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

Spring 2018 Taxonomic Analysis Summary Report

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ENVIRONMENTAL CONSULTANTS

APEM

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Introduction

The second spring survey for the NYSERDA offshore planning area (OPA) was started on April 21 and completed April 26, 2018. There was only one day of delay in completion, which was caused by weather conditions, and the survey window spanned six days. 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 3,126.71 km^2 area of the OPA and 300-m buffer using a transect design (Table 1), which amounts to 318,455 images. Of the 318,455 images analyzed, 308,772 were blank (Table 2). The target extraction identified 45,930 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, turtles, sharks, 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 or rays 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	318,455	3,126.71	7.15	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	318,455	308,772	30,912	10.01	96.96

Table 3. Targets Sent for Identification

Group	# Individuals
Avian	21,489
Marine Mammals	845
Turtles	1
Sharks	22,934
Large Bony Fish	653
Vessels	5
Fixed Structures	3
Total	**45,930**

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 October 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. A full list of identified species can be found in the Appendix.

Quality Control Results (Spring 2018)

Table 4. Quality Control Results, All Groups

Group	Number of Images	Number of Images for QC	% Agreement
Avian	21,489	4,298	100
Marine Mammals	845	172	99
Turtles	1	1	100
Sharks	22,934	4,560	100
Large Bony Fish	653	498	100
Total	**45,992**	**5,929**	**100**

Table 5. Quality Control Results, Endangered Species Only

Group	Number of Images	% Agreement
Avian	44	100
Marine Mammals	14	100
Turtles	1	100
Large Bony Fish	497	100
Total	**556**	**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

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, phalaropes and ducks were encountered (Table 6). All 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).

This season had very high bird activity with 21,489 individuals recorded representing 31 species (see Table 7). Phalaropes (n=5,644) and ducks (n=5,169) were the most numerous groups present, followed by gulls (n=4,565), auks (n=3,733) and gannets (n=1,258). Other species encountered were loons (n=601), storm-petrels (n=223), cormorants (n=170), *Sterna* terns (n=47), shorebirds (n=34), fulmars (n=21), shearwaters (n=12), petrels (n=5), skuas (n=4), and individuals of horned grebe, brown booby, and osprey.

Avian fight height data will be presented in detail in the annual report. 66% of birds were flying.

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

Group	# Individuals	% ID Success	% Sitting
Duck	5,169	9	97
Loon	601	100	88
Grebe	1	100	100
Fulmar	21	100	48
Petrel	5	100	0
Shearwater	12	75	58

Group	# Individuals	% ID Success	% Sitting
Storm-petrel	223	0	4
Booby	1	100	0
Gannet	1,258	100	72
Cormorant	170	0	0
Raptor	1	100	0
Shorebird	34	0	0
Phalarope	5,644	70	61
Skua	4	75	50
Auk	3,733	29	98
Gull	4,565	98	75
Sterna Tern	47	6	2
		Average ID Success	**Average % Sitting**
Total Individuals	**21,489**	**62%**	**44%**

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

Avian Group/ Species	# Individuals	# Flying	% Flying
Duck	**5,169**	**145**	**3**
Surf Scoter	106	106	100
White-winged Scoter	312	27	9
Black Scoter	28	12	43
Scoter unid.	4,721	0	0
species unknown	2	0	0
Loon	**601**	**72**	**12**
Red-throated Loon	161	43	27
Common Loon	438	28	6
species unknown	2	1	50
Grebe	**1**	**0**	**0**
Horned Grebe	1	0	0
Fulmar	**21**	**11**	**52**
Northern Fulmar	21	11	52
Petrel	**5**	**5**	**100**
Black-capped Petrel	5	5	100
Shearwater	**12**	**5**	**42**
Sooty Shearwater	9	5	56

