Digital Aerial Baseline Survey of Marine Wildlife in Support of Offshore Wind Energy

Fall 2018 Taxonomic Analysis Summary Report

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Prepared for

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August 2019

Introduction

The third fall survey for the NYSERDA offshore planning area (OPA) was started on November 11 and completed December 7, 2018. The survey took twelve days to complete with poor weather conditions allowing few or partial lines to be flown each day. Other down-days in November and December were also caused by poor weather conditions. These surveys are designed to characterize the usage of the area by marine fauna to aid in the planning for offshore wind.

Methods

Data were collected for the OPA including a 300-m buffer. The survey collected imagery covering a 3,192.36 km^2 area of the OPA and 300-m buffer using a transect design (Table 1), which amounts to 323,702 images. Of the 323,702 images analyzed, 314,907 were blank (Table 2). The target extraction identified 25,935 objects within imagery collected in the OPA and 300-m buffer survey area (Table 3). These targets were categorized into seven groups representing avian (birds), marine mammals, sharks, rays, large bony fish individuals (excluding fish shoals), vessels, and fixed structures. Each group was assigned to taxonomic experts for identification. Large bony fish and fish shoals are the topic of a separate report. Targets extracted that were identified as trash or other floating debris were removed from the dataset. No bats were found in imagery. Species listed as "Endangered" on the state threatened and endangered list and as "Endangered" or "Threatened" under the federal Endangered Species Act were flagged for review.

Table 1.   Total Images and Area Surveyed

Area	Total Number of Images Collected	km^2 of Analyzed Images within the Survey Area	Percent Coverage	Survey Area (km^2)
OPA	323,702	3,192.36	7.30	43,745.20

Table 2.   Blank Images Detected

Area	Total Images Analyzed	Blank Images			
		Number Detected	Number Sent for QA	Total Percent QA	Total Percent Blank
OPA	323,702	314,907	31,502	10.00	97.28

Table 3.   Targets Sent for Identification

Group	# Individuals
Avian	24,688
Marine Mammals	1,121
Sharks	2
Rays	2
Large Bony Fish**	47
Vessels	72
Fixed Structures	3
Total	**25,935**

**Large bony fish and fish shoals are the topic of a separate report

Quality Control

All identifications were made by biologists highly experienced in their species group. A minimum of 20% of all avian and marine mammal images identified were reviewed by a taxonomic expert, and taxonomic agreement had to meet a minimum of 90% concurrence (Table 4). Failure to do so would trigger a review of 100% of identifications made by the individual concerned. The 20% review included quality control review of 100% of ESA-listed species, and for endangered species a 100% agreement had to be reached on identifications (Table 5). Additional experts on the species concerned were called in to arbitrate identifications when concurrence could not be reached.

Results

All target extraction and quality control of target extraction was completed in August 2019. All animals were identified and all identifications reached quality control standards. Animals were also fully georeferenced and exact locations of individuals are available for review on the data portal. A full list of identified species can be found in the Appendix.

Quality Control Results (Fall 2018)

Table 4.   Quality Control Results, All Groups

Group	Number of Images	Number of Images for QC	% Agreement
Avian	24,688	4,938	99
Marine Mammals	1,121	224	100
Rays	8	1	100
Total	**25,817**	**5,163**	**99**

Table 5.   Quality Control Results, Endangered Species Only

Group	Number of Images	% Agreement
Marine Mammals	3	100
Total	**3**	**100**

Identification Success

Identification success varied by species group and by depth of subsurface animals. All identifications had a level of certainty ascribed to them (e.g., possible, probable, and definite). Subsurface animals were also ranked as "breaching," "near surface," and "significantly submerged." The reason for this was to be able to evaluate whether the inability to identify animals to species stemmed from image quality, angle of the animal at point of capture, or from depth in the water. Digital imagery captured from downward rather than angled sensors "sees" through the water column more effectively, and more animals are "observed." Visual surveyors from boats and digital imagery captured by angled lenses will "see" fewer animals to a greater or lesser degree because subsurface animals are hidden by the water column. However, this improvement in reporting animal presence by downward facing lenses sometimes is at a cost of species identification because of the depth of the animal.

