OBSERVATIONS ON A MASS STRANDING OF SPINNER DOLPHIN, *STENELLA LONGIROSTRIS*, FROM THE WEST COAST OF FLORIDA

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ABSTRACT

The spinner dolphin, *Stenella longirostris*, while well known in portions of the Pacific Ocean, has rarely been available for study in the Atlantic. Data from 28 individuals from a mass stranding in Florida enabled us to make preliminary estimates of mean size and age at sexual and physical maturity, reproductive seasonality, and sexual dimorphism for this species in the southwest Atlantic. Our sample most closely resembles the Hawaiian populations described by Perrin, but further work in the Atlantic is likely to demonstrate other populations differing morphologically from this one.

The spinner dolphin, *Stenella longirostris*, is widely distributed in tropical to warm temperate waters of the world (Perrin 1975), but due to its predominately pelagic habits, is seldom found stranded and is not generally taken in coastal fisheries. As a result, very little is known of its biology except in the eastern tropical Pacific, where it is taken in considerable numbers incidental to purse seining for yellowfin tuna. Perrin et al. (1977) have recently published investigations on the eastern population of spinner dolphin from the Pacific.

The species is apparently common in the Caribbean (Caldwell et al. 1971; Erdman et al. 1973; Taruski and Winn 1976), but there are few records, all of them strandings, from the Gulf of Mexico. Gunter (1954) did not find any evidence of this species in the Gulf of Mexico. Layne (1965) reported on a mass stranding of this species from Dog Island, Fla. (lat 29°48′ N, long. 84°38′ W), where 36 animals stranded on September 1961. Lowery (1974) reported a single adult male from Fort Walton Beach, Fla. (lat. 30°24′ N, long. 84°47′ W). Schmidley and Shane[5] reported a 158 cm male which stranded alive at Sabine Pass Beach, Tex., on 16 May 1976, and a pregnant 188 cm female found on Padre Island, Tex., during March 1975. Shane (1977) reported two additional records from Padre Island: a 173 cm female which stranded about January 1976 and a 183 cm male on 4 June 1977. The present study is based on 28 animals from a single mass stranding on the west coast of Florida.

At this point it is not possible to determine whether the occurrences recorded from the west coast of Florida were derived from a population in the Gulf of Mexico or were strays from the Caribbean. While there is a small fishery for mixed species of dolphins in the Caribbean (Caldwell et al. 1971), catches of spinner dolphin are relatively infrequent and are unlikely to have an appreciable effect on the population. In contrast, the populations studied by Perrin and others in the Pacific are taken in large numbers incidental to purse seining for yellowfin tuna.

The causes of mass strandings of cetaceans are still very little understood (see Geraci 1978 for a recent review of the subject). It is clear that this is a very complex problem which goes far beyond the scope of this paper. It is also clear that much of our lack of understanding is based upon a lack of information on the species involved. We have felt that it was also important to include material on the circumstances of the stranding itself, even though this is not directly related to the conclusions drawn from examination of the specimens.

CIRCUMSTANCES OF THE STRANDING

The stranding occurred on the north end of Casey Key, with most of the dolphins concentrated

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[5]Schmidley, D. F., and S. H. Shane. 1978. A biological assessment of the cetacean fauna of the Texas coast. Final Rep., U.S. Marine Mammal Commission Contract MM4AC008, available Natl. Tech. Inf. Serv., Springfield, Va., as PB 281763, 38 p.

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at about lat. 27°12′10″ N, long. 82°30′30″ W (Figure 1). The animals began coming ashore about 2200 h e.d.t. on the evening of 13 July 1976. At that time the wind was westerly at 10-15 mi/h, seas were running about 2 ft, and there was an extreme low tide at 2211 h. Upon discovering the animals, local residents attempted to direct them back to sea or move them to more sheltered areas.

Most observers concurred that there was a great deal of noise coming from all of the dolphins when they first came ashore, including much "squealing and crying," but that this later subsided. The animals were quite passive on the beach, with the exception of one large animal that reacted violently to handling and died during the short trip to Midnight Pass. Most of the dolphins did not resist handling and were easily walked to the shallow sand bar 10-15 m from shore, where they were pointed seaward, held until they began rhythmic swimming motions, and then given a push offshore. This was believed to be successful with some of the animals, but in many cases they would turn towards the south with the first wave that came over the bar and be washed back onto shore.

