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Biology of Tuna Juveniles Occurring along the Coromandal Coast

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Abstract

The Juveniles of tuna *Sarda orientalis* (Temminck and Schlegel), *Euthynnus affinis* (Cantor) and *Auxis thazard* (Lacepede) is dealt. The peak period of occurrence is July-September and the potential ground is of Thirumullaivassal, South of the other two species constituted 68.7 to 90.6% whereas the other two species constituted the rest. The food and feeding habits of these commercially important are described. Length-weight distribution, the spawning season, migratory habits and pattern or recruitment in the tuna fishery described and discussed. Analysis of length-weight data revealed no significant difference between the species and regression coefficient is found to be very close to 3.0.

Introduction

Our knowledge on the biological characteristics of tuna of Indian waters is quite limited. A very few attempts have been made to study the occurrence of the juveniles of tuna, such as the juveniles of skipjack, *Katsuwonus pelamis* in the Indian Ocean (Portier and Marsac 1984) juveniles of *Katsuwonus pelamis*, *Neothunnus macropus* and *Euthynnus affinis* from Indian waters (Jones, 1959 and 1960 a), the occurrence, size distribution, morphometry and feeding habits of the juveniles of *Euthynnus affinis*, *Auxis thazard* and *Sarda orientalis* along the Tuticorin coast in the Gulf of Mannar (Sirai meetan, 1985a), occurrence of *S. orientalis* from Madras coast and *A. thazard* and *E. affinis* from Parangipettai coast by Gnanamuthu (1996) and Sivakumaran and Ramaiyan (1988) respectively. The present study deals with the occurrence and biological aspects of tuna juveniles, *Sarda orientalis* (Temminck and Schlegel), *Euthynnus affinis* (Cantor) and *Auxis thazard* (Lacepede) along the Coromandel coast in Bay of Bengal during 1991-92.

The juveniles of tuna are caught accidentally along with sardines by using sardine gillnets (30-35 mm mesh) in the coromandel coast. The crafts engaged are small mechanised (16 hp) wooden boats and non - mechanised units mostly catamarans operated in shallow waters between 20-30 m depth zone.

Materials and Methods

A sample of 192, 37 and 10 specimens of the juveniles of *S. orientalis*, *E. affinis* and *A. thazard* in the size range of 100-220 mm, 100-220 mm and 180-220 mm in fork length and weighting 18-170g, 22-186 gm and 74-176 g respectively from Pazhayar, Parangipettai, Pudhupettai and Cuddalore in the Coromandel Coast were collected and examined during the year 1991 and 1992. The length measurements were grouped at 20 mm intervals and length frequency was studied. The stomach contents were analysed and the results are presented.

Results and Discussion

The length of juveniles of *S. orientalis* ranged from 100-220 mm (FL) with a single mode at 140 mm in August and 180 mm in July '91 and also a single mode at 100 mm, 120 mm and 160 mm during July, August and September '92 respectively. In the case of *E. affinis*, two modes at 120 mm and 220 mm during July '91 were recorded. During July '92, two modes, a small at 100 mm and a large at 160 mm and three modes at 120 mm, 160 mm and 200 mm during August and also two modes at 180 mm and 220 mm in September 92 were recorded. The juvenile *A. thazard* have two modes, one at 180 mm in August 92 were also recorded.

There is no published data on the length-weight relationship of tuna species from Coromandel Coast. Applying the formula $\text{Log } W = aL^b$ the calculated length-weight relationship of juvenile of *S. orientalis*, *E. affinis* and *A. thazard* are $\text{Log } W = 0.000017382 L^{2.9291}$, $\text{Log } W = 0.000016751 L^{2.9554}$ and $\text{Log } W = 0.0000857 L^{3.0772}$.

The rate of increment in weight per unit length of tuna is very slow upto a size of 6 to 12 cm, after which the growth rate increases rapidly (Sirai meetan, 1985 b). The weight gain for every unit of length in all the three species are shown in Fig.1.

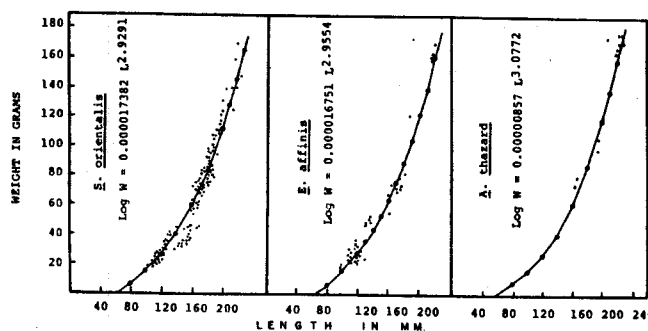


Fig.1. Length - weight relationships of the juveniles of three species of tunas collected along the Coromandal coast during 1991-92 (Pooled).