Avian

Avian species-level identifications varied by species group depending on size, coloration, and flight activity. Birds that are both small and sitting are generally more difficult to identify, and groups that contain multiple species that are morphologically similar are also difficult to distinguish. In this survey we found large numbers of shorebirds (n=623), many of which were sitting on exposed beach and few of which could be positively identified resulting in a rounded down identification success number of 0% (Table 6). We also found a large number of shearwaters (n=446) of which there are multiple species to be found in the area (Table 6). Very few shearwaters were identified to species, resulting in a rounded down identification success number of 29% (Table 6). Cormorants and storm-petrels are difficult to distinguish, with two and three species respectively expected in the area. All bird identifications were classified to species or species group (Table 7). Average identification success was 54%, but removing shorebirds, hirundines and passerines, identification success reached 66%.

This season had high bird activity with 24,688 individuals recorded representing 33 species (see Table 7). Gulls (n=11,613) and phalaropes (n=6,763) were the most numerous groups present, followed by auks (n=1,691), ducks (n=1,347), gannets (n=1,007), loons (n=796), shorebirds (n=623), shearwaters (n=446), cormorants (n=231), fulmars (n=135), hirundines (swallows/martins, n=12), skuas (n=9), geese (n=6), storm-petrels (n=6) and a solitary horned grebe, a solitary great blue heron, and a solitary passerine.

Avian flight height data will be presented in detail in the annual report. Over 47% of birds were flying.

Table 6.   Avian Groups Identified, Percent ID Success to Species, and Percent Sitting (rounded)

Group	# Individuals	% ID Success	% Sitting
Goose	6	100	100
Duck	1,347	85	82
Loon	796	95	82
Grebe	1	100	0
Fulmar	135	100	18
Shearwater	446	29	78

Group	# Individuals	% ID Success	% Sitting
Storm-petrel	6	0	0
Gannet	1,007	100	56
Cormorant	231	0	44
Ardeidae	1	100	0
Shorebird	623	0	63
Phalarope	6,763	94	68
Skua	9	22	78
Auk	1,691	2	93
Gull	11,613	91	47
Hirundine	12	0	0
Passerine	1	0	0
		Average ID Success	**Average % Sitting**
Total Individuals	**24,688**	**54%**	**48%**

Table 7.   Number of Avian Species Identified and Number and Percent of Flying Individuals*

Avian Group/ Species	# Individuals	# Flying	% Flying
Goose	**6**	**0**	**0**
Brant	6	0	0
Duck	**1,347**	**241**	**18**
Mallard	1	1	100
American Black Duck	14	14	100
Surf Scoter	153	38	25
White-winged Scoter	79	56	71
Black Scoter	890	102	11
Scoter unid.	189	21	11
Long-tailed Duck	5	0	0
Bufflehead	3	0	0
Common Merganser	1	1	100
Red-breasted Merganser	1	0	0
species unknown	11	8	73
Loon	**796**	**143**	**18**
Red-throated Loon	320	87	27
Common Loon	440	56	13

Avian Group/ Species	# Individuals	# Flying	% Flying
species unknown	36	0	0
Grebe	**1**	**1**	**100**
Horned Grebe	1	1	100
Fulmar	**135**	**111**	**82**
Northern Fulmar	135	111	82
Shearwater	**446**	**97**	**22**
Cory's Shearwater	3	0	0
Great Shearwater	99	35	35
Manx Shearwater	26	7	27
species unknown-Large	317	54	17
species unknown-Small	1	1	100
Storm-petrel	**6**	**6**	**100**
species unknown	6	6	100
Gannet	**1,007**	**440**	**44**
Northern Gannet	1,007	440	44
Cormorant	**231**	**130**	**56**
species unknown	231	130	56
Ardeidae	**1**	**1**	**100**
Great Blue Heron	1	1	100
Shorebird	**623**	**233**	**37**
species unknown	623	233	37
Phalarope	**6,763**	**2,157**	**32**
Red-necked Phalarope	9	0	0
Red Phalarope	6,361	2,000	31
Red/Red-necked Phalarope	393	157	40
Skua	**9**	**2**	**22**
Parasitic Jaeger	2	2	100
species unknown	7	0	0
Auk	**1,691**	**111**	**7**
Dovekie	10	0	0
Murre/Razorbill	1,657	111	7

