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James N. Layne



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OBSERVATIONS ON MARINE MAMMALS IN FLORIDA WATERS

JAMES N. LAYNE¹

SYNOPSIS: Data are presented on the distribution, measurements and weights, ecology, and other aspects of the biology of 12 species of cetaceans, one pinniped, and the manatee in Florida waters. Most of the records are for the period from 1953 through June 1963, although some for earlier years are included.

Records of cetaceans based on strandings or specimens washed onshore, dead specimens seen or collected in offshore waters, and skeletal materials from beaches include a probable one of the little piked whale (*Balaenoptera acutorostrata*), 1 of the humpbacked whale (*Megaptera novaeangliae*), 3 of the goose-beaked whale (*Ziphius cavirostris*), 7 of the pygmy sperm whale (*Kogia breviceps*), 2 of the sperm whale (*Physeter catodon*), 1 of the rough-toothed dolphin (*Steno bredanensis*), 18 verified or probable records of the short-finned pilot whale (*Globicephala macrorhyncha*), 17 verified or probable records of the bottle-nosed dolphin (*Tursiops truncatus*), 2 of the common dolphin (*Delphinus delphis*), and 1 of the long-beaked dolphin (*Stenella longirostris*). The latter is the second record of this species in Florida waters and apparently the third for North America.

Observations on living cetaceans include 16 and possibly 18 verified or probable records for the Atlantic right whale (*Balaena g. glacialis*), 1 for the humpback whale, 2 for the killer whale (*Orcinus orca*), 3 and a possible 4th for the short-finned pilot whale, and 10 for the bottle-nosed dolphin. The sight record of the humpback whale apparently constitutes the first record of this species in the Gulf of Mexico.

External, skeletal measurements, or both, of Florida specimens of *Megaptera*, *Kogia*, *Physeter*, *Steno*, *Globicephala*, *Tursiops*, *Delphinus*, and *Stenella longirostris* are given.

One pinniped record obtained was of the California sea lion (*Zalophus californianus*), and another probably also refers to this species. Both undoubtedly involve animals escaped from captivity. One individual apparently moved approximately 100 miles from where it escaped in about 10 days.

Twenty-five records of dead manatees (*Trichechus manatus*) and 5 sight records are summarized. Of the former, 10 individuals had apparently been killed by cold, 3 by boats, and 2 by shooting. The cause of death of the remainder is unknown, although the death of 7 individuals in the Fort Myers area in the spring of 1963 coincided with a red tide epidemic in the Gulf to the north. Further evidence of the occurrence of seasonal movements in Florida manatee populations is presented.

¹ Associate Professor of Zoology, Division of Biological Sciences and Department of Conservation, Cornell University, Ithaca, New York, and Research Associate in Mammalogy, Florida State Museum. The present paper is an outgrowth of an investigation of the status of North American marine mammals undertaken by the Committee on Marine Mammals of the American Society of Mammalogists. The writer represented the Florida sector on the Committee from 1959 to 1963.

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INTRODUCTION

In his summary of the available data on the occurrence of marine mammals in Florida waters from the late 1800's through 1951, Moore (1953) listed 18 species of cetaceans, 2 of pinnipeds, and the manatee. Although no additional species have been added to the known marine mammal fauna of Florida since this study, further records of the following have been published: *Balaena glacialis* (Moore and Clark, 1963), *Balaenoptera acutorostrata* (Moore and Palmer, 1955), *Ziphius cavirostris* (Hansen and Weaver, 1963; Wood and Moore, 1954), *Mesoplodon gervaisi* (Moore, 1960), *M. mirus* (Moore and Wood, 1957), *Kogia breviceps* (Caldwell, Inglis, and Siebenaler, 1960; Essapian, 1955), *Physeter catodon* (Caldwell, Inglis, and Siebenaler, 1960), *Pseudorca crassidens* (Bullis and Moore, 1956), *Orcinus orca* (Caldwell, Layne, and Siebenaler, 1956), *Delphinus delphis* (Essapian, 1954), and *Stenella plagiodon* (Caldwell, 1960). Several papers concerning vari-

ous aspects of the ecology, life history, and behavior of the bottle-nosed dolphin, *Tursiops truncatus*, and manatee, *Trichechus manatus*, in Florida waters have also appeared (Caldwell, 1955; Caldwell and Fields, 1959; Moore, 1955, 1956; Siebenaler and Caldwell, 1956).

The purpose of this paper is to provide a further contribution to the knowledge of the distribution and biology of the marine mammals of the Florida region. Although several records for the period covered by Moore's report are included, the bulk of the data presented are for the period from 1952 through June, 1963.

ACKNOWLEDGMENTS

I am indebted to a number of persons who have contributed information contained in this report. Particular thanks are due F. G. Wood, Jr., U. S. Naval Missile Center, Pt. Mugu, California, who, while on the staff of the Marineland Research Laboratory, generously allowed the use of the files on marine mammals maintained by Marine Studios and kindly reviewed an earlier draft of this paper. Joseph C. Moore, Chicago Natural History Museum, also contributed much useful information from his notes and correspondence. He also aided in the identification of several skeletal elements and critically read an earlier version of the paper. F. C. Fraser, British Museum (Natural History), was most helpful to me in questions relating to the identification of *Stenella longirostris* and made available pertinent notes, measurements, and photographs from his files. Grateful acknowledgment is also made to the following persons who supplied specimens or observations: C. Herrick Hammond, Delray Beach, Florida; Robert M. Ingle, Florida State Board of Conservation; W. L. Jennings, Florida State Board of Health; S. J. Olsen, Florida Geological Survey; E. Lowe Pierce, University of Florida; William B. Robertson, Jr., Everglades National Park; David Swindell, Florida Game and Fresh Water Fish Commission; Marvin Wass, Western Carolina College; and Glen E. Wolfenden, University of South Florida. Thanks are also due Dale E. Birkenholz, Illinois State University, for welcome assistance in measuring and examining specimens in the field on several occasions. Gilbert Voss, University of Miami, identified the cephalopod beaks and Mrs. John Taylor the algae contained in stomachs of rough-toothed dolphins. Douglass M. Payne, Cornell University, aided in the preparation of the illustrations.

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SPECIES ACCOUNTS ²*Balaena glacialis glacialis* Müller

NORTH ATLANTIC RIGHT WHALE

True (1904) stated that the regular wintering grounds of the Atlantic right whale probably extended southward to South Carolina and the Bermuda Islands, whereas Allen (1908) regarded Florida and the Bermudas as the southern limits of its range. Moore (1953) cited three records involving seven individuals along the Florida east coast, and Moore and Clark (1963) reported the first known occurrence of this species in the Gulf of Mexico. Additional records of right whales off the Florida east coast in recent years are summarized below. Most of the data presented are from the files of Marine Studios, and many of the observations were made by F. G. Wood, Jr.

On 7 January 1953, Wood observed a pair of whales accompanied by a group of 10 to 12 *Tursiops* about 2 miles S of Flagler Beach (Flagler Co.) about 300 to 400 yards off shore. The two individuals showed a pronounced size discrepancy and were thus presumed to be an adult female and a calf. When first observed the larger individual was swimming slowly in circles at the surface. It then partly submerged and swam leisurely southward. The dolphins escorting it swam aimlessly about nearby while the whale remained in the same area but followed on a direct course when it moved off. The smaller individual of this pair surfaced to breathe at intervals of 7 to 20 seconds. As the larger remained partially awash nearly all of the time it was being watched, the frequency of its breathing could not be determined. When surfacing and submerging, the adult tended to keep its body relatively straight, whereas the calf arched its body markedly.

On 9 February 1954, an adult approximately 50 feet in length accompanied by a smaller individual about 20 feet long, apparently a calf, was seen near Summer Haven (St. Johns Co.). Observers in a small boat were able to approach closely and photograph the pair without visibly disturbing them.

On 15 March 1957 a Marine Studios collecting vessel sighted an adult about 2 or 3 miles off St. Augustine (St. Johns Co.). Its length was estimated as 30 feet. During most of the time this individual was under observation it remained at the surface, swimming clumsily with exaggerated movements that brought the flukes clear of the

² Common and scientific names of cetaceans for the most part follow Scheffer and Rice (1963) and the sequence of genera is that of Fraser and Purves (1960).

water at each stroke. Occasionally it lay quietly at the surface, and the few times it dove it remained submerged for no more than 3 to 4 minutes. Two more individuals were observed about $\frac{1}{4}$ mile offshore and 1 mile S of Crescent Beach (St. Johns Co.) on the same date; both appeared to be adults, and the owner of a motel in the vicinity reported they remained in the same general area throughout the day. On 25 March 1957, 2 right whales were seen off Marineland (Flagler Co.).

On 20 January 1959 F. G. Wood observed an adult *Balaena* a few hundred yards off Marineland. On 22 February 1959 a resident of South Ponte Vedra Beach (St. Johns Co.) reported seeing a "big whale about 40 feet long," probably a right whale also, about $\frac{1}{2}$ mile offshore.

Wood informed me that Marine Studios personnel sighted no right whales during the winters of 1959-60 and 1960-61 and that only second or third-hand reports of one or two sightings had been received each season.

In contrast a number of records are available for 1962 and 1963. On 30 January 1962 a large whale, presumably this species, was seen close to shore just north of Flagler Beach. It swam north during the time it was observed and was reported to be accompanied by several large sharks. When queried about the latter identification, the observer, reportedly an experienced fisherman, insisted that the animals were sharks and not dolphins, which appear to often be associated with right whales in Florida waters. Another large whale reported swimming south the same day about 2 miles from the above may or may not have been the same individual.

Wood judged 2 right whales seen about 300 yards offshore about $1\frac{1}{2}$ miles N of Marineland on 1 February 1962 to be an adult female and a yearling calf. The first was about 50 feet in length, the other 25 to 30 feet long. The two animals remained close together while under observation.

According to the Orlando Sentinel of 14 March 1962, two whales were seen about 300 yards offshore at Canova Beach (Brevard Co.) on the previous day. Observers reported that one of the individuals was about 35 to 40 feet long, the other much smaller, a "... good 7 or 8 feet," and presumably a calf. Although this estimate is too low even for a newborn right whale, it does suggest a very small individual. Some observers reported seeing the larger whale buffeted by a school of porpoises. A local resident also claimed that two whales, possibly the same pair, had been seen in the same vicinity in late February.

The Marine Studios records contain several reports of one or more

whales, assumed to be *Balaena*, in the vicinity of Flagler Beach during the third week in March 1962.

Two newspaper accounts of whales along the Florida east coast in January and one in February 1963 probably refer to this species, although in neither case is enough information given for positive identification. On 10 January a whale estimated at 30-40 feet in length came within 400 feet of a fishing pier at Daytona Beach (Volusia Co.). Another appeared off South Ocean Beach Park at Vero Beach (Indian River Co.) on 23 January. When first seen this whale was within about 150 feet of the beach and surrounded by dolphins. Another whale, probably the same individual and also accompanied by dolphins, was seen in the same area on the following day. According to the Vero Beach Press-Journal both were reported by a city lifeguard, Richard DeCarlo, who added that in 1961 a large whale came to within 200 feet of shore at this locality and gave birth to a calf, and that two whales were seen in the area in 1962.

The Palm Beach Post of 7 February 1963 carried a story of a whale seen north of Jupiter Inlet (Martin Co.) on 5 February. The article noted that one observer reported seeing the whale jump out of the water.

The present data for *Balaena glacialis* in Florida coastal waters indicate that the species' occurrence is strongly seasonal. All sightings on record fall between early January and late March; there are 5 records for January, 4 for February, and 9 for March. Sightings along the Florida east coast have apparently increased over the past few years, particularly in the vicinity of the Marine Studios where reasonably constant observation effort from one year to the next may be assumed. This may also indicate a general increase in the western North Atlantic population of this species, which Moore and Clark (1963) suggested as possibly explaining the first known occurrence of the species in the Gulf of Mexico.

The apparent change in the relative frequency of pairs and single adults during the three-month period from January to March might be of biological significance. Half of the total sightings (9 of 18) are of pairs believed, because of pronounced size discrepancy and in some cases of behavior suggestive of nursing, to be adult females with calves. The five observations available for January involve four single adults and one pair. In contrast, three of the four February sightings and five of the nine March records consisted of pairs. This suggests the possibility of different migratory patterns or wintering areas among segments of the population. Adult males and perhaps females without young may start moving northward earlier than

females with calves, or the latter may tend to come closer inshore later in the season. The rather tenuous evidence of calving in Florida waters cited above may also be relevant to this point.

