
Environmental Imaging Solutions

**Ornithological and Marine Fauna Aerial Survey of Lease Area OCS-
A 0512**

Monthly Report: May 2018

Equinor

APEM Ref: P00002032

Issued September 2018

Client: Equinor
Address: 120 Long Ridge
Stamford
Connecticut
CT 06902
USA

Project reference: P00002032

Date of issue: November 2018

Project Director: Stuart Clough

Project Manager: Laura Jervis

Key Contributors: Roger Buisson, Simon Warford, Julia Robinson Willmott
(Normandeau Associates)

APEM, Inc.
2603 NW 13th Street
#402
Gainesville
Florida
FL 32609

Document number of the corporation: P15000019267

Normandeau-APEM (2018). Lease Area OCS-A 0512 Monthly Survey Report: May 2018.
Scientific Monthly Report P00002032-07. Equinor, 11/06/2018, v2.1 Final, 7 pp.

Revision and Amendment Register

Version Number	Date	Section(s)	Page(s)	Summary of Changes	Approved by
1.0	06/09/2018	All	All	Creation	LJ
1.1	07/09/2018	All	All	Review prior to issue to client	RB
1.2	07/09/2018	All	All	Amendments following review	LJ
2.0	11/06/2018	All	All	Client review	MG
2.1	12/19/2018	All	All	Tern ID review	LJ

Contents

1. Executive Summary	1
2. Introduction	2
3. Summary of Survey	2
4. Abundance and Distribution	3
4.1 Species Abundance	3
4.2 Spatial Distribution	4
5. Shipping Observations	6
6. General Conclusions	6
Appendix I Species List in Taxonomic Order	7

List of Figures

Figure 1 Distribution of all records from the May 2018 survey of Lease Area OCS-A 0512 plus 4 km (2.5 mile) buffer.	5
--	---

List of Tables

Table 1 Total number of individuals of the bird species (in taxonomic order) recorded during the May 2018 survey of the Lease Area OCS-A 0512 plus 4 km buffer.	3
--	---

Table 2 Total number of individuals of the marine mammal and other fauna species (in taxonomic order) recorded during the May 2018 survey of the Lease Area OCS-A 0512 plus 4 km buffer.	4
---	---

1. Executive Summary

- An aerial survey of Equinor's Lease Area OCS-A 0512 in the New York Bight was conducted on the 21st of May 2018 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 May 2018 survey are presented here.
- A total of 578 marine animals (342 birds, 71 marine mammals and 165 large bony fish) were recorded in the Survey Area in May 2018. The most abundant group recorded was terns (n=245), followed by fish (n=165), marine mammals (n=71), loons (n=64), gulls (n=19), shearwaters (n=7), gannets (n=3), cormorants (n=1), hawks (n=1), phalaropes (n=1), petrels (n=1).
- Sterna terns and Atlantic Bluefin tuna were recorded during the May survey. These are Listed Species (Federally listed as Threatened or Endangered, New York State listed as Endangered).
- A total of 212 birds (62%) were recorded in flight during this survey. These consisted of 'commic' / Forster's terns (n=172), Sterna tern species (n=11), common terns (n=8), Least terns (n=4), common loons (n=4), northern gannets (n=3), herring gulls (n=2), Forster's terns (n=1), cormorant species (n=1), hawk species (n=1), laughing gulls (n=1), ring-billed gulls (n=1), small shearwater species (n=1), sooty shearwaters (n=1), and storm-petrel species (n=1). There were 125 birds recorded as sitting (37%), 2 recorded perching (<1%), and 3 recorded diving (<1%).
- A total of 71 marine mammals and 165 large bony fish were recorded during this survey. These consisted of 68 common dolphins, three dolphin species, 131 mahi-mahi, eight Atlantic bluefin tuna, 24 unknown tuna species, and two ocean sunfish.

2. Introduction

APEM and Normandeau were contracted by Equinor to provide monthly aerial digital survey data of the Lease Area OCS-A 0512 from November 2017 until October 2018.

