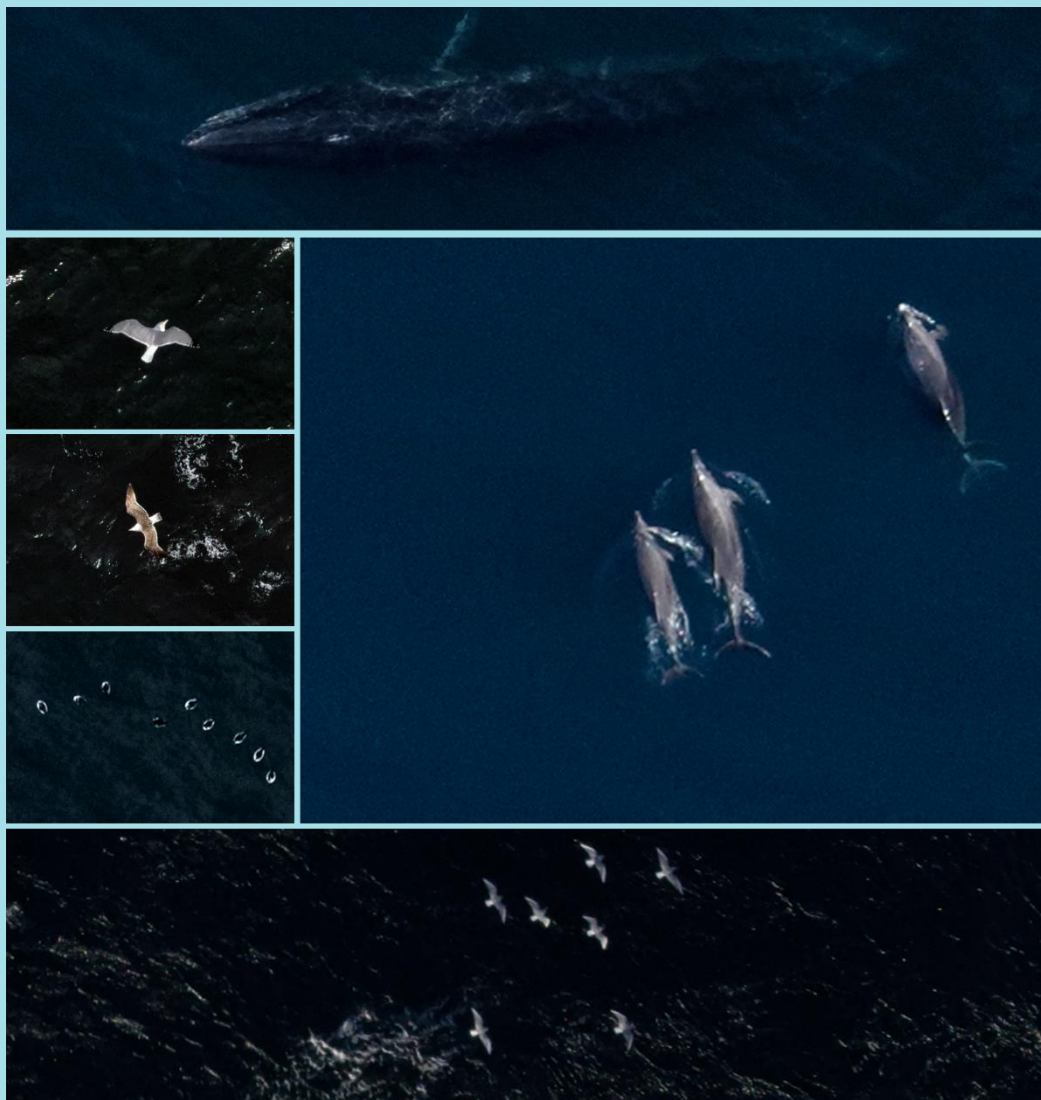


# Digital Aerial Baseline Survey of Marine Wildlife in Support of Offshore Wind Energy

Winter 2017 Taxonomic Analysis Summary Report



**NYSERDA**



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

## Winter 2017 Taxonomic Analysis Summary Report

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## Introduction

The first winter survey for the Digital Aerial Baseline Survey of Marine Wildlife in Support of Offshore Wind Energy for the New York Offshore Planning Area (OPA) and Wind Energy Area (WEA) began on March 6, 2017, and finished April 3, 2017. Target extraction for the first winter survey for the NYSERDA Offshore Planning Area (OPA) and Wind Energy Area (WEA) was started in May. All target extraction and quality control of target extraction was completed in July 2017. All animals were identified and all identifications reached quality control standards. Animals were also fully georeferenced with exact locations of individuals available for review on the data portal.

## Methods

Data were collected for the OPA including a 300-m buffer and the WEA including a 4-km buffer. As the camera array width is large, additional data has been collected around the OPA to ensure complete coverage to the boundary of the OPA. The survey collected imagery covering a 3,952.89-km<sup>2</sup> area of the OPA and 300-m buffer using a transect pattern and 112.74 km<sup>2</sup> of the WEA with a 4-km buffer using a grid pattern (Table 1), which amounts to 414,494 images. Of the 414,494 images analyzed, 403,032 were blank (Table 2). The initial target extraction identified 22,721 objects: 22,681 (99.82%) within imagery collected in the OPA and 300-m buffer survey area and 40 objects within imagery exclusively covering the WEA and 4-km buffer area. These targets were initially categorized into nine groups representing avian (birds), turtles, marine mammals, rays, sharks, large bony fish individuals (excluding fish shoals), fixed structures, vessels, and unknown/other (Table 3) and assigned to taxonomic experts for identification. Of the large bony fish, only ocean sunfish was identified to species (see Appendix for a full list of scientific names). No bats were found in imagery. Reclassifications of targets included corrections of subsurface targets into appropriate groups and unknown/other into species groups. Species listed on the state threatened and endangered list