THE DEPTH DISTRIBUTION OF THE CAT-FISHES, *TACHYSURUS THALASSINUS* (RÜPP.) AND *T. TENUISPINIS* (DAY), IN THE NORTH-WESTERN BAY OF BENGAL.

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ABSTRACT

During 1964-67, a study was made of the depth distribution of the cat-fishes, *Tachysurus thalassinus* (Rüpp.) and *T. tenuispinis* (Day) in the grounds up to 100 m deep in the north-western Bay of Bengal, based on the catches of exploratory trawlers. On an annual average, both species have peak abundance in two depth-ranges, the first being 30-39 or 40-49 m and the second, 60-69 or 70-79 m. Both species have high abundance in shallow grounds (< 50 m deep) in April-June and October-December and in deeper grounds in July-September. In September-December the sizes available, of both species, increased with increase in depth. *T. thalassinus* of small size was recorded only from the 17°40′, 19°10′ and 19°40′ zones. No inter-zonal difference was found in the size of the other species.

INTRODUCTION

In an account of exploratory trawling from 1961 to 1965 on the continental shelf along the north-western Bay of Bengal, Sekharan *et al.* (1968) gave estimates of the relative abundance of cat-fishes, as a group, in the grounds up to 100 m deep. Work on the biology of the cat-fishes of this region was started in 1964. It was seen that the cat-fishes represented in the trawl catches consisted mainly of two species, *Tachysurus thalassinus* (Rüpp.) and *T. tenuispinis* (Day). The seasonal abundance, and possible annual catch, in commercial trawling, of each species has been dealt with by the author (Sekharan, 1968). The present account deals with the catch per hour and the length-groups of each species according to depth in different zones in the area, based on the observation of exploratory trawling from 1964 to 1967.

MATERIAL AND METHODS.

The present account is based on observations on the catches of the Government of India trawlers, *m. t. Ashok, m. v. Champa* and *m. v. Sea Horse*, stationed at Visakhapatnam and the log reports of the skippers. The log reports gave the data for cat-fishes as a group. The species composition was

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estimated by shipboard observations whenever possible. When this was not possible, the following procedure was adopted for estimating it. (i) For daily voyages the catch heaps on the deck could normally be split into hauls (there were usually only 2-3 hauls on each day). (ii) In respect of long voyages, the cat-fishes in the fish-hold could be divided into 4-5 layers, the topmost layer assigned to the last few hauls, the bottom one to the first few hauls and the others to the intermediate hauls containing cat-fishes, as recorded in the log sheets. The disadvantage here is of course that the same composition would be assigned to more than one haul. However, the species composition so arrived at compared favourably with that observed in the same depth-ranges and areas during shipboard work.

The mid-value of the depth-range of a haul was regarded as the depth of the haul. The depth-wise data were summed up for 10 m intervals. The length measurements were grouped into 2 cm size-classes. *Ashok* used a trawl net with larger mesh than the other two vessels; hence the data of *Ashok* on the one hand and *Champa* and *Sea Horse* on the other are treated separately. The zones are the same as those mentioned by Sekharan *et al.* (1968).

Annual Catch per hour in different Depth-ranges

The annual depth-wise catch per hour in the intensively fished zones is given in Fig. 1.

a) *T. thalassinus.* The c.p.h. in all zones and for all vessels has maxima in two depth-intervals, the first usually in the 30-39 or 40-49 m and the second in 60-69 of 70-79 m.

b) *T. tenuispinis.* The depths of maximum c.p.h. are roughly the same as in the case of the other species; only in certain zones and in certain years the depth of the maximum c.p.h. of the two species differed by about 10 m, which can be expected even on sampling considerations.

Seasonal changes in the Depth-wise c.p.h.