Avian Group/ Species	# Individuals	# Flying	% Flying
species unknown-Large	1	0	0
species unknown-Small	2	0	0
Storm-petrel	**223**	**214**	**96**
species unknown	223	214	96
Booby	**1**	**1**	**100**
Brown Booby	1	1	100
Gannet	**1,258**	**358**	**28**
Northern Gannet	1,258	358	28
Cormorant	**170**	**170**	**100**
species unknown	170	170	100
Raptor	**1**	**1**	**100**
Osprey	1	1	100
Shorebird	**34**	**34**	**100**
species unknown	34	34	100
Phalarope	**5,644**	**2,176**	**39**
Red-necked Phalarope	350	160	46
Red Phalarope	3,577	1,723	48
Red/Red-necked Phalarope	1,717	293	17
Skua	**4**	**2**	**50**
Great Skua	1	0	0
Parasitic Jaeger	2	2	100
species unknown	1	0	0
Auk	**3,733**	**71**	**2**
Common/Thick-billed Murre	163	18	11
Razorbill	546	3	1
Murre/Razorbill	2,483	33	1
Atlantic Puffin	539	17	3
species unknown	2	0	0
Gull	**4,565**	**1,142**	**25**
Black-legged Kittiwake	2	2	100
Bonaparte's Gull	795	310	39
Little Gull	1	1	100
Laughing Gull	31	17	55
Ring-billed Gull	17	5	29
Herring Gull	3,164	657	21
Iceland Gull	2	1	50

Avian Group/ Species	# Individuals	# Flying	% Flying
Lesser Black-backed Gull	32	11	34
Glaucous Gull	1	0	0
Great Black-backed Gull	450	130	29
species unknown - Large	12	1	8
species unknown - Small	58	7	12
Sterna Tern	**47**	**46**	**98**
Common Tern	3	3	100
species unknown	44	43	98
TOTAL	**21,489**	**4,453**	**21**

Turtles

There was one turtle found in the imagery which could not be definitely identified to species (Table 8).

Table 8. Turtle Species Identified*

Species Group/ Species OPA	# Individuals	# Sig. Submerged	% Sig. Submerged
species unknown	1	0	0
Total	**1**	**0**	**0**

Marine Mammals

There were 845 marine mammals recorded during the spring survey (Table 9). Most of these were dolphins (n=809) consisting of six identified species or group, as follows:

- Common dolphin (n=229)
- Risso's dolphin (n=164)
- Striped dolphin (n=81)
- Bottlenose dolphin (n=49)
- Common/white-sided dolphin (n=22)
- Harbor porpoise (n=85)
- Species unknown (n=179)

One species of seal (gray seal) was identified (n=2), and five unidentified seals along with six 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 23 whales, common minke whale (n=8), sei whale (n=6), humpback whale (n=5), and fin whale (n=3) were identified, and one deeply submerged animal could not be identified (see Table 9)

Of the 809 dolphins, 179 (22%) were classed as “species unknown.” Of these, 156 (87%) were significantly submerged (Table 9).

Seven seals were recorded and only two could be identified to species. None were significantly submerged.

Six individuals could not be classified beyond marine mammal and most (five) were significantly submerged. General characteristics suggested they were likely either seals or dolphins.

There were 23 whales recorded, one (4%) of which remained unidentified and was significantly submerged.

Table 9. Marine Mammal Species Identified*

Species	# Individuals		Significantly Submerged	
	Group	Species	Number	Percent of total
Seal	**7**		**0**	**0**
Gray Seal		2	0	
species unknown		5	0	0
Whale	**23**		**12**	**52**
Common Minke Whale		8	5	63
Fin Whale		3	0	0
Sei Whale		6	4	67
Humpback Whale		5	2	40
species unknown		1	1	100
Dolphin	**809**		**531**	**66**
Common Dolphin		229	150	66
Risso's Dolphin		164	86	52
Striped Dolphin		81	58	72
Bottlenose Dolphin		49	33	67
Common/White-sided Dolphin		22	18	82
Harbor Porpoise		85	30	35
species unknown		179	156	87
Unid. Mammal	**6**		**5**	**83**
species unknown		6	5	83
Total Mammals	**845**		**548**	**65**

*Highlighted (in green) species are classified as endangered

Sharks

Of the 22,934 sharks recorded, all but two were identified to species, and these were both ranked as significantly submerged (Table 10). The most notable numbers were of 22,871 spurdogs. These were visible in large schools, and the clearest individual in each school was used to identify the others within

that group. The remaining individuals were comprised 46 basking sharks, 15 blue sharks and two were unidentified (see Table 10).

