

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

Spring 2019 Taxonomic Analysis
Summary Report



NYSERDA



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Prepared for

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December 2019



Introduction

The third spring survey for the NYSERDA offshore planning area (OPA) was started on April 27 and completed on May 7, 2019. The survey took five days to complete with poor weather conditions causing down-days in early May. 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 3,153.84 km² area of the OPA and 300-m buffer using a transect design (Table 1), which amounts to 320,793 images. Of the 320,793 images analyzed, 313,983 were blank (Table 2). The target extraction identified 13,721 objects within imagery collected in the OPA and 300-m buffer survey area (Table 3). These targets were categorized into eight groups representing avian (birds), marine mammals, turtles, 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	320,793	3,153.84	7.2	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	320,793	313,983	31,409	10.00	97.88

Table 3. Targets Sent for Identification

Group	# Individuals
Avian	12,019
Marine Mammals	814
Turtles	3
Sharks	512
Rays	1
Large Bony Fish**	362
Vessels	7
Fixed Structures	3
Total	13,721

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

Quality Control

Biologists highly experienced in their species groups made all initial identifications. A second taxonomic expert re-identified a minimum of 20% of all avian and marine mammal images 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 original taxonomist. 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 were completed in November 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	12,019	2,404	99
Marine Mammals	814	163	99
Turtles	3	3	100
Sharks	512	102	100
Large Bony Fish	362	50	84
Total	13,710	2,722	99

Table 5. Quality Control Results, Endangered Species Only

Group	Number of Images	% Agreement
Avian	72	100
Marine Mammals	7	100
Turtles	3	100
Large bony Fish	39	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 storm-petrels (n=2,086) of which there are three morphologically similar species commonly found in the study area and none of which could be confidently identified to species (Table 6). We also found a large number of ducks (n=1,067) of which there are multiple species to be found in the area with females all looking very similar. This species group is easier to identify in flight, but 91% of the birds found were sitting and only a 21% identification success was reached (Table 6). Of the *Sterna* terns, common, arctic, and Forster’s terns are difficult to distinguish, being morphologically very similar. Of 1,701 *Sterna* terns, only 85 were identified to species, providing a success rate of 5% (Table 6). We encountered large numbers of phalaropes (n=1,784) of which two species are commonly found in the project area. We achieved an identification success rate for phalaropes of 43% (Table 6). Cormorants are difficult to distinguish, with two expected in the area. All bird identifications were classified to species or species group (Table 7). Average identification success was 48%, but removing storm-petrels and phalaropes, identification success reached 66%.

This season had moderate bird activity with 12,019 individuals recorded representing 34 species (see Table 7). Gulls (n=2,423) and storm-petrels (n=2,086) were the most numerous groups present, followed by phalaropes (n=1,784), *Sterna* terns (n=1,701), gannets (n=1,370), ducks (n=1,067), loons (n=703), auks (n=687), fulmars (n=70), shearwaters (n=45), petrels (n=22), shorebirds (n=18), cormorants (n=17), terns (n=11), skuas (n=10), Ardeidae (n=3), and grebes (n=2).

Avian flight height data will be presented in detail in the annual report. Over 46% of birds were flying.

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

Group	# Individuals	% ID Success	% Sighting
Duck	1,067	21	91
Loon	703	98	92
Grebe	2	0	100
Fulmar	70	100	23
Petrel	22	100	14
Shearwater	45	82	31
Storm-petrel	2,086	0	2
Gannet	1,370	100	63
Cormorant	17	0	24
Ardeidae	3	100	67
Shorebird	18	94	78
Phalarope	1,784	43	67
Skua	10	100	10
Auk	687	61	100
Gull	2,423	86	77
Tern	11	45	18
Sterna Tern	1,701	5	10
		Average ID Success	Average % Sighting
Total Individuals	12,019	48%	54%

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

Avian Group/ Species	# Individuals	# Flying	% Flying
Duck	1,067	101	9
Surf Scoter	93	89	96
White-winged Scoter	112	5	4
Black Scoter	23	5	22
Scoter unid.	830	1	0
species unknown	9	1	11
Loon	703	56	8
Red-throated Loon	126	27	21
Common Loon	563	29	5
species unknown	14	0	0

Avian Group/ Species	# Individuals	# Flying	% Flying
Grebe	2	0	0
species unknown	2	0	0
Fulmar	70	54	77
Northern Fulmar	70	54	77
Petrel	22	19	86
Black-capped Petrel	22	19	86
Shearwater	45	31	69
Cory's Shearwater	4	2	50
Sooty Shearwater	24	22	92
Manx Shearwater	9	2	22
species unknown-Small	5	3	60
species unknown	3	2	67
Storm-petrel	2,086	2,045	98
species unknown	2,086	2,045	98
Gannet	1,370	511	37
Northern Gannet	1,370	511	37
Cormorant	17	13	76
species unknown	17	13	76
Ardeidae	3	1	33
Great Blue Heron	1	1	100
Snowy Egret	2	0	0
Shorebird	18	4	22
American Oystercatcher	17	3	18
species unknown	1	1	100
Phalarope	1,784	593	33
Red-necked Phalarope	427	132	31
Red Phalarope	338	166	49
Red/Red-necked Phalarope	1,019	295	29
Skua	10	9	90
South Polar Skua	1	1	100
Parasitic Jaeger	9	8	89

