**Equinor Wind US**

**APEM Ref: P00005432**

**Issued November 2021**

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## Revision and Amendment Register

| Version Number | Date | Section(s) | Page(s) | Summary of Changes | Approved by |
|---|---|---|---|---|---|
| 1.0 | 09/08/21 | All | All | Creation | MA |
| 1.1 | 11/02/21 | All | All | Addition of June data | MA |
| 1.2 | 11/03/2021 | All | All | Internal Review | BG |
| 1.3 | 11/09/2021 | 3 | 3-6 | Map updates and flight path clarification | MA |
| FINAL | 12/09/2021 | All | All | Final review | DF |

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# 1. Executive Summary

- Year 2 digital aerial wildlife surveys of the Bureau of Ocean Energy Management (BOEM) Lease Area Outer Continental Shelf – Atlantic (OCS-A) 0520, off the Massachusetts coast were conducted in March, April, May, and June 2021 using APEM Inc.'s high-resolution camera system to capture digital still imagery. Images collected have been analyzed by APEM Inc. (hereafter referred to as APEM) and quality assured by Normandeau Associates (hereafter referred to as Normandeau). Raw counts of all species and incidental observations recorded during the surveys are presented here.

- A total of 574 birds and 16 marine mammals were recorded in the Survey Area for the March 2021 survey. The most abundant group recorded was waterfowl (n=338). This was followed by auks (n=185), gulls (n=32), fulmars (n=7), and shorebirds (n=6) and gannets (n=6). Additionally, dolphins (n=11), seals (n=3), and porpoises (n=2) were also recorded.

- A total of 572 birds and two marine mammals were recorded in the Survey Area for the April I 2021 survey. The most abundant group recorded was auks (n=313). This was followed by waterfowl (n=172), loons (n=42), gulls (n=36), and gannets (n=9). Additionally, seals (n=2) were also recorded.

- A total of 271 birds and 10 marine mammals were recorded in the Survey Area for the April II 2021 survey. The most abundant group recorded was auks (n=201). This was followed by gulls (n=26), loons (n=22), waterfowl (n=12), and shearwaters (n=5) and gannets (n=5). Additionally, porpoises (n=7), whales (n=2), and dolphins (n=1) were also recorded.

- A total of 68 birds, five marine mammals, and one fish were recorded in the Survey Area for the May I 2021 survey. The most abundant group recorded was loons (n=34). This was followed by gulls (n=13) and terns (n=13), and auks (n=4) and fulmars (n=4). Additionally, unidentified marine mammals (n=5), and large bony fish (n=1) were also recorded.

  Roseate terns were recorded during the May I survey. These are Listed Species (Federally listed or Massachusetts State Listed as Threatened or Endangered). Unidentified Sterna tern species also recorded during the May I survey offer the potential to include roseate terns, though this should only be a precautionary consideration.

- A total of 37 birds, seven marine mammals, and four sharks were recorded in the Survey Area for the May II 2021 survey. The most abundant group recorded was terns (n=20). This was followed by loons (n=7), gulls (n=5), gannets (n=3), and fulmars (n=1) and shearwaters (n=1). Additionally, unidentified marine mammals (n=7), and unidentified sharks (n=4) were also recorded.

  Unidentified Sterna tern species recorded during the May II survey offer the potential to include roseate terns, though this should only be a precautionary consideration.

- A total of 349 birds, six marine mammals, three fish, and two sharks were recorded in the Survey Area for the June 2021 survey. The most abundant group recorded was shearwaters (n=303). This was followed by gannets (n=27), storm petrels (n=10), gulls (n=5), fulmars (n=2), and skuas (n=1) and unidentified birds (n=1). Additionally, dolphins (n=3), large bony fish (n=3), unidentified marine mammals (n=2), unidentified sharks (n=2), and seals (n=1) were also recorded.

- No turtles or rays were recorded during the March 2021, April I 2021, April II 2021, May I 2021, May II 2021, or June 2021 surveys.

# 2. Introduction

APEM and Normandeau were contracted by Equinor Wind US (hereafter referred to as Equinor) to provide combined spring through fall digital aerial wildlife surveys of the Massachusetts Lease Area OCS-A 0520. This will comprise the second year of surveys following the initial Year 1 surveys undertaken from March 2020 to November 2020. Surveys will be carried out on a monthly basis from March 2021 through October 2021, except for April, May, August and September, when two surveys per month shall be carried out in order to coincide with potential use of the area by roseate tern (*Sterna dougallii*).

The aims and objectives of the work are to assess the abundance and distribution of birds, marine mammals, turtles, sharks, and rays present in the Lease Area OCS-A 0520 over the course of spring through fall. The surveys will provide the baseline information required for conducting impact assessments and are consistent with the survey guidelines for providing avian, marine mammal, and sea turtle information for renewable energy development on the OCS (BOEM 2017 and 2019).

The Survey Area referred to herein is comprised of the Lease Area OCS-A 0520, plus a 2 km (*c*. 1 NM) buffer surrounding it with an approximately 4 km (*c.* 2 NM) buffer towards the northeast end.

Images were captured using a grid-based survey design with a 1.5 cm ground sampling distance (GSD). Images were analyzed by APEM and quality assurance (QA) was undertaken by Normandeau. This report describes the results of the March 2021, April 2021, May 2021, and June 2021 surveys.

This is the first of two progress reports (Spring and Fall) to summarize the information collected following the completion of six aerial surveys of the Survey Area: March 2021, April 2021 (two surveys), May 2021 (two surveys), and June 2021.

The following information is provided in Section 3:

- The number of surveys conducted to date; and
- The dates, start and end times, and weather conditions.

The following information is provided in Section 4, 5, and 6:

- The number of bird species / taxonomic groupings;
- Maps showing the locations of birds and actual survey route; and
- The status of data processing, error checking, and analysis.

Shipping information recorded visually from the aircraft or captured in the imagery has been provided in Section 7.

For surveys that have not yet been reported (July 2021 to October 2021), the survey dates have been provided in Section 8.These data are awaiting finalization and will be included in the Fall Report.

The reports that are remaining as part of the requirements of Equinor are as follows.

- Monthly reports for the remaining surveys (July to October 2021 inclusive, with two reports for August and September); and
- Fall Report to summarize data collected from the completed surveys: July 2021, August 2021 (two surveys), September 2021 (two surveys), and October 2021.

# 3. Summary of Surveys

Surveys have been undertaken for March 2021 to June 2021 inclusive, with two surveys undertaken for both April and May.

Data collected were 1.5 cm GSD digital still images using a GPS-linked bespoke flight management system to ensure the tracks were flown with a high degree of accuracy.

The digital aerial survey captured images along 15 lines spaced approximately 1.9 km across-track and 0.5 km along-track between image nodes within the Survey Area, at an altitude of approximately 1,350 ft and a speed of approximately 120 knots. Coverage of images analyzed was calculated to be approximately 10% of the Survey Area, as contracted. Flight lines and image capture points for the March 2021 to June 2021 surveys are presented in Figures 1 to 6.

Note: For some surveys, image capture points may not align precisely with the indicative flight path due to lateral aircraft movement, predominantly as a result of crosswinds. Any deviations encountered were within expected tolerances for flight paths.

