GENERAL NOTES

OCCURRENCE AND SOUNDS OF FRASER'S DOLPHINS (*LAGENODELPHIS HOSEI*) IN THE GULF OF MEXICO

STEPHEN LEATHERWOOD[1], THOMAS A. JEFFERSON[2], JEFFREY C. NORRIS[3], WILLIE E. STEVENS[4], LARRY J. HANSEN[5], AND KEITH D. MULLIN[6]

[1]*IUCN/SSC Cetacean Specialist Group, c/o Department of Wildlife and Fisheries Sciences, 210 Nagle Hall, Texas A&M University, College Station, TX 77843-2258;* [2]*Marine Mammal Research Program (MMRP), c/o Department of Wildlife and Fisheries Sciences, 210 Nagle Hall, Texas A&M University, College Station, TX 77843-2258;* [3]*Department of Engineering Technology, Texas A&M University, College Station, TX 77843-2258;* [4]*MMRP, Texas A&M University at Galveston, 4700 Avenue U, Bldg. 303, Galveston, TX 77551;* [5]*National Marine Fisheries Service, Southeast Fisheries Science Center (NMFS/SEFSC), 75 Virginia Beach Dr., Miami, FL 33149;* [6]*NMFS/SEFSC, P. O. Drawer 1207, Pascagoula, MS 39568.*

Fraser's dolphin, *Lagenodelphis hosei*, is one of the least-known cetacean species. From its original description in 1956 (Fraser, 1956) to its "rediscovery" in 1973, it was known only from a single skeleton collected in Sarawak (Borneo). Perrin et al. (1973) provided the first description of external appearance and confirmed a tropical distribution in the Indian and Pacific oceans, based on seven new records. Since 1973, information on the biology of this species has accumulated slowly [summaries by Jefferson and Leatherwood (1993) and Perrin et al. (1993)]. Published accounts include only eight records from the Atlantic Ocean (three strandings and one sighting), and adjacent Caribbean Sea (three fisheries takes) and Gulf of Mexico (one mass stranding) (Fig. 1), and contain no information on sounds produced by these dolphins. This paper presents details of the first five observations of free-ranging animals in the Gulf of Mexico, describes sounds recorded during one of those observations, and presents details of a recent stranding on the Florida Gulf Coast.

A cooperative program on cetaceans of the northern Gulf of Mexico (Gulfcet) is being undertaken (1991-1993) by Texas A&M University, the U.S. Minerals Management Service, and the National Marine Fisheries Service through two of its southeastern laboratories. Data for this investigation are being collected during vessel and aerial surveys along preplanned transects. Visual searches with 25-power, pedestal-mounted binoculars are supplemented on many cruises by acoustic recordings using the Texas Institute of Oceanography's 183-m long linear towed array (Thomas et al., 1986) and an eight-channel Raycal V-Store tape recorder. The array consists of fore and aft high-frequency stations, with multiple hydrophone (Benthos AQ 20) traces centered at 5, 10 and 15kHz bandwidths. The tape recorder is operated at 9.53 cm per second, resulting in a 12.5 kHz bandwidth.

Four groups of Fraser's dolphins (including one tentative indentification) were encountered during Gulfcet cruises, two in 1992 and two in 1993, and a fifth was seen during a Gulfcet aerial survey in 1993. The first sighting was made from the Texas A&M University research vessel *Gyre* at 0925 on 24 May 1992, at 25°13.978'N, 96°09.196'W. Water depth at the location was 1,750 meters, surface water temperature 26.4°C. A tight group of approximately 180-220 animals was detected through the binoculars at a bearing of 340° and an estimated distance of 300 meters from the vessel. During the next 10 minutes, as the vessel continued on course, the dolphins maintained tight ranks as they first approached the vessel from the eleven o'clock position, swam briskly in the opposite direction of the ship's heading until they were about 50 meters astern, and then turned and crossed beneath the towed array. Sounds were detected