Only the zones fished for 6 months or more each in a year have been taken into account here. The 17°40′ - 19°40′ zones fall into this category. The monthly depth-wise c.p.h. are represented in Figs. 2-5. The depths of the maximum c.p.h. of various months are joined by lines. Following Sekharan *et al.* (1968) the grounds up to 50 m deep are referred to as shallow and those more than 50 m in depth as deep. The figures show that the shallow and deep regions have alternating periods of abundance of cat-fishes.

a) *T. thalassinus.*

i) *m.t. Ashok*: Generally April-June and October-November are the periods when c.p.h. is higher in shallow regions than in the deeper grounds

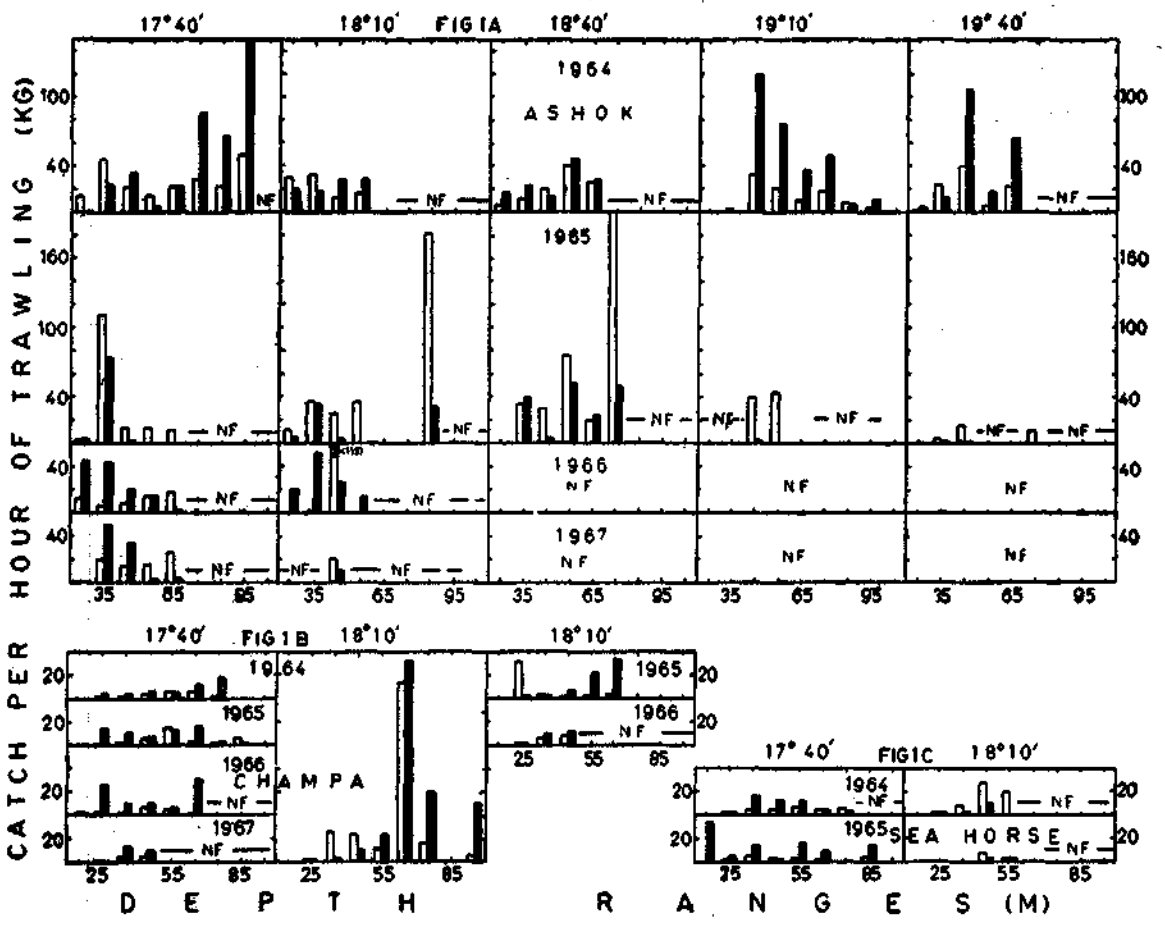

FIG. 1. Annual catch per hour (kg) of *T. thalassinus* (white bars) and *T. tenuispinis* (black bars) in different depth-ranges of various zones. (NF = No Fishing)

and July-September and November-December, the period when the reverse trend is seen. The table below sums up the pattern in different zones.

Zone.	Months when c.p.h. is higher in shallow grounds than in deeper grounds.	Months when c.p.h. is higher in deeper grounds than in shallow grounds.
17°40′	March - June, October	Mar. (some years), July-September, Nov.-Feb.
18°10′	March - June, Oct., Nov.	Mar. (some years), Aug., Sept.
18°40′	April, May, September	Feb., Mar., June., July, Oct.
19°10′	April - June, Sept., Nov., Dec.	Feb., March, July, Oct.
19°40′	March.	September.

