



Environmental Imaging Solutions

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

Equinor

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1. Executive Summary

- Aerial surveys of Equinor's Lease Area OCS-A 0512 lease area and a 4 km (2.5 mile) buffer (the Survey Area) in the New York Bight were conducted in May, June and July 2018 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 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 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 species 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) and petrels (n=1).
- A total of 189 marine animals (146 birds, 23 marine mammals, eight turtles, six sharks, and six large bony fish) were recorded in the Survey Area in June 2018. The most abundant species group recorded was shearwaters (n=125) and followed by marine mammals (n=23), gulls (n=10), turtles (n=8), sharks (n=6), sunfish (n=6), petrels (n=5), gannets (n=3), cormorants (n=2), and alcids (n=1).
- A total of 100 marine animals (78 birds, 11 turtles, nine sharks, and two large bony fish) were recorded in the Survey Area in July 2018. The most abundant species group recorded was petrels (n=32), followed by shearwaters (n=27), shorebirds (n=16), turtles (n=11), sharks (n=9), ducks (n=2), large bony fish (n=2) and loons (n=1).
- Sterna terns (n=60 in May 2018), Atlantic bluefin tuna (n=8 in May 2018), loggerhead turtles (n=7 and n=6 in June and July 2018 respectively), Kemp's Ridley turtle (n=4 in July 2018) and loggerhead / Kemp's Ridley turtle (n=1 and n=1 in June and July 2018 respectively) were recorded. These are considered Listed Species (Federally listed as Threatened or Endangered, New York State listed as Endangered).

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 comprises of the Lease Area OCS-A 0512 (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 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 is the third of three quarterly progress reports to summarise the information collected following the completion of three aerial surveys of Lease Area OCS-A 0512: May, June and July 2018.

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 birds and non-avian fauna species / taxonomic group;
- 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.

All surveys from November 2017 to October 2018 have now been undertaken; as such there are no plans currently to undertake further aerial surveys of Lease Area OCS-A 0512.

Two Quarterly Reports summarising the data collected November 2017 to January 2018, and February to April 2018 have been previously submitted in draft format and are pending finalisation.

One Annual Report is remaining to be delivered as part of the requirements of Equinor and BOEM. The Annual Report will provide detailed information comprising the full 12 months of aerial survey data collected November 2017 to October 2018 inclusive.

3. Summary of Surveys

Surveys have been undertaken for May until July 2018 inclusive.

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 (Figure 1). 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.

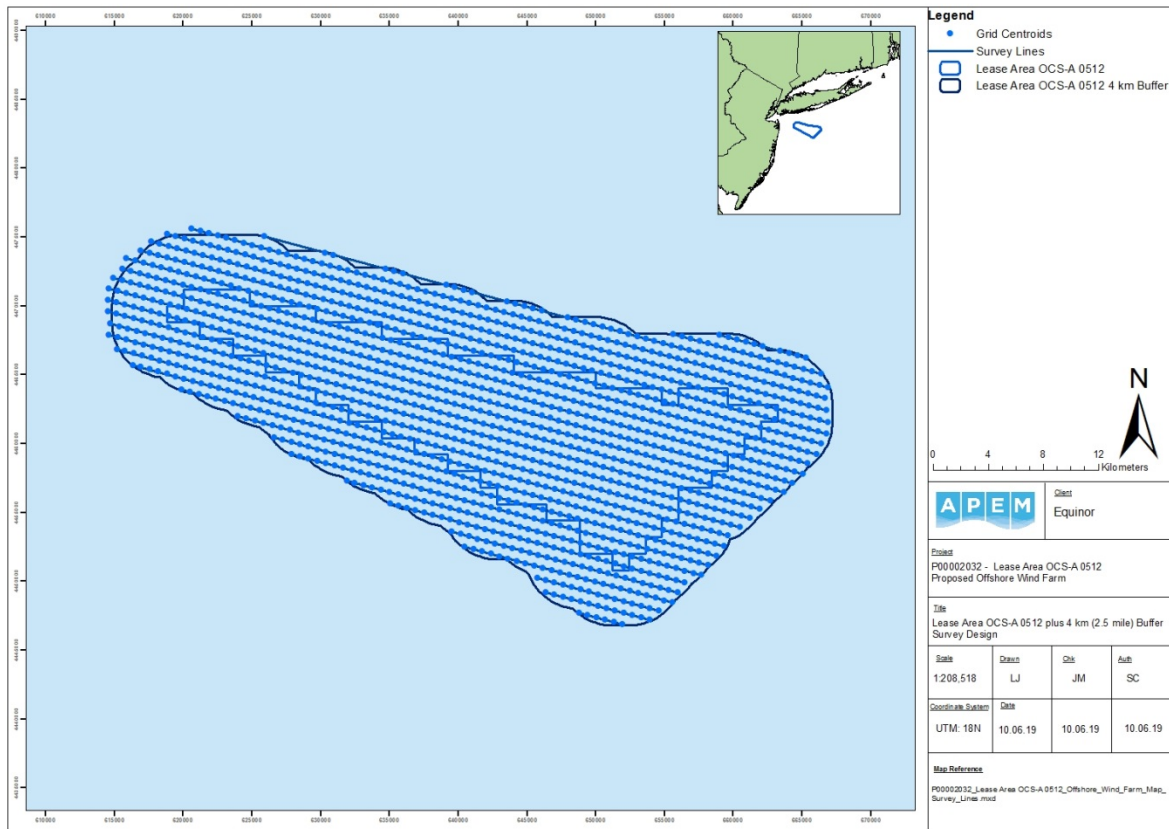


Figure 1 Flight lines and image capture points of the aerial imagery at Lease Area OCS-A 0512 plus 4 km (2.5 mile) Buffer

No health and safety issues were reported during the surveys.

