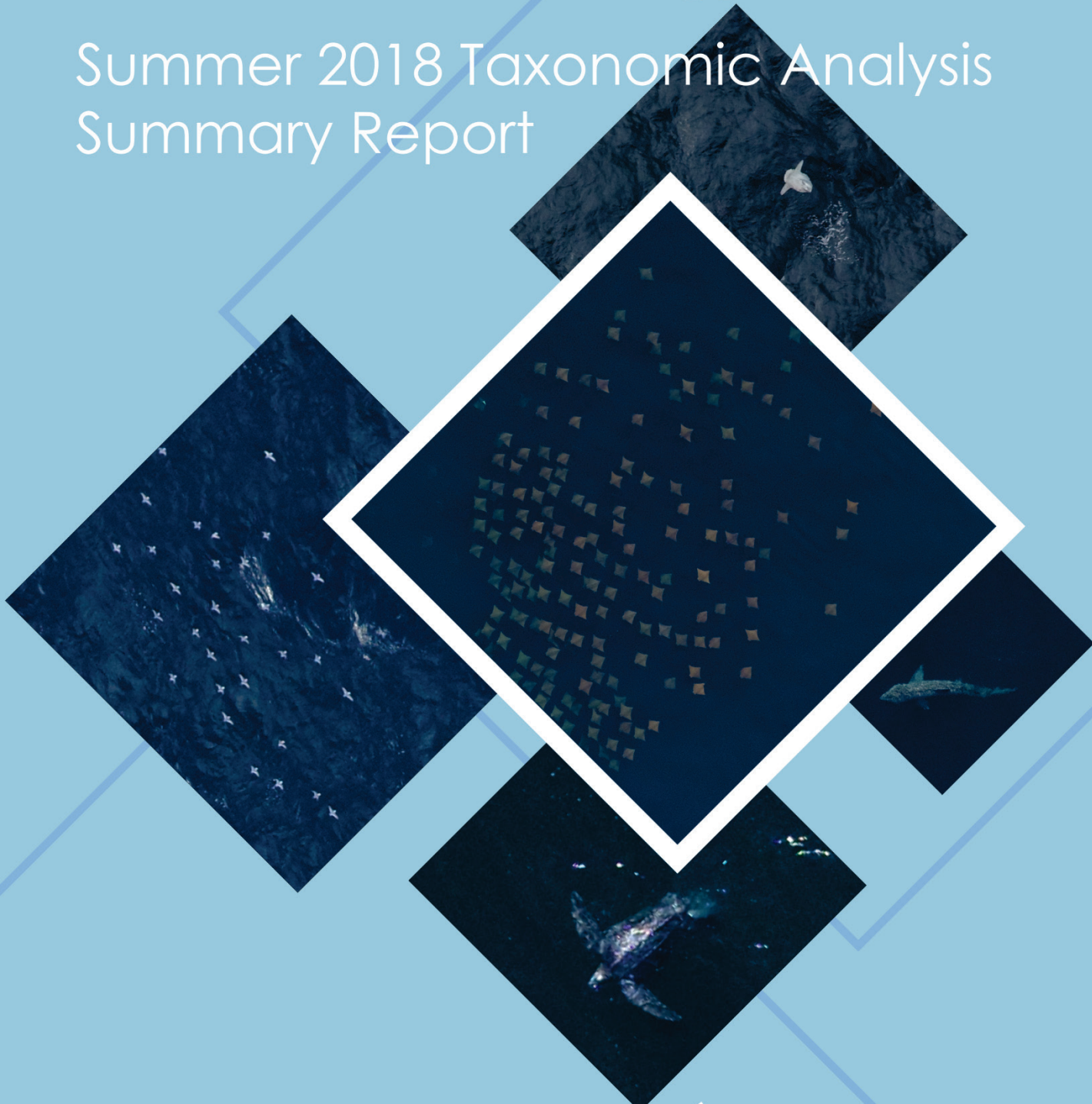


Digital Aerial Baseline Survey of Marine Wildlife in Support of Offshore Wind Energy

Summer 2018 Taxonomic Analysis Summary Report



NYSERDA



**NORMANDEAU
ASSOCIATES**
Environmental Consultants



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Summer 2018 Taxonomic Analysis Summary Report

Prepared for

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Introduction

The third summer survey for the NYSERDA offshore planning area (OPA) was started on July 29 and completed August 16, 2018. The survey took eight days to complete with the down-days in August caused by 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 3,150.38 km² area of the OPA and 300-m buffer using a transect design (Table 1), which amounts to 320,453 images. Of the 320,453 images analyzed, 315,371 were blank (Table 2). The target extraction identified 14,318 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), fixed structures, and vessels and 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 later 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	320,453	3,150.38	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	320,453	315,371	31,750	10.07	98.41

Table 3. Targets Sent for Identification

Group	# Individuals
Avian	4,871
Marine Mammals	2,165
Turtles	547
Sharks	413
Rays	5,797
Large Bony Fish**	488
Vessels	34
Fixed Structures	3
Total	14,318

**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 October 2018. 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 (Summer 2018)

Table 4. Quality Control Results, All Groups

Group	Number of Images	Number of Images for QC	% Agreement
Avian	4,871	974	99
Marine Mammals	2,165	433	100
Turtles	547	547	100
Sharks	413	166	100
Rays	5,797	1,159	100
Total	13,793	3,279	100

Table 5. Quality Control Results, Endangered Species Only

Group	Number of Images	% Agreement
Avian	85	100
Marine Mammals	13	100
Turtles	547	100
Sharks	125	100
Rays	3	100
Total	773	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=1,466), many of which were sitting on the extended sandbar and few of which could be positively identified (Table 6); although, one of those identified was a piping plover (Table 7). We also found a large number of storm petrels (n=2,123) of which there are three species to be found in the area (Table 6). Very few were identified to species, resulting in a rounded down identification success number of 0% (Table 6). All bird identifications were classified to species or species group (Table 7).

This season had moderate bird activity with 4,871 individuals recorded representing 23 species (see Table 7). Storm-petrels (n=2,123) and shorebirds (n=1,466) were the most numerous groups present, followed by shearwaters (n=499), gulls (n=487), *Sterna* terns (n=220; with three identified species including roseate tern), terns (n=50), phalaropes (n=8), petrels (n=6), loons (n=6), raptors (n=3), cormorants (n=2) and an individual parasitic jaeger.

Avian flight height data will be presented in detail in the annual report. 58% of birds were flying.

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

Group	# Individuals	% ID Success	% Sitting
Loon	6	100	100
Petrel	6	100	0
Shearwater	499	60	42
Storm-petrel	2,123	0	0

Group	# Individuals	% ID Success	% Sitting
Cormorant	2	0	50
Raptor	3	100	0
Shorebird	1,466	0	93
Phalarope	8	0	0
Skua	1	100	0
Gull	487	98	85
Tern	50	100	70
<i>Sterna</i> Tern	220	45	12
		Average ID Success	Average % Sitting
Total Individuals	4,871	59%	42%

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

Avian Group/ Species	# Individuals	# Flying	% Flying
Loon	6	0	0
Common Loon	6	0	0
Petrel	6	6	100
Black-capped Petrel	6	6	100
Shearwater	499	289	58
Cory's Shearwater	199	163	82
Great Shearwater	97	89	92
Sooty Shearwater	1	1	100
species unknown-Large	199	34	17
species unknown-Small	3	2	67
Storm-petrel	2,123	2,118	100
White-faced Storm-Petrel	2	2	100
species unknown	2,121	2,116	100
Cormorant	2	1	50
species unknown	2	1	50
Raptor	3	3	100
Osprey	3	3	100
Shorebird	1,466	99	7
American Oystercatcher	3	1	33
Black-bellied Plover	2	2	100
Piping Plover	1	0	0

