

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

Summer 2016 Taxonomic Analysis Summary Report



**NYSERDA**





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## Summer 2016 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

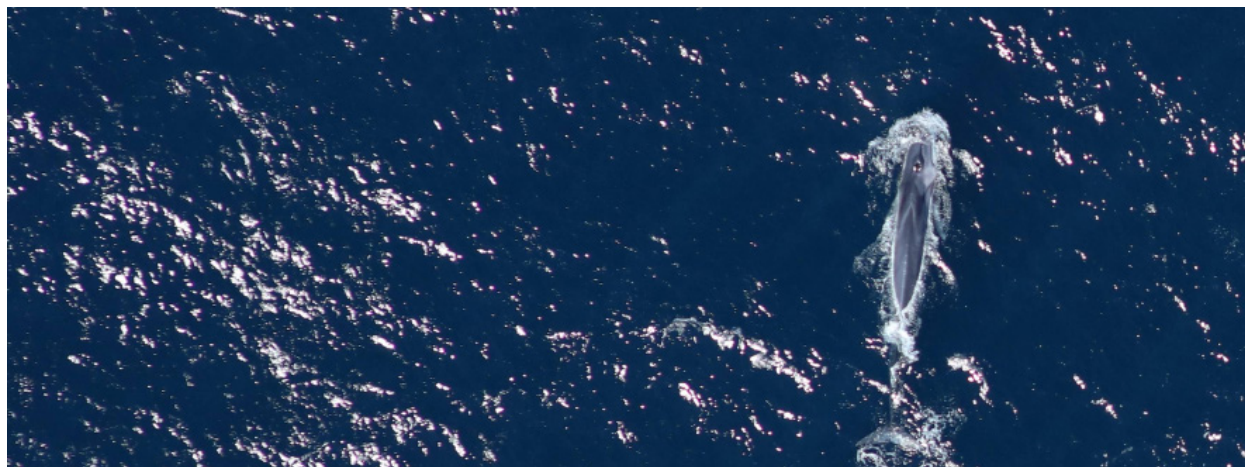


### with

APEM, Inc.  
747 Southwest 2nd Avenue, Suite 226  
Gainesville, FL 32601



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## Introduction

The first summer 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 26 July 2016 and finished 9 August 2016. Target extraction for the first summer survey for the NYSERDA Offshore Planning Area (OPA) and Wind Energy Area (WEA) was started in August 2016. All target extraction and quality control of target extraction was completed by 26 October 2016. Image analysis was completed by 6 December 2016 with all animals identified and identifications reaching quality control standards. Animals were also fully georeferenced with exact locations of individuals available for review on the data portal.

## Methods

The survey collected imagery covering a 3182.35-km<sup>2</sup> area of the OPA and 103 km<sup>2</sup> of the WEA (Table 1), amounting to 311,614 images. Of the 311,614 images collected, 296,757 were blank. The initial target extraction identified 13,620 objects within imagery collected within the OPA and 573 objects within imagery exclusively covering the WEA. These targets have been categorized into nine groups representing avian (birds), turtles, marine mammals, rays, sharks, bony fish individuals (excluding fish shoals), fixed structures, vessels, and unknown/other (Table 2). Of the large bony fish, only ocean sunfish was identified to species (see Table 11 for a full list of scientific names). No bats were found in imagery. Extracted targets placed into the “unknown/other” category tended to be subsurface detritus or floating organic matter that the extraction process had identified as potentially being an animal. Other reclassifications of targets included corrections of shark and marine mammal extraction identifications into “fish.” Species listed as “Endangered” or “Threatened” under the Endangered Species Act were flagged for review. A total of 943 individuals were categorized into this group. This categorization was conservative. For example, it is possible that “Sterna tern” could represent roseate tern, and so all such identifications were placed into the endangered category (Table 3). Inability to identify this species group to individual species was usually a result of the angle of the bird and an inability to see the bird’s head and bill.

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

Area	Total Number of Images Collected	Total km <sup>2</sup> Area Collected	Number of Images within the Survey Area	km <sup>2</sup> of Images within the Survey Area	Percent Coverage	Survey Area (km <sup>2</sup> )
WEA area <sup>a</sup>	11,146 <sup>a</sup>	107.59	10,587	103.21	12.01%	850.92
OPA area	300,468	3,319.97	287,211	3,182.35	7.30%	43,471.78
Total	311,614	3,427.56	297,798	3,285.56	7.56% <sup>b</sup>	44,322.70

<sup>a</sup> This table only represents the imagery that was processed and analysed per the scope of work. An additional 10% percent 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. Targets Identified**

Group	Total (OPA and WEA)	OPA	WEA
Avian	2,086	2,079	7
Turtles	586	573	13
Marine mammals	1,035	1,033	2
Rays	8,407	8,176	231
Sharks	942	778	164
Large Bony Fish (excluding shoals)	979	836	143
Fixed Structure	6	5	1
Vessel	53	52	1
Unknown/Other	278	266	12

**Table 3. Endangered Species Act Listed Species Identified**

Group	Total (OPA and WEA)	OPA	WEA
Avian	191	191	0
Turtles	586	573	13
Marine mammals	11	11	2
Sharks	155	154	1

## 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 4). Failure to do 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

### Quality Control Results (Summer 2016)

**Table 4. All Species**

Taxonomic Group	Number of Images	Number of Images for QC	% Agreement Reached
Avian	2,086	532	100
Turtles	586	586	100
Marine mammals	1,035	147	97
Rays	8,407	1,405	100
Sharks	942	111	100
All other (boats, etc.)	1,316	192	100
<b>TOTAL</b>	<b>14,374</b>	<b>2,973</b>	<b>99</b>

**Table 5. Endangered Species Only**

Taxonomic Group	Number of Images	% Agreement Reached
Avian	191	100
Turtles	586	100
Marine mammals	11	100
Sharks	155	100
<b>TOTAL</b>	<b>943</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). Some schooling rays for example were identified as possible when groups of conspecifics had already been identified within that school. 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.