? *Balaenoptera acutorostrata* Lacépède

LITTLE PIKED WHALE

A small fin whale that stranded in shallow water off Pine Island in the Gulf of Mexico near the town of Bayport (Hernando Co.) 14 November 1962 is questionably referred to this species, primarily on the basis of size. Joe Plummer, who was one of the first persons to examine the whale, informed me in a letter dated 31 December 1962 that it was 30 feet long from tail to the end of the snout by actual measurement (whether straight line or over the curve of the body was not stated) and that the upper parts were dark blue and the belly white. He could provide no additional information on such critical details as the length or color of the baleen plates, color of the upper surface of the flippers, or color of the underside of the flukes. Photographs in the St. Petersburg Times 16 November 1962 and Brooksville Sun-Journal 22 November 1962 confirm the approximate size of the specimen by the human figures standing by it, but they do not show the flippers clearly enough to reveal whether the diagnostic whitish patch of *B. acutorostrata* is present or absent. In one photograph the upper surface of the flipper is partly obscured by letters painted on by an enterprising local motel owner.

The whale was alive and thrashing about when first discovered and had several wounds in the back and tail region that appeared to have been made by large caliber bullets.

Megaptera novaeangliae (Borowski)

HUMPBACK WHALE

Although Townsend's (1935) charts show humpback whales in the western North Atlantic occurring within about 40 miles of the Florida coast and Brown (1958) reports a sighting of 7 individuals in the Bahamas, apparently no previous Florida records of this species have been based upon actual specimens.

In October 1957 the hind portion of a large whale skull washed up on the beach at the home of C. Herrick Hammond of Delray Beach (Palm Beach Co.). Photographs of the skull were submitted to Remington Kellogg of the U. S. National Museum who identified the skull as that of *Megaptera novaeangliae*. Some measurements of this

partial skull, which is now on the beach at the Hammond residence, are: greatest breadth across squamosal processes 1524 mm, greatest breadth across occipital condyles 483 mm, greatest length of left occipital condyle 254 mm, greatest breadth of left occipital condyle 152 mm.

On 8 April 1962 fishing boats encountered a large whale in the Gulf of Mexico off Egmont Key at the mouth of Tampa Bay. The whale was identified in newspaper accounts as a humpback, and descriptive details provided by various newspaper articles and David Haile, who was on the scene, together with photographs (Fig. 1) the St. Petersburg Times made available to me confirm the identification. Observers expressly mentioned the presence of exceptionally long flippers, and photographs clearly show the characteristic dorsal fin of *Megaptera*. The blow, shown in one picture, is approximately 6 or 7 feet high and appears more or less pear-shaped, closely resembling that of the humpback as figured and described by Slijper (1962, fig. 56, pp. 117-119).

The whale remained in the area throughout the day and, according to observers, spent much of its time at the surface and doing little actual swimming. It showed no evident concern for the small boats that trailed it closely most of the day, and even remained at the surface when they approached within a few feet.

Ziphius cavirostris G. Cuvier

GOOSE-BEAKED WHALE

Previous records for *Ziphius cavirostris* in Florida waters consist of six substantiated by skeletal material and one observation unsupported by a specimen (Ulmer, 1941; Moore, 1953; Wood and Moore, 1954; Hansen and Weaver, 1963). Three additional records for the region follow:

Joseph M. Philip of Stuart, Florida, found a rather well-worn skull of a beaked whale on Hobe Sound Beach (Martin Co.) about 1955. Photographs of the specimen were sent to Joseph C. Moore, who identified it as an adult male *Z. cavirostris*.

In the collection of the Marineland Research Laboratory is the skull of a goose-beaked whale that stranded at St. Augustine Beach (St. Johns Co.) in June 1957. The whale was reported to have been on the beach on 19 June, but the date on which it actually came ashore is not known. On 21 June the carcass was buried with a bulldozer, the skull being recovered 6 weeks later. The well developed teeth in the tip of the lower jaw suggest the skull is that of a male.

On 1 November 1957 a University of Florida mammalogy class

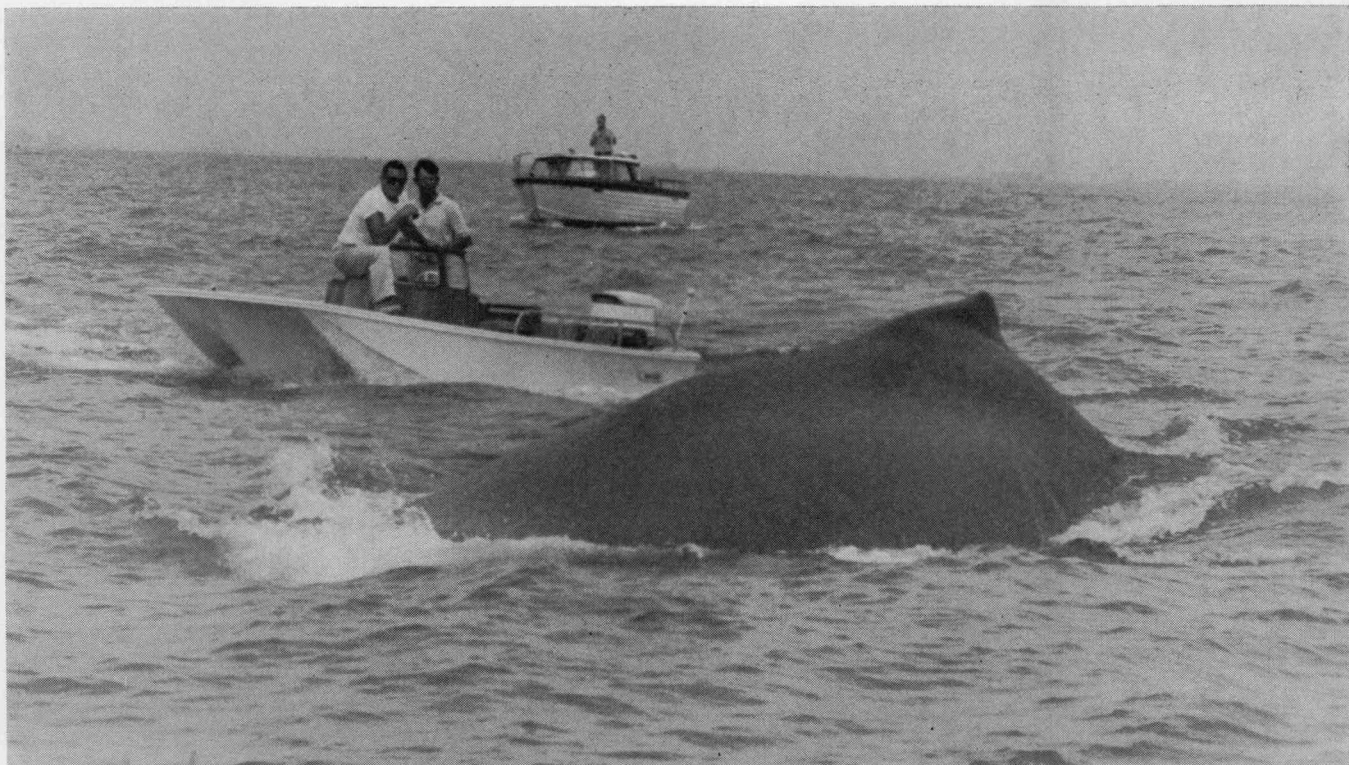


FIGURE 1. Humpback whale (*Megaptera novaeangliae*) at surface. Gulf of Mexico off Egmont Key at the mouth of Tampa Bay, 8 April 1962. (Photography by Dan Hightower, courtesy of St. Petersburg Times.)

collected several cetacean vertebrae at the north end of Anastasia Island (St. Johns Co.) behind the dunes at some distance from the open beach. No other skeletal elements were located in the vicinity. By comparing these vertebrae, No. 4621 in the University of Florida mammal collection, with materials in the Chicago Natural History Museum collections, Joseph C. Moore identified them as *Ziphius*.

Kogia breviceps (Blainville)

PYGMY SPERM WHALE

Arthur McBride in a letter to Remington Kellogg dated 30 September 1946 stated that he had seen five specimens of the pygmy sperm whale beached within 10 miles of Marineland in a period of 9 years. Moore (1953) cited seven records of this species in Florida waters, and Essapian (1955) and Caldwell *et al.* (1960) each provided another. A number of additional records for the period 1955 to 1962 have been obtained.

A photograph published 1 February 1955 in the Daytona Beach Morning Journal showed a specimen that washed ashore 3 miles N of Ormond Beach (Volusia Co.) on 29 January. Its length was stated as 14 feet and its weight as about 1,400 pounds. The animal was dead when discovered and bore a wound near the head.

A male *Kogia* that stranded just north of Palm Beach (Palm Beach Co.) 8 April 1955 was alive when discovered but died shortly afterward. Al Pflueger of Miami placed it in a refrigerated room where Joseph C. Moore examined it the next day and sent me the following data from his notes: The flippers and flukes of the whale were black above and white flecked with irregular blotches of black beneath; the black patches were more strongly developed on the flukes than on the flippers. The anterior teeth were blunt from wear, the front ones having only about $\frac{1}{2}$ inch of the crowns exposed above the gum line; the teeth in the more posterior part of the series were characteristically long, sharp, and curved backward; 12 exposed teeth were counted on the right side and 10 on the left, from which 2 teeth were obviously missing. The genital groove was 10 inches long and the dissected penis was approximately 24 inches long. The combined weight of the testes was 12 pounds. Moore's body measurements of this specimen are given in Table 1.

The Marine Studios files record *Kogia* strandings in 1957 and 1958. On 1 March 1957 F. G. Wood, Jr., examined a male stranded on the south side of St. Augustine Inlet. Local residents told Wood the whale had come ashore several days before and a bulldozer operator

working nearby shoved the animal back into the water two or three times only to have it beach itself again each time. The right and left testes were 485 and 500 mm long respectively and together weighed 13 pounds, 1 ounce. Cephalopod beaks were recovered from the second stomach. Wood's body measurements of this individual are given in Table 2. The skull is now in the collection of the Marineland Research Laboratory.

A young male *Kogia* stranded on the beach adjacent to Marineland on 2 September 1958. The animal was alive when found and was transferred to one of the dolphin tanks at Marine Studios, where it survived until 27 September. Wood took the following notes and measurements on the carcass: The thickness of the blubber on various parts of the body was as follows—venter just posterior to sternum 20 mm, neck 8 inches posterior to blowhole 27 mm, middle of side below origin of dorsal fin 26 mm, side below tip of dorsal fin 23 mm. The left testis was 110 mm in length. The body and skull measurements of this specimen, now No. 5857 in the University of Florida mammal collection, are given in Tables 2 and 3, respectively. As this animal was a juvenile, its measurements are useful in assessing the degree of ontogenetic variation in body and skeletal proportions in this species.

On or about 7 March 1960 a small whale was sighted just off the beach about 2 miles S of St. Augustine Beach. It later washed up dead on shore and was buried before it could be examined, but from the description a local resident gave F. G. Wood a short time later there can be little doubt that it was a *Kogia*.

Robert Christensen, while a graduate student at Florida State University, informed me of an individual found on the beach at Jupiter Island about 1 mile N of Jupiter Inlet (Palm Beach Co.) 23 December 1960. The whale was at the edge of the wave zone when first seen and was still alive, but bleeding from the vent, perhaps from internal wounds received from being pounded on nearby rocks by the waves. There were no obvious external wounds. The specimen, believed to be a female, was about 6 feet long. It was photographed in the flesh and the skeleton was prepared.

On 23 December 1961 a pygmy sperm whale approximately 10 feet long washed ashore dead at Key Biscayne south of Miami Beach (Dade Co.). A photograph of the ventral aspect of the whale published in the Miami Herald of 24 December clearly shows the salient characteristics. The animal was a male and the venter was rather heavily marked with dark, irregular spots.