The date, 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.

Coverage was estimated to be at least 10% generated from approximately 12,200 images (Table 3).

Table 1 Date and start and end time (Coordinated Universal Time) for each flight for the May to July 2018 surveys

Survey	Date	Flight Number	UTC Start Time (HH:MM)	UTC End Time (HH:MM)
Survey 7	05-21-18	1	12:11	15:00
		2	18:43	20:21
Survey 8	06-14-18	1	12:03	15:29
		2	18:34	20:52
Survey 9	07-29-18	1	12:25	16:17
		2	19:55	21:35

Table 2 Weather conditions recorded for completed surveys to date: May to July 2018

Survey	Date	Sea State	Turbidity	Wind Speed (knots) / Direction	Cloud Cover	Visibility (km)	Air Temp (°F)
Survey 7	05-21-18	1	0 - 1	Calm - 10 / NE or SW	5 - 20	> 10 km	59 - 67
Survey 8	06-14-18	2 - 3	1	10 - 17 / W to NW	0 - 10	> 10 km	68 - 82
Survey 9	07-29-18	1 - 2	1	5 - 10 / NW	70 - 95	> 10 km	70 - 72

Table 3 Image number and coverage for February, March and April 2018

Survey	Image Number	Coverage (%)
Survey 7	12,180	12.96
Survey 8	12,175	12.95
Survey 9	12,174	12.95

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 quality assurance (QA) 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 identified 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. The results of the QA are provided in Tables 4 and 5. The agreement exceeded 99% for every survey.

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 7	12,180	1,187	0	100.00
Survey 8	12,175	1,204	4	99.67
Survey 9	12,174	1,210	4	99.67

Table 5 The number of individuals that were found during QC

Survey	Order Found by QC	Number of individuals
Survey 8	Avian	3
	Turtle	1
Survey 9	Avian	2
	Ray	1
	Large bony fish	1

5. Abundance and Distribution

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.

Species Latin names are provided in Appendix 1 Species List in Taxonomic Order.

5.1 Avian Abundance

For May, June and July 2018, totals of 342, 146, and 78 birds were recorded, respectively (Table 6). Birds mostly comprised of ‘commic’ / Forster’s tern (n=172). Thereafter, Cory’s shearwater (n=70) was the most abundant followed by sterna tern species (n=60), common loon (n=53), great shearwater (n=35), large shearwater species (n=27), sooty shearwater (n=16), shorebird species (n=16), herring gull (n=14), red-throated loon (n=12), small shearwater species (n=9), common tern (n=8) northern gannet (n=6), great black-backed gull (n=4), small gull species (n=4), least tern (n=4) cormorant species (n=3), laughing gull (n=3), ring-billed gull (n=2), duck species (n=2), Manx shearwater (n=2) and ring-billed gull (n=2). One hawk species, one red / red-necked phalarope, one murre / razorbill, one lesser black-backed gull, one large gull species and one Forster’s tern were also recorded.

Table 6 Total number of individuals of the avian species recorded during May, June and July 2018 surveys of the Lease Area OCS-A 0512 plus 4 km buffer.

Group	Species	May-18					Jun-18			Jul-18		
		Flying	Sitting	Diving	Perched	Total	Flying	Sitting	Total	Flying	Sitting	Total
Duck	Species unknown	-	-	-	-	0	-	-	0	-	2	2
Loon	Common loon	4	45	3	-	52	-	-	0	-	1	1
	Red-throated loon	-	12	-	-	12	-	-	0	-	-	0
Shearwater	Cory's shearwater	-	-	-	-	0	54	8	62	7	1	8
	Great shearwater	-	-	-	-	0	17	1	18	16	1	17
	Sooty shearwater	1	-	-	-	1	14	1	15	-	-	0
	Manx shearwater	-	-	-	-	0	2	-	2	-	-	0
	Species unknown - large	-	-	-	-	0	14	11	25	-	2	2
	Species unknown - small	1	5	-	-	6	1	2	3	-	-	0
Shorebird	Species unknown	-	-	-	-	0	-	-	0	16	-	16
Storm-Petrel	Species unknown	1	-	-	-	1	5	-	5	32	-	32
Gannet	Northern gannet	3	-	-	-	3	2	1	3	-	-	0

Group	Species	May-18					Jun-18			Jul-18		
		Flying	Sitting	Diving	Perched	Total	Flying	Sitting	Total	Flying	Sitting	Total
Cormorant	Species unknown - cormorant	1	-	-	-	1	2	0	2	-	-	0
Hawk	Species unknown	1	-	-	-	1	-	-	0	-	-	0
Phalarope	Red / red-necked phalarope	-	1	-	-	1	-	-	0	-	-	0
Alcid	Murre* / razorbill	-	-	-	-	0	-	1	1	-	-	0
Gull	Laughing gull	1	1	-	-	2	1	-	1	-	-	0
	Ring-billed gull	1	1	-	-	2	-	-	0	-	-	0
	Herring gull	2	6	-	-	8	5	1	6	-	-	0
	Lesser black-backed gull	-	1	-	-	1	-	-	0	-	-	0
	Great black-backed gull	-	3	-	-	3	1	-	1	-	-	0
	Species unknown - small	-	2	-	-	2	1	1	2	-	-	0
	Species unknown - large	-	1	-	-	1	-	-	0	-	-	0
Tern	Common tern	8	-	-	-	8	-	-	0	-	-	0
	Least tern	4	-	-	-	4	-	-	0	-	-	0
	Forster's tern	1	-	-	-	1	-	-	0	-	-	0
	'Commic' / Forster's tern	172	-	-	-	172	-	-	0	-	-	0
	Species unknown - sterna	11	47	-	2	60	-	-	0	-	-	0
Total Birds		212	125	3	2	342	119	27	146	71	7	78

*Note: Murre refers to either common murre or thick-billed murre.