Avian Group/ Species	# Individuals	# Flying	% Flying
Atlantic Puffin	23	0	0
species unknown	1	0	0
Gull	**11,613**	**6,180**	**53**
Black-legged Kittiwake	2,804	2,028	72
Bonaparte's Gull	1,333	860	65
Little Gull	2	1	50
Laughing Gull	1,368	1,162	85
Ring-billed Gull	688	596	87
Herring Gull	3,785	1,141	30
Iceland Gull	1	1	100
Lesser Black-backed Gull	67	5	7
Great Black-backed Gull	540	183	34
species unknown - Large	152	54	36
species unknown - Small	833	128	15
species unknown	40	21	53
Hirundine	**12**	**12**	**100**
species unknown	12	12	100
Passerine	**1**	**1**	**100**
species unknown	1	1	100
Total	**24,688**	**9,866**	**47**

*Highlighted species are classified as endangered

Turtles

There were no turtles found in the imagery.

Marine Mammals

There were 1,121 marine mammals recorded during the Fall survey (Table 9). Most of these were dolphins (n=1,105) consisting of six identified species or groups, as follows:

- Common dolphin (n=827)
- Risso's dolphin (n=84)
- Pilot whale (unid.) (n=8)
- Common/white-sided dolphin (n=5)
- Harbor porpoise (n=3)
- Bottlenose dolphin (n=1)
- Species unknown (n=177)

One unidentified seal was found along with nine animals that could have been seals or dolphins but depth in the water column or angle of the animal at the moment of image capture obscured features needed for identification (see Table 9).

Of six whales, three were beaked whale (unid.), and the remaining three whales were individual as fin whale, sei whale, and sperm whale. Of the three beaked whales (unid.), two (67%) were significantly submerged (see Table 9).

Of the 1,105 dolphins, 796 (72%) were significantly submerged. Of the 177 dolphins not identified to species or species group, 132 (75%) were classed as significantly submerged (Table 9).

Nine individuals could not be classified beyond marine mammal and all were significantly submerged.

Table 9.   Marine Mammal Species Identified*

Species	# Individuals		Significantly Submerged	
	Group	Species	Number	Percent of total
Seal	**1**		**0**	**0**
species unknown		1	0	0
Whale	**6**		**3**	**50**
Fin Whale		1	1	100
Sei Whale		1	0	0
Sperm Whale		1	0	0
Beaked Whale (unid.)		3	2	67
Dolphin	**1,105**		**796**	**72**
Common Dolphin		827	585	71
Pilot Whale (unid.)		8	6	75
Risso's Dolphin		84	65	77
Bottlenose Dolphin		1	1	100
Common/White-sided Dolphin		5	5	100
Harbor Porpoise		3	2	67
species unknown		177	132	75
Unid. Mammal	**9**		**9**	**100**
species unknown		9	9	100
Total	**1,121**		**800**	**71**

*Highlighted species are classified as endangered

Rays

Eight rays were found in the imagery, of which two were identified as Chilean devil rays, and the remaining six as cownose/bullnose rays. All rays were deeply submerged (Table 10).

Table 10. Ray Species Identified*

Species	# Individuals	Significantly Submerged	
		Number	Percent of Total
Chilean Devil Ray	2	2	100
Cownose/Bullnose Ray	6	6	100
Total	**8**	**8**	**100**

*Highlighted species are classified as endangered

Sharks

Only two sharks were found in the imagery; one Great White Shark that was near the surface and one unidentified shark that was significantly submerged (Table 11).

Table 11. Shark Species Identified

Species	# Individuals	Significantly Submerged	
		Number	Percent of Total
Great White Shark	1	0	0
species unknown	1	1	100
Total	**2**	**1**	**50**

*Highlighted species are classified as endangered

Endangered Species

There were four species identified as state or federally threatened or endangered species (Table 12). These were fin whale (n=1), sei whale (n=1), sperm whale (n=1), and Atlantic bluefin tuna (n=18).