Avian Group/ Species	# Individuals	# Flying	% Flying
Auk	687	1	0
Dovekie	59	0	0
Common/Thick-billed Murre	1	0	0
Razorbill	44	0	0
Murre/Razorbill	213	1	0
Atlantic Puffin	316	0	0
species unknown	54	0	0
Gull	2,423	552	23
Black-legged Kittiwake	6	2	33
Bonaparte's Gull	202	105	52
Laughing Gull	46	31	67
Ring-billed Gull	4	2	50
Herring Gull	1,573	331	21
Iceland Gull	1	1	100
Lesser Black-backed Gull	22	4	18
Great Black-backed Gull	234	54	23
species unknown - Large	60	11	18
species unknown - Small	259	8	3
species unknown	16	3	19
Tern	11	9	82
Least Tern	4	4	100
Black Tern	1	1	100
species unknown	6	4	67
Sterna Tern	1,701	1,539	90
Roseate Tern	17	17	100
Common Tern	47	47	100
Forster's Tern	28	21	75
Commic/Forster's Tern	1,554	1,409	91
species unknown	55	45	82
Total	12,019	5,538	46

*Highlighted species are classified as endangered

Turtles

Three loggerhead turtles were found in imagery.

Table 9. Number of Turtle Species Identified and Number and Percent of Significantly Submerged

Species Group/ Species	OPA		
	# Individuals	# Sig. Submerged	% Sig. Submerged
Loggerhead Turtle	3	0	0
Total	3	0	0

Marine Mammals

There were 814 marine mammals recorded during the Spring 2019 survey (Table 10). Most of these were dolphins (n=780) consisting of seven identified species or groups, as follows:

- Common dolphin (n=148)
- Risso's dolphin (n=155)
- Bottlenose dolphin (n=122)
- Harbor porpoise (n=53)
- Pilot whale (unid.) (n=22)
- Striped dolphin (n=4)
- Atlantic spotted dolphin (n=2)
- Species unknown (n=274)

One harbor seal was found along with eight unidentified seals (see Table 10).

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 10).

Of the 780 dolphins, 533 (68%) were significantly submerged; despite this high number of submerged individuals, 65% were identifiable to species. Of the 274 dolphins not identified to species or species group, 210 (77%) were classed as significantly submerged (Table 10).

Eight individual animals could not be classified beyond marine mammal and all were significantly submerged.

Table 10. Marine Mammal Species Identified*

Species	# Individuals		Significantly Submerged	
	Group	Species	Number	Percent of total
Seal	9		2	22
Harbor Seal		1	0	0
species unknown		8	2	25
Whale	17		11	65
North Atlantic Right Whale		1	0	0
Common Minke Whale		2	1	50

Species	# Individuals		Significantly Submerged	
	Group	Species	Number	Percent of total
Fin Whale		1	0	0
Sei Whale		3	3	100
Humpback Whale		2	1	50
Pygmy Sperm Whale		1	0	0
Beaked Whale (unid.)		5	5	100
species unknown		2	1	50
Dolphin	780		533	68
Common Dolphin		148	83	56
Pilot Whale (unid.)		22	17	77
Risso's Dolphin		155	99	64
Atlantic Spotted Dolphin		2	1	50
Striped Dolphin		4	1	25
Bottlenose Dolphin		122	88	72
Harbor Porpoise		53	34	64
species unknown		274	210	77
Unid. Mammal	8		7	88
species unknown		8	7	88
Total	814		553	68

*Highlighted species are classified as endangered

Rays

One ray was found in the imagery and identified as Chilean devil ray (Table 11).

Table 11. Ray Species Identified

Species	# Individuals	Significantly Submerged	
		Number	Percent of Total
Chilean Devil Ray	1	0	0
Total	1	0	0

Sharks

There were 512 sharks found in the imagery including 430 basking sharks, 63 spurdogs, 18 blue sharks, and 1 unknown species (Table 12).

Table 12. Shark Species Identified

Species	# Individuals	Significantly Submerged	
		Number	Percent of Total
Basking Shark	430	71	17
Blue Shark	18	1	6
Spurdog	63	0	0
species unknown	1	1	100
Total	512	73	14

Endangered Species

There were seven species identified as state or federally threatened or endangered species (Table 13). These were loggerhead turtle (n=3), north Atlantic right whale (n=1), fin whale (n=1), sei whale (n=3), humpback whale (n=2), roseate tern (n=17), unknown *Sterna* tern (that could represent roseate tern; n=55), and Atlantic bluefin tuna (n=39).