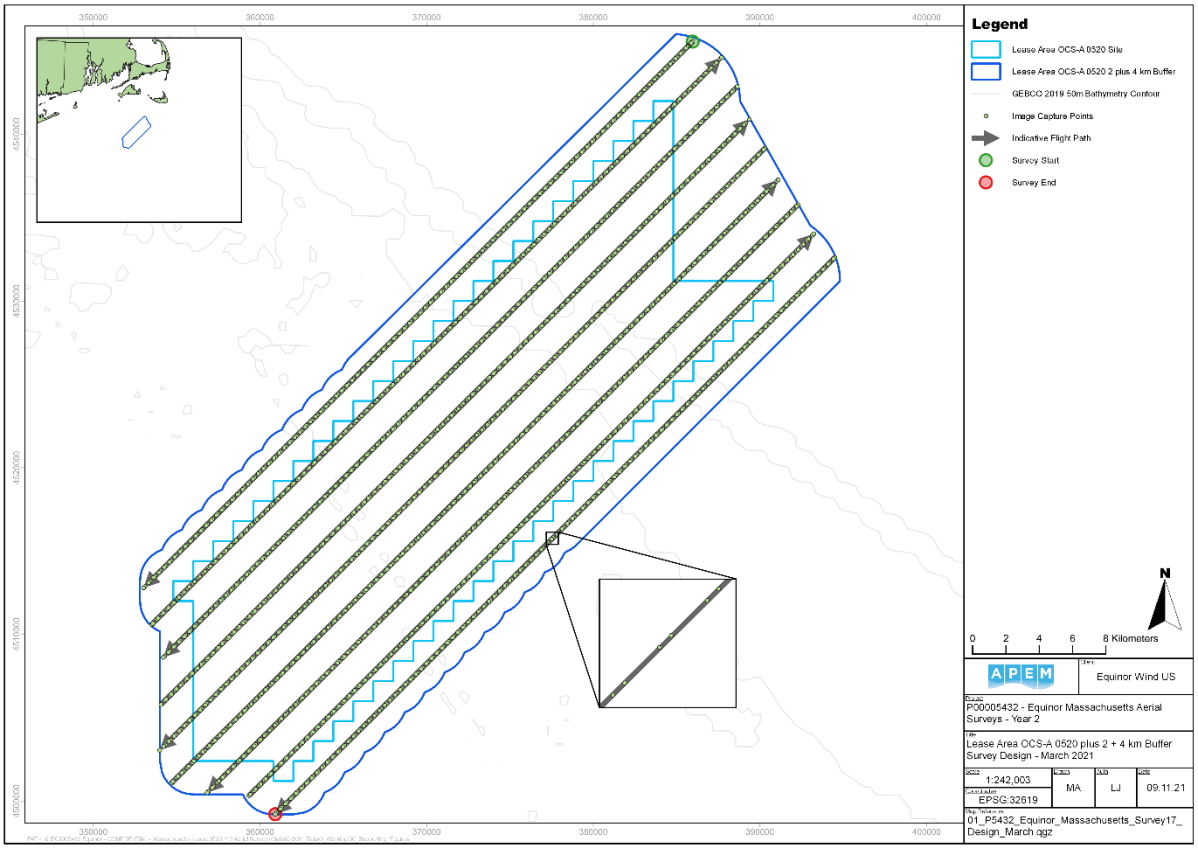


**Figure 1 Indicative flight lines and image capture points of the Survey Area for March 2021**

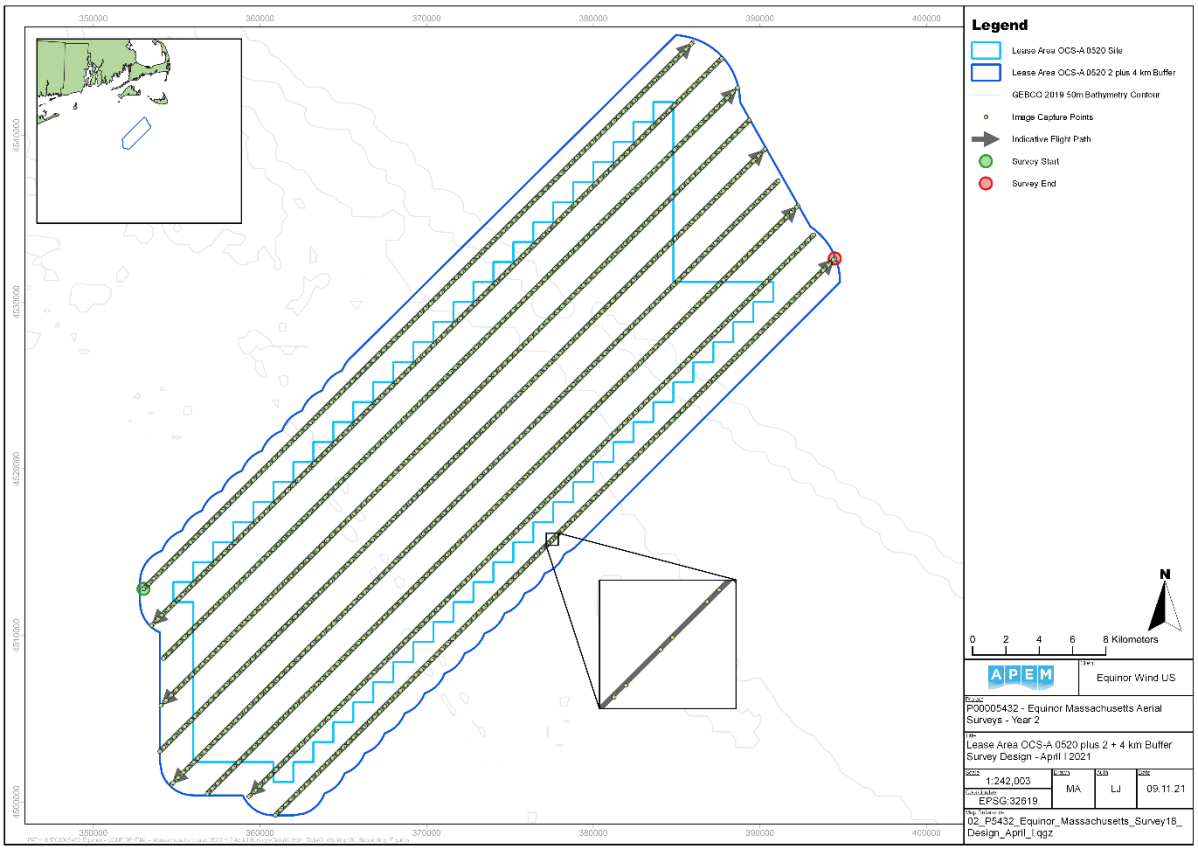


**Figure 2 Indicative flight lines and image capture points of the Survey Area for April I 2021**

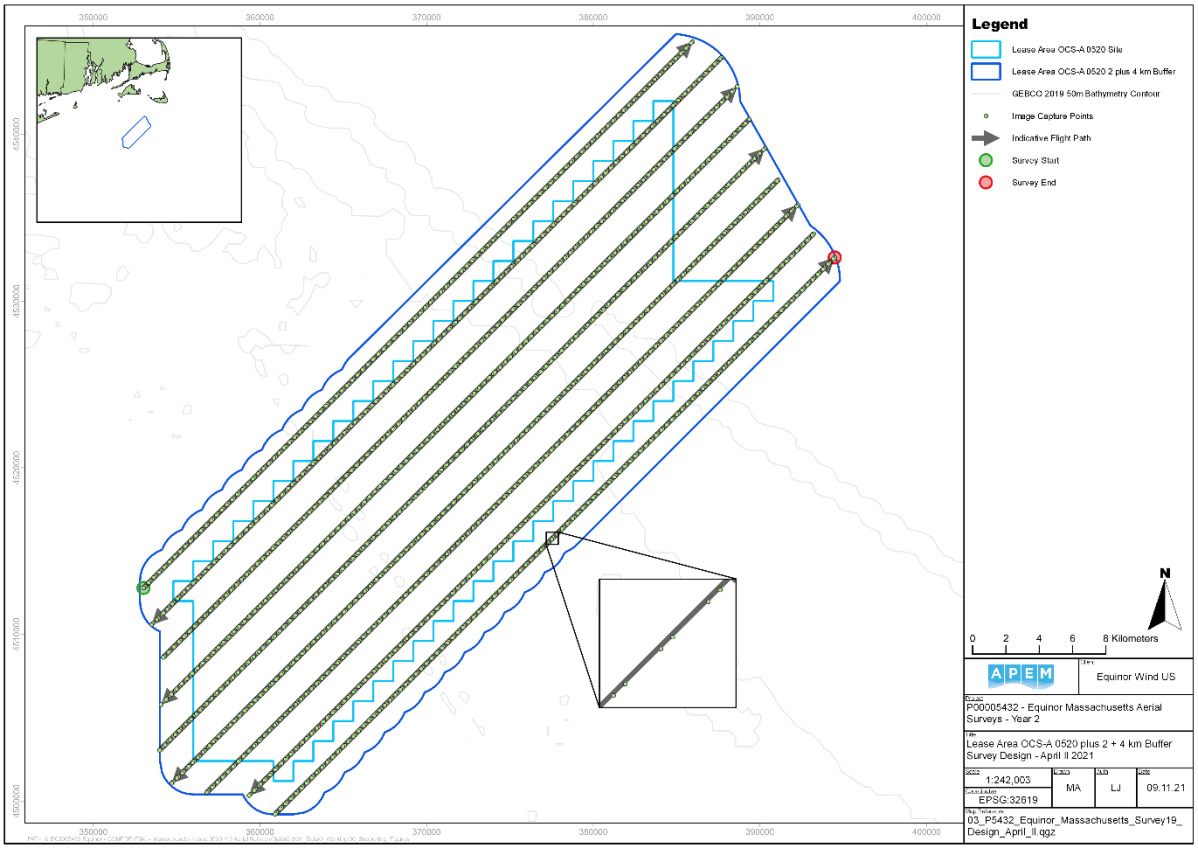


**Figure 3 Indicative flight lines and image capture points of the Survey Area for April II 2021**

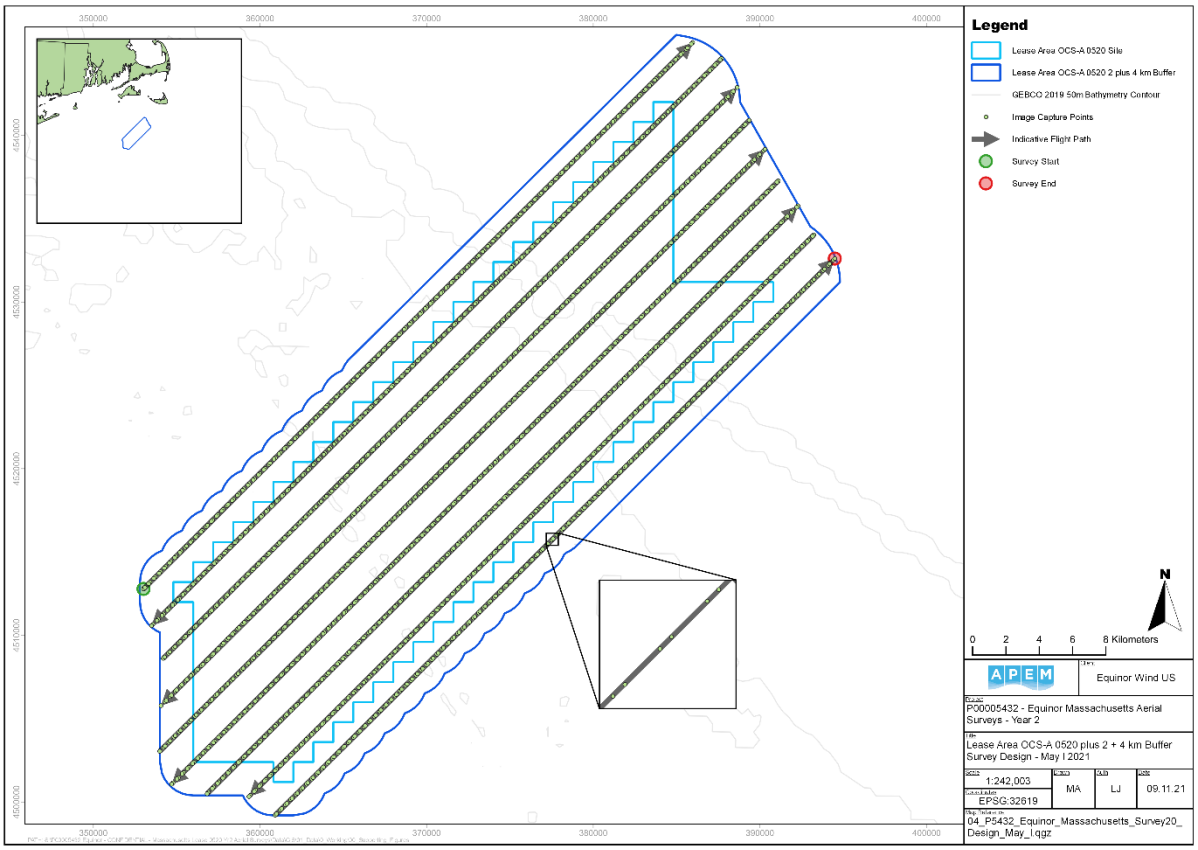


**Figure 4** **Indicative flight lines and image capture points of the Survey Area for May I 2021**

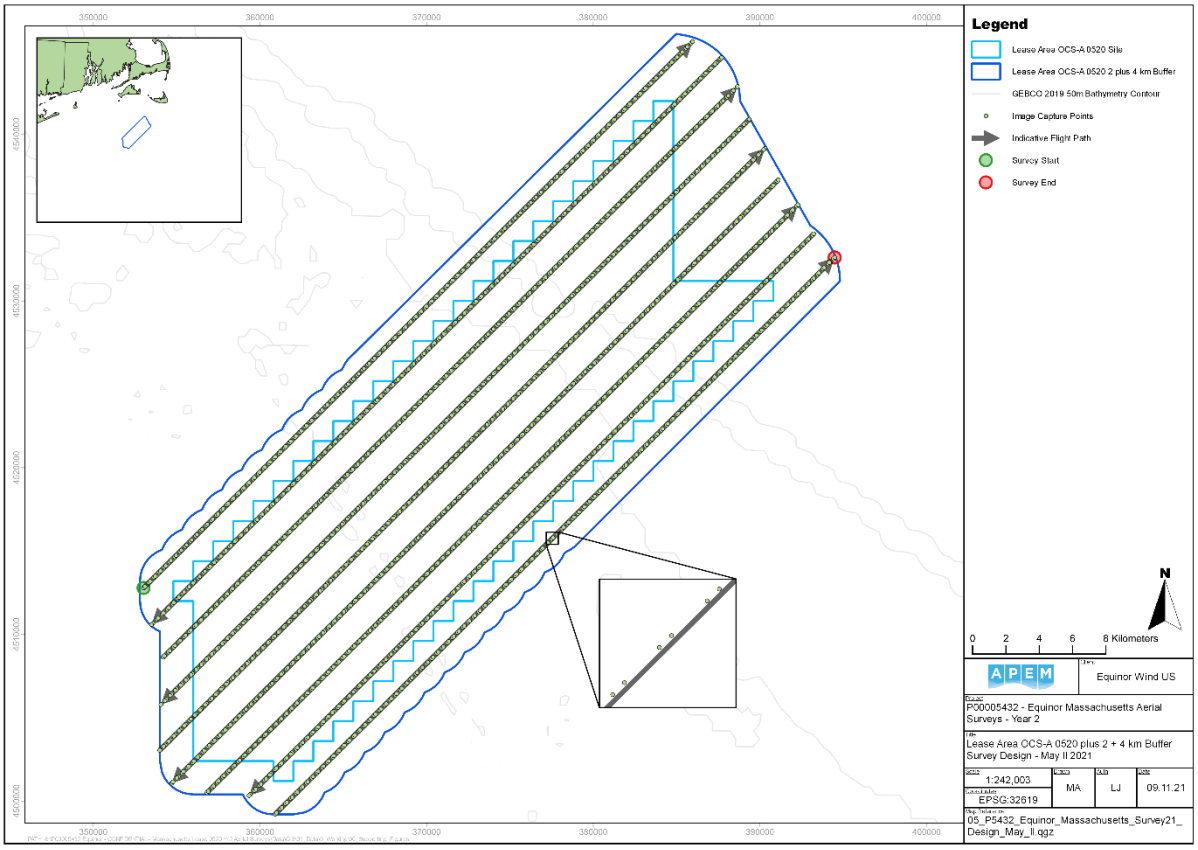


**Figure 5** **Indicative flight lines and image capture points of the Survey Area for May II 2021**

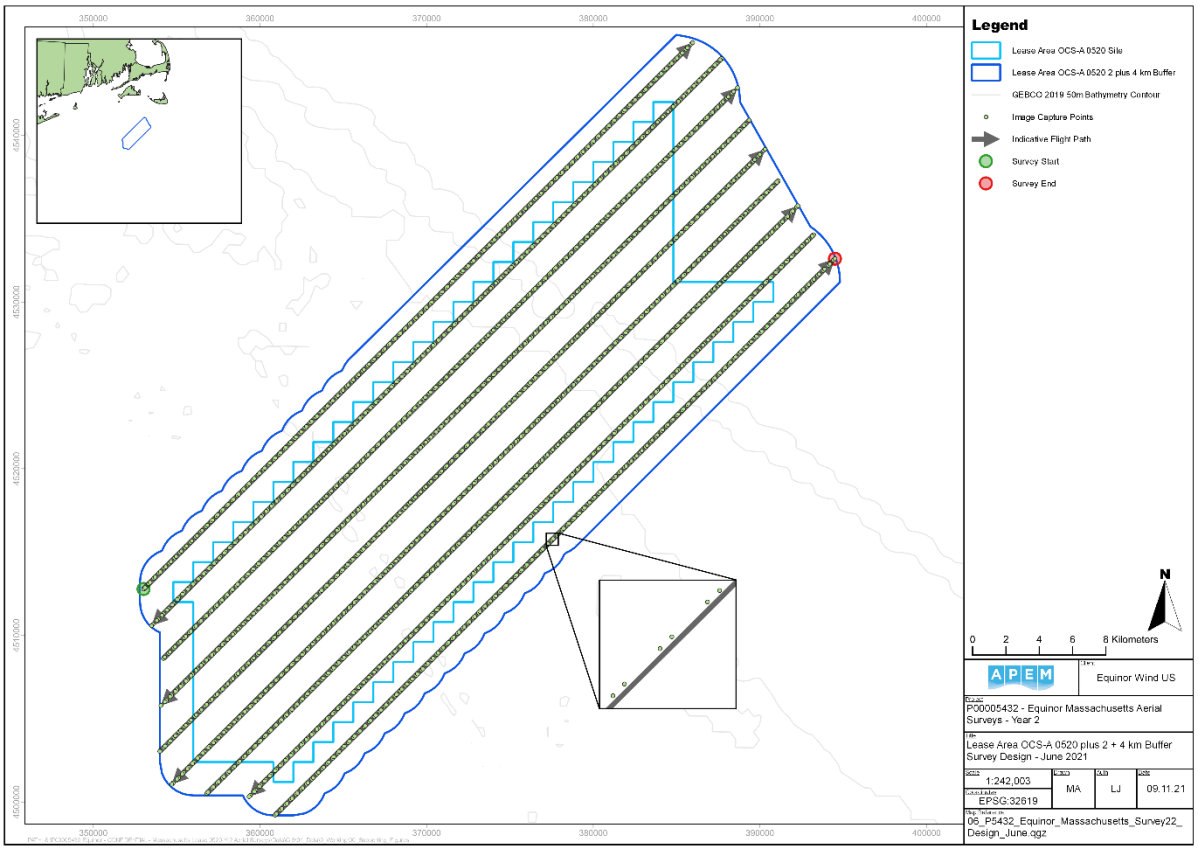


**Figure 6** **Indicative flight lines and image capture points of the Survey Area for June 2021**

No health and safety issues were reported during the surveys.

