

NEWS ITEM

FIRST OSTEOLOGICAL COLLECTION OF MARINE MAMMALS FOR PUERTO RICO AND THE VIRGIN ISLANDS

An osteological collection of marine mammals provides a source of valuable information for researchers and is often used for academic teaching and education. Skeletal remains are used in systematics, to determine the physical maturity of specimens, and in documenting injuries, illnesses and abnormalities. This contribution notifies the scientific and academic community of the establishment of such a collection at the University of Puerto Rico Biology Museum, Rio Piedras Campus.

To create the collection, the Caribbean Stranding Network (CSN) collected between 1989 and 1995 skeletal remains from animals stranded in waters of Puerto Rico and the Virgin Islands. Additionally, location and catalog numbers of previously collected specimens were requested from other museums and collections to prepare a list of skeletal voucher material available from the Northeastern Caribbean.

Specimens to be collected were selected based on accessibility to recover or transport the bones (location), size of the animal, and experience on whether the bone cleaning process would yield an appropriate skeleton. Large animals were usually not collected, except for the skull. Calves of well-represented species were not collected because the bones fragment during cleaning. Specimens were collected under the authority of permits issued by the Commonwealth of Puerto Rico's Department of Natural and Environmental Resources and under a letter of authorization from NOAA's National Marine Fisheries Service's Protected Species Management Branch. Manatee skeletal remains were collected under the authority of Fish and Wildlife permits PRT 2-8430 and PRT-684532. The importation of skeletal remains from Caribbean countries was authorized under CITES permits issued to the Fish and Wildlife Service's National Forensic Laboratory.

Skeletons were flensed from flesh, then boiled or macerated in salt or fresh water to remove all remaining tissue. Maceration inside meshed cages (PVC tubes and 2-cm eye plastic mesh) secured under a boat dock yielded a better and faster result. Some large skeletons or bones were left on site and allowed to decomposed over time. Others were cleaned of flesh and bone by placing them inside a barrel filled with tap water. After removal of the remaining tissue, they were immersed in a solution of chlorinated water (calcium hypochlorite 10%) for 1 h and then allowed to air dry and sun bleach for 1 week. Some heavily oiled bones were treated with an ammonia-peroxide solution (ammonium hydroxide 10%, hydrogen peroxide 20-30%) for up to 2 h before chlorination. Specimens were catalogued in a computerized data base (FileMaker Pro) and stored in labeled corrugated cardboard boxes. Small bones were stored in plastic ziploc bags inside the boxes to avoid loss. A collection with its own serial number (MMOC0000), was established within the University of Puerto Rico Biology Museum to house the skeletal remains.

We collected 79 marine mammal specimens and found a total of 25 specimens from Puerto Rico and the Virgin Islands catalogued in collections throughout the world, including 32 West Indian manatees, 71 cetaceans, and one phocid. Table 1 summarizes the data from each specimen catalogued, its CSN salvage field number (NEPST000), and whether its skull, mandible, axial skeleton, vertebrae, ribs, and teeth/baleen are complete (C), partial (P), or not collected (N). The table also details where the remains reside and their accession number. Of the specimens listed, 32 are complete skeletons, 72 are partial skeletons or skeletal parts, and 77 are skulls.

Voucher specimens from the study area were found at New York's American Museum of Natural History—1.0%, Georgia College—1.0%, British Virgin Islands' H.

TABLE 1. Osteological collection for marine mammals stranded in Puerto Rico and the Virgin Islands.

