

THE SAILFISH FISHERY OFF CALICUT DURING 1974-75 AND 1975-76

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ABSTRACT

Unusual landings of the sailfish *Istiophorus gladius* (Broussonet) by the driftnet units, during the 1974-75 and 1975-76 seasons have been reported for the first time along the Calicut coast. The data on sailfish catches, the gear used and the area depths of fishing during the two seasons have been presented. The heaviest sailfish catch was made in October 1974 (5505.0 kg). The catch data of the black marlin, *Makaira indica* (Cuvier) and the blue marlin, *M. nigricans* Lacepede, have also been given. Length-frequency studies on the sailfish during the above-cited seasons indicated that the standard length of the fish ranged from 1450 to 2590 mm. In October 1974, the dominant modal length was at 2000 mm. In November and December, both the 1950 and the 2050mm modal lengths preponderated. In January of 1975, both the 1850 and the 2200mm modal lengths were dominant. The 2050mm length mode of November progressed to 2150 mm in December and also in January 1976; it progressed further in February. The mean standard lengths of the fish have also been calculated. Studies on the stomach contents of the fish revealed that it feeds largely on teleost fishes and cuttle fishes (*Sepia* spp.).

INTRODUCTION

Our present knowledge of the fishery and biology of the sailfish *Istiophorus gladius* (Broussonet) occurring off the west coast of India is rather meagre. However, observations on the sailfish and marlins by Silas and Rajagopalan (1967) have indicated that their fisheries can be developed off the Tuticorin region.

There has been no sailfish landing during the last four or five decades along the Malabar coast, even though the drift net units have been landing large-sized *Scomberomorus* spp., tunas, *Chirocentrus*, *Arius* spp., *Chorinemus*, *Sciaena*, *Sphyræna* spp., Sharks and Rays made from grounds about the 20-35 m depth.

With the present day operations of the nylon-drift net units (towed by mechanized vessels towards the fishing grounds and back) in the offshore waters extending up to the 60m depth region moderate catches of the sailfish have now been obtained.

This account on the unusual landings of this hitherto rare beaked scom- broid *Istiophorus gladius* (Brouss.) by the present author, is the first record from this part of the west coast. However, small catches of sailfish are occasionally made off Vizhinjam. In view of the economic importance of its fishery and the present meagre condition of its biological data collected hitherto from our coastal waters, the present investigation was taken up at Calicut during 1974-75 (October-February) and 1975-76 (November-March) seasons.

MATERIAL AND METHODS

Initially, with the aid of a spring balance, a few billfish specimens were weighed nearest to 0.5 kg; subsequently, the weight of each individual fish was assessed carefully by the eye estimations only.

The drift net landings of the billfishes at Calicut (Vellayil) were esti- mated on the basis of the random sampling method. For convenience, on each fishing day, one in every five drift net units landed was examined and estimated the weights of billfishes. In this manner, the catches of billfishes were estimated by adding up their catches in the drift net units sampled and therefrom raising the billfish catch for the total number of units operated on each sampling day. The monthly total billfish estimates was made by adding up the billfish catches estimated on different fishing days of the month. (Details of the method same as Sekharan 1965).

Data on the number of fishing units operated, depths of fishing grounds and their durations of fishing on the different fishing days were also collected concurrently.

Sailfish specimens obtained off Calicut and also off Pudiappa village (5km north of Calicut) were utilised for the study of biological aspects such as length frequency, morphometry, gonadal maturation and food and feeding. Standard lengths of 434 Nos. of billfishes were measured accurately nearest to 1mm from the tip of upper beak to the origin of tail fin.

The stomachs of a few individuals were cut open and the contents therein identified; and, on a qualitative basis they were recorded. The gonads also were examined whenever available to determine their sex and sexual maturation. Only a few gonads were available for examination; they were in "immature" stage of maturation only.