The date and start and end times of the surveys are provided in **Table 1**, and a summary of the weather conditions that were recorded are provided in **Table 2**.

**Table 1** **Date, and start and end time (Coordinated Universal Time; UTC) for each flight for the March 2021 to June 2021 surveys. Times were determined based upon the suitability of weather conditions and sun angles for surveying**

| Survey | Date | Flight Number | UTC Start Time (HH:MM) | UTC End Time (HH:MM) |
|---|---|---|---|---|
| Survey 17 | 03-03-21 | 1 | 18:04 | 20:05 |
| Survey 18 | 04-02-21 | 1 | 12:39 | 14:39 |
| Survey 19 | 04-18-21 | 1 | 13:36 | 15:33 |
| Survey 20 | 05-09-21 | 1 | 13:36 | 15:39 |
| Survey 21 | 05-16-21 | 1 | 13:35 | 15:35 |
| Survey 22 | 06-02-21 | 1 | 15:06 | 17:17 |

**Table 2 Weather conditions recorded for each of the March 2021 to June 2021 surveys**

| Survey | Date | Sea State | Turbidity | Wind Speed (knots) / Direction | Cloud Cover (%) | Visibility (km) | Air Temp (ºF) |
|---|---|---|---|---|---|---|---|
| Survey 17 | 03-03-21 | 3 | 1 | 12-20 WSW | 0 | > 10 km | 37 |
| Survey 18 | 04-02-21 | 1 | 2 | 15 NW | 20-50 | > 10 km | 29-31 |
| Survey 19 | 04-18-21 | 1 | 0 | 10 W | 10-40 | > 10 km | 43-46 |
| Survey 20 | 05-09-21 | 1-2 | 1 | 15-20 SW | 5-40 | > 10 km | 49-50 |
| Survey 21 | 05-16-21 | 1 | 0 | 15 WN | 50-60 | > 10 km | 67 |
| Survey 22 | 06-02-21 | 1 | 0 | 15 SW | 80-100 | > 10 km | 64-67 |

**Table 3 Image number and coverage for each of the March 2021 to June 2021 surveys**

| Survey | Image Number | Coverage (%) |
|---|---|---|
| Survey 17 | 12,042 | 11.75 |
| Survey 18 | 12,042 | 11.75 |
| Survey 19 | 12,042 | 11.75 |
| Survey 20 | 12,042 | 11.75 |
| Survey 21 | 12,042 | 11.75 |
| Survey 22 | 12,047 | 11.75 |

# 4. Quality Control Results

APEM analyzed the images to enumerate birds to species level, and to enumerate any other non-avian marine fauna. Normandeau provided QA of the data to check for missed animals in 10% of images recorded as empty and quality assured 20% of the bird species identification undertaken by APEM (and 100% of Listed species). Normandeau identified 100% of the species of non-avian marine fauna including marine mammals, turtles, fish, sharks, and rays. Birds and marine fauna identified from the images were 'snagged' (i.e., located within the images) and categorized usually to species, but sometimes to the species grouping. The results of the QA are provided in **Table 4** and **Table 5**. The agreement exceeded 99% for all surveys.

**Table 4 The number of blank images, the number of blank images that went to QC, and the results of the QC**

| Survey | Blank Images | Blank Images QC'd | Image Number QC'd Not Blank | Agreement (%) |
|---|---|---|---|---|
| Survey 17 | 11,759 | 1,176 | 0 | 100 |
| Survey 18 | 11,837 | 1,184 | 1 | 99.92 |
| Survey 19 | 11,914 | 1,192 | 0 | 100 |
| Survey 20 | 11,987 | 1,199 | 2 | 99.84 |
| Survey 21 | 12,047 | 1,205 | 4 | 99.67 |
| Survey 22 | 11,949 | 1,195 | 0 | 100 |

**Table 5 The number of individuals that were found during QC**

| Survey | Order Found by QC | Number of individuals |
|---|---|---|
| Survey 17 | - | 0 |
| Survey 18 | Avian | 1 |
| Survey 19 | - | 0 |
| Survey 20 | Avian | 2 |
| Survey 21 | Avian | 2 |
| | Shark | 3* |
| Survey 22 | - | 0 |

**One probable, two indistinct.*

# 5. Abundance and Distribution

Data reported are raw counts of animals that have not been subject to extrapolation for population estimates. Species scientific names are provided in Appendix 1 Species List.

## 5.1 Avian Abundance

For the March 2021, April I and II 2021, May I and II 2021, and June 2021 surveys, totals of 574, 572, 271, 68, 37, and 349 birds were recorded respectively (**Table 6**). Birds mostly comprised of long-tailed duck (n=460 in total across March to May 2021) and murres and / or razorbills (n=403) were the second most abundant species. Thereafter, the following species were recorded: sooty shearwater (n=264), razorbill (n=141), red-throated loon (n=100), common / thick-billed murre (n=75), Atlantic puffin (n=54), northern gannet (n=50), herring gull (n=40), great black-backed gull (n=39), white-winged scoter (n=34), unidentified auk species (n=30), unidentified scoter species (n=27), unidentified shearwater species (n=21), northern fulmar (n=14), Bonaparte's gull (n=12), 'commic' / Forster's tern (n=12), unidentified small gull species (n=11), unidentified storm petrel species (n=10), great shearwater (n=9), unidentified small shearwater species (n=9), unidentified tern species (n=7), red / red-necked phalarope (n=6), unclassified gull species (n=6), unidentified Sterna tern species (n=6), unidentified large gull species (n=5), roseate tern (n=4), lesser black-backed gull (n=3), common tern (n=3), unidentified loon species (n=3), common loon (n=2), Manx shearwater (n=2), and unidentified large shearwater species (n=2). Single individuals of unidentified duck species, south polar skua, laughing gull, black tern, Cory's shearwater, unidentified small shearwater species, and unidentified bird species were also recorded.

**Table 6 Total number of birds recorded within the Survey Area during the March 2021, April I and II 2021, May I and II 2021, and June 2021 surveys**

| Group | Species | Mar-21 | | | Apr-21 Survey I | | | Apr-21 Survey II | | | May-21 Survey I | | | May-21 Survey II | | | Jun-21 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flying | Sitting | Total | Flying | Sitting | Total | Flying | Sitting | Total | Flying | Sitting | Total | Flying | Sitting | Total | Flying | Sitting | Total |
| Waterfowl | White-winged Scoter | - | 32 | **32** | - | - | **-** | 2 | 0 | **2** | - | - | **-** | - | - | **-** | - | - | **-** |
| | Scoter species | - | 8 | **8** | - | 9 | **9** | - | 10 | **10** | - | - | **-** | - | - | **-** | - | - | **-** |
| | Long-tailed Duck | 3 | 294 | **297** | 5 | 158 | **163** | - | - | **-** | - | - | **-** | - | - | **-** | - | - | **-** |
| | Duck species | - | 1 | **1** | - | - | **-** | - | - | **-** | - | - | **-** | - | - | **-** | - | - | **-** |
| Shorebird | Red / Red-necked Phalarope | - | 6 | **6** | - | - | **-** | - | - | **-** | - | - | **-** | - | - | **-** | - | - | **-** |
| Skua | South Polar Skua | - | - | **-** | - | - | **-** | - | - | **-** | - | - | **-** | - | - | **-** | 1 | - | **1** |
| Auk | Common / Thick-billed Murre | 3 | 50 | **53** | 1 | 5 | **6** | - | 12 | **12** | 1 | 3 | **4** | - | - | **-** | - | - | **-** |
| | Razorbill | - | 44 | **44** | 18 | 71 | **89** | - | 8 | **8** | - | - | **-** | - | - | **-** | - | - | **-** |
| | Murre' / Razorbill | 11 | 65 | **76** | 2 | 154 | **156** | - | 171 | **171** | - | - | **-** | - | - | **-** | - | - | **-** |
| | Atlantic Puffin | - | 8 | **8** | - | 42 | **42** | - | 4 | **4** | - | - | **-** | - | - | **-** | - | - | **-** |
| | Auk species | - | 4 | **4** | 2 | 18 | **20** | - | 6 | **6** | - | - | **-** | - | - | **-** | - | - | **-** |
| Gull | Bonaparte's Gull | - | - | **-** | 12 | - | **12** | - | - | **-** | - | - | **-** | - | - | **-** | - | - | **-** |
| | Laughing Gull | - | - | **-** | - | - | **-** | 1 | - | **1** | - | - | **-** | - | - | **-** | - | - | **-** |
| | Small Gull species | - | 6 | **6** | 2 | 1 | **3** | - | - | **-** | - | 1 | **1** | - | - | **-** | 0 | 1 | **1** |
| | Herring Gull | 5 | 3 | **8** | 5 | 4 | **9** | 5 | 4 | **9** | 2 | 6 | **8** | 5 | - | **5** | 1 | 0 | **1** |
| | Lesser Black-backed Gull | - | - | **-** | - | 1 | **1** | - | 2 | **2** | - | - | **-** | - | - | **-** | - | - | **-** |
| | Great Black-backed Gull | 5 | 12 | **17** | 3 | 5 | **8** | 4 | 5 | **9** | 1 | 3 | **4** | - | - | **-** | 1 | 0 | **1** |
| | Large Gull species | - | 1 | **1** | - | 3 | **3** | - | 1 | **1** | - | - | **-** | - | - | **-** | - | - | **-** |
| | Gull species | - | - | **-** | - | - | **-** | - | 4 | **4** | - | - | **-** | - | - | **-** | 0 | 2 | **2** |
| Tern | Black Tern | - | - | **-** | - | - | **-** | - | - | **-** | - | - | **-** | 1 | - | **1** | - | - | **-** |
| | Roseate Tern | - | - | **-** | - | - | **-** | - | - | **-** | 4 | - | **4** | - | - | **-** | - | - | **-** |
| | Common Tern | - | - | **-** | - | - | **-** | - | - | **-** | - | - | **-** | 3 | - | **3** | - | - | **-** |
| | 'Commic' / Forster's Tern | - | - | **-** | - | - | **-** | - | - | **-** | 6 | - | **6** | 6 | - | **6** | - | - | **-** |
| | Sterna Tern species | - | - | **-** | - | - | **-** | - | - | **-** | 3 | - | **3** | 1 | 2 | **3** | - | - | **-** |
| | Tern species | - | - | **-** | - | - | **-** | - | - | **-** | - | - | **-** | - | 7 | **7** | - | - | **-** |

| Group | Species | Mar-21 | | | Apr-21 Survey I | | | Apr-21 Survey II | | | May-21 Survey I | | | May-21 Survey II | | | Jun-21 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flying | Sitting | Total | Flying | Sitting | Total | Flying | Sitting | Total | Flying | Sitting | Total | Flying | Sitting | Total | Flying | Sitting | Total |
| Loon | Common Loon | - | - | - | - | - | - | - | 2 | **2** | - | - | - | - | - | - | - | - | - |
| | Red-throated Loon | - | - | - | 13 | 29 | **42** | 8 | 10 | **18** | 1 | 33 | **34** | - | 6 | **6** | - | - | - |
| | Loon species | - | - | - | - | - | - | - | 2 | **2** | - | - | - | - | 1 | **1** | - | - | - |
| Storm Petrel | Storm Petrel species | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 10 | - | **10** |
| Fulmar | Northern Fulmar | 4 | 3 | **7** | - | - | - | - | - | - | 4 | - | **4** | 1 | - | **1** | 0 | 2 | **2** |
| Shearwater | Cory's Shearwater | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 1 | **1** |
| | Great Shearwater | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 9 | **9** |
| | Sooty Shearwater | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 263 | **264** |
| | Manx Shearwater | - | - | - | - | - | - | - | 2 | **2** | - | - | - | - | - | - | - | - | - |
| | Small Shearwater species | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | **1** | 0 | 9 | **9** |
| | Large Shearwater species | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 2 | **2** |
| | Shearwater species | - | - | - | - | - | - | 3 | - | **3** | - | - | - | - | - | - | 1 | 17 | **18** |
| Gannet | Northern Gannet | 3 | 3 | **6** | 7 | 2 | **9** | 5 | - | **5** | - | - | - | 2 | 1 | **3** | 8 | 19 | **27** |
| Unid. Avian | Unidentified Bird species | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 1 | **1** |
| **Total Birds** | | **34** | **540** | **574** | **70** | **502** | **572** | **28** | **243** | **271** | **22** | **46** | **68** | **20** | **17** | **37** | **23** | **326** | **349** |

†*Note: Murre refers to either common murre or thick-billed murre.* ‡*Note: 'Commic' refers to either common tern or Arctic tern.*

## 5.2 Marine Mammal and Other Marina Fauna Abundance

For March 2021, April I 2021, April II 2021, May I 2021, May II 2021, and June 2021, totals of 16, 2, 10, 6, 11, and 11 marine mammals and other marine fauna were recorded respectively (**Table 7**). Marine mammals mostly comprised of unidentified marine mammal species (n=14 in March to June 2021). Common dolphin (n=12) was the most abundant thereafter, which was followed by harbor porpoise (n=9), unidentified seal species (n=5), and unidentified dolphin species (n=3). Single individuals of gray seal, common minke whale, and unidentified whale species were also recorded. Four large bony fish were recorded, consisting of ocean sunfish (n=3), and unidentified fish species (n=1), and six sharks were recorded, all recorded as unidentified shark species.