Taxon	Skeletal remains						Resides	Access no.
	Field no.	S	M	T/B	AS	V		
Cetacea-Odontoceti								
Delphinidae								
<i>Steno bredanensis</i> (rough-tooth dolphin)								
NEPST010	N	N	C	N	N	N	UPR BM	MMOC0110
NEPST013	C	C	P	N	N	N	UPR BM	MMOC0001
NEPST121	C	C	P	C	C	C	UPR BM	MMOC0020
NEPST474	N	N	P	N	N	N	UPR BM	MMOC0067
<i>Tursiops truncatus</i> (bottlenose dolphin)								
NEPST016	C	C	N	N	N	N	UPR BM	MMOC0069
NEPST020	C	C	C	P	C	C	US NMNH	142536
NEPST102	C	N	N	N	N	N	UPR BM	MMOC0068
NEPST191	C	C	P	C	C	C	UPR BM	MMOC0035
NEPST314	C	C	C	C	C	C	UPR BM	MMOC0054
NEPST372	C	C	C	C	C	C	UPR BM	MMOC0058
NEPST373	C	N	N	N	N	N	UPR BM	MMOC0109
<i>Stenella frontalis</i> (Atlantic spotted dolphin)								
NEPST014	C	—	—	—	—	—	UZMC	Prodelphinus No. 14
NEPST042	C	—	—	—	—	—	UF FMNH	UF23334
NEPST044	C	—	—	—	—	—	Private coll	EDM808
NEPST058	C	—	—	—	—	—	UZMC	Prodelphinus No. 10
NEPST107	C	C	C	C	C	C	UPR BM	MMOC0013
NEPST111	C	C	C	C	C	C	UPR BM	MMOC0014
NEPST192	C	C	C	C	C	C	UPR BM	MMOC0038
NEPST193	C	C	N	C	C	C	UPR BM	MMOC0039
NEPST232	C	C	P	N	P	C	UPR BM	MMOC0049
NEPST365	C	C	C	C	C	C	UPR BM	MMOC0070
NEPST366	C	C	C	C	C	C	UPR BM	MMOC0065
NEPST367	C	C	C	C	C	C	UPR BM	MMOC0071
NEPST477	C	—	—	—	—	—	UF FLMNH	UF23335
NEPST478	C	—	—	—	—	—	GC	UF23336
NEPST479	C	—	—	—	—	—	UF FLMNH	UF23337
NEPST480	C	—	—	—	—	—	AMNH	239116
<i>Stenella longirostris</i> (spinner dolphin)								
NEPST176	N	N	P	N	N	N	UPR BM	MMOC0030
<i>Stenella coeruleoalba</i> (striped dolphin)								
NEPST029	C	N	P	N	N	N	UPR BM	MMOC0002
<i>Lagenodelphis hosei</i> (Fraser's dolphin)								
NEPST319	C	C	C	C	C	C	UPR BM	MMOC0056
<i>Grampus griseus</i> (Risso's dolphin)								
NEPST173	C	C	C	N	C	C	UPR BM	MMOC0029
<i>Peponocephala electra</i> (melonhead whale)								
NEPST223	C	C	C	C	C	C	UPR BM	MMOC0047
<i>Feresa attenuata</i> (pygmy killer whale)								
NEPST456	C	C	C	C	C	C	UPR BM	MMOC0073
NEPST457	C	C	C	C	C	C	LSCC	—
<i>Globicephala macrorhynchus</i> (shortfin pilot whale)								
NEPST291	C	C	P	N	N	N	UPR BM	MMOC0053
NEPST320	C	C	C	C	N	N	UPR BM	MMOC0074

TABLE 1. Continued.