Eight to 10 animals, one of which was marked on the dorsal fin with a cattle ear tag, were moved to the more sheltered waters of Midnight Pass and released in there. A single small animal (possibly 504457)[6] was released in Little Sarasota Bay. The last live animal to come ashore with the initial stranding was 504449 which was found at 0130 h and died while attempts were being made to direct it back to sea. Estimates of the total number of animals ranged from 50 to 150, with most of the observers agreeing on the lower number.

Early morning of 14 July, four large animals and a calf stranded just north of Turtle Beach on Siesta Key, about 2 km north of the original stranding. Three of the large animals were directed back to sea, one died on the beach and was subsequently lost, and the calf (504459) was moved to Turtle Lagoon where it died. All of the live animals were off of the beach by 0800 h.

Later that morning, two live animals were picked up, one from the northeast end of Casey Key along the Intracoastal Waterway, and one from the grass beds just east of Bird Keys. The animal which had been tagged the night before (504434) was recovered dead from the latter area. Both of the live animals were probably from the group that had been transported and released at Midnight Pass. The live animals were held in an impoundment at the Mote Marine Laboratory on Siesta Key until they were picked up by Sea World and transported to holding facilities at Orlando, Fla., on 15 July. One of these (504456) died the next day; the other (504455) died 4 days later. A dead calf (504458) was recovered from the southern tip of Siesta Key, a dead adult (504451) was picked up on the west side of Bird Keys, and the accumulation of dead animals at the original stranding site on Casey Key was recovered and put on ice at the Mote Marine Laboratory on 14 July.

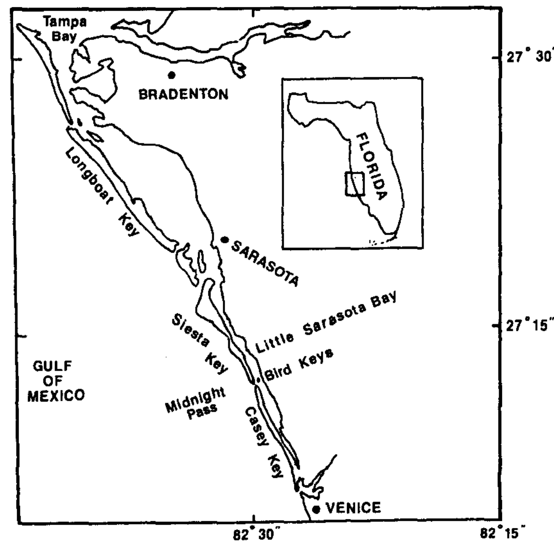

FIGURE 1.—Central west coast of Florida localities involved in the mass stranding of spinner dolphin.

Late afternoon of 15 July, we received notification that a small dolphin had been seen in the Intracoastal Waterway near marker no. 23 about 6 km south of Midnight Pass. This animal (504457) was found just after dark swimming slowly near shore and whistling loudly. It was picked up alive, but died early the next morning while being transported to Orlando. This was probably the calf which had been released in Little Sarasota Bay on 13 July.

The last animal to be recovered was the decomposed carcass of an adult male that was picked up on 16 July from Casey Key (504460).

An aerial survey was flown in a U.S. Coast Guard helicopter from 1800 to 2000 h on 14 July and on the afternoon of 16 July. No animals other than the dead ones on the beach were seen. The

[6]The six digit numbers used to identify the animals are catalog numbers of the United States National Museum, where the skeletal remains have been deposited.

stranding received a great deal of publicity from the news media, and it would be expected that we would have been notified if any additional animals had turned up on the coast.

Most of the dolphins bore minor abrasions that were probably incurred while stranding. Only one (504448) exhibited any appreciable physical damage. This animal, the largest male of the group, had two large shark bites on the left flank at about midlength and a third which completely removed the left fluke. These bites appeared to have been inflicted after death.

NECROPSY

One specimen was necropsied late on the evening of 14 July, the others on 15 July. The two animals which were transported to Sea World were necropsied on 16 and 20 July by the Sea World staff. A variety of lesions were observed in the sample necropsied on 15 July. Most were parasitic and not serious enough to account for death. The blubber layer appeared thin, but this was due at least in part to postmortem changes in the hot sun and measurements were not taken.