and those listed as “Endangered” or “Threatened” under the federal Endangered Species Act were flagged for review (Table 4). Thirteen individuals were categorized into this group. This categorization was conservative. For example, it is possible that “hammerhead shark (unid.)” could represent scalloped hammerhead, and so this identification was placed into the Endangered category.

Collection of images for the winter 2017 survey occurred over a four week period (march 4 through April 3) because of erratic weather conditions. Data users should bear this in mind when evaluating seasonal patterns.

**Table 1. Total Images and Area Surveyed**

Area	Total Area (km <sup>2</sup> )	Survey Area		
		Area (km <sup>2</sup> )	Percent Coverage <sup>b</sup>	Number of Images
WEA <sup>a</sup>	850.92	112.74	13.25%	13,837
OPA	43,745.20	3,952.89	9.04%	400,657
<b>Total</b>	<b>44,596.12</b>	<b>4,065.63</b>	<b>9.12%</b>	<b>414,494</b>

<sup>a</sup> This table only represents the imagery that was processed and analysed per the scope of work. An additional 10% coverage was collected for the WEA but is being stored if needed for future processing and analysis.

<sup>b</sup> Percent coverage of the entire OPA including the WEA imagery.

**Table 2. Blank Images Detected**

Area	Number of Images in Survey Area	Blank Images			
		Number	Percent	Number QC'd	Percent QC'd
WEA	13,837	13,779	99.58	1,378	10.00
OPA	400,657	389,253	97.15	39,052	10.03
<b>TOTAL</b>	<b>414,494</b>	<b>403,032</b>	<b>97.23</b>	<b>40,430</b>	<b>10.03</b>

**Table 3. Targets Identified**

Taxonomic Group	Total (OPA and WEA)	OPA	WEA
Avian	20,958	20,919	39
Large Bony Fish	21	20	1
Fixed Structures	3	3	0
Marine Mammals	1,609	1,609	0
Rays	0	0	0
Sharks	26	26	0
Turtles	1	1	0
Vessels	5	5	0
Unknown/Other	98	98	0
<b>TOTAL</b>	<b>22,721</b>	<b>22,681</b>	<b>40</b>

**Table 4. Endangered Species Act Listed Species Identified**

Group	Total (OPA and WEA)	OPA	WEA
Turtles	1	1	0
Marine Mammals	12	12	0
<b>TOTAL</b>	<b>13</b>	<b>13</b>	<b>0</b>

## Quality Control

All identifications were made by biologists highly experienced in their species group. A minimum of 20% of all images identified were reviewed by a taxonomic expert and taxonomic agreement had to meet a minimum of 90% concurrence (Table 5). 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 6). Additional experts in the species concerned were called in to arbitrate identifications when concurrence could not be reached.