Another animal came ashore at Hallandale Beach (Broward Co.)

on 24 August 1962. The whale was alive though bleeding when discovered and was being pounded heavily by waves. When pushed back into the water it attempted to beach itself again. It finally died while an effort was being made to pull it out of the waves onto the beach. It was reported to be 12 feet long and to weigh 1,140 pounds.

Table 4 gives additional body measurements of a *Kogia* (female) from Florida. Extracted from the Marine Studios files copy of a letter from Arthur McBride to Remington Kellogg, they were presumably made by McBride.

Gunter *et al.* (1955) suggested that the pygmy sperm whale population in the western North Atlantic may shift northward during the summer. Of the 31 Gulf of Mexico stranding records available to them, none occurred in June, July, or August, and only two in May. Fourteen dated records from Florida waters exhibit a similar seasonal trend, none occurring from May through July and only one in August.

Except for the summer scarcity, the total stranding records for Florida waters show no obvious seasonal peaks, there being 4 in the September-November interval, 4 in the December-February period, and 5 from March through May. However, the apparent frequency of strandings shows a marked contrast between the northern and southern parts of the Atlantic coast, using Melbourne (Brevard Co.) as an arbitrary dividing line, with 14 records from the northern sector and 5 from the southern. Even admitting the undoubtedly higher probability of cetacean strandings being recorded in the vicinity of Marineland in northern Florida, the difference still seems pronounced enough to be real. The limited data give no clear indication of any seasonal differences in the occurrence of strandings in the two sectors.

To summarize further, the strandings of *Kogia* on the Florida coast show no differences in overall sex ratio. Of 11 individuals of known sex, 5 were males and 6 females. Considered on a seasonal basis, however, the data suggest the possibility that females may strand more frequently during fall and early winter. Two of five male strandings occurred in the September-December period in comparison to four out of six female records. Moore's (1953) report of a stranded female that gave birth to a calf in November and another with a calf (size not stated) stranding in September suggest the possibility that adult females may frequent inshore waters to give birth to young or when accompanied by young calves and at such times may be more vulnerable to stranding.

Another aspect of the Florida *Kogia* data worth noting is the

marked discrepancy between the number of strandings known for the Gulf (2) and Atlantic coasts (19). A difference in the probability of strandings being reported on the two coasts may account for some of the disparity, but the paucity of records on the Florida west coast as well as for the Gulf as a whole is suggestive of a low population. Although Davies (1963) regards *Kogia* as one of a group of basically tropical cetaceans with a relatively wide temperature tolerance, Gunter *et al.* (1955) suggest that it may be an example of a species showing an antitropical distribution. As evidence they point to the lack of records of *Kogia breviceps* in the western North Atlantic south of the Gulf of Mexico. If the latter hypothesis is correct, the apparent scarcity of pygmy sperm whales in the Gulf of Mexico could be attributed to the fact that only a small segment of the western North Atlantic population ranges far enough south to gain access to these waters.

Physeter catodon Linnaeus

SPERM WHALE

Although compilations of whaling and sighting records (Townsend, 1935; Gilmore, 1959; Slijper and Utrecht, 1959) indicate the sperm whale is not uncommon in the Gulf of Mexico and western North Atlantic in the latitude of Florida, only six records based on strandings or skeletal remains have previously been available for the Florida coasts (Moore, 1953; Caldwell *et al.* 1960). Two additional records are noted below:

A photograph of a sperm whale that had become trapped in shallow water about 12 miles off Marco Island (Collier Co.) in the Gulf of Mexico in 1956 appeared in the Collier County News of 7 July 1963. According to reports, the whale was 54 feet long.

C. Herrick Hammond told me of a dead whale that washed into shallow water at Delray Beach (Palm Beach Co.) in the summer of 1958. The animal floated in the surf for several days and was finally buried on the beach at the home of Harold Roig. Later a portion of the skull was exhumed during the building of some concrete structures on the beach near the burial site. I examined this partial skull, which is being kept as a souvenir at the Roig home, in August 1960. The fragment consists of most of the right half of the rostrum and a small portion of the facial region. The shape of the intact part of the rostrum, presence of a basirostral notch, position of various foramina, and size (length from basirostral notch to tip of rostrum, 1937 mm), show the skull to be that of *Physeter catodon*. A figure of a sperm whale skeleton and body outline given by Lydekker (1894-95)

indicates that rostral length is contained about 4.6 times in total length, from which the length of the Delray Beach specimen in the flesh may be estimated at approximately 30 feet. The apparently small size of this individual suggests that it may have been a young male or an adult female.

Steno bredanensis (Lesson)

ROUGH-TOOTHED DOLPHIN

The basis for the previous inclusion of this species in the list of cetaceans known from Florida waters is a specimen in the U. S. National Museum from Tampa (Miller, 1924). Moore (1953) noted of this record, however, that in the absence of further information about the circumstances under which the specimen was obtained, the possibility that it might have been brought in on a ship from elsewhere should not be ignored. A mass stranding in 1961 on the upper east coast of the Gulf of Mexico now definitely establishes the occurrence of this species in Florida waters.

On the night of 29 May 1961, a fisherman, Wallace Blue, discovered a herd of dolphins stranded on the coast of Taylor County between the mouths of the Fenholoway River and Cow Creek about 1 mile NNW of Rock Island. He counted 16 animals and noted no movements when he put a light on them. Presumably, the dolphins were dead at this time. The following day Florida Game and Fresh Water Fish Commission Wildlife Officer M. Cook visited the scene and counted 14 dolphins. He returned on 1 June and tried to carry a specimen back to the mainland across the bow of his small boat, but it slipped off and was lost.

David Swindell of the Florida Game and Fresh Water Fish Commission notified me of the stranding on 1 June, and the following day I visited the area with Cook and Dale E. Birkenholz. At this time we were able to locate 12 animals. All were blackened and blistered by the sun and badly bloated. Two carcasses were extensively damaged, apparently having been fed upon by crabs and fishes.

The stranding had occurred in an area of shallow water extending $\frac{1}{2}$ mile or so from shore. The coast here is bordered by extensive salt marshes and greatly dissected by creeks. At low tide many bars are exposed and much of the area is covered by less than a foot of water (Fig. 2). At normal high tide the depth of water at the site of the stranding was about 2 feet.

The dolphins lay at the edge of the marsh within about 100 feet of one another; eight were bunched together, the others more widely



FIGURE 2. Site of stranding of rough-toothed dolphins (*Steno bredanensis*) in Gulf of Mexico approximately 1 mile NNW of Rock Island, Taylor Co., 29 May 1961. Several carcasses are visible in foreground.

scattered. No signs of struggle were apparent other than the vegetation matted down around one or two carcasses which could have been caused by wave or wind action. The location of the carcasses and absence of clear evidence of struggling suggest that the herd might have stranded farther out at low tide and drifted in on the high tide.

Of the 10 carcasses that could be sexed, 6 were males and 4 were females. All the carcasses had scars of various sorts. Some had apparently rather fresh long, narrow scratches on the venter as well as older round scars on the sides and back.

The stomachs of 11 specimens, 6 males, 4 females, and one unsexed, were examined. Those of 1 unsexed, 1 male, and 2 females were empty; the contents of the others consisted of only two items, beaks of the blanket octopus, *Tremoctopus violaceus*, and remains of the algae *Sargassum filipendula*. One male and one female had only *Tremoctopus* beaks in the stomach; 2 males had both beaks and pieces of *Sargassum*; while the stomachs of 2 males and 1 female contained only algae. All materials found in the stomachs were in the second compartment. One would be inclined to speculate that the plant material represented accidental ingestion, for in most cases it was present only as a few fragments representing various parts of the plant. In one case, however, the second compartment of the stomach was filled with a surprising quantity of *Sargassum*. According to Gilbert L. Voss (*in litt.*) the blanket octopus is a fairly common pelagic cephalopod. Roundworms were present in the stomach of only one, a male, of the animals examined.

None of the females examined was pregnant or obviously recently parturient. The mean measurements (greatest length and breadth) of the right ovary of four females were: 41.8 x 17.5 mm. Two individuals with unworn and only slightly worn teeth and with total lengths of 1995 and 2187 mm had ovaries (right) measuring 32 x 16 mm and 35 x 15 mm respectively. The right ovary of one specimen with more heavily worn teeth (total length 2090 mm) was 40 x 15 mm, while that of one individual (total length 2550 mm) with greatly worn and broken teeth was 60 x 24 mm.

Testes measurements were obtained for five males. The mean (greatest length x greatest breadth) was 106.6 x 19.8 mm. Three individuals with unworn dentition had testes with the following measurements (total lengths in parentheses): 88 x 17 (2170), 110 x 13 (1800), 120 x 24 (2000) mm. The testes of an individual 1970 mm long with slightly worn teeth and one of 1820 mm total length whose tooth condition was not recorded were 120 x 25 and 95 x 20 mm respectively.

Eight body measurements of 11 individuals (6 males, 4 females, 1 unsexed) are given in Table 5. The four females averaged larger than males in all measurements with the exception of length of flipper from axilla, but whether the differences are due to sex or age is not clear. As possible evidence for the latter, however, it may be noted that whereas three out of four females showed signs of tooth wear, only one of five males had visibly worn teeth.

Entire or partial skulls of the animals in this stranding collected later by David Swindell are now numbers 6810 to 6821 in the University of Florida mammal collection.

Orcinus orca (Linnaeus)

KILLER WHALE

Most of the killer whale sight records given by Moore (1953) involve observations at some distance offshore in the Gulf Stream, and only one case concerned more than single individual. The following records of occurrence of a herd and single individual of this species in inshore waters in the Florida area are thus of interest:

F. G. Wood, Jr. observed a small herd of killer whales off Marineland in the early afternoon of 19 February 1952. The surf temperature at the time was 60° F. The whales were readily identifiable by the characteristic dorsal fin and color pattern. The members of this herd also possessed the saddle-shaped light area behind the dorsal fin which is of variable occurrence in this species.

The group, consisting of an estimated six to eight animals, moved past Marineland in a southerly direction, at times no more than 100 yards offshore. The whales were strung out over a distance of about ½ mile along the coast and moved in a leisurely manner, individuals often remaining in the same vicinity for several minutes. The whales surfaced frequently at intervals of about 10 seconds, although occasionally one would remain submerged longer. By their behavior and the fact that they were accompanied by a flock of gulls that were apparently feeding on something at or near the surface, the whales were assumed to be feeding. The lead individual, which appeared to be the largest in the herd and had a better developed dorsal fin than any of the others, was probably a male. One individual, assumed to be a female on account of its relatively small size and small dorsal fin, appeared to be accompanied by a calf.

On 6 February 1960 a Marineland employee, known to be a reliable observer and who had seen the 1952 herd of killer whales, sighted a single killer whale about ½ mile offshore. When first noted

the animal was lying motionless at the surface, but it soon turned and swam off.

Globicephala macrorhyncha Gray

SHORT-FINNED PILOT WHALE

Strandings of pilot whales in Florida waters far outnumber those of any other cetacean. The present report adds one record for the period covered in Moore's (1953) study and a number of others for the interval from 1955 through June 1963.

In 1953 Ivan R. Tompkins sent Joseph C. Moore a photograph of a *Globicephala* skull that was exhibited in the window of a sporting goods store in Jacksonville, Florida, and believed to have come from Amelia Island (Nassau Co.) sometime prior to 1938.

On 3 November 1955 a mass stranding of pilot whales occurred on the Atlantic coast 11 miles S of Melbourne (Brevard Co.). The Florida Times-Union stated that the number of animals involved was 53, while a Miami Herald story gave the number as 55. The herd, which came ashore at 3 PM, consisted of adults of both sexes and four calves. The largest individual and apparently the leader of the herd was a male 14 feet long. Weights were claimed to range from about 100 pounds for the calves to 2,000 pounds for the largest male. Bystanders were reported to have pushed one of the calves into deeper water several times, only to have it return to the beach each time.

On 10 February 1957 a herd of about 50 pilot whales stranded on Marathon Key (Monroe Co.). Newspaper accounts indicated that the whales began to come ashore at 4 AM, that most of them beached on the shore off the causeway of the Key Colony resort, while about a dozen stranded on shallow flats nearby. The whales were reported to range from 7 to 18 feet in length and from about 300 to over 1,600 pounds in weight. Attempts to tow several of the living animals into deeper water proved unsuccessful.