Table 10. Shark Species Identified

Species	# Individuals	Significantly Submerged	
		Number	Percent of Total
Basking Shark	46	14	30
Blue Shark	15	0	0
Spurdog	22,871	58	0
species unknown	2	2	100
Total	**22,934**	**74**	**0**

Endangered Species

There were four animals representing state or federally threatened or endangered species recorded (Table 11). These were sei whale (n=6), humpback whale (n=5), and fin whale (n=3). One unidentified sea turtle was observed in the imagery, along with 497 Atlantic bluefin tuna and 44 *Sterna* tern which could be roseate terns.

Table 11. Threatened and Endangered Species Identified

Species	# Individuals
Sterna Tern	**44**
species unknown	44
Turtle	**1**
species unknown	1
Whale	**14**
Fin Whale	3
Sei Whale	6
Humpback Whale	5
Tuna	**497**
Atlantic bluefin tuna	497
TOTAL	**556**

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 spring 2018 Survey. *Sterna* terns are included here as possibly representing the federally endangered roseate tern.

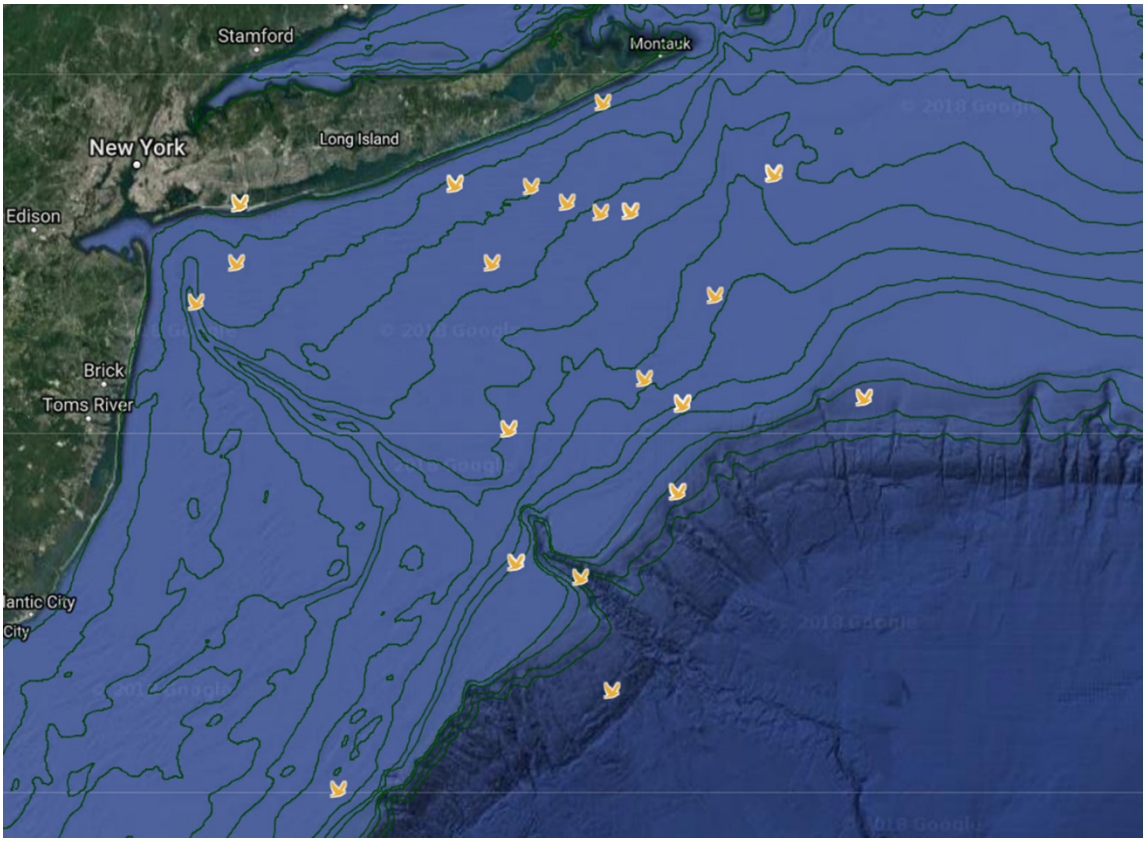

Figure 1. *Sterna* tern distribution during the spring 2018 survey

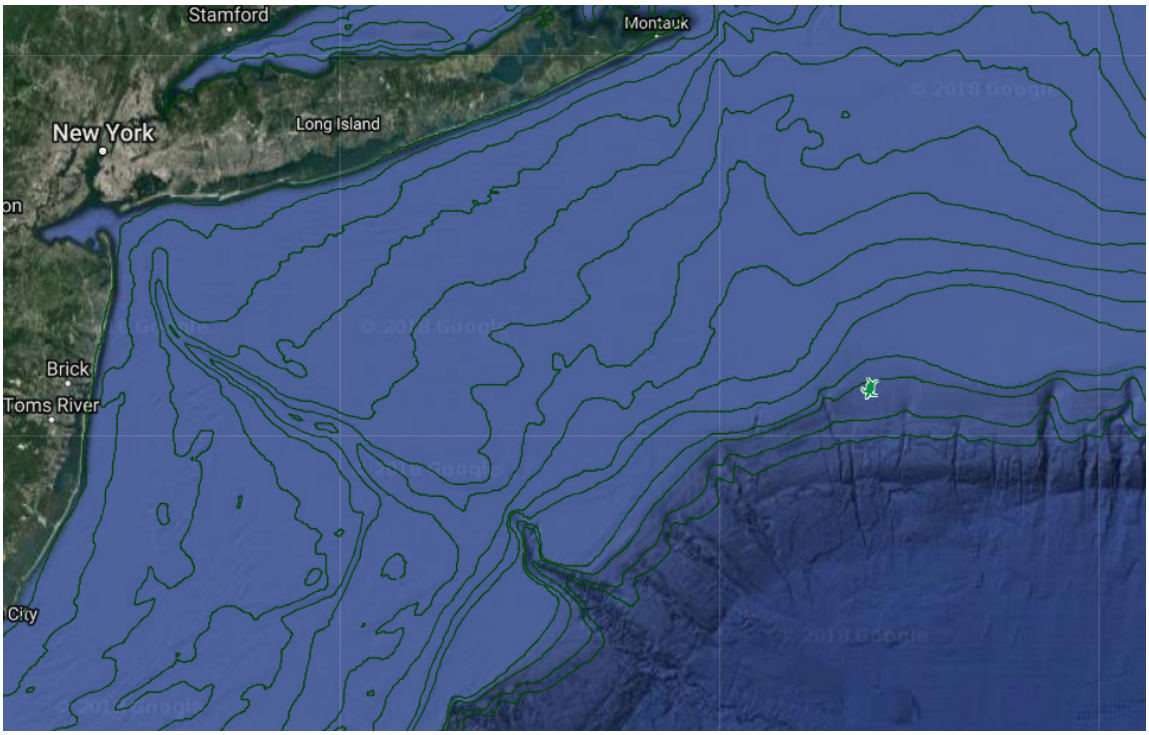

Figure 2. Turtle distribution during the spring 2018 survey

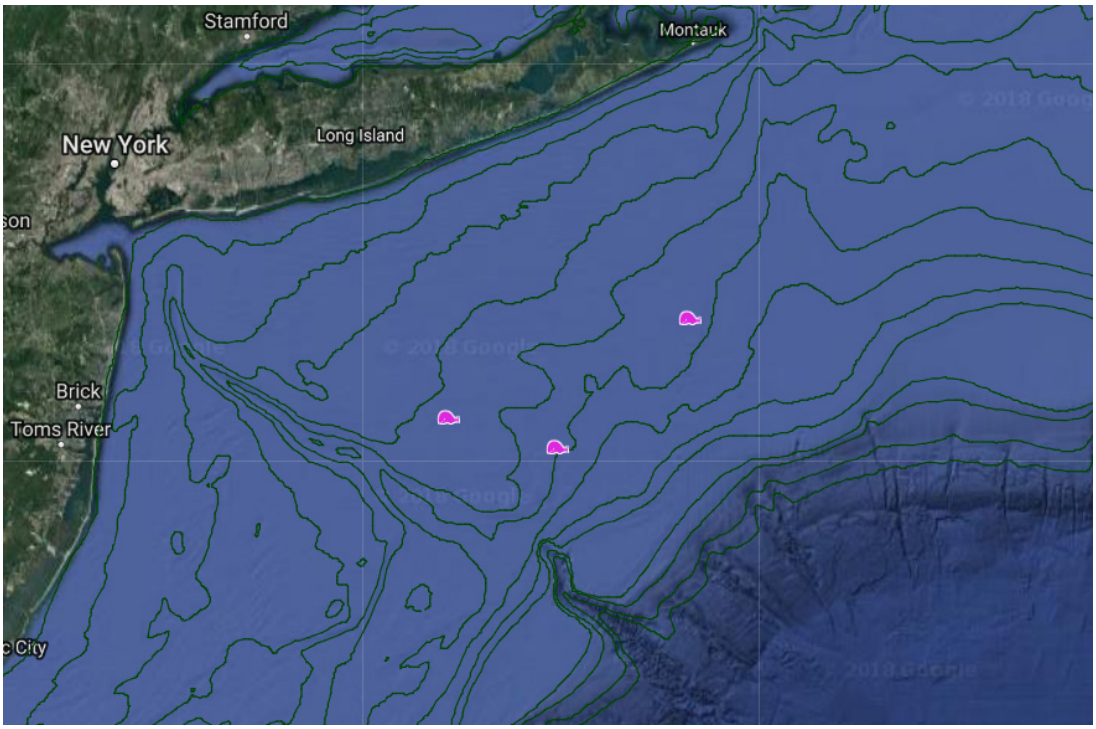

Figure 3. Fin Whale distribution during the spring 2018 survey

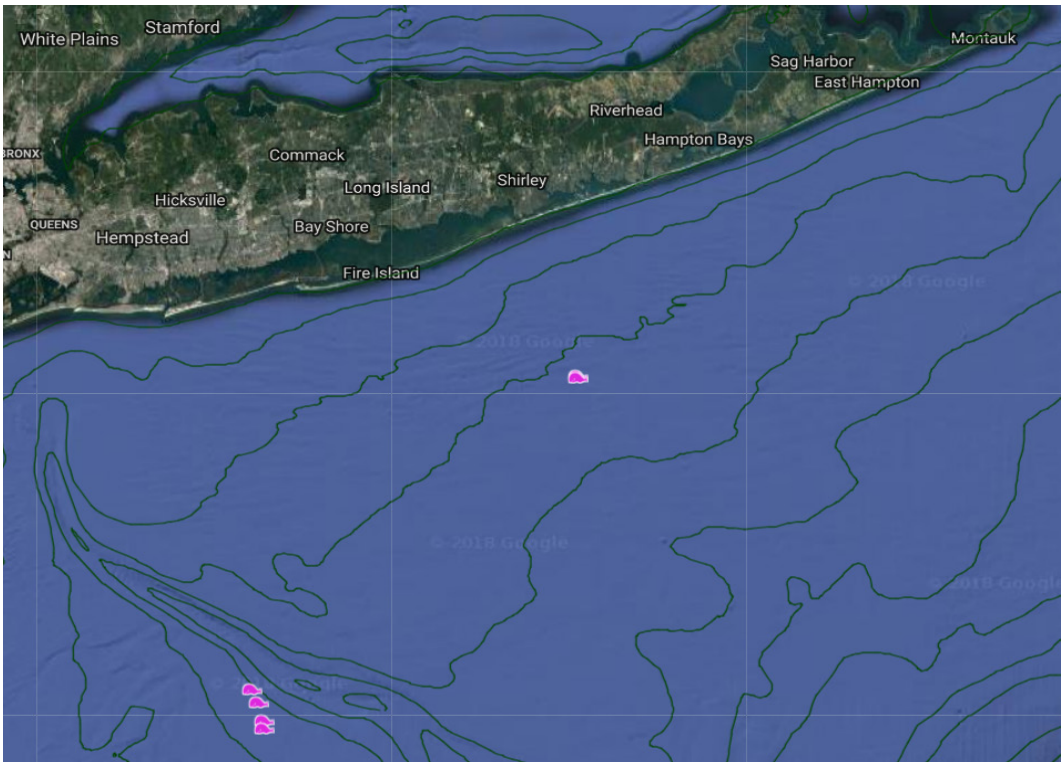

Figure 4. Sei Whale distribution during the spring 2018 survey

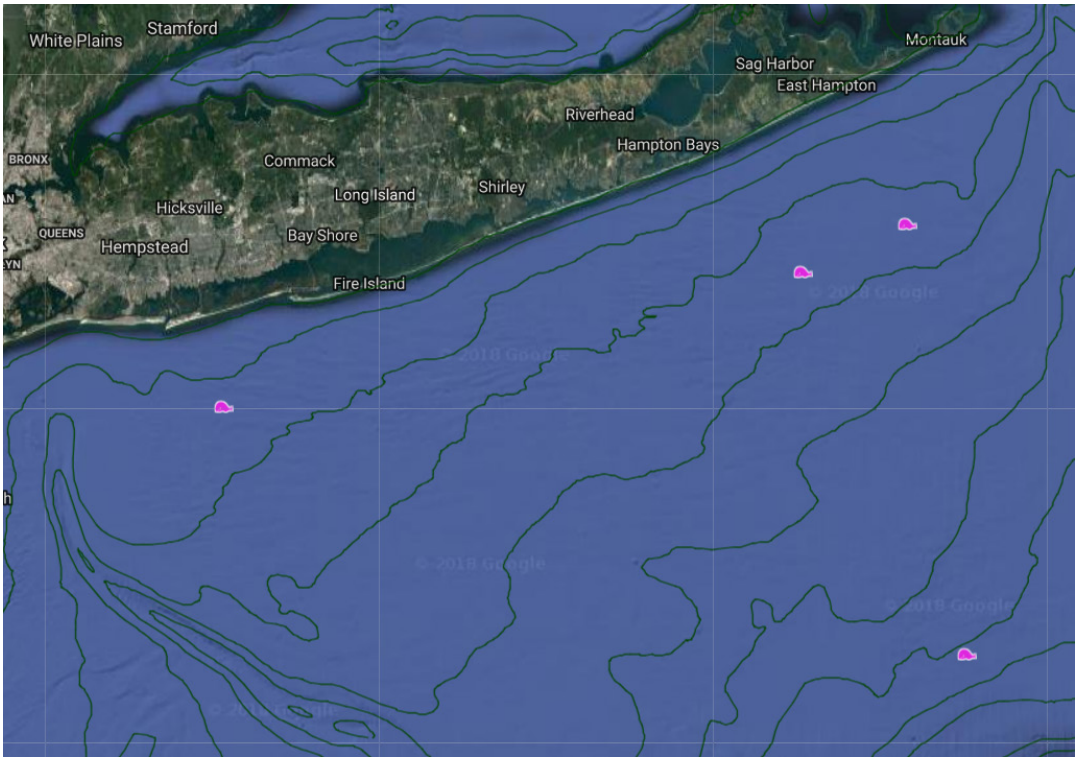

