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SOME BIOLOGICAL ASPECTS OF TWO SPECIES OF BARRACUDAS FROM THE SOUTH WEST COAST OF INDIA

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ABSTRACT

Two species of barracudas viz. *Sphyraena obtusata* and *S. jello* are commonly caught from the coastal waters of the southwest coast of India. The fishing season extends from October to May with two peaks; one in November and the other in March which is closely associated with the breeding habits. Their length - weight studies showed differential growth in male and female. Analysis of stomach contents indicated that they are highly predatory fishes feeding mainly on other pelagic species. The barracudas have an extended spawning period with high fecundity rate.

INTRODUCTION

As some of our coastal fisheries have been over-exploited, attention is now being diverted to under exploited groups like barracudas. Recently the barracudas or sea - pikes are caught in sizeable quantities along the Indian coasts by trawling. But so far no attempt has been made to study the present status, stock dynamics and future prospects of barracudas along the Indian coasts. De' Sylva (1973) reviewed the systematics and ecology of the barracudas of the Indian Ocean and adjacent seas. Kothare (1973) made a study on *Sphyraena obtusata*. Pillai (1981) gave an account of the barracudas of the Indian coasts. Bal and Rao (1985) described the fishery of barracudas. The present attempt gives information on the biology and fishery of two species of barracudas that are abundant along the south-west coast.

MATERIAL AND METHODS

Catch and effort data pertaining to the trawling operations of Integrated Fisheries Project vessels for the period 1985 - '89 are taken for the study. Samples for biological studies were taken twice in a month for a period of one year. Observations were made on length-weight, food and feeding and maturity stages. A total of 348 specimens were examined. Length-weight relationship was calculated by the method of least squares. Fecundity estimations were made by gravimetric and volumetric methods using advanced or pre-spawning stages of ovaries. The length and weight of the fish and ovaries were measured in fresh condition and preserved in 5% formalin. The weight and volume of the preserved ovaries were carefully recorded. The sub samples from the anterior, middle and posterior regions of both the ovaries were mixed and subjected to gravimetric and volumetric counts and the average of both the methods was recorded as the mean of absolute fecundity. Relative fecundity was determined by the ratio of total number of ova and total weight of fish.

FISHERY

Barracudas are active predatory fishes found in tropical and warm temperate seas.

There are four species of barracudas reported from the western Indian Ocean by Fischer and Bianchi (1984). They are *Sphyraena barracuda, S. forsteri, S. jello* and *S. obtusata*. Of these *S. barracuda* and *S. jello* grow to over 175 cm, whereas the other two grow to a maximum of 60 - 70 cm; the common size being 20 - 30 cm. Barracudas are usually caught from surface to down to a depth of 200 m and reported even from depth upto 400 m. They are captured by a variety of gears like hand line, trolling and also in trawls. Though they are shoaling species, large individuals are often found to be solitary.

About 3,476 tonnes of barracudas were landed in India during 1985 -'86 (CMFRI - 1986). State - wise analysis showed that nearly 41% of the landings were accounted from Tamil Nadu, followed by Kerala (28%) and Andhra Pradesh (8%). Landings in other States were insignificant. Two species viz. *S. obtusata* and *S. jello* are usually found along the southwest coast. Of these *S. obtusata* is mostly caught from nearshore waters upto 50 m and *S. jello* slightly away from the inshore area. Landings of Integrated Fisheries Project for the last five years showed that they are mainly caught in bottom trawls. The season extends from October to May with peaks in November and March (Table 1).

Length/age group in the fishery

In the pelagic trawl landings, *S. obtusata* were in the length groups of 110 to 150 mm, whereas in bottom trawls, the length ranged from 200 to 320 mm. Length- frequency distribution showed that commercial catch varied from 200 to 300 mm in the case of *S. obtusata* while for *S. jello* the size range was 350 to 550 mm. But specimens below 300 mm were obtained only during June-July months and the commercial catch range varied between 400 and 500 mm. On few occasions specimens of *S. jello* ranging in size from 800 - 1,300 mm were also obtained.

Length-weight relationship (Fig. 1 & 2)

Length-weight relationship of barracudas were estimated in view of its utility in calculating the weight for a given length and vice versa. Of the total 348 specimens examined 152 were *S. obtusata* within the range of 115 to 370 mm with a weight range of 10 to 245 g; which include 94 females and 58 males. The regression equation for male and female are as follows :

Male log W : -1.7822 + 2.6872 log L
Female log W : -1.9583 + 2.8388 log L

The rate of change of weight relative to length was slightly different in male and female. However, the 'r' value (0.95) showed very good correlation between length and weight.