**Table 7 Total number of marine mammals and other marine fauna recorded within the Survey Area during the March 2021, April I and II 2021, May I and II 2021, and June 2021 surveys**

| Group | Species | Mar-21 | | | Apr-21 Survey I | | | Apr-21 Survey II | | | May-21 Survey I | | | May-21 Survey II | | | Jun-21 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Submerged | Surfacing | Total | Submerged | Surfacing | Total | Submerged | Surfacing | Total | Submerged | Surfacing | Total | Submerged | Surfacing | Total | Submerged | Surfacing | Total |
| Marine Mammal | Gray Seal | 1 | - | **1** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Seal species | 2 | - | **2** | 2 | - | **2** | - | - | - | - | - | - | - | - | - | 0 | 1 | **1** |
| | Common Minke Whale | - | - | - | - | - | - | 1 | - | **1** | - | - | - | - | - | - | - | - | - |
| | Whale species | - | - | - | - | - | - | 1 | - | **1** | - | - | - | - | - | - | - | - | - |
| | Common Dolphin | 10 | - | **10** | - | - | - | - | - | - | - | - | - | - | - | - | 2 | 0 | **2** |
| | Dolphin species | 1 | - | **1** | - | - | - | 1 | - | **1** | - | - | - | - | - | - | 0 | 1 | **1** |
| | Harbor Porpoise | 2 | - | **2** | - | - | - | 6 | 1 | **7** | - | - | - | - | - | - | - | - | - |
| | Marine Mammal species | - | - | - | - | - | - | - | - | - | 4 | 1 | **5** | 5 | 2 | **7** | 1 | 1 | **2** |
| Large Bony Fish | Ocean Sunfish | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3 | 0 | **3** |
| | Fish species | - | - | - | - | - | - | - | - | - | 1 | - | **1** | - | - | - | - | - | - |
| Shark | Shark species | - | - | - | - | - | - | - | - | - | - | - | - | 4 | - | **4** | 2 | 0 | **2** |
| **Total Marine Megafauna** | | **16** | **-** | **16** | **2** | - | **2** | **9** | **1** | **10** | **5** | **1** | **6** | **9** | **2** | **11** | **8** | **3** | **11** |

## 5.3 Spatial Distribution

Figures 7 to 12 show the location of all birds and marine mammals recorded throughout the Survey Area during the March 2021 to June 2021 surveys respectively.

Overall, birds and marine mammals were distributed throughout the majority of the Survey Area in March with notable concentrations of birds evident in the northeast and in the south of the Survey Area. Long-tailed ducks occurred in high densities in the northeast, and auks, particularly murres and razorbills, exhibited an even distribution across the south. Marine mammals were loosely distributed throughout the Survey Area, with only common dolphins found in close densities (**Figure 7**).

In the April I survey, large densities of long-tailed ducks continued to be present in the northeast as with the March survey, though overall bird distribution was reduced in the south compared with March. Murres and razorbills showed much closer associations between individuals compared with March, with densities apparent in the north, the east, the southeast, and the west of the Survey Area. Marine mammals were present in the center to northeast of the Survey Area (**Figure 8**).

For the April II survey, a notably reduced waterfowl presence was evident, with low numbers of unidentified scoters present in the northeast and a pair of white-winged scoters in the southwest. Auks, specifically murres and / or razorbills for the April II survey, were distributed both in close densities, particularly in the north, and in loose distributions, particularly across the south of the Survey Area. Marine mammal distribution was once again loose, with individuals found from the center to the northwest of the Survey Area (**Figure 9**).

In the May I survey, no waterfowl observations were recorded, and auk records were also reduced compared with the April II survey. Red-throated loons showed the broadest distribution, found across the central section of the Survey Area through to the northeast. The May I survey was marked by the presence of terns compared with the previous surveys, and most notably by the occurrence of identified roseate terns, located in the center and west of the Survey Area. Marine mammals occurred in loose distribution in the north and in a close grouping in the west of the Survey Area, and a solitary fish species was also recorded in the north. Overall, target distribution was looser in the May I survey, and numbers of individuals were reduced compared with the previous surveys (**Figure 10**).

For the May II survey, distribution was also loose, with a further reduction in overall numbers compared with the first May survey. Red-throated loon distribution was predominantly confined to the northeast of the Survey Area, with an unidentified loon in the southwest. Terns were mainly confined to two main groups around the center of the Survey Area, with two additional unidentified Sterna terns in the northeast, and one in the southwest. Marine mammals were all located in the north of the Survey Area, predominantly in one group. Additionally, sharks were loosely distributed in the south of the Survey Area only (**Figure 11**).

In the June survey, distribution was relatively loose and located towards the north and northeast of the Survey Area for the majority of species. Small concentrations of unidentified storm petrels were apparent in the southwest, though most other species in the area were recorded without other individuals nearby. Sooty shearwaters occurred in the highest densities, located across the north and northeast of the Survey Area, predominantly in the buffer. Northern gannets occurred in some densities in the north and northeast as well though these were considerably smaller than those apparent for sooty shearwater. Marine megafauna occurred in low numbers with only common dolphin occurring in a group, located in the southwest of the buffer (**Figure 12**).

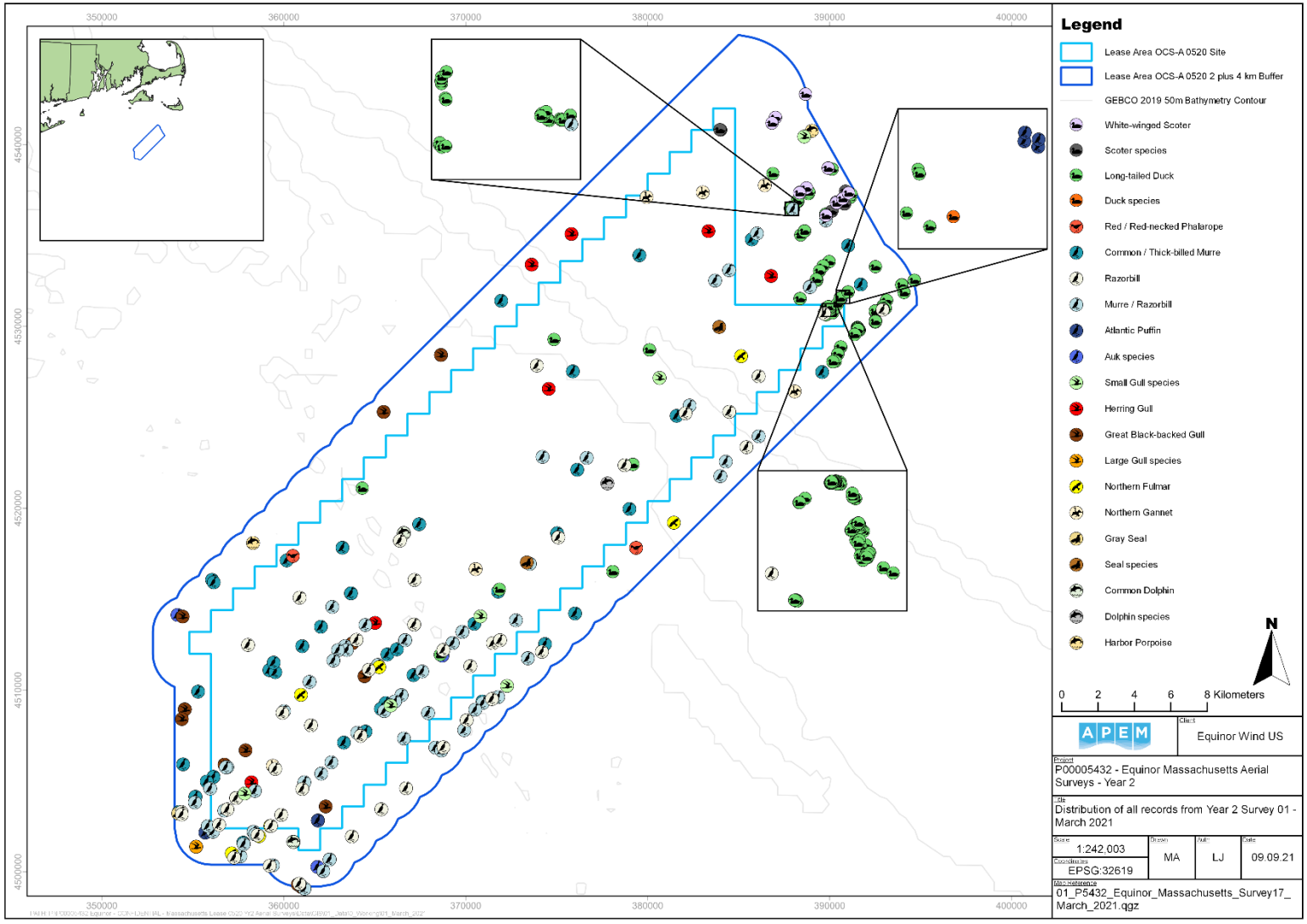


**Figure 7 Distribution of all birds and other marine fauna recorded in March 2021**

Note: Individuals may appear to overlap if they are in close proximity to each other.

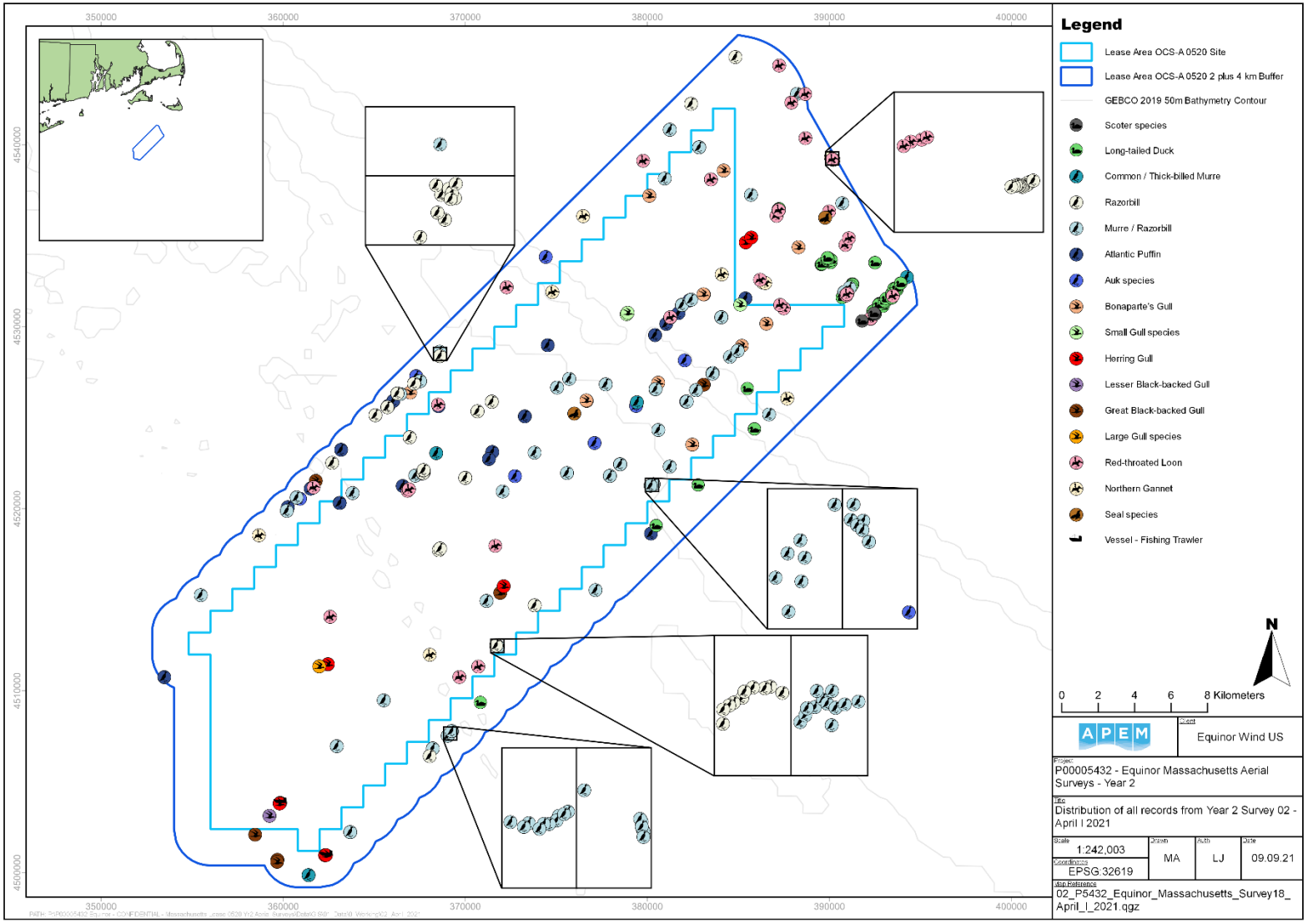


**Figure 8 Distribution of all birds, other marine fauna, and human artifacts recorded in April I 2021**

Note: Individuals may appear to overlap if they are in close proximity to each other.

