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Age and Growth of *Himantura bleekeri* (Blyth) and Fishery for Rays off Tuticorin

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Abstract

An estimated annual average total catch of 900.9 t of rays were landed at Tuticorin during 1991-92 to 1995-96. The small mechanised trawlers landed 778.8 t at the catch rate of 24.2 kg/unit which constituted 3.3% of the total catch by trawlers and the bottom-set gillnets landed 122.1 t at the catch rate of 73.9 kg/unit which formed 69.7% of the total catch by bottom set gillnets. The abundance of rays in the trawling grounds increased from April to reach a peak in September and then fluctuated. Such a definite trend was not seen in the abundance of rays in the grounds of bottom set gillnets and in general the abundance of rays was good in almost all the months. As many as nine and odd spec ies sup ported thefishery an d in both the gears *Himantura bleekeri* was the dominant species recording 34.1% in trawlnet and 34.5% in bottom-set gillnets and the second dominant species was *H. aurnak*. The sexwise age and growth of *H.bleekeri* is studied from length frequency data collected from trawl and bottom-set gillnet landings. The growth of this species is described by the von Bertalanffy growth equation : $lt = 1242 (1 - e^{-0.5612(t+0.0103)})$ for males and $lt = 1303 (1 - e^{-0.505(t+0.0155)})$ for females.

Introduction

Review of literature reveals that very limited information is available on the fishery biology of rays (Samuel, 1951; James, 1971a) and most of the reports deal with rare and abnormal occurrence (Luther, 1962; Sam Bennet, 1965; Sivaprakasam, 1966; James, 1971b; Silas and Selvaraj, 1985; James, 1985 and others). Considering the commercial importance of the elasmobranch, the study on the fishery and biology of rays and sharks has been initiated at Tuticorin since 1991 with an aim to provide the required information for propoer management of the fishery. The present investigation deals with the fishery for rays, species composition and growth of the dominant species *Himantura bleekeri* (Blyth).

Materials and Methods

Basic data on the catch, effort, species composition of rays and length frequency of the dominant species *H. bleekeri* were collected once a week. The raw data were initially raised to the sampling day and then to the month by the respective raising factors. The progression of the modes in subsequent months was traced from the scatter diagram of all the modes obtained on an arithmetic graph for males and females respectively as per Pauly (1980). The time of origin of a few modes available at the lower size ranges was fixed by extrapolating the curves back to the time axis. Since this species is viviparous, the time of origin obtained in the above manner is considered to include the gestation period also. The average size attained in subsequent months by males and females of this species were obtained for growth estimation by tabulating the traced modes chronologically as per George and Banerji (1968). The quarterly sizes atained by this species, obtained from these empirical growth curves were used for further analysis to obtain growth parameters as per Bagenal (1955).

Results and Discussion

Catch statistics : An estimated annual average total catch of 900.9 t of rays were landed by both trawl and gillnet units at Tuticorin during 1991-96. The small mechanised trawlers landed an estimated catch of 425.5 t of rays at the catch rate of 13.2 kg/unit during 1993-94, in 1994-95 988.3 t were landed at the catch rate of 29.7 kg/unit and in 1995-96 928.3 t were landed at the catch rate of 29.7 kg/unit. On an average catch rate of 24.2 kg/unit which constituted 3.3% of the total catch by trawlers. The monthwise average catch and effort data given in Table 1 indeicate that the landings of rays increased from 18.4 t in April to 144.9 t in September due to continued increase in the abundance of rays as indicated by the catch rate and increase in the effort input upto July. Subsequently, the landings fluctuated due to variation in the abundance of rays and the effort input (Table 1). The annual landings of rays by bottom-set gillnets indicate a declining trend in the catch from 1991-92 to 2993-94 with a short revival in 1994-95 and again declined in 1995-96. The annual catch rate also exhibited a similar trend upto 1994-95 and in 1995-96 the decline in the catch of rays was mainly due to reduction in the effort input as the catch rate was better than previous year.

An estimated average catch of 122.1 to of rays were landed during 1991-96 at the average catch rate of 73.9 kg/unit which formed 69.7% of the total catch by bottom-set gillbet units. The monthwise catch rate initially declined from April to May and then increased to reach a peak in August. Then it declined again in subsequent months upto November and again increased to reach another peak in March, whereas, the catch did not commensurate with abundance due to variation in the effort input during April to August. Subsequently, the effort input coincided with the abundance of rays (Table 2).