The stomachs of all specimens except the three calves were empty. Nicholas Hall (Department of Neuropathology, University of Florida, Gainesville, FL 32601) collected the brains from the animals necropsied on 15 July for neuropathological examination. Helminth parasites were collected and forwarded to Donald Forrester (Laboratory of Wildlife Disease Research, University of Florida, Gainesville, FL 32611). Gonad samples were collected and later analyzed at the Smithsonian Institution by Mead. Teeth were taken from all of the animals except the calves and were sectioned at about 175 μm in thickness by Odell using a Buehler Isomet Low Speed Saw[7], and were read for age determination by Odell and Mead. External measurements were taken by Wells and Scott while the animals were still on the beach, and organ weights were taken during the necropsies. Copies of all the measurements and necropsy data are in the Marine Mammal Program files (Division of Mammals, Smithsonian Institution, Washington, DC 20560). Skeleton materials from the specimens are being studied by William F. Perrin (Southwest Fisheries Center, NMFS, NOAA, La Jolla, CA 92038).

[7]Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

REPRODUCTIVE DATA

The female reproductive tracts were removed, flat diameter of uterine horns measured at their midlength, ovaries collected and fixed, uterus opened and examined for fetuses, and mammary glands checked for gross indications of lactation. The ovaries were examined for externally visible corpora, indications of large maturing follicles, and were weighed. The ovaries were subsequently sectioned by William F. Perrin, providing confirmation of the external examination and an exact count of the corpora albicantia. None of the animals were visibly pregnant and only one (504456) was lactating. For practical purposes, females were considered sexually mature if there were external indications of at least one corpus on the ovaries. There was only one individual (504440) in which there was a discrepancy between the results of the external ovarian examination and the sectioning (Table 1). In this case a large follicle was probably mistaken for a corpus albicans on external examination.

The smallest sexually mature female was 187 cm long, and the largest immature female was 190 cm long. A 177 cm female showed no indications of follicular development, while four animals between 180 and 186 cm showed external indications of maturing follicles. The diameter of the larger of the two uterine horns showed a considerable increase (about twofold) at sexual maturity.

The good correspondence between ovarian condition and diameter of the uterine horns indicates that the latter may be a useful character for defining sexual maturity, as it is probably the result of pregnancy.

It seems likely that females begin to mature at about 180 cm and reach sexual maturity at a length of about 188 cm and a weight of about 55 kg. The 188 cm pregnant female reported by Schmidley and Shane (see footnote 5) fits this interpretation.

Considering only those females in which the pulp cavity of the tooth was open and for which an exact count of growth layer groups[8] could be made, there were four sexually immature animals, with a mean of 8.25 growth layer groups (7, 8, 8, and 10 groups), and three sexually mature animals, with a mean of 10 groups (7, 11, and 12 groups). Al-

[8]Terminology adopted at International Workshop on Determining Age of Odontocete Cetaceans, 8-19 September 1978, Southwest Fisheries Center, NMFS, NOAA, La Jolla, Calif.

TABLE 1.—Reproductive data on female spinner dolphin stranded in Florida. Epiphyses: 0 = open; 1 = closed; 2 = fused. Sexual maturity: 0 = mature; 1 = maturing; 2 = mature. Ages are in number of dentinal growth layer groups with + signifying that the pulp cavity was closed and the age was greater than the number of visible groups. The right and left ovaries were confused on 504437. However, they are presumed to correspond to the relative diameter of the uterine horns.

USNM number	Length (cm)	Weight (kg)	Age	Epiphyses	Gonad weight (g)		Uterine diameter (cm)		Ovarian corpora		Sexual maturity
					Right	Left	Right	Left	Right	Left	
504438	177	49	10	0	0.81	0.76	1.5	1.5	0	0	0
504450	180	54	8	0	0.48	1.47	1.5	1.5	0	0	1
504449	181	46.1	7	0	0.45	1.36	1.4	1.5	0	0	1
504453	183	47.5	8	0	0.50	1.08	1.5	1.5	0	0	1
504454	186	54	7	0	0.29	1.02	1.2	1.2	0	0	1
504441	187	55.3	8+	0	1.16	4.29	2.0	2.8	0	4	2
504444	189	53	11+	0	0.37	1.58	1.8	1.3	0	0	1
504440	190	56	7	0	0.81	1.85	1.3	1.6	0	0	1
504437	195	61.1	12	0	0.95	6.3+	1 9	3.0	0	1	2
504433	196	60.3	6+	1	1.39	1.99	1.9	2.3	0	7	2
504445	197	64	—	0	1.57	2.46	1.6	2.0	0	1	2
504451	201	65.2	11	2	1.22	5.11	2.9	3.0	0	9	2
504456	204	59	—	—	1.55	4.5	—	—	—	—	2

though sample size is small, it gives a useful preliminary estimate of age at sexual maturity of 7-10 growth layer groups (7-10 yr, see Perrin et al. 1976, 1977 for discussion of alternative growth layer-age relationships).