## Results

### Quality Control Results (Winter 2017)

**Table 5. All Species**

Taxonomic Group	Number of Images	Number of Images for QC	% Agreement Reached
Avian	20,958	4,282	99
Large Bony Fish	21	0	—
Fixed Structures	6	0	—
Marine Mammals	1,609	333	98
Rays	0	0	—
Sharks	26	0	—
Turtles	1	1	100
Vessels	6	0	—
<b>TOTAL</b>	<b>13,735</b>	<b>4,616</b>	<b>100</b>

**Table 6. Endangered Species Only**

Taxonomic Group	Number of Images	% Agreement Reached
Turtles	1	100
Marine Mammals	12	100
<b>TOTAL</b>	<b>13</b>	<b>100</b>

## Identification Success

Identification success varied by species groups and by depth of subsurface animals. All identifications had a level of certainty ascribed to them (e.g., possible, probable, and definite), and 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 species-level identifications varied by species groups depending on size and coloration. All bird identifications were classified to species or species group with a species identification success of over 90% (Table 7), as follows:

- Avian species groups consisting of fulmar, gannet, goose, grebe, merganser, and phalarope achieved 100% identification success rates
- 47% of auk species were identified to species
- 100% of cormorants remained at group level
- 93% of ducks were identified to species
- 97% of gulls were identified to species
- 99% of loons were identified to species
- 50% of petrels were identified to species
- 50% of shearwaters were identified to species
- 100% of shorebirds remained at group level
- 96% of shearwaters remained at group level

**Table 7. Avian Species Identified (20,919 in OPA, 39 in WEA)**

Species	OPA		WEA	
	Subtype	Species	Subtype	Species
Auk	8,952		3	
Atlantic Puffin		2,387		1
Black Guillemot		8		0
Dovekie		1,793		1
Murre/Razorbill		4,154		1
Species unknown		610		0
Cormorant	3		0	
Species unknown		3		0
Duck	1,385		0	
Black Scoter		536		0
Bufflehead		108		0
Common Goldeneye		1		0
King Eider		1		0
Lesser Scaup		7		0
Long-tailed Duck		49		0
Scoter unid.		50		0
Species unknown		50		0
Surf Scoter		235		0
White-winged Scoter		348		0
Fulmar	49		0	
Northern Fulmar		49		0
Gannet	4,114		22	
Northern Gannet		4,114		22

Species	OPA		WEA	
	Subtype	Species	Subtype	Species
Goose	1		0	
Canada Goose		1		0
Grebe	8		0	
Horned Grebe		8		0
Gull	5,505		9	
Black-headed Gull		1		0
Black-legged Kittiwake		9		0
Bonaparte's Gull		614		3
Glaucous Gull		1		0
Great Black-backed Gull		964		2
Herring Gull		3,495		2
Iceland Gull		7		0
Lesser Black-backed Gull		23		0
Little Gull		6		0
Ring-billed Gull		220		0
Species unknown		6		0
Species unknown–Large		23		0
Species unknown–Small		136		2
Loon	586		5	
Common Loon		342		4
Red-throated Loon		241		1
Species unknown		3		0
Merganser	5		0	
Red-breasted Merganser		5		0
Petrel	2		0	
Black-capped Petrel		1		0
Species unknown		1		0
Phalarope	233		0	
Red/Red-necked Phalarope		233		0
Shearwater	4		0	
Sooty Shearwater		2		0
Species unknown–Large		2		0
Shorebird	1		0	
Species unknown		1		0
Storm-Petrel	71		0	
Species unknown		71		0
<b>TOTAL</b>	<b>20,919</b>	<b>20,919</b>	<b>39</b>	<b>39</b>



One turtle was observed in the OPA and was identified as loggerhead, which is listed under the ESA, and was not assigned a depth rating.