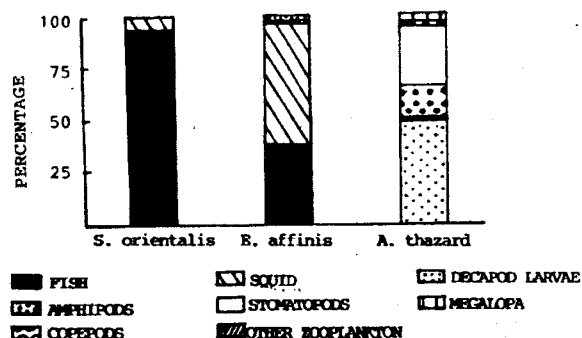


Fig. 2. Percentage composition of the major food constituents of the juveniles of *S. orientalis*, *E. affinis* and *A. thazard* along the Coromandel coast.

In the grading of food of *S. orientalis*, *E. affinis* and *A. thazard* 53.6%, 51.4% and 50% of the fish were found to have empty stomachs respectively. Most of the fishes collected from Coromandel coast were observed to have empty stomachs, perhaps due to the paucity of food organisms. Percentage composition of different stomach conditions among the three species studied are given below:

Stomach condition	Grading		
	<i>S. orientalis</i>	<i>E. affinis</i>	<i>A. thazard</i>
Empty	53.6	51.4	50
Trace	3.1	-	10
1/4 + or -	16.7	21.6	20
1/2 + or -	22.4	18.9	10
3/4 + or -	2.6	2.7	-
Full (gorged)	1.6	5.4	10

Percentage composition of different types of food in the girt conditions of these 3 species are shown in Fig. 2. *S. orientalis* feeds mainly of fishes (93.7%) *Sardinella* spp. 63% and *Stolephorus* sp. (30.7%) and squids *Loligo* sp. (6.3).

E. affinis feeds on squids *Loligo* sp. (67.2%), fish *Sardinella* spp. (39.5%), decapod larvae (2.2%) and other zooplankters (1.1%).

But the young ones of *A. thazard* feeds mostly on zooplanketers such as decapod larvae (49.1%), stomatopods (27.3%), amphipods (16.4%), megalopa of crab (3.6%), Copepods (1.8%) and other zooplankters (1.8%).

The 'b' value observed for the juveniles of *S.orientalis*, *E. affinis* and *A. thazard* from the Coromandel coast in the present study is identical to that observed by Siraimetan (1985 a) for these juvenile species from the Gulf of Mannar. According to Silas (1967), the weight and length were related by using the equation $\text{Log } W = \text{Log } a + b \text{ Log } L$ is almost same and the fit was found to be good in the present study also.

Tunas are highly predatory fish. In waters around Sri Lanka, *E. affinis* are found in schools with *A. thazard* and presumably these two species are directly competing for food. Siraimetan (1985 a) noticed the schooling pattern of *E. affinis*,

A. thazard and *S. orientalis* which were in search of food in Gulf of Mannar. The same pattern is noticed in the present study also.

The occurrence juveniles along with the adults in large numbers in Coromandel coast may suggest that these species may perform a coastal migration for feeding and breeding. Among these juvenile tunas, *S. orientalis* is a seasonal migrant to coastal waters which is influenced by temperature, food and breeding (Joseph *et al.*, 1981).

Variations in exponential values between species have attributed to a less favourable conditions and the quantity and quality of food available (Milton *et al.*, 1990). Another reason for the differences in weight gain could be their migratory pattern. This is evident in the case of *S. orientalis* which showed low weight probably due to their feeding migration to coastal waters.

The juveniles of *S. orientalis* and *E. affinis* feed mainly on fishes, whereas the young ones of *A.thazard* are predominantly plankton feeders, feed only on smaller prey items because of its closely placed gillrakers. The other two species have wider gillraker gap and their gut contents are of larger organisms. These results are in general agreement with the earlier observations made by Siraimetan (1985 a, b) as well as by Kumaran (1964) who also reported similarities of food habits of *E. affinis*, *Auxis thazard*, *A.thynnoides*, and *S. orientalis*.

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