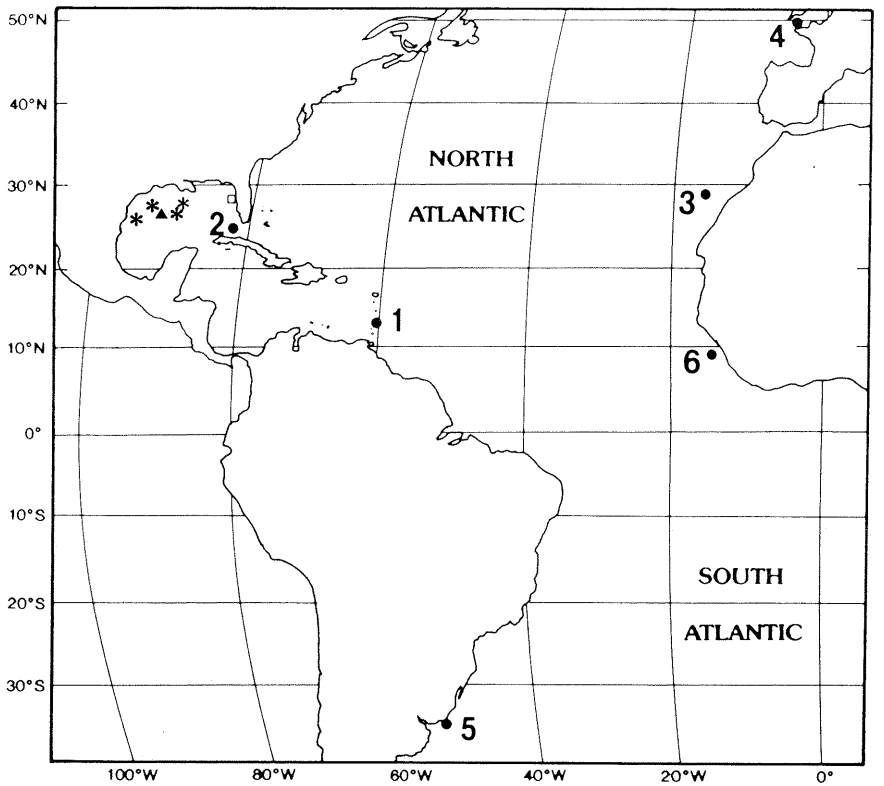

FIGURE 1. Records of Fraser's dolphins in the Atlantic Ocean, Caribbean Sea and Gulf of Mexico: (1) single animals harpooned off St. Vincent, Lesser Antilles, 2 October 1972 and 15 and 18 May 1976 (Caldwell et al., 1976); (2) 17 + stranded on Marquesas Key, Florida, in November 1981 (Hersh and Odell, 1986); (3) single animal stranded at the Canary Islands in August 1983 (Vonk and Martel, 1990); (4) 11 stranded in Brittany, France, on 29 May 1984 (Duguy, 1985; van Bree et al., 1986); (5) 4 animals stranded in Uruguay in March 1991 (Praderi et al., 1992); (6) sighting of 40 animals from a research vessel off West Africa (Tormosov et al., 1980); previously-unpublished sightings (asterisks); previously-unpublished tentative sighting (triangle); and previously-unpublished stranding (square) from the Gulf of Mexico.

and recorded. The vessel was then turned and slowed and the milling dolphin group approached for closer observation. Three large animals came to the ship and briefly rode the bow wave. Two had dark eye-to-anus stripes, but the third did not. The group appeared to contain individuals of various size-classes, but no obvious newborns were noted. By the time observation was terminated at 1010, the dolphins were in a tight formation swimming hurriedly away from the vessel with frequent leaping.

Sound recordings from the encounter were analyzed on a Kay model 5500 digital sonograph with a DC to 16 kHz frequency range. After the sounds were captured on the sonograph, they were passed to another computer for bandpass filtering using the Interactive Laboratory Software (ILS). The signals were anti-alias filtered and digitized at 35,000 samples/second. The eight whistles recorded were of two basic types: relatively long duration (0.4 - 0.5 seconds) single calls centered at either 11.4 - 13.4 kHz (Fig. 2A) or 7.64 - 8.88 kHz (Fig. 2B) and