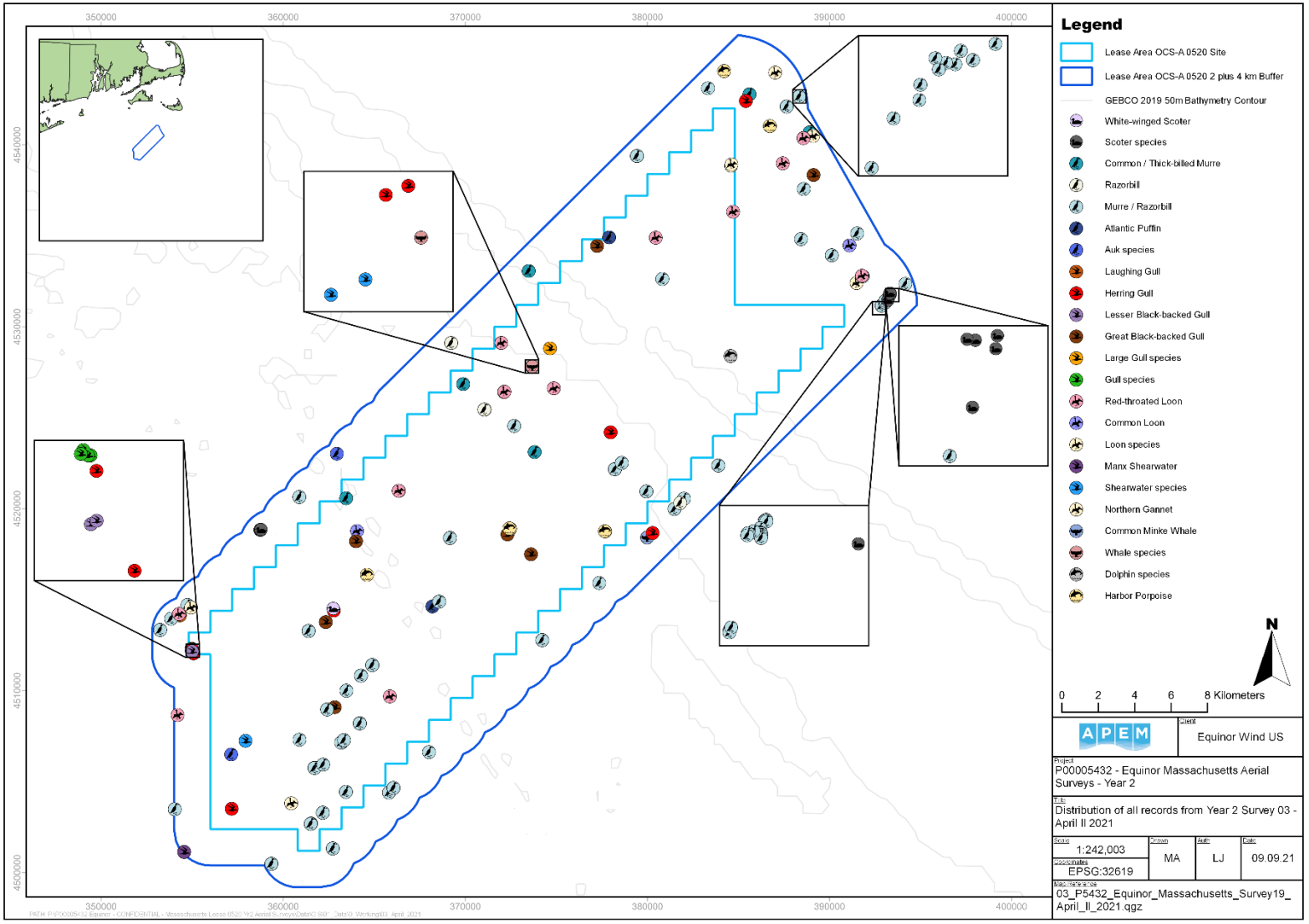


**Figure 9 Distribution of all birds and other marine fauna recorded in April II 2020**

Note: Individuals may appear to overlap if they are in close proximity to each other.

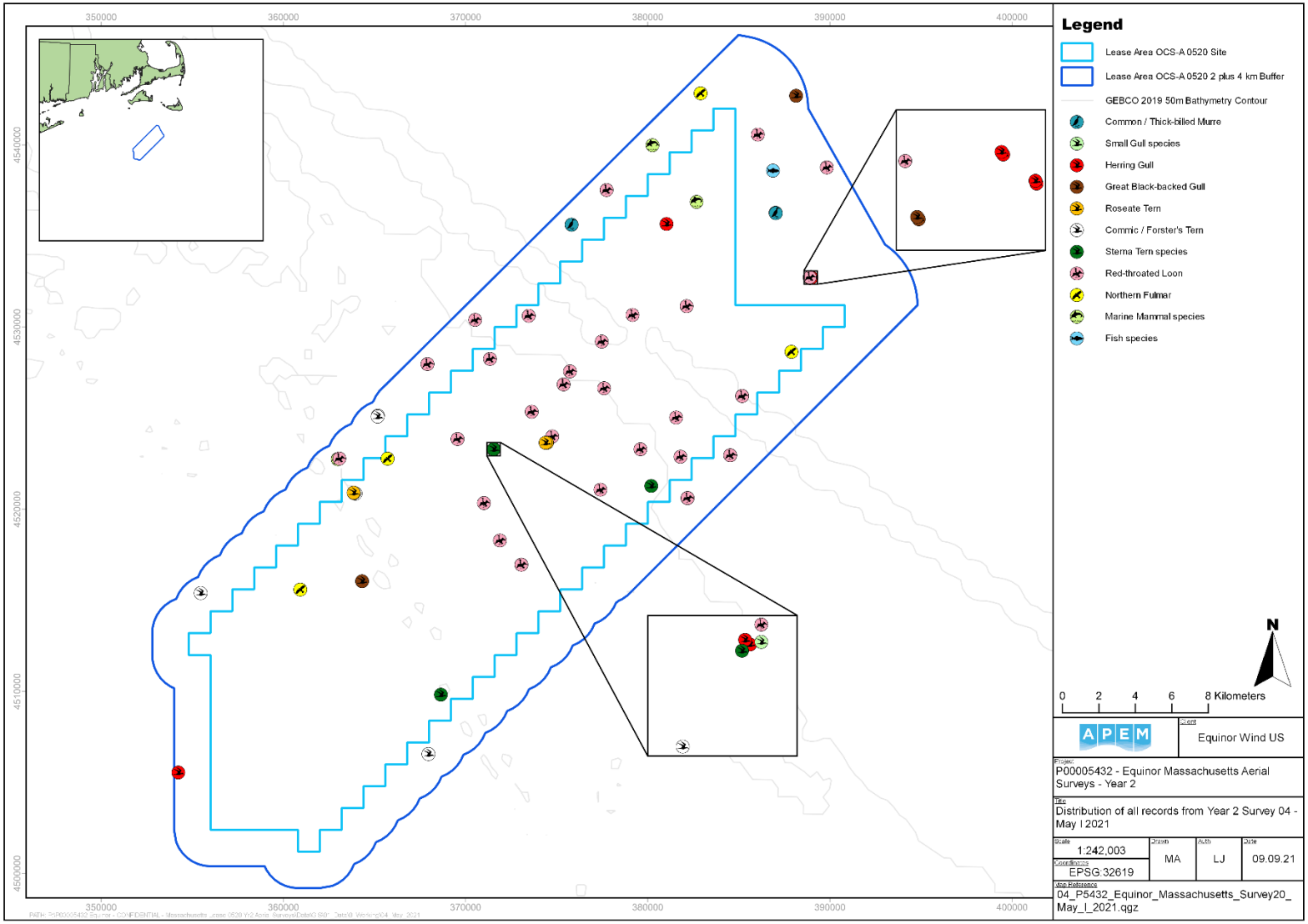


**Figure 10 Distribution of all birds and other marine fauna recorded in May I 2021**

Note: Individuals may appear to overlap if they are in close proximity to each other.

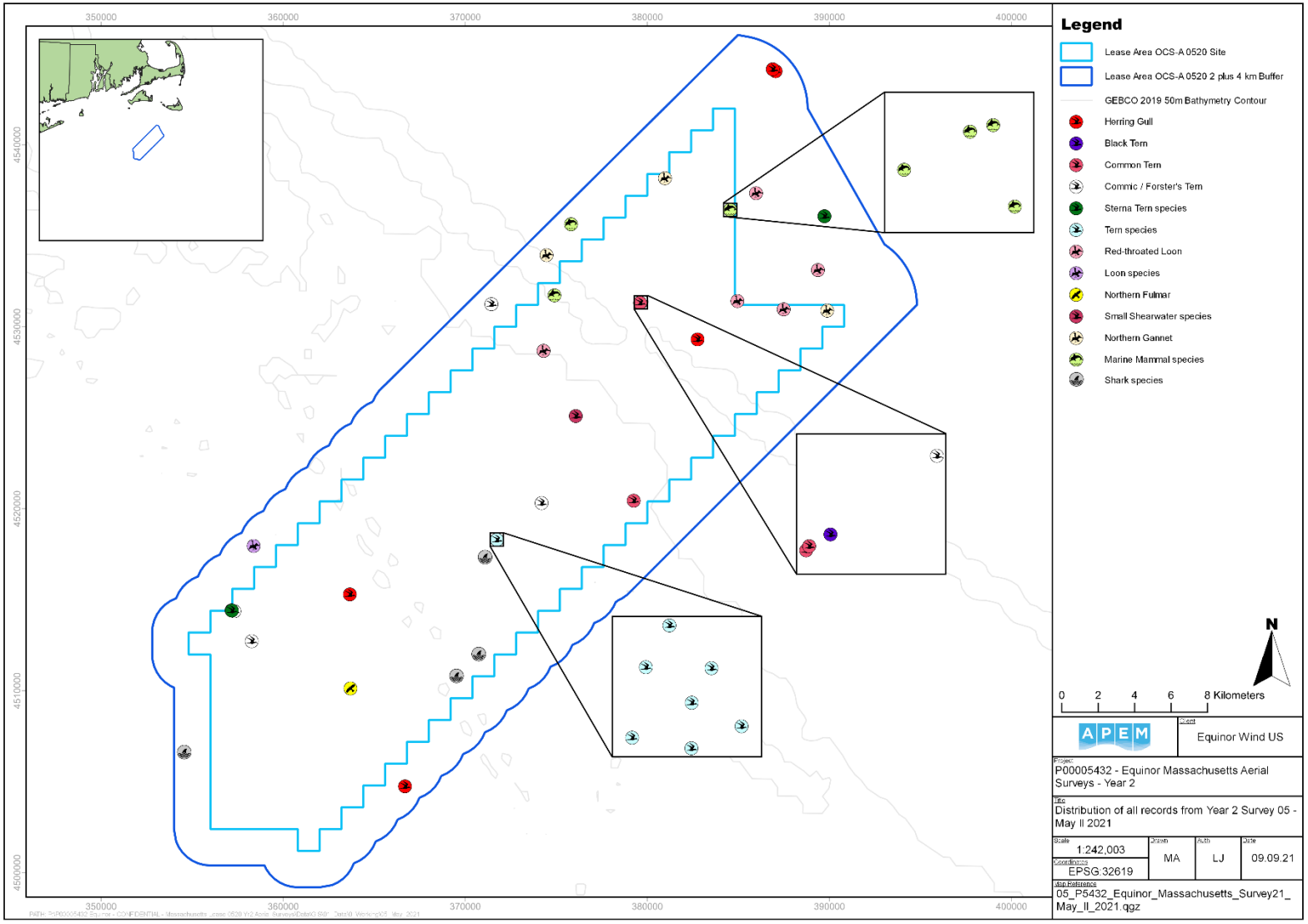


**Figure 11 Distribution of all birds and other marine fauna recorded in May II 2021**

Note: Individuals may appear to overlap if they are in close proximity to each other.

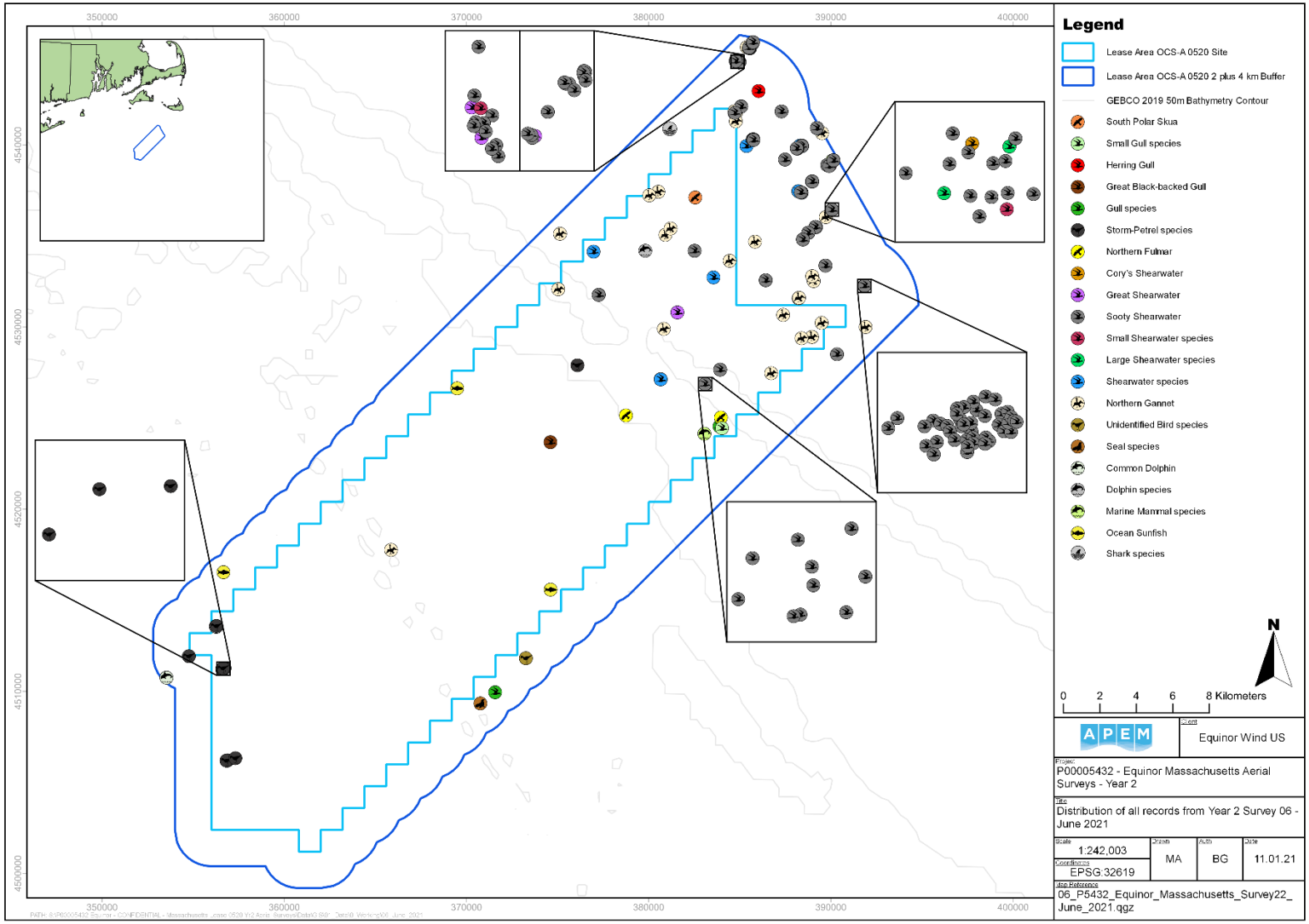


**Figure 12 Distribution of all birds and other marine fauna recorded in June 2021**

Note: Individuals may appear to overlap if they are in close proximity to each other.