Taxon	Skeletal remains						Resides	Access no.
	Field no.	S	M	T/B	AS	V		
Kogiidae								
<i>Kogia breviceps</i> (pygmy sperm whale)								
NEPST108	C	N	N	C	C	C	UPR BM	MMOC0011
NEPST200	C	C	P	P	P	P	UPR BM	MMOC0040
<i>Kogia simus</i> (dwarf sperm whale)								
NEPST288	C	C	C	C	C	C	UPR BM	MMOC0051
Physeteridae								
<i>Physeter macrocephalus</i> (sperm whale)								
NEPST038	N	N	P	N	P	N	UPR BM	MMOC0075
NEPST115	C	C	C	C	C	C	UPR BM	MMOC0017
NEPST161	N	C	P	N	N	N	UPR BM	MMOC0076
NEPST168	P	N	N	N	N	N	UPR BM	MMOC0064
NEPST179	N	N	P	N	N	N	UPR BM	MMOC0077
NEPST324	N	C	C	P	N	N	UPR BM	MMOC0078
NEPST460	N	N	P	N	N	N	UPR BM	MMOC0079
Ziphiidae								
<i>Ziphius cavirostris</i> (goosebeak whale)								
NEPST002	C	C	C	N	N	N	FMNH	95286
NEPST003	N	C	N	N	N	N	FMNH	—
NEPST004	N	N	C	N	N	N	Private Collection	
NEPST008	C	N	N	N	P	N	US NMNH	550107
NEPST017	C	N	N	N	N	N	FMNH	99362
NEPST041	N	P	N	N	P	N	US NMNH	504856
NEPST043	C	C	N	N	P	P	UPR BM	MMOC0086
NEPST045	C	C	N	N	N	N	UPR BM	MMOC0087
NEPST101	N	N	N	P	P	P	UPR BM	MMOC0088
NEPST143	C	C	N	N	N	N	UPR BM	MMOC0089
NEPST144	N	N	N	P	P	P	UPR BM	MMOC0112
NEPST145	C	C	N	P	P	P	UPR BM	MMOC0090
NEPST190	N	N	P	P	C	P	UPR BM	MMOC0034
NEPST195	C	C	N	N	N	N	UPR BM	MMOC0037
NEPST280	N	N	C	N	N	N	Private Collection	
NEPST374	N	N	N	P	P	P	UPR BM	MMOC0111
NEPST488	N	N	N	N	P	N	US NMNH	504611
<i>Mesoplodon europaeus</i> (Antillean beaked whale)								
NEPST187	C	C	C	N	N	N	UPR BM	MMOC0032
NEPST233	C	C	C	N	N	N	UPR BM	MMOC0080
<i>Mesoplodon densirostris</i> (dense beaked whale)								
NEPST167	C	N	N	N	N	N	UPR BM	MMOC0027
Cetacea-Misticeti								
Balaenopteridae								
<i>Megaptera novaeangliae</i> (humpback whale)								
NEPST051	N	N	N	N	N	P	UPR BM	MMOC0081
NEPST241	P	P	N	N	N	N	UPR BM	MMOC0082
Unidentified large whale								
NEPST481	N	N	N	N	P	N	UPR BM	MMOC0083
NEPST046	P	N	N	N	N	N	UPR BM	MMOC0084
NEPST464	N	N	N	N	P	N	UPR BM	MMOC0085

TABLE 1. Continued.

Taxon	Skeletal remains						Resides	Access no.
	Field no.	S	M	T/B	AS	V		
Sirenia								
Trichechidae								
<i>Trichechus manatus</i> (West Indian manatee)								
NEPST019	C	C	C	P	P	P	UPR BM	MMOC0009
NEPST069	C	C	C	C	C	C	US NMNH	554181
NEPST070	C	C	C	P	C	C	US NMNH	550416
NEPST071	C	C	C	C	C	C	US NMNH	550417
NEPST072	C	C	C	C	C	C	US NMNH	550418
NEPST073	C	C	C	C	C	C	US NMNH	550419
NEPST075	C	C	C	P	C	C	US NMNH	550420
NEPST078	C	C	C	C	C	C	UPR BM	MMOC0003
NEPST079	C	N	C	C	P	P	UPR BM	MMOC0004
NEPST080	C	C	C	P	N	N	UPR BM	MMOC0005
NEPST085	N	N	N	N	N	P	UF FMNH	13833
NEPST106	N	N	N	P	P	C	UPR BM	MMOC0012
NEPST112	C	C	C	C	C	C	UPR BM	MMOC0092
NEPST113	C	C	C	C	C	C	UPR BM	MMOC0016
NEPST124	C	C	C	C	C	C	UPR BM	MMOC0021
NEPST142	C	C	C	P	P	P	UPR BM	MMOC0022
NEPST149	C	C	C	C	C	C	UPR BM	MMOC0023
NEPST150	C	C	C	C	C	C	UPR BM	MMOC0024
NEPST163	C	C	C	C	C	C	UPR BM	MMOC0025
NEPST164	C	C	C	C	C	C	UPR BM	MMOC0026
NEPST172	C	N	P	N	N	N	UPR BM	MMOC0028
NEPST186	C	C	C	C	C	C	UPR BM	MMOC0033
NEPST194	C	C	C	C	C	C	UPR BM	MMOC0042
NEPST202	C	C	P	P	P	P	UPR BM	MMOC0044
NEPST212	C	C	C	C	C	C	UPR BM	MMOC0094
NEPST230	C	C	C	C	C	C	UPR BM	MMOC048
NEPST234	C	C	C	C	C	C	UPR BM	MMOC050
NEPST282	N	C	N	P	N	P	UPR BM	MMOC045
NEPST290	C	C	C	C	N	N	UPR BM	MMOC052
NEPST294	N	N	N	N	N	P	UPR BM	MMOC093
NEPST329	C	C	C	C	C	C	UPR BM	MMOC057
NEPST469	N	N	N	N	N	P	UPR BM	MMOC091
Carnivora								
Phocidae								
<i>Cystophora crista</i> (hooded seal)								
NEPST222	C	C	C	C	C	C	UPR BM	MMOC046