Figure 5. Humpback Whale distribution during the spring 2018 survey

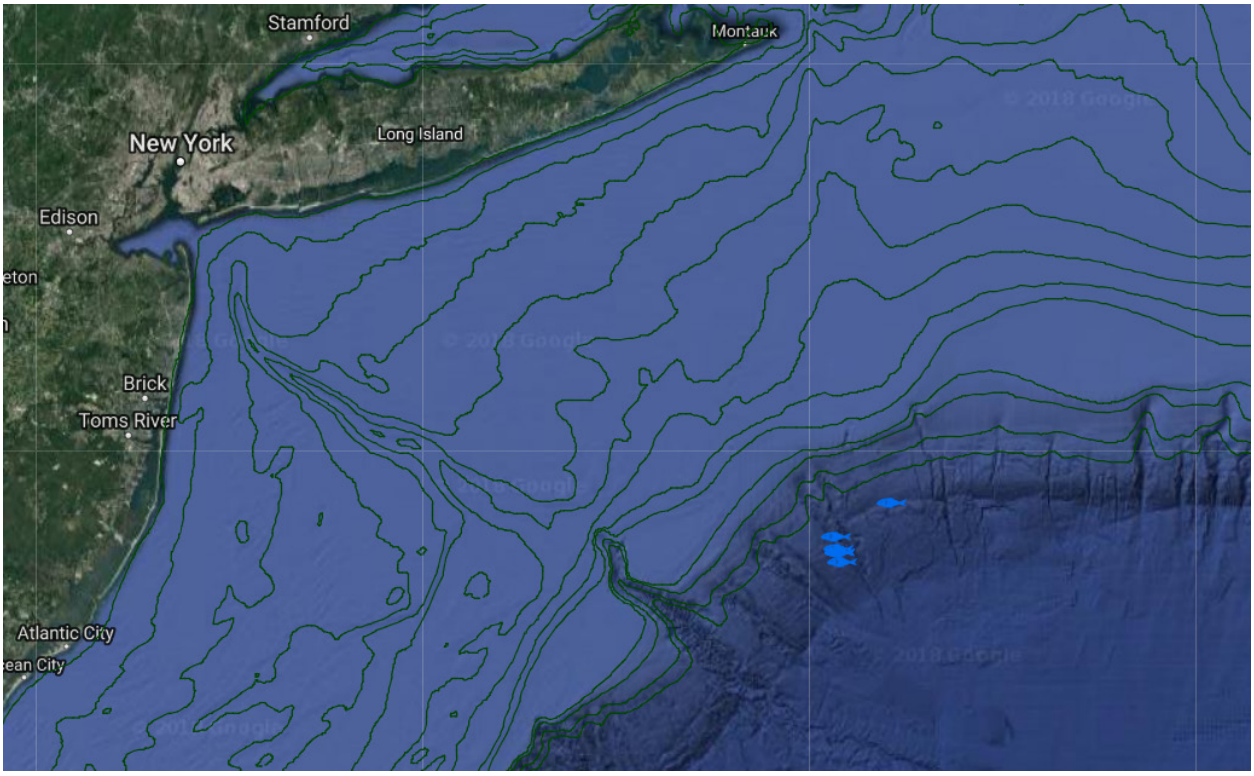

Figure 6. Atlantic Bluefin tuna distribution during the spring 2018 survey

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

List of Species Found in Imagery during the Survey, in Taxonomic Order

Common Name	Scientific Name	Class	Family
Surf Scoter	*Melanitta perspicillata*	Aves	Anatidae
White-winged Scoter	*Melanitta fusca*	Aves	Anatidae
Black Scoter	*Melanitta americana*	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
Black-capped Petrel	*Pterodroma hasitata*	Aves	Procellariidae
Sooty Shearwater	*Ardenna grisea*	Aves	Procellariidae
Brown Booby	*Sula leucogaster*	Aves	Sulidae
