

## INCIDENTAL BY-CATCH OF DOLPHINS AT FISHERIES HARBOUR, COCHIN WITH A NOTE ON THEIR CONSERVATION AND MANAGEMENT IN INDIA

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### ABSTRACT

The present paper deals with the incidental by-catch of dolphins at Fisheries Harbour, Cochin. Catch statistics of dolphins from drift gillnets from January 1981 to December 1987 are given. Conservation and management of dolphins in India are stressed upon.

### INTRODUCTION

THOUGH there is no regular fishery for dolphins along the Indian Coasts, they are being caught in stray to large numbers in the gillnets incidentally. Depending on the way they are entangled and the time lapse in hauling, atleast some of them which may live can be saved by releasing them back to the sea. At Fisheries Harbour, Cochin, the drift gillnetters operating to exploit a variety of larger pelagic fishes also have been found dolphins to entangle incidentally (Silas *et al.*, 1984). An instance of dolphins 'caught' in large numbers by a purse-seiner operating at this centre is also reported here. An interesting feature is that the dolphins caught are in good demand by local population all along the coastal belt of Cochin and during certain seasons the meat is also used as bait for shark fishing by the small scale sector long-line units. It requires a concerted effort to educate the fishermen and the local people to conserve these smaller cetaceans since they are considered as endangered marine mammals.

Stranding of dolphins, their systematics, captivity, biology and distribution along the Indian Coasts have been reported by many

workers (Ferguson, 1903; Lydekker, 1904, 1905, 1908; Pillai, 1926; Sineder, 1894; Krishna Pillai and Kasinathan, 1988; Lal Mohan, 1982, 1983, 1985 a; Rajaguru and Natarajan, 1985). Further, in India, reports on the incidental by-catch of dolphins have been reported by many workers (James and Lal Mohan, 1987; Lal Mohan, 1985 b; Krishna Pillai and Kasinathan, 1987, 1991; Krishna Pillai and Lipton, 1991; Krishna Pillai *et al.*, 1989, 1991; Mahadevan Pillai and Chandrangathan, 1990; Rajagopalan *et al.*, 1984; Shantha *et al.*, 1987), but there are no definite statistics available. Dolphins are caught in good numbers at Cochin, Malpe, Karwar, Goa and Bombay areas also. Stray numbers are caught in the Gulf of Mannar region. The commonly occurring dolphins of the Indian Coasts are Spinner dolphin *Stenella longirostris* Gray, Saddle-back dolphin *Delphinus delphis* Linnaeus, Bottle-nose dolphin *Tursiops truncatus* Ehvenberg and Hump-back dolphin *Sousa chinensis* (Osbeck). Dolphins are accidentally caught by drift gillnetters and landed in stray numbers during certain months at Cochin. They contribute about 1% of the total drift gillnet landings. No seasonal periodicity in the catch could be attributed to

this group (Silas *et al.*, 1984). The present paper details with various species of dolphins landed by drift gillnetters at Fisheries Harbour, Cochin together with a note on their conservation and management in India.

MATERIAL AND METHODS

Dolphins occurring in the drift gillnetters were measured for the total length and grouped