Among the 196 specimens of *S. jello* examined 117 were females and 79 males with a length range of 330 to 620 mm and weight range of 200 to 920 g. The length- weight relationship was found separately for male and female. The equation being :

Male log W : -1.7201 + 2.6369 log L
Female log W : -1.9252 + 2.7587 log L

There is not much difference in weight between sexes. However, males are found to be smaller in size.

FOOD AND FEEDING

Barracudas are highly predatory fishes feeding mainly on other pelagic fishes. They

TABLE 1. *Year-wise /month-wise landings of barracuda at Integrated Fisheries Project from 1985 - 1989 (Weight in kg and catch per hour)*

Month	1985	1986	1987	1988	1989
January	1,770 (15.40)	2,105 (16.19)	425 (13.00)	115 (3.11)	339 (11.29)
February	2,588 (18.22)	706 (10.38)	592 (9.82)	1,005 (24.60)	1,292 (26.59)
March	7,113 (31.44)	1,982 (19.18)	1,576 (22.66)	665 (16.86)	1,963 (45.69)
April	2,136 (20.92)	2,110 (28.90)	1,687 (21.28)	478 (0.55)	688 (12.96)
May	600 (2.32)	3,357 (46.40)	509 (4.07)	451 (4.25)	517 (8.70)
June	-	29 (0.07)	149 (1.09)	-	7 (0.17)
July		96 (0.12)	50 (0.99)	131 (3.18)	6 (0.65)
August		9 (0.03)	-	-	161 (0.70)
September	51 (0.29)	-	-	-	12 (0.01)
October	52 (0.40)	63 (0.24)	6 (0.03)	3,953 (27.50)	647 (6.46)
November	4,734 (30.88)	3,538 (50.74)	452 (3.92)	5,761 (113.86)	368 (13.27)
December	1,848 (32.40)	927 (12.95)	1,034 (14.72)	497 (14.01)	906 (6.37)
Total	20,892	14,927	6,480	13,056	6,906