All avian identifications were classified to species group (Table 6). Of gull species 12% remained at group level identification, 28% of petrels remained at group level, 20% of shearwaters remained at group level and 22% of shorebirds were identified to species. Of terns, 75% were identified to the group “sterna,” which potentially includes roseate tern. Another 20% were identified to species. Only 4% of terns were unidentified to species. All other species groups consisting of cormorants, loons, and raptors achieved 100% identification success rates.

Of 148 turtles not ascribed to species, 132 (89%) were rated as significantly submerged (Table 7). For marine mammals, of the 543 dolphins not ascribed to species, 480 (88%) were rated as significantly submerged (Table 8). Of the whale species, 2 out of 8 whales identified as “beaked” whales were significantly submerged (25%) and 120 out of 144 (83%) of whales identified as “pilot whale unid.” were significantly submerged (Table 8). Of 1182 rays not identified to species (Table 9), 815 (69%) were rated as significantly submerged.

## Species presence

A total of 26 avian species or species groups were identified (Table 6); 81% of individual images was identified to species and 90% of the remaining images was identified to a species group. Of these one species group was classified as potentially endangered. This was *Sterna* tern, the group that includes roseate terns. For this first survey, analysts were not confident enough to separate out roseate terns from the other potential similar looking terns such as common, arctic and Forster’s terns so all terns were examined by two independent taxonomists. The team is still hopeful that after collecting more data/images of this group, we will be able to have some success on future surveys; these data can be revisited in the future to reclassify if needed. Four species of turtles were encountered (Table 7). All turtle species encountered are classified as endangered (Kemp’s ridley and leatherback) or threatened (green and loggerhead). There were 10 species or species groups of marine mammals identified in the imagery (Table 8). Two of these were classed as endangered at the time of the summer 2016 survey. These were fin whale and humpback whale. Effective October 11, 2016, NOAA has de-listed the West Indies DPS (the population segment that includes individuals observed off US east coast) of the humpback whale (NOAA 2016). None of the four ray species found are classified as endangered (Table 9). Of the 16 shark species or species groups, the Central and Southwest Atlantic DPS of the scalloped hammerhead is listed as threatened, while the Eastern Atlantic DPS is listed as endangered (Table 10). There were also 136 ocean sunfish found in the OPA. This species is not listed under the ESA.

**Table 6. Avian Species identified (2,079 in OPA, 7 in WEA)\***

Name	OPA-Subtype	OPA-species	WEA-Subtype	WEA-species
Cormorant	6		0	
Double-crested Cormorant		6		0
Gull	162		0	
Great Black-backed Gull		76		0
Herring Gull		35		0
Laughing Gull		20		0
Ring-billed Gull		12		0
species unknown		4		0
species unknown – Large		4		0
species unknown – Small		11		0
Loon	3		0	

Name	OPA-Subtype	OPA-species	WEA-Subtype	WEA-species
Common Loon		3		0
Petrel	18		0	
Black-capped Petrel		13		0
species unknown		5		0
Raptor	5		0	
Bald Eagle		2		0
Osprey		3		0
Shearwater	739		0	
Audubon's Shearwater		8		0
Cory's Shearwater		512		0
Great Shearwater		72		0
Sooty Shearwater		2		0
species unknown-Large		131		0
species unknown-Small		14		0
Shorebird	21		7	
Black-bellied Plover		6		0
species unknown		15		7
Storm-petrel	871		0	
Wilson's Storm-Petrel		871		0
Tern	254		0	
Least Tern <sup>a</sup>		43		0
Royal Tern		9		0
species unknown		11		0
Sterna Tern		191		0

\*Highlight denotes classed as endangered

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

**Table 7. Turtle Species Identified (573 in OPA, 13 in WEA)\***

Name	OPA-species	WEA-species
Green Turtle	1	0
Kemp's Ridley Turtle	18	1
Leatherback Turtle	9	0
Loggerhead Turtle	395	4
Loggerhead/Kemp's Turtle	10	0
species unknown	140	8

\*All listed under the Endangered Species Act



**Table 8. Marine Mammal Species Identified (1033 in OPA, 2 in WEA)\***

Name	OPA-Subtype	OPA-species	WEA-Subtype	WEA-species
Dolphin	868		2	
Common Bottlenose Dolphin		100		0
Risso's Dolphin		166		0
Short-beaked Common Dolphin		61		0
species unknown		541		2
Whale	165		0	
Beaked Whale (unid.)		8		0
Common Minke Whale		1		0
Fin Whale		10		0
Humpback Whale <sup>a</sup>		1		0
Pilot Whale (unid.)		144		0
species unknown		1		0

\*Highlight denotes classed as endangered

<sup>a</sup>West Indies DPS delisted from the ESA effective October 11, 2016; listed as endangered by NYSDEC

**Table 9. Ray Species identified (8176 in OPA, 231 in WEA)**

Name	OPA-species	WEA-species
Bluntnose Stingray	1	0
Bullnose Ray	2	0
Cownose Ray	3,301	21
Cownose/Bullnose Ray	3,474	39
Giant Manta Ray	387	0
species unknown	1,011	171

**Table 10. Shark Species Identified (778 in OPA, 164 in WEA)\***

Name	OPA-species	WEA-species
Basking Shark	1	0
Blue Shark	5	0
Bull Shark	1	0
Carcharhinidae (unid.)	176	18
Dusky Shark	1	0
Great Hammerhead	6	0
Great White Shark	1	0
Hammerhead (unid.)	133	1
Oceanic Whitetip Shark	1	0
Sandbar Shark	1	0
Scalloped Hammerhead	21	0
Smooth Hammerhead	9	0