The fall survey recorded 1,609 marine mammals (Table 8), all of which were recorded in the OPA.

- Of the 1,516 dolphins, 548 (36%) were classed as “species unknown.” Of these, 409 (75%) were ranked as significantly submerged.
- Thirty-five pinnipeds (seals) were recorded, of which 4 were clearly identifiable. Problems with identification frequently stemmed from subsurface depth obscuring important features, and 10 of the pinnipeds fell in to this category.
- There were 33 unidentified mammals that were not ascribed to species group, 25 of which were ranked as significantly submerged.
- There were six whales not ascribed to species or species group, 5 of which were ranked as significantly submerged.

**Table 8. Marine Mammal Species Identified (1,609 in OPA, 0 in WEA)\***

Species	OPA		WEA		Significantly Submerged	Percent of Total
	Subtype	Species	Subtype	Species		
Dolphin	1,516		0			
Atlantic White-sided Dolphin		7		0	2	29
Common Bottlenose Dolphin		132		0	81	61
Common Dolphin		566		0	381	67
Common/White-sided Dolphin		16		0	2	13
Harbor Porpoise		192		0	111	58
Risso's Dolphin		49		0	25	51
Rough-toothed dolphin		1		0		
Species unknown		548		0	409	75
Striped Dolphin		5		0	3	60
Seal	35		0			
Gray Seal		3		0		
Harbor Seal		1		0		
Species unknown		31		0	10	32
Unid. Mammal	33		0			
Species unknown		33		0	25	76
Whale	25		0			
Beaked Whale (unid.)		1		0	1	100
Blue Whale <sup>a</sup>		1		0		
Common Minke Whale		7		0	3	43
Fin Whale <sup>a</sup>		5		0	3	60
Humpback Whale <sup>a</sup>		2		0	2	100
North Atlantic Right Whale <sup>a</sup>		4		0	3	75
Species unknown		5		0	4	80
<b>TOTAL</b>	<b>1,609</b>		<b>0</b>			

\*Highlight denotes classed as endangered

<sup>a</sup> Listed as threatened or endangered by NYSDEC



No rays were recorded during the Winter 2017 survey.

Of the 26 sharks recorded, 8 (31%) were not identified to species, 7 of which were ranked as significantly submerged (Table 9).

**Table 9. Shark Species Identified (26 in OPA, 0 in WEA)**

Species	OPA-species	WEA-species	Significantly Submerged	Percent of Total
Basking Shark	14	0	8	57
Blue Shark	2	0		
Species unknown	8	0	7	88
Spurdog	2	0		
<b>TOTAL</b>	<b>26</b>	<b>0</b>		

Out of the 21 large bony fish recorded, 8 (38%) were identified as ocean sunfish with 1 (13%) being ranked as significantly submerged. Out of the remaining 13 individuals unidentified to species, 4 (31%) were rated as significantly submerged (Table 10).

**Table 10. Large Bony Fish Species Identified (20 in OPA, 1 in WEA)**

Species	OPA-species	WEA-species	Significantly Submerged	Percent of Total
Ocean Sunfish	8	0	1	13
Species unknown	12	1	4	31
<b>TOTAL</b>	<b>20</b>	<b>1</b>		

## Species Presence

This season had high bird activity with 20,958 individuals recorded representing 33 species (see Table 7). The survey was timed to provide as much information as possible on northern gannets and red-throated loons and was anticipated to coincide with sea duck, and gull activity.