Table 13. Threatened and Endangered Species Identified*

Species	# Individuals
Turtle	3
Loggerhead Turtle	3
Whale	7
North Atlantic Right Whale	1
Fin Whale	1
Sei Whale	3
Humpback Whale	2
Sterna Tern	72
Roseate Tern	17
species unknown	55
Tuna	39
Atlantic bluefin tuna**	39
TOTAL	121

*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. Graphical presentation of 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 2019 Survey.

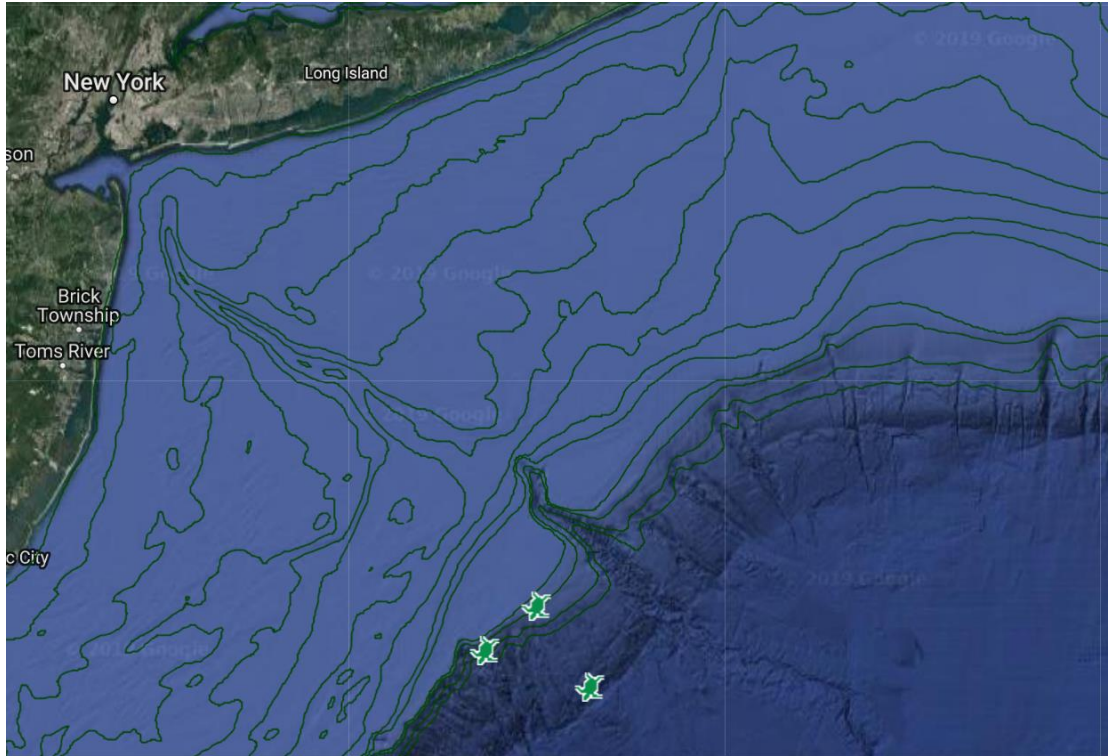


Figure 1. Loggerhead Turtle distribution during the Spring 2019 survey.