Name	OPA-species	WEA-species
species unknown	415	145
Thresher Shark	2	0
Tiger Shark	3	0
Whale Shark	2	0

\*Highlight denotes classed as threatened or endangered

### Spatial Distribution of Animals Classed as Threatened or Endangered

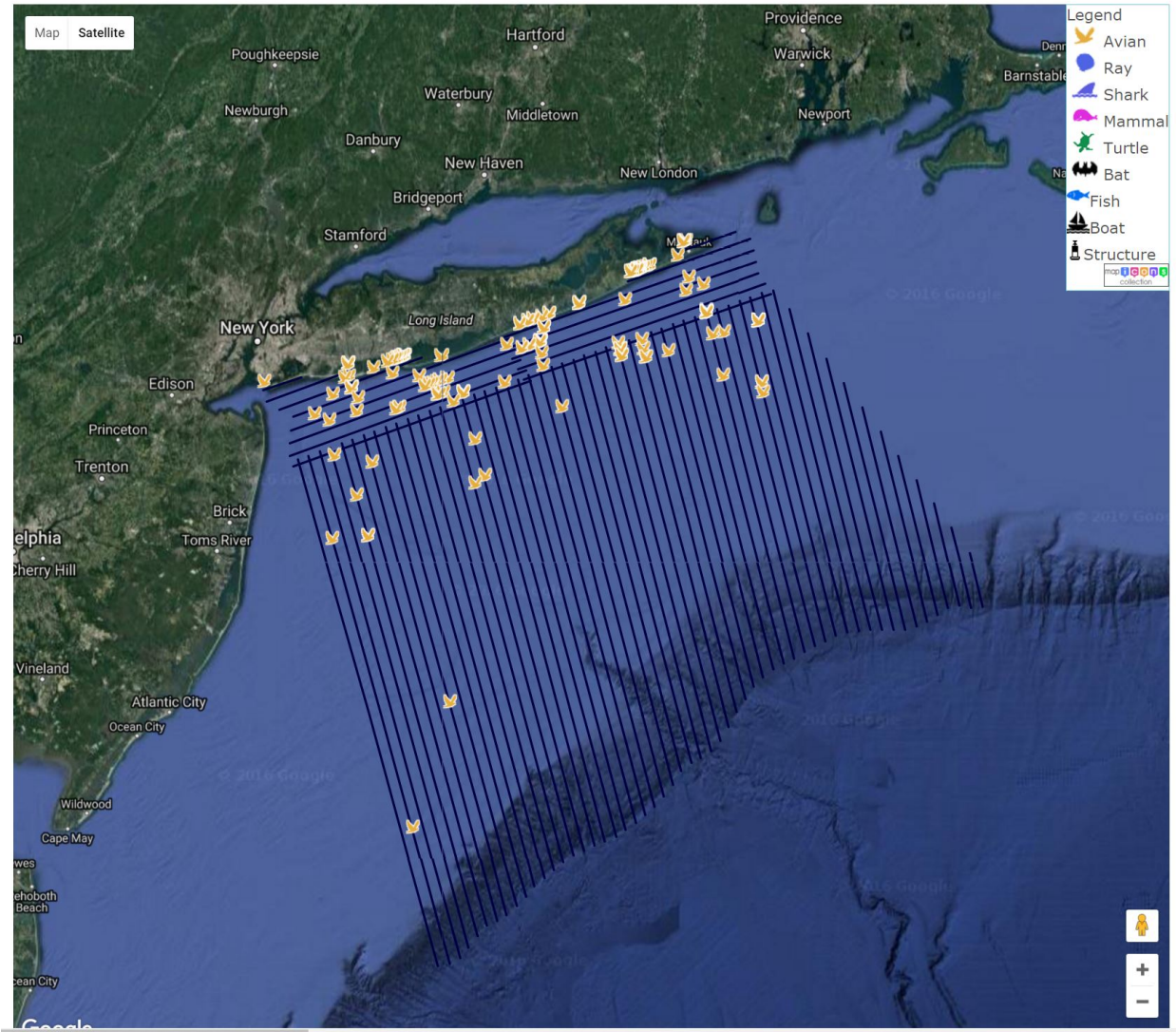
All animals except fish shoals have had their location mapped, and we have very precise location data. Presenting locations of animals spread over such a broad area is difficult as the size of the icon representing the animal suggests a greater spatial use than is real. A better idea of spatial use can be obtained by using the map tool in REMOTE.com, which allows for zoom.

Images below show the locations of the endangered species encountered in the Summer 2016 survey.