- As anticipated, large numbers of northern gannets were reported (n=4,136)
  - 1,240 were documented as flying
- Both red-throated and common loons were documented (n=504)
  - Of the 242 red-throated loons, 84 were flying
- There were 1,385 sea ducks, with 8 different species identified
  - Most were black scoters (n=536); 525 were sitting on the water
- There were 5,514 gulls identified in the imagery of 10 different species, of which 1,602 were reported as flying
  - 3,496 herring gulls
  - 967 great black-backed gulls
  - 617 Bonaparte's gulls
  - 220 ring-billed gulls
  - with small numbers of black-headed gulls, black-legged kittiwakes, glaucous gulls, Iceland gulls, lesser black-backed gulls, and little gulls

- Remaining species occurring in notable numbers include
  - 8,955 auks of 4 species; 8,789 were sitting on the water
  - 233 phalaropes, of which 142 were sitting

Only one turtle was recorded, which was identified as loggerhead.

Large numbers of marine mammals were encountered (n=1,609; see Table 8). Most of these were dolphins (n=1,516) consisting of 8 identified species or species group, as follows:

- Atlantic White-sided dolphin (n=7)
- Common Bottlenose dolphin (n=132)
- Common dolphin (n=566)
- Common/White-sided dolphin (16)
- Harbor porpoise (n=192)
- Risso's dolphin (n=49)
- Rough-toothed dolphin (n=1)
- Striped dolphin (n=5)
- Species unknown (n=548)

Of whale species (n=25), common minke whales (n=7), fin whales (n=5), North Atlantic right whales (n=4), and humpback whales (n=2) were the only species with more than one encounter (see Table 8).

Of the 26 sharks seen, 14 (53.8%) were basking sharks (see Table 9). Of the 8 species unidentified to species, 7 were ranked as significantly submerged.

Of large bony fish species, 21 individuals were encountered, 8 of which were identified as ocean sunfish (see Table 10). Of the 13 unidentified to species, 4 were ranked as significantly submerged.

Thirteen animals listed as state or federally threatened or endangered species were recorded in the OPA and none in the WEA (Table 11). The turtle species encountered in the winter survey is classified as threatened (Figure 1). In addition, there were 12 listed marine mammals. These were blue whale (n=1), fin whale (n=5), humpback whale (n=2), and North Atlantic right whale (n=2) (Figure 2).

**Table 11. Threatened and Endangered Species Identified\***

Species	TOTAL (OPA & WEA)	OPA	WEA
<b>Turtles</b>			
Loggerhead Turtle <sup>a</sup>	1	1	0
<b>Marine Mammals</b>			
Blue Whale <sup>a</sup>	1	1	0
Fin Whale <sup>a</sup>	5	5	0
Humpback Whale <sup>a</sup>	2	2	0
North Atlantic Right Whale <sup>a</sup>	4	4	0

\*Highlight denotes classified as endangered

<sup>a</sup> listed as threatened or endangered by NYSDEC

## Flight Height

Avian flight height data will be presented in detail in the semi-annual report. However, here we present a brief overview of flight altitude assessment success. We were able to calculate flight heights for