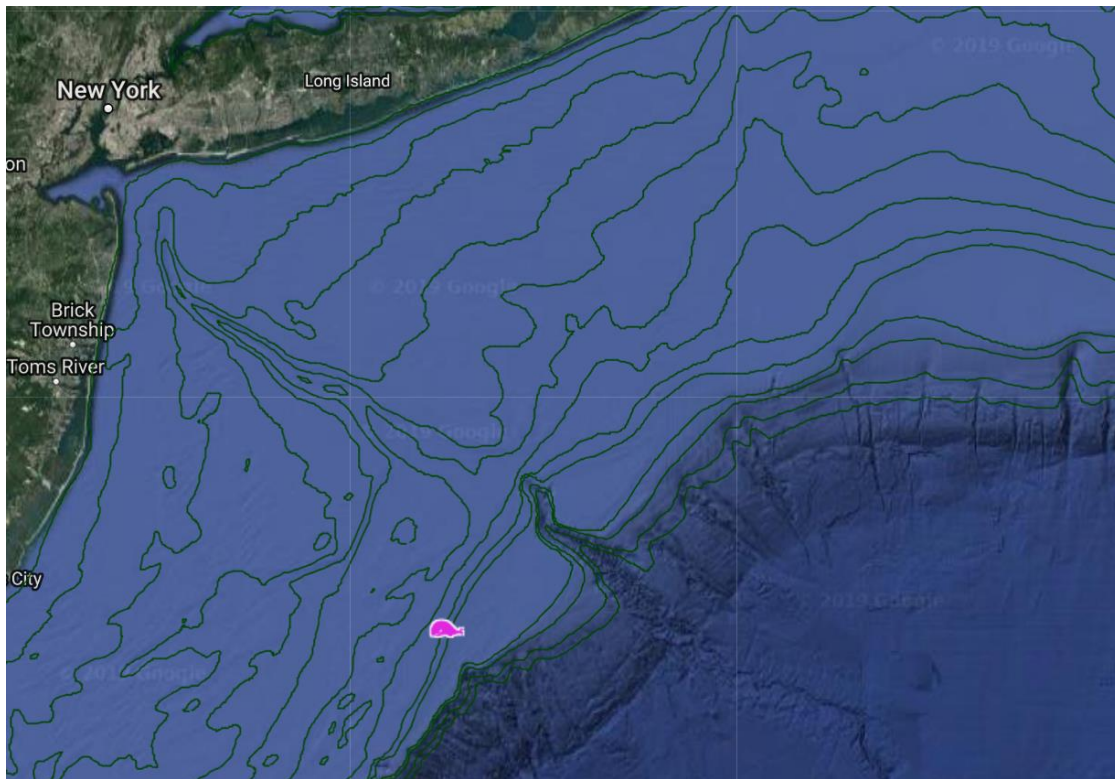


Figure 2. North Atlantic Right Whale distribution during the Spring 2019 survey.

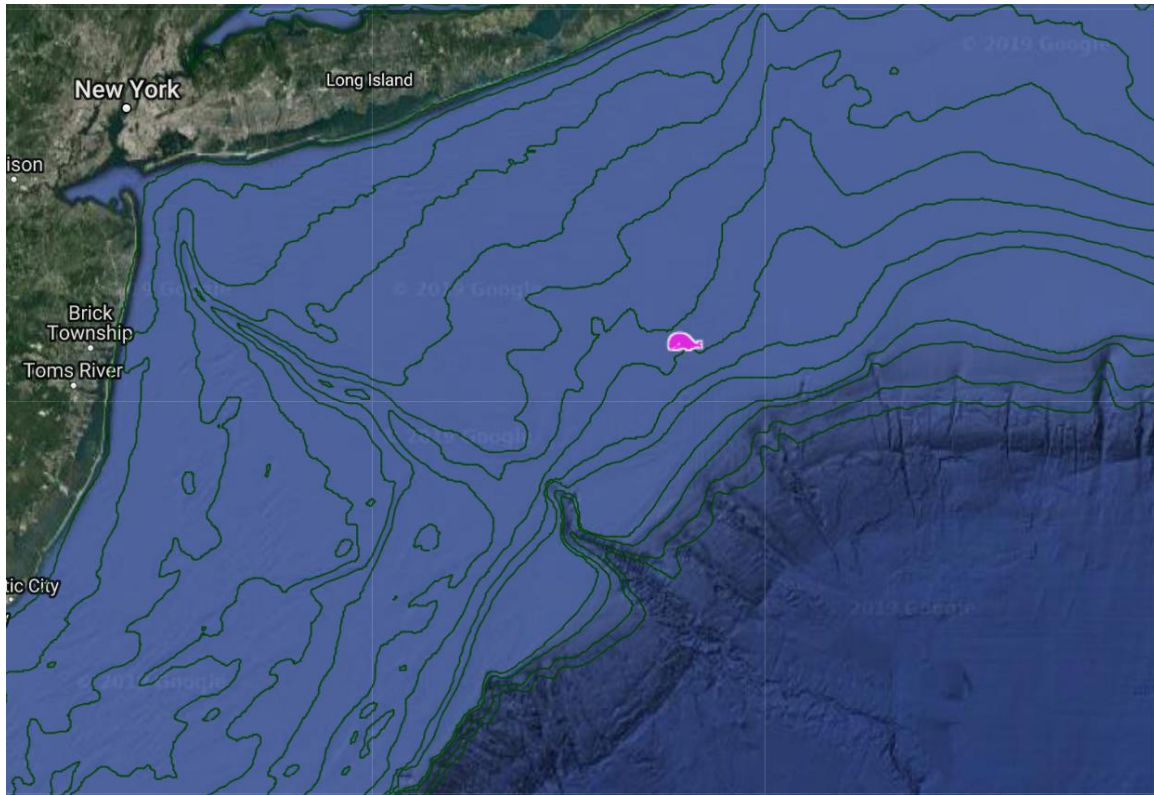


Figure 3. Fin Whale distribution during the Spring 2019 survey.