Comparable figures were given by Perrin et al. (1977) for the eastern spinner dolphin from the Pacific. They found a mean length at sexual maturity of 165 cm which is appreciably shorter than the estimate for this sample (188 cm). This is due at least in part to the eastern spinner dolphin being a relatively smaller animal (mean length of sexually mature females was 171 cm, whereas it was 197 cm for this sample). Perrin et al. (1977) found that mean age at sexual maturity was 5.5 growth layer groups, which may represent a decrease in age at sexual maturity as a result of fishing pressure on the eastern spinner population. This also might contribute to the shorter length at sexual maturity in that population.

As appears to be the case with many delphinids, there was a marked dominance of the left side of the reproductive tract (Harrison et al. 1972). In all of the mature or maturing animals, the left ovary was decidedly larger than the right, and only one animal (504441) bore any externally visible corpora on the right ovary. There was a corresponding asymmetry in the size of the uterine horns, with the left being equal to or larger than the right in all but one animal (504444), indicating that the greater number of pregnancies were carried in the left horn.

The testes were measured, weighed with the epididymis removed, and a sample taken for histological examination. Sections of testis samples were cut at 10 μm, stained with hematoxylin and eosin, and the diameter of the seminiferous tubules measured with an ocular micrometer. The tubules were randomly selected for examination, but only those approaching a direct rather than an oblique cross section and free from obvious artifacts of sectioning or decomposition were chosen for measurement. The least diameter was measured and the results given in Table 2 are the mean of 10 tubules, at a depth of about 1 cm from the surface of the testis. Tubules were also mea-

TABLE 2.—Reproductive data on male spinner dolphin stranded in Florida. Epiphyses: 0 = open; 1 = closed; 2 = fused. Sperm in epididymis: 0 = none; 1 = present; 2 = copious. Testis activity: 0 = no spermatogenesis; 2 = active spermatogenesis. Sexual maturity: 0 = immature; 1 = maturing; 2 = mature. Ages are in number of dentinal growth layer groups, with + signifying that the pulp cavity was closed and the age was greater than the number of visible layers.

USNM number	Length (cm)	Weight (kg)	Age	Epiphyses	Gonad weight (g)		Gonad length (cm)		Sperm in epididymis	Testis activity	Tubule diameter	Sexual maturity
					Right	Left	Right	Left				
504434	188	51	7	0	18	17	11	10	0	0	62	0
504435	189	55.8	7	0	250	220	24	20	0	1	136	1
504455	190	63.6	8+	—	320	310	—	—	1	—	—	1
504439	192	65.5	9+	1	730	720	32	30	—	1	244	2
504436	194	65.3	10	0	400	430	23	24	2	1	185	2
504442	195	60	10	—	—	460	27	27	1	1	180	2
504443	197	68	9+	1	560	550	27	25	1	1	200	2
504447	197	63.8	7+	0	96.5	100	15	16	1	0	80	0
504446	201	75	9+	2	860	870	31	32	2	1	196	2
504452	203	63.6	9+	—	500	500	27	27	1	1	173	2
504448	208	69+	8+	1	980	870	36	35	2	—	—	2

sured near the surface of the testis and it was noted that tubule diameter averaged about 10% less at that level in the mature males. The process of selection of the tubules for measurement may have introduced a slight bias in favor of smaller tubules, as these are possibly less likely to have been affected by decomposition artifacts. Much of the variation in tubule diameter within an individual slide may have been the result of autolytic distortion, which would tend to increase the diameter of the tubules.

There is a sharp increase in the size of the testes of animals with length of 188 or 189 cm (Table 2), which apparently is the size range at which maturation of the testes begins. Spermatogenesis was taking place in the testes of the 189 cm individual, but the testes weights were still low relative to those of fully mature animals and no sperm was present in the epididymis. In the next largest animal (190 cm), the testes were slightly larger and sperm was present in the epididymis, indicating that this animal was functionally sexually mature. All of the animals above 190 cm had large, active testes and were sexually mature, with the exception of a single 203 cm individual (504452), whose testes were markedly small, though there was a slight indication of spermatogenesis. The body weight of this animal was also low for its length, and it is probable that it was an abnormal individual.