Another pilot whale herd came ashore 5 miles S of Flagler Beach (Volusia Co.) 16 December 1957. On that date F. G. Wood Jr. found 57 whales dispersed irregularly over about a mile of beach. According to Wood's notes, the largest was a male 16 feet, 4 inches long and the smallest was a female 6 feet, 2 inches long. All the larger whales (14-16 feet) in the herd were males. Additional pilot whales scattered over other nearby sections of the coast brought the total number involved in the stranding to about 75. Some reports claimed that the whales had begun to come ashore about 11:30 PM, 15 December; others indicated that the animals had begun to drift in with the breakers early the following morning and had

seemed to become helpless when they reached shallow water, finally being driven onto the beach by strong northeast winds.

Nine of the pilot whales that were still alive and in relatively good condition were taken to Marine Studios and placed in an enclosed inlet. These animals ranged in size from about 6 to 13 feet. Two of them were found dead on 17 December, and the last survivor died on 5 January 1958. Two fetuses were recovered from the inlet in which the whales were confined during the period of their captivity.

When I visited the site of this stranding 18 December the whales beached at the main stranding had already been buried by bulldozers. I found three females in the surf about $\frac{1}{2}$ mile N of Flagler Beach and saw a fourth which I did not examine just south of Flagler Beach. The stomachs of two adult females were empty, and their reproductive tracts were not enlarged. Parasitic copepods were seen on the flippers. Observers at the stranding three days before reported that several females had given birth to young in the surf and that the young, "about 3 feet long," had been promptly carried away by bystanders.

One of the whales brought to Marineland on 16 December and which died the next day was donated to the University of Florida mammal collection (UF 5860). The teeth were just beginning to erupt, and several hair follicles were distinctly visible above the margins of the upper jaw anteriorly. A whale louse (Cyamidae) was attached to the throat and another occurred in the axilla of the flipper. Circles of eight light dots on several parts of the body probably marked previous cyamid attachments. The rear portion of the body between the dorsal fin and tail stock bore a circular row of lacerations that extended over almost the entire side of the specimen. The stomach was filled with a milky fluid, indicating that the animal was still nursing.

Two strandings of small groups of pilot whales and one of a single individual are known to have occurred in 1958. Six individuals came ashore between noon and 1:30 PM on 8 March 1958 at South Ponte Vedra Beach (St. Johns Co.). F. G. Wood Jr. found five whales spaced irregularly over about $\frac{1}{4}$ mile of beach and the sixth about 1 mile S of the main group. The day was overcast, a stiff breeze blew from the north and the air temperature was approximately 56° F. The group consisted of two males, one 7 feet 10 inches long, the other 8 feet long, and four females of the following lengths: 9 feet 8 inches, 10 feet 8 inches, 10 feet 8 inches, and 10 feet 10 inches. One of the males that was in better condition than the others was removed to Marine Studios, where it lived until 10 April.

F. G. Wood Jr. investigated another pilot whale stranding at Ponte Vedra on 23 May. When he arrived at the site five whales were scattered along about $\frac{1}{2}$ mile of beach. The next morning 11 dead or moribund individuals were on the beach, and a group of men and boys were trying to free a twelfth that had apparently come ashore more recently and was in better condition than the others. The whale was repeatedly turned out to sea but persisted in returning to shore each time. After about an hour only one boy remained at the task. He managed to prevent the whale from grounding despite its size (about 10 feet) and the action of the surf. After pushing it out for about 20 minutes more he finally succeeded in getting it to swim off into deep water.

The beached whales were four males and seven females. The lengths of the males were: 12 feet 8 inches, 15 feet 8 inches, 16 feet 3 inches, and 16 feet 3 inches; those of the females were: 11 feet 6 inches, 12 feet 3 inches, 12 feet 3 inches, 12 feet 4 inches, 12 feet 8 inches, 15 feet 2 inches, and 15 feet 8 inches. The bodies of a number of the animals showed cuts and scratches, and some examined on 23 May possessed a few circular marks approximately 1 to $1\frac{1}{2}$ inches in diameter on several parts of the skin. These marks had either disappeared or were much fainter the following day.

A single *Globicephala* stranded on the lower east coast 28 November 1958. Different newspaper accounts placed the stranding at West Palm Beach and at Delray Beach, about 20 miles apart. Reported to have been a 15-foot male, the whale was transported in a water-filled rubber life raft to the Miami Seaquarium, where it died on 2 December.

Another single specimen stranded 7 February 1959 at Jupiter Inlet (Palm Beach Co.). The animal was alive when discovered and was taken to the Miami Seaquarium. The caption accompanying a photograph of the whale in the Miami Herald of 10 February stated that the 8-foot animal had been saved from sharks, but gave no further particulars.

Hamilton (1941) and A. Schwartz (cited by Moore, 1953) have observed living *Globicephala* in inshore waters of the Gulf and lower east coast. According to F. G. Wood, Jr. sightings of pilot whales at sea along the upper east coast of Florida are rare. Of interest, therefore, is an account in Marine Studios files by Pard Andreu of the sighting of a huge herd of pilot whales about 50 miles off Marine-land on the morning of 7 April 1959. The whales followed a north-easterly course while under observation and passed close around Andreu's boat without pausing.

Glen E. Woolfenden observed a lone individual swimming in Tampa Bay off the Sunshine Parkway, which spans the bay, on 4 December 1960. On 20 February 1961, a Marine Studios collecting vessel encountered a herd of at least five large pilot whales swimming rapidly south about 6 miles off St. Augustine.

The only stranding known for 1961 was of a single specimen, variously estimated as between 15 and 18 feet long, that came ashore at Daytona Beach (Volusia Co.) on 19 March.

William B. Robertson, Jr. wrote me 4 June 1962 that on 14 May he had observed a stranded cetacean, tentatively identified as a pilot whale, on a narrow beach at the northeast side of the Marquesas pseudo-atoll about 30 miles W of Key West, Florida. On 9 August an injured pilot whale, easily identifiable from newspaper photographs, was found in shallow water off Grassy Key near Marathon (Monroe Co.) on the Gulf side of the Florida Keys. The animal was towed several hundred feet into deeper water and reportedly swam off slowly. This is the same locality where the mass stranding of February 1957 occurred.

The Fort Pierce News Tribune of 10 August 1962 carried a story of the stranding of a 12-foot whale, presumably *Globicephala*, near Fort Pierce (St. Lucie Co.). The whale apparently came onto the beach to escape from some sharks that were pursuing it. A lifeguard at the scene, Richard Jurkowski, and two other persons succeeded in getting the whale back into the water and headed out to sea. As soon as it got into deeper water, sharks again attacked it and were seen to rip out large chunks of its flesh. They drove the whale back onto the beach where it died. At high tide the sharks were able to reach the carcass and fed upon it.

A small mass stranding of six pilot whales also occurred on the lower Gulf coast in August 1962. The animals, first seen by William B. Robertson, Jr. on 13 August, occurred along the coast of Everglades National Park in Monroe Co., between Highland Beach and Seminole Point. Park personnel reportedly took measurements and saved skulls of several individuals.

On 12 October 1962 local newspapers stated a dead 10-foot "porpoise" washed up on a small sandbar in a bayou at Holmes Beach (Manatee Co.), on the Gulf. The Miami News of 18 October reported a herd of about 50 pilot whales seen in the Gulf off Everglades National Park and implied that five of this herd stranded near Lostman's River. Although the locality and number of animals are closely similar to those reported by Robertson in August, the discrepancy in the dates suggest two separate strandings occurred. In correspondence

concerning the August stranding Robertson made no mention of a herd being seen.

Another stranding, probably of a pilot whale, in 1962 was of a single individual, reportedly 9 feet long, that came ashore in heavy seas at South Ocean Beach Park near Vero Beach (Indian River Co.), on 17 October. According to the account in the 21 October edition of the Vero Beach Free Press, the mouth of the whale was torn as if chewed, and a dying 7- or 8-foot shark was seen floating nearby.

Two 1963 reports concern a single stranding of a small whale, here assumed to be *Globicephala* although positive identification is lacking, and a mass stranding. In the first case the whale, alive but injured, was discovered on Hutchinson's Island about $\frac{1}{2}$ mile N of Jensen Beach (Martin Co.) 10 February. It was shot by an unidentified conservation officer, who was quoted in a Fort Pierce News-Tribune story on 12 February as claiming that the whale appeared to have been the victim of a shark attack.

The mass stranding occurred between South Daytona Beach and New Smyrna Beach (Volusia Co.) in April. The many news reports of this stranding present a rather confused picture of the event. Apparently a large herd, numbering over 20 and perhaps as high as 27, came into shallow water at low tide between South Daytona Beach and New Smyrna Beach during the night of 7-8 April. At least four of the animals stranded and died on the beach, while others entered nearby ditches or creeks and remained alive for some time. Three individuals were seen swimming in continuous circles in Callalisa Creek some distance from the ocean, and seven or eight others were reported in other creeks or ditches in the area. Two of the animals, reported to measure 9 feet 10 inches and 10 feet 6 inches in length, were taken alive to Marine Studios.

Of 13 dated records available to Moore (1953), 10 were from the period March-July, suggesting that the occurrence of the pilot whale in Florida waters, or at least its tendency to strand, was seasonal. Table 6 summarizes the monthly distribution of 29 records of strandings or dead individuals washed ashore now available for this region. These additional data extend the occurrence of strandings to every month except January and September and reduce the proportion of total records falling in the March-July period to about 48 per cent.

Although no strong seasonality in strandings is indicated for the Florida region as a whole, Table 6 suggests possible seasonal differences between strandings on the Gulf and Atlantic coasts. All of the records for the Gulf are from February through October. In contrast, five (33%), or seven if two records from "late autumn" and

"winter" are included, of the Atlantic strandings have occurred from October through December. A sighting in December falls outside the period delimited by strandings in Gulf waters, while two sight records of pilot whales at sea fall within the seasonal range of stranding records for the Atlantic coast.

Reports of strandings or sightings of live pilot whales from other parts of the Gulf (Gunter 1946, 1954, Lowery 1943, Caldwell 1955) do not alter the seasonal picture given by the Florida data alone. The present data show no obvious correlation between latitude and date of strandings on either coast, although the larger mass strandings in the Atlantic have occurred along the upper east coast in October, November, and December.

The reason or reasons for the apparent difference in the seasonal occurrences of stranding on the two coasts of Florida must remain speculative until further data are accumulated. Actual seasonal movements of the populations may occur as a result of shifting food supply or changing water temperature. On the other hand, the tendency to strand may vary at different times of the year as the result of seasonal variation in social behavior or other habits, presence of predators, or other biological factors. Abiotic environmental factors such as frequency and intensity of storms, wind direction, and water temperature might also be involved. In the latter connection, it is suggestive that the larger strandings on the Atlantic coast occur at a time of the year when high onshore winds are especially prevalent (U.S.D.A. Weather Bur., 1938).

Although all records of pilot whales from Florida have here and elsewhere been referred to *G. macrorhyncha*, species identification has not been verified by actual examination of specimens in all cases. As the limits of the ranges and seasonal movements of *G. melaena* and *G. macrorhyncha* in the western North Atlantic are not clearly known, the possibility that *melaena* may occasionally range southward to the Florida latitudes, particularly in winter when cooler surface waters extend farther south, should not be dismissed. Although this possibility is perhaps slight, it is probably prudent to regard as provisional Florida records of *G. macrorhyncha* that are not accompanied by adequate data for species identification.

Table 7 gives measurements of five skulls in the University of Florida mammal collection. Skull 624 is of a young male from a stranding that occurred about 8 miles N of Marineland on 7 October 1948 (Kritzler, 1949, 1952). This animal was kept in captivity at Marineland for about nine months. The tooth count in this speci-

men is $R \frac{8?}{9}$; $L \frac{8?}{10}$; the last tooth in the left mandibular series is 10

small and was probably non-functional in life. Skulls 5858 and 5859 are from adult females involved in the mass stranding near Flagler Beach in December 1957, while 3337 and 3338 are unsexed and lack locality data, although both are presumed to have come from Florida. All of the above skulls have the prominently expanded premaxillae diagnostic of *G. macrorhyncha* and, allowing for probable age, sex, and individual differences, generally agree in absolute and proportional measurements with data given for the short-finned pilot whale by Fraser (1950). Moore (1953) and Miller and Kellog (1955) list other records of *G. macrorhyncha* from Florida based on examination of skulls.