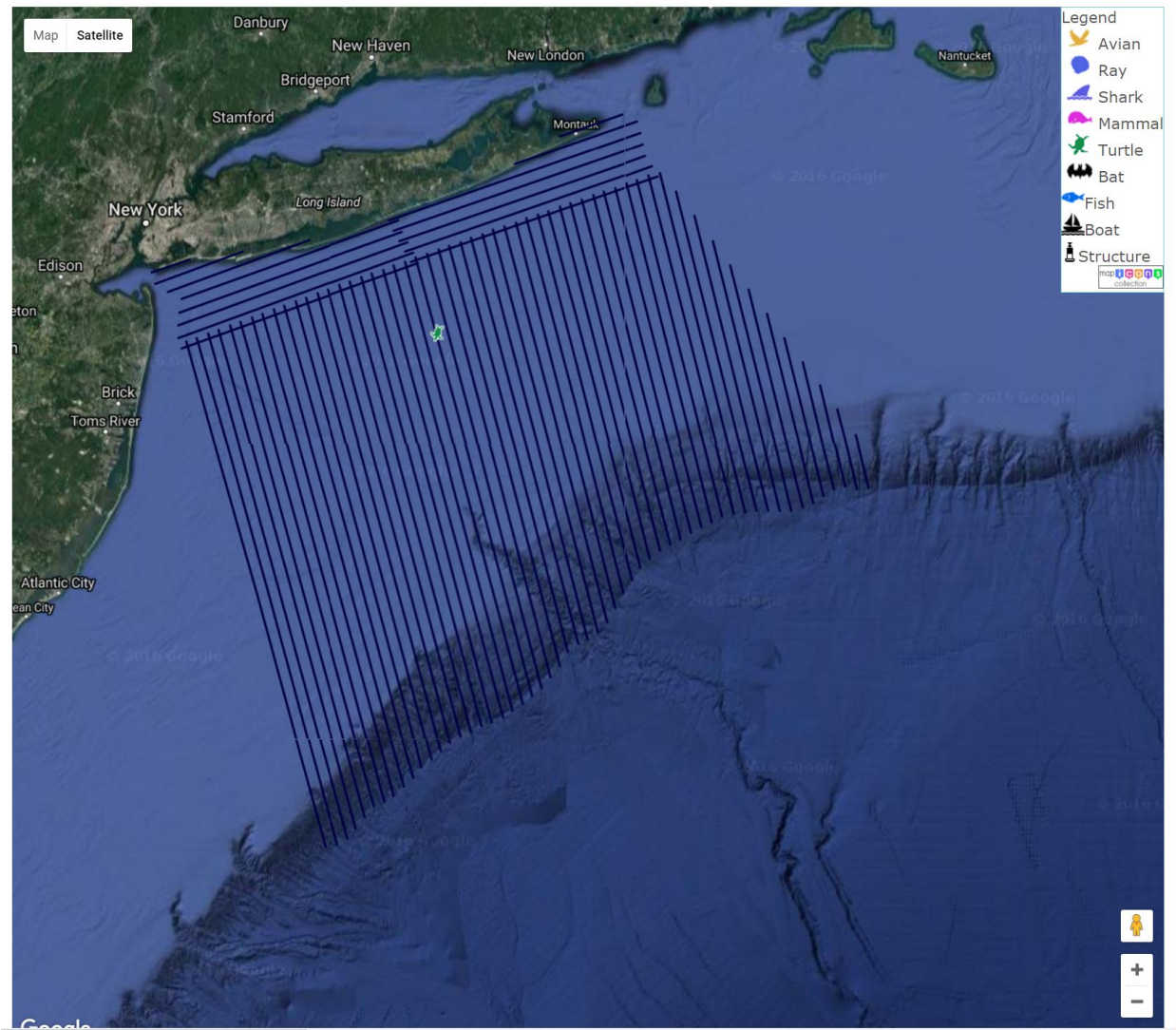
### Citations

NOAA. 2016. Endangered and Threatened Species; Identification of 14 Distinct Population Segments of the Humpback Whale (*Megaptera novaeangliae*) and Revision of Species-Wide Listing; Final Rule. Federal Register 81(174): 62260-62320.