Although the sample of males was too small to statistically define sexual maturity, it seems likely that maturation begins around a body length of about 190 cm and a weight of about 60 kg, and maturity is reached at a length of about 192 cm and a weight of about 65 kg. Animals with a seminiferous tubule diameter of less than about 150 μm were immature or maturing, and those with a diameter in excess of this were sexually mature. The corresponding figures for testis weight and length were about 300 g and 24 cm. The sample of males with the pulp cavity open in the teeth consists of only four specimens. One of these did not have well-defined growth layers, leaving only three usable individuals. These are an immature animal with 7 growth layer groups and two mature animals with 10 groups.

Perrin et al. (1977) found a mean length at sexual maturity of about 175-180 cm (the middle of several estimates based on different criteria, and the estimate which is most comparable with that applied to the present sample) and a mean age at sexual maturity of about 10-12 groups in the eastern spinner dolphin. As was seen when comparing the sexual maturity figures for females from the two populations, the eastern spinner reaches maturity at a shorter length than our sample from the Gulf of Mexico. In the case of males, the ages at attainment of sexual maturity are more similar and the length difference is probably due to population differences in mean size of individuals.

PRODUCTIVE SEASONALITY

Of the six mature females in this sample, one (504456) was lactating and one had a large corpus luteum with no visible conceptus. Both of these had probably given birth recently. None of the six were pregnant. Six of the seven mature males were examined for presence of sperm in the epididymis. Sperm was present in all six and was judged to be copious in three. Admittedly, this is a very small sample, but it is indicative of recent calving and breeding activity.

Perhaps the most convincing evidence for recent reproductive activity in this sample are the three calves which were present, with lengths of 90, 91, and 97 cm. Perrin et al. (1977) estimated length at birth in the eastern spinner to be 75.5 cm. Since the mean lengths of mature animals and the mean lengths at attainment of sexual maturity in the Florida sample are uniformly about 14% greater than the corresponding figures for the eastern spinner dolphin, it is logical to assume, for an initial approximation, that length at birth would also be about 14% greater, or about 86 cm. Perrin et al. (1977) estimated the postnatal growth rate in the first 10 or 11 mo after birth to be 4.77 cm/mo. Again, allowing a difference of 14% for the larger mean size in the Florida sample, a usable estimate of the growth rate during this period would be 5.4 cm/mo. This provides projected ages for the two smaller calves of about 1 mo old, and for the larger of about 2 mo, with birth dates of mid-June and mid-May.

The only other data available for spinner dolphins in the Gulf of Mexico are the 8.1 cm fetus which Layne (1965) found in an animal which stranded in mid-September and the 61 cm fetus which Schmidley and Shane (see footnote 5) found in early March. Using the fetal growth curve for the eastern spinner (Perrin et al. 1977), and assuming that the mean size difference between the populations would not be significant for small fetuses, the approximate date of conception for the

8.1 cm fetus would be late June or early July, and for the 61 cm fetus would be early May.

Thus, although the data are few, there is a convincing consistency indicative of a calving season for this population in early summer (May-July).

PHYSICAL MATURITY

Physical maturity was judged on the basis of examination of the epiphyseal suture in one of the midthoracic vertebrae and noting whether a cartilaginous plate was present (open), absent but with the epiphyseal line still visible (closed), or absent with all trace of the epiphyseal suture obliterated (fused). The suture was examined on a cut surface at least 1 cm deep, and generally on a median section of a whole centrum. Closure of the suture takes place last along the periphery of the epiphyseal plate, and a shallow cut can frequently be misleading. As can be seen in Table 2, males reached physical maturity at about the same size as sexual maturity (with the exception of 504447, which as noted earlier, was probably an abnormal individual). Females, however, reached physical maturity considerably after sexual maturity, at a length of about 196 cm and a weight of about 61 kg.

EXTERNAL MORPHOLOGY

External measurements were taken in the manner outlined by Norris (1961), at the time the animals were picked up from the beach, using a steel tape graduated in centimeters. Numbers in parentheses in the text refer to the numbered measurements as defined in that paper. In the following discussion, relative dimensions are with respect to the total length of the individual, and are expressed as the means of the individual dimensions divided by the individual total lengths (Table 3). Figure 2 shows the long slender rostrum and a pigmentation pattern characteristic of this species.

