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

Winter 2017-2018 Taxonomic Analysis Summary Report

NEW YORK STATE OF OPPORTUNITY. | NYSERDA

NORMANDEAU ASSOCIATES
Environmental Consultants

APEM

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

Winter 2017-2018 Taxonomic Analysis Summary Report

Prepared for
New York State Energy Research and Development Authority
17 Columbia Circle
Albany, NY 12203-6399

Prepared by
Normandeau Associates, Inc.
4581 NW 6th Street, Suite A
Gainesville, FL 32609
352-372-4747
www.normandeau.com

with

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

June 2018

Introduction

The second summer survey for the NYSERDA offshore planning area (OPA) was started on 18 February, 2018, and completed on 1 March, 2018. Delay in completion was caused by weather conditions, and the survey window spanned 1.5 weeks. Data users should bear this in mind when evaluating seasonal patterns. 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 3,147.14 km^2 area of the OPA and 300-m buffer using a transect (Table 1), which amounts to 320,107 images. Of the 320,107 images analyzed, 315,434 were blank (Table 2). The target extraction identified 12,326 objects within imagery collected in the OPA and 300-m buffer survey area (Table 3). These targets were categorized into six groups representing avian (birds), marine mammals, turtles, large bony fish individuals (excluding fish shoals), fixed structures, and vessels and assigned to taxonomic experts for identification. Targets extracted that were later identified as trash or other floating debris were removed from the dataset. No bats, rays, or turtles were found in imagery. Species listed as "Endangered" 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 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	320,107	3,147.14	7.19	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	320,107	315,434	31,604	10.02	98.54

Table 3. Targets Sent for Identification

Group	# Individuals
Avian	11,218
Marine Mammals	1,082
Sharks	11
Large Bony Fish	9
Sea Turtles	0
Vessels	6
Fixed Structures	3
Total	**12,329**

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 in 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 July 2018. 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.

Quality Control Results (Summer 2017)

Table 4. Quality Control Results, All Groups

Group	Number of Images	Number of Images for QC	% Agreement
Avian	11,218	2,244	100
Marine Mammals	1,082	219	99
Sharks	11	3	100
Total	**12,311**	**2,465**	**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 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 Identification Success

Avian species-level identifications varied by species groups depending on size, coloration and flight activity. Birds that are both small and sitting on the water are generally more difficult to identify, and in this survey a large number of auks and ducks were encountered (Table 6). Both of these groups contain multiple species that are morphologically similar and difficult to distinguish, more than one of which could be expected in the study area. All bird identifications were classified to species or species group (Table 7).

Table 6. Avian Groups Identified, Percent ID Success, and Percent Sitting

Group	# Individuals	% ID Success	% Sitting
Swan	12	100	100
Duck	1,662	100	97
Loon	190	98	96
Grebe	3	100	100
Fulmar	705	100	26
Gannet	831	100	83
Shorebird	4,026	0	99
Phalarope	1	100	100
Skua	2	50	50
Auk	650	98	93
Gull	3,136	97	82
		Average ID Success	**Average % Sitting**
Total Individuals	**11,218**	**90%**	**80%**

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

Avian Group/ Species	OPA		
	# Individuals	# Flying	% Flying
Swan	**12**	**0**	**0**
Tundra Swan	12	0	0
Duck	**1,662**	**47**	**3**
Surf Scoter	9	0	0
White-winged Scoter	132	42	32
Black Scoter	3	0	0
Scoter unid.	1,473	0	0
Long-tailed Duck	43	4	9
Bufflehead	1	1	100
species unknown	1	0	0
Loon	**190**	**8**	**4**
Red-throated Loon	35	3	9
Common Loon	151	5	3
species unknown	4	0	0
Grebe	**3**	**0**	**0**
Horned Grebe	3	0	0
Fulmar	**705**	**523**	**74**
Northern Fulmar	705	523	74
Gannet	**831**	**140**	**17**
Northern Gannet	831	140	17
Shorebird	**4,026**	**36**	**1**
Black-bellied Plover	3	3	100
species unknown	4,023	33	1
Phalarope	**1**	**0**	**0**
Red/Red-necked Phalarope	1	0	0
Skua	**2**	**1**	**50**
Great Skua	1	1	100
species unknown	1	0	0
Auk	**650**	**47**	**7**
Dovekie	14	0	0
Murre/Razorbill	547	47	9
Atlantic Puffin	73	0	0
species unknown	16	0	0