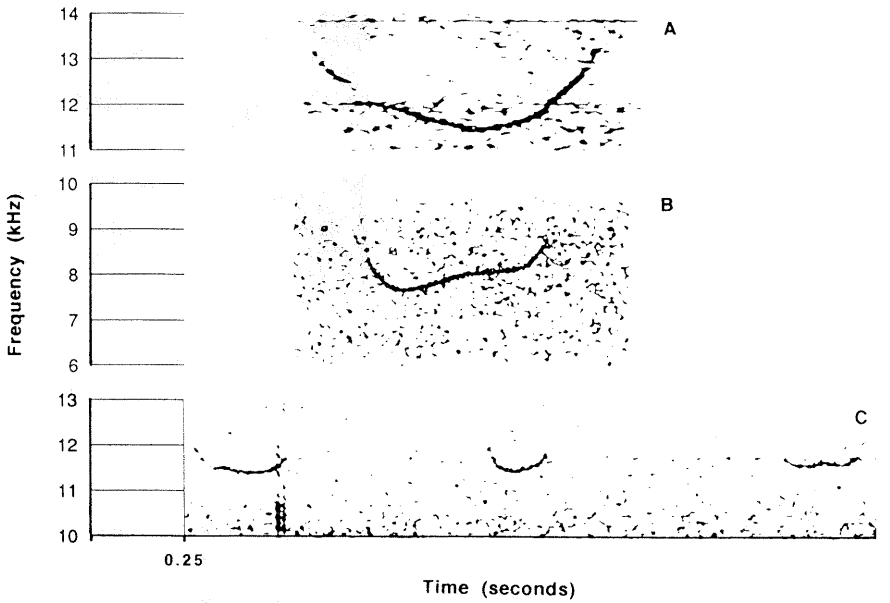

FIGURE 2. Whistles recorded in the presence of a group of 180-220 Fraser's dolphins on 24 May 1992. Single calls (0.4-0.5 s duration) 11.4-13.4 kHz (A), single calls (0.4-0.5 s duration) 7.64-8.88 kHz (B), 3 to 5 calls (0.2 s duration) 11.4-12.8 kHz (C).

groups of 3-5 relatively short duration (0.2 seconds) calls centered between 11.4 and 12.8 kHz (Fig. 2C). Overall, the whistles were relatively stereotyped. We do not know if they are representative of the repertoire of Fraser's dolphin. Compared to whistles recorded to date during the Gulfcet project, they are higher in frequency than typical whistles recorded from bottlenose dolphins, *Tursiops truncatus*, but similar in frequency to whistles of dolphins of the genus *Stenella*. Pulsed vocalizations, presumably used for echolocation, were also recorded. Unfortunately, the recording system was too bandlimited to permit any conclusions about the frequency content of those signals.

The second sighting was made from the NOAA Ship *Oregon II* at 1757 hr on 4 June 1992 at 26°22.34'N, 91°00.08'W. It involved a large (approximately 135 animals), mixed-species group of Fraser's dolphins (25%) and melon-headed whales, *Peponocephala electra* (75%), first detected through 25-power binoculars at a bearing of 9° and an estimated distance of 8 kilometers. Surface water temperature was 26.5 °C and depth was 2,057 meters. Initially, the animals were leaping and splashing. During the next few minutes, several small Fraser's dolphins came to the bow and rode the bow wave briefly before returning to the herd. The eye-to-anus stripe was evident on only a few of the Fraser's dolphins (Fig. 3A). The larger and more numerous melon-headed whales trailed the Fraser's dolphins throughout the observation.

The third sighting was made from the Louisiana Universities Marine Consortium's research vessel *Pelican* at 1913 hr on 1 June 1993 at 27°26.71'N, 94°09.95'W. A mixed-species group was detected through 25-power binoculars at an estimated 3.7 kilometers ahead of the vessel. The herd was overtaken in 9 minutes and observed at close range for 25 minutes. The aggregation contained an estimated 30-55 Fraser's dolphins, some of which rode the bow wave, and 105-195 melon-headed whales, which did not (although some did surf in the vessel's wake). In the fading light and rough seas, it was not possible to describe subtle details of the Fraser's dolphins' color pattern, but most of the animals seen well had only faint eye-to-anus stripes.