Avian Group/ Species	# Individuals	# Flying	% Flying
species unknown	1,460	96	7
Phalarope	8	8	100
Red/Red-necked Phalarope	8	8	100
Skua	1	1	100
Parasitic Jaeger	1	1	100
Gull	487	74	15
Laughing Gull	13	6	46
Ring-billed Gull	86	3	3
Herring Gull	101	25	25
Lesser Black-backed Gull	44	2	5
Great Black-backed Gull	233	38	16
species unknown - Large	8	0	0
species unknown - Small	2	0	0
Tern	50	15	30
Least Tern	13	13	100
Black Tern	36	1	3
Royal Tern	1	1	100
Sterna Tern	220	193	88
Roseate Tern	1	1	100
Common Tern	94	94	100
Forster's Tern	4	4	100
Commic/Forster's Tern	67	67	100
species unknown	54	27	50
Total	4,871	2,807	58

*Highlighted species are classified as endangered

Turtles

There were 547 turtles found in the imagery and 427 were identifiable to species or species group (Loggerhead/Kemp's). Of the 120 (22%) turtles that could not be definitely identified to species or species blend, there were 74 (62%) that were significantly submerged. Of the 66 turtles (12%) identified as loggerhead/Kemp's, 22 (33%) were significantly submerged (Table 8). Loggerheads were the most common species, representing 62% of the total individuals.

Table 8. Turtle Species Identified*

Species Group/ Species OPA	# Individuals	# Sig. Submerged	% Sig. Submerged
Leatherback Turtle	3	2	67
Loggerhead Turtle	340	107	31
Loggerhead/Kemp's Turtle	66	22	33
Kemp's Ridley Turtle	18	0	0
species unknown	120	74	62
Total	547	205	37

*Highlighted species are classified as endangered

Marine Mammals

There were 2,165 marine mammals recorded during the summer survey (Table 9). Most of these were dolphins (n=2,133) consisting of six identified species or group, as follows:

- Common dolphin (n=1,342)
- Risso's dolphin (n=229)
- Bottlenose dolphin (n=116)
- Striped dolphin (n=75)
- Pilot whale (unid.) (n=54)
- Common/white-sided dolphin (n=5)
- Species unknown (n=312)

Two unidentified seals were found along with three 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 27 whales, fin whale (n=6), sperm whale (n=5), common minke whale (n=5), and humpback whale (n=2) were identified. Of nine whales (33%) that were not identified to species, six (67%) were significantly submerged (see Table 9).

Of the 2,133 dolphins, 1,470 (69%) were significantly submerged. Of the 312 dolphins not identified to species or species group, 254 (81%) were classed as significantly submerged (Table 9).

Three individuals could not be classified beyond marine mammal and all were significantly submerged. General characteristics suggested they were likely either seals or dolphins.

Table 9. Marine Mammal Species Identified*

Species	# Individuals		Significantly Submerged	
	Group	Species	Number	Percent of total
Seal	2		0	0
species unknown		2	0	0
Whale	27		14	52
Common Minke Whale		5	3	60
Fin Whale		6	4	67
Humpback Whale		2	1	50
Sperm Whale		5	0	0
species unknown		9	6	67
Dolphin	2,133		1,470	69
Common Dolphin		1,342	889	66
Pilot Whale (unid.)		54	35	65
Risso's Dolphin		229	159	69
Striped Dolphin		75	59	79
Bottlenose Dolphin		116	71	61
Common/White-sided Dolphin		5	3	60
species unknown		312	254	81
Unid. Mammal	3		3	100
species unknown		3	3	100
Total	2,165		1,487	69

*Highlighted species are classified as endangered

Rays

There were 5,797 rays found in the imagery, representing five species. Cownose rays were the most encountered (n=2,498). This species can be difficult to separate from bullnose ray, and 2,575 animals were put in a species blend of “cownose/bullnose.” Of these, 1,620 (63%) were significantly submerged. Chilean devil ray was the next most encountered species (n=21), followed by giant devil ray (n=12), bullnose ray (n=11), and giant manta ray (n=3). There were 677 (12%) rays not identified to species of which 603 (89%) were significantly submerged.

Table 10. Ray Species Identified

Species	# Individuals	Significantly Submerged	
		Number	Percent of Total
Giant Manta Ray	3	2	67
Giant Devil Ray	12	6	50
Chilean Devil Ray	21	7	33
Bullnose Ray	11	2	18
Cownose/Bullnose Ray	2,575	1,620	63
Cownose Ray	2,498	811	32
species unknown	677	603	89
Total	5,797	3,051	53

*Highlighted species are classified as endangered

Sharks

Of the 413 sharks recorded, all but 162 were identified to species or species group. Of the unidentified species, 148 (91%) were ranked as significantly submerged (Table 11). Nine species were identified. Hammerhead sharks were the most frequently encountered (n=130) and scalloped and smooth hammerheads were the most identified of the hammerhead sharks (n=7 and n=7) (Table 11). There were 115 hammerhead sharks that could not be identified to species. Of these 75 (65%) were significantly submerged. Of the other identified sharks, basking sharks (n=6), whale sharks (n=3), shortfin mako (n=2), tiger (n=2), and blue (n=1) sharks were encountered (Table 11). There were 106 sharks identified as “Carcharhinidae (unid.)” of which 59 (56%) were significantly submerged (Table 11).

Table 11. Shark Species Identified

Species	# Individuals	Significantly Submerged	
		Number	Percent of Total
Whale Shark	3	2	67
Basking Shark	6	0	0
Great White Shark	1	1	100
Shortfin Mako	2	0	0
Blue Shark	1	0	0
Carcharhinidae (unid.)	106	59	56
Tiger Shark	2	0	0
Great Hammerhead	1	0	0
Smooth Hammerhead	7	2	29
Scalloped Hammerhead	7	0	0
Hammerhead (unid.)	115	75	65
species unknown	162	148	91
Total	413	287	69

*Highlighted species are classified as endangered

Endangered Species

There were 12 species identified as state or federally threatened or endangered species (Table 12). These were loggerhead turtle (n=340), Kemp’s Ridley turtle (n=18), scalloped hammerhead shark (n=7), fin whale (n=6), sperm whale (n=5), whale shark (n=3), leatherback turtle (n=3), giant manta ray (n=3), Atlantic bluefin tuna (n=3), humpback whale (n=2), roseate tern (n=1), and piping plover (n=1). There were also 66 loggerhead/Kemp’s turtles and 120 unidentified turtles. Also found in the imagery and considered to potentially be listed species were 54 *Sterna* tern, which could be roseate terns, and 115 hammerhead (unid.), which could be scalloped hammerhead sharks (Table 12).