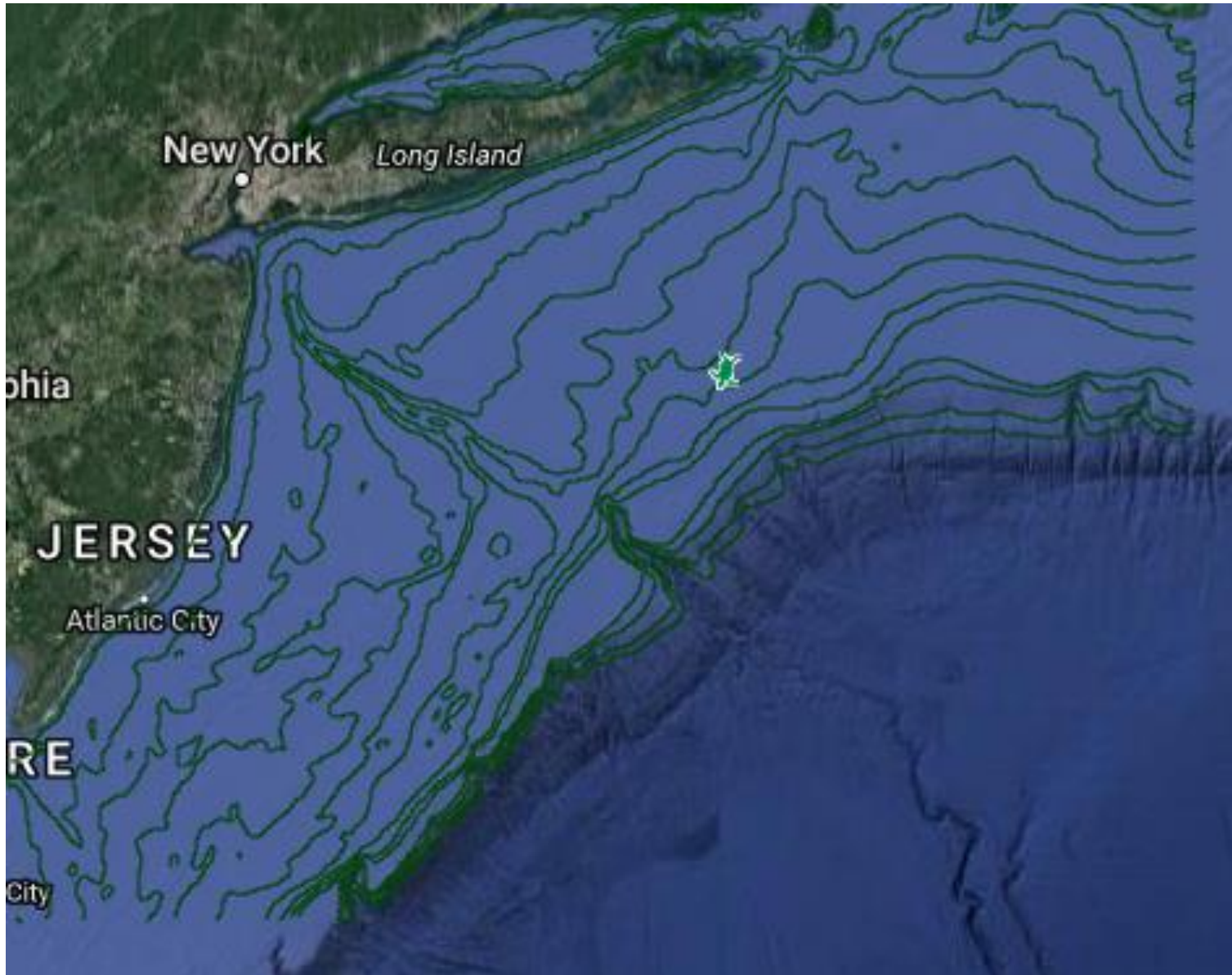
- 1,070 (86.3%) of 1,240 flying northern gannet
- 71 (84.5%) of 84 flying red-throated loons
- 11 (100.0%) of 11 flying black scoter
- 82 (87.2%) of 94 flying sea ducks (other than black scoter)
- 1,422 (88.8%) of 1,602 flying gulls
- 14 (8.4%) of 166 flying auks
- 3 (3.3%) of 91 flying phalaropes
- 1 (25.0%) of 4 flying shearwaters

## Spatial Distribution of Animals Classed 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](http://remote.normandeau.com)), which allows for zoom.

The following images show the locations of the endangered species encountered in the Winter 2017 survey.

Figure 1. Turtle distribution over the OPA during the 2017 Winter survey.