Sexual dimorphism in the external measurements was most apparent in the relative length of the rostrum (snout to apex of melon (3)). This dimension was about 7% larger in females for the total sample, but was less in the adult and neonatal samples. Perrin (1975) found the same sexual difference in the sample of *S. longirostris* which he examined from the Pacific.

The other anterior body measurements which are taken from the tip of the snout show sexual differences of a lower relative magnitude, due to inclusion of the rostral length as a component of these dimensions. We should then expect, if no other factors were active, that all measurements containing rostral length would be proportionately greater in females, and all those not containing rostral length would be proportionately smaller. In this particular sample, however, the variation is such that these differences are not apparent in most cases.

TABLE 3.—External measurements on Florida spinner dolphin expressed as individual dimensions divided by individual total lengths. For these purposes animals with a total length >195 cm were considered adult. Numbers in parentheses refer to Norris (1961) for definitions of the measurement.

Measurement	Sample	*N*	Mean	SD
Snout to apex of melon (3)	Total males	12	0.089	0.005
	Total females	14	.095	.008
	Adult Males	9	.090	.005
	Adult females	4	.093	.005
	Neonatal males	1	.080	—
	Neonatal females	2	.081	.005
Snout to genital slit (13)	Adult males	9	.652	.020
	Adult females	5	.706	.023
Girth at anus (23)	Adult males	9	.312	.012
	Adult females	5	.281	.022
Fluke width (34)	Total males	12	.233	.017
	Total females	15	.216	.017
	Adult males	9	.235	.019
	Adult females	5	.222	.016
	Neonatal males	1	.221	—
	Neonatal females	2	.210	.014
Height of dorsal fin (32)	Total males	12	.102	.009
	Total females	15	.095	.006

The position of the center of the genital slit, as determined by the measurement from the tip of the snout to the genital slit (13), differs between males and females, with the center of the slit being farther posterior in females. The difference amounts to a relative increase of about 8% in this measurement in adult females when compared with adult males. This particular sexual difference seems to be true of cetaceans in general.

Girth at the anus (23) relative to total length is about 11% greater in adult males. This is correlated with development of a postanal keel in adult males as described by Perrin (1972, 1975).

The relative width of the flukes (34) was 5-8% greater in males in the adult, total, and neonatal samples. Although the variation in this character renders this statistically insignificant in this sample, the same sort of difference was found by Perrin (1975) in his Pacific samples, suggesting that it is a real difference. The relative height of the dorsal fin (32) was 7% greater in males in the total sample. Here again, the variation renders the difference statistically insignificant. There is a possible indication that the flippers are relatively larger in females, but the difference is slight