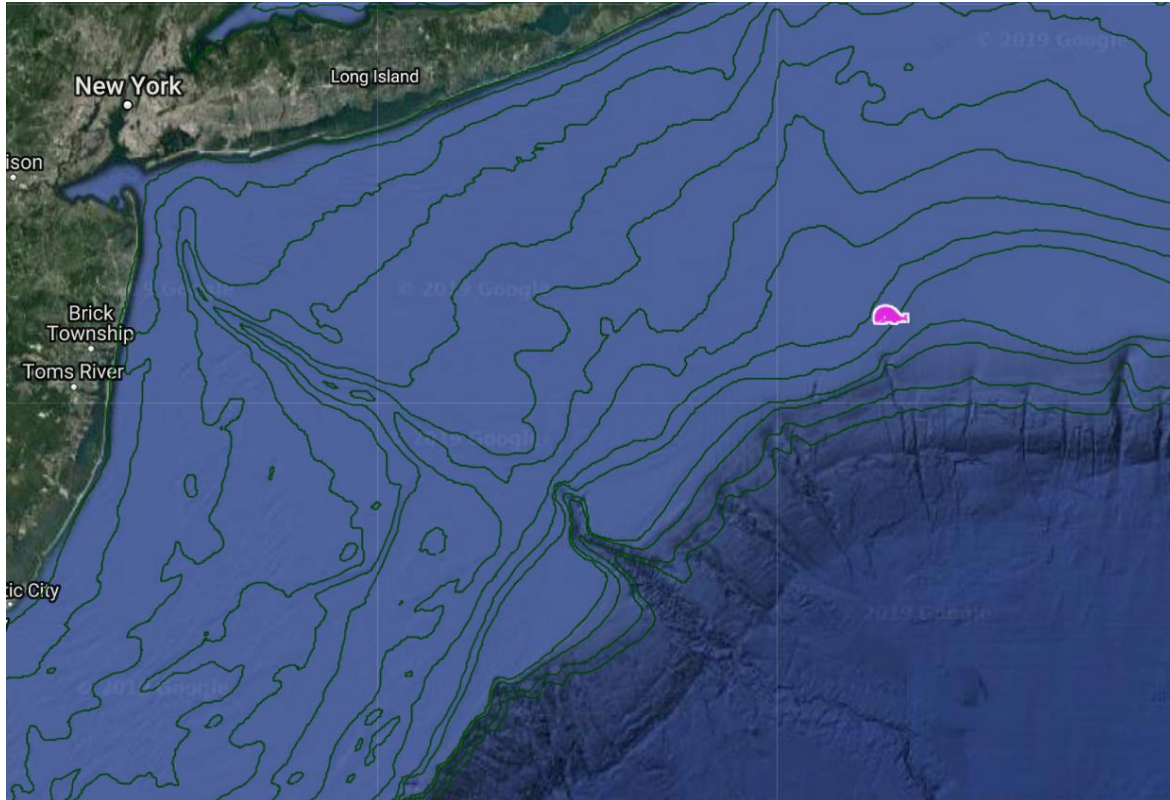


Figure 4. Sei Whale distribution during the Spring 2019 survey.

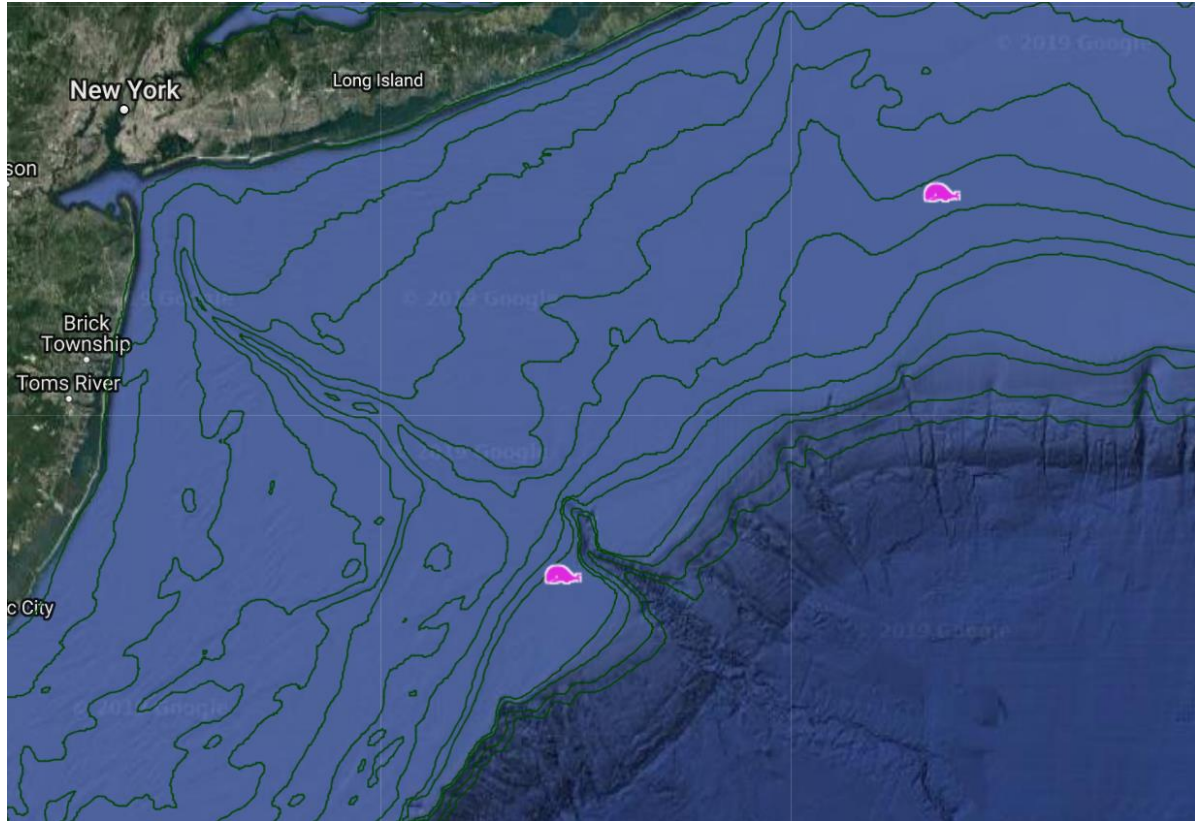


Figure 5. Humpback Whale distribution during the Spring 2019 survey.