Table 12. Threatened and Endangered Species Identified

Species	# Individuals
Whale	**3**
Fin Whale	1
Sei Whale	1
Sperm Whale	1
Tuna	**18**
Atlantic bluefin tuna**	18
TOTAL	**21**

*Highlighted species are classified as endangered

**Large bony fish and fish shoals are the topic of a separate report

Spatial Distribution of Animals Treated as Threatened or Endangered

All animals have had their location mapped, and we have very precise location data. Presenting locations of animals spread over such a broad area is difficult as the size of the icon representing the animal suggests a greater spatial use than is real. A better idea of spatial use can be obtained by using the map tool in ReMOTe (remote.normandeau.com), which allows for zoom.

The following images show the location of the federally listed endangered species encountered in the Fall 2018 Survey.
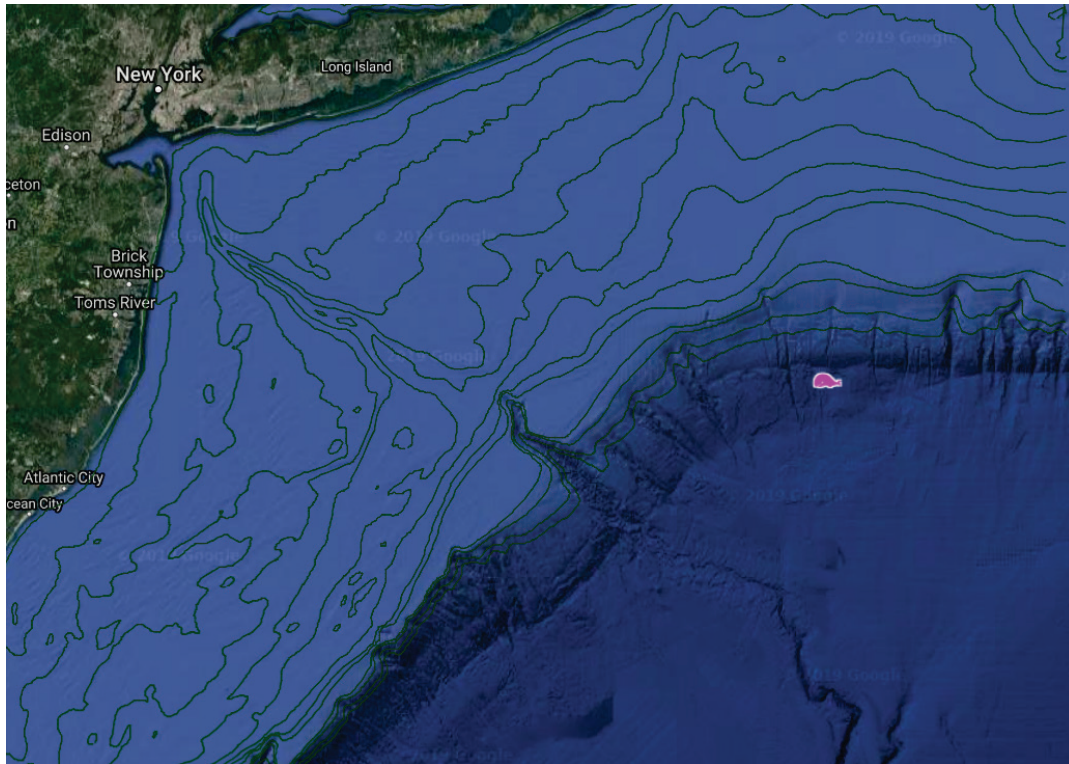
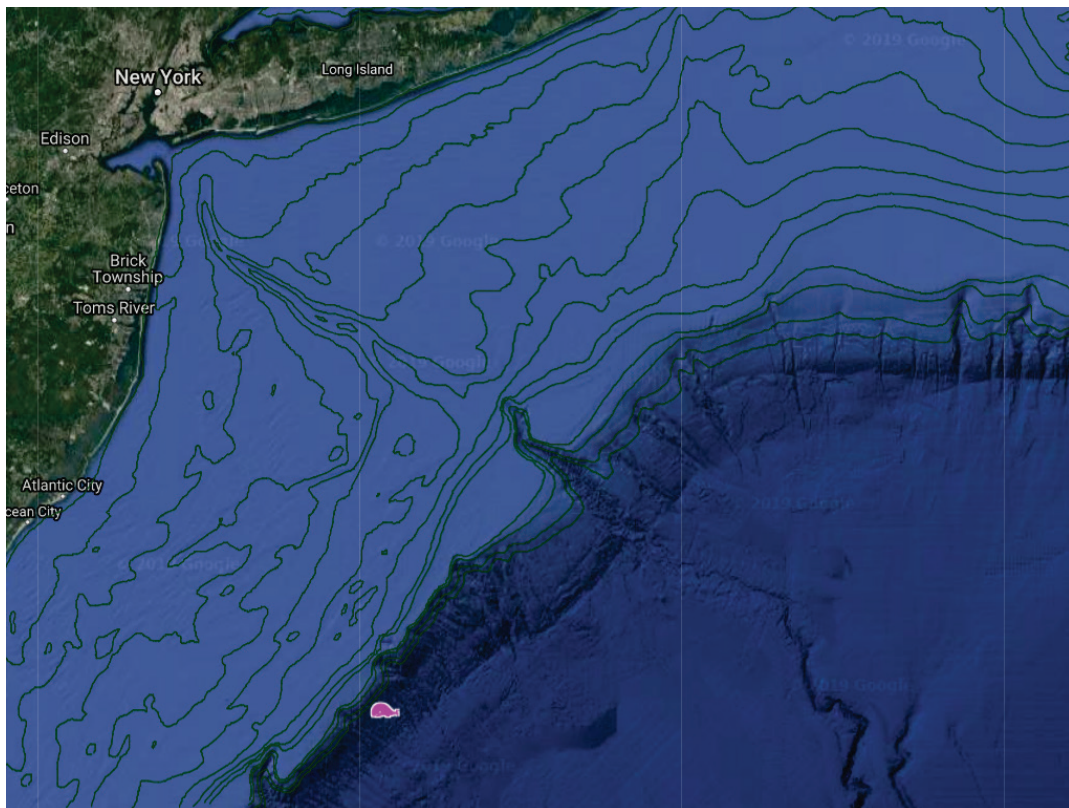**Figure 1.   Fin Whale distribution during the Fall 2018 survey.**