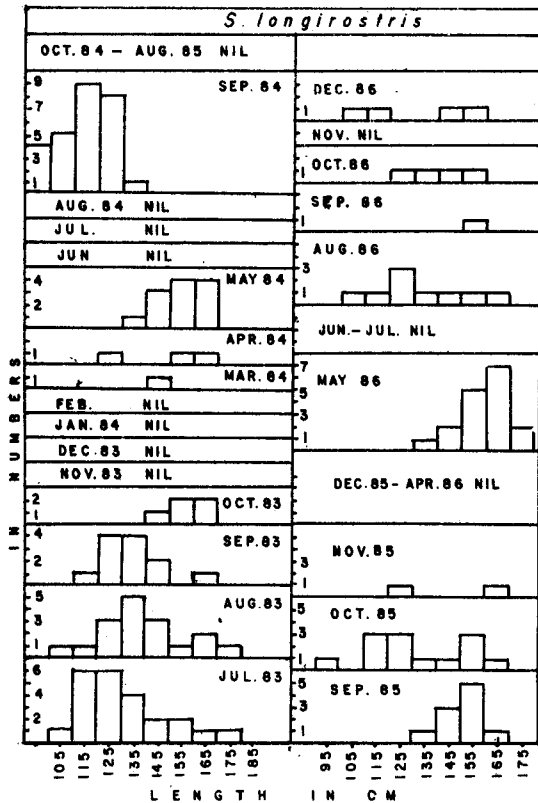


FIG. 1. Number and size groups (cm) of *S. longirostris* caught incidentally in the drift gillnets at Cochin during July 1983 to Dec. 1986.

sexwise. Whenever possible morphometric measurements of important species were also taken. Weekly two days observations were made on the gillnet landings. Since the first author was attached to the Field Laboratory at Fisheries

Harbour, Cochin, measurements and other observations could be carried out almost on all fishing days with respect to gillnetters, shrimp trawlers and purse-seiners. Details of craft, gear and area of operation of the drift gillnetters

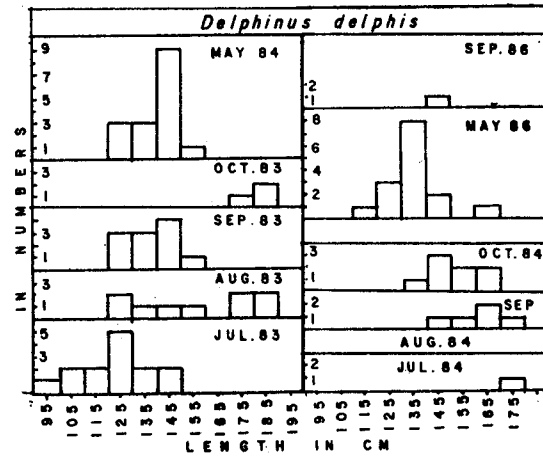


FIG. 2. Number and size groups (cm) of *D. delphis* caught incidentally in the drift gillnets at Cochin during July 1983 to Sep. 1986.

were given in detail by Silas *et al.* (1984). The operational range of gillnetters was 20 - 50 m depth zone, extending to as far as Azhikode in the north and to Alleppey in the south. The catch statistics were also taken by personal observations. However, the monthwise catch of dolphins as estimated by Fisheries Resources Assessment Division (FRAD) is followed here, except that the species composition has been worked out separately. The catch statistics from 1981-1987 are given. The length range, species composition, morphometric measurements and other observations pertaining to July 1983 to December 1986 are presented.

RESULTS

*Species composition*

Four species of dolphins have been found in the drift gillnet catch at Cochin *viz.* *Stenella*

*longirostris*, *Delphinus delphis*, *Sousa chinensis* and *Tursiops truncatus* (Pl. I). But the former two species were more abundant in the catches than the latter two species.

to dominate. Studies on sex ratio showed that females (54%) dominated over males (46%). The spinner dolphins formed 38.6% of the total dolphins landed.