The aims and objectives of the work required by Equinor were to assess the abundance and distribution of primarily birds present in the Lease Area OCS-A 0512, and also to gather information on other marine fauna such as marine mammals, sharks, rays, and turtles. These surveys will provide the baseline information required for conducting impact assessments and will meet the U.S. Bureau of Ocean Energy Management's (BOEM's) regulatory requirements for environmental review of Wind Energy Areas.

The Survey Area referred to herein comprise of the Lease Area OCS-A 0512 (its proposed turbine array footprint) plus a 4 km (2.5 mile) buffer surrounding it. The Survey Area data in this report represent the total number of birds, other marine fauna, and incidental occurrences recorded across all images (including those that may fall outside the proposed Lease Area OCS-A 0512 plus buffer region).

To meet the objectives of the project, 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 was undertaken by Normandeau. This report describes the results of the May 2018 survey.

3. Summary of Survey

The survey was undertaken on the 21st of May 2018. 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 aerial digital survey captured images along 28 lines spaced approximately 0.8 km across-track and 0.6 km along-track between image nodes within the Lease Area OCS-A 0512 plus 4 km buffer. Coverage was calculated to be approximately 10% generated from 1,550 image capture points.

On the 21st of May 2018, the cloud cover was recorded as 0 to 30% (clear to scattered), visibility was greater than 10 km (6.2 miles), and no precipitation was recorded. Winds of 5-10 knots blew from northerly easterly and south westerly directions. The outside air temperature at the survey altitude was recorded as 59 to 67°F. The sea state was 1 (rippled) and the water turbidity was 0 to 1 (clear to slightly turbid).

No health and safety issues were reported during the survey.

APEM analyzed the images to enumerate birds to species level, and to enumerate any other non-avian marine fauna. Normandeau provided quality assurance of the data to check for missed animals in 10% of images recorded as empty and also quality assured 20% of the bird species identification undertaken by APEM (and 100% of Listed species). Normandeau identify 100% of the species of non-avian marine fauna including marine mammals, sharks, rays, turtles. Birds and marine fauna identified from the images were 'snagged' (i.e. located within the images) and categorised usually to species, but sometimes to the species grouping.

Data reported are raw counts of animals that have not yet been subject to extrapolation for population estimates. Design-based population estimates will be provided in the annual report following the completion of the October 2018 survey.

4. Abundance and Distribution

4.1 Species Abundance

A total of 342 birds (Table 1), 71 marine mammals (Table 2), and 165 large bony fish (Table 2) were recorded in the Survey Area in May 2018. The most abundant group recorded was terns (n=245), followed by fish (n=165), marine mammals (n=71), loons (n=64), shearwaters (n=7), small gulls (n=6), gannets (n=3), cormorants (n=1), hawks (n=1), phalaropes (n=1), petrels (n=1).

Listed Species¹ that were recorded during the survey included Sterna Terns and Atlantic Bluefin tuna.

Table 1 Total number of individuals of the bird species (in taxonomic order) recorded during the May 2018 survey of the Lease Area OCS-A 0512 plus 4 km buffer.

Group	Species	Diving	Flying	Perched	Sitting	Total
Loon	Common Loon	3	4	-	45	52
	Red-throated Loon	-	-	-	12	12
Shearwater	Sooty Shearwater	-	1	-	-	1
	Small Shearwater Species	-	1	-	5	6
Storm-Petrel	Species Unknown - Storm-Petrel	-	1	-	-	1
Gannet	Northern Gannet	-	3	-	-	3
Cormorant	Species Unknown - Cormorant	-	1	-	-	1
Raptor	Species Unknown - Hawk	-	1	-	-	1
Phalarope	Red/Red-necked Phalarope	-	-	-	1	1
Gull	Laughing Gull	-	1	-	1	2
	Ring-billed Gull	-	1	-	1	2
	Herring Gull	-	2	-	6	8
	Lesser Black-backed Gull	-	-	-	1	1
	Great Black-backed Gull	-	-	-	3	3
	Species Unknown - Large	-	-	-	1	1
	Species Unknown - Small	-	-	-	2	2
Tern	Common Tern	-	8	-	-	8
	Forster's Tern	-	1	-	-	1
	Least Tern	-	4	-	-	4
	'Commic' / Forster's Tern	-	172	-	-	172
Sterna Tern	Species Unknown - Sterna Tern	-	11	2	47	60
Total Birds		3	212	2	125	342

¹ Federally listed as Threatened or Endangered, New York State listed as Endangered.

