

## Fishery and Certain Biological Aspects of *Stolephorus devisi* (Whitley) At Cochin, West Coast of India

PUTHRAN PRATHIBHA

Central Marine Fisheries Research Institute, Cochin-682 031

### ABSTRACT

*Stolephorus devisi* is the most abundant of the six white bait species landed at Cochin and contributes upto 55.8% of the white bait catch. Peak landings were noticed during April-May and November-December. The individuals in the landings ranged from 50 to 98 mm in total length. The species attained a total length of 88mm at the end of first year. The length-weight relationship was found to be  $W=0.00001236356 L^{2.98}$  for males and  $W=0.000005873346 L^{3.01}$  for females. The length at first maturity for the species was 56 mm. The von Bertalanffy growth parameters estimated were  $L_{\infty}=105$  mm and  $K=1.2$ /year.

### INTRODUCTION

The white bait, represented by the genus *Stolephorus* is a major pelagic resource of Cochin with an average annual (1987-1989) landings of about 1145 tonnes (Table 1). Six species contribute to the fishery at this centre, of which *Stolephorus devisi* is the most dominant one contributing upto 55.8% of the total white bait catch. Luther (1979) described the anchovy fishery of the southwest coast of India with special reference to the fishery and biology of important species available at Vizhinjam. Rao (1988) described the biology of *S. devisi* collected from Dakshina Kannada Coast. The present paper deals with the fishery and some aspects of the biology of *S. devisi* landed at Cochin during the period April, 1987 to March, 1989.

### MATERIAL AND METHODS

Weekly observations were made at the Cochin fishing harbour from April 1987 to March 1989 to estimate the landings of *S. devisi*. Random samples were collected and analysed for their total length, wet weight, sex and maturity stages. The monthly length frequency data were analysed and percentage frequency polygon prepared. The length-weight relationship was calculated separately for both sexes using the relation  $W=aL^b$  and the similarity of the relationship between sexes was tested using the covariance technique (Snedecor and Cochran, 1967). Sex distribution was examined with respect to months and size groups using the Chi-square test. Stages of maturity were assessed using the maturity scale adopted by International Council for the Exploration of the Sea (ICES)

Table 1. Total white bait and *Stolephorus devisi* landings at Cochin fishing harbour during April, 1987 to March, 1989

Month	1987-88		1988-89		Average		Per cent
	White bait (kg)	<i>S.devisi</i> (kg)	White bait (kg)	<i>S. devisi</i> (kg)	White bait (kg)	<i>S.devisi</i> (kg)	
April	113174	57097	43806	16432	78490	36764	46.7
May	240931	124994	34979	29615	137955	77304	56.0
June	439060	158500	134429	22937	286745	90718	31.6
July	nil	nil	nil	nil	nil	nil	
August	nil	nil	nil	nil	nil	nil	
September	nil	nil	nil	nil	nil	nil	
October	279073	245582	nil	nil	139537	122791	87.9
November	460212	359076	73921	31868	267067	195472	73.2
December	179150	144952	134628	46852	156889	95902	61.1
January	11116	8155	4287	1500	7702	4827	62.7
February	13123	2755	466	114	6795	1435	21.2
March	128737	26867	nil	nil	64369	13434	20.9
<b>TOTAL</b>	<b>1864576</b>	<b>1127978</b>	<b>426516</b>	<b>149318</b>	<b>1145546</b>	<b>638648</b>	<b>55.75</b>

and the monthly distribution of mature and immature fish in the catches were estimated. The total length at which more than 50% of the fish attained stage III and above was considered as the length at first maturity. The ELEFAN I (Pauly and David, 1981) was employed to estimate the parameters in the von Bertalanffy growth equation.

#### RESULTS AND DISCUSSION

At Cochin fishing harbour, an average of about 639 tonnes of *S. devisi* was landed during the period April 1987 to March 1989. The trawl net formed the major gear landing 98% of the resource followed by the ring net operated from the country craft fitted with outboard engines. Though purse seine is known to contribute to the fishery at Cochin (Rao *et al.*, 1982), the gear failed to contribute to the fishery at this centre during the present period of observation.