5.2 Non-Avian Abundance

For May, June and July 2018, totals of 71, 23, and zero marine mammals were recorded, respectively (Table 7). Marine mammals mostly comprised of common dolphin (n=68 in May). Twenty-two bottlenose dolphins were recorded in June, three unknown dolphin species were recorded in May and a single humpback whale was recorded in June. Eight and 11 turtles were recorded in June and July, respectively, comprised of loggerheads turtle (n=7 in June and n=6 in July), Kemp's Ridley turtle (n=4 in July), and loggerhead / Kemp's Ridley turtle (one in June and one in July). All six sharks recorded in June were blue sharks. The nine sharks recorded in July consisted of two scalloped hammerhead, two unidentified hammerhead, two shark species (n=2), one great white shark, one tiger shark and one unidentified carcharhinidae. A considerable number of large bony fish were recorded in May (n=165), mostly comprised of mahi-mahi (n=131), along with unidentified tuna species (n=24), Atlantic bluefin tuna (n=8) and ocean sunfish (n=2). Ocean sunfish were also recorded in June (n=6) and July (n=2).

Table 7 Total number of individuals of the non-avian species recorded during February, March and April 2018 surveys of the Lease Area OCS-A 0512 plus 4 km buffer.

Group	Species	May-18			Jun-18			Jul-18		
		Surfacing	Submerged	Total	Surfacing	Submerged	Total	Surfacing	Submerged	Total
Marine Mammal	Common dolphin	16	52	68	-	-	0	-	-	0
	Bottlenose dolphin	-	-	0	18	4	22	-	-	0
	Species unknown - dolphin	-	3	3	-	-	0	-	-	0
	Humpback whale	-	-	0	-	1	1	-	-	0
Total Mammals		16	55	71	18	5	23	0	0	0
Turtle	Loggerhead turtle	-	-	0	2	5	7	2	4	6
	Kemp's Ridley turtle	-	-	0	-	-	0	-	4	4
	Loggerhead / Kemp's Ridley turtle	-	-	0	-	1	1	-	1	11
Total Turtles		0	0	0	2	6	8	2	9	11

Group	Species	May-18			Jun-18			Jul-18		
		Surfacing	Submerged	Total	Surfacing	Submerged	Total	Surfacing	Submerged	Total
Shark	Great white shark	-	-	0	-	-	0	-	1	1
	Tiger shark	-	-	0	-	-	0	-	1	1
	Blue shark	-	-	0	-	6	6	-	-	0
	Species unknown - Carcharhinidae	-	-	0	-	-	0	-	1	1
	Scalloped hammerhead	-	-	0	-	-	0	-	2	2
	Species unknown - hammerhead	-	-	0	-	-	0	-	2	2
	Species unknown - shark	-	-	0	-	-	0	-	2	2
Total Sharks		0	0	0	0	6	6	0	9	9
Large Bony Fish	Mahi-Mahi	-	131	131	-	-	0	-	-	0
	Atlantic bluefin tuna	-	8	8	-	-	0	-	-	0
	Species unknown - tuna	-	24	24	-	-	0	-	-	0
	Ocean sunfish	-	2	2	-	6	6	-	2	2
Total Large Bony Fish	0	165	165	0	6	6	0	2	2	

5.3 Spatial Distribution

Figures 2, 3, and 4 shows the location of all birds and marine fauna recorded throughout the Survey Area during May, June, and July 2018 respectively.