Table 2 Total number of individuals of the marine mammal and other fauna species (in taxonomic order) recorded during the May 2018 survey of the Lease Area OCS-A 0512 plus 4 km buffer.

Group	Species	Surfacing	Submerged	Total
Marine Mammal	Common Dolphin	16	52	68
	Unknown Species - Dolphin	-	3	3
Total Mammals		16	55	71
Large Bony Fish	Mahi-Mahi	-	131	131
	Atlantic Bluefin Tuna	-	8	8
	Unknown Species - Tuna	-	24	24
	Ocean Sunfish	-	2	2
Total Large Bony Fish		-	165	165

4.2 Spatial Distribution

Figure 1 shows the location of birds, marine mammals and other large marine fauna recorded throughout the Survey Area.

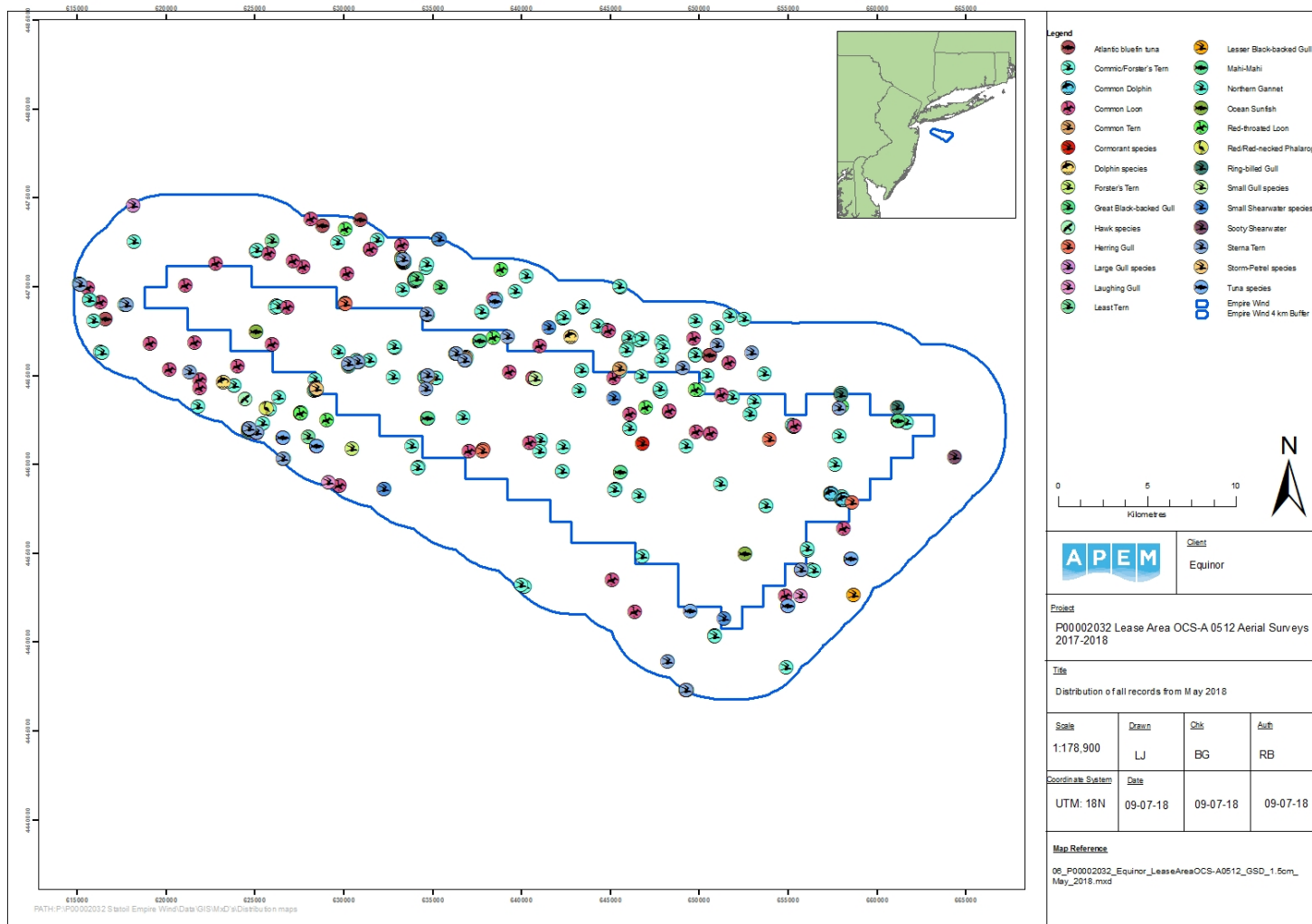


Figure 1 Distribution of all records from the May 2018 survey of Lease Area OCS-A 0512 plus 4 km (2.5 mile) buffer.

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

5. Shipping Observations

Two vessels identified as trawlers were recorded visually from the aircraft on the 21st of May 2018, one with a westerly bearing and the second with a southerly bearing.

No vessels were recorded in the imagery.

6. General Conclusions

A total of 578 marine animals (342 birds, 71 marine mammals and 165 large bony fish) were recorded in the Survey Area in May 2018. The most abundant group recorded was terns (n=245), followed by fish (n=165), marine mammals (n=71), loons (n=64), gulls (n=19), shearwaters (n=7), gannets (n=3), cormorants (n=1), hawks (n=1), phalaropes (n=1), petrels (n=1).