The total length and wet weight of *S. devisi* ranged from 50 to 100 mm and 1.32 to 4.94 g respectively. The length-weight relationship for males and females were calculated separately as:

$$\text{Males : } W = 0.00001236356 L^{2.98}$$

$$\text{Females : } W = 0.000005873346 L^{3.01}$$

Analyses of covariance showed that there was no significant difference in slopes between the sexes at 5% level (Table 2). The length-weight relationship in *S. devisi* revealed that the weight increases almost at the rate equal to the cube of its length.

In the length frequency polygon (Fig. 1) dominant modes were noticed at 55, 70, 80 and 85 mm. From the distribution of modal shifts in the length frequency polygon, it is estimated that the fish attains 80 to 85 mm at the end of first year. This value is comparable to the value estimated by the ELEFAN I. Rao (1988) estimated higher length of 101 mm at the end of first year and a maximum length of 115 mm for *S. devisi* collected from Mangalore area. The fishes collected from Mangalore area attained

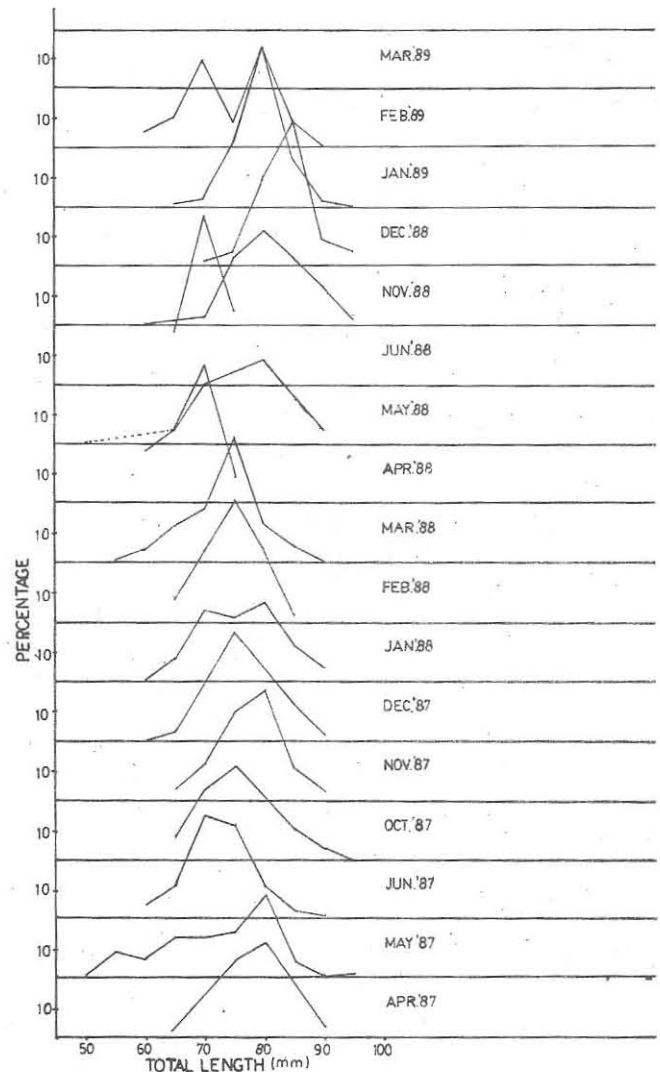


Fig. 1. Monthly length frequency polygons in *S. devisi* for the period April, 1987 to March, 1989

sexual maturity at 60 to 65 mm as compared to the present study of 55 to 59 mm.

The distribution of sexes during the different months of the year showed a significant dominance of males during

Table 2. Analysis of covariance to test the significance of difference between regression lines of sexes in the length-weight relationship of *S. devisi*.