Table 12. Threatened and Endangered Species Identified

Species	# Individuals
Turtle	547
Leatherback Turtle	3
Loggerhead Turtle	340
Loggerhead/Kemp's Turtle	66
Kemp's Ridley Turtle	18
species unknown	120
Shark	125
Whale Shark	3
Scalloped Hammerhead	7
Hammerhead (unid.)	115
Ray	3
Giant Manta Ray	3
Whale	13
Fin Whale	6
Humpback Whale	2
Sperm Whale	5
Shorebird	1
Piping Plover	1
Sterna Tern	55
Roseate Tern	1
species unknown	54
Tuna	3
Atlantic bluefin tuna**	3
TOTAL	776

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

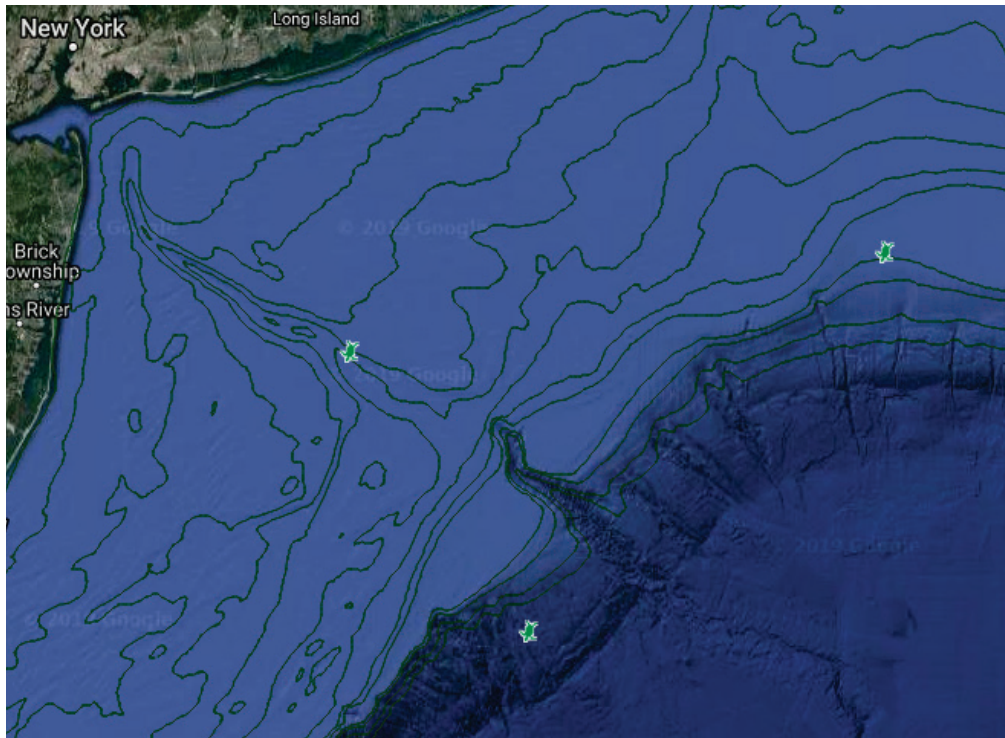


Figure 1. Leatherback turtle distribution during the Summer 2018 survey.

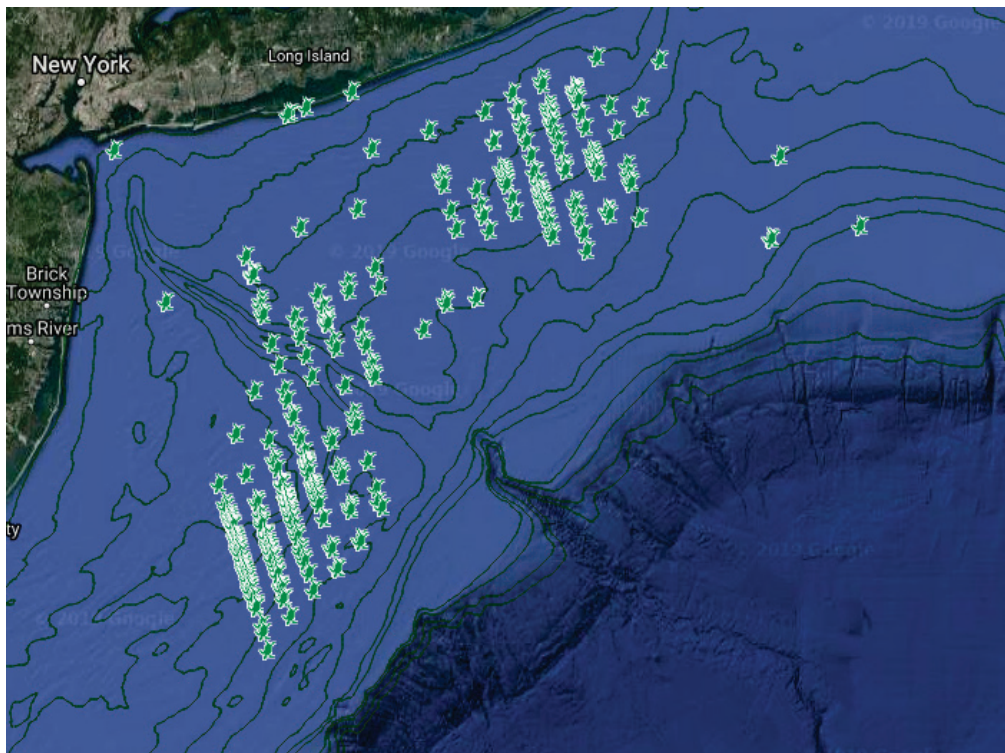


Figure 2. Loggerhead turtle distribution during the Summer 2018 survey.

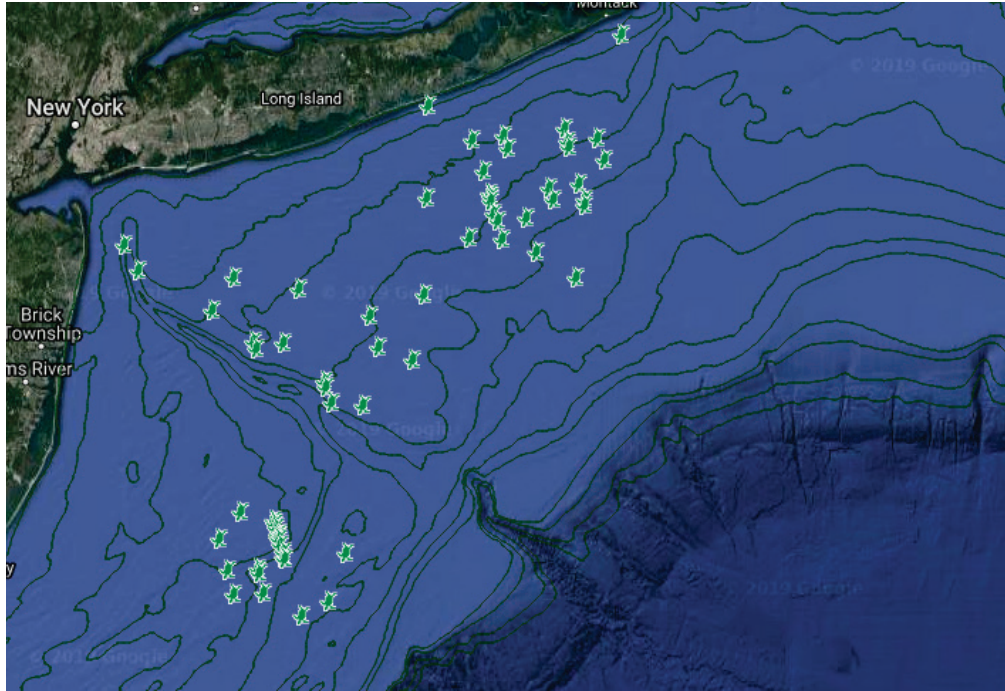


Figure 3. Loggerhead/Kemp's turtle distribution during the Summer 2018 survey.