A total of 212 birds (62%) were recorded in flight during this survey. These consisted of 'commic' / Forster's terns (n=172), sterna tern species (n=11), common terns (n=8), Least tern (n=4), common loon (n=4), northern gannet (n=3), herring gull (n=2), Forster's tern (n=1), cormorant species (n=1), hawk species (n=1), laughing gull (n=1), ring-billed gull (n=1), small shearwater species (n=1), sooty shearwater (n=1), and storm-petrel species (n=1). There were 125 birds recorded as sitting (37%), 2 recorded perching (<1%), and 3 recorded diving (<1%).

A total of 71 marine mammals and 165 large bony fish were recorded during this survey. These consisted of 68 common dolphins, three dolphin species, 131 mahi-mahi, eight Atlantic bluefin tuna, 24 unknown tuna species, and two ocean sunfish.

Appendix I Species List in Taxonomic Order

Common Name	Scientific Name	Family	Class
Red-throated Loon	<i>Gavia stellata</i>	Gaviidae	Aves
Common Loon	<i>Gavia immer</i>	Gaviidae	Aves
Sooty Shearwater	<i>Ardenna grisea</i>	Procellariidae	Aves
Northern Gannet	<i>Morus bassanus</i>	Sulidae	Aves
Laughing Gull	<i>Leucophaeus atricilla</i>	Laridae	Aves
Ring-billed Gull	<i>Larus delawarensis</i>	Laridae	Aves
Herring Gull	<i>Larus argentatus</i>	Laridae	Aves
Lesser Black-backed Gull	<i>Larus fuscus</i>	Laridae	Aves
Great Black-backed Gull	<i>Larus marinus</i>	Laridae	Aves
Common Tern	<i>Sterna hirundo</i>	Laridae	Aves
Least Tern	<i>Sterna antillarum</i>	Laridae	Aves
Arctic Tern	<i>Sterna paradisaea</i>	Laridae	Aves
Forster's Tern	<i>Sterna forsteri</i>	Laridae	Aves
Common Dolphin	<i>Delphinus delphis</i>	Mammalia	Delphinidae
Mahi-Mahi	<i>Coryphaena hippurus</i>	Delphinidae	Coryphaenidae
Atlantic Bluefin Tuna	<i>Thunnus thynnus</i>	Actinopterygii	Scombridae
Ocean Sunfish	<i>Mola mola</i>	Actinopterygii	Molidae