DISTRIBUTION

"The Indian Ocean sailfish, if considered as distinct from the sailfish of other oceans, is limited in its range to that part of the sea bounded by Africa, Arabia, India and the Indo-Australian Archipelago. The southerly limit of its range has not been established, but it certainly reaches Durban on the south

African coast and Mauritius. If this fish is considered conspecific with the sailfishes of other areas, then its range is world wide in tropical and warm temperate seas." (Morrow 1962, p. 434, in "Symposium on scombroid fishes, Part I, 1962"), *vide* also DeBeaufort and Chapman (1951) Jones and Silas (1962), Williams (1962) and Deraniyagala (1962). Drift net (*Ozhukku Vala*): This net has been found very efficacious for the capture of billfishes and other large scombroids. Usually, twenty pieces of white nylon webbing are laced together provided with floats and sinkers. Each rectangular pieces of netting is about 19.0 m long and 8.5 m wide; and the total length of one fishing unit is about 385.0-400.0m. The mesh size, on an average, (knot to knot, diagonally) when stretched, in wet condition, ranges from 85.0 to 120.0 mm.

FISHERY

1974-75 Season:

Towards the close of October 1974, the drift net units started landing moderately good quantities of the sailfish *Istiophorus gladius*. The sailfish catch (at the beginning of the fishery) in October 1974 was the highest, recording 5505.00 kg; and the highest monthly catch per gear of sailfish in the drift net was also during October. The catches registered a marked fall after January, 1975.

1975-76 Season:

Though the sailfish catch was very meagre in October, it improved during November and December; and, the catches decreased markedly thereafter (*Vide* Table 1).

The depths of the grounds of operation of drift nets off Calicut ranged from 35 to 60 m during the two seasons. However, the catch data indicated that the fishing units which operated between 35 and 40m depth region had obtained very poor sailfish catches. It is therefore, reasonable to infer that more sailfish schools occur usually beyond the 40m depth region. Its marked absence in the drift net catches from the shallower waters (20.0 to 30.0m depth) during the past several decades also lends support to this view.

The drift net fishermen reported at Calicut that small schools of sailfish have been occasionally sighted exposing their "sail" (dorsal fin) above the surface film of water (while they were in the epi-pelagic phase of distribution) during certain nights in October and November 1974.

Marlin Catches:

The black marlin (*Makaira indica*) and the blue marlin (*M. nigricans*) were also landed by drift nets in small numbers occasionally during this investigation. The standard lengths of *M. indica* ranged from 2065.0mm to 2900.0mm and those of *M. nigricans* ranged from 1110.0 to 2115.0mm. It may be added

TABLE 1. *Catch and Effort of Drift Net for Istiophorus gladius and Makaira spp. at Calicut during 1974-75 and 1975-76.*

(* Marlin catches in brackets).

Months	Area depths of fishing	Total drift net units operated	Total catch (kg.)	Monthly catch per gear fo drift net (kg.)	Standard length range in mm.	Individual weight range in kg.
October, 74	35-60m	520	5,505.00	10.58	1450-2550	10.00-32.00
November, 74	—do—	645	2,834.00 + (709.00*)	4.40 (1.10*)	1750-2350	16.50-28.00
December, 74	—do—	330	120.00 + (240.00*)	0.40 (0.80*)	1800-2150	14.00-20.00
January, 75	35-55m	201	174.00 + (183.00*)	0.87 (0.91*)	2050* 1750-2300	(40.00*) 12.00-2300
February, 75	35-50m	93	Catch Nil	—	—	—
March, 75	35-40m	94	88.00	0.94	—	—
April, 75	35-45m	260	Catch Nil	—	—	—
May, 75	—do—	76	—do—	—	—	—
June, 75				No fishing		
July, 75	35-45m	394	Catch Nil	—	—	—
August, 75	—do—	91	—do—	—	—	—
September, 75	—do—	431	—do—	—	—	—
October, 75	45-60m	472	109.0	0.23	No data	No data
November, 75	—do—	689	1,163.0	1.70	1550-2350	15.00-40.00; (55.00-110.00*)
December, 75	—do—	519	750.0 (62.5)	1.50 (0.12)	1750-2250	15.00-39.00; (65.00*)
January, 76	—do—	325	446.0	1.37	1550-2450	18.00-45.00; (105.00*)
February, 76	—do—	186	210.0	1.13	1650-2400	22.00-38.00
March, 76	—do—	141	Nil	—	—	—

here that these two species of marlins though meagre in quantity off the Calicut coast appear more frequently off the east coast of India (*Vide* Silas and Rajagopalan, *loc. cit.*).