Northern Gannet	*Morus bassanus*	Aves	Sulidae
Osprey	*Pandion haliaetus*	Aves	Pandionidae
Red-necked Phalarope	*Phalaropus lobatus*	Aves	Scolopacidae
Red Phalarope	*Phalaropus fulicarius*	Aves	Scolopacidae
Great Skua	*Stercorarius skua*	Aves	Stercorariidae
Parasitic Jaeger	*Stercorarius parasiticus*	Aves	Stercorariidae
Razorbill	*Alca torda*	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
Herring Gull	*Larus argentatus*	Aves	Laridae
Iceland Gull	*Larus glaucoides*	Aves	Laridae
Lesser Black-backed Gull	*Larus fuscus*	Aves	Laridae
Glaucous Gull	*Larus hyperboreus*	Aves	Laridae
Great Black-backed Gull	*Larus marinus*	Aves	Laridae
Common Tern	*Sterna hirundo*	Aves	Laridae
Gray Seal	*Halichoerus grypus*	Mammalia	Phocidae

Common Name	Scientific Name	Class	Family
Common Minke Whale	*Balaenoptera acutorostrata*	Mammalia	Balaenopteridae
Fin Whale	*Balaenoptera physalus*	Mammalia	Balaenopteridae
Sei Whale	*Balaenoptera borealis*	Mammalia	Balaenopteridae
Humpback Whale	*Megaptera novaeangliae*	Mammalia	Balaenopteridae
Common Dolphin	*Delphinus delphis*	Mammalia	Delphinidae
Risso's Dolphin	*Grampus griseus*	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
Spurdog	*Squalus acanthias*	Chondrichthyes	Squalidae
Cobia	*Rachycentron canadum*	Actinopterygii	Rachycentridae
Atlantic bluefin tuna	*Thunnus thynnus*	Actinopterygii	Scombridae
Atlantic swordfish	*Xiphias gladius*	Actinopterygii	Xiphiidae
Ocean Sunfish	*Mola Mola*	Actinopterygii	Molidae