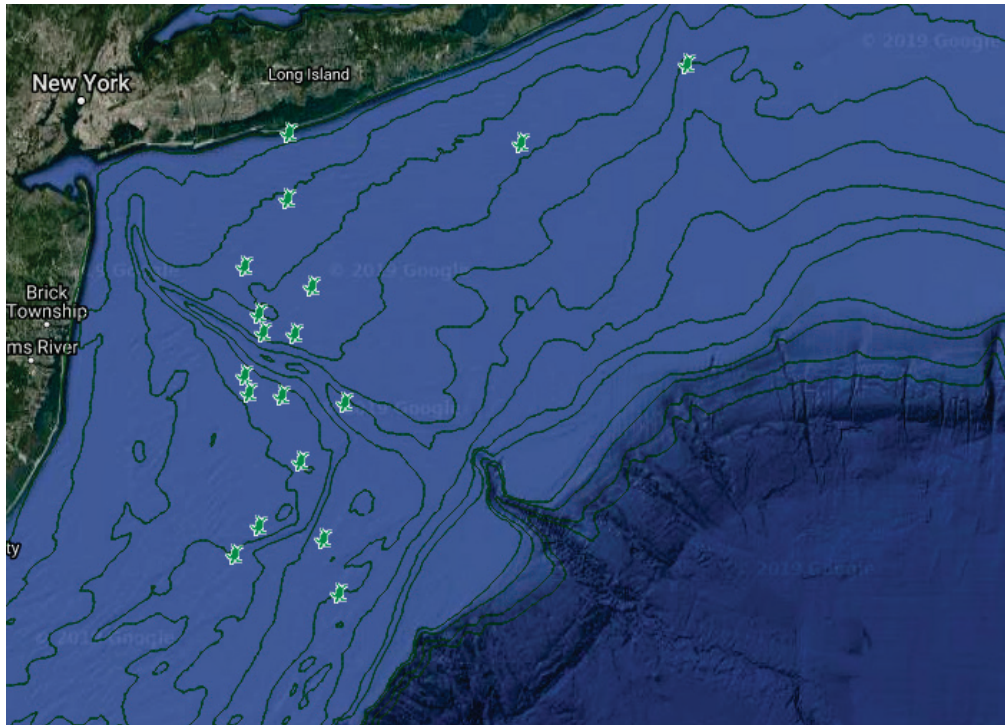


Figure 4. Kemp's Ridley turtle distribution during the Summer 2018 survey.

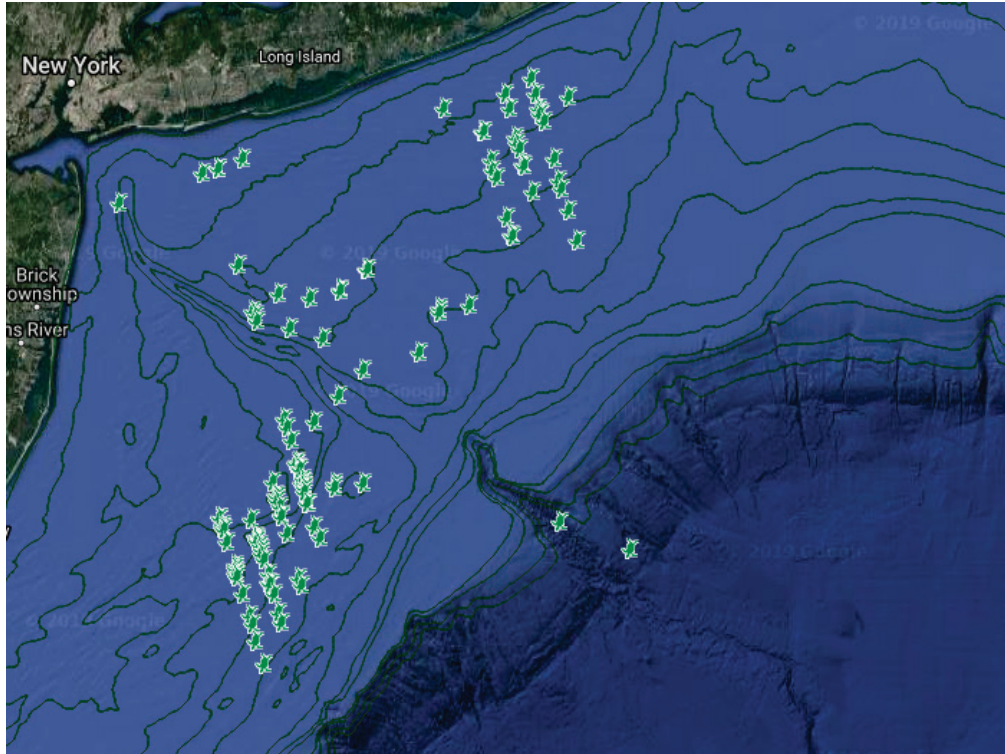


Figure 5. Unknown turtle species distribution during the Summer 2018 survey.

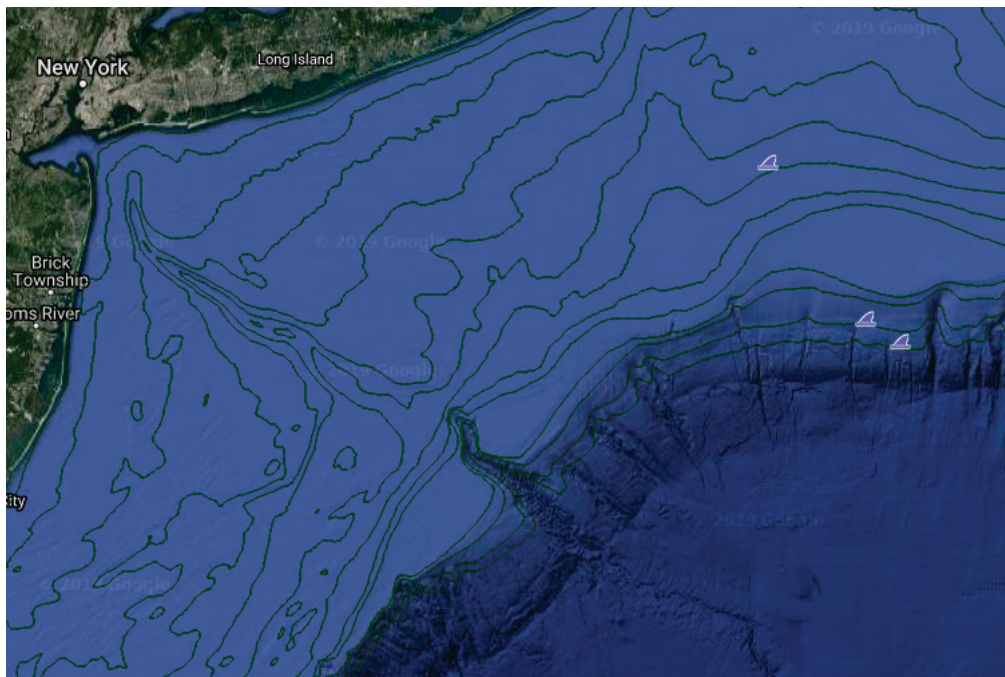


Figure 6. Whale shark distribution during the Summer 2018 survey.