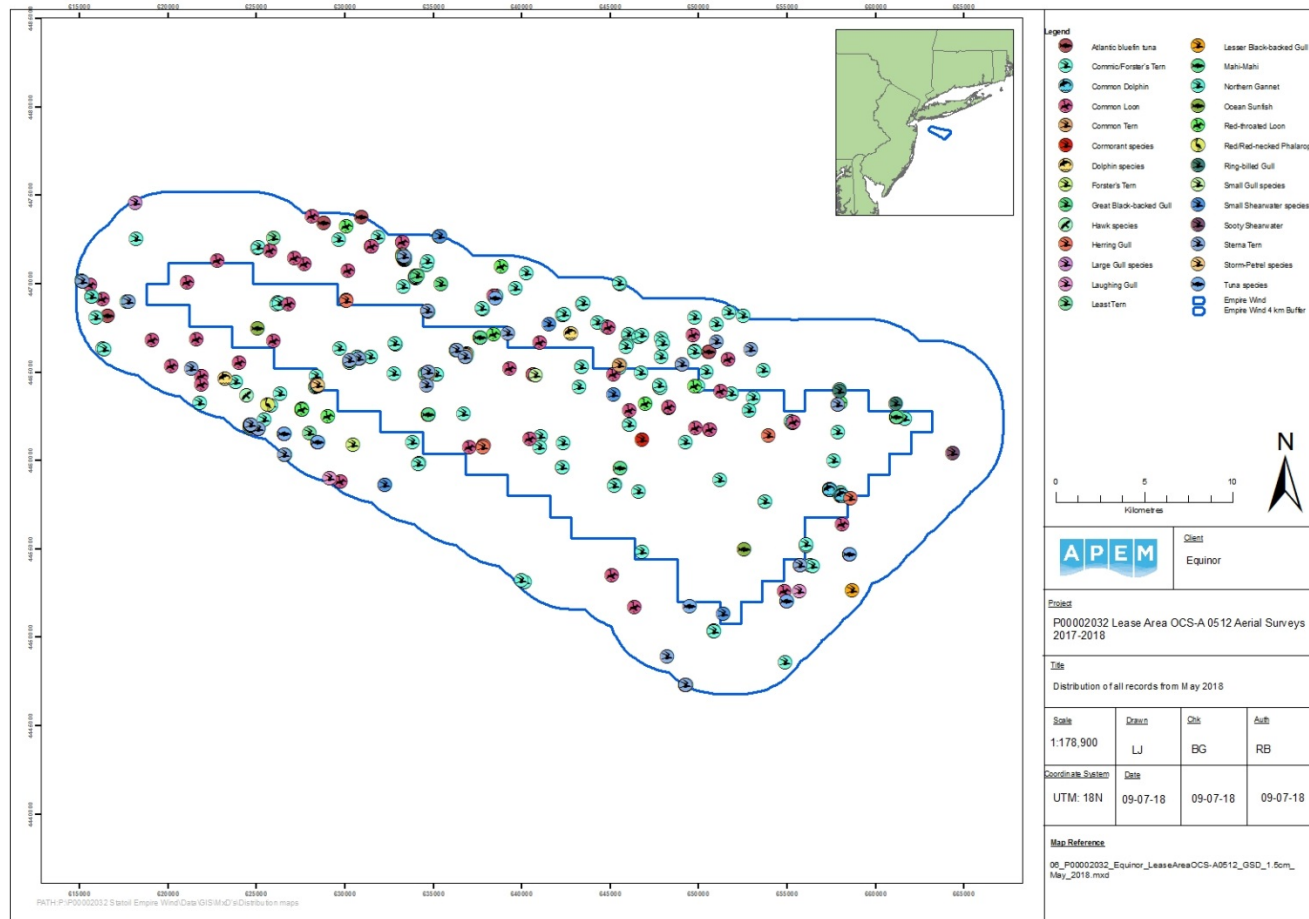


Figure 2 Distribution of all birds, marine fauna, and human artifacts recorded in the May 2018 survey of Lease Area OCS-A 0512.