S = skull, M = mandible, T/B = teeth or baleen, AS = axial skeleton, V = vertebrae, R = ribs, C = complete, P = partial, N = not collected. UPR BM = University of Puerto Rico Biology Museum, MMOC = Marine Mammal Osteological Collection, US NMNH = United States National Museum of Natural History, UF FLMNH = University of Florida—Florida Museum of Natural History, GC = Georgia College, AMNH = American Museum of Natural History, UZMC = University of Copenhagen's Zoologisk Museum, LSCC = BVI's Lavity Stoutt Community College, FMNH = Chicago's Field Museum of Natural History.

Lavity Stoutt Community College—1.0%, Denmark's University of Copenhagen Zoologisk Museum—1.9%, private collections—2.8%, Chicago's Field Museum of Natural History—2.9%, Florida Museum of Natural History—3.8%, US National Museum of Natural History—9.6%, and the University of Puerto Rico Biology Museum—76.0%.

In the University of Puerto Rico collection, 18 species and 74 specimens are catalogued, including 25 West Indian manatees, 53 cetaceans, and 1 phocid. Of the specimens listed, 29 are complete skeletons, 50 are partial skeletons or skeletal parts, and 58 are skulls.

To augment the University of Puerto Rico Marine Mammal Osteological Collection and its use as a comparative collection, additional material was obtained from the United States (Alaska, Florida, Hawaii, Texas, Washington, and California) and from the Caribbean (Venezuela, Dominican Republic, and Cuba), including 10 odontocetes (rough-toothed dolphin, longsnout common dolphin, tucuxi, belukha, dwarf sperm whale, bottlenose dolphin), four baleen plate series (bowhead whale, humpback whale, fin whale), two Florida manatees, two phocids (Hawaiian monk seals), three otterids (California sea lion and northern fur seal), and three sea otters.

Skeletal remains of marine mammals have been collected throughout the Gulf of Mexico (Jefferson, T. A. and G. D. Baumgardner. 1997. Osteological specimens of marine mammals [Cetacea and Sirenia]

from the western Gulf of Mexico. *Texas Journal of Science* 49[2]:97–108), the Caribbean, and in Venezuela, Colombia and Mexico, where they are catalogued in curated collections. In other countries, marine mammal bones are kept in private collections or in government offices as souvenirs of unusual stranding events. The collection at the University of Puerto Rico is the first dedicated and curated marine mammal collection for the Caribbean. It will help researchers and the scientific community, both local and international, to study and better understand this protected and endangered Caribbean fauna.

We thank Caribbean Stranding Network participants for securing carcasses as well as volunteers for assisting in the cleaning and storage of bones. We also appreciate the assistance of Dr. J. M. Vélez, Dr. R. Thomas, and Dr. C. Duckett from the Biology Museum for authorizing the establishment of the marine mammal collection. Data of specimens in other museums was kindly provided by Dr. J. G. Mead. We also would like to acknowledge the contribution of all the organizations which provided specimens for the collection.

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