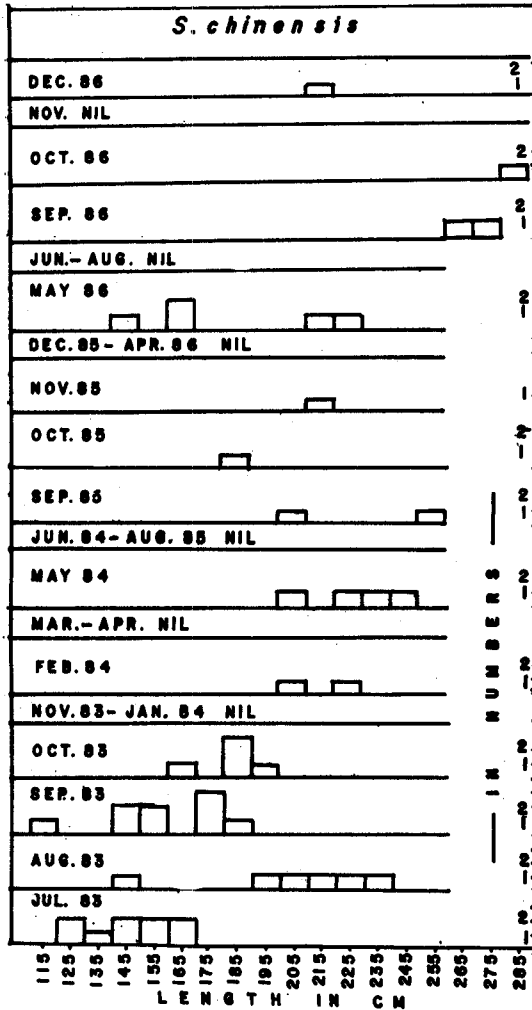


FIG. 3. Number and size groups (cm) of *S. chinensis* caught incidentally in the drift gillnets at Cochin during July '83 to Dec. '86.

**Spinner dolphin :** A total of 123 specimens were measured (Fig. 1). Size range of the species was 91-178 cm in total length, those in size groups 115 cm and 165 cm were found

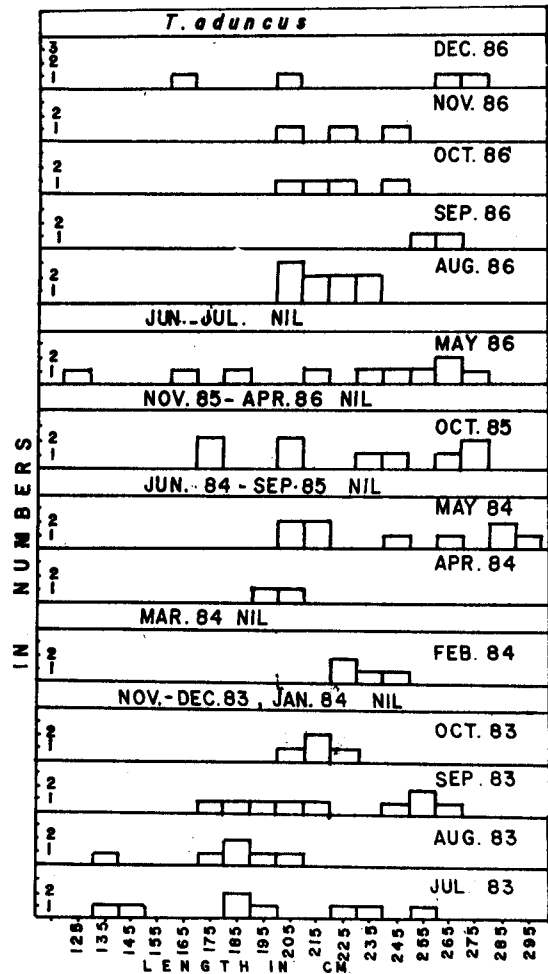


FIG. 4. Number and size groups (cm) of *T. aduncus* caught incidentally in the drift gillnets at Cochin during July '83 to Dec. '86.

**Saddle-back dolphin :** Length measurements of 83 specimens ranging from 95-184 cm were taken. The size groups 135 cm and 145 cm dominated the catches (Fig. 2). Females