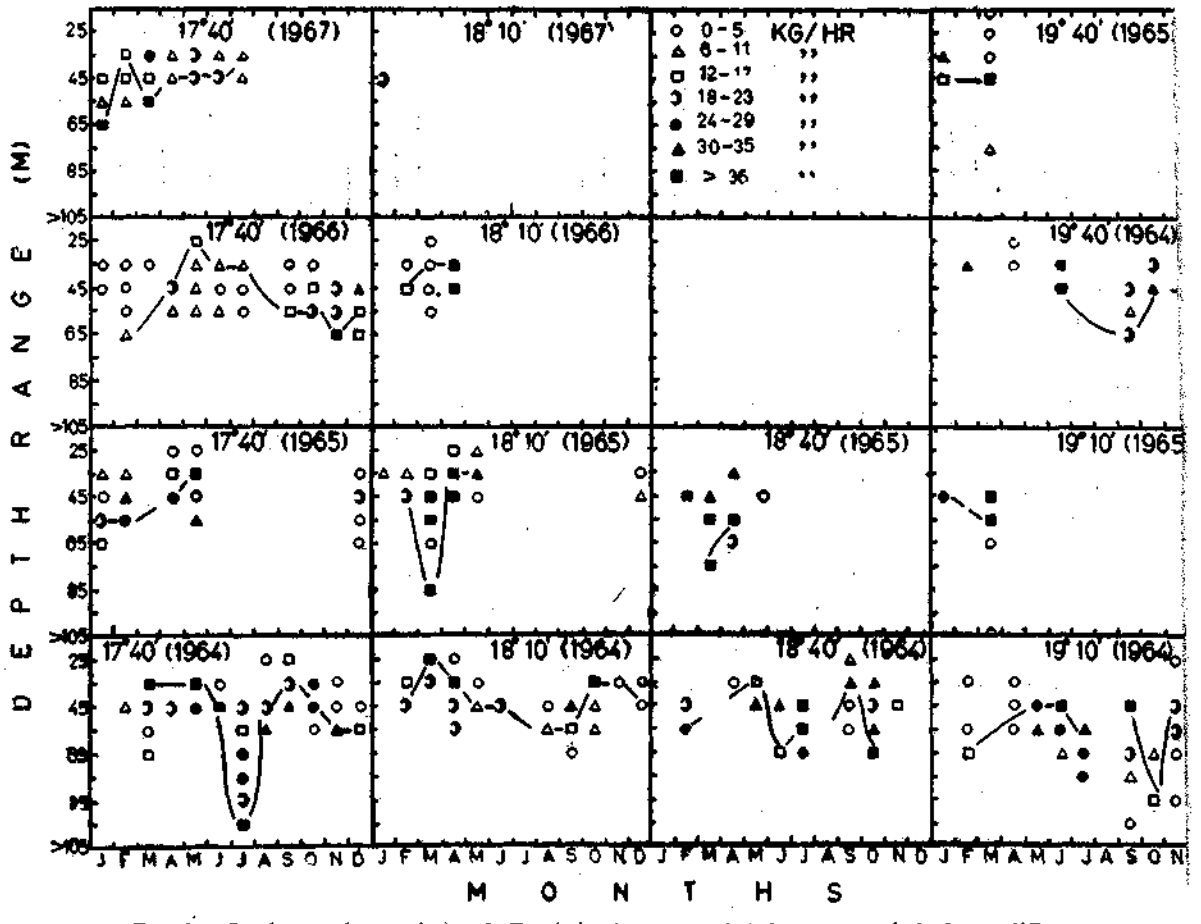

FIG. 2. Catch per hour (kg) of *T. thalassinus* recorded by *m.t. Ashok* from different depth-ranges. (The depths of maximum c.p.h. in various months are joined by lines).

The difference between zones may, to some extent, be due to sampling error. However in 1964 and 1965 when all zones were fished, the offshore shift of the best c.p.h. in March-April was found to be more marked in the northern zones, 18°40′ and 19°10′, than in the southern zones. On the other hand the shift in July-September of the best c.p.h. to deeper grounds is well expressed in all zones.

ii) *m.v. Champa and m.v. Sea Horse.* The pattern is roughly the same as that shown by the data of *Ashok*.