# 6. Species Accounts

## 6.1 White-winged Scoter

White-winged scoters were recorded in both the March 2021 and the April II 2021 surveys. These consisted of 32 birds sitting on the water in the March survey, and two flying birds in the April II survey. For the March survey, all white-winged scoters were located in the north-northeastern extent of the buffer, whilst for the April II survey, white-winged scoters were located in the southwest of the site.

## 6.2 Scoter species – unidentified

Unidentified scoters were recorded in the March 2021, and April I and II 2021 surveys, with a total of 27 scoters recorded all sitting on the water surface. The majority of individuals occurred in the north to northeast of the Survey Area, particularly for the March and April I surveys, with the remainder from the April II survey either in the northeast of the buffer or in the west-southwest of the buffer.

## 6.3 Long-tailed Duck

Long-tailed ducks were recorded in both the March 2021 and April I 2021 surveys. These consisted of 294 birds sitting on the water surface and three flying birds for the March survey, and 158 sitting birds and five flying birds for the April I survey. Almost all long-tailed ducks were located in the northeast of the Survey Area with additional loose distributions of ducks located around the center of the Survey Area for both surveys.

## 6.4 Duck species – unidentified

A single unidentified duck was recorded in the March survey, consisting of one individual sitting on the water surface in the northeast of the buffer.

## 6.5 Red and / or Red-necked Phalarope

Red / red-necked phalaropes were recorded in the March 2021 survey only, consisting of six sitting birds, four of which were located in the east of the buffer, and the remaining two were located in the west of the site.

## 6.6 South Polar Skua

A single flying south polar skua was recorded in the June 2021 survey, located in the north of the site.

## 6.7 Common and / or Thick-billed Murre

Common / thick-billed murres were recorded in the March 2021, April I and II 2021, and May I 2021 surveys. These consisted of 50 birds sitting on the water surface and three flying birds for the March survey, five sitting birds and one flying bird for the April I survey, 12 sitting birds in the April II survey, and three sitting birds and one flying bird in the May I survey. For the

March survey, common / thick-billed murres were predominantly located across the southern half of the Survey Area with comparatively looser distribution apparent in the north. For the April I and April II surveys, common / thick-billed murres were loosely distributed across the Survey Area, and for the May I survey, common / thick-billed murres were located in the north of the buffer.

## 6.8 Razorbill

Razorbills were recorded in the March 2021, and April I and II 2021 surveys, consisting of 44 razorbills sitting on the water surface for the March survey, 71 sitting razorbills and 18 flying for the April I survey, and eight sitting razorbills for the April II survey. As with common / thick-billed murres, razorbills were predominantly located across the southern half of the Survey Area for the March survey, with looser distribution to the east and northeast. For the April surveys, razorbills were predominantly located in the west of the Survey Area, mostly the buffer, with additional groups of razorbills located from the center to the southeast of the Survey Area and in the north and northeast of the buffer for the April I survey specifically.

## 6.9 Murre and / or Razorbill

Murres / razorbills were recorded in the March 2021, and April I and II 2021 surveys, consisting of 65 birds sitting on the water and 11 flying for the March survey, 154 sitting and two flying for the April I survey, and 171 sitting birds for the April II survey. For the March survey, murres / razorbills were predominantly located in the south to southeast of the Survey Area with looser distribution in the east to northeast. For the April I survey, birds were predominantly located around the center to northeast of the Survey Area, with additional dense groups in the south of the Survey Area. For the April II survey, murres / razorbills were predominantly loosely distributed across the Survey Area with additional dense groups in the northeast, center, and south of the Survey Area.

## 6.10 Atlantic Puffin

Atlantic puffins were recorded in the March 2021, and April I and II 2021 surveys, consisting of eight puffins sitting on the water for the March survey, 42 sitting birds for the April I survey, and four sitting birds for the April II survey. For the March survey, puffins were equally split between the northeast of the buffer and the south of the Survey Area, with four individuals respectively in each location. For the April I survey puffins were predominantly located in the west of the buffer and in the center to northeast center of the site. Puffins in the April II survey were located in the south-center and north of the site, and in the east of the buffer.

## 6.11 Auk species – unidentified

Unidentified auks were recorded in the March 2021, and April I and II 2021 surveys, consisting of four auks sitting on the water for the March survey, 18 sitting birds and two flying birds for the April I survey, and six sitting birds for the April II survey. For the March survey, unidentified auks were loosely distributed in the south to southwest of the Survey Area. For the April I survey, auks were predominantly located in the center to northeast of the site and in the west of the buffer. For the April II survey, auks were loosely distributed in the south and west of the Survey Area.

## 6.12 Bonaparte's Gull

Bonaparte's gulls were recorded in the April I 2021 survey only, consisting of twelve flying individuals, loosely distributed across the northeastern half of the Survey Area.

## 6.13 Laughing Gull

A single flying laughing gull was recorded in the April II 2021 survey, located in the southwest of the buffer.

## 6.14 Small Gull species – unidentified

Unidentified small gulls were recorded in the March 2021, April I 2021, May 2021, and June 2021 surveys, consisting of six small gulls sitting on the water surface for the March survey, two flying gulls and one sitting gull for the April I survey, one gull sitting on the water surface for the May I survey, and one small gull sitting on the water surface for the June survey. Small gulls were loosely distributed across the Survey Area for the March survey and in the north-northeast of the Survey Area for the April I survey. The single small gull recorded in the May I survey was located in the west of the center of the site, and the single small gull recorded in the June survey was located in the northeast of the site.

## 6.15 Herring Gull

Herring gulls were recorded in all six of the surveys, consisting of three gulls sitting on the water surface and five flying gulls for the March survey, five flying and four sitting gulls for both the April I and April II surveys, six sitting and two flying gulls for the May I survey, five flying gulls for the May II survey, and one flying gull for the June survey. Herring gulls were loosely distributed across the Survey Area for all six of the surveys.

## 6.16 Lesser Black-backed Gull

Lesser black-backed gulls were recorded in the two April 2021 surveys, consisting of three gulls sitting on the water surface; one located in the south of the site for the April I survey, and two located in the southwest of the site for the April II survey.

## 6.17 Great Black-backed Gull

Great black-backed gulls were recorded in the March 2021, April I and II 2021, May I 2021, and June 2021 surveys. These consisted of 12 gulls sitting on the water and five flying gulls for the March survey, five sitting and three flying gulls for the April I survey, five sitting and four flying gulls for the April II survey, three sitting and one flying gulls for the May I survey, and one flying gull for the June survey. Great black-backed gulls were loosely distributed across the Survey Area, with marginally greater numbers located in the southern half.

## 6.18 Large Gull species – unidentified

Unidentified large gulls were recorded in the March 2021, and April I and II 2021 surveys. These consisted of one gull sitting on the water in the south of the buffer for the March 2021

survey, three gulls sitting in the southwest of the site for the April I survey, and one sitting gull in the northwest of the site for the April II survey.

## 6.19 Gull species – unclassified

Unclassified gulls were recorded in the April II 2021, and June 2021 surveys, consisting of four gulls sitting on the water surface in the southwest of the site for April I, and two gulls sitting on the water surface in the June survey; one located in the east-northeast of the site, and one located in the south-southeast of the buffer.

## 6.20 Black Tern

A single black tern, consisting of one flying individual, was located in the north-northeast of the site for the May II 2021 survey.

## 6.21 Roseate Tern

Roseate terns were recorded in the May I 2021 survey only, consisting of two individuals flying in a southerly direction in the west of the site, and two individuals flying in a westerly direction in the center of the site (**Figure 13**).

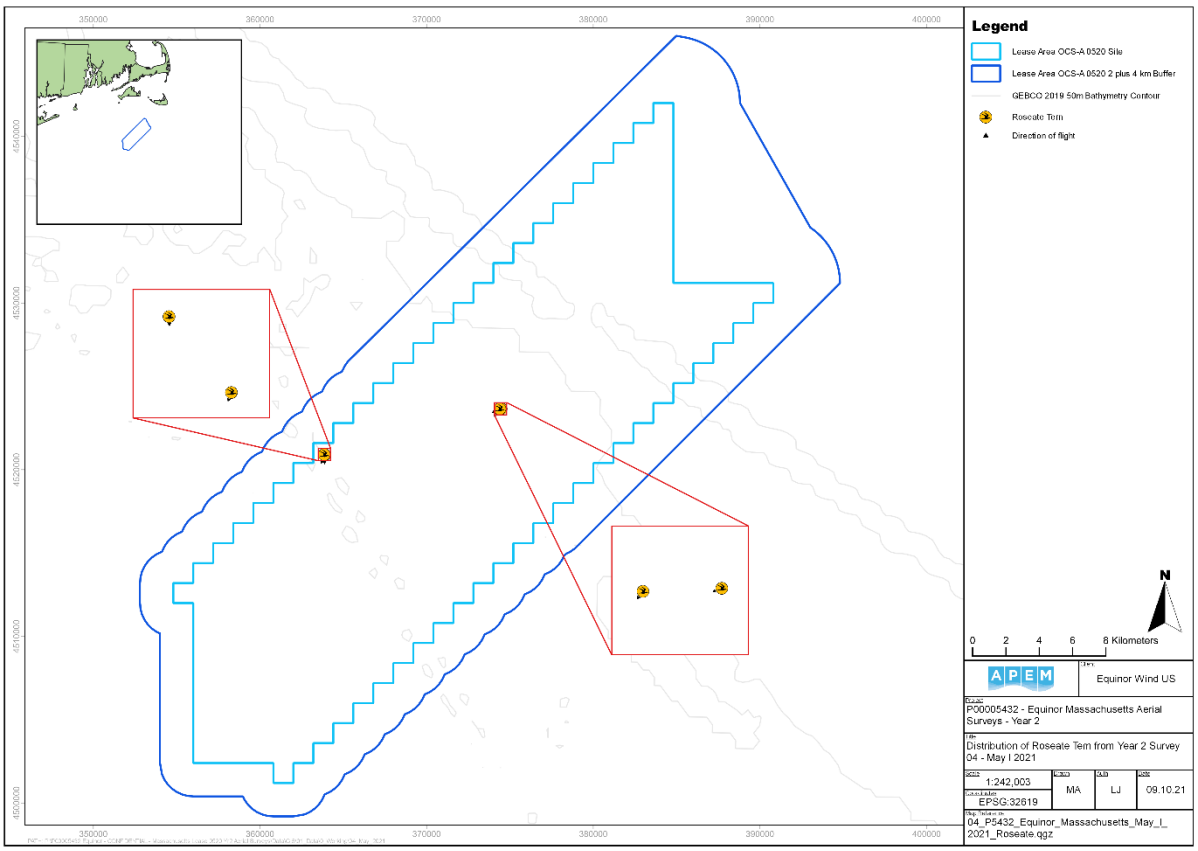


**Figure 13 Distribution of roseate terns from the May I 2021 survey**

## 6.22 Common Tern

Common terns were recorded in the May II 2021 survey only, consisting of three flying terns; two located in the north-northeast of the site, and one located in the east of the site.

## 6.23 'Commic' and / or Forster's Tern

'Commic' / Forster's terns were recorded in the May I and II 2021 surveys, consisting of six flying terns distributed predominantly in the west of the Survey Area for the May I survey, and six flying terns loosely distributed across the Survey Area for the May II survey.

## 6.24 Sterna Tern species – unidentified

Unidentified Sterna terns were recorded in the May I and II 2021 surveys, consisting of three flying terns loosely distributed across the center of the site for the May I survey, and three flying terns for the May II survey; one located in the southwest of the site, and two located in the northwest of the buffer.

## 6.25 Tern species – unidentified

Unidentified terns were recorded in the May II 2021 survey only, consisting of seven sitting terns all located in one group in the center of the site.

## 6.26 Common Loon

Common loons were recorded in the April II 2021 survey only, consisting of two sitting common loons; one in the northeast of the buffer, and one in the west of the site.