Avian Group/ Species	OPA		
	# Individuals	# Flying	% Flying
Gull	**3,136**	**578**	**18**
Black-legged Kittiwake	10	3	30
Bonaparte's Gull	127	42	33
Ring-billed Gull	26	5	19
Herring Gull	1,777	321	18
Iceland Gull	2	1	50
Lesser Black-backed Gull	17	2	12
Great Black-backed Gull	1,097	198	18
species unknown - Large	40	5	13
species unknown - Small	39	0	0
species unknown	1	1	100
Total	**11,218**	**1,380**	**12**

Marine Mammal Identification Success

There were 1,082 marine mammals recorded during the summer survey (Table 8).

Of the 1,063 dolphins, 354 (33%) were classed as "species unknown." Of these, 292 (82%) were significantly submerged (Table 8).

Five seals were recorded and only two could be identified to species. Of the remaining three, one (33%) was significantly submerged.

The presence of seals and dolphins in the area, and some very submerged individuals of both meant that we had five mammals that could not be classed as dolphin or seal. Of these, four (80%) were significantly submerged.

There were nine whales recorded, two (25%) of which remained unidentified. Both of these were significantly submerged.

Table 8. Marine Mammal Species Identified*

Species	# Individuals		Significantly Submerged	Percent of Total
	Group	Species		
Seal	5			
Harbor Seal		2	0	
species unknown		3	1	33
Whale	9			
Common Minke Whale		1	0	0
Fin Whale		2	2	100

Species	# Individuals		Significantly Submerged	Percent of Total
	Group	Species		
Beaked Whale (unid.)		4	2	50
species unknown		2	2	100
Dolphin	1,063			
Common Dolphin		504	292	58
Risso's Dolphin		57	29	51
Atlantic White-sided Dolphin		2	1	50
Striped Dolphin		90	56	62
Bottlenose Dolphin		29	22	76
Harbor Porpoise		27	12	44
species unknown		354	292	82
Unid. Mammal	5			
species unknown		5	4	80
Total Mammals	**1,082**		**715**	**66**

*Highlighted (in green) species are classified as endangered

Shark Identification Success

Of the 11 sharks recorded, all (100%) were identified to species of which five (45%) were ranked as significantly submerged (Table 9).

Table 9. Shark Species Identified*

Species	# Individuals	# Significantly Submerged	Percent of Total
Basking Shark	9	4	44
Blue Shark	2	1	50
Total	**11**	**5**	**45**

* Highlighted species are classified as endangered

Large Bony Fish Identification Success

Large bony fish identification has not been formally undertaken for the Winter 2017–2018 survey; however, ocean sunfish were easily identified and included in this dataset (Table 10).

Table 10. Large Bony Fish Species Identified

Species	# Individuals in Group	# Individuals	# Significantly Submerged	Percent of Total
Sunfish	7			
Ocean Sunfish		7	0	0
Not identified	2	2		
Total	**9**	**9**	**0**	**0**

Species Presence

Avian

This season had high bird activity with 11,218 individuals recorded representing 24 species (see Table 7). Shorebirds (n=4,026) and gulls (n=3,136) were the most numerous groups present, followed by ducks (n=1,662), gannets (n=831) and fulmars (n=705). Other species encountered were loons (n=190), swans (n=11), grebes (n=3) and skuas (n=2).

Marine Mammals

Large numbers of marine mammals were encountered (n=1,082; see Table 8). Most of these were dolphins (n=1,063) consisting of six identified species or group, as follows:

- Common dolphin (n=504)
- Striped dolphin (n=90)
- Risso's dolphin (n=57)
- Bottlenose dolphin (n=29)
- Harbor porpoise (n=27)
- Atlantic white-sided dolphin (n=2)
- Species unknown (n=354)

One species of seal (harbor seal) was identified (n=2), and five animals were also recorded 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 8).