Table 8 gives body measurements of two adult and one young female from the 1957 Flagler Beach stranding. The relative length of the flipper in these specimens approximates the value characteristic of *G. macrorhyncha*, although averaging somewhat higher than the figures presented by Sergeant (1962), which might result from minor variations in methods of measuring. Kritzler (1952) found the relative length of the flipper in specimens that stranded north of Marineland in October 1948 to agree with the proportion considered characteristic of *G. macrorhyncha*. As noted above, the skull of one of these whales (UF 624) is typical of *G. macrorhyncha*.

Although *G. macrorhyncha* and *G. scammoni* were previously thought to lack the light ventral markings of *G. melaena*, Norris and Prescott (1961) and Sergeant (1962) have pointed out that all three forms possess the ventral pattern, which Sergeant (1962) notes is a darker gray in *G. macrorhyncha* and *G. scammoni* than in *G. melaena*. Fraser (1950) specifically stated that well-defined markings are absent in specimens of *G. macrorhyncha* from the South Atlantic and Indian Oceans and neither Gunter (1946) nor Lowery (1943) mentioned their presence (or absence) in observations on stranded short-finned pilot whales in the Gulf of Mexico. In some or all of the above cases possibly the stage of decomposition of the specimens might have obscured the kedge mark. On the other hand, the paucity of detailed color descriptions of *G. macrorhyncha* populations throughout the species' range suggests that geographic variation in the expression of this pattern should not be ruled out.

In view of the need for additional data on color patterns of *Globicephala*, it seems worthwhile to present further observations on the markings of Florida specimens. Four pilot whales from the

stranding near Flagler Beach in December 1957 examined several days after death were all black, although slightly lighter below. Two of three adult females and a young female showed a definite, though rather faint, grayish kedge-shaped mark on the underside of the throat and breast. The anterior border of the expanded portion of the mark was more distinct than the posterior margin and was deeply indented medially. The tapering shaft extended posteriorly along the mid-ventral line to a point under the anterior one-third of the dorsal fin. The greatest breadth of the anterior wing-like portion of the mark on the young female was 7 inches, and the length of the shaft was 22 inches. Light areas of the same color as the mark were also present around the genital slit of this specimen.

A similar pattern has been observed in at least two other Florida specimens of *Globicephala*. Kritzler (1952) described a grayish kedge-shaped mark on the pilot whales that stranded in October 1948 near St. Augustine Beach. The mark is faintly visible in photographs of adults at the scene of the stranding and shows clearly in a photograph of a young male from this herd (UF 624) that was kept in captivity at Marineland (Kritzler, 1949). As indicated above, specimens of this herd are clearly referable to *G. macrorhyncha* on the basis of flipper proportions and the skull characteristics of UF 624. F. G. Wood, Jr. also noted the ventral mark on the *Globicephala* that stranded at Ponte Vedra 23 May 1958. His notes suggest that pronounced post-mortem changes may alter its appearance, for the pattern was conspicuous when the animals were examined shortly after stranding, but had faded markedly by the next morning, being little lighter than the rest of the venter. No skulls or flipper measurements are available for specimens in this stranding.

Kritzler (1952) observed the mark on some pilot whales stranded at Beaufort, North Carolina. These were identified as *G. macrorhyncha*, the flipper length being stated to be about $\frac{1}{2}$ of the body length. The site of the stranding is not far south of the southernmost locality (Virginia) for *G. melaena* in the western North Atlantic (Paradiso, 1958).

Tursiops truncatus (Montagu)

ATLANTIC BOTTLE-NOSED DOLPHIN

The Marine Studios files contain several records of beached individuals of this species. A small male was found badly decomposed on the beach at Marineland 16 December 1952. The dolphin was apparently recently born, having a total length of only 40 inches.

A large male was found on the beach at Summer Haven (St. Johns Co.) 17 February 1954. The animal was dead but still relatively fresh when discovered. A badly decomposed carcass of a female dolphin, not positively identified but presumed to be *Tursiops*, was found in St. Johns County between Crescent Beach and St. Augustine Beach 4 February 1955. An apparently stillborn or newborn male was discovered on the beach at Marineland 5 January 1956; its teeth had not yet erupted, and the umbilical cord seemed to have been chewed off. It was 38 inches long and weighed 25 pounds.

The above records of apparently recently-born *Tursiops* found in December and January indicate that birth in wild bottle-nosed dolphin populations in Florida waters may occur outside the period (February-May) during which mating and parturition take place in the captive colony at Marine Studios (Tavolga and Essapian, 1957; Essapian, 1963). Two recently-captured *Tursiops* gave birth to young in September at the Miami Seaquarium (Essapian, 1963).

Marvin Wass informed me that he came upon a small *Tursiops* about 40 inches long on the beach near Johns Pass at St. Petersburg (Pinellas Co.), in February (month uncertain) 1955. Its lacerated body suggested the animal might have been attacked and driven onto the beach by a shark.

Robert F. Hutton, Florida State Board of Conservation, reported in a letter to Gordon Gunter dated 6 June 1960 that a dead and bloated adult dolphin, probably *Tursiops*, was seen floating offshore in Johns Pass about 2 miles SE of Madeira Beach (Pinellas Co.) 10 October 1959. This discovery coincided with an outbreak of red tide. E. R. Harding, an agent of the Florida State Board of Conservation, observed a dead dolphin about 8 feet long on the north end of Egmont Key at the mouth of Tampa Bay on or about 28 March 1960. In all likelihood this specimen also was a *Tursiops*.

A dolphin found dead 23 April 1961 on the flats near the west end of the Howard Frankland Causeway spanning Old Tampa Bay was identified as a *Tursiops* by Glen E. Woolfenden, University of South Florida, who provided the record. I observed a partially decomposed *Tursiops* carcass on Deer Island in the Gulf near Cedar Key (Levy Co.) 29 April 1962.

An article appearing in the St. Petersburg Times on 3 October 1961 noted the stranding of two dolphins, probably *Tursiops*, in the Gulf at Bradenton Beach (Manatee Co.) on 1 October. One of the animals was stated to be about 6 feet long, the other about 4 feet. The larger animal had severe wounds that could have been inflicted by a boat propeller. Persons at the scene dragged both individuals

to deeper water and they swam out to sea; the smaller one was seen to join a group of dolphins offshore.

The Bradenton Herald of 13 July 1963 carried a story of a dead dolphin seen floating in the Manatee River near Bradenton the day before. It is likely that this also was a *Tursiops*.

Several new Florida records of the bottle-nosed dolphin are provided by skeletal material. Photographs of a skull collected on a small island in the Indian River near New Smyrna in 1962 or 1963 by Edward G. Smith were identified by Joseph C. Moore, who informed me of this record in a letter dated 16 April 1963. A skull (UF 868) in the University of Florida mammal collection was collected by B. A. Barrington 12 miles S of Melbourne Beach (Brevard Co.) in March 1948. Another, UF 4648, was obtained by W. L. Jennings from St. George Island (Franklin Co.) 10 July 1958. A series of vertebrae in the University of Florida collection (UF 7644) collected behind the beach at Anastasia State Park (St. Johns Co.) by Mrs. Margaret C. Lewis on 11 December 1962 appear to be those of *Tursiops*. David K. Caldwell informed me (*in litt.*) that in 1955 he obtained the skull of an adult *Tursiops* reported to have come from an animal washed up on shore at St. Augustine Beach after a winter storm several years before; in the interval 1954-56 he saw a badly decomposed *Tursiops* on Atsena Otie Key at Cedar Key (Levy Co.).

Bottle-nosed dolphins are of course common in the coastal waters of Florida. Some specific localities at which I have observed them in recent years are as follows: Caloosahatchee River at Fort Myers (Lee Co.) 3 June 1956; vicinity of Cedar Key (Levy Co.) 20 October 1956, 25 March 1961, 29 April 1962, 19 May 1962; St. Marks National Wildlife Refuge (Wakulla Co.) 31 May 1959; Melbourne Beach (Brevard Co.) 21 August 1960; Sanibel Island (Lee Co.) 26 August 1960; Fort Myers Beach (Lee Co.) 27 August 1960; and Captiva Island (Lee Co.) 15 May 1962.

A group of 10 to 12 *Tursiops* I watched for about ½ hour 25 March 1962 in the Gulf at Cedar Key appeared to be engaged in breeding behavior. When first seen they were about 500 yards off a dock, but they gradually worked in closer, then back out again. Most of the time the animals were associated together in groups of two or three. They maintained very close contact and spent a good deal of time rolling over, splashing and churning about vigorously at the surface, and thrusting their heads out of the water. Sometimes they would surface to breathe simultaneously, and several times one dolphin appeared to be wrapped around the body of another. At such times, the pair would flop around at the surface, rolling over on their sides

or backs. In some cases one of the individuals would slide over the other. Sometimes during such a performance the flukes of one animal would suddenly be thrust vertically out of the water.

Considering the abundance of bottle-nosed dolphins in Florida waters, strandings appear to be relatively infrequent. Very young animals account for a rather high proportion of the dead individuals found, and possibly some of the smaller specimens may represent stillbirths. With one exception the stranding records noted above involve animals dead on discovery, and it is thus not possible to know how many of these actually represent accidental strandings. R. Winston Menzel of Florida State University noted in a letter to Gordon Gunter dated 30 May 1960 that the occasional dead *Tursiops* he has examined often appear to have been shot. Shooting and various accidents, such as being struck by boats, probably account for a good share of the dead individuals found. Because of its tendency to occur in inshore waters, *Tursiops* may also be somewhat more vulnerable to storms than other species. In a letter of 4 June 1962 William B. Robertson Jr., reported observing one dead *Tursiops* on a beach at Cape Sable and two in Florida Bay and another trapped in canals behind Cape Sable following hurricane Donna in 1961. Gilmore (1959) has postulated that the low incidence of actual strandings of *Tursiops* is due to the species' adaptation to shallow water habitats. Occasionally, however, mass strandings of *Tursiops* do occur. E. Lowe Pierce of the University of Florida told me that some years ago he witnessed an entire herd of some 30 individuals swim onto a beach near Key West (Monroe Co.) and perish. He observed no apparent reason for this behavior.

Fraser (1949) notes that strandings of *Tursiops* in the English Channel and North Sea show a definite relationship to time of year, whereas Gunter (1942) found no evidence of migration or seasonal variation in abundance along the Texas Gulf coast. The bottle-nosed dolphin seems to occur year-round along both the Gulf and Atlantic coasts of Florida, and no seasonal pattern is apparent in the strandings and sighting records presently available. Possibly, however, more intensive observations might well reveal seasonal shifts in numbers, herd sizes and composition, tendencies to occur in certain environments, or other aspects of the ecology and behavior of populations of this species in Florida waters.

Delphinus delphis Linnaeus

COMMON DOLPHIN

The Marine Studios files contain a note on the stranding of an adult female *Delphinus delphis* just north of Marineland 20 January 1952. The specimen had a total length of 7 feet, and the flukes were 16 inches wide. Jane Gallena and Joseph Scolara, then students at the University of Florida, found a partially buried carcass of a young male common dolphin at Crescent Beach (St. Johns Co.), on 2 April 1960. Although the skin was peeling, some color details were still discernible. The total length of this specimen, the skeleton of which is now in the University of Florida mammal collection (UF 5425), was 1473 mm.

Moore (1953) quotes a letter from R. Collins stating that Marine Studios collectors have seen this species only during the winter, individuals having been captured in January and February, and suggests the possibility that a seasonal shift in range might occur in the North Atlantic. If such is the case, the April record noted above of an animal that surely stranded in March, indicates the presence of *Delphinus* in Florida waters at least into the early spring. Essapian (1954) also records the capture of a common dolphin about 10 miles off St. Augustine in March.

Stenella longirostris (Gray)

LONG-BEAKED DOLPHIN

A large herd of dolphins that stranded on a small island a few miles off the Florida coast in the northern Gulf of Mexico in September 1961 appears referable to this species. Although both Miller and Kellogg (1955) and Hall and Kelson (1959) cite a skeleton of a specimen in the U. S. National Museum (No. 23302) taken between the Galapagos Islands and Panama as the only North American record of this species, Moore (1953) also records it from west of the Bahamas about 45 nautical miles off Miami Beach. *Stenella microps*, known in the eastern North Pacific from the vicinity of the Tres Marias Islands off Nayarit, Mexico (Miller and Kellogg, 1955), is possibly conspecific with *S. longirostris* (Nelson, 1899; Scheffer and Rice, 1963).