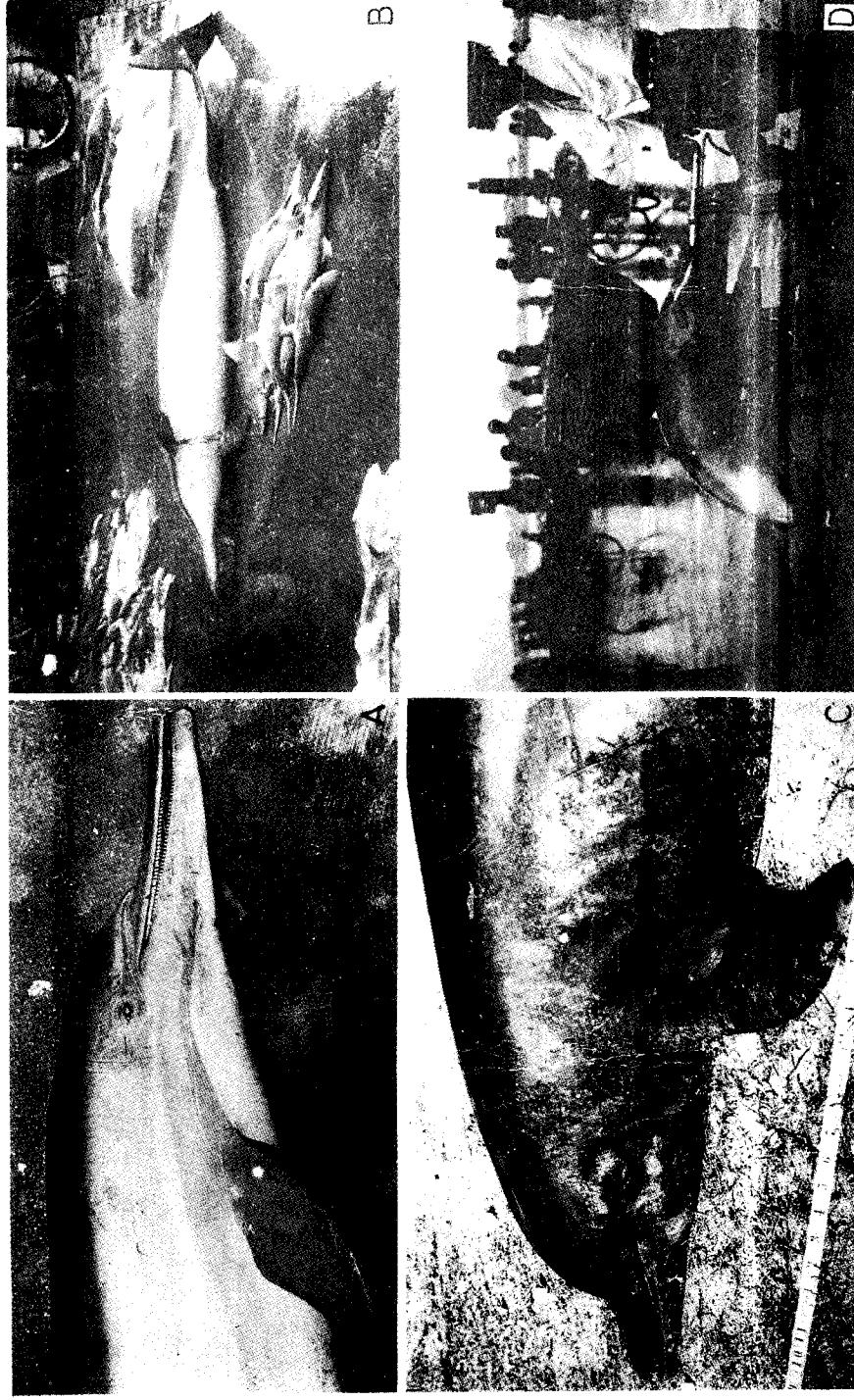


PLATE I A. Saddle-back dolphin *Delphinus delphis* Linnaeus, B. Gillnet landings of Saddle-back dolphin, C. Bottle-nose dolphin *Tursiops truncatus* Eivenberg and D. Black porpoise *Neophocaena phocaenoides* G. Cuvier.