Of nine whales, fin whale (n=2), beaked whale unid (n=4), and common minke whale (n=1) were identified, and two deeply submerged animals could not be identified (see Table 8).

Sharks

Of the 11 sharks seen, nine were basking sharks and two were blue sharks (see Table 9).

Large Bony Fish

There were nine large bony fish recorded during the Winter 2017–2018 survey. Of these only 7 sunfish species were identified. All other large bony fish (n=2) remain requiring identification.

Fish Shoals

169 images containing fish shoals were recorded in the Winter 2017–2018 survey.

Endangered Species

There were two animals representing state or federally threatened or endangered species recorded (Table 11). The individual positively identified as an endangered species was fin whale (n=2). No sea turtles were observed in the imagery.

Table 11. Threatened and Endangered Species Identified

Species	# Individuals
Whale	
Fin Whale*	2
Total	**2**

*Denotes classed as endangered

Flight Activity

Avian fight height data will be presented in detail in the annual report. However, here we present a brief overview of flight altitude assessment success. The number of flying individuals by group and by species is presented in Table 7. Species specific flight height success is shown in Table 12 below.

Of the 593 flying birds, we were able to calculate flight heights for

- 36 (77%) of 47 flying ducks
- 8 (100%) of 8 flying loons
- 237 (45%) of 523 flying fulmars
- 83 (59%) of 140 flying gannets
- 5 (11%) of 47 flying auks
- 221 (38%) of 577 flying gulls

Table 12. Number of Flying Individuals with Calculated Flight Heights

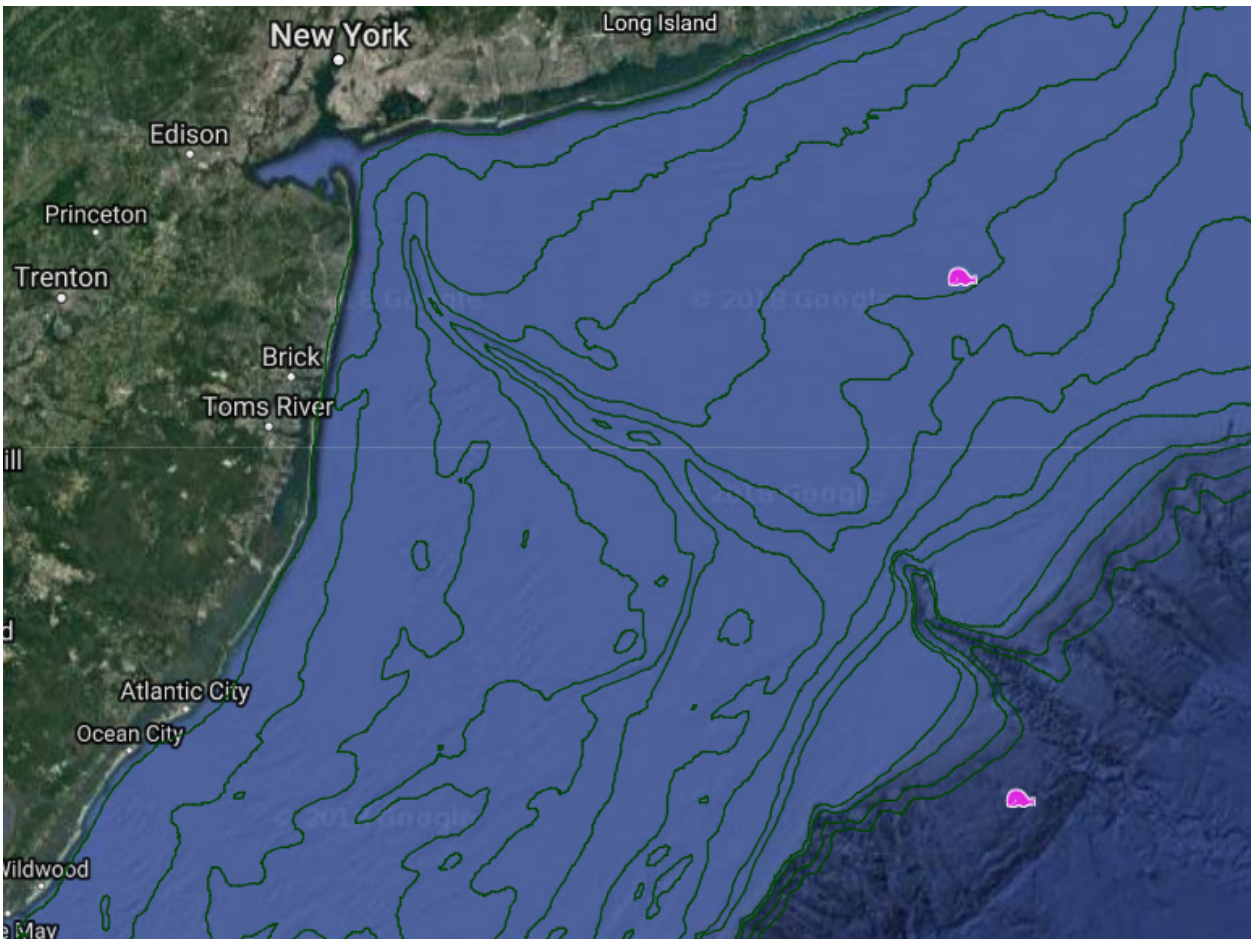
Avian Species	OPA		
	# Flying Individuals	# With Height	% With Height
White-winged Scoter	42	34	81
Long-tailed Duck	4	1	25
Bufflehead	1	1	100
Red-throated Loon	3	3	100
Common Loon	5	5	100
Northern Fulmar	523	237	45
Northern Gannet	140	83	59
Black-bellied Plover	3	0	0
Shorebird species unknown	33	0	0
Great Skua	1	0	0
Murre/Razorbill	47	5	11
Black-legged Kittiwake	3	2	67
Bonaparte's Gull	42	24	57
Ring-billed Gull	5	4	80
Herring Gull	321	127	40
Iceland Gull	1	0	0
Lesser Black-backed Gull	2	2	100
Great Black-backed Gull	198	60	30
Gull species unknown - Large	5	3	60
Gull species unknown	1	0	0
Total	**1,380**	**591**	**43%**