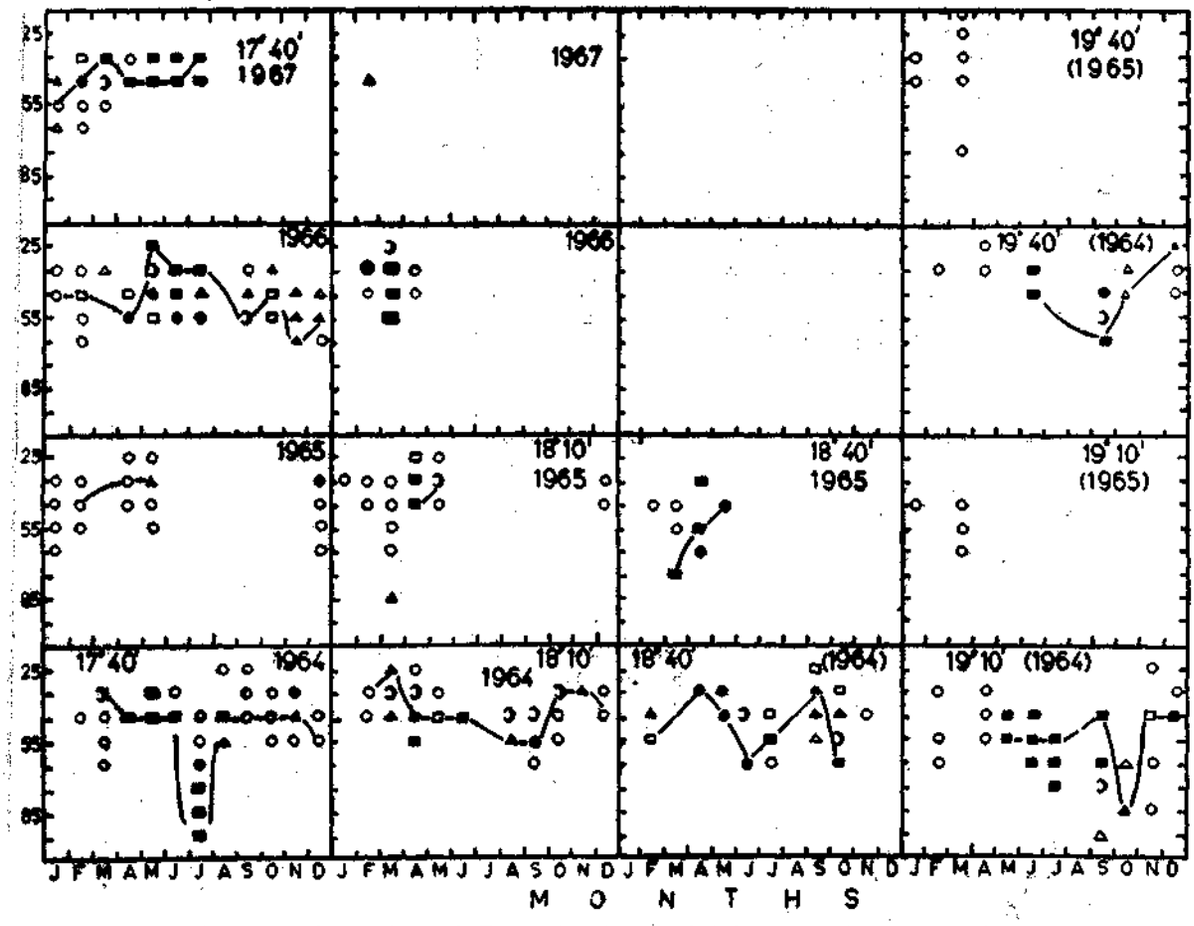

FIG. 3. Catch per hour (kg) of *T. tenuispinis* recorded by *m. t. Ashok* from different depth-ranges (details as in Fig. 2).

b) *T. tenuispinis.*

i) *m.t. Ashok.* April-June and October-December are the periods when c.p.h. is higher in the shallow region than in the deeper region and July-September, the period when it is higher in the deeper grounds. The following table gives the general pattern of shift in maximum c.p.h. in different grounds.