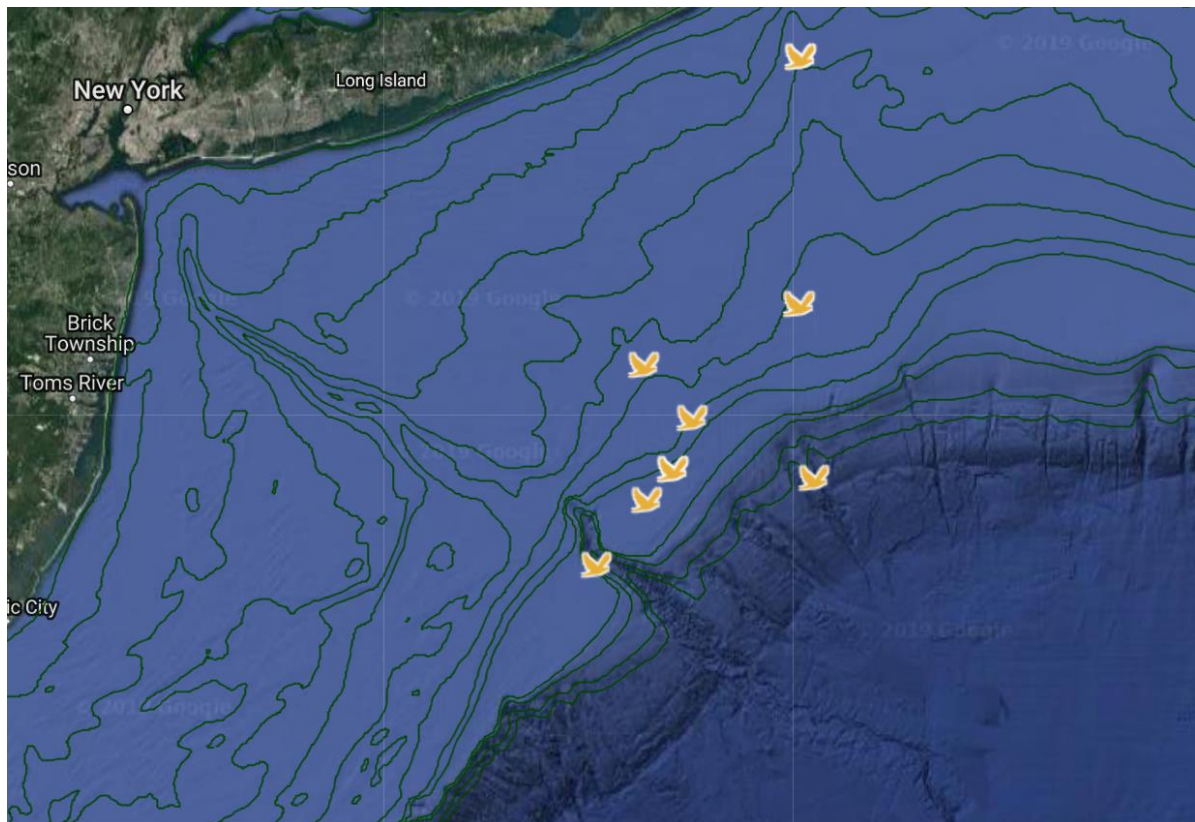


Figure 6. Roseate Tern distribution during the Spring 2019 survey.