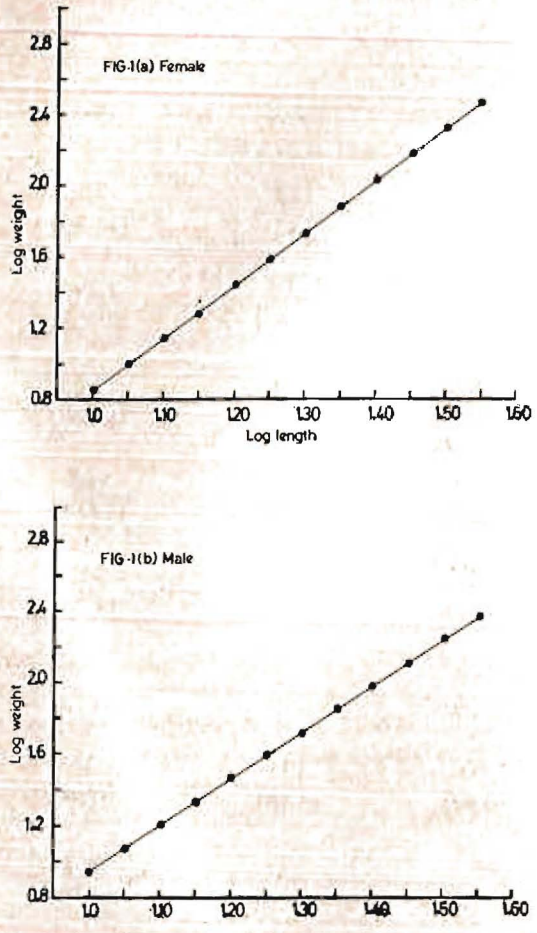

Fig. 1. Length - weight relationship of *S. obtusata*

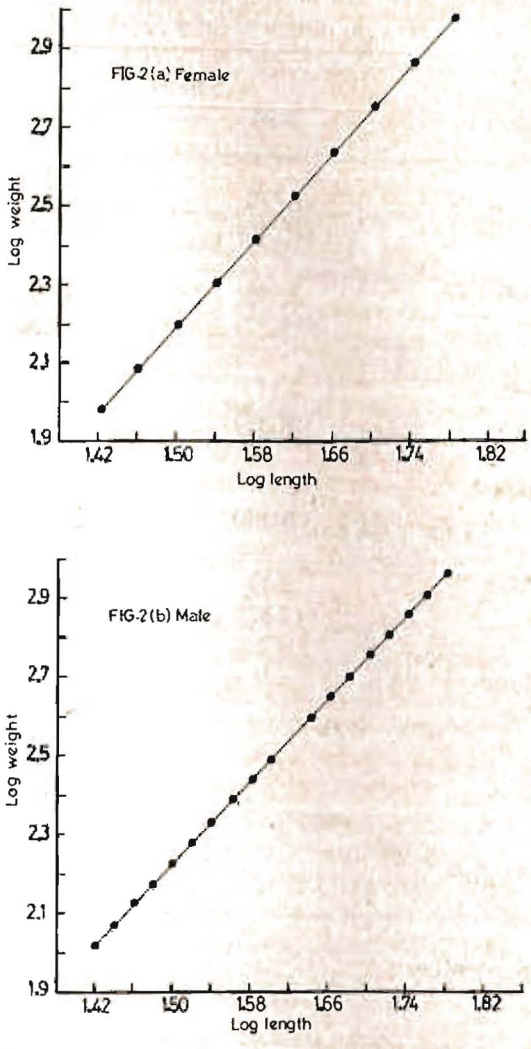

Fig. 2. Length - weight relationship of *S.Jello*

possess long and sharp cutting type teeth on jaws. There were many incidences of gut gorged with food items as well as many a time empty stomach too. The food items of *S. obtusata* were mainly anchovies, whereas for *S. jello*, mackerels, horse mackerels, clupeids, lizard fish and cuttle fishes were found. The feeding habits of barracudas are so clear that the smaller fish consume anchovies, while bigger ones feed on the shoals of other pelagic fishes like *Decapterus russelli, Atule mate, Rastrelliger kanagurta* and *Saurida undosquamis*. Feeding intensity during various months was studied from the data on the degree of fullness of stomach. Fishes with stomach full and $^{3}/_{4}$ full were considered to have been feeding actively. Similarly $^{1}/_{4}$ full, little and empty stomachs were considered to denote poor feeding. It was observed that higher percentage of occurrence of empty stomach and lower volumes of feed consumed are noticed during breeding season and the feeding intensity is

high in the post spawning periods of *S. obtusata;* while *S. jello* is found to feed actively even during spawning.

Maturity and Spawning

Studies on maturation and spawning habits of barracudas from Indian waters are meagre except for Kothare (1973). During the present study the spawning stages of barracudas were determined by a gross examination of gonads. Six stages of maturity were recorded in females and three in males. In the ripe and running stages (VI) of females the ovary occupied the entire body cavity with fully packed ripe eggs, while flattened in the oozing stage of male (III) the creamy white testis occupied $^{3}/_{4}$ of the body cavity. Spawning season was determined on the basis of occurrence of individuals in ripe, running and spent stages (Fig. 3). The size at maturity was determined by tabulating the percentage of occurrence of fish belonging to stage III and above.

Monthwise distribution of maturity stages denotes rather prolonged spawning season for *S. obtusata.* The spawning season starts from October and continues upto March with the peak period during November - December. Most of them are multiple spawners too. The minimum size at maturity is 200 mm.

The species, *S. jello* spawns only once in a year. Specimens above 400 mm showed maturing gonads from March onwards. The peak spawning season is April - May and spawning continues upto June - July. The samples collected from August - October were all in spent condition. Juveniles of *S. jello* ranging in size from 22 to 27 mm are found to occur on the east coast in September - November (Venkataramanujan and Ramamoorthy, 1974). Young ones are caught from Cochin area during June - July.

Spawning Ground

The ripe fish samples were collected from Cochin area with a depth range of 50 m. This observation reveals that spawning takes place in the belt quite close to the shore or ripe fish migrate shorewards and spawn at any