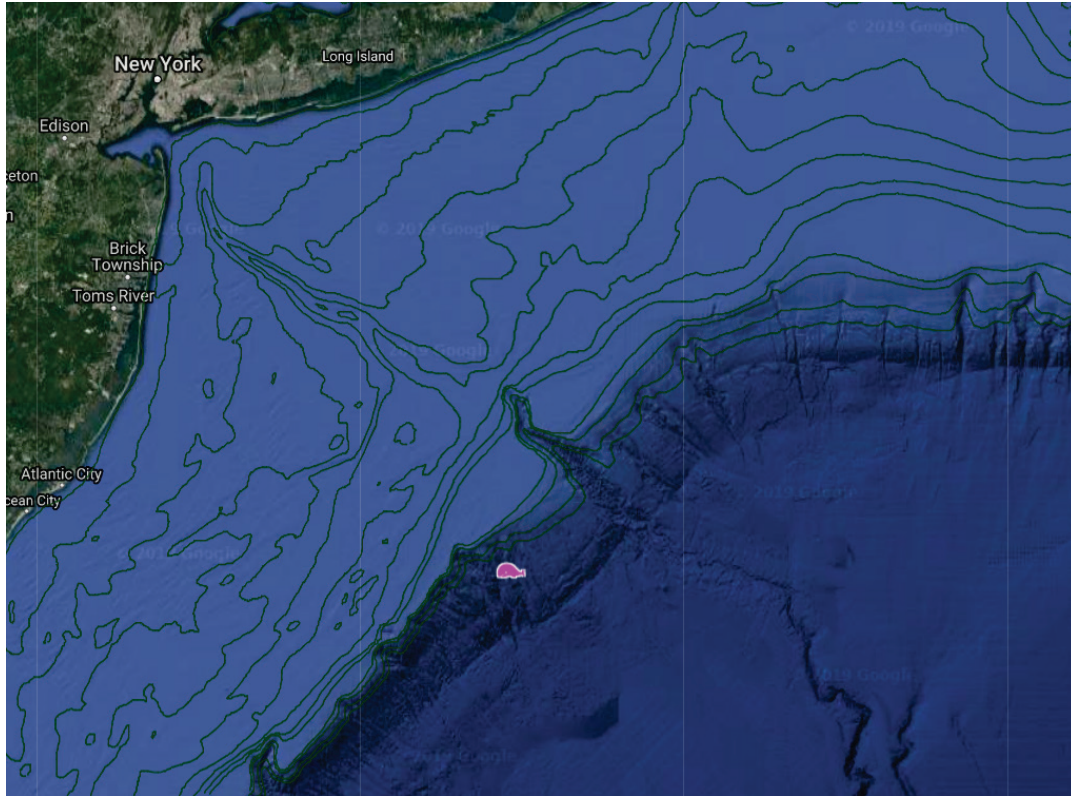**Figure 2.   Sei Whale distribution during the Fall 2018 survey.**

