
Environmental Imaging Solutions

Ornithological and Marine Fauna Aerial Survey of Empire Wind

Monthly Report: November 2017

Equinor

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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	3
5. Shipping Observations	5
6. General Conclusions	5
Appendix I Species List in Taxonomic Order	6

List of Figures

Figure 1 Distribution of all records from the November 2017 survey of Empire Wind offshore wind lease area plus 4 km (2.5 mile) buffer.	4
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List of Tables

Table 1 Total number of individuals of the species (in taxonomic order) recorded during the November 2017 survey of the Empire Wind Survey Area.	3
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1. Executive Summary

- An aerial survey of Equinor's Empire Wind in the New York Bight was conducted on the 28th and 29th of November 2017 using APEM Inc.'s (hereafter referred to as APEM) high-resolution camera system to capture digital still imagery.
- Images collected have been analyzed by APEM Inc. and quality assured by Normandeau Associates (hereafter referred to as Normandeau). Raw counts of all species and incidental observations recorded during the November 2017 survey are presented here.
- A total of 467 birds and 5 marine mammals were recorded in the Survey Area in November 2017. The most abundant group recorded was gulls (n=129), followed by loons (n=102), ducks (n=97), gannets (n=75), phalaropes (n=60), marine mammals (n=5), fulmars (n=2), and alcids (n=2).
- No individuals listed as Endangered (Federally listed as Threatened or Endangered, and New York State listed as Endangered) were recorded.
- A total of 283 birds (61%) were recorded in flight during this survey. These consisted of American black ducks (n=13), surf scoters (n=7), white-winged scoters (n=8), black scoters (n=69), red-throated loon (n=62), common loon (n=16), northern gannet (n=20), red phalarope (n=12), black-legged kittiwake (n=17), Bonaparte's gull (n=57), ring-billed gull (n=1), and herring gull (n=1). There were 184 birds recorded as sitting (39%).
- Five submerged common dolphins were recorded.

2. Introduction

APEM and Normandeau were contracted by Equinor to provide monthly aerial digital survey data of the Empire Wind offshore wind lease area 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 Empire Wind offshore wind lease area, 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 comprises of the Empire Wind offshore wind lease area (its proposed turbine array footprint) plus a 4 km (2.5 miles) 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 Empire Wind offshore wind lease area 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 November 2017 survey.

3. Summary of Survey

The survey was undertaken on the 28th and 29th of November 2017. 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 Empire Wind Survey Area. Coverage was calculated to be approximately 10% generated from 1,550 image capture points.

On the 28th of November 2017, the cloud cover was recorded as 1 to 3 (few to scattered), visibility was greater than 10 km (6.2 miles), and no precipitation was recorded. Winds of 10-15 knots blew from a north westerly to south easterly direction. The outside air temperature at the survey altitude was recorded as 39 to 48°F. The sea state was 1 to 3 (calm to slight) and the water turbidity was 1 to 2 (slightly turbid to moderately turbid).

On the 29th of November 2017, the cloud cover was recorded as 1 to 5 (few to broken), visibility was greater than 10 km (6.2 miles), and no precipitation was recorded. Winds of 30-35 knots blew from a westerly direction. The outside air temperature at the survey altitude was recorded as 54 to 59°F. The sea state was 3 to 4 (slight to moderate) and the water turbidity was 2 (moderately 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 467 birds and 5 marine mammals were recorded during the November 2017 aerial survey of the Survey Area (Table 1). The most abundant group recorded was gulls (n=129), followed by loons (n=102), ducks (n=97), gannets (n=75), phalaropes (n=60), marine mammals (n=5), fulmars (n=2), and alcids (n=2).

No Endangered¹ species were recorded during the survey.

Table 1 Total number of individuals of the species (in taxonomic order) recorded during the November 2017 survey of the Empire Wind Survey Area.