Zone.	Period in which c.p.h. is higher in shallow grounds than in deeper grounds.	in deeper grounds than in shallow grounds.
17°40′	March - June, Oct.	July - Sept., Nov. - Jan.
18°10′	March, May, Oct., Nov.	March (Some years), Aug., Sept.
18°40′	April, May, Sept.	Feb., March, June, July, Oct.
19°10′	Sept., Nov., Dec.	March - July, Oct.
19°40′	Oct. - Dec.	September.

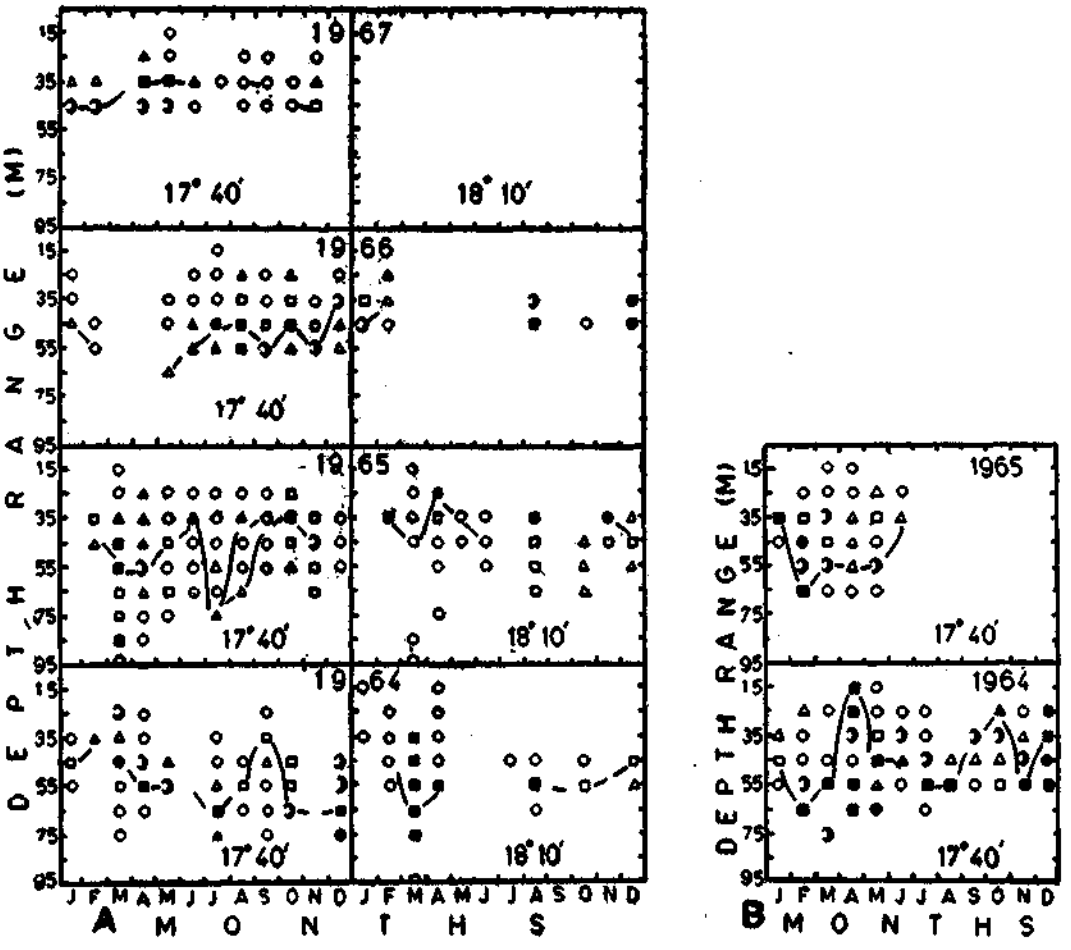

FIG. 4A. Catch per hour of *T. thalassinus* recorded from different depth-ranges by *m.v. Champa* (details are in Fig. 5A).

FIG. 4B. Catch per hour (kg) of *T. thalassinus* recorded from different depth-ranges by *m.v. Sea Horse* (details as in Fig. 5A).