## 6.27 Red-throated Loon

Red-throated loons were recorded in the April I and II 2021, and May I and II 2021 surveys. These consisted of 29 birds sitting on the water and 13 flying birds for the April I survey, ten sitting and eight flying for the April II survey, 33 sitting and one flying for the May I survey, and six sitting birds for the May II survey. For the April I survey, red-throated loons were predominantly located around the north to northeast of the Survey Area with some loose distribution to the west and south. For the April II survey, distribution was similar to the April I survey but with individuals spread further apart. For the May I survey, distribution was loose, predominantly around the center of the Survey Area with some individuals towards the north. Red-throated loons in the May II survey were predominantly located in the north-northeast of the Survey Area, with two individuals located in the west-northwest.

## 6.28 Loon species – unidentified

Unidentified loons were recorded in the April II 2021 and May II 2021 surveys, consisting of two loons sitting on the water in the north and northeast of the buffer for the April II survey, and one sitting loon in the west-southwest of the buffer for the May II survey.

## 6.29 Storm Petrel species – unidentified

Unidentified storm petrels were recorded in the June 2021 survey only, consisting of nine flying storm petrels in the southeast of the Survey Area, and one located north of the center of the site.

## 6.30 Northern Fulmar

Northern fulmars were recorded in the March 2021, May I and II 2021, and June 2021 surveys, consisting of four flying birds and three sitting on the water for the March survey, four flying birds for the May I survey, one flying bird for the May II survey, and two birds sitting on the water surface for the June survey. For the March survey, fulmars were predominantly located in the south of the Survey Area, with one individual also in the east and one in the northeast. For the May I survey, fulmars were loosely distributed in the west, north, and northeast of the Survey Area, and for the May II survey, a single northern fulmar was located in the south-southwest of the site. For the June survey, both individuals were located in the northeast of the site.

## 6.31 Cory's Shearwater

A single Cory's shearwater was recorded in the June 2021 survey only, consisting of one bird sitting on the water surface in the north-northeast of the buffer.

## 6.32 Great Shearwater

Great shearwaters were recorded in the June 2021 survey only, consisting of nine birds sitting on the water surface, predominantly located in the north-northeast of the buffer, with four located in the north of the site.

## 6.33 Sooty Shearwater

Sooty shearwaters were recorded in the June 2021 survey only, consisting of one flying bird, and 263 birds sitting on the water surface. All sooty shearwaters were located in the north to northeast of the Survey Area, with the majority located in dense groups in the buffer.

## 6.34 Manx Shearwater

Manx shearwaters were recorded in the April II 2021 survey only, consisting of two birds sitting on the water in the south-southwestern extent of the buffer.

## 6.35 Small Shearwater species – unidentified

Unidentified small shearwaters were recorded in the May II 2021, and June 2021 surveys, consisting of one flying bird located in the northeast of the center of the site for May II, and nine birds sitting on the water surface in the north of the buffer for June.

## 6.36 Large Shearwater species – unidentified

Unidentified large shearwaters were recorded in the June 2021 survey only, consisting of two individuals sitting on the water surface in the north-northeast of the buffer.

## 6.37 Shearwater species – unidentified

Unidentified shearwaters were recorded in the April II 2021, and June 2021 surveys. For April II, these consisted of three birds sitting on the water, two of which were located in the west-northwest of the site, and one of which was located in the southwest of the site. For the June survey, one flying shearwater was located in the north of the site, and seventeen shearwaters were recorded sitting on the water surface in the northern half of the Survey Area, predominantly in the buffer.

## 6.38 Northern Gannet

Northern gannets were recorded in the March 2021, April I and II 2021, May II 2021, and June 2021 surveys. These consisted of three birds sitting on the water and three flying birds for the March survey, seven flying and two sitting for the April I survey, five flying for the April II survey, two flying and one sitting for the May II survey, and eight flying and 19 sitting for the June survey. Overall, northern gannets were loosely distributed across the Survey Area with greater numbers apparent towards the north of the Survey Area.

## 6.39 Avian species – unidentified

A single unidentified bird was recorded in the June 2021 survey, sitting on the water surface in the south-southeast of the buffer.

## 6.40 Gray Seal

A single gray seal was recorded in the March 2021 survey, located in the south-southwestern extent of the buffer.

## 6.41 Seal species – unidentified

Unidentified seals were recorded in the March 2021, April I 2021, and June 2021 surveys, consisting of one submerged seal in the south of the center of the site and one in the northeast of the site for the March survey, one in the center of the site and one in the northeast of the buffer for the April I survey, and one surfacing seal in the south-southeast of the site for the June survey.

## 6.42 Common Minke Whale

A single common minke whale was recorded in the April II 2021 survey only, located in the east of the buffer.

## 6.43 Whale species – unidentified

A single unidentified whale was recorded in the April II 2021 survey only, located in the north of the center of the site.

## 6.44 Common Dolphin

Common dolphins were recorded in the March 2021, and June 2021 surveys only, consisting of seven submerged dolphins located in one group in the southwest of the center of the site and three located in a separate group in the south of the buffer for the March survey, and two submerged dolphins in the southwest of the buffer for June.

## 6.45 Dolphin species – unidentified

Unidentified dolphins were recorded in the March 2021, April II 2021, and June 2021 surveys, consisting of one submerged dolphin in the east of the site for the March survey, one submerged dolphin in the northeast of the site for the April II survey, and one surfacing dolphin in the north of the site for the June survey.

## 6.46 Harbor Porpoise

Harbor porpoises were recorded in the March 2021 and April II 2021 surveys, consisting of two submerged porpoises, with one in the north-northeast of the buffer and one in the west-southwest of the buffer for the March survey, and one surfacing porpoise in the north of the buffer and six submerged porpoises located primarily around the center of the site for the April II survey.

## 6.47 Marine Mammal species – unidentified

Unidentified marine mammals were recorded in the May I and II 2021, and June 2021 surveys, consisting of one surfacing and four submerged marine mammals for the May I survey located in the west and north of the Survey Area, two surfacing and five submerged marine mammals in the north-northwest of the Survey Area for the May II survey, and one submerged mammal in the north of the buffer and one surfacing mammal in the northeast of the site for the June survey.

## 6.48 Ocean Sunfish

Ocean sunfish were recorded in the June 2021 survey only, consisting of three submerged individuals loosely distributed from the center to the west of the Survey Area.

## 6.49 Fish species – unidentified

A single submerged unidentified fish was recorded in the May I 2021 survey, located in the northeast of the buffer.

### 6.50 Shark species – unidentified

Unidentified sharks were recorded in the May II 2021, and June 2021 surveys only, consisting of three submerged sharks in the south-southeast of the site and one located in the southwest of the buffer for the May II survey, and one submerged shark in the north of the buffer and one in the southwest of the site for the June survey.

## 7. Shipping Observations

One vessel, identified as a commercial fishing vessel, was recorded in the imagery during the April I 2021 survey. No vessels were recorded in the imagery for the March 2021, April II 2021, May I 2021, May II 2021, or June 2021 surveys.

Three vessels identified as two fishing vessels and one survey vessel were recorded visually from the aircraft during the April I 2021 survey. No vessels were recorded visually from the aircraft from the March 2021, April II 2021, May I 2021, May II 2021, or June 2021 surveys.

## 8. Survey Completion Dates

**Table 8** provides the survey dates for all completed surveys to date: March to October 2021 inclusive, the latter half of which are awaiting data finalization.

**Table 8 Survey dates for completed surveys to date**

| Survey Number | Survey Month | Survey Dates |
|---|---|---|
| Survey 17 | March | March 3rd |
| Survey 18 | April | April 2nd |
| Survey 19 | | April 18th |
| Survey 20 | May | May 9th |
| Survey 21 | | May 16th |
| Survey 22 | June | June 2nd |
| Survey 23 | July | July 27th |
| Survey 24 | August | August 6th |
| Survey 25 | | August 17th |
| Survey 26 | September | September 7th |
| Survey 27 | | September 20th |
| Survey 28 | October | October 14th |

# 9. Summary of Results

## 9.1 March 2021

A total of 574 birds were recorded in the Survey Area in the March 2021 survey. The most abundant group recorded was waterfowl (n=338). This was followed by auks (n=185), gulls (n=32), fulmars (n=7), and shorebirds (n=6) and gannets (n=6).

A total of 34 birds (6%) were recorded in flight during this survey. These consisted of murre / razorbill (n=11), herring gull (n=5), great black-backed gull (n=5), northern fulmar (n=4), long-tailed duck (n=3), common / thick-billed murre (n=3), and northern gannet (n=3). There were 540 birds (94%) recorded as sitting.

A total of 16 marine mammals were recorded consisting of common dolphin (n=10), unidentified seal species (n=2), harbor porpoise (n=2), gray seal (n=1), and unidentified dolphin species (n=1). Of the 16 marine mammals recorded, all were recorded as submerged.

## 9.2 April I 2021

A total of 572 birds were recorded in the Survey Area in the April I 2021 survey. The most abundant group recorded was auks (n=313). This was followed by waterfowl (n=172), loons (n=42), gulls (n=36), and gannets (n=9).

A total of 70 birds (12%) were recorded in flight during this survey. These consisted of razorbill (n=18), red-throated loon (n=13), Bonaparte's gull (n=12), northern gannet (n=7), long-tailed duck (n=5), herring gull (n=5), great black-backed gull (n=3), murre / razorbill (n=2), unidentified auk species (n=2), unidentified small gull species (n=2), and common / thick-billed murre (n=1). There were 502 birds (88%) recorded as sitting.

A total of two marine mammals were recorded, consisting of unidentified seal species (n=2). Of the two marine mammals recorded, both were recorded submerged.

## 9.3 April II 2021

A total of 271 birds were recorded in the Survey Area in the April II 2021 survey. The most abundant group recorded was auks (n=201). This was followed by gulls (n=26), loons (n=22), waterfowl (n=12), and shearwaters (n=5) and gannets (n=5).

A total of 28 birds (10%) were recorded in flight during this survey. These consisted of red-throated loon (n=8), herring gull (n=5), northern gannet (n=5), great black-backed gull (n=4), unidentified shearwater species (n=3), white-winged scoter (n=2), and laughing gull (n=1). There were 243 birds (90%) recorded as sitting.

A total of ten marine mammals were recorded, consisting of harbor porpoise (n=7), common minke whale (n=1), unidentified whale species (n=1), and unidentified dolphin species (n=1). Of the ten marine mammals recorded, nine were recorded submerged, and one was recorded surfacing.

## 9.4 May I 2021

A total of 68 birds were recorded in the Survey Area in the May I 2021 survey. The most abundant group recorded was loons (n=34). This was followed by gulls (n=13) and terns (n=13), and auks (n=4) and fulmars (n=4).

A total of 22 birds (32%) were recorded in flight during this survey. These consisted of 'commic' / Forster's tern (n=6), roseate tern (n=4), northern fulmar (n=4), unidentified Sterna tern species (n=3), herring gull (n=2), common / thick-billed murre (n=1), great black-backed gull (n=1), and red-throated loon (n=1). There were 46 birds (68%) recorded as sitting.

A total of five marine mammals were recorded, consisting of unidentified marine mammal species (n=5). Of the five marine mammals recorded, four were submerged, and one was recorded surfacing. Additionally, a submerged unidentified fish species (n=1) was also recorded.

## 9.5 May II 2021

A total of 37 birds were recorded in the Survey Area in the May II 2021 survey. The most abundant group recorded was terns (n=20). This was followed by loons (n=7), gulls (n=5), gannets (n=3), fulmars (n=1), and shearwaters (n=1).

A total of 20 birds (54%) were recorded in flight during this survey. These consisted of 'commic' / Forster's tern (n=6), herring gull (n=5), common tern (n=3), northern gannet (n=2), black tern (n=1), unidentified Sterna species tern (n=1), northern fulmar (n=1), and unidentified small shearwater species (n=1). There were 17 birds (46%) recorded as sitting.

A total of seven marine mammals were recorded, consisting of unidentified marine mammal species (n=7). Of the seven marine mammals recorded, five were submerged, and two were recorded surfacing. Four submerged sharks, consisting of unidentified shark species (n=4), were also recorded.

## 9.6 June 2021

A total of 349 birds were recorded in the Survey Area in the June 2021 survey. The most abundant group recorded was shearwaters (n=303). This was followed by gannets (n=27), storm petrels (n=10), gulls (n=5), fulmars (n=2), and skuas (n=1) and unidentified birds (n=1).

A total of 23 birds (7%) were recorded in flight during this survey. These consisted of unidentified storm petrel species (n=10), northern gannet (n=8), south polar skua (n=1), herring gull (n=1), great black-backed gull (n=1), sooty shearwater (n=1), and unidentified shearwater species (n=1). There were 326 birds (93%) recorded as sitting.

A total of six marine mammals were recorded, consisting of common dolphin (n=2), unidentified marine mammal species (n=2), unidentified seal species (n=1), and unidentified dolphin species (n=1). Of the six marine mammals recorded, three were submerged, and three were recorded surfacing. Three submerged large bony fish consisting of ocean sunfish (n=3) were recorded, and two submerged sharks consisting of unidentified shark species (n=2) were also recorded.

# 10. Discussion

For the purposes of this report, a direct comparison has been made between the year one second quarterly report results (March to May 2020) and the results from the corresponding surveys for the second year (March to May 2021). The June 2021 survey has been addressed separately to draw comparisons with the year one June 2020 survey.