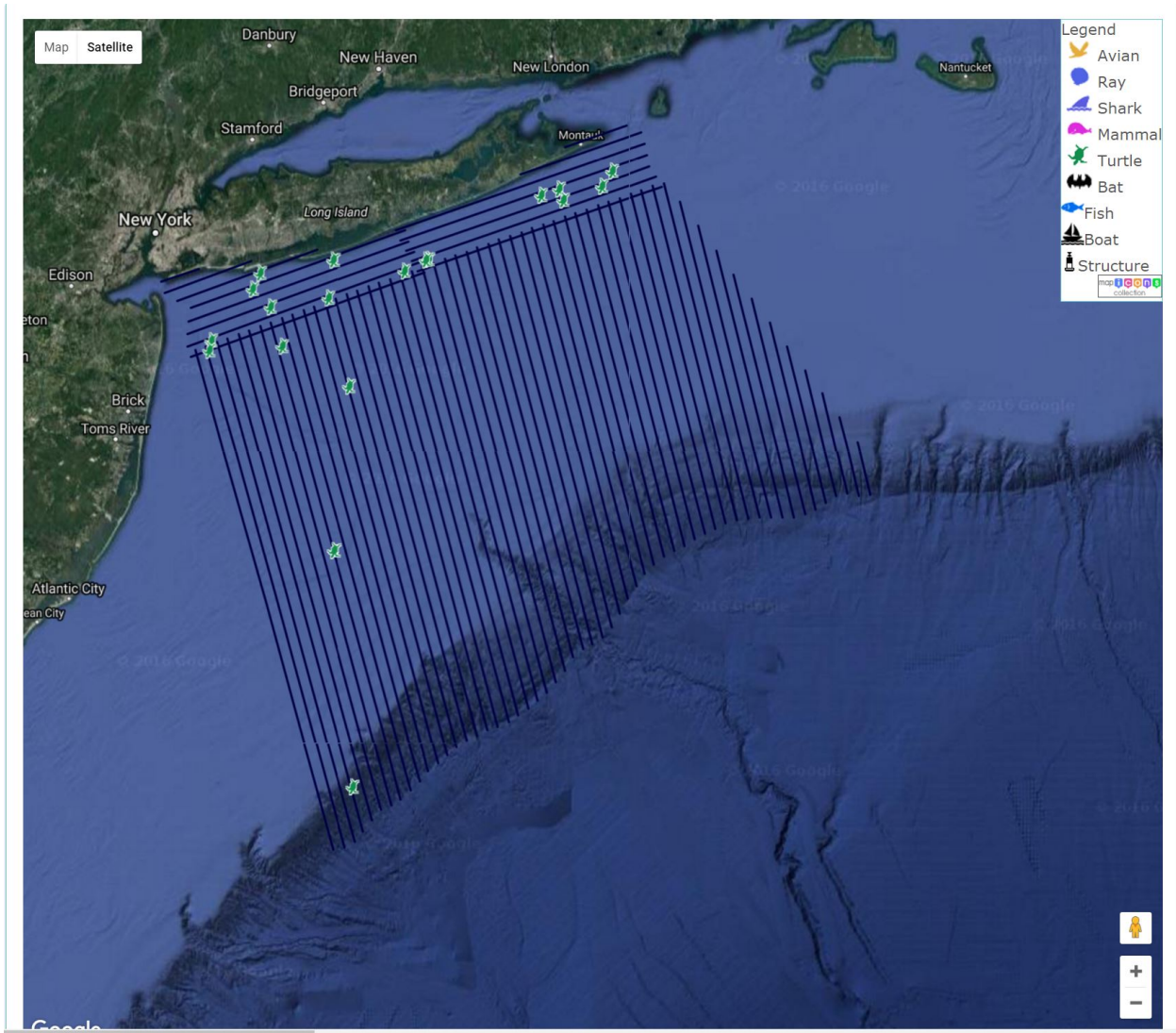
## Sterna Tern



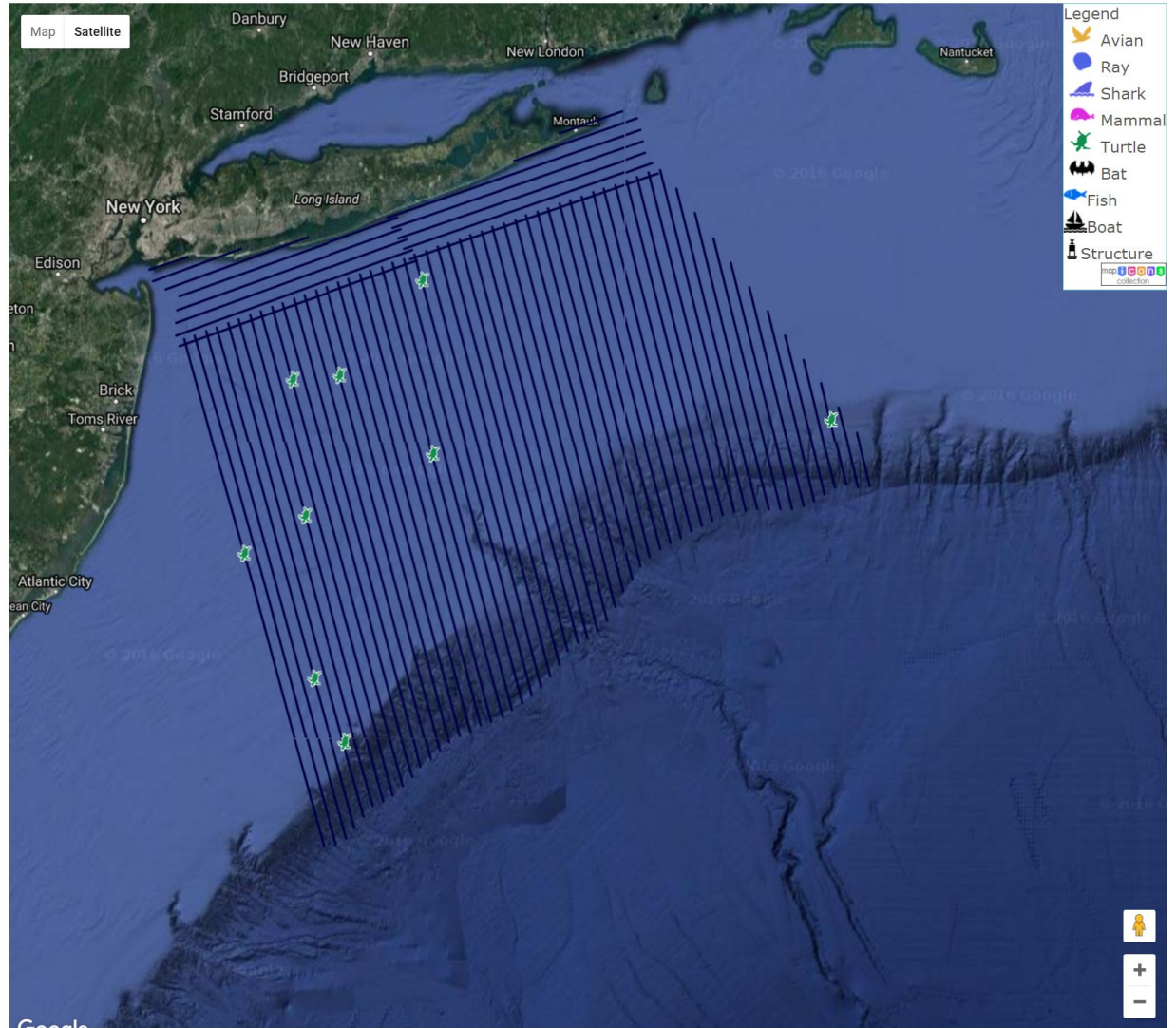
## Green Turtle



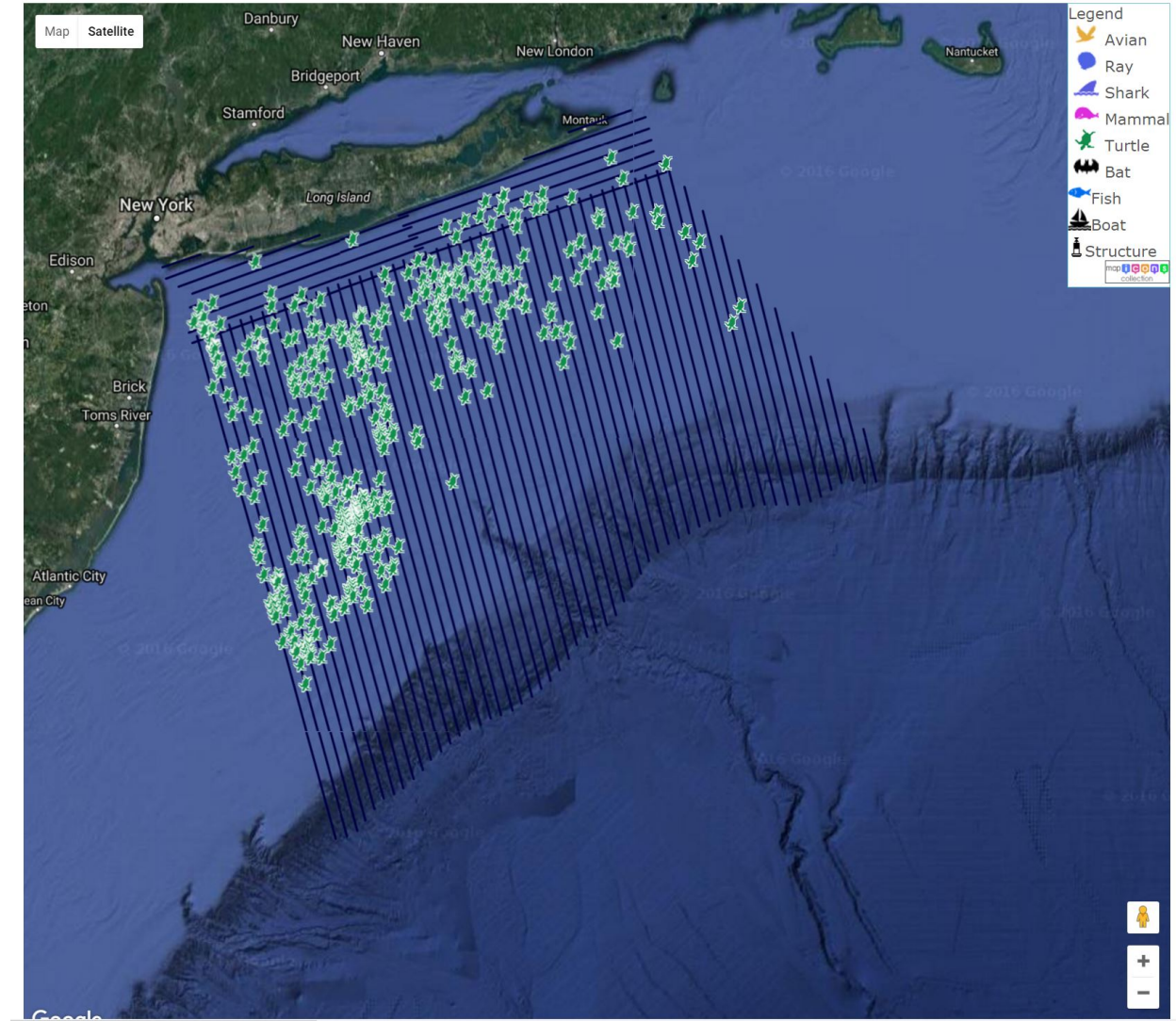
## Kemp's Ridley Turtle



## Leatherback Turtle



## Loggerhead Turtle

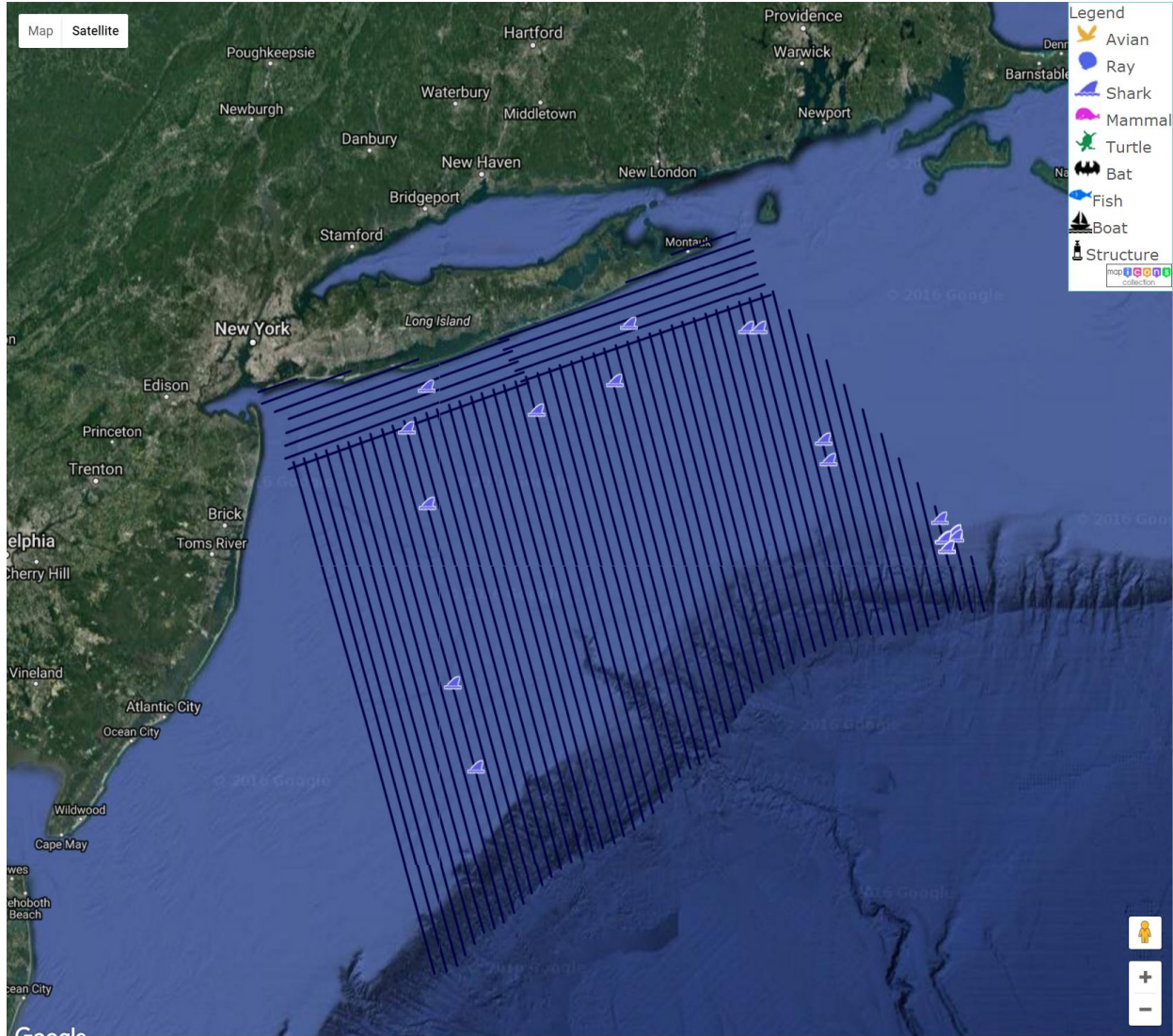


## Fin Whale

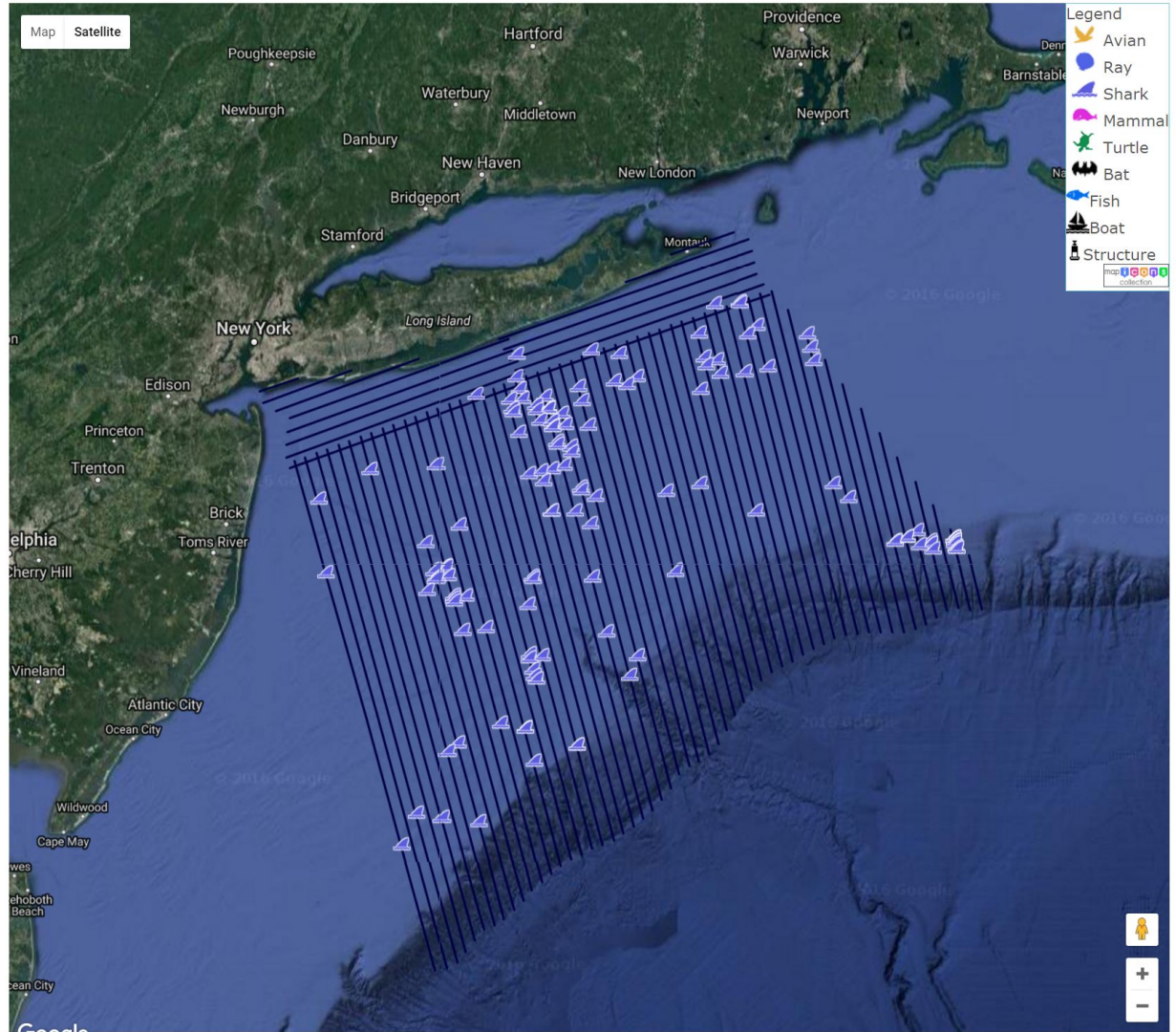




## Scalloped Hammerhead Shark



## Hammerhead (unid.)



**Table 11. List of Species and their scientific names found in Imagery during Summer 2016 surveys**

Subtype: Common Name	Class	Species Order	Family	Scientific Name
Raptor: Bald Eagle	Aves	Accipitriformes	Accipitridae	<i>Haliaeetus leucocephalus</i>
Raptor: Osprey	Aves	Accipitriformes	Pandionidae	<i>Pandion haliaetus</i>
Shorebird: Black-bellied Plover	Aves	Charadriiformes	Charadriidae	<i>Pluvialis squatarola</i>
Gull: Herring Gull	Aves	Charadriiformes	Laridae	<i>Larus argentatus</i>
Gull: Ring-billed Gull	Aves	Charadriiformes	Laridae	<i>Larus delawarensis</i>
Gull: Great Black-backed Gull	Aves	Charadriiformes	Laridae	<i>Larus marinus</i>
Gull: Laughing Gull	Aves	Charadriiformes	Laridae	<i>Leucophaeus atricilla</i>
Tern: Sterna Tern	Aves	Charadriiformes	Laridae	NULL