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

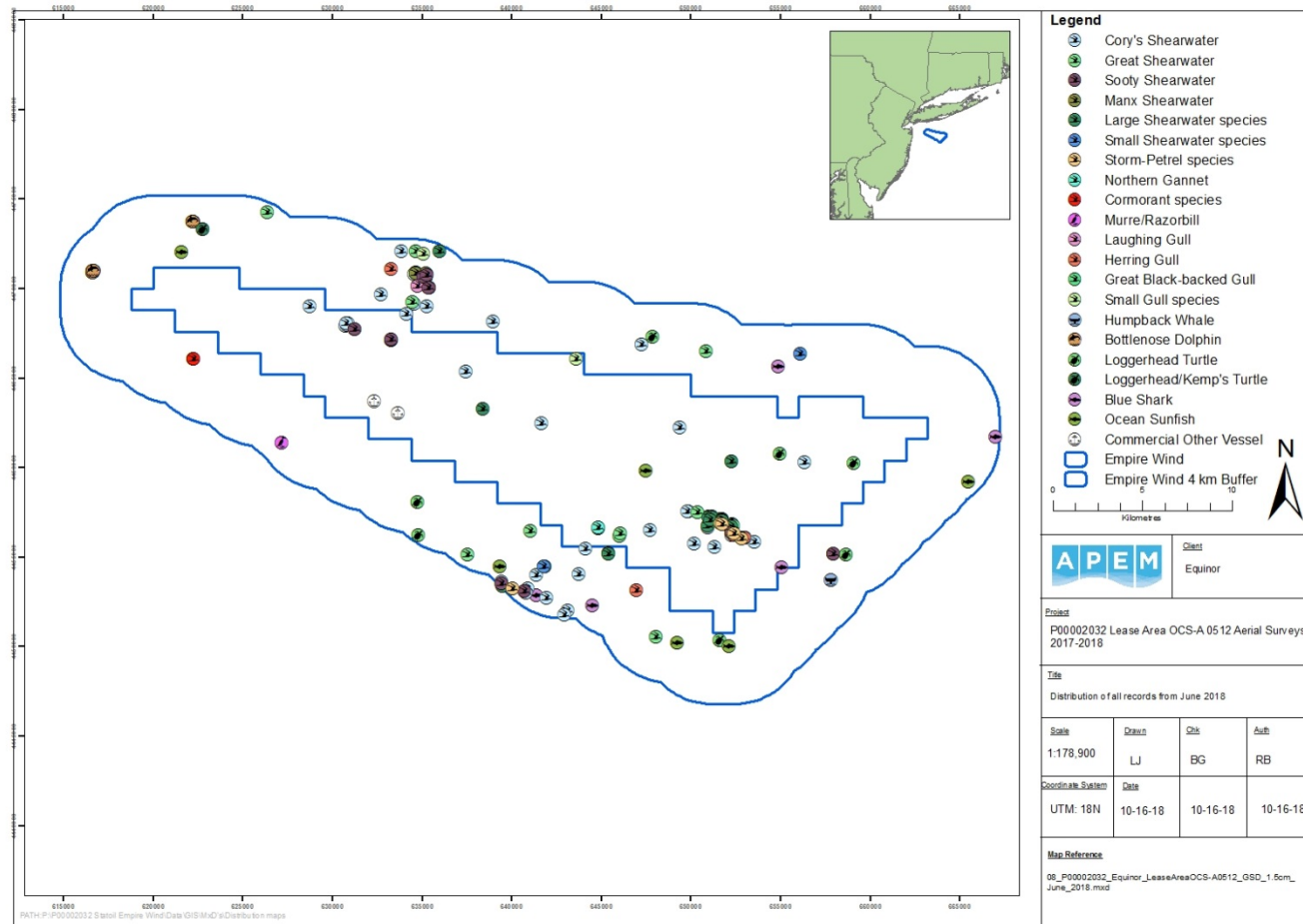


Figure 3 Distribution of all birds, marine fauna, and human artifacts recorded in the June 2018 survey of Lease Area OCS-A 0512.

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

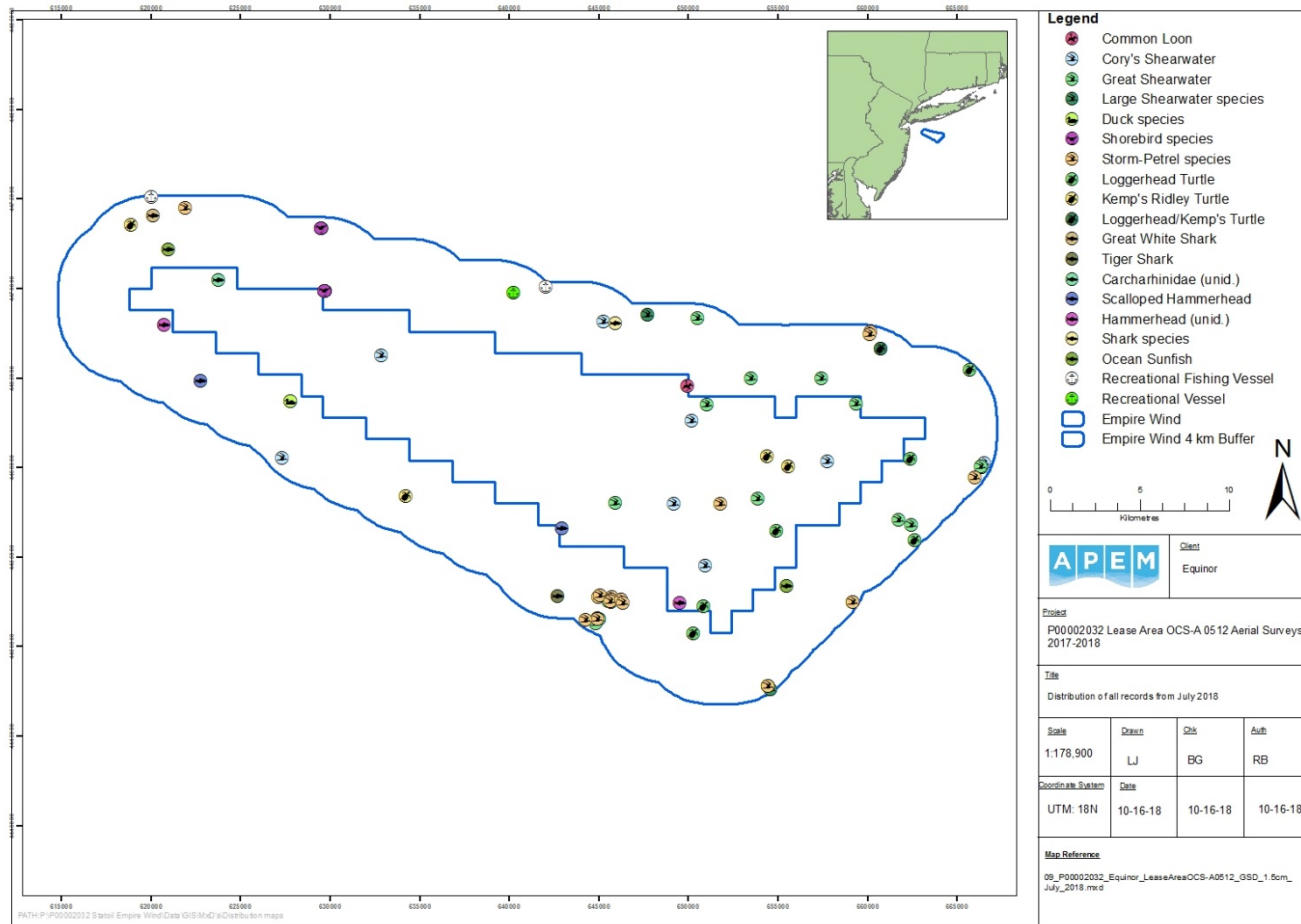


Figure 4 Distribution of all birds, marine fauna, and human artifacts recorded in the July 2018 survey of Lease Area OCS-A 0512.