Source of variation	SX <sup>2</sup>	SXY	SY <sup>2</sup>	Reg. Coeff.	d.f	dev.ss	mss
Males	0.4926758	1.393951	4.841694	2.829348	72	0.8977196	0.01246833
Females	0.3920899	1.181274	4.398171	3.012765	48	0.8392687	0.07484760
Total					120	1.736988	0.014479
Pooled (W)	0.8847656	2.575226	9.239864	2.910631	121	1.744333	0.01441598
Between slopes					1	0.007344961	0.007344961
Between (B)	0.002441406	0.005706787	0.01526642				
(W+B)	0.8872071	2.569619	9.255131		122	1.813319	
Between adjusted means					1	0.06898546	0.06898546

Slope F Cal. = 0.5074274, d.f 1,120 Not significant at 5%

Elevation F Cal. = 4.785348, d.f 1,121 Significant at 5%

Table 3. Monthly distribution of *S. devisi* (males and females) during April, 1987 to March, 1989

	1987-88				1988-89				Pooled Data			
	Males	Females	Total	X <sup>2</sup>	Males	Females	Total	X <sup>2</sup>	Males	Females	Total	X <sup>2</sup>
April	27	23	50	0.32	15	10	25	1.0	42	33	75	1.08
May	40	35	75	0.32	11	15	26	0.6	51	50	101	0.008
June	44	31	75	2.26	32	21	53	0.42	76	52	128	4.50*
July	-	-	-	-	-	-	-	-	-	-	-	-
August	-	-	-	-	-	-	-	-	-	-	-	-
September	-	-	-	-	-	-	-	-	-	-	-	-
October	42	33	75	1.08	-	-	-	-	42	33	75	1.08
November	25	25	50	0.0	43	57	100	1.96	68	82	150	1.30
December	39	36	75	0.12	10	15	25	1.00	49	51	100	0.04
January	22	28	50	0.72	52	23	75	11.22	7	51	125	4.24*
February	15	15	30	0.00	14	11	25	0.36	29	26	55	0.16
March	36	19	55	5.26*	-	-	-	-	36	19	55	5.26*
TOTAL	290	245	535	3.78*	203	176	379	1.92	493	421	914	5.66*

\* Significant at 5% level

Table 4. Distribution of males and females of *S. devisi* in different size groups

Length groups (mm)	Males	Females	Total	X <sup>2</sup>
50-54	0	1	1	1.0
55-59	5	0	5	5.0*
60-64	11	7	18	0.88
65-69	40	20	60	6.66*
70-74	87	67	154	2.60*
75-79	143	118	261	2.40*
80-84	125	115	240	0.42
85-89	51	67	118	2.40*
90-94	27	20	47	1.04
95-99	4	6	10	0.40
Total	493	421	914	5.66*

\*Significant at 5% level

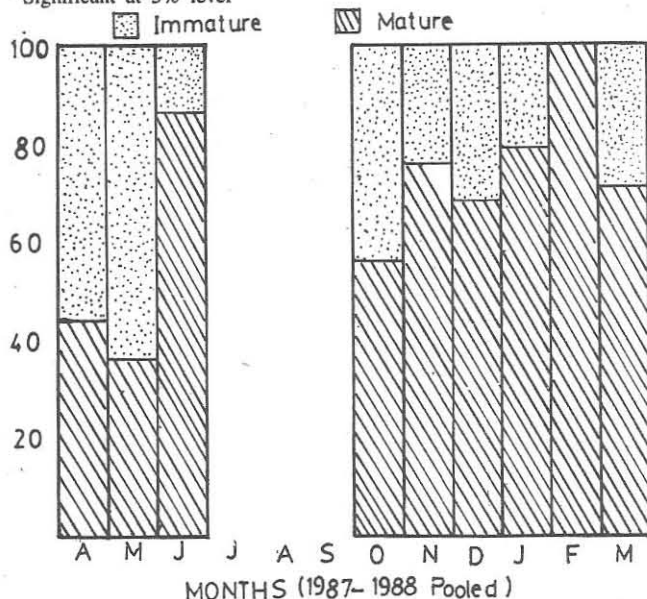


Fig. 2. Distribution of immature and mature *S. devisi* during different months of the year