Overall, the year two spring surveys (March 2021, April I and II 2021, and May I and II 2021) recorded less than half of the total number of avian numbers from the year one surveys (March 2020, April I and II 2020, and May I and II 2020), with a total of 1,522 recorded for the year two surveys compared with the 3,269 recorded for the year one surveys. Additionally, each survey from the year one surveys recorded higher numbers of birds than the equivalent year two surveys. Despite this, when analyzing the assigned species groups for birds, it is evident that waterfowl, phalaropes, and gulls all featured higher numbers than the year one surveys in the year two surveys. Waterfowl featured 522 records for year two compared with 393 for year one, whilst gulls featured a more marginal increase in numbers for the year two surveys (n=112) when compared with the year one surveys (n=108). Phalaropes were absent from the year one surveys and so the six red / red-necked phalaropes recorded for the year two surveys were a new spring record for the Survey Area. For the total number of individual species per species group, phalaropes, gulls, and terns featured higher numbers of species in the year two surveys (n=1, n=8, and n=6 respectively) compared with the year one surveys (n=0, n=6, and n=4 respectively). Auks, and loons recorded the same number (n=5 and n=3 respectively), as did fulmars and gannets (n=1 for both), though their species groups realistically only feature a maximum of one species each (northern fulmar and northern gannet respectively) for the survey location.

A number of notable observations were apparent between the two years of spring surveys, particularly with regards to differences in species numbers. White-winged scoters, for instance, were recorded at a total of 301 individuals for the year one surveys and only 34 for the year two surveys, though peak numbers occurred in the March survey for both years (n=115 and n=32 respectively). The inverse was true of long-tailed ducks, with a total of 73 recorded in the year one surveys compared with a total of 460 from the year two surveys, with peak numbers seen in the first April survey of year one (n=46) and in the March survey for year two (n=297). Auks experienced a large reduction in numbers between the two years, with a total of 1,537 recorded in the year one surveys, and 703 in the year two surveys. However, the high auk numbers from the year one surveys were observed to potentially have been a result of unseasonable climate conditions between winter and spring, as many winter species such as auks persisted throughout or began appearing in greater numbers in the spring season for the 2020 surveys. It is therefore within expectations that winter species should occur in lower numbers for the 2021 surveys compared with the 2020 surveys, though the afore mentioned increase in waterfowl would not support this hypothesis. Of all the species differences between the two survey years, red-throated loons exhibited the most dramatic reduction, with a total of 896 recorded for the year one surveys compared with 105 for the year two surveys. However, due to the breeding season for red-throated loons occurring during the spring and their nesting preference for inland freshwater bodies, it would be expected that offshore red-throated loon numbers would normally be reduced during the spring[1]. The unseasonal conditions between winter and spring for the year one surveys may account for why red-throated loon numbers were comparatively higher during those surveys.

[1]Barr, J.F., Eberl, C., and McIntyre, J.W. Red-throated Loon (*Gavia stellata*). In: Poole, A., Gill, F., editors. The Birds of North America. Philadelphia; The Birds of North America, Inc. no. 513.

Terns were only recorded within the Survey Area for the year two surveys from the May I survey. This is in line with expectations, as the migration of roseate terns was the instigating factor in the decision to fly bimonthly surveys in April and May, though no terns were recorded in April for year two. The presence of two roseate tern breeding colonies along the Massachusetts coast, at the sites of Bird Island and Ram Island (**Figure 14**), highlights the importance of monitoring potential passage through the Survey Area. As with the year one survey, roseate terns were present for the May I survey only, with a total of four individuals recorded, an increase in one from the total of three that were recorded from the year one survey. Additionally, a new tern species record was made for the Survey Area in the form of black tern (n=1), recorded in the May II survey.

Other avian observations include a reduction in shearwaters, with 105 recorded in the year one surveys, and six recorded in the year two surveys, with none of the identified species shared between years. Northern gannets also saw a reduction, with 108 recorded in the year one surveys and 23 recorded for the year two surveys. Northern fulmars were reduced also, from a total of 57 in the year one surveys to 12 in the year two surveys. Additionally, no storm petrels or cormorants were recorded during the year two surveys.

As with birds, marine mammals, fish, and sharks were recorded in less numbers for the year two surveys (n=40, n=1, and n=4 respectively) compared with the year one surveys (n=130, n=3, and n=12 respectively), whilst turtles and rays continued to be absent for the year two surveys. Additionally, each survey from the year one surveys recorded higher numbers of marine mammals, fish, and sharks than the equivalent year two surveys, save for the May I 2021 survey where one fish was recorded compared with no fish for the May I 2020 survey. Marine mammals did witness an increase in total species or species groups overall, though this was in the form of an unidentified whale recorded in the April II survey. However, fish and sharks witnessed a reduction in species or species groups compared with the year one surveys as only unidentified fish and unidentified sharks were recorded for the year two surveys.

The June 2021 survey saw an increase in total birds in the second year survey (n=349) when compared with the results of the first year survey (n=118). The year two survey also exhibited a greater number of individuals for the majority of avian groups, with the year one survey only exhibiting greater numbers of gulls and terns. However, with the exception of shearwaters and gannets, the differences in numbers were relatively marginal. For shearwaters and gannets, a considerable increase was experienced for both during the year two survey, with only one gannet recorded in 2020 compared with 27 in 2021, and 95 shearwaters recorded in 2020 compared with 303 in 2021. Of these shearwaters, the most numerous by far was sooty shearwater, with a total of 264 individuals in 2021. No terns were recorded in the second year survey compared with the two ‘commic’ / Forster’s terns recorded in the first year survey.

Unlike with birds, marine megafauna numbers decreased in June 2021 compared with 2020, with reductions in marine mammal, large bony fish, and shark total numbers, as well as total species recorded. No whales were recorded in the year two surveys, as well as no identified shark species. In comparison, the first year survey recorded four whales from four different species, as well as 25 sharks from three identified species. Large bony fish were composed of two species in 2020 and only one species in 2021 (ocean sunfish), of which 22 were recorded in the first year, compared with three recorded in the second year.

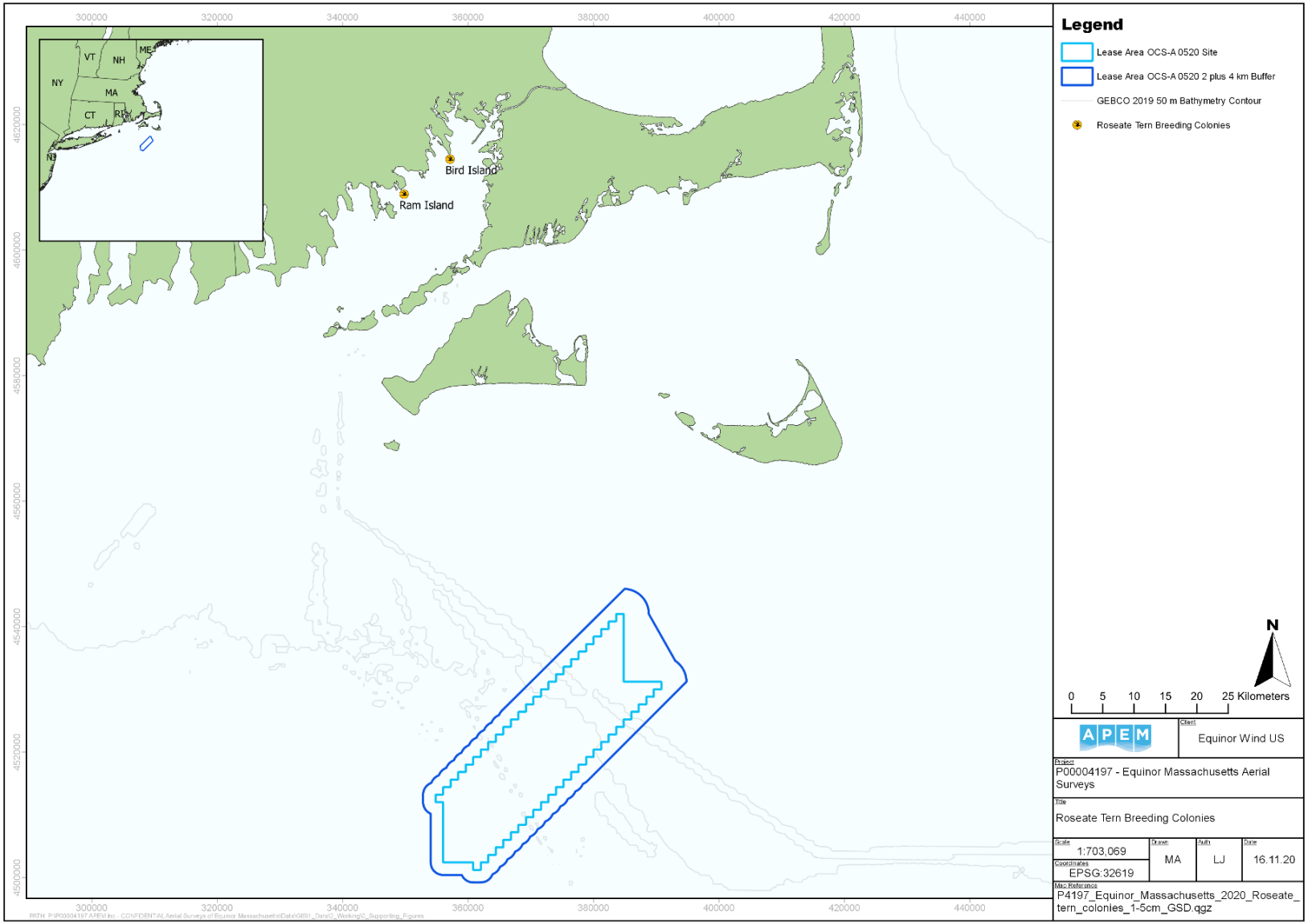


**Figure 14** **Massachusetts roseate tern breeding colony locations relative to Lease Area OCS-A 0520**

# Appendix I Species List

| Common Name | Scientific Name | Family | Class |
|---|---|---|---|
| White-winged Scoter | *Melanitta deglandi* | Anatidae | Aves |
| Scoter sp. – unidentified | *Melanitta* spp. | Anatidae | Aves |
| Long-tailed Duck | *Clangula hyemalis* | Anatidae | Aves |
| Duck sp. – unidentified | - | Anatidae | Aves |
| Red / Red-necked Phalarope | *Phalaropus fulicarius / lobatus* | Scolopacidae | Aves |
| South Polar Skua | *Stercorarius maccormicki* | Stercorariidae | Aves |
| Common / Thick-billed Murre | *Uria aalge / lomvia* | Alcidae | Aves |
| Razorbill | *Alca torda* | Alcidae | Aves |
| Murre / Razorbill | *Uria aalge / lomvia; Alca torda* | Alcidae | Aves |
| Atlantic Puffin | *Fratercula arctica* | Alcidae | Aves |
| Auk sp. – unidentified | - | Alcidae | Aves |
| Bonaparte's Gull | *Chroicocephalus philadelphia* | Laridae | Aves |
| Laughing Gull | *Leucophaeus atricilla* | Laridae | Aves |
| Small Gull sp. – unidentified | - | Laridae | Aves |
| Herring Gull | *Larus argentatus* | Laridae | Aves |
| Lesser Black-backed Gull | *Larus fuscus* | Laridae | Aves |
| Great Black-backed Gull | *Larus marinus* | Laridae | Aves |
| Large Gull sp. – unidentified | *Larus* spp. | Laridae | Aves |
| Black Tern | *Chlidonias niger* | Laridae | Aves |
| Roseate Tern | *Sterna dougallii* | Laridae | Aves |
| Common Tern | *Sterna hirundo* | Laridae | Aves |
| 'Commic' / Forster's Tern | *Sterna hirundo / paradisaea / forsteri* | Laridae | Aves |
| Sterna Tern sp. – unidentified | *Sterna* spp. | Laridae | Aves |
| Tern sp. – unidentified | - | Laridae | Aves |
| Common Loon | *Gavia immer* | Gaviidae | Aves |
| Red-throated Loon | *Gavia stellata* | Gaviidae | Aves |
| Loon sp. – unidentified | *Gavia* spp. | Gaviidae | Aves |
| Storm Petrel sp. – unidentified | - | Hydrobatidae / Oceanitidae | Aves |
| Northern Fulmar | *Fulmarus glacialis* | Procellariidae | Aves |
| Cory's Shearwater | *Calonectris borealis* | Procellariidae | Aves |
| Great Shearwater | *Ardenna gravis* | Procellariidae | Aves |
| Sooty Shearwater | *Ardenna grisea* | Procellariidae | Aves |
| Manx Shearwater | *Puffinus puffinus* | Procellariidae | Aves |
| Small Shearwater sp. – unidentified | - | Procellariidae | Aves |
| Large Shearwater sp. – unidentified | - | Procellariidae | Aves |
| Shearwater sp. – unidentified | - | Procellariidae | Aves |
| Northern Gannet | *Morus bassanus* | Sulidae | Aves |
| Bird sp. – unidentified | - | - | Aves |
| Gray Seal | *Halichoerus grypus* | Phocidae | Mammalia |
| Seal sp. – unidentified | - | Phocidae | Mammalia |
| Common Minke Whale | *Balaenoptera acutorostrata* | Balaenopteridae | Mammalia |
| Whale sp. – unidentified | - | - | Mammalia |
| Common Dolphin | *Delphinus delphis* | Delphinidae | Mammalia |
| Dolphin sp. – unidentified | - | Delphinidae | Mammalia |
| Harbor Porpoise | *Phocoena phocoena* | Phocoenidae | Mammalia |
| Marine Mammal sp. – unidentified | - | - | Mammalia |
| Ocean Sunfish | *Mola mola* | Molidae | Actinopterygii |
| Fish sp. – unidentified | - | - | Actinopterygii |
| Shark sp. – unidentified | - | - | Chondrichthyes |