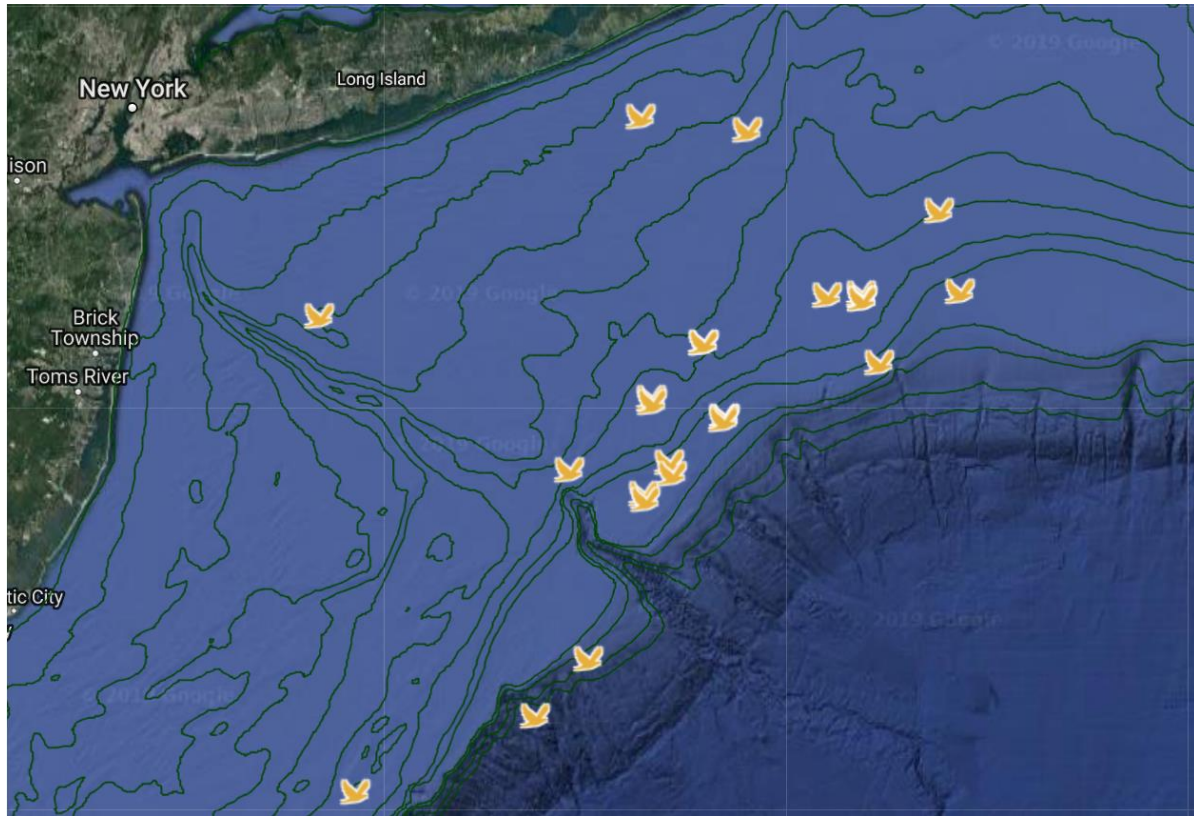


Figure 7. *Sterna* Tern distribution during the Spring 2019 survey.

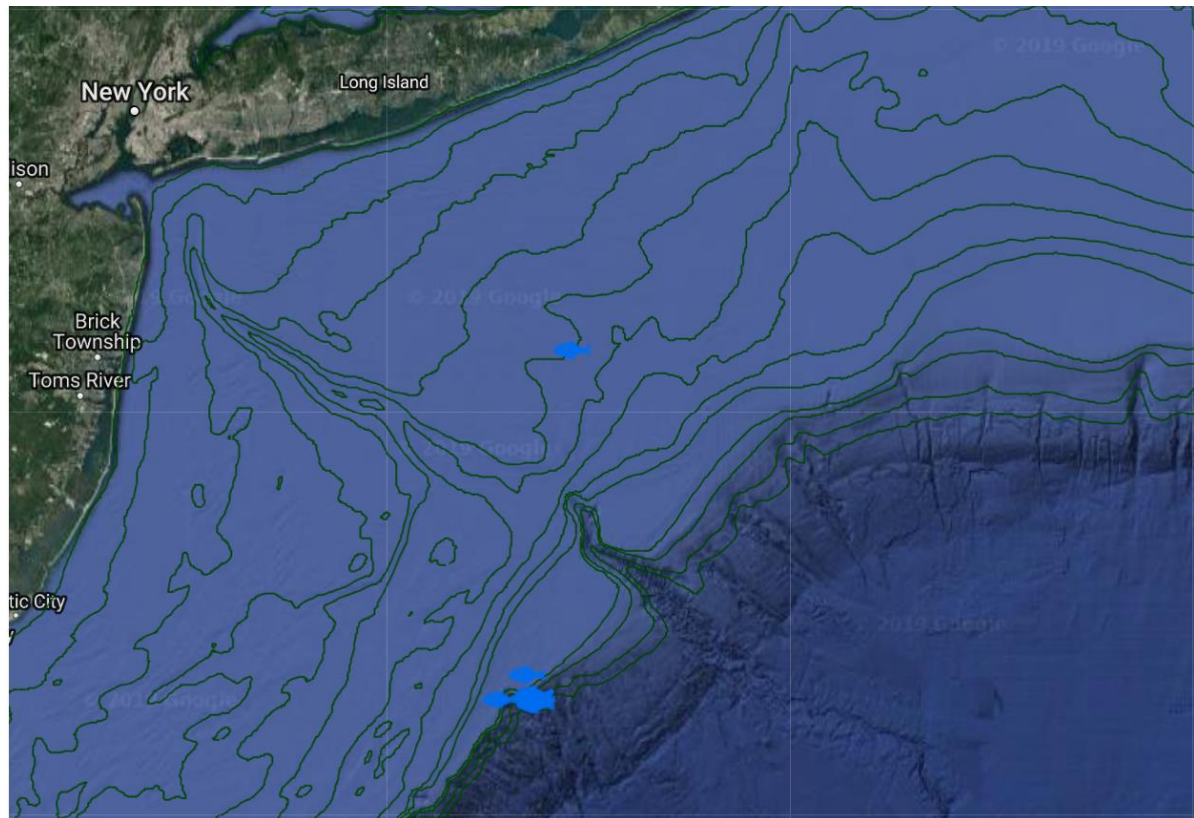


Figure 8. Atlantic Bluefin Tuna distribution during the Spring 2019 survey.