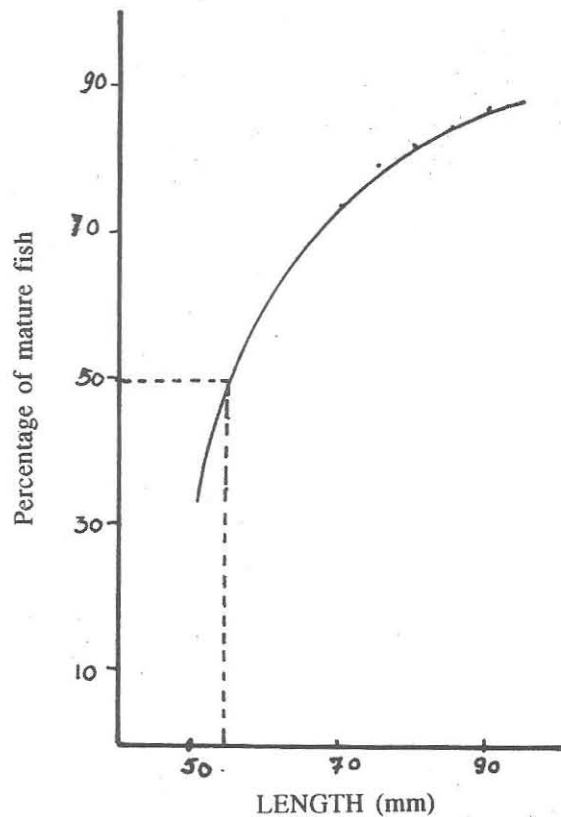


Fig. 3. Size at first maturity in *S. devisi*

in the size groups 55-59 mm, 65-69 mm, 70-74 mm and 85-89 mm (Table 4). Mature fishes were encountered whenever *S. devisi* was landed indicating the protracted spawning habit of the fish. Mature fishes formed a dominant group during June and November to March period (Fig. 2) with the fish attaining maturity at a total length of 56 mm (Fig 3).

The growth parameters in the von Bertalanffy equation,  $L_t = L_{\infty} [1 - e^{-k(t-t_0)}]$  estimated using ELEFAN I gave values of  $L_{\infty} = 105$  mm and  $K = 1.2/\text{year}$ . *S. devisi*

June, January and March (Table 3). Sex distribution in relation to size groups also revealed a dominance of males