It may be noted that the shift of the best c.p.h. to deeper grounds in July-September is seen in all zones.

ii) *m.v. Champa and m.v. Sea Horse.* The shifts in c.p.h. have the same general pattern as those mentioned in regard to *Ashok.*

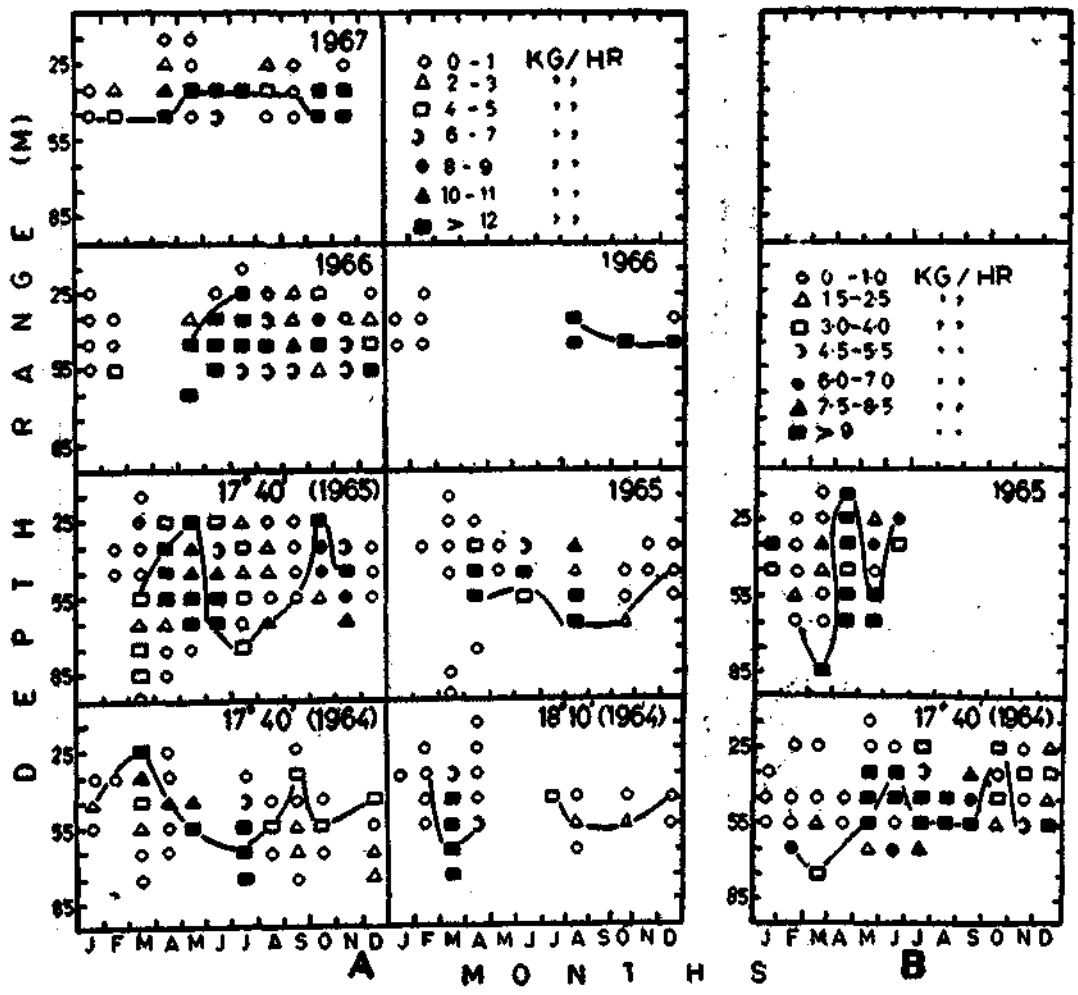

FIG. 5A. Catch per hour (kg) of *T. tenuispinis* recorded from different depth-ranges by *m.v. Champa.*

FIG. 5B. Catch per hour (kg) of *T. tenuispinis* recorded from different depth-ranges by *m.v. Sea Horse.*

LENGTH-RANGES RECORDED IN DIFFERENT DEPTHS

The size-ranges recorded from different depth-intervals are shown in Table 1. The data of *Champa* and *Sea Horse* showed that in September-December, with increase in depth there is perhaps an increase in the size of the two species. Apart from this, there was no indication of change of size of the two species in relation to depth.