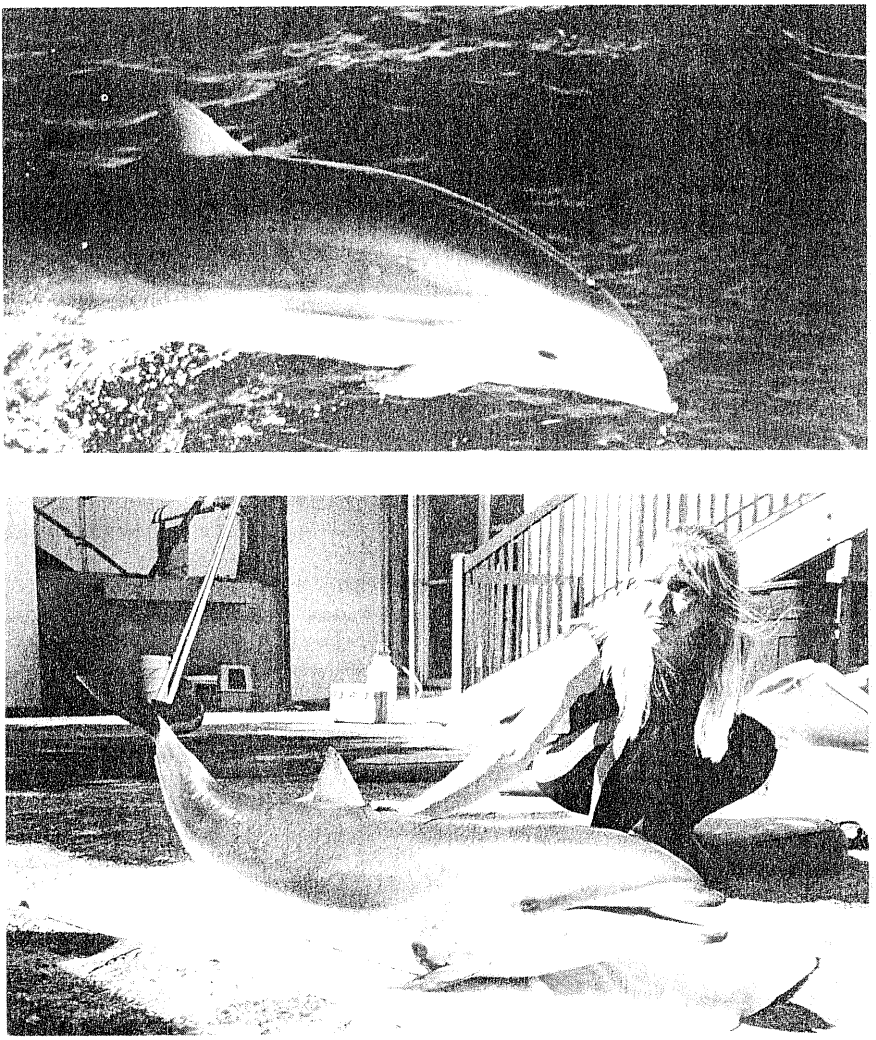

FIGURE 3. Fraser's dolphins in the Gulf of Mexico; a live animal at 26°22.34'N, 91°00.08'W, 4 June 1992 (A); and a 142.3cm male live-stranded at 28°05.0'W, 82°49.0'W on 23 February 1993 (B). Note the subdued eye-to-anus stripe. [Scott R. Benson (A); courtesy of Clearwater Marine Science Center Aquarium Museum (B)].

Tape recordings were made using the towed array described above. The analyses of those tapes are not reported here, however, because it was not possible for us to ascertain for certain which of the sounds were produced by Fraser's dolphins and which were by melon-headed whales.

A fourth group, consisting of 17 Fraser's dolphins including three calves, was sighted during Gulfcet aerial surveys on 16 May 1993 at 27°47.4'N, 90°19.9'W at a depth of 835 meters. The Fraser's dolphins were identified by their small size, short beak, and the black eye-to-anus stripe that was clearly visible on some individuals. The loosely-aggregated subgroups of 2-3 Fraser's dolphins were leaping and traveling fast in a long line. They were along the

western perimeter of a group of approximately 400 melon-headed whales, in widely dispersed groups of 5-10. A group of 13 rough-toothed dolphins, *Steno bredanensis*, was on the northeast perimeter. There were large east-to-west patches of *Sargassum* sp. along portions of both the northern and southern perimeters of the cetacean complex.