Figure 3.   Sperm Whale distribution during the Fall 2018 survey.
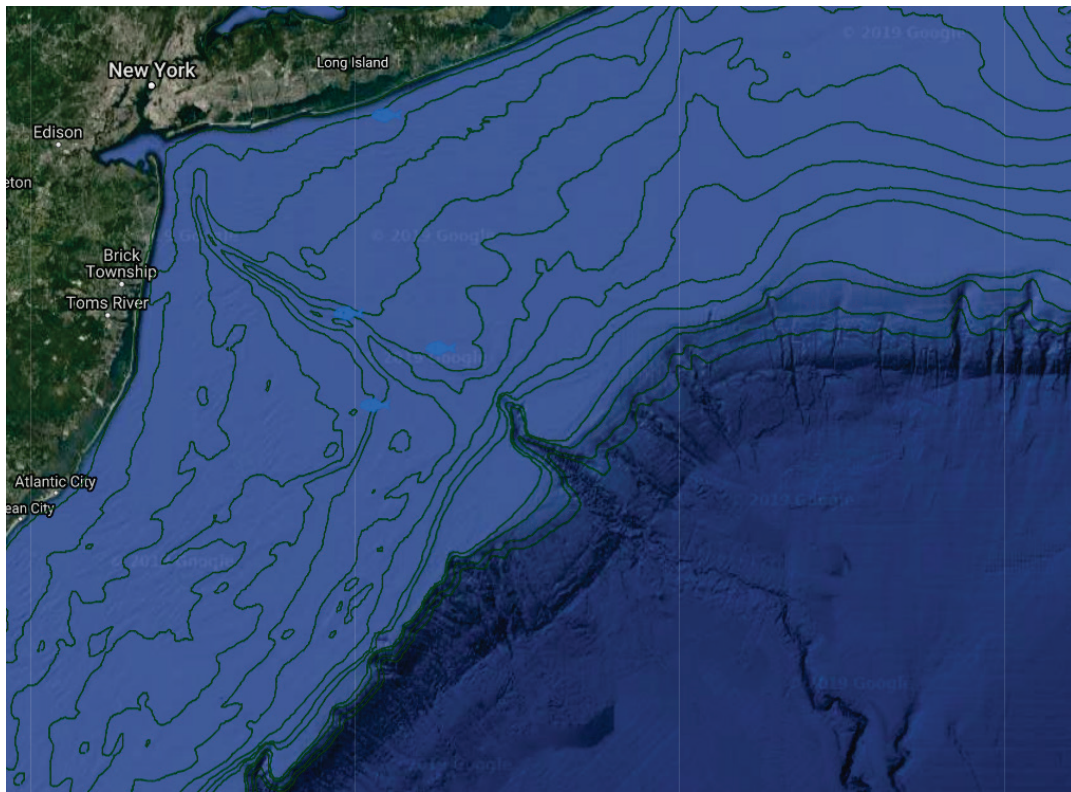

Figure 4.   Atlantic Bluefin tuna distribution during the Fall 2018 survey.