TABLE 1. *Length-ranges (cm) of* Tachysurus thalassinus (T. thal.) *and* T. tenuispinis (T. ten.) *recorded from different depth intervals during* 1964-67.

a) *m.t. Ashok.*

Depth-range (m)	17°40′		18°10′		18°40′		19°10′		19°40′	
	T.thal.	T.ten.	T.thal.	T.ten.	T.thal.	T.ten	T.thal.	T.ten.	T.thal.	T.ten
20-29	16-47	no data	20-43	no data	no data	no data	no data	no data	14-39	14-31
30-39	14-47	14-39	16-47	14-43	22-43	-do-	-do	-do-	18-47	26-35
40-49	8-47	14-43	16-47	14-43	16-47	20-45	14-47	14-41	16-49	16-39
50-59	16-47	16-43	18-47	14-43	16-47	14-43	14-47	14-43	16-39	14-39
60-69	14-43	14-43	no data	no data	18-39	14-39	16-47	14-43	16-39	no data
70-79	18-41	14-43	-do-	-do-	18-43	18-31	16-47	no data	no data	-do-
80-89	18-41	14-43	-do-	-do-	no data	no data	20-47	-do-	-do-	-do-
90-99	18-41	no data	-do-	-do-	-do-	-do-	no data	-do-	-do-	-do-
100 m & above.	—	-do-	-do-	-do-	-do-	-do-	-do-	-do-	-do-	-do-

TABLE 1. (*Continued.*)

Depth-range	b) *m.v. Champa* 17°40′		18°10′		c) *m.v. Sea Horse* 17°40′	
	T.thal.	T.ten.	T.thal.	T.ten.	T.thal.	T.ten
10-19	no data					
20-29	14-43	12-41	16-25	no data	16-37	12-39
30-39	10-47	14-47	10-39	12-41	12-43	12-43
40-49	8-43	12-47	12-37	12-47	14-43	12-45
50-59	10-45	14-55	12-35	14-39	14-47	18-43
60-69	16-41	12-43	no data	14-45	no data	no data
70-79	no data	no data	-do-	24-39	-do-	-do-
80-89	22-31	-do-	-do-	no data	-do-	16-29
90-99	no data	-do-	-do-	-do-	-do-	no data

But inter-zonal differences are found in the size-range of *T. thalassinus*. The small-sized fish were landed by *Ashok* only from the southern zone 17°40′ and the two northern zones 19°10′ and 19°40′. In all zones, May-July and November-February were the main periods of occurrence of young fish. In regard to *T. tenuispinis* no marked inter-zonal difference in size-range was found; in all zones, young fish were landed mainly in May-July and October-December. The smallest of the size-groups of this species represented in the catches of *Champa* and *Sea Horse* was not recorded from the landings of *Ashok*, which used a net with larger mesh size, as already mentioned.

DISCUSSION

In the account of exploratory trawling from 1961 to 1965 in north-west Bay of Bengal, Sekharan *et al.* (1968) showed that cat-fishes as a group had greater abundance in the grounds more than 50 m deep than in shallow grounds in March-April and July-September and that the shift of the concentration of these fishes to deeper grounds is more marked and regular in July-September than in March-April. The present data for 1964-67 show the same phenomenon, when individual species are taken into account. The shift is perhaps related to the upwelling reported to take place in the area (Prasad, 1952; La Fond, 1954).

The present study also showed that the size groups caught from various depths are practically the same, except during the last 3-4 months of the year,

when the sizes in deeper grounds tended to be larger than those in the shallow grounds. The inter-zonal differences in the size of *T. thalassinus* are striking. Fish belonging to lower limit of the size range recorded during the study were found only in the 17°40′, 19°10′ and 19°40′ zones. These zones also gave higher annual catch per hour of this species than the other zones (Sekharan, 1968). Thus, from the point of view of the size-range available and the annual c.p.h. two groups of *T. thalassinus* may be made out: one around 17°40′ and the other around 19°40′.

The annual c.p.h. values show that the two species attain high level of relative abundance in practically the same depth-ranges. This may be expected on a consideration of their diet, the food spectrum of the two species being different (Mojumder, personal communication). However the monthly c.p.h. shows that the two species may attain dominance in two different depths during a particular period. The indication given by annual c.p.h. can therefore be regarded only as the average condition.

Acknowledgements

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