LENGTH FREQUENCY DISTRIBUTION OF SAILFISH

1974-75 season:

With the commencement of the lucrative sailfish fishery in October 1974 (Catches made in drift nets the standard length indicated a range from 1450.0 to 2550.0mm. The highest standard length mode was at 2000.0mm in that

TABLE 2. Length-frequency (Standard lengths) distribution of *Istiophorus gladius* during 1974-75 and 1975-76.

Months & Season	Nos. Examined	Standard length range (mm.)	Main modal lengths (mm) and their %	Lesser modal lengths (mm) and their %	Mean standard length (mm).
(1974-75)					
Oct. 74	59	1450-2550	200(21.6)	1750(3.6) 1850(7.2) 2300(7.2) 2400(3.6)	2060.26
Nov. 74	107	1750-2350	1950(18.6) 2050(18.6)	1850(4.6) 2300(5.6)	2076.36
Dec. 74	9	1800-2150	1950(22.5) 2000(22.5) 2050(22.5)	—	2002.78
Jan. 75	9	1750-2300	1850(22.5) 2200(22.5)	—	2041.67
Total	184	—	—	—	—
(1975-76)					
Nov. 75	100	1550-2350	2050(18.0) 2100(18.0)	2200(11.0)	2092.06
Dec. 75	41	1750-2250	2150(19.2)	1900(14.4)	2080.98
Jan. 76	69	1550-2450	2150(21.7)	2250(11.6)	2142.97
Feb. 76	40	1650-2400	2250(25.0)	2100(15.0)	2166.37
Total	250	—	—	—	—

month. In November, the 1950 and 2050mm length modes appeared. In the next month, in addition to these two modes, an equally strong modal length (2000.0 mm) was observed. In January, two new length modes appeared, indicating relatively fast modal length progression (*vide* Table 2).

1975-76 Season:

The belated fishery season commenced only in November 1975 when the 2050.0mm standard length mode as in November of the preceding season appeared. This length mode advanced to 2150.0mm in December which persisted in the next month also. In February, the mode progressed further.

During December of this season, the range of standard length observed was markedly narrow as in December of 1974-75, which is partly due to a decrease in the numbers of young fish in the fishing grounds. Synchronous with that, the bigger fish might have temporarily migrated into the deeper waters.

FOOD STUDY

The detailed stomach content examinations of 76 Nos. of *Istiophorus gladius* from October 1974 to February 1976 revealed that the fish is highly predatory and carnivorous, feeding mainly on teleost fishes and cuttle fishes (*Sepia*). Among the fishes, *Anchoviella heterolobus* dominated (*Vide* Table 3). From the nature of skeletal remnants and the state of partially digested stomach contents, it could be inferred that a great part of digestion takes place within the ridged and spacious stomach itself. It is possible that the profuse quantity of gastric fluid often noticed in the stomachs is accelerating the digestion. Generally, the stomach is not found heavily filled. From the stomach content data so far collected, it has not been possible to establish that the temporary emptiness of some stomachs was caused by probable regurgitation of the food on account of the violent struggle of the fish consequent on getting enmeshed in the strong drift nets, during the nights.

The nature of orientation of the food contents noticed inside the stomach on most occasions lends support to the inference that the sailfish captures its prey by chasing it mostly from behind. Their speedy chasing after the baited trolling hooks during day time, perhaps suggests that their feeding frenzy or proclivity is more prominent during day time, being facilitated by better visibility at surface waters. Also, no clear evidence is available from the stomach content data to prove that the sailfish impales or attacks its prey before capture and deglutition. (For details of viscera of the sailfish, *vide* Silas and Rajagopalan, *loc. cit.*).