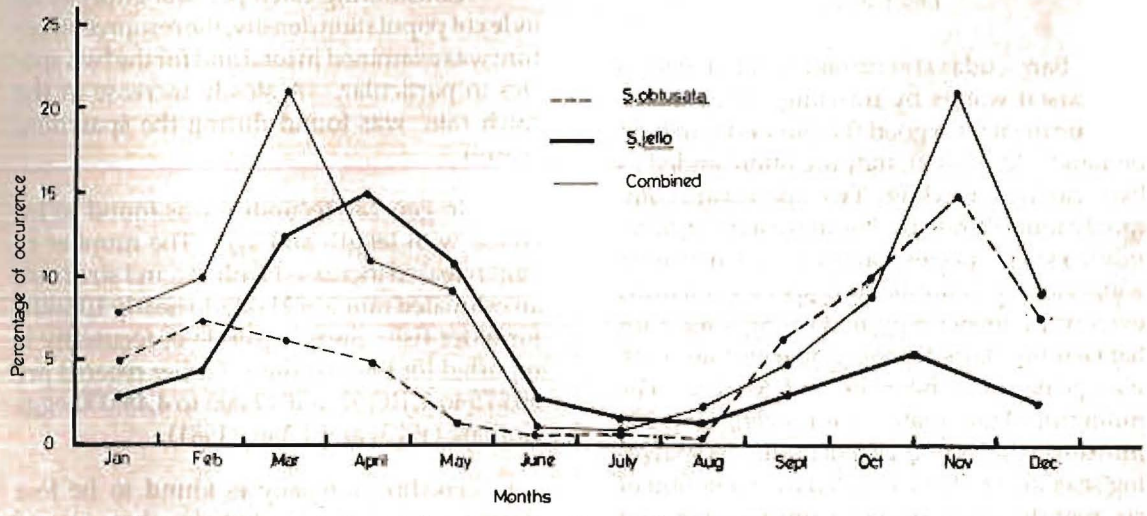

Fig. 3. Monthly percentage occurrence of different species of barracuda.

protected place near shore. This view is very well supported by the presence of young ones in the pelagic trawl. It also appears that shoals of *S. jello* move to deeper water after spawning, as the samples obtained from deeper region from August to October are all in spent condition with empty stomachs. From November - December onwards signs of gonad developments are noticed and in January - February III and IV stages occurred.

Fecundity

Fecundity studies on fishes are very essential in understanding the reproductive potential. Here the fecundity estimation included 35 matured ovaries of both the species. It has been found that the number of eggs released increased with age and size of the fish. Fecundity estimates varied from 1.5 to 2 lakh eggs for *S. obtusata*. In the case of *S. jello* the range was between 3 and 5 lakhs. There were incidences of higher estimates too. A barracuda weighing 7 kg (1300 mm) having an ovary weight of 275 g was supposed to release nearly 10 lakh eggs per year.

Discussion

Barracudas are currently exploited from the coastal waters by trawling. They are of delicate meat with good flavour and is in high demand. At present, they are often landed as bye - catch in trawling. Two species are commonly found along the south west coast, *S. obtusata* a small species usually found in inshore waters and *S. jello* a sholaing species, obtained even from deeper region. Fishing season for barracudas starts from October to May with two peaks in November and March. The minimum size at maturity for *S. obtusata* is 200 mm durig the second year of its life. Its spawning season is rather extended over a period of six months commencing from October and terminating by April. According to Bal and Rao (1985) the spawning season for *S. obtusata* is extended over a period of four months (November - February). But during the present study, the spawning continues upto March - April, eventhough the peak period is during November - February. In a limitted study of ovarian development, Pillai (1981) observed that barracudas may spawn more than once in a season.

Based on the study of 'condition factor', the size at first maturity of *S. obtusata* from Bombay waters is reported to be in the 161 - 180 mm group (Kothare, 1973). But in the catches, landed at Cochin the minimum size at maturity was 200 mm for *S. obtusata*.

S. jello spawns only once in a year. The season starts from March with a peak in April - May and continues upto June - July. It has been possible to associate the fishing season with the breeding movement. The abundance of *S. jello* is on the increase from March to May, while *S. obtusata* is found to appear more from October to February.

Considering catch per unit effort as an index of population density, the resource structure was examined in total and for the two species in particular. A steady increase in the catch rate was found during the spawning season.

In general, fecundity was found to increase with length and age. The number of eggs released increased with age and size from an estimated range of 2 lakhs to nearly 10 lakhs for older fish. Such high rate of fecundity is reported for the first time. Earlier records are 30,175 to 1,10,152 and 42,000 to 4,48,000 eggs Kothare (1973) and Pillay (1981).

Feeding intensity is found to be less during spawning period in the case of

S. obtusata and high in the case *S. jello*. Food items between the two species have been clearly ascertained, anchovies being the main food of *S. obtusata* while mackerels, horse - mackerels, lizard fish and cuttle fish are preferred by *S. jello*.

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