Group	Species	Flying	Sitting	Total
Duck	American Black Duck	13	-	13
	Surf Scoter	7	-	7
	White-winged Scoter	8	-	8
	Black Scoter	69	-	69
Loon	Red-throated Loon	62	4	66
	Common Loon	16	20	36
Fulmar	Northern Fulmar	-	2	2
Gannet	Northern Gannet	20	55	75
Phalarope	Red Phalarope	12	38	50
	Red / Red-necked Phalarope	-	10	10
Alcid	Murre* / Razorbill	-	2	2
Gull	Black-legged Kittiwake	17	8	25
	Bonaparte's Gull	57	44	101
	Ring-billed Gull	1	-	1
	Herring Gull	1	1	2
Total Birds		283	184	467
Group	Species	Surfacing	Submerged	Total
Marine Mammal	Common Dolphin	-	5	5
Total Mammals		-	5	5

*Note: Murre refers to either Common Murre or Thick-billed Murre.

4.2 Spatial Distribution

Figure 1 shows the location of birds and marine mammals recorded throughout the Survey Area.

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

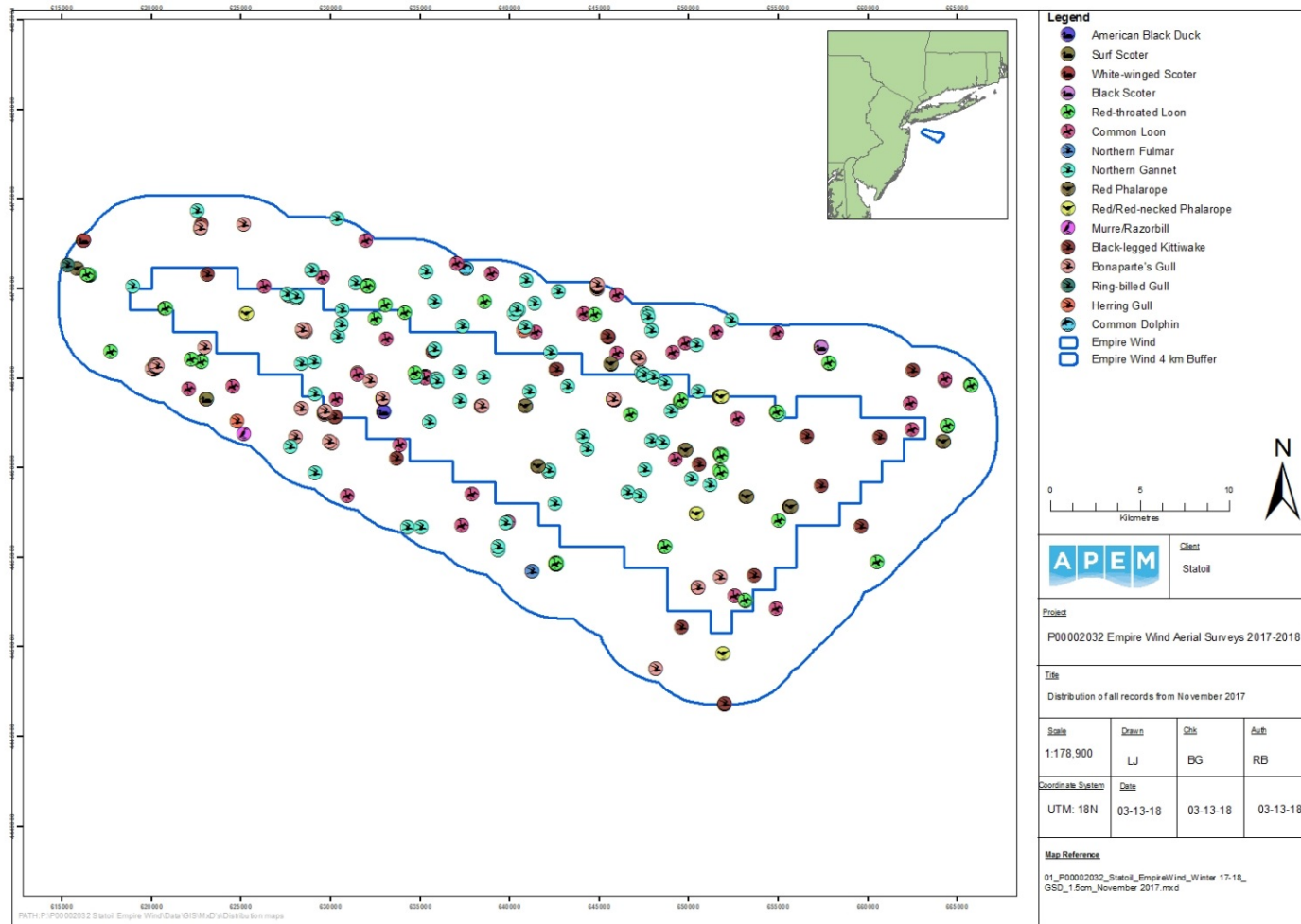


Figure 1 Distribution of all records from the November 2017 survey of Empire Wind offshore wind lease area plus 4 km (2.5 mile) buffer.

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

5. Shipping Observations

One tanker (with a south-eastern bearing) and one trawler (with a south south-western bearing) were observed visually from the aircraft on the 28th November 2017. No vessels were recorded visually during the flight on the 29th November.

No vessels were recorded in the imagery.

6. General Conclusions

A total of 467 birds and 5 marine mammals were recorded during the November 2017 aerial survey of the Survey Area (Table 1). The most abundant group recorded was gulls (n=129), followed by loons (n=102), ducks (n=97), gannets (n=75), phalaropes (n=60), fulmars (n=2), and alcids (n=2).