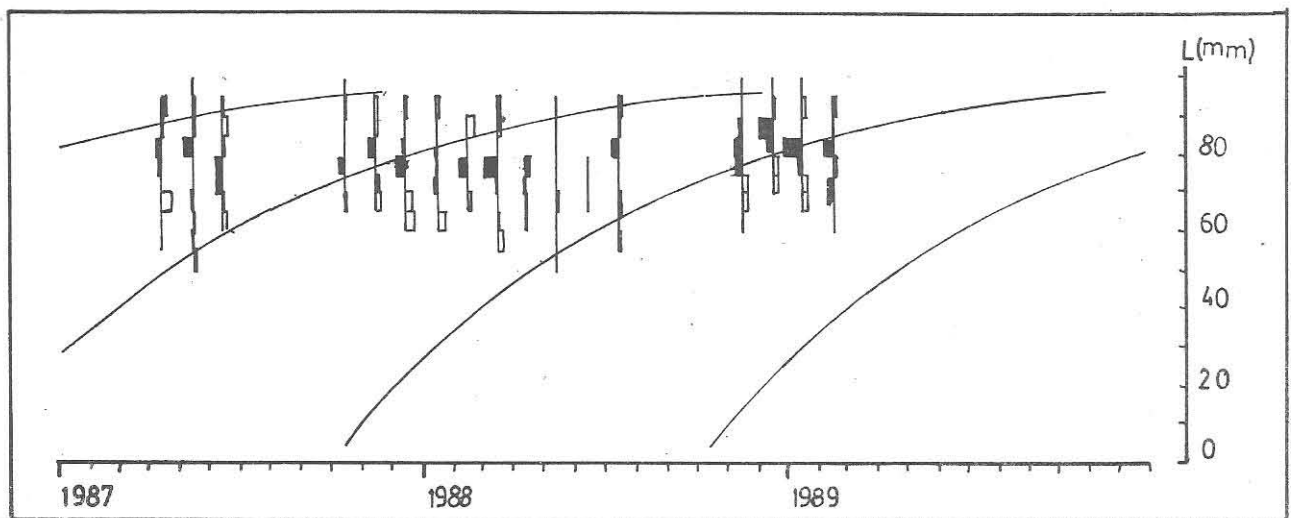


Fig. 4. Growth curve in *S. devisi* using ELEFAN I.

attains a total length of 65 mm in six months and 88 mm at the end of one year (Fig. 4). Tham (1967) estimated the  $L_{\infty}$  value of *S. pseudoheterolobus* Hardenberg as 89 mm (standard length) and Muller (1978) estimated the  $L_{\infty}$  of *S. heterolobus* (Ruppel) as 91 mm (standard length). These two species are synonyms and are closely related to *S. devisi* (Luther, 1979). The  $L_{\infty}$  value of 105 mm (Total length) observed in *S. devisi* (Whitley) in the present study favourably compares with the above observations.

#### ACKNOWLEDGEMENTS

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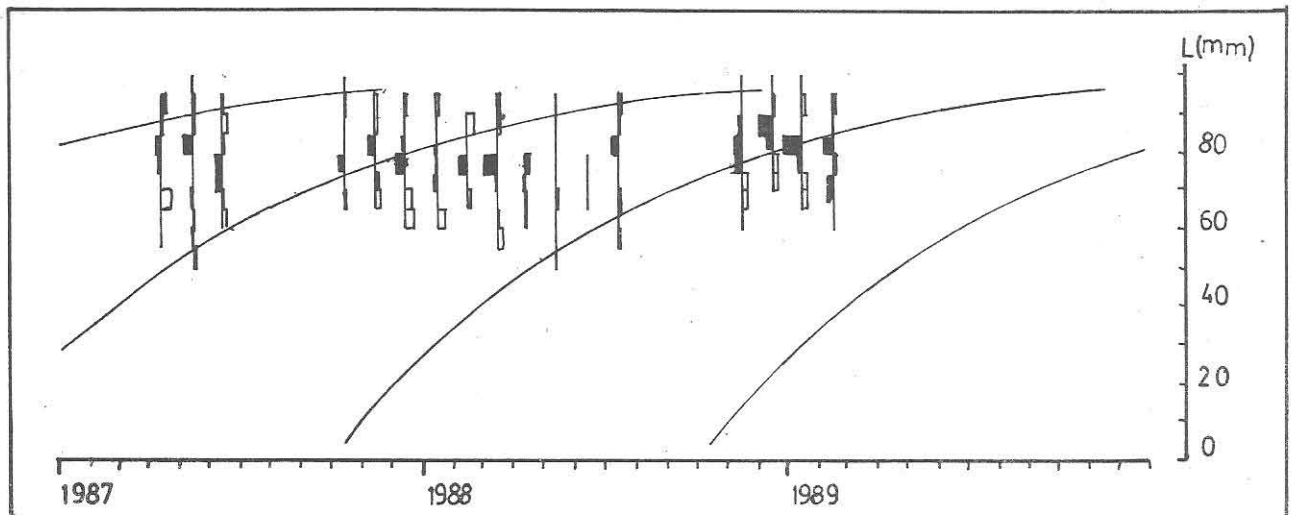


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