APPENDIX: List of Species Found in Imagery during the 2018 Fall Survey in Taxonomic Order

Common Name	Scientific Name	Class	Family
Birds			
Brant	Branta bernicla	Aves	Anatidae
Mallard	Anas platyrhynchos	Aves	Anatidae
American Black Duck	Anas rubripes	Aves	Anatidae
Surf Scoter	Melanitta perspicillata	Aves	Anatidae
White-winged Scoter	Melanitta fusca	Aves	Anatidae
Black Scoter	Melanitta americana	Aves	Anatidae
Long-tailed Duck	Clangula hyemalis	Aves	Anatidae
Bufflehead	Bucephala albeola	Aves	Anatidae
Common Merganser	Mergus merganser	Aves	Anatidae
Red-breasted Merganser	Mergus serrator	Aves	Anatidae
Red-throated Loon	Gavia stellata	Aves	Gaviidae
Common Loon	*Gavia immer*	Aves	Gaviidae
Horned Grebe	Podiceps auritus	Aves	Podicipedidae
Northern Fulmar	Fulmarus glacialis	Aves	Procellariidae
Cory's Shearwater	Calonectris diomedea	Aves	Procellariidae
Great Shearwater	Ardenna gravis	Aves	Procellariidae
Manx Shearwater	Puffinus puffinus	Aves	Procellariidae
Northern Gannet	Morus bassanus	Aves	Sulidae
Great Blue Heron	Ardea herodias	Aves	Ardeidae
Red-necked Phalarope	Phalaropus lobatus	Aves	Scolopacidae
Red Phalarope	Phalaropus fulicarius	Aves	Scolopacidae
Parasitic Jaeger	Stercorarius parasiticus	Aves	Stercorariidae
Dovekie	Alle alle	Aves	Alcidae
Atlantic Puffin	Fratercula arctica	Aves	Alcidae
Black-legged Kittiwake	Rissa tridactyla	Aves	Laridae
Bonaparte's Gull	Chroicocephalus philadelphia	Aves	Laridae
Little Gull	Hydrocoloeus minutus	Aves	Laridae
Laughing Gull	Leucophaeus atricilla	Aves	Laridae
Ring-billed Gull	Larus delawarensis	Aves	Laridae

Common Name	Scientific Name	Class	Family
Herring Gull	Larus argentatus	Aves	Laridae
Iceland Gull	Larus glaucoides	Aves	Laridae
Lesser Black-backed Gull	Larus fuscus	Aves	Laridae
Great Black-backed Gull	Larus marinus	Aves	Laridae
Marine Mammals			
Fin Whale	Balaenoptera physalus	Mammalia	Balaenopteridae
Sei Whale	Balaenoptera borealis	Mammalia	Balaenopteridae
Sperm Whale	Physeter macrocephalus	Mammalia	Physeteridae
Common Dolphin	Delphinus delphis	Mammalia	Delphinidae
Risso's Dolphin	Grampus griseus	Mammalia	Delphinidae
Bottlenose Dolphin	Tursiops truncatus	Mammalia	Delphinidae
Harbor Porpoise	Phocoena phocoena	Mammalia	Phocoenidae
Sharks			
Great White Shark	*Carcharodon carcharias*	Chondrichthyes	Lamnidae
Rays			
Chilean Devil Ray	*Mobula tarapacana*	Chondrichthyes	Mobulidae
Large Bony Fish*			
Atlantic bluefin tuna	*Thunnus thynnus*	Actinopterygii	Scombridae
Ocean Sunfish	*Mola Mola*	Actinopterygii	Molidae

*Large bony fish and fish shoals are the topic of a separate report