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TABLE 1. *Monthwise effort (E) expended by the drift gillnets (boat days) and catch (C) in weight (kg) of dolphins incidentally entangled and landed at Fisheries Harbour, Cochin*

	1981		1982		1983		1984		1985		1986		1987	
	E	C	E	C	E	C	E	C	E	C	E	C	E	C
Jan.	1607	—	580	150	1125	—	314	—	975	—	711	17	81	—
Feb.	1257	—	1368	—	743	—	596	647	1124	—	130	95	119	42
Mar.	1444	80	1907	1210	815	—	436	247	991	—	560	—	541	—
Apr.	1382	110	1300	—	768	—	738	455	1612	—	1125	—	1096	—
May	2712	540	2464	—	1018	—	2667	5708	2174	—	2972	11283	1172	—
June	2576	—	2516	130	2303	—	2531	—	2206	—	2043	—	2049	—
July	2844	500	3370	150	2490	4277	2232	—	2531	—	3226	174	3559	2715
Aug.	2572	—	2184	150	2636	6804	2695	—	1860	—	1825	2456	1510	2496
Sep.	2327	—	2114	—	2518	5191	2550	—	2863	703	3247	314	1989	389
Oct.	1225	—	1458	690	2345	936	3088	—	2791	2403	3563	1217	805	—
Nov.	1247	140	693	—	851	—	1606	—	927	—	1800	693	614	—
Dec.	760	—	655	—	372	—	1117	—	242	—	151	1251	222	—
Total	21953	1370	20609	2480	17984	17208	20570	7057	20296	3106	21353	17500	13757	5642

TABLE 2. *Morphometric measurements (in cm) of the Spinner dolphin Stenella longirostris from Fisheries Harbour, Cochin*

Total length	169	136	152	152	165	142	115	133	162	161	128	159	173	165
Length of snout (upper)	28	24.5	28	30	25.2	13.8	10.3	123	16	17	12	25	28	25.5
Snout to eye	30.5	26.5	28.5	30.8	28	28	21.6	25	29	29	25	28	31	28
Snout to blow-hole	32	29	30	31	30	29.5	21.8	26.5	29	28	24	29	31.5	31
Snout to dorsal fin	73.5	55.2	71	72.5	75	67.5	53.8	64.5	74	75	61	71	77	79
Length of dorsal fin	29	24	25	26	25	21.8	16.6	18.8	29	24.5	18	26	25	24
Base of dorsal fin	26	20.5	—	—	24	20	16	19	26	24	17	24	25	27
Snout to pectoral	46	28	41	43	41.8	38.2	33.2	35.5	42	43	36	41	43	43.5
Length of pectoral	27.5	23.5	24	25	25	23.5	19	22	24	25	21	23	27	25
Base of pectoral	14	12.5	12	13	9	9.3	7.5	11	12.5	10	7	9	7.5	9
Snout to anus	124	96	106	104	105	79	74	85	103	125	78	117	126	118
Caudal : Outer fluke	25	18	22	23	22	19.5	16.5	19	25	19	18	23	23	23
Inner fluke	22	16	19	19.5	21	16.5	12	16	22	17.5	14	19	21	20
Width of caudal	33	29	31	28	30	—	20	23.5	30.2	29	22	20	20	30
Eye diameter	2.4	2.3	2.2	2.5	2.5	1.9	1.8	2.2	2.4	2.1	2.1	2.1	2.3	2.3
<i>Teeth</i>														
Lower jaw-right	39	44	47	51	—	47	46	46	46	47	48	48	43	48
Lower jaw-left	41	42	48	49	—	45	43	48	45	48	47	46	47	47
Upper jaw-right	42	43	46	48	—	46	44	48	45	48	42	48	46	47
Upper jaw-left	41	43	46	47	—	44	43	47	47	48	43	47	45	45
Sex	M	F	F	F	M	F	M	M	M	F	F	M	M	F

constituted 58% of the catch. The total catch of 3661 kg of saddle-back dolphins contributed 20.5% to the dolphin landings.

and 1986 respectively. Length composition of 88 specimens showed that the size ranged from 131-311 cm with size group 195 cm dominating

TABLE 3. *Morphometric measurements (in cm) of Hump-back, Saddle-back and bottle-nose dolphins from Fisheries Harbour, Cochin*