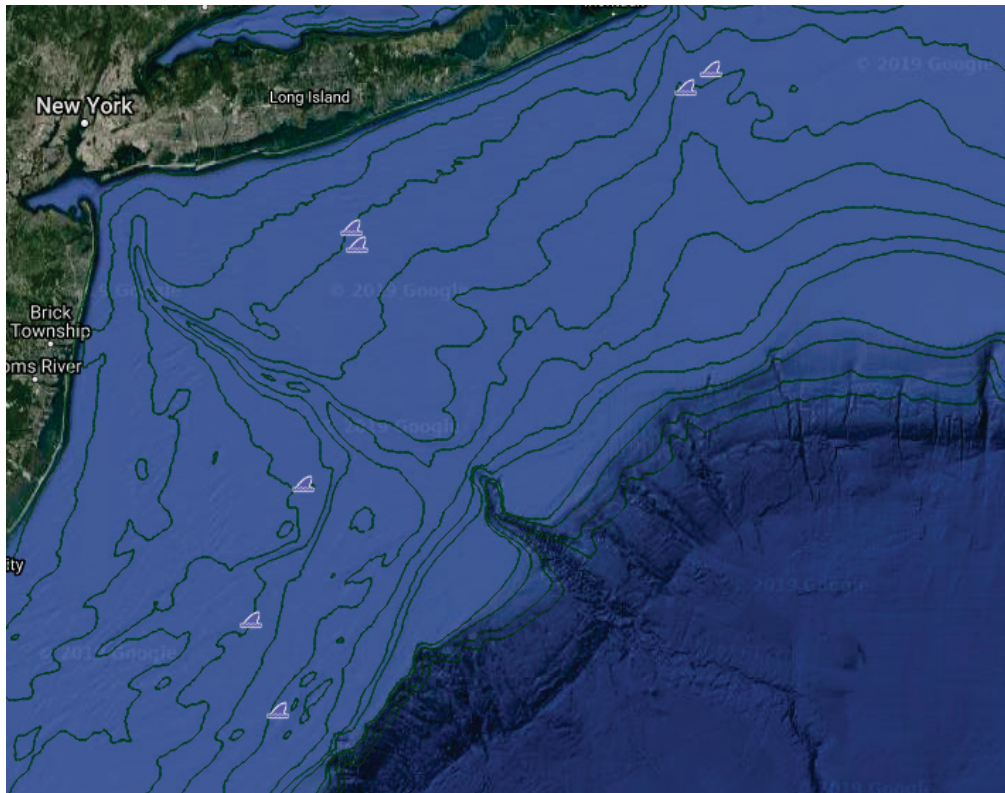


Figure 7. Scalloped hammerhead distribution during the Summer 2018 survey.

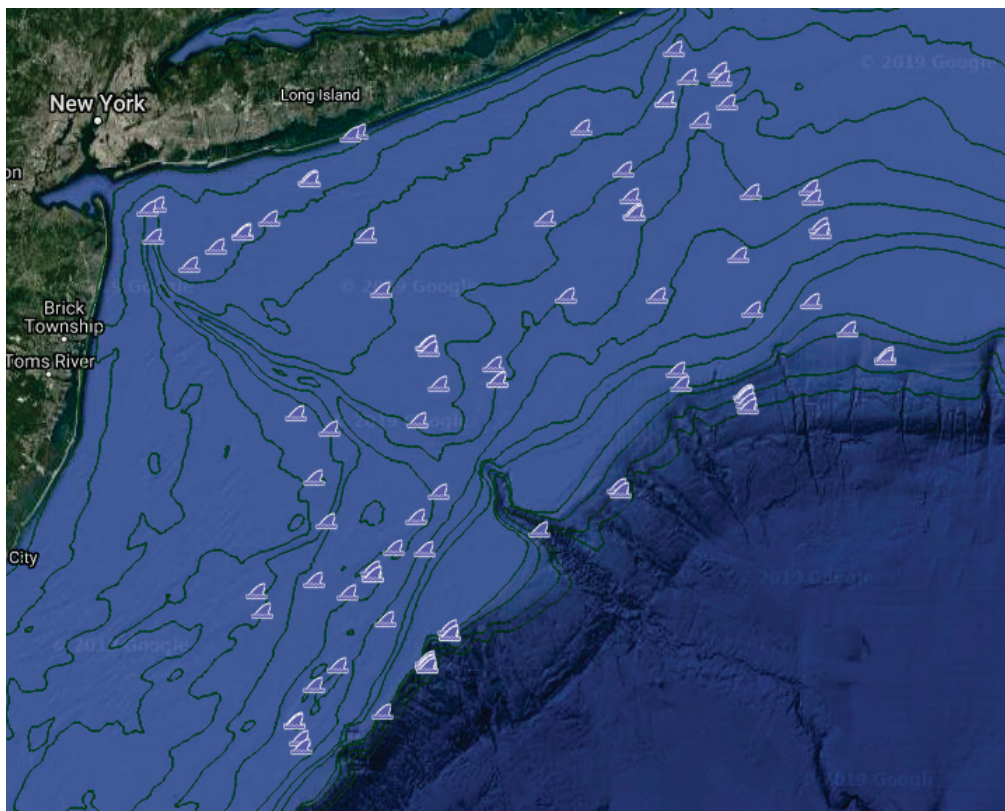


Figure 8. Hammerhead (unid.) distribution during the Summer 2018 survey.

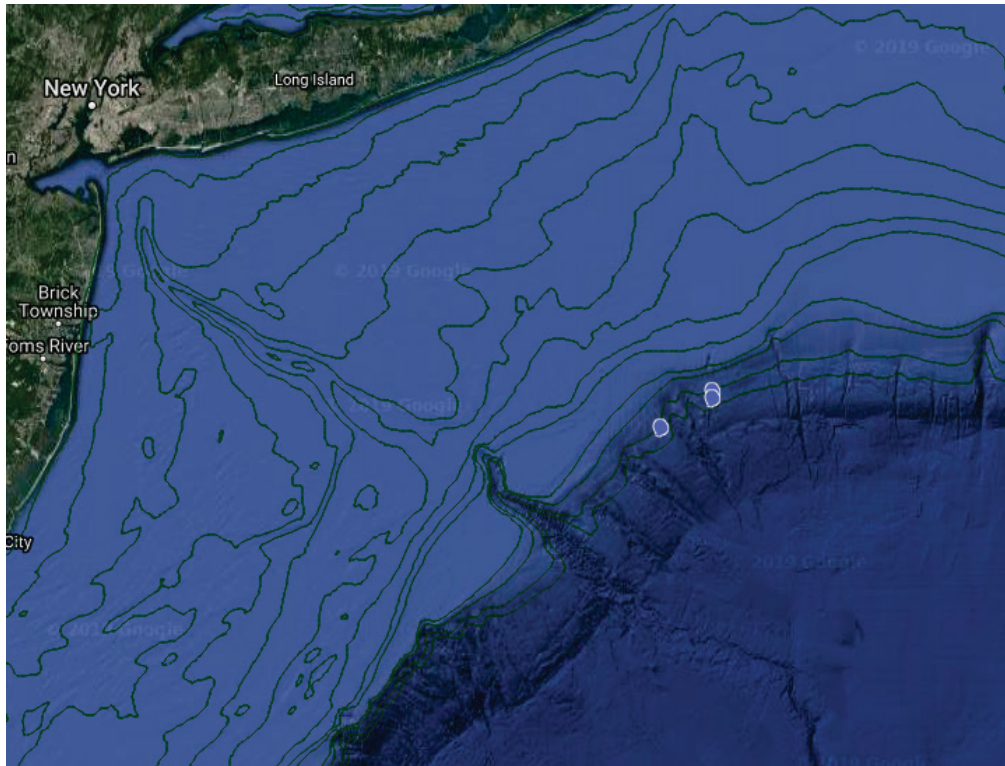


Figure 9. Giant Manta Ray distribution during the Summer 2018 survey.