Tern: Least Tern	Aves	Charadriiformes	Laridae	<i>Sternula antillarum</i>
Tern: Royal Tern	Aves	Charadriiformes	Laridae	<i>Thalasseus maximus</i>
Loon: Common Loon	Aves	Gaviiformes	Gaviidae	<i>Gavia immer</i>
Storm-petrel: Wilson's Storm-Petrel	Aves	Procellariiformes	Hydrobatidae	<i>Oceanites oceanicus</i>
Shearwater: Great Shearwater	Aves	Procellariiformes	Procellariidae	<i>Ardenna gravis</i>
Shearwater: Sooty Shearwater	Aves	Procellariiformes	Procellariidae	<i>Ardenna grisea</i>
Shearwater: Cory's Shearwater	Aves	Procellariiformes	Procellariidae	<i>Calonectris diomedea</i>
Petrel: Black-capped Petrel	Aves	Procellariiformes	Procellariidae	<i>Pterodroma hasitata</i>
Shearwater: Audubon's Shearwater	Aves	Procellariiformes	Procellariidae	<i>Puffinus lherminieri</i>
Cormorant: Double-crested Cormorant	Aves	Suliformes	Phalacrocoracidae	<i>Phalacrocorax auritus</i>
Bony Fish: Ocean Sunfish	Actinopterygii	Tetraodontiformes	Molidae	<i>Mola mola</i>
Ray: Bluntnose Stingray	Chondrichthyes	Rajiformes	Dasyatidae	<i>Dasyatis say</i>
Ray: Giant Manta Ray	Chondrichthyes	Rajiformes	Mobulidae	<i>Manta birostris</i>