DISCUSSION

Existence of sailfish resources was reported by Hornell (1917) off Tuticorin. Observations of Silas and Rajagopalan (*loc.cit.*), have indicated their occurrence there in moderate quantities.

The drift netters are fishing at the fringes of the regions (35-60m depth) of the sailfish distribution off Calicut. There would be a possibility of increasing their catches (and other large scombroids) if an extension of drift net fishing beyond the 60m depth region is made. The trolling lines if operated regularly in the deeper waters off Calicut can also augment their catches.

The sailfish catch trends indicate that the fish tend to visit coastal waters where cold conditions prevail in winter and migrate to deeper waters with the warming up in Summer. It is in agreement with the observations of Day: "Common in the cold season off Madras, arriving about October and continuing until March" (Day 1875-1878, pp. 198-199).

Hydrographic factors may have some influence on the availability of this pelagic fish as remarked by Silas and Rajagopalan (*loc.cit.*).

TABLE. 3. *Stomach contents of Istiophorus gladius (Brouss.) during 1974-76.*

Date of observation	Nos. examined.	Standard length range of fish. (mm)	Stomach contents	State of food consumed.
29 & 30-10-74	4	1770-2130	— Nil —	Empty stomach
2,7,9,11,16, 17&20-11-74	8	1756-2320	— Nil —	Empty stomach
10-11-74	1	1820	<i>Caranx</i> sp. (3 Nos., each about 24.0 cm. long)	In full size and undigested.
12-11-74	1	2285	Vertebral column of one <i>Caranx</i> ?	body tissues digested broken into 2 bits; Vertebral column
17-12-74	1	1820	<i>Rastrelliger kanagurta</i> (1 No.); pieces of 2 medium sized <i>boligo</i> .	Both undigested
6-1-75	1	1960	1 cuttle bone and pieces of 6 Nos. of <i>Sepia</i> .	Undigested stage.
16-1-75	1	2120	— Nil —	Empty stomach
17-3-75	1	1190	Vertebral columns of 2 <i>Caranx</i> 1 small <i>Sepia</i> and 1 big cuttle bone	Fish digested; small <i>Sepia</i> undigested.
7-4-75	1	1890	1. One vertebral column of <i>Caranx</i> ? 1. Two pens of <i>Loligo</i> ; 3. Big cuttle bone of <i>Sepia</i> .	Food items digested. Stomach gorged moderately.
8-5-75	1	1400	— Nil —	Empty stomach
21-11-75	2	1910 & 2205	Skeletal remnants of teleost.	Digested
22-11-75	1	2000	<i>Saurida</i> ? and other teleost fish remnants; and one cuttle bone	Partly digested fishes.
24-11-75	1	Not known	Skeletal remnants of teleost fishes.	Digested
27-11-75	1	2320	— Nil —	Empty stomach
28-11-75	2	2000 2100	A few eyes of teleost fishes.	Fishes digested
28-11-75	1	2310	3 cuttle bones; 2 extra ossified supra-occipital of Ribbon fish. One Ribbon fish and one ossified supra-occipital of ribbon fish.	Food digested
29-11-75	1	2100	One Ribbon fish and one ossified supra-occipital of ribbon fish.	Both undigested and digested.
2-12-75	1	2100	— Nil —	Empty stomach
1-12-75	1	2120	One medium sized unidentifiable teleost fish.	Partly digested
7-12-75	1	1910	2 cuttle bones and plenty of gastric fluid.	Food digested

TABLE 3. (Contd)