	<i>S. chinensis</i>			<i>D. delphis</i>			<i>T. truncatus</i>		
Total length	250	200	210	189	218	172	185	210	145
Length of snout (upper)	31.5	26	30	20	28	39	23.5	27.8	20.6
(lower)	29.5	27.5	31	25	30	39.5	34.2	29.0	20.7
Snout to eye	37	31	33.5	28	33	42	30.4	34.5	24.0
Snout to blow-hole	35.5	33	36.5	30	—	40	30.0	34.0	24.5
Snout to dorsal fin	111.5	97	96.3	82	100.5	51	—	—	—
Length of dorsal fin	42.5	32	34	19	33	28	20.4	26.0	15.0
Base of dorsal fin	35.0	30	29	21	30	24	24.1	28.2	20.5
Snout to pectoral fin	57.0	52	54	40	54	88	45.8	53.5	37.5
Length of pectoral fin	43	33	35	22	35	27	31.7	38.0	26.6
Base of pectoral fin	14	18	13.5	9	14	11	13.1	13.8	12.7
Snout to anus	171	119	137	125	142	112	124.2	149.2	99.2
Length - Caudal fin									
Outer fluke	42	32	33.5	22	34	—	28	31	23.3
Inner fluke	35	27	27.5	18.5	29	—	23	26.2	18.5
Width of caudal fin	50	—	37	—	—	—	40.7	47.5	32.0
Eye diameter	3.3	2.8	3.0	2.3	3.2	2.1	1.5	1.9	1.0
<i>Teeth</i>									
Lower jaw-right	25	22	27	31	27	58	25	24	17
left	25	22	26	32	26	60	24	23	18
Upper jaw-right	25	22	28	32	26	58	23	25	19
left	25	21	27	32	26	59	25	22	18
Sex	M	F	F	F	F	M	M	F	F

*Hump-back dolphin* : The length measurements of 45 specimens ranged from 119 - 284 cm (Fig. 3). The size groups 175 cm and 185 cm dominated the catches. Females formed 58%. The species formed 17%, 10.2% and 8.3% during 1983, 1984 and 1986 respectively of the total dolphin catch.

*Bottle-nose dolphin* : This species contributed to 18.8%, 20.4% and 32.6% during 1983, 1984

the catch (Fig. 4). Females formed 58% of the catch.

*Black porpoise* : Though not common as the dolphins, the black porpoise *Neophocaena phocaenoides* G. Cuvier also has been found to get entangled in the drift gillnets at Cochin (Pl. I). During the period of observation, three specimens of the size 108 cm, 138 cm and

141 cm have been recorded. The first one was a male and the other two females.

#### *Dolphins in the purse-seiners*

There had been reports of the inadvertent destruction of large numbers of these small

Sri Lanka, the estimation of the annual dolphin catches by the deep sea trawlers ranged from 8200-60,000 numbers (Lisa, 1991). But such incidents were uncommon in Indian waters.

One such case was noticed at Cochin, wherein a purse-seiner (12.5 m OAL), meant for the

TABLE 4. *Species and percentage composition of dolphins entangled in the drift gillnets at Cochin (percentage in parenthesis)*

	Total weight (kg)	S. longirostris (kg)	D. delphis (kg)	S. chinensis (kg)	T. truncatus (kg)
July '83	4277	1788 (41.8)	1168 (27.3)	622 (14.5)	699 (16.4)
Aug. '83	6804	3043 (44.7)	1505 (22.1)	1074 (15.8)	1182 (17.2)
Sep. '83	5191	1888 (36.4)	1299 (25.0)	1015 (19.6)	989 (19.0)
Oct. '83	936	200 (21.4)	165 (17.6)	220 (23.5)	351 (37.5)
Feb. '84	647	480 (74.1)	—	267 (25.8)	—
Mar. '84	247	247 100	—	—	—
Apr. '84	455	273 (60.0)	—	—	182 (40.0)
May '84	5708	1670 (29.3)	2230 (29.1)	556 (9.7)	1252 (21.91)
Sep. '85	703	384 (54.6)	319 (45.4)	—	—
Oct. '85	2403	1335 (55.6)	1068 (44.4)	—	—
May '86	11283	3996 (35.4)	3525 (31.2)	940 (8.3)	2822 (25.1)
July '86	174	174 (100.0)	—	—	—
Aug. '86	2456	1471 (59.8)	—	—	985 (40.2)
Sep. '86	314	136 (16.7)	136 (16.7)	271 (33.3)	271 (33.3)
Oct. '86	1217	595 (48.9)	—	135 (11.1)	487 (40.00)
Nov. '86	693	—	—	—	693 (100.0)
Dec. '86	1251	530 (42.4)	—	145 (11.6)	576 (46.0)