The site of the stranding was Dog Island (Franklin Co.) about 4 miles off the coast at Carrabelle between St. George Island on the west and Alligator Point on the east. Dog Island is approximately $6\frac{3}{4}$ miles long and 1 mile wide at the widest point. It is broadest at the eastern end and tapers to a narrow strand at the western extremity. The long axis of the island roughly parallels the coast and

is oriented approximately NE-SW. Dog Island Reef, which is about 5 miles long and 1 mile wide, lies about 4 miles ENE and has approximately the same orientation as the island. Topographic maps indicate that the bottom in the vicinity of Dog Island is mainly sand and grass and the water is generally shallow.

The dolphins were discovered the afternoon of 23 September by Charles Campbell, an agent of the Florida State Board of Conservation. He reported them to David Weatherspoon of the Florida State University Marine Station on Alligator Point who, accompanied by Robert Short, also of Florida State University, went with Campbell to the site. They brought six of the dolphins to Florida State University at Tallahassee. Three of these they examined for parasites and disposed of, while the remaining three (2 males, 1 female) they placed in a cold room for temporary storage. Ralph Yerger of Florida State University advised me of the stranding by telephone, and on the next day Dale E. Birkenholz and I drove to Tallahassee to examine and measure the remaining specimens. At that time Yerger kindly provided me with as many details of the stranding as he had been able to obtain.

The herd had stranded on the outer beach at the northeast end of the island. The bottom here is of sand and gently sloping, and the water is very shallow. Observers believed that a bar might have been located just offshore at the site of the stranding. If so, the dolphins were between it and the shore. Thirty-six dolphins were counted. The tide was in at the time the site was visited, and the dolphins were in 2 to 3 feet of water. All were dead and their heads were directed toward the beach. Most were resting on the bottom, but one or two appeared to be floating. The animals had apparently not been dead long, as none was obviously bloated, the skin was still in good condition, and the color pattern remained fairly distinct. It was considered possible that the herd might have stranded during the previous low tide.

As is often the case, there was little evidence as to the cause of the stranding. All three of the specimens I examined bore fresh wounds. Two individuals had rather superficial cuts, but one had a series of deep lacerations on the left side of the body arranged in the form of a series of concentric arcs. The female also had a circular wound about 3 inches in diameter on the lower abdominal region of the left side which might have been caused by a lamprey. One of the males had a small hole about the size of a .38 cal. bullet on the left side of the tail stock, which suggests the possibility that the dolphins had been shot at either before or after stranding.

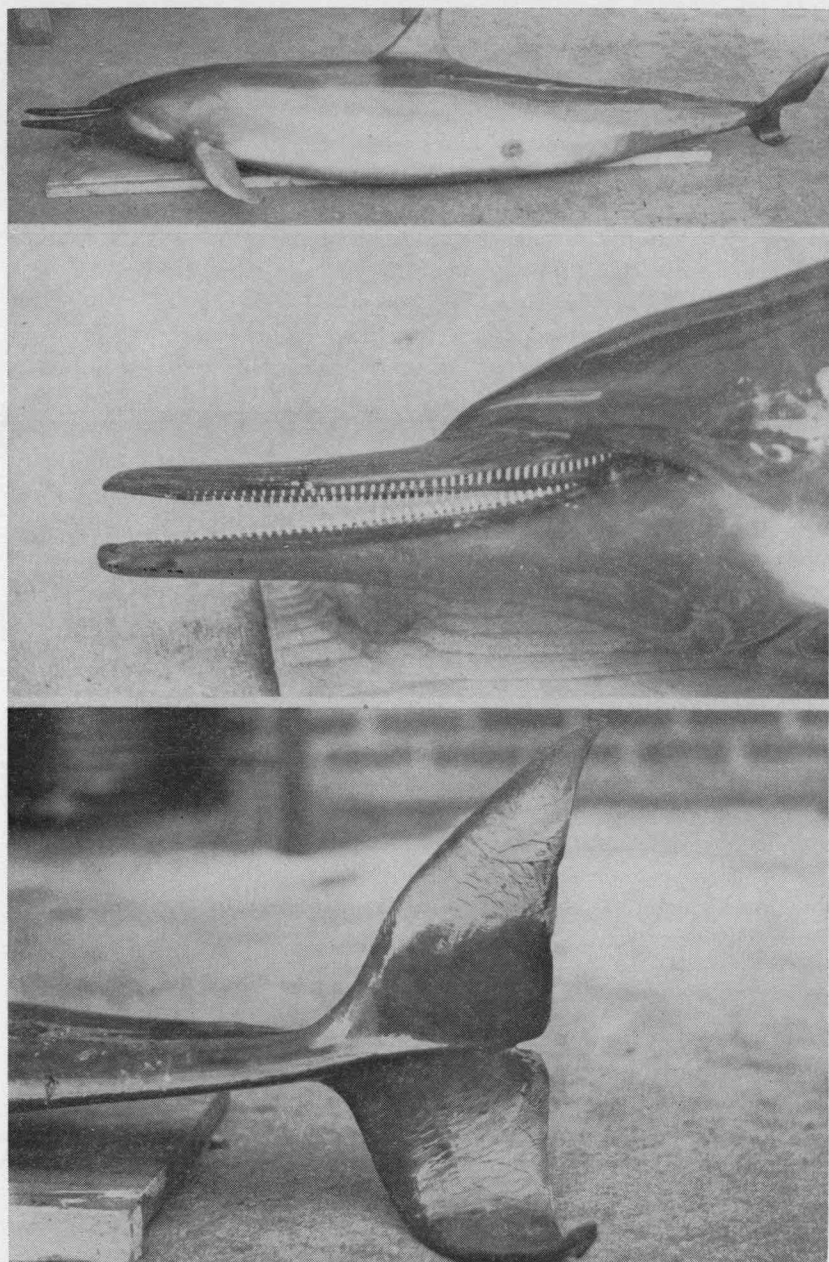


FIGURE 3. Adult female long-beaked dolphin, *Stenella longirostris*, collected on Dog Island, Franklin Co., 23 September 1961. (Upper) lateral aspect; (middle) close-up of head; (lower) detail of flukes. Reflections obscure some details of the color pattern, particularly on the head.

By the time of examination the specimens had apparently undergone some postmortem changes in coloration as a result of drying, exposure to sun, or discoloration from blood, which should be considered when evaluating the following descriptions. The specimens were generally dark gray to blackish on the back, upper sides, tail stock, and flukes, shading to a light gray on the sides. The mid-ventral areas all were blotched with reddish-purplish color, which appeared to be due to accumulation of blood rather than a feature of normal coloration. The female showed the most distinctive color pattern (Fig. 3) of the three, and its details were more evident on the side upon which the carcass had lain in the cooler, the exposed side being very dark, perhaps from drying. This individual had a series of small, dark, relatively discrete pigment spots extending horizontally from the eye to a point about halfway to the origin of the dorsal fin and a rather broad band of dark gray passing obliquely from the eye to the base of the flipper. This band was bordered anteriorly by a rather conspicuous patch of light gray. A fainter and more poorly defined streak of gray extended from behind the shoulder posteriorly across the lighter ground color of the lower sides. The eye was ringed with blackish, which extended forward to meet that from the opposite side on the forehead. There was no evidence of yellowish on the sides of the body.

Body measurements of the Florida specimens are given in Table 9. Short noted that some of the dolphins in the stranding were smaller than the smallest individual collected, but the largest specimen obtained was about as large as any in the herd. Weights of the female and larger male were 135 and 133 pounds, respectively.

The skull and postcranial skeleton of the female and the skull of the smaller male are now in the mammal collection of Florida State University (nos. 284 and 285, respectively), while the postcranial skeleton of the smaller male and the skull and partial postcranial skeleton of the larger male are now numbers 6741 and 7861, respectively, in the University of Florida mammal collection. Measurements of the male skull UF 7861 are given in Table 10. Counts of visible teeth in the female (FSU 284) and larger male (UF 7861) were

made in the flesh, and the numbers obtained were $\frac{48}{52} - \frac{48}{50}$ and $\frac{45}{49} - \frac{44}{49}$,

respectively. The numbers of alveoli counted in the cleaned skull

of the male are $\frac{56}{49} - \frac{56}{49}$. The first four alveoli in the maxillary tooth

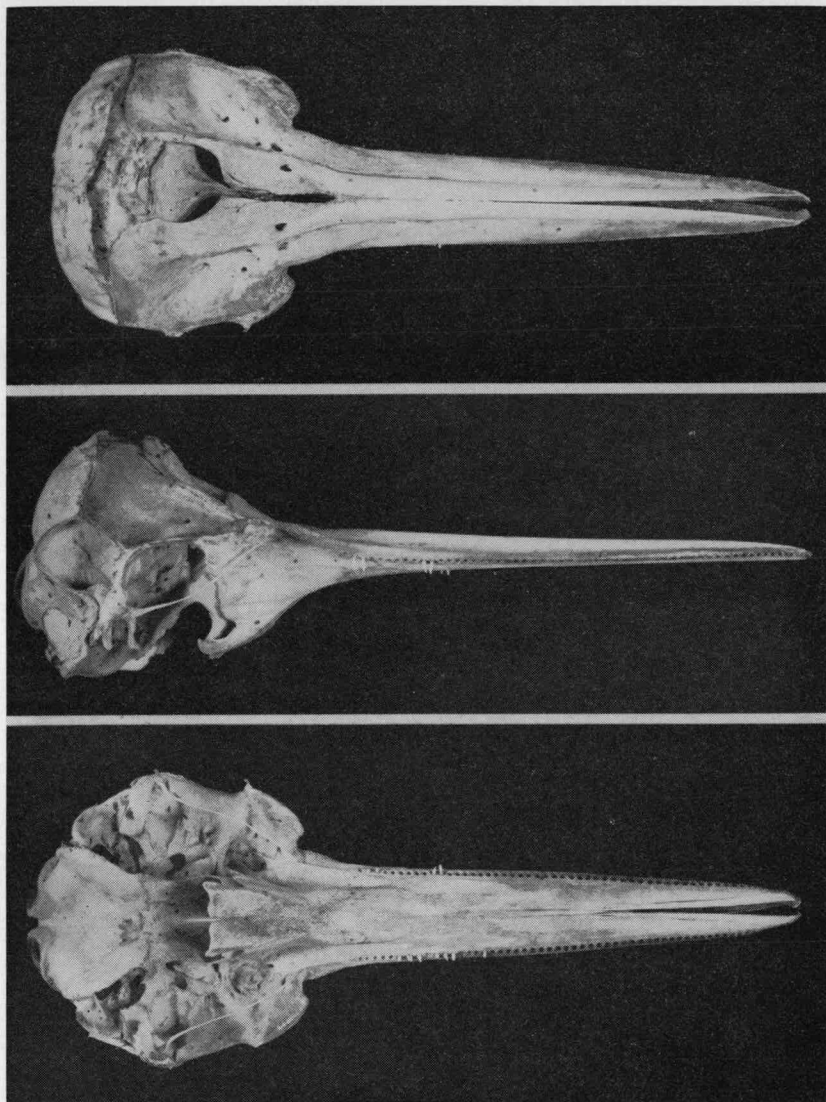


FIGURE 4. Skull (UF 7861) of adult male *Stenella longirostris* collected on Dog Island, Franklin Co., 23 September 1961. (Upper) dorsal aspect; (middle) lateral aspect; (lower) ventral aspect.

rows of both sides are indistinct, and the first alveolus on the left side contains a tiny forward projecting tooth that was not visible above the gum in life. Other such teeth may have been present at the anterior ends of the tooth rows and lost in cleaning. Although the visible tooth and alveoli counts for the lower tooth rows agree, possibly additional small, unerrupted teeth were hidden in a small amount of hard dried tissue present on the tip of the lower jaw.