## APPENDIX

### List of Species Found in Imagery during the Winter 2016 Survey in Taxonomic Order

Common Name	Scientific Name	Class	Family
Canada Goose	<i>Branta canadensis</i>	Aves	Anatidae
Lesser Scaup	<i>Aythya affinis</i>	Aves	Anatidae
King Eider	<i>Somateria spectabilis</i>	Aves	Anatidae
Surf Scoter	<i>Melanitta perspicillata</i>	Aves	Anatidae
White-winged Scoter	<i>Melanitta fusca</i>	Aves	Anatidae
Black Scoter	<i>Melanitta americana</i>	Aves	Anatidae
Long-tailed Duck	<i>Clangula hyemalis</i>	Aves	Anatidae
Bufflehead	<i>Bucephala albeola</i>	Aves	Anatidae
Common Goldeneye	<i>Bucephala clangula</i>	Aves	Anatidae
Red-breasted Merganser	<i>Mergus serrator</i>	Aves	Anatidae
Red-throated Loon	<i>Gavia stellata</i>	Aves	Gaviidae
Common Loon	<i>Gavia immer</i>	Aves	Gaviidae
Horned Grebe	<i>Podiceps auritus</i>	Aves	Podicipedidae
Northern Fulmar	<i>Fulmarus glacialis</i>	Aves	Procellariidae
Black-capped Petrel	<i>Pterodroma hasitata</i>	Aves	Procellariidae
Sooty Shearwater	<i>Ardenna grisea</i>	Aves	Procellariidae
Leach's Storm-Petrel	<i>Oceanodroma leucorhoa</i>	Aves	Hydrobatidae
Northern Gannet	<i>Morus bassanus</i>	Aves	Sulidae
Red Phalarope	<i>Phalaropus fulicarius</i>	Aves	Scolopacidae
Dovekie	<i>Alle alle</i>	Aves	Alcidae
Razorbill	<i>Alca torda</i>	Aves	Alcidae
Black Guillemot	<i>Cephus grylle</i>	Aves	Alcidae
Atlantic Puffin	<i>Fratercula arctica</i>	Aves	Alcidae
Black-legged Kittiwake	<i>Rissa tridactyla</i>	Aves	Laridae

Common Name	Scientific Name	Class	Family
Bonaparte's Gull	<i>Chroicocephalus philadelphia</i>	Aves	Laridae
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	Aves	Laridae
Little Gull	<i>Hydrocoloeus minutus</i>	Aves	Laridae
Ring-billed Gull	<i>Larus delawarensis</i>	Aves	Laridae
Herring Gull	<i>Larus argentatus</i>	Aves	Laridae
Iceland Gull	<i>Larus glaucoides</i>	Aves	Laridae
Lesser Black-backed Gull	<i>Larus fuscus</i>	Aves	Laridae
Glaucous Gull	<i>Larus hyperboreus</i>	Aves	Laridae
Great Black-backed Gull	<i>Larus marinus</i>	Aves	Laridae
Ocean Sunfish	<i>Mola mola</i>	Actinopterygii	Molidae
Atlantic White-sided Dolphin	<i>Lagenorhynchus acutus</i>	Mammalia	Delphinidae
Common Bottlenose Dolphin	<i>Tursiops truncatus</i>	Mammalia	Delphinidae
Harbor Porpoise	<i>Phocoena phocoena</i>	Mammalia	Phocoenidae
Risso's Dolphin	<i>Grampus griseus</i>	Mammalia	Delphinidae
Rough-toothed dolphin	<i>Steno bredanensis</i>	Mammalia	Delphinidae
Short-beaked Common Dolphin	<i>Delphinus delphis</i>	Mammalia	Delphinidae
Striped Dolphin	<i>Stenella coeruleoalba</i>	Mammalia	Delphinidae
Gray Seal	<i>Halichoerus grypus</i>	Mammalia	Phocidae
Harbor Seal	<i>Phoca vitulina</i>	Mammalia	Phocidae
Blue Whale	<i>Balaenoptera musculus</i>	Mammalia	Balaenopteridae
Common Minke Whale	<i>Balaenoptera acutorostrata</i>	Mammalia	Balaenopteridae
Fin Whale	<i>Balaenoptera physalus</i>	Mammalia	Balaenopteridae
Humpback Whale	<i>Megaptera novaeangliae</i>	Mammalia	Balaenopteridae
North Atlantic Right Whale	<i>Eubalaena glacialis</i>	Mammalia	Balaenidae
Loggerhead Turtle	<i>Caretta caretta</i>	Reptilia	Cheloniidae