cetaceans by tuna purse-seiners in some of the countries (Leatherwood and Reeves, 1978). In

smaller pelagic fishes like oilsardine and mackerel, brought 42 common dolphin *D. delphis* on 24th



September 1984. The size ranged from 93 cm - 133 cm. The sex ratio (M : F) was 1 : 1.45. An interesting feature was that at the time of the landing of this purse-seiner, most of the dolphins were showing signs of life, which indicated that they were pursued from very near waters of 15-20 m depth. These were sold at the rate of Rs. 20 to Rs. 35/- per specimen and were immediately taken to the markets in the coastal areas of Alleppey District such as Mararikkulam, Shertallay and Arthunkal and to coastal areas of the suburbs of Cochin.

#### *Onboard observations on dolphins*

The first author, while onboard FORV *Sagar Sampada* (Cruise No. 83) could count nearly 300 dolphins on the port side of the vessel at about 1645 hrs on 28th December 1990 while the vessel was sailing north [Position 11°46' N - 74°10' E (south of Mangalore)]. Some of them could be observed at very close. The striking black slash mark from the eye to flipper indicated that they belong to the species *S. longirostris*. The approximate length observed was about 150 cm.

The second author while onboard FORV *Sagar Sampada* (Cruise No. 36) sighted a school of about 12 common dolphins *Dolphinus delphis* very close to the vessel near Paradeep (20° 50' N - 85° 25' E) at 1100 hrs on 5th September 1987 along the Orissa Coast. Again the second author while onboard FORV *Sagar Sampada* (Cruise No. 58), sighted about 8 saddle-back dolphins *D. delphis* on the deck side of the vessel at 1000 hrs on 5th February 1989 while the vessel was sailing north [at position 16° 04' N - 81° 31' E (north of Kakinada)]. All the dolphins could be observed very close to the vessel. The well defined narrow beak indicated that they belong to the species *Delphinus delphis*. The approximate length was around 200 cm. Further, 4 common

Saddle-back dolphins *D. delphis* were sighted at 07° 47' N - 77° 12' E near Wadge Bank area along the Kerala Coast at 0800 hrs on 18th February 1991, while proceeding in southwest direction during the FORV *Sagar Sampada* Cruise No. 85.

#### DISCUSSION

The present account may throw more light on the need for conservation of these endangered species. Not much rapid inroads to create this awareness have been made so far. The incidental entangling and mortality of dolphins continue unabated as long as the gillnets are in operation. The magnitude of this mortality along the Indian Coast, however is alarming as in the Eastern Pacific region. Perhaps it may increase with further development of the gillnet fishery as well as with the introduction of the tuna purse-seiners in the Indian EEZ.

There is a good gillnet fishery for larger pelagics at Munambam, another landing centre about 32 km north of Cochin. Dolphins do occur in the gillnet catches at this centre also.

There is a coincidence of the occurrence of dolphins and tunas at Cochin. The tuna season starts by April-May and ends by August-September. The incidental catches of dolphins by the drift gillnetters have been found to follow with the moderate to peak catches of tunas.

There is no dearth of policies and programmes to create awareness among the fishermen and the public to conserve these endangered cetaceans. Extension programmes have to be carried out in the coastal belt to create some awareness so that atleast the live dolphins at the time of hauling could be saved by the fishermen by releasing them into the sea.

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