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

6. Species Accounts

6.1 Species unknown – duck

Two unidentified duck species were recorded in July, sitting just outside of the western boundary of the proposed wind farm.

6.2 Common loon

Common loons were recorded in May and July. These comprised of four flying, 45 sitting, and three diving in May, and one sitting in July. In May common loons were distributed throughout the Survey Area. In June the single individual was recorded along the north-eastern boundary of the proposed wind farm.

6.3 Red-throated loon

Twelve red-throated loons were recorded in May, all observed sitting, which were loosely distributed throughout the Survey Area.

6.4 Cory's shearwater

Cory's shearwaters were recorded in June and July. These comprised of 54 flying and eight sitting in June and seven flying and one sitting in July. In June Cory's shearwaters were distributed throughout the Survey Area, with the majority being recorded in the southern corner. In July Cory's shearwater were loosely distributed throughout the Survey Area.

6.5 Great shearwater

Great shearwaters were recorded in June and July. These comprised of 17 flying and one sitting in June and two sitting in July. In June great shearwaters were loosely distributed throughout the Survey Area, with the majority of individuals in the southern corner. In July great shearwaters were loosely distributed throughout the eastern half of the Survey Area.

6.6 Sooty shearwater

Sooty shearwaters were recorded in May and June. These comprised of one flying in May and 14 flying and one sitting in June. In May the single flying individual was recorded in the north-eastern corner of the buffer. In June three loose groups of sooty shearwaters were recorded, two small groups in the south-eastern corner comprised of two and five individuals. The largest group was recorded along the northern boundary of the proposed wind farm comprised of eight individuals.

6.7 Manx shearwater

Two Manx shearwaters were recorded in June flying along the northern boundary of the buffer.

6.8 Species unknown – large shearwater

Unidentified large shearwater species were recorded in June and July. These comprised of 14 flying and 11 sitting individuals in June and two sitting individuals in July. In June the majority of individuals were recorded in the southern corner, a smaller loose group comprised of eight individuals was recorded along the northern boundary of the buffer. In July two sitting individuals were recorded along the northern boundary of the buffer.

6.9 Species unknown – small shearwater

Unidentified small shearwater species were recorded in May and June. These comprised of one flying and five sitting individuals in May and one flying and two sitting individuals in June. In May individuals were loosely distributed throughout the Survey Area. In June two individuals were recorded along the southern boundary, and one individual was recorded along the north-eastern boundary of the buffer.

6.10 Species unknown – shorebird

Sixteen unidentified shorebird species were recorded in July flying in two groups along the north-western boundary of the buffer.

6.11 Species unknown – storm-petrel

Unidentified storm-petrel species were recorded in May, June, and July. These comprised of one flying in May, five flying in June, and 32 flying in July. In May the single individual was recorded along the proposed wind farm western boundary. In June the five individuals were recorded in a loose group in the southern corner. In July unidentified storm petrel species were recorded throughout the Survey Area with the majority recorded in the southern corner.

6.12 Northern gannet

Northern gannets were recorded in May and June. These comprised of three flying in May, and two flying and one sitting in June. In May two individuals were recorded flying in the north-west corner identified as first summer and second summer. The third individual, identified as first summer, was recorded along the northern boundary of the proposed wind farm. In June the northern gannets were recorded in southern corner of the proposed wind farm.

6.13 Species unknown – cormorant

Unidentified cormorant species were recorded in May and June. These comprised of one flying individual in May and two flying individuals in June. In May the single flying individual was recorded in the centre of the proposed wind farm. In June two flying individuals were recorded in the north-west corner of the buffer.

6.14 Species unknown – hawk

A single unidentified hawk species was recorded in May flying in the western corner the buffer.

6.15 Red / red-necked phalarope

A single red / red-necked phalarope was recorded in May sitting in the western corner of the buffer.

6.16 Murre / razorbill

A single murre / razorbill was recorded in June sitting along the south-western boundary of the buffer.

6.17 Laughing gull

Laughing gulls were recorded in May and June. These comprised of one flying and one sitting in May and one flying individual in June. In May one individual was recorded along the south-western boundary of the buffer and one individual was recorded in just outside of the southern corner of the proposed wind farm. In June one laughing gull, identified as first summer, was recorded in the central northern buffer region.

6.18 Ring-billed gull

Two ring-billed gulls were recorded in May comprised of one sitting and one flying which were recorded in the north-eastern corner of the proposed wind farm. The individual recorded as flying was identified as second summer.

6.19 Herring gull

Herring gulls were recorded in May and June. These comprised of two flying and six sitting individuals in May, and five flying and one sitting in June. In May herring gulls were loosely distributed throughout the Survey Area. In June three herring gulls were loosely distributed in the southern corner, and the remaining three were located along the northern boundary of the buffer.

6.20 Lesser black-backed gull

A single lesser black-backed gull was recorded sitting in May along the eastern boundary of the buffer.

6.21 Great black-backed gull

Great black-backed gulls were recorded in May and June. These comprised of three sitting individuals in May and one flying individual in June. In May one great black-backed gull was located in the central region of the proposed wind farm with two individuals along the northern boundary of the buffer. In June a single individual was recorded near the eastern boundary of the proposed wind farm.

6.22 Species unknown – small gull

Unidentified small gull species were recorded in May and June. These comprised of two sitting individuals in May, and one flying and one sitting in June. In May the two individuals

were recorded in the central region of the proposed wind farm. In June two individuals were recorded along the northern edge of the buffer.