Ray: Bullnose Ray	Chondrichthyes	Rajiformes	Myliobatidae	<i>Myliobatis freminvillii</i>
Ray: Cownose Ray	Chondrichthyes	Rajiformes	Rhinopteraidae	<i>Rhinoptera bonasus</i>
Shark: Carcharhinidae (unid.)	Chondrichthyes	Carcharhiniformes	Carcharhinidae	NULL
Shark: Bull Shark	Chondrichthyes	Carcharhiniformes	Carcharhinidae	<i>Carcharhinus leucas</i>
Shark: Oceanic Whitetip Shark	Chondrichthyes	Carcharhiniformes	Carcharhinidae	<i>Carcharhinus longimanus</i>

Subtype: Common Name	Class	Species Order	Family	Scientific Name
Shark: Dusky Shark	Chondrichthyes	Carcharhiniformes	Carcharhinidae	<i>Carcharhinus obscurus</i>
Shark: Sandbar Shark	Chondrichthyes	Carcharhiniformes	Carcharhinidae	<i>Carcharhinus plumbeus</i>
Shark: Tiger Shark	Chondrichthyes	Carcharhiniformes	Carcharhinidae	<i>Galeocerdo cuvier</i>
Shark: Blue Shark	Chondrichthyes	Carcharhiniformes	Carcharhinidae	<i>Prionace glauca</i>
Shark: Scalloped Hammerhead	Chondrichthyes	Carcharhiniformes	Sphyrnidae	<i>Sphyrna lewini</i>
Shark: Great Hammerhead	Chondrichthyes	Carcharhiniformes	Sphyrnidae	<i>Sphyrna mokarran</i>
Shark: Smooth Hammerhead	Chondrichthyes	Carcharhiniformes	Sphyrnidae	<i>Sphyrna zygaena</i>