The Florida skull (fig. 4) agrees closely with the diagnosis and measurements of *S. longirostris* given by True (1889). I have also compared the skull with photographs of the dorsal, lateral, and ventral aspects of the type of *S. longirostris* (No. 12, Mus. Pays Bas) kindly provided by F. C. Fraser and can find no significant differences. The shallow lateral palatal grooves mentioned by True as one of the characteristics of the species extend forward in the Florida skull to within about 70 mm of the tip of the rostrum, at the level of the 40th alveolus from the rear. The grooves are about 7 mm wide and 1 mm deep at midrostral length. The bone of the proximal part of the furrow up to about the level of the beginning of the maxillary tooth rows is smooth and compact, while that of the remaining portion is distinctly more porous. According to Fraser (*in litt.*), the former type of bone reflects the extent of the anterior air sac.

None of the stomachs of the three specimens examined contained food. Weights and measurements of the testes of the smaller male were: left—215 x 60 mm, 309 g; right—232 x 60 mm, 326 g. Corresponding values for the larger specimen were: left—240 x 74 mm, 397 g; right—252 x 65 mm, 369 g.

The female contained a small fetus in the left uterine horn, which had a diameter of approximately 80 mm compared with about 20 mm for the right. The fetus was oriented with the head in the direction of the ovary. Its head was bent ventrally at an angle to the longitudinal axis of the trunk, and the tail stock was curled under the body so that the flukes were directed anteriorly. The total length of the fetus, measured from the vertex of the head which was the most anterior point to the end of the straightened tail, was 81 mm. The flipper was 15 mm from its anterior base to the tip, and the digits were apparent within the common integument. The flukes were spade-like in shape and 7 mm in greatest breadth. The jaws were not greatly produced; the upper extended about 5 mm beyond the forehead and was about 1 mm shorter than the lower. The distance from the tip of the upper jaw to the blow hole was 13 mm. The eye was approximately 3.5 mm in diameter. The dorsal fin was indicated only as a slight ridge on the midline of the back; the prom-

inent urogenital papilla was 2.5 mm from anterior base to tip. The diameter of the umbilical cord at the point of attachment to the fetus was 5 mm. The fetus showed no indication of a color pattern. Numerous fine longitudinal grooves, which may have been an artifact of preservation, were visible on the sides.

The left and right ovaries were 43 x 28 and 26 x 11 mm, respectively. The former showed a large corpus luteum externally while the remainder of the ovarian tissue appeared lobulated. The maximum diameter of the corpus luteum was 26 mm, and when hand-sectioned with a razor blade it proved to have a small central cavity about 4 mm in diameter.

The following organ weights (grams) were obtained for the larger male: heart 369, lungs 2055, liver 1276, kidneys (both) 396.

Zalophus californianus (Lesson)

CALIFORNIA SEA LION

Marineland personnel captured a young California sea lion at Flagler Beach 25 January 1958. According to F. G. Wood, Jr. it was not particularly tame and appeared to be in poor health. The animal was kept at Marineland until 27 May 1958, when it was presented to the Jacksonville Zoo. In all likelihood it had escaped from captivity, although Wood ascertained it had not been lost by either the "Theater of the Sea" at Windley Key (Monroe Co.) or "Sea Zoo" at Daytona Beach, both of which have featured performing sea lions in recent years. It may have escaped or been released from a passing vessel.

In January 1963, several Florida newspapers (Miami Herald, Stuart News, Orlando Sentinel) published accounts of two "seals", probably *Zalophus californianus*, that escaped or were stolen 11 January from a tourist attraction known as "Florida Wonderland" near Titusville (Brevard Co.). One of these was recaptured the following day in the nearby Indian River. A seal, presumably the other individual, was seen in Cape Canaveral Harbor a day or two later. On 20 and 21 January a seal was observed swimming in the North Fork of the St. Lucie River near Stuart, approximately 100 airline miles south along the coast. It appears likely that the seal seen near Stuart was the same individual lost near Titusville earlier. If so, the animal may have moved south along the coast to enter the Sebastian or St. Lucie Inlets rather than remaining entirely within the Indian River.

Trichechus manatus latirostris (Harlan)

MANATEE

A number of reports of dead manatees during the period from December 1957 to June 1963 have been obtained from various sources. S. J. Olsen provided information on 10 dead ones observed by field parties of the Florida Geological Survey in south Florida. Single specimens were reported from Martin Co. (exact locality not stated) in December 1957, near Shark Island in the St. Petersburg area 4 January 1960, Jupiter Inlet (Palm Beach Co.) in January 1958, and the Caloosahatchee River at Fort Myers (Lee Co.) in January 1958. Five females and one male were also found at the last locality 2 February 1958. The skeleton of one of these females is now in the University of Florida collections (UF 5713). Most of the animals reported above were found after cold snaps of 26° to 30° F in south Florida, and the deaths can probably be attributed to cold. Moore (1951) summarized 18 previous records of manatees in which low temperatures were the apparent cause of mortality.

A mass of decayed flesh containing some ribs washed ashore at Siesta Key (Sarasota Co.) 13 October 1959. Eugenie Clark of the Cape Haze Marine Laboratory collected two ribs and sent them to Joseph C. Moore who identified them as manatee and kindly sent me the record.

Agent Melvin Davis of the Florida State Board of Conservation reported finding a dead manatee on the south shore of the Caloosahatchee River near Fort Myers in February (month uncertain) 1960. The animal was approximately 8 feet long. From the nature of wounds on the body, the manatee appeared to have been killed by a boat propeller.

Agent Joe Humphreys, Florida State Board of Conservation, observed a dead manatee 5 to 6 feet long floating in Barnes Sound at Cross Key (Dade Co.) 15 February 1961. An adult female found dead in Blue Springs (Volusia Co.) 14 December 1961 appeared to have been shot through the head with a large caliber bullet. Its measurements (in millimeters) were as follows: total length 3099, length of flipper from axilla to tip 584, greatest breadth of flipper 165, length of nails 25, 26, 18, and greatest breadth of flukes 711. The teats and mammary tissue of this specimen were well developed and the genital tract was enlarged and vascular, suggesting that parturition had occurred fairly recently. The skeleton is in the University of Florida vertebrate paleontology collection.

On 7 March 1962 J. C. Dickinson, Jr. of the Florida State Museum

informed me that he had learned from local residents of the shooting of a baby manatee about 3 weeks earlier at the mouth of the Withlacoochee River (Citrus Co.). Agent L. A. Walcott, Florida State Board of Conservation, told me that on 14 May 1962 his boat had struck a manatee swimming in shallow water near Fort Myers (Lee Co.), and that the animal had probably died. When asked about winter mortality in the Fort Myers area over the past few years, he said that he knew of no deaths in 1961-62 but that two dead manatees had been reported in the area during the winter of 1960-61.

An unusual number of manatee deaths are on record for 1963. An article and photograph of a manatee that died in the Imperial River near Bonita Springs a day or so before appeared in the Bonita Banner of 20 December. Another individual drifted into shallow water along the east shore of the Indian River near Eau Gallie (Brevard Co.) on 28 March and died shortly afterwards. According to several newspaper accounts (Orlando Sentinel, 29 March; Miami Herald, 31 March) the animal had evidently been struck by the propeller of a boat.

Seven dead manatees were reported in the vicinity of Fort Myers (Lee Co.) between 26 March and 9 April 1963, and another washed ashore in the Caloosahatchee River 4 May. The unusual manatee mortality in this area coincided with newspaper reports of many deaths of cormorants, gulls, and raccoons and the occurrence of a red tide outbreak in the Englewood area not far to the north.

Sight records of manatees obtained from newspaper accounts include about six animals in the St. Johns River at Jacksonville (Duval Co.) 23 October 1960 (Miami Herald, 25 October), four in the Withlacoochee River near Yankeetown in July 1962 (St. Petersburg Times, 28 July), a herd of approximately a dozen in Turkey Creek near Palm Bay (Brevard Co.) in October 1962 (Miami Herald, 16 October), two in the St. Johns River near Blue Springs (Volusia Co.) during the third week of October 1962 (Orlando Sentinel, 28 October); and a herd estimated to number more than 50 in the St. Johns River near Palatka (Putnam Co.) in late May 1963 (Palatka News, 30 May).

Additional evidence of seasonal movements by Florida manatees is provided by some of the new reports available. Several individuals apparently winter each year in Blue Springs. Gordon W. Pierson, owner of Blue Springs Park, reports that the animals arrive each year within a day of 11 November, according to the Orlando Sentinel of 23 October 1962. The newspaper story cited above of manatees in Turkey Creek near Palm Bay in October 1962 stated that this is an annual occurrence. Manatees also apparently spend the winter reg-

ularly in the St. Johns River in the vicinity of the Talleyrand Avenue and Southside electric plants of the city of Jacksonville, seemingly attracted by warm water the plants discharge into the river. An article in the Miami Herald of 25 October 1960 quoted C. W. Taylor, a guard at the Talleyrand Avenue plant, as reporting that the manatees had appeared at the plant on 23 October for three consecutive years and over a longer period had always arrived between 22 and 27 October. I visited the plant on 4 December 1960 and talked with Joseph Winter, the station engineer, who told me that four or five manatees were present that winter. Although none was observed during the hour or so I was present, Winter told me that the animals are usually seen every day. The bottom of the river in the area of warm water the manatees frequent was heavily silted and lacking in vegetation. Potential feeding grounds were present across the river from the plant, but Winter expressed his impression that the animals went farther away to feed. Although present data on seasonal movements suggest the most prevalent pattern to be a migration into springs and rivers in the late fall and early winter, F. G. Wood, Jr. informed me in a letter of 21 March 1961 that manatees appear in Matanzas Bay at St. Augustine every year, usually in July or August, and that the dockmaster of the St. Augustine Yacht Pier had seen as many as 17 animals in one herd.

TABLE 1. BODY MEASUREMENTS OF AN ADULT MALE *Kogia breviceps* STRANDED NEAR PALM BEACH, PALM BEACH CO., FLORIDA, 8 APRIL 1955. MEASUREMENTS, EXCEPT THOSE MARKED WITH AN ASTERISK, ARE THE SAME AS THOSE USED BY YAMADA, 1954.

Measurement	Mm	% Total length
Total length, from snout to notch of flukes	3162	100.0
From snout to tip of lower jaw	292	9.2
From snout to center of blowhole	394	12.5
Length of blowhole	102	3.2
From snout to center of eye	540	17.1
Lower jaw, from tip to corner of gape	190	6.0
From snout to tip of flipper	1156	36.6
From notch of flukes to hind margin of dorsal fin*	1321	41.8
Height of dorsal fin	203	6.4
From notch of flukes to anus	889	28.1
Flipper, length from anterior insertion*	381	12.0
Greatest width of flipper	152	4.8
Left fluke, from tip to notch	432	13.7
Right fluke, from tip to notch	444	14.0
Tail flukes, distance between tips	876	27.7
Depth of body at anus	381	12.0
Right eye to blowhole*	330	10.4
Right eye to corner of gape*	279	8.8

TABLE 2. BODY MEASUREMENTS OF TWO MALE *Kogia breviceps* STRANDED IN FLORIDA IN 1957 AND 1958.

Measurement	St. Augustine 1 Mar. 1957		Marineland 2 Sept. 1958*	
	Mm	% Total length	Mm	% Total length
Total length	3048	100.0	2019	100.0
Length from snout to origin of dorsal fin	1524	50.0	1003	49.7
Length from snout to origin of flipper	737	24.2	432	21.4
Length from snout to anus	2083	68.3	1384	68.6
Length from snout to center of eye	457	15.0	279	13.8
Length from snout to blowhole	381	12.5	248	12.3
Length of flipper	476	15.6	305	15.1
Breadth of flipper	190	6.2	114	5.7
Span of flukes	864†	28.3	597	29.6
Height of dorsal fin	127	4.2	102	5.0
Length from origin to tip of dorsal fin	286	9.4	229	11.3

* UF 5857.

† Tip abraded.

TABLE 3. SKULL MEASUREMENTS AND TOOTH COUNT OF A JUVENILE MALE *Kogia breviceps* (UF 5857) STRANDED 2 SEPTEMBER 1958, AT MARINELAND, FLAGLER COUNTY, FLORIDA.