6.23 Species unknown – large gull

A single unidentified large gull species was recorded in May sitting in the north-west corner of the buffer.

6.24 Common tern

Eight common terns were recorded in May. One to the south east of the buffer zone with the rest recorded more centrally in the wind farm area.

6.25 Least tern

Four flying least terns were recorded in May. These were distributed throughout the western half of the Survey Area.

6.26 Forster's tern

One Forster's tern in May was recorded flying in the south east of the buffer zone.

6.27 'Commic' / Forster's tern

One-hundred and seventy-two flying 'commic' / Forster's terns were recorded during May across the whole of the survey area.

6.28 Species unknown – sterna tern

A total of 11 flying, 47 sitting and two perched unidentified sterna terns were recorded in May. These were distributed across the Survey Area.

6.29 Common dolphin

Sixty-eight common dolphins were recorded in May. These comprised of 16 surfacing and 52 submerged individuals in May. In May two groups, comprised of four and 64 individuals, were recorded along the eastern boundary of the proposed wind farm.

6.30 Bottlenose dolphin

Twenty-two bottlenose dolphins, 18 surfacing and four submerged individuals were recorded in June. The individuals were recorded in two groups, comprised of 10 and 12 individuals, in the north-west corner of the buffer.

6.31 Species unknown - dolphin

Three submerged unidentified dolphin species were recorded in May. The three individuals were loosely distributed on the western half of the Survey Area.

6.32 Humpback whale

A single submerged humpback whale was recorded in June along the eastern boundary of the buffer.

6.33 Loggerhead turtle

Loggerhead turtles were recorded June and July. These comprised of two surfacing and five submerged individuals in June, and two surfacing and four submerged in July. In June and July the individuals were distributed across the eastern half of the Survey Area.

6.34 Kemp's Ridley turtle

Four submerged Kemp's Ridley turtles were recorded in July. The four individuals were distributed loosely throughout the Survey Area. Two individuals were recorded near to the eastern boundary of the proposed wind farm, with the two further individuals in the buffer; one located in central southern region and one in the north-west corner.

6.35 Loggerhead / Kemp's Ridley turtle

Loggerhead / Kemp's Ridley turtle was recorded in June and July. One individual was recorded in June and one individual was recorded in July. In June the single individual was recorded along the north-west corner of the buffer. In July the single individual was recorded along the north-west corner of the buffer.

6.36 Great white shark

A single great white shark was recorded in July. The individual was recorded in the north-west corner of the buffer.

6.37 Tiger shark

A single tiger shark was recorded in July. The individual was recorded along the southern boundary within the buffer.

6.38 Blue shark

Six blue sharks were recorded in June. The six individuals were loosely distributed throughout the eastern half of the Survey Area.

6.39 Species unknown – Carcharhinidae

A single unidentified carcharhinidae species was recorded in July. The individual was recorded in the north-west corner of the wind farm.

6.40 Scalloped hammerhead

Two scalloped hammerhead sharks were recorded in July. One individual was recorded along the southern corner of the proposed wind farm and one individual was recorded just outside of the north-west corner of the proposed wind farm.

6.41 Species unknown – hammerhead

Two unidentified hammerhead shark species were recorded in July. One individual was recorded in the southern corner of the proposed wind farm and one individual was recorded just outside of the north-west corner of the proposed wind farm.

6.42 Species unknown – shark

Two unidentified shark species were recorded in July. One individual was recorded along the northern buffer boundary, and the second individual was recorded in the southern corner.

6.43 Mahi-Mahi

A total of 131 mahi-mahi were recorded in May. These individuals were distributed in four groups varying in size from two to 82. The largest group was recorded along the eastern corner of the proposed wind farm. The three small groups were distributed throughout the centre of the proposed wind farm.

6.44 Atlantic bluefin tuna

Eight Atlantic Bluefin tuna were recorded in May. These individuals were distributed throughout the northern buffer.

6.45 Species unknown – tuna

Twenty-four unidentified tuna species were recorded in May. These individuals were loosely distributed throughout the Survey Area.

6.46 Ocean sunfish

Ocean sunfish were recorded in May, June and July. These comprised of two individuals in May, six individuals in June, and two individuals in July. In May one individual was recorded in the north-west corner of the proposed wind farm, and the second individual was recorded along the eastern boundary of the proposed wind farm. In June five of the six individuals were recorded in the eastern half of the proposed wind farm, with one further individual just outside of the north-west corner of the proposed wind farm. In July one individual was recorded in the north-west corner of the proposed wind farm, and the second individual was recorded along the eastern boundary of the proposed wind farm.

7. Shipping Observations

Two vessels, both identified as trawlers, were recorded visually from the aircraft on the 21st of May, the first with a westerly bearing and the second with a southerly bearing. Two vessels, identified as a survey boat and personnel water craft, were recorded visually from the aircraft on the 20th of June. Both of these vessels had a north-westerly bearing. Seven vessels were observed visually from the aircraft on the 27th July. These were identified as one fishing vessel with a southerly bearing, one speedboat with a southerly bearing, two yachts with unknown bearings, one ferry with a northerly bearing, and two trawlers; one with a westerly bearing and one with a southerly bearing.

In June, two vessels were captured in the imagery, classified as commercial (other) vessel types. In July, three vessels were captured in the imagery, classified as recreational fishing vessels.

8. Plans for Future Surveys

All surveys from November 2017 to October 2018 have been undertaken.

There are no plans currently to undertake further aerial surveys of Lease Area OCS-A 0512.