Shark: Basking Shark	Chondrichthyes	Lamniformes	Cetorhinidae	<i>Cetorhinus maximus</i>
Shark: Great White Shark	Chondrichthyes	Lamniformes	Lamnidae	<i>Carcharodon carcharias</i>
Whale: Common Minke Whale	Mammalia	Cetartiodactyla	Balaenopteridae	<i>Balaenoptera acutorostrata</i>
Whale: Fin Whale	Mammalia	Cetartiodactyla	Balaenopteridae	<i>Balaenoptera physalus</i>
Whale: Humpback Whale	Mammalia	Cetartiodactyla	Balaenopteridae	<i>Megaptera novaeangliae</i>
Dolphin: Short-beaked Common Dolphin	Mammalia	Cetartiodactyla	Delphinidae	<i>Delphinus delphis</i>
Dolphin: Risso's Dolphin	Mammalia	Cetartiodactyla	Delphinidae	<i>Grampus griseus</i>
Dolphin: Common Bottlenose Dolphin	Mammalia	Cetartiodactyla	Delphinidae	<i>Tursiops truncatus</i>
Turtle: Loggerhead/Kemp's Turtle	Reptilia	Testudines	Cheloniidae	NULL
Turtle: Loggerhead Turtle	Reptilia	Testudines	Cheloniidae	<i>Caretta caretta</i>
Turtle: Green Turtle	Reptilia	Testudines	Cheloniidae	<i>Chelonia mydas</i>
Turtle: Kemp's Ridley Turtle	Reptilia	Testudines	Cheloniidae	<i>Lepidochelys kempii</i>
Turtle: Leatherback Turtle	Reptilia	Testudines	Dermochelyidae	<i>Dermochelys coriacea</i>