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 image shows the location of the federally-listed endangered species encountered in the Winter 2017–2018 Survey.

Figure 1. Fin Whale distribution during the Winter 2017–2018 survey

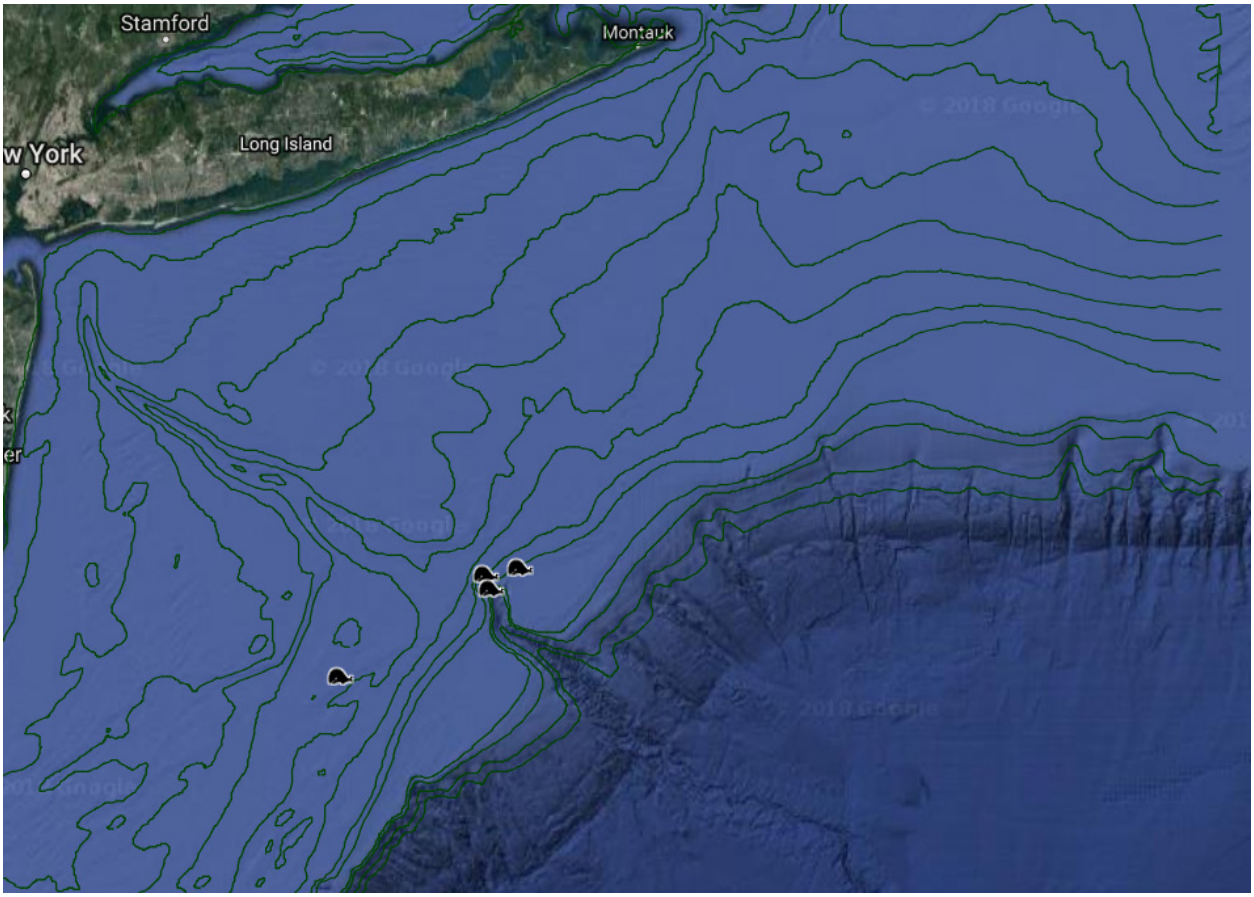


Additional Notable Encounters

Deceased Mammals

Three dolphins and one whale were found dead in the imagery. This is the first survey in which we have encountered marine mammal mortalities within the imagery. Species involved are identified as two probable common dolphins (an adult and calf), one unidentified dolphin and one humpback whale. Locations of these animals can be seen on Figure 2.

Figure 2. Deceased Mammal Locations



APPENDIX: List of Species Found in Imagery during the 2017 Summer Survey in Taxonomic Order

Common Name	Scientific Name	Class	Family
Tundra Swan	Cygnus columbianus	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
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
Northern Gannet	Morus bassanus	Aves	Sulidae
Black-bellied Plover	Pluvialis squatarola	Aves	Charadriidae
Great Skua	Stercorarius skua	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
Ring-billed Gull	Larus delawarensis	Aves	Laridae
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
Harbor Seal	Phoca vitulina	Mammalia	Phocidae
Common Minke Whale	Balaenoptera acutorostrata	Mammalia	Balaenopteridae
Fin Whale	Balaenoptera physalus	Mammalia	Balaenopteridae
Common Dolphin	Delphinus delphis	Mammalia	Delphinidae
Risso's Dolphin	Grampus griseus	Mammalia	Delphinidae
Atlantic White-sided Dolphin	Lagenorhynchus acutus	Mammalia	Delphinidae
Striped Dolphin	Stenella coeruleoalba	Mammalia	Delphinidae
Bottlenose Dolphin	Tursiops truncatus	Mammalia	Delphinidae
Harbor Porpoise	Phocoena phocoena	Mammalia	Phocoenidae
Basking Shark	Cetorhinus maximus	Chondrichthyes	Cetorhinidae
Blue Shark	Prionace glauca	Chondrichthyes	Carcharhinidae
Ocean Sunfish	Mola Mola	Actinopterygii	Molidae