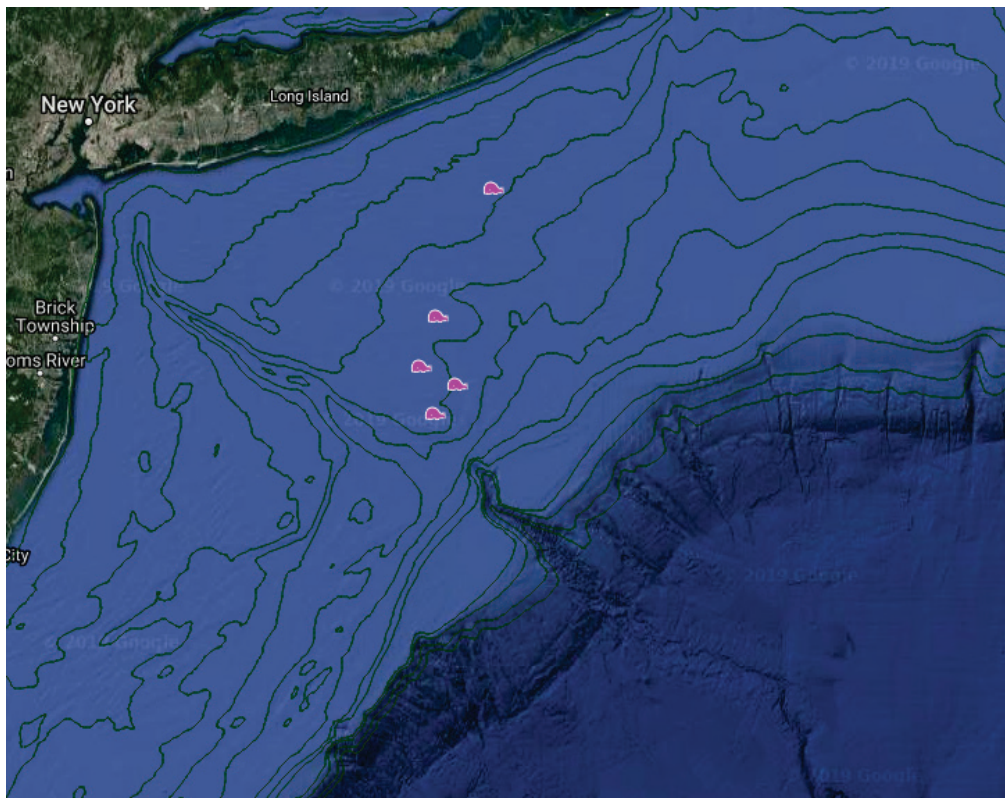


Figure 10. Fin whale distribution during the Summer 2018 survey.

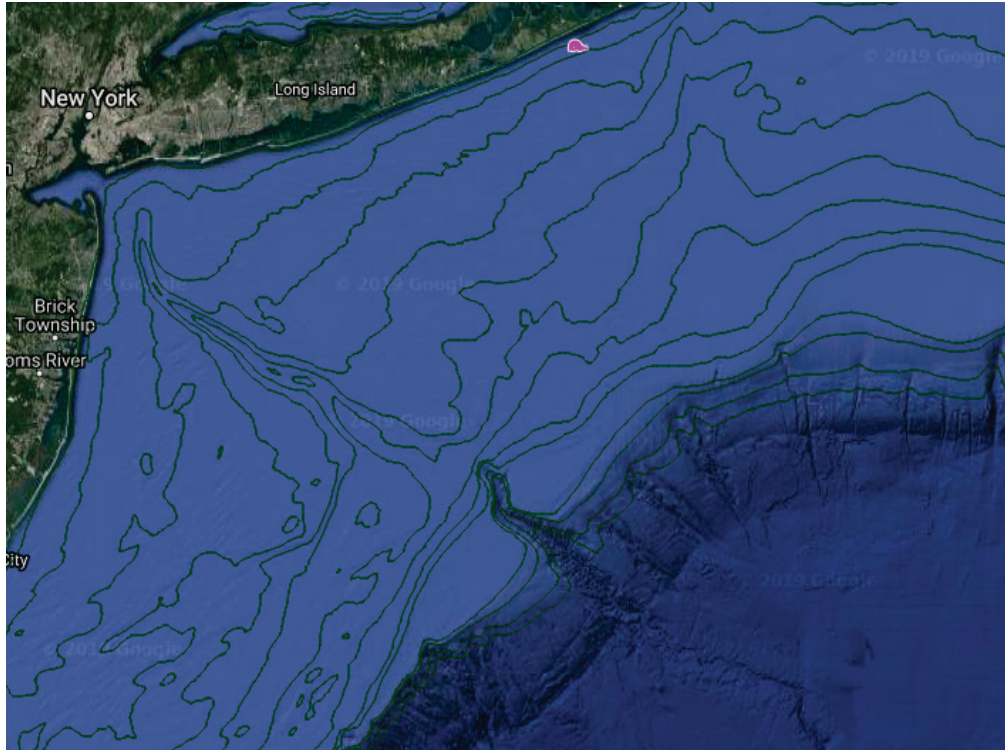


Figure 11. Humpback whale distribution during the Summer 2018 survey.

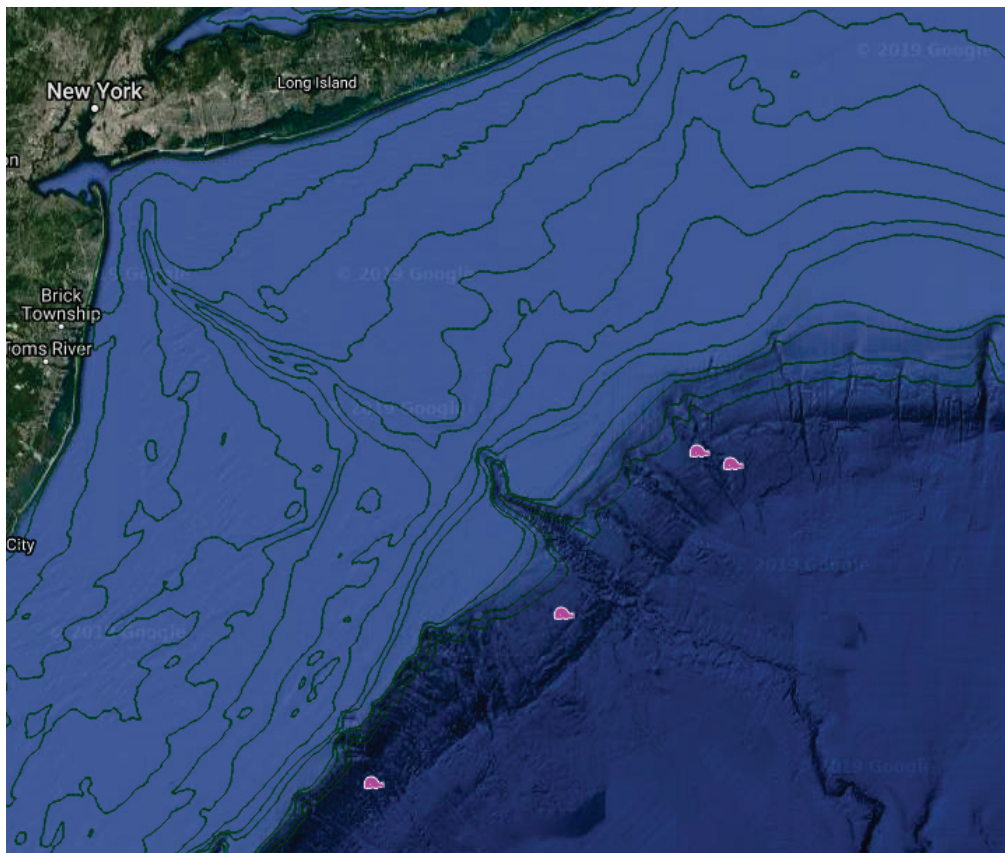


Figure 12. Sperm whale distribution during the Summer 2018 survey.