A total of 283 birds (61%) were recorded in flight during this survey. These consisted of American black ducks (n=13), surf scoters (n=7), white-winged scoters (n=8), black scoters (n=69), red-throated loon (n=62), common loon (n=16), northern gannet (n=20), red phalarope (n=12), black-legged kittiwake (n=17), Bonaparte's gull (n=57), ring-billed gull (n=1), and herring gull (n=1). There were 184 birds recorded as sitting (39%).

Five submerged common dolphins were recorded.

Appendix I Species List in Taxonomic Order

Common Name	Scientific Name	Family	Class
American Black Duck	<i>Anas rubripes</i>	Anatidae	Aves
Surf Scoter	<i>Melanitta perspicillata</i>	Anatidae	Aves
White-winged Scoter	<i>Melanitta fusca</i>	Anatidae	Aves
Black Scoter	<i>Melanitta americana</i>	Anatidae	Aves
Red-throated Loon	<i>Gavia stellata</i>	Gaviidae	Aves
Common Loon	<i>Gavia immer</i>	Gaviidae	Aves
Northern Fulmar	<i>Fulmarus glacialis</i>	Procellariidae	Aves
Northern Gannet	<i>Morus bassanus</i>	Sulidae	Aves
Red Phalarope	<i>Phalaropus fulicarius</i>	Scolopacidae	Aves
Red-necked Phalarope	<i>Phalaropus lobatus</i>	Scolopacidae	Aves
Common Murre	<i>Uria aalge</i>	Alcidae	Aves
Thick-billed Murre	<i>Uria lomvia</i>	Alcidae	Aves
Razorbill	<i>Alca torda</i>	Alcidae	Aves
Black-legged Kittiwake	<i>Rissa tridactyla</i>	Laridae	Aves
Bonaparte's Gull	<i>Chroicocephalus philadelphia</i>	Laridae	Aves
Ring-billed Gull	<i>Larus delawarensis</i>	Laridae	Aves
Herring Gull	<i>Larus argentatus</i>	Laridae	Aves
Common Dolphin	<i>Delphinus delphis</i>	Delphinidae	Mammalia