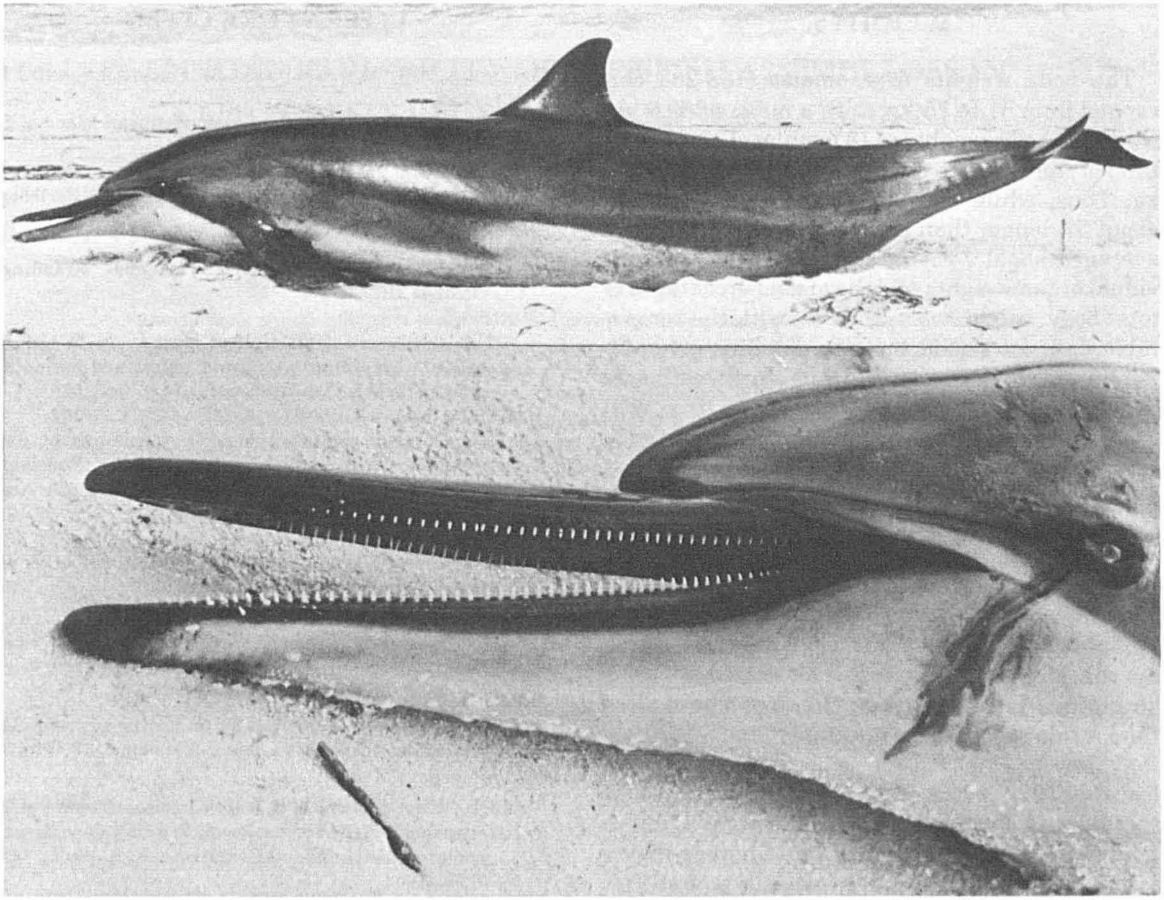

FIGURE 2.—Adult *Stenella longirostris* stranded at Casey Key, Fla. Above adult male, 195 cm total length (504442); below, head of adult female, 186 cm total length (504454).

enough that a larger sample would be needed to demonstrate its validity.

None of the other measurements show any appreciable sexual differences when the differences in total length and rostral length are taken into account.

Since the sample is lacking in intermediate-size animals, there is relatively little that can be said about growth patterns. It is apparent that the snout is relatively shorter and the rest of the head relatively larger in neonatal animals than in adults. The girths appear to be relatively greater, the flippers relatively larger, but the flukes and dorsal fin about the same proportion in the neonates as in the adults. Although the sample of neonates is too small to have any statistical significance, the sexual differences in length of rostrum, position of genital slit, width of flukes, and height of dorsal fin are the same in the neonates as in the adults.

Although comparable data for samples of *S. longirostris* from other areas are sparse (Perrin 1975), this sample appears to be similar to Hawaiian spinners in total length, rostral length, and girths. More meaningful comparison to other populations of *S. longirostris* will require increased sample sizes and more sophisticated statistical procedures.

WEIGHTS

The body weights of 11 males (188-208 cm) ranged from 51 to 75 kg, with a mean of 63.8 kg, while the body weights of 13 females (177-204 cm) ranged from 46.1 to 65.2 kg, with a mean of 55.7 kg. Thus, while the sample of males averaged about 3% longer than the sample of females, they averaged about 14% heavier. The range of individual organ weights and the mean percentages of total body weight are as follows, with the comparable data for Pacific spinner dolphins given by Perrin and Roberts (1972) in parentheses; heart 260-440 g, 0.59% (191-272 g, 0.46%); liver 980-2,200 g, 2.7% (832-997 g, 1.90%); kidneys 350-620 g, 0.78% (289-393 g, 0.65%); brain 500-780 g, 1.02%. The organ weights in the Florida sample, expressed as mean percentage of body weight, averaged about 25% greater than those given for the Pacific spinner dolphins. It is possible that some of this difference is due to weight loss (primarily blubber and muscle) in the Florida sample induced by the stress of whatever factors led to their stranding. As noted earlier, the stomachs of all of the Florida specimens were empty, and it is likely that they had not fed for some time. Perrin and Roberts (1972) noted that in both their samples of spotted and spinner dolphins, the right kidneys tended to be larger than the left whereas in our sample the kidneys were essentially equal (left was heavier in nine, right was heavier in five, and both were equal in eight).

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