Measurement	Mm	% Total length
Total length	326	100.0
Length from inferior margin of foramen magnum to tip of rostrum	315	96.6
Rostral length from line joining antorbital processes to tip	124	38.0
Breadth of rostrum at antorbital processes	160	49.1
Breadth of rostrum at mid-length	80	24.5
Length from tip of rostrum to middle of posterior margin of pterygoid	199	61.0
Breadth across preorb. angles of supraorbitals	277	85.0
Breadth across postorb. angles of supraorbitals	287	88.0
Least interorbital breadth	267	81.9
Breadth across lateral margins of pmx. on line connecting antorbital processes	67	20.6
Length from hind edge occipital condyles to posterior wall of left naris	140	42.9
Height of supraoccipital from superior margin of foramen magnum	101	31.0
Greatest length of pterygoid	82	25.2
Maximum breadth across occipital condyles	72	22.1
Maximum length of temporal fossa	49	15.0
Maximum height of temporal fossa	65	19.9
Length of right ramus from condyle to tip	288	88.3
Length of right tooth row	114	35.0
Length of symphysis	51	15.6
Teeth	L 14, R 13	

TABLE 4. BODY MEASUREMENTS OF AN ADULT FEMALE *Kogia breviceps* STRANDED AT CRESCENT BEACH, ST. JOHNS COUNTY, FLORIDA, ON 23 SEPTEMBER 1948.

Measurement	Mm	% Total length
Total length	3200	100.0
Length from tip of snout to tip of dorsal fin	1905	59.5
Length from anus to trailing edge of flukes	1067	33.3
Length from eye to axilla	432	13.5
Length from eye to tip of snout	419	13.1
Length from eye to blowhole	178	5.6
Length from eye to angle of mouth	229	7.1
Length from tip of jaw to angle of mouth	203	6.3
Breadth of jaw at angle of mouth	140	4.4
Length of flukes in midsagittal plane	394	12.3
Breadth of flukes from midline to tip	444	13.9
Height of dorsal fin	140	4.4
Length of dorsal fin base	229	7.1
Length of flipper from ant. edge to tip	521	16.3
Length of flipper from axilla to tip	406	12.7
Breadth of flipper	190	6.0
Breadth of head through level of eye	597	18.6
Depth of body at eye	457	14.3
Depth of body at ant. insertion of dorsal fin	756	23.6
Depth of body at tip of flipper	762	23.8
Depth of body at anus	483	15.1
Depth of body at mid-peduncle	318	9.9

TABLE 5. BODY MEASUREMENTS (IN MILLIMETERS)* AND TOOTH COUNTS OF 11 *Steno bredanensis* FROM A STRANDING IN THE GULF OF MEXICO ON THE COAST OF TAYLOR CO., FLORIDA, MAY, 1961.

Measurement	Sex										
	♂	♂	♂	♂	♂	♂	♀	♀	♀	♀	?
Total length	1820	1970	2000	1800	1750	1820	2187	2090	2550	1995	2170
Length from tip of upper jaw to center of eye	322	340	335	335	290	336	350	338	335	347	330
Length of gape from tip of upper jaw to angle of gape	260	287	288	280	250	300	295	288	290	310	270
Length from tip of upper jaw to anterior insertion of flipper	480	500	538	490	406	500	540	510	525	560	520
Length of flipper from anterior insertion to tip	318	404	398	340	298	352	400	393	360	388	420
Length of flipper from axilla to tip	234	297	311	243	210	252	312	289	270	288	315
Maximum width of flipper	118	140	144	102	107	102	144	144	103	104	152
Width of flukes from tip to tip	460	575	532	490	412	510	590	620	625	575	—
Visible teeth											
Upper right	21	21	19	23	23	23	21	20	20	21	19
Upper left	21	21	19	23	22	24	23	20	19	21	19
Lower right	22	22	19	22	22	23	23	20	20	21	20
Lower left	22	22	20	22	21	24	23	22	20	21	20
Total	86	86	77	90	88	94	90	82	79	84	78
Condition of teeth †	U	S	U	U	U	?	S	M	H	U	U

* Taken in the manner defined by Norris *et al.* (1961).

† U—unworn, S—slight wear, M—moderate wear, H—heavy wear.

TABLE 6. SEASONAL DISTRIBUTION OF 29 *Globicephala* STRANDINGS OR DEAD INDIVIDUALS WASHED ONSHORE ALONG FLORIDA COASTS (DATA FROM MOORE, 1953, AND PRESENT STUDY).

Month	Number of Individuals Involved	
	Gulf Coast and Keys	Atlantic Coast
January	—	—
February	±50	1?, 1
March	26	6, 1?
April	1, 12	1, 20-27
May	4, 1?	12
June	5, 200+	—
July	3, 7	—
August	1, 6	1?
September	—	—
October	5, 1?	46, 1?
November	—	1, 53-55
December	—	75+
Late autumn	—	5
Winter	—	30+

TABLE 7. SKULL MEASUREMENTS OF *Globicephala macrorhyncha* from Florida.

Measurement	UF 624 ♂ Yg		UF 3337 Sex ?		UF 3338 Sex ?		UF 5858 ♀ Ad.		UF 5859 ♀ Ad.	
	8 mi. N		Locality		Locality		½ mi. N.		½ mi. N.	
	Marineland		unknown		unknown		Flagler Beach		Flagler Beach	
	Mm	% TL	Mm	% TL	Mm	% TL	Mm	% TL	Mm	% TL
Total length	518	100.0	659	100.0	550*	100.0	555	100.0	558	100.0
Length of rostrum	251	48.4	344	52.2	279	50.7	285	51.4	293	52.5
Width of rostrum at base	175	33.8	257	39.0	213	38.7	221	39.8	201	36.0
Width of rostrum 60 mm anterior to antorbital notches	166	32.0	260	39.4	205	37.3	206	37.1	190	34.0
Width of rostrum at middle	131	25.3	235	35.7	173	31.4	145	26.1	160	28.7
Breadth across preorb. angles of supraorbital processes	305	58.9	453	68.7	371	67.4	360	64.9	341	61.1
Breadth across postorb. angles of supraorbital processes	323	62.4	481	73.0	409	74.4	394	71.0	380	68.1
Breadth at orbits	294	56.8	439	66.6	365	66.4	358	64.5	339	60.8
Breadth across zygomatic apophyses	326	62.9	487	73.9	413	75.1	396	71.4	382	68.4
Width of braincase across parietals	213	41.1	291	44.2	247	44.9	235	42.3	235	42.1
Max. distance between outside edges of pmx. proximally	137	26.4	172	26.1	150	27.3	140	25.2	149	26.7
Max. dist. between outside edges pmx. distally	137	26.4	226	34.3	178	32.4	157	28.3	161	28.8
Breadth of pmx. at middle of rostrum	124	23.9	221	33.5	176	32.0	147	26.5	155	27.8
Least dist. between lateral margins of pmx.	119	23.0	165	25.0	140	25.4	137	24.7	130	23.3
Tip of rostrum to middle of post. margin of pterygoid	322	62.2	413	62.7	354	64.4	352	63.4	361	64.7
Length of temporal fossa	125	24.1	164	24.9	147	26.7	124	22.3	138	24.7
Depth of temporal fossa	57	11.0	107	16.2	84	15.3	78	14.0	83	14.9
Length of upper tooth row (to end pmx.)	136	26.2	163	24.7	139	25.3	128	23.1	148	26.5

* Occipital condyles partly missing.

TABLE 8. BODY MEASUREMENTS OF THREE SPECIMENS OF *Globicephala macrorhyncha* FROM A STRANDING NEAR FLAGLER BEACH* (VOLUSIA CO.) ON 16 DECEMBER 1957.

Measurement	UF 5858		UF 5859		UF 5860	
	♀ Adult		♀ Adult		♀ Young	
	Mm	% TL	Mm	% TL	Mm	% TL
Total length	3277	100.0	3340	100.0	1968	100.0
Girth at post. insertion of flipper	1511	46.1	1524	45.6	1181	60.0
Tip of snout to blowhole	—	—	—	—	273	13.9
Tip of snout to insertion of dorsal fin	—	—	—	—	622	31.6
Tip of snout to tip of dorsal	—	—	—	—	1029	52.2
Tip of snout to ant. margin of eye	—	—	—	—	241	12.2
Post. margin of eye to ant. insertion of flipper	—	—	—	—	197	10.0
Blowhole to insertion of dorsal	—	—	—	—	362	18.4
Post. margin of eye to auditory meatus	—	—	—	—	70	3.6
Length of eye	28	0.9	—	—	28	1.4
Greatest width of closed blowhole	70	2.1	—	—	44	2.2
Tip of snout to angle of mouth	381	11.6	—	—	222	11.3
Tip of dorsal to notch of flukes	2013	59.1	—	—	1060	53.9
Spread of flukes	851†	26.0	794†	23.8	495	25.2
Height of dorsal	286	8.7	—	—	178	9.0
Length of dorsal from insertion to tip	724	22.1	—	—	—	—
Length of flipper from ant. insertion to tip	610	18.6	565	16.9	362	18.4
Length of flipper from post. insertion to tip	489	14.9	419	12.5	298	15.2

* UF 5858 and 5859 collected ½ mile N of Flagler Beach; UF 5860 collected 5 miles S of Flagler Beach.

† Extreme tip of one cut off.

‡ Tips of both flukes cut off.

TABLE 9. ABSOLUTE* AND PROPORTIONAL BODY MEASUREMENTS OF *Stenella longirostris* FROM A STRANDING ON DOG ISLAND, FRANKLIN CO., ON 23 SEPTEMBER 1961.

Measurement	UF 6741		UF 7861		FSU 284	
	♂		♂		♀	
	Mm	% TL	Mm	% TL	Mm	% TL
Total length	1845	100.0	1910	100.0	1965	100.0
Length from tip of upper jaw to center of eye	312	16.9	330	17.2	338	17.2
Length from tip of upper jaw to angle of gape	246	13.3	263	13.7	260	13.2
Length from tip of upper jaw to anterior-most point of head on midline	154	8.3	172	9.0	163	8.2
Length from tip of upper jaw to mid-point of dorsal fin base	940	50.9	1005	52.6	1018	51.8
Length from tip of upper jaw to blowhole	297	16.0	354	18.5	392	19.9
Length from tip of upper jaw to anterior insertion of flipper	435	23.5	452	23.6	491	24.9
Length of eye	20	1.0	17	0.8	18	0.9
Height of eye	8	0.4	5	0.2	9	0.4
Width of blowhole	21	1.1	17	0.8	20	1.0
Length of flipper from anterior insertion to tip	258	13.9	264	13.8	268	13.6
Length of flipper from axilla to tip	200	10.8	205	10.7	203	10.3
Maximum width of flipper	90	4.8	87	4.5	95	4.8
Height of dorsal fin	181	9.8	185	9.6	186	9.4
Length of dorsal fin base	265	14.3	280	14.6	275	13.9
Width of flukes from tip to tip	200†	—	448	23.4	420	21.3

* Taken as described by Norris *et al.* (1961).

† Left fluke from center of notch to tip. Tip of right missing.

TABLE 10. SKULL MEASUREMENTS OF AN ADULT MALE *Stenella longirostris* (UF 7861) COLLECTED ON DOG ISLAND, FRANKLIN CO., ON 23 SEPTEMBER 1961.

Measurement	Mm	% Total length
Total length	425	100.0
Length of rostrum	280	65.8
Width of rostrum at base of maxillary notches	75	17.6
Width of rostrum at middle (140 mm from base)	45	10.5
Width of rostrum over posterior maxillary teeth	55	12.9
Width of premaxillaries at middle of rostrum	18	4.2
Maximum width of premaxillaries proximally	63	14.8
Length of upper tooth row	244	57.4
Distance from last tooth to base of maxillary notch	40	9.4
Exposed portion of vomer on midline of rostrum	78	18.3
Distance from tip of rostrum to anterior margin of superior nares	315	74.1
Distance from tip of rostrum to end of pterygoid	323	76.0
Breadth of cranium between middle of orbits	145	34.1
Breadth of cranium between hinder margins of temporal fossae	124	29.1
Greatest breadth of cranium (at posterior margin of orbit)	156	36.7
Length of temporal fossa	48	11.2
Depth of temporal fossa	32	7.5
Breadth of superior nares	41	9.6
Length of mandible	370	87.0
Length of mandibular symphysis	52	12.2
Length of mandibular tooth row	227	53.4
Depth of mandible between angle and coronoid process	58	13.6

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