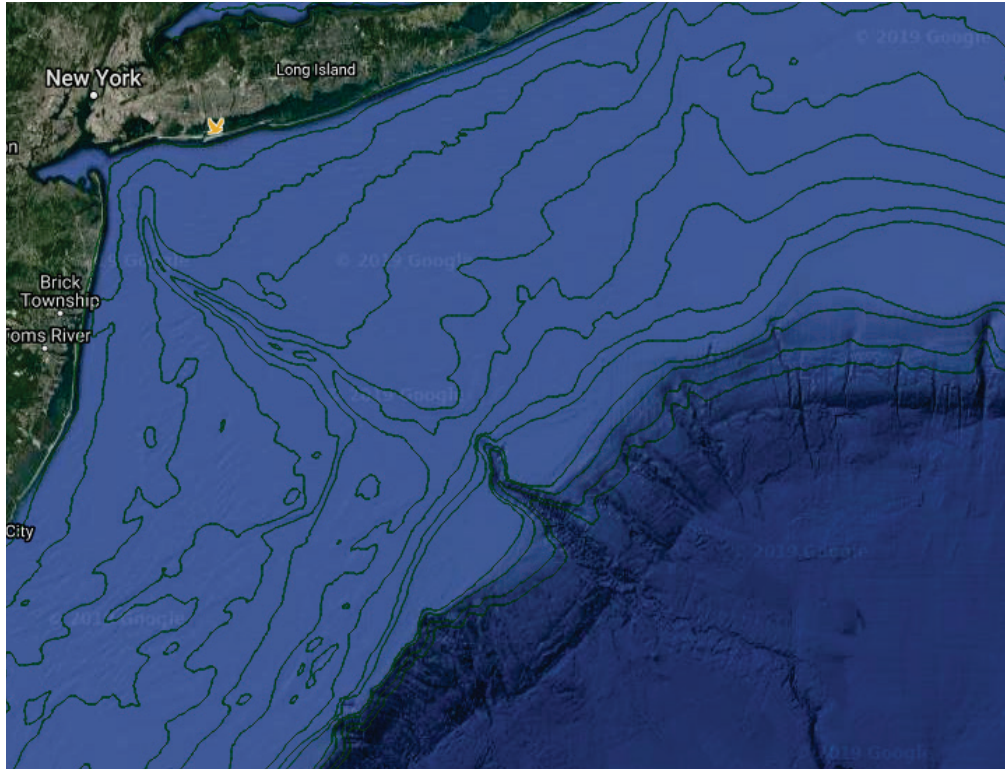


Figure 13. Piping plover distribution during the Summer 2018 survey.

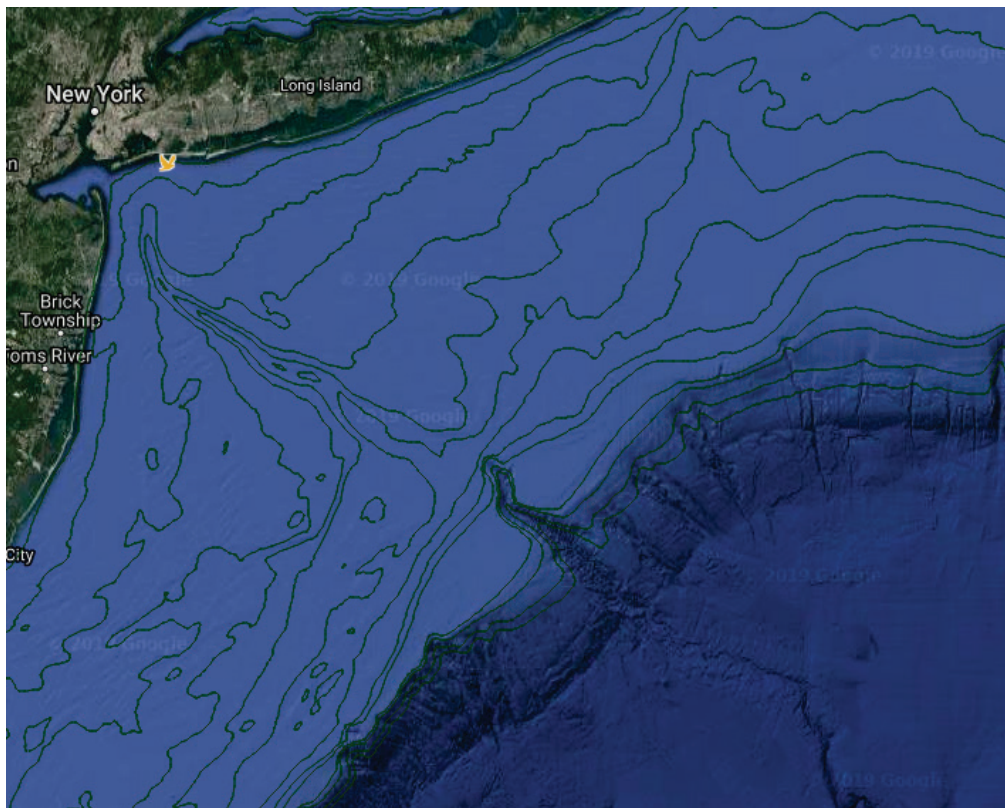


Figure 14. Roseate tern distribution during the Summer 2018 survey.

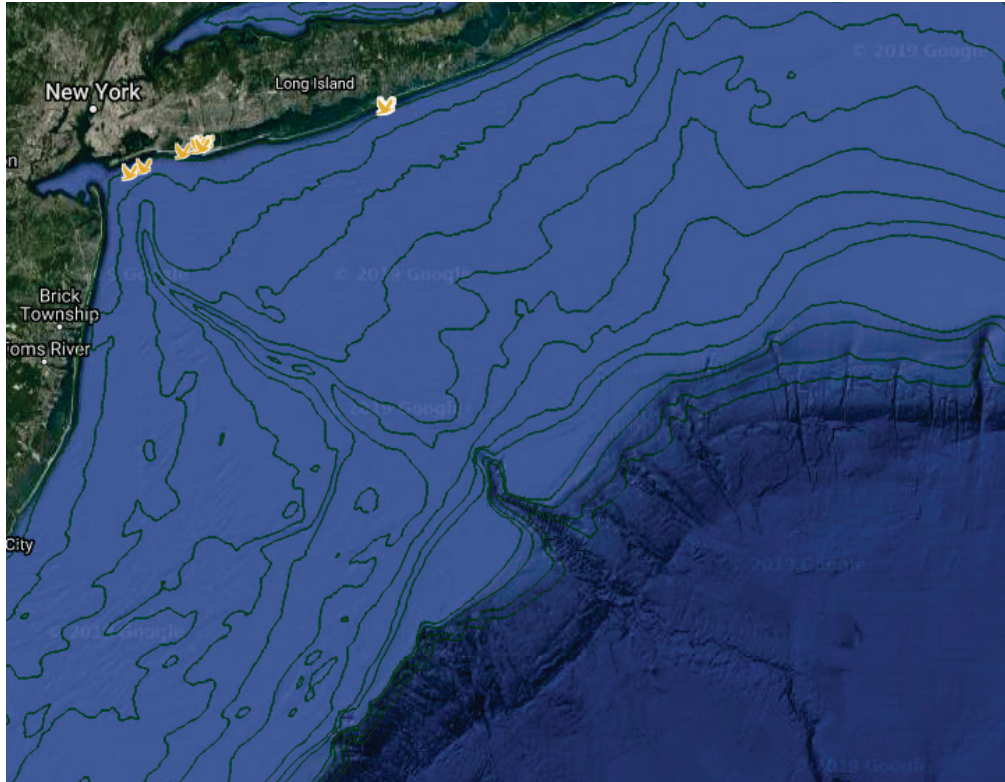


Figure 15. *Sterna tern* (species unknown) distribution during the Summer 2018 survey.