Table 1: Estiamted monthwise average effort, catch of rays and other fishes, percentage composition of rays and CPUE by trawlnet during 1993-96

Month	Effort (Units)	Total Catch (t)	Rays (t)	%	CPUE (Kg)
Apr	2007	684.0	18.4	2.7	9.2
May	3106	1423.9	42.5	3.0	13.7
Jun	3320	1756.0	68.6	3.7	20.6
Jul	4247	3412.8	113.0	3.3	26.6
Aug	4156	4009.5	123.6	3.1	29.7
Sep	3359	3486.4	144.9	4.2	43.1
Oct	2823	4842.6	62.6	1.3	22.0
Nov	2166	1123.3	41.0	3.6	18.9
Dec	1781	1265.7	44.5	3.5	25.0
Jan	1945	883.6	42.6	4.8	21.9
Feb	1947	1153.7	53.0	4.6	27.2
Mar	1348	578.8	24.5	4.2	18.2
Total	32205	23609.2	778.8	3.3	24.2

Table 2: Estimated monthwise average effort, catch of allfish and rays, percentage and CPUE by bottom-set gillnet during 1991-96.

Month	Effort (Units)	Total Catch (t)	Rays (t)	%	CPUE (Kg)
APR	167	17.7	11.8	66.9	70.9
May	134	14.1	9.4	66.4	69.8
Jun	168	18.9	12.2	64.6	72.5
Jul	146	15.7	11.2	71.5	76.7
Aug	167	17.6	13.2	74.6	78.8
Sep	138	14.3	10.0	70.3	72.8
Oct	122	10.9	7.6	70.2	62.5
Nov	85	6.8	4.5	66.0	52.7
Dec	93	10.1	5.9	58.3	63.3
Jan	108	10.6	7.2	68.1	67.0
Feb	123	13.9	10.3	73.7	83.5
Mar	201	24.5	18.8	76.7	93.6
Total	1652	175.1	122.1	69.7	73.9

Abundance: The abundance of rays in the trawling grounds off Tuticorin as seen from the monthwise catch rate (Table 1) was good in all the months except during March - May and November. The peak period of abundance of rays was noticed during August and September. On the other hand, the abundance of rays in the fishing grounds of bottom-set gillnet units was more or less good in all the months with minor variation as indicated by the catch rates (Table 2). However, two periods of better abundance were noticed during June - September and February - April.

Species composition: As many as 9 species belonging to 5 genera supported the ray fishery by trawlnet at Tuticorin. *Himantura bleekeri, H. uarnak, H. sephen, Aetobatus narinari, A. flagillum, Amphotistius kuhlii, A. zugei, Rhynoptera javanica, Gymnura poecilur* and others consituted the ray catch by trawlnet. Among them the dominant species was *H. bleekeri* (34.1%), followed by *H. uarnak* (23.5%), *A. narinari* (10.4%), *A. flagillum* (5.5%), *H. sephen* (5.4%), *A. kuhlii* (4.9%) and other constituted by the rest of the ray catch by trawl net. The monthwise catch composition varied in accordance with the monthwise total abundance of rays in the trawling grounds with minor variation among the species.

The species composition of rays in the bottom-set gillnet landings indicates that in addition to the 8 species which occur in trawlnet, *Mobula diabolus* and *Amphotistius imbricatus* were also available in the bottom-set gillnet landings of the dominant species was in accordance with the total abundance of the rays.

Length frequency : The sexwise and monthwise size frequency obtained at an interval of 20 mm for *H. bleekeri* from bottom-set gillnet landings was observed to consist multimodes indicating the occurrence of different broods in the fishery. The size of males varied from 460 mm to 1079 mm and of females from 380 mm to 1259 mm. Age and growth : Empirical growth curves for male and female of this species were obtained by plotting the agverage sizes obtained against the respective months on an arithmetic graph and fitting a free hand curve through the plots as shown in Fig. 1 and 2 for male and female respectively. The sexwise growth of this species may be expressed as per von Bertalanffy growth equation as followed :

Male : $lt = 1242\ (1- e^{-0.5612}(t+0.0103))$

Female : $lt = 1303\ (1-e^{-0.505}(t+0.0155))$

Based on these equations, the males attain a size of 529.3, 835.4, 1010.0, 1109.7, 1166.5 and 1198.9 mm in 1.0, 2.0, 3.0, 4.0, 5.0 and 6.0 years respectively and females attain 510.5, 824.7, 1014.3, 1128.8, 1197.9, 1239.6 and 1264.7 mm in 1.0, 2.0, 3.0, 4.0, 5.0, 6.0 and 7.0 years respectively.

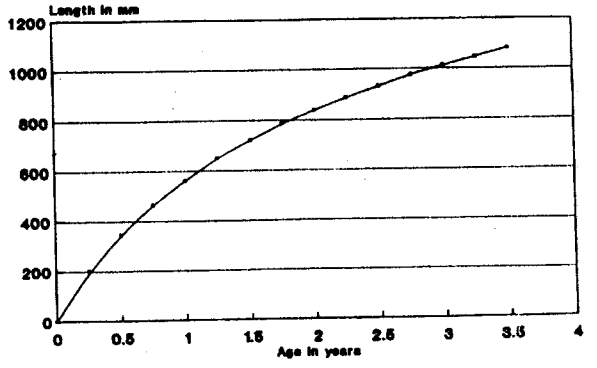

Fig. 1. Growth curve of *H. bleekeri* (male) in Tuticorin waters.