9. General Conclusions

Overall, the combined abundance of all species of birds recorded during May to July was similar to that recorded in the previous three months of February to April. A greater number of non-avian fauna were recorded in May to July in comparison to previous quarters, including new species groups such as turtles and sharks. Notable numbers of unidentified sterna terns, loons, and large bony fish (mainly mahi-mahi) have also been recorded. General conclusions for each survey May to July are provided below.

9.1 May 2018

A total of 578 marine animals (342 birds, 71 marine mammals and 165 large bony fish) were recorded in the Survey Area in May. The most abundant species 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) and 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 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.

9.2 June 2018

A total of 189 birds and marine fauna were recorded in the Survey Area in June 2018. The most abundant group recorded was shearwaters (n=125) and followed by marine mammals (n=23), gulls (n=10), turtles (n=8), sharks (n=6), sunfish (n=6), petrels (n=5), gannets (n=3), cormorants (n=2), and alcids (n=1).

A total of 119 birds (82%) were recorded in flight during this survey. These consisted of Cory's shearwaters (n=54), great shearwaters (n=17), large shearwater species (n=14), sooty shearwater (n=14), storm-petrel species (n=5), herring gull (n=5), northern gannet (n=2), max shearwater (n=2), cormorant species (n=2), great black-backed gull (n=1), laughing gull (n=1), small gull species (n=1), and small shearwater species (n=1). There were 29 birds recorded as sitting (18%).

Eight turtles identified as loggerhead turtles (n=7) and one loggerhead / Kemp's turtle were recorded during the survey. These species / species group are listed as Endangered (Federally listed as Threatened or Endangered, and New York State listed as Endangered).

9.3 July 2018

A total of 78 birds were recorded in the Survey Area in July 2018. The most abundant group recorded was petrels (n=32), followed by shearwaters (n=27), shorebirds (n=16), turtles (n=11), sharks (n=9), ducks (n=2), large bony fish (n=2), and loons (n=1).

A total of 71 birds (91%) were recorded in flight during this survey. These consisted of unknown storm petrel species (n=32), great shearwater (n=16), unknown shorebird species (n=16), and Cory's shearwater (n=7). There were seven birds recorded as sitting (9%).

Eleven turtles classified as loggerhead turtles (n=6), Kemp's Ridley turtle (n=4), and one loggerhead / Kemp's turtle and four sharks classified as scalloped hammerheads (n=2), and unknown hammerhead species (n=2) were recorded during the survey. These species / species group are listed as Endangered (Federally listed as Threatened or Endangered, and New York State listed as Endangered).

9.4 Comparison to previous quarters

In November and December 2017 and January 2018; 467 birds and 5 marine mammals, 517 birds and 29 marine mammals, and 178 birds and seven marine mammals were recorded respectively. In the previous three months of surveys; 37 birds, one marine mammal, and two large bony fish; 308 birds and 12 marine mammals; and 262 birds were recorded in February, March and April 2018 respectively.

Similar numbers of birds and greater numbers of other marine fauna were recorded in the subsequent three months with totals of 342 birds, 71 marine mammals, and 165 large bony fish in May 2018; 146 birds, 23 marine mammals, eight turtles, six sharks, and six large bony fish in June 2018; and 78 birds, 11 turtles, nine sharks, and two large bony fish in July 2018.

Notable new species and species groups have been recorded including various species of shearwaters such as Cory's, great, sooty, and Manx shearwaters, as well as tuna, turtles, and sharks. A large number of shearwaters recorded in June (n=159) were located in three loose groups, one in the eastern side of the proposed wind farm, one just to the south-west of the aforementioned group, and the third group was distributed in the northern buffer region. A smaller number of shearwaters was also recorded in July (n=23), scattered mainly

throughout the eastern half of the Survey Area. The turtles recorded in June and July were distributed on the eastern half of the Survey Area in both months. The sharks recorded in June and July were distributed on the eastern half of the Survey Area in June and throughout the Survey Area in July.

Notable numbers of species or species groups that have been previously recorded included a large number of 'commic' / Forster's terns that accounted for the majority of birds recorded in May 2018. These terns were distributed across the entire Survey Area. Likewise a large number of mahi-mahi accounted for the all of the large bony fish recorded in May 2018 which were recorded in one large group in the central northern buffer region. Loons, such as red-throated and common, were recorded in relatively high numbers in May 2018 (n=64) which is the second highest number after November 2017. These loons were recorded throughout the Survey Area in May.

Appendix I Species List in Taxonomic Order

Common Name	Scientific Name	Family	Class
Common loon	<i>Gavia immer</i>	Gaviidae	Aves
Red-throated diver	<i>Gavia stellata</i>	Gaviidae	Aves
Cory's shearwater	<i>Calonectris diomedea</i>	Procellariidae	Aves
Great shearwater	<i>Ardenna gravis</i>	Procellariidae	Aves
Manx shearwater	<i>Puffinus puffinus</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
Loggerhead	<i>Caretta caretta</i>	Celoniidae	Reptilia
Kemp's Ridley turtle	<i>Lepidochelys kempii</i>	Reptilia	Cheloniidae
Great white shark	<i>Carcharodon carcharias</i>	Chondrichthyes	Lamnidae
Tiger shark	<i>Galeocerdo cuvier</i>	Chondrichthyes	Carcharhinidae
Scalloped hammerhead	<i>Sphyrna lewini</i>	Chondrichthyes	Sphyrnidae