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

Common Name	Scientific Name	Class	Family
Birds			
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
Red-throated Loon	<i>Gavia stellata</i>	Aves	Gaviidae
Common Loon	<i>Gavia immer</i>	Aves	Gaviidae
Northern Fulmar	<i>Fulmarus glacialis</i>	Aves	Procellariidae
Black-capped Petrel	<i>Pterodroma hasitata</i>	Aves	Procellariidae
Cory's Shearwater	<i>Calonectris diomedea</i>	Aves	Procellariidae
Sooty Shearwater	<i>Ardenna grisea</i>	Aves	Procellariidae
Manx Shearwater	<i>Puffinus puffinus</i>	Aves	Procellariidae
Northern Gannet	<i>Morus bassanus</i>	Aves	Sulidae
Great Blue Heron	<i>Ardea herodias</i>	Aves	Ardeidae
Snowy Egret	<i>Egretta thula</i>	Aves	Ardeidae
American Oystercatcher	<i>Haematopus palliatus</i>	Aves	Haematopodidae
Red-necked Phalarope	<i>Phalaropus lobatus</i>	Aves	Scolopacidae
Red Phalarope	<i>Phalaropus fulicarius</i>	Aves	Scolopacidae
South Polar Skua	<i>Stercorarius maccormicki</i>	Aves	Stercorariidae
Parasitic Jaeger	<i>Stercorarius parasiticus</i>	Aves	Stercorariidae
Dovekie	<i>Alle alle</i>	Aves	Alcidae
Razorbill	<i>Alca torda</i>	Aves	Alcidae
Atlantic Puffin	<i>Fratercula arctica</i>	Aves	Alcidae
Black-legged Kittiwake	<i>Rissa tridactyla</i>	Aves	Laridae
Bonaparte's Gull	<i>Chroicocephalus philadelphia</i>	Aves	Laridae
Laughing Gull	<i>Leucophaeus atricilla</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
Great Black-backed Gull	<i>Larus marinus</i>	Aves	Laridae
Least Tern	<i>Sternula antillarum</i>	Aves	Laridae
Black Tern	<i>Chlidonias niger</i>	Aves	Laridae
Roseate Tern	<i>Sterna dougallii</i>	Aves	Laridae
Common Tern	<i>Sterna hirundo</i>	Aves	Laridae

Common Name	Scientific Name	Class	Family
Forster's Tern	<i>Sterna forsteri</i>	Aves	Laridae
Marine Mammals			
Harbor Seal	<i>Phoca vitulina</i>	Mammalia	Phocidae
North Atlantic Right Whale	<i>Eubalaena glacialis</i>	Mammalia	Balaenidae
Common Minke Whale	<i>Balaenoptera acutorostrata</i>	Mammalia	Balaenopteridae
Fin Whale	<i>Balaenoptera physalus</i>	Mammalia	Balaenopteridae
Sei Whale	<i>Balaenoptera borealis</i>	Mammalia	Balaenopteridae
Humpback Whale	<i>Megaptera novaeangliae</i>	Mammalia	Balaenopteridae
Pygmy Sperm Whale	<i>Kogia breviceps</i>	Mammalia	Physeteridae
Common Dolphin	<i>Delphinus delphis</i>	Mammalia	Delphinidae
Risso's Dolphin	<i>Grampus griseus</i>	Mammalia	Delphinidae
Atlantic Spotted Dolphin	<i>Stenella frontalis</i>	Mammalia	Delphinidae
Striped Dolphin	<i>Stenella coeruleoalba</i>	Mammalia	Delphinidae
Bottlenose Dolphin	<i>Tursiops truncatus</i>	Mammalia	Delphinidae
Harbor Porpoise	<i>Phocoena phocoena</i>	Mammalia	Phocoenidae
Turtles			
Loggerhead Turtle	<i>Caretta caretta</i>	Reptilia	Cheloniidae
Sharks			
Basking Shark	<i>Cetorhinus maximus</i>	Chondrichthyes	Cetorhinidae
Blue Shark	<i>Prionace glauca</i>	Chondrichthyes	Carcharhinidae
Spurdog	<i>Squalus acanthias</i>	Chondrichthyes	Squalidae
Rays			
Chilean Devil Ray	<i>Mobula tarapacana</i>	Chondrichthyes	Mobulidae
Large Bony Fish*			
Mahi-Mahi	<i>Coryphaena hippurus</i>	Actinopterygii	Coryphaenidae
Atlantic bluefin tuna	<i>Thunnus thynnus</i>	Actinopterygii	Scombridae
Ocean Sunfish	<i>Mola Mola</i>	Actinopterygii	Molidae

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