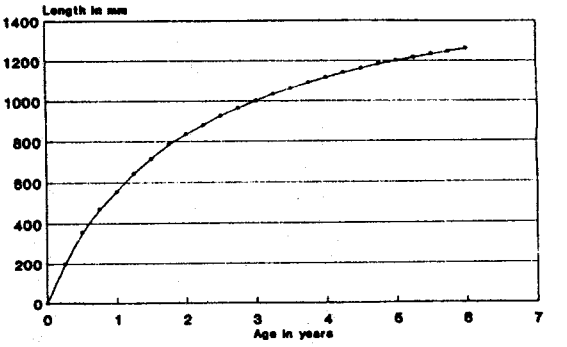

Fig. 2. Growth curve of *H. bleekeri* (female) in Tuticorin waters.

The growth of rays from length frequency studies have not been reported in India and the present study is the first report on the growth of *H. bleekeri.* Hence, the comparison could not be made wtih previous reports. However, available information on the closely related resources such as shark (Nair, 1981; Krishnamoorthi and Jagdis, 1986; Kasim, 1991) indicate a varied growth rates. Kasim (1991) reported a higher growth rate than Nair (1981) and Krishnamoorthi and Jagdis (1986). He has substantiated the higher growth rate by stating that the tropical species including sharks, being poikilotherms, their growth rates are directly correlated to the environmental temperature and it is naturally higher than their counter part in temperate waters. The K values obtained in this study are higher than that obtained for sharks by Nair (1981) and Krishnamoorthi and Jagdis (1986).

References

Bangenal, T.B., 1955. The growth rate of the long rough dab *Hippo glossoides platessoides* (Fabr.) *J. Mar. Biol. Ass. U.K.,* 34:297-311.

George, K.C. and Banerji, S.K., 1986. Age and growth studies on the Indian mackerel *Rastrelliger kanagurta* (Cuvier) with special reference to length frequency data collected at Cochin. *Indian J. Fish.,* 11(1) : 621-638.

James, P.S.B.R. 1971a. Notes on the biology and fishery of the butterfly ray *Gymnura poecilura* (Shaw) from the Palk Bay and Gulf of Mannar. *Indian J. Fish.,* 13 (1&2) : 150-157.

1971b. Further obnservations on shoals of the Javanese cownose ray *Rhinoptera javanica* Muller and Henle from the Gulf of Mannar with a note on the teeth structure in the species. *J. Mar. Biol. Ass. India.* 12 (1&2) : 151-157.

1985. Notes on a giant devil ray *Manta birostris* (Walbaum) caught off Madras. *Indian J. Fish.,* 32 (4) : 492-494.

Kasim, H.M., 1991. Shark fishery of Veraval coast with special reference to populaton dynamics of *Scoliodon laticuadus* (Muller and Henle) and *Rhizoprionodon acutus* (Ruppell). *J. Mar. Biol. Ass. India,* 33 (1&2) : 213-228.

Krishnamoorthi, B. and Jagdis, I., 1986. Biology and population dynamics of the Grey dog shark *Rhizoprioinodon (Rhizoprionodon) acutus* (Ruppell) in Madras waters. *Indian J. Fish.,* 33(4) : 371-385.

Luther, G., 1962. On an apparently specific type of abnormality in the white spotted showelnose ray *Rhyncobatus djidensis* (For skal). *J. Mar. Biol. Ass. India,* 3 (1&2) : 203.

Nair, K., 1981. Age and growth of yellow dog shark *Scoliodon laticaudus* Muller and Henle from Bombay waters. J. mar. bio. Ass. India (1976), 18 (3) : 531-539.

Pauly, D. 1980. A selection of simple methods for the assessment of tropical fish stocks. FAO Fisheries Circular No. 729:54 pp.

Sam Bennet, P. 1965. On an abnormal ray from Vizhinjam. *J. Mar. Biol. Ass. India,* 6 (2) : 316-317.

Samuel, M., 1951. Shark and ray fisheries and shark liver oil. Hand book on Indian Fisheries (Govt. of India, Ministry of Agricultre), pp. 59-62.

Silas, E.G. and Selvaraj, G.S.D., 1985. On the occurrence of the rough tail sting ray *Dsyatis centroura* (Mitchill) in Indian waters. *Indian J. Fish.,* 32(2) : 248-255.

Sivaprakasam, T.E., 1966. On the capture of two giant devil rays *Manta birostris* (Walbaum) at Veraval, Saurashtra. *J. Mar. Biol. Ass. India,* 7(1):204-205.