The fifth sighting took place on 4 September 1993, at 26°39.49'N, 93°30.23'W, during a survey aboard the *Pelican*. A group of about 20 dolphins was first observed at 312° and approximately 400 meters from the boat. Despite several attempts to approach the group for closer observation, the dolphins were very elusive and appeared to avoid the vessel. Very short beaks, robust bodies, small triangular dorsal fins, and some evidence of side stripes were observed on some animals. These animals are tentatively referred to *L. hosei*; however, we could not positively confirm species identification.

On 23 February 1993, a 142.3 cm Fraser's dolphin stranded alive on the northeastern tip of Honeymoon Island, Pinellas County, Florida (28°05.0'N, 82°49.0'W) (Fig. 3B). It died during transport to the Clearwater Marine Science Center Aquarium Museum in Clearwater, Florida, where it was measured and necropsied. The dolphin, a 42.6 kg male, had enlarged lymph nodes with white foci and showed signs of chronic pancreatitis. There were unidentified tapeworms internally and gooseneck barnacles, *Xenobalanus* sp., on the flukes. The stomach was empty. The most important external measurements (in cm - following Norris, 1961) are: snout to center of eye 26.9, to apex of melon 3.6, to center of blowhole 27.9, to flipper 35.6, to tip of dorsal fin 84.5, to center of umbilicus 77.5, to genital slit 99.0, and to anus 114.3; flipper anterior length 20.3, posterior length 13.3, and maximum width 5.0; dorsal fin height 11.4, and base 21.5; fluke width 30.4, and length 10.8; girth at axilla 81.2, at eye 66.0, maximum 85.0, at anus 46.9, and 30 cm anterior to fluke notch 35.5; projection of lower jaw < 0.6; length of gape 22.9; eye to gape 5.0, and to center of blowhole 17.7; blowhole length 1.0, and width 2.5; length of anal slit 3.7, and of genital slit 10.5. The tooth count was 37 (UL), 35 (UR), 39 (LL), 40 (LR). The skull, post-cranial skeleton, gonads, and miscellaneous tissues (muscle, blubber, liver, kidney, and brain) were saved (Specimen CMSC-04-93) (Terri Hepburn, *in litt.*, 10 August 1993).

Fraser's dolphins have now been found, albeit at apparent low densities, in all tropical oceans where there have been intensive and systematic surveys for cetaceans (Jefferson and Leatherwood, 1993). The Gulfcet program represents the first such surveys in oceanic waters of the northern Gulf of Mexico. Thus, it is not surprising that Fraser's dolphins have only recently been added to the list of diverse marine mammalian fauna documented to occur in the Gulf of Mexico, or that specimens of this species have occasionally been found stranded on Gulf beaches.

Participation of the Texas A&M University authors on the *Gyre* and *Pelican* cruises was supported by Texas A&M University and the Gulfcet project, under contract number 14-35-001-30619 from the Minerals Management Service. The use of trade names of commercial products does not constitute endorsement of recommendation for use. The authors thank the officers and crew of the *Gyre, Oregon II* and *Pelican* for their cheerful and competent assistance, the other marine mammal observers who participated in the cruises, and the Clearwater Marine Science Center, especially Terri Hepburn, for providing the data and photograph of the unpublished stranding. This represents Contribution No. 13 of the Marine Mammal Research Program, Texas A&M University.

Literature Cited

van Bree, P. J. H., A. Collet, G. Desportes, E. Hussenot, and J. A. Raga. 1986. Le dauphin de Fraser, *Lagenodelphis hosei* (Cetacea, Odontoceti), espece nouvelle pour la fauna d'Europe. Mammalia, 50:57-86.

Caldwell, D. K., M. C. Caldwell, and R. V. Walker. 1976. First records for Fraser's dolphin (*Lagenodelphis hosei*) in the Atlantic and the melon-headed whale (*Peponocephala electra*) in the western Atlantic. Cetology, 25:1-4.