Date of observation	Nos. Examined	Standard length range of flw. (mm)	Stomach contents	State of food consumed
9-1-76	1	2100	1 big cuttle bone	Food digested
15-1-76	1	1970	Pieces of <i>Sepia</i> flesh; 1 cuttle bone	Both digested and undigested food.
17,19,22,23,24,28, 30 & 31-1-76	10	1960-2340	— Nil —	Empty stomach
23-1-76	1	2240	1 cuttle bone	Digested
24-1-76	1	2130	<i>Anchoviella heterolobus</i> (40 Nos.)	Undigested
—do—	1	2210	<i>A. heterolobus</i> (20 Nos.) and 1 <i>Sardinella fimbriata</i> .	Undigested
—do—	1	1980	4 <i>Anchoviella heterolobus</i> and 1 full <i>Sepia</i> .	
—do—	1	2250	1 cuttle bone	Digested
26-1-76	1	2210	A few <i>Anchoviella</i> sp., 2 cuttle bones.	Undigested
27-1-76	1	2050	25 Nos. of <i>Anch. heterolobus</i> and 1 cuttle bone	Fish undigested
—do—	1	2200	20 Nos. <i>Anch. heterolobus</i> (?) and one <i>Sardinella fimbriata</i> .	Undigested
—do—	1	2260	15 <i>A. heterolobus</i> and one cuttle bone.	Fish undigested
28-1-76	1	2150	10 <i>A. heterolobus</i> and one cuttle bone	Fish undigested
—do—	1	2150	30 <i>A. heterolobus</i> and one cuttle bone	Fish undigested
30-1-76	1	2270	15 <i>A. heterolobus</i> , one <i>Hemiramphus</i> and 1 cuttle bone.	Fish undigested
—do—	1	2160	25 <i>A. heterolobus</i> and one cuttle bone.	
3-2-76	1	2300	20 <i>A. heterolobus</i> and 2 entire <i>Sepia</i> .	Food undigested
7-2-76	1	2320	25 <i>A. heterolobus</i> and 1 <i>Sepia</i> .	Undigested
—do—	1	2180	one big cuttle bone.	Digested
7-2-76		1680	— Nil —	Empty
11-2-76	4	2210	— Nil —	Empty
12-2-76			— Nil —	Empty
14-2-76			— Nil —	Empty
11-2-76	1	2080	Entire <i>Sepia</i> and 20 Nos. <i>A. heterolobus</i>	Undigested
12-2-76	1	2280	2 cuttle bone and 15 <i>A. heterolobus</i> .	Fish undigested
13-2-76	1	2360	2 <i>Sepia</i> and 20 <i>A. heterolobus</i>	All digested
14-2-76	1	2240	1 <i>Sepia</i> and 1 cuttle bone	<i>Sepia</i> undigested
19,21,22, 23,27-2-76	5	1875-2310	— Nil —	All empty.
20,22,23rd Feb, 76	3	2260-2410	1 <i>Sepia</i> ; 10 Nos <i>Anch. heterolobus</i> and one <i>Megalaspis cordyla</i> cuttle bone 1 cuttle bone.	Undigested Undigested Partly broken

TABLE. 4. *Standard length and weight distribution of Makaira spp. caught in Drift net, off Calicut.*

Name of Marlin	Date of capture	No. captured.	Standard length (mm)	Individual weight in kg.
<i>M. indica</i>	17-11-74	1	2533.0	65.0
"	18-12-74	1	2065.0	40.0
"	7-4-75	1	2240.0	70.0
"	20-11-75	1	2470.0	55.0
"	26-11-75	1	2900.0	110.0
"	27-11-75	1	2810.0	100.0
"	28-1-76	1	2870.0	105.0
<i>M. nigricans.</i>	4-11-74	1	1110.0	10.0
"	16-11-74	1	2115.0	50.0
"	22-11-74	1	1600.0	28.0
"	7-1-75	1	2070.0	40.0
"	30-9-75	1	1020.0	5.0
"	8-12-75	1	2100.0	65.0

Much additional knowledge regarding abundance, migrations, egg and larval history and biology of the billfishes as well as oceanographic factors (chemical and physical) influencing their distribution is necessary to formulate sound management policies for their utilization.

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