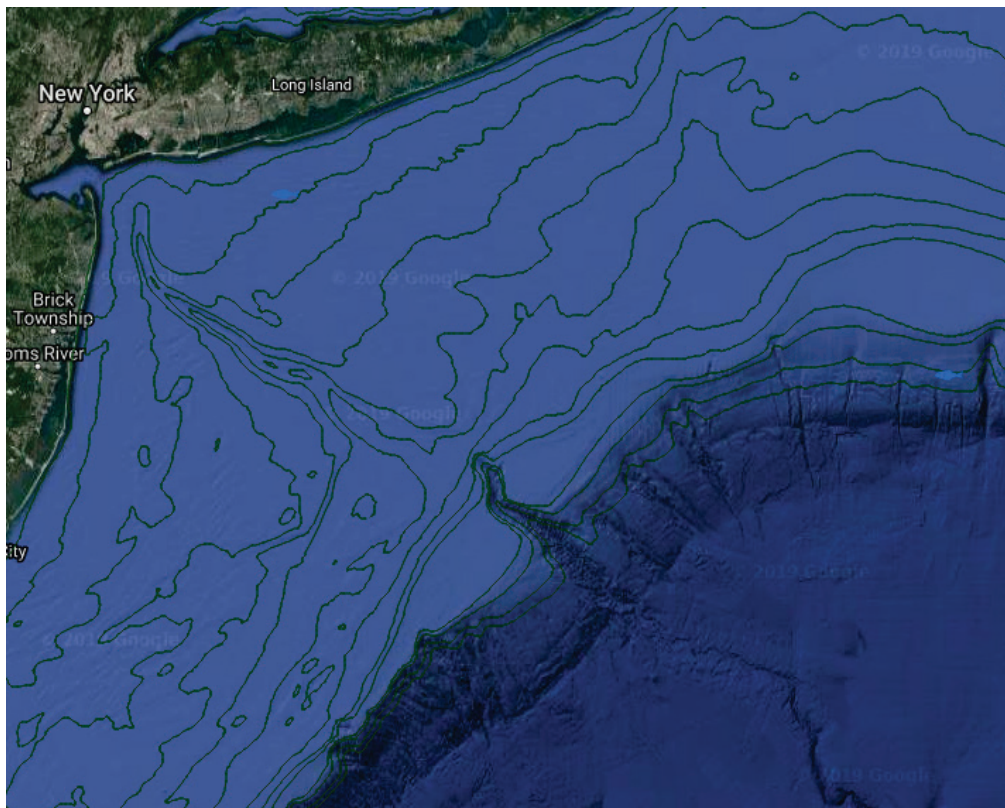


Figure 16. Atlantic Bluefin tuna distribution during the Summer 2018 survey.

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

Common Name	Scientific Name	Class	Family
Birds			
Common Loon	<i>Gavia immer</i>	Aves	Gaviidae
Black-capped Petrel	<i>Pterodroma hasitata</i>	Aves	Procellariidae
Cory's Shearwater	<i>Calonectris diomedea</i>	Aves	Procellariidae
Great Shearwater	<i>Ardenna gravis</i>	Aves	Procellariidae
Sooty Shearwater	<i>Ardenna grisea</i>	Aves	Procellariidae
White-faced Storm-Petrel	<i>Pelagodroma marina</i>	Aves	Hydrobatidae
Osprey	<i>Pandion haliaetus</i>	Aves	Pandionidae
American Oystercatcher	<i>Haematopus palliatus</i>	Aves	Haematopodidae
Black-bellied Plover	<i>Pluvialis squatarola</i>	Aves	Charadriidae
Piping Plover	<i>Charadrius melodus</i>	Aves	Charadriidae
Parasitic Jaeger	<i>Stercorarius parasiticus</i>	Aves	Stercorariidae
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
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
Royal Tern	<i>Thalasseus maximus</i>	Aves	Laridae
Roseate Tern	<i>Sterna dougallii</i>	Aves	Laridae
Common Tern	<i>Sterna hirundo</i>	Aves	Laridae
Forster's Tern	<i>Sterna forsteri</i>	Aves	Laridae
Marine Mammals			
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
Sperm Whale	<i>Physeter macrocephalus</i>	Mammalia	Physeteridae
Common Dolphin	<i>Delphinus delphis</i>	Mammalia	Delphinidae
Risso's Dolphin	<i>Grampus griseus</i>	Mammalia	Delphinidae

Common Name	Scientific Name	Class	Family
Striped Dolphin	<i>Stenella coeruleoalba</i>	Mammalia	Delphinidae
Bottlenose Dolphin	<i>Tursiops truncatus</i>	Mammalia	Delphinidae
Sea Turtles			
Leatherback Turtle	<i>Dermochelys coriacea</i>	Reptilia	Dermochelyidae
Loggerhead Turtle	<i>Caretta caretta</i>	Reptilia	Cheloniidae
Kemp's Ridley Turtle	<i>Lepidochelys kempii</i>	Reptilia	Cheloniidae
Sharks			
Whale Shark	<i>Rhincodon typus</i>	Chondrichthyes	Rhincodontidae
Basking Shark	<i>Cetorhinus maximus</i>	Chondrichthyes	Cetorhinidae
Great White Shark	<i>Carcharodon carcharias</i>	Chondrichthyes	Lamnidae
Shortfin Mako	<i>Isurus oxyrinchus</i>	Chondrichthyes	Lamnidae
Blue Shark	<i>Prionace glauca</i>	Chondrichthyes	Carcharhinidae
Tiger Shark	<i>Galeocerdo cuvier</i>	Chondrichthyes	Carcharhinidae
Great Hammerhead	<i>Sphyrna mokarran</i>	Chondrichthyes	Sphyrnidae
Smooth Hammerhead	<i>Sphyrna zygaena</i>	Chondrichthyes	Sphyrnidae
Scalloped Hammerhead	<i>Sphyrna lewini</i>	Chondrichthyes	Sphyrnidae
Rays			
Giant Manta Ray	<i>Manta birostris</i>	Chondrichthyes	Mobulidae
Giant Devil Ray	<i>Mobula mobula</i>	Chondrichthyes	Mobulidae
Chilean Devil Ray	<i>Mobula tarapacana</i>	Chondrichthyes	Mobulidae
Bullnose Ray	<i>Myliobatis freminvillii</i>	Chondrichthyes	Myliobatidae
Cownose Ray	<i>Rhinoptera bonasus</i>	Chondrichthyes	Rhinopteridae
Large Bony Fish*			
Cobia	<i>Rachycentron canadum</i>	Actinopterygii	Rachycentridae
Mahi-Mahi	<i>Coryphaena hippurus</i>	Actinopterygii	Coryphaenidae
Atlantic bluefin tuna	<i>Thunnus thynnus</i>	Actinopterygii	Scombridae
Yellowfin tuna	<i>Thunnus albacares</i>	Actinopterygii	Scombridae
Atlantic swordfish	<i>Xiphias gladius</i>	Actinopterygii	Xiphiidae
Ocean Sunfish	<i>Mola Mola</i>	Actinopterygii	Molidae
Sharptail Sunfish	<i>Masturus lanceolatus</i>	Actinopterygii	Molidae

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