Duguy, R. 1985. Rapport annuel sur les cetaces et pinnipedes trouves sur le cotes de France. XIV - Annee 1984. Ann. Soc. Sci. Nat. Charente-Martime, 7:349-364.

Fraser, F. C. 1956. A new Sarawak dolphin. Sarawak Museum Journal, 7:478-503.

Hersh, S. L., and D. K. Odell. 1986. Mass stranding of Fraser's dolphin, *Lagenodelphis hosei*, in the western North Atlantic. Marine Mamal Science, 2:73-76.

Jefferson, T. A., and S. Leatherwood. 1993. Lagenodelphis hosei. Mammalian Species (in press).

Norris, K. S. 1961. Standardized methods for measuring and recording data on the smaller cetaceans. J. Mamm., 42:471-476.

Perrin, W. F., S. Leatherwood, and A. Collet. 1993. Fraser's dolphin *Lagenodelphis hosei* Fraser, 1956, *in* S. H. Ridgway and R. Harrison, eds., Handbook of marine mammals, volume 5: The first book of dolphins. London. Academic Press (in press).

Perrin, W. F., P. B. Best, W. H. Dawbin, K. C. Balcomb, R. Gambell, and G. J. B. Ross. 1973. Rediscovery of Fraser's dolphin, *Lagenodelphis hosei*. Nature, 241:345-350.

Praderi, R., G. Praderi, and R. Garcia. 1992. First record of Fraser's dolphin, *Lagenodelphis hosei* in the South Atlantic Ocean (Mammalia: Cetacea: Delphinidae). Comunicaciones Zoologicas des Museo de Historia Natural de Montevideo, 12:1-6.

Thomas, J. A., S. R. Fisher, L. M. Ferm, and R. S. Holt. 1986. Acoustic detection of cetaceans using a towed array of hydrophones. Rep. Int. Whal. Commn. (Special Issue 8),:139-148.

Tormosov, D. D., G. A. Budylenko, and E. G. Suzhinov. 1980. Biocenological aspects in the investigations of sea mammals. Document SC/32/02 presented to the IWC Scientific Committee. 9 pp (unpublished).

Vonk, R., and V. M. Martel. 1990. Fraser's dolphin *Lagenodelphis hosei* Fraser, 1956: first record on the Canary Islands. Pp. 70-72, *in* European research on cetaceans 4. (P. G. H. Evans, A. Aguilar, and C. Smeenk, eds.). European Cetacean Society.

THE GRAY FOX, *UROCYON CINEREOARGENTEUS*, ON THE LLANO ESTACADO OF NEW MEXICO

JAMES N. STUART AND RICHARD E. ANDERSON
Museum of Southwestern Biology, University of New Mexico, Albuquerque, New Mexico 87131

The gray fox (*Urocyon cinereoargenteus*) occurs widely in New Mexico and Texas where it is primarily associated with broken terrain or forested areas below the spruce-fir zone (Davis, 1974; Findley et al., 1975). Specimen records from New Mexican grasslands have been few and are apparently limited to areas where rock outcrops occur or juniper (*Juniperus* spp.) woodland encroaches (Findley et al., 1975). Aday and Gennaro (1973) reported no specimens from the grasslands of the Llano Estacado in eastern New Mexico, but provided a record from the western escarpment of the plain in Chaves County. Records for northwestern Texas (Packard and Bowers, 1970; Jones et al., 1987) include localities at the eastern and northern limits of the Llano Estacado in that state where the High Plains are delimited by broken terrain and stream valleys. Conversely, recent collections of gray foxes from Andrews and Midland counties, Texas (Choate et al., 1992), are from grassland habitat in the southern part of the Llano Estacado. Herein we provide additional records for the southern Llano Estacado in New Mexico.

On 3 October 1992 a vehicle-killed gray fox was collected at the junction of U.S. Highway 83 and State Highway 132, 21 km. E of Lovington, Lea County, New Mexico. The specimen, a young adult male, was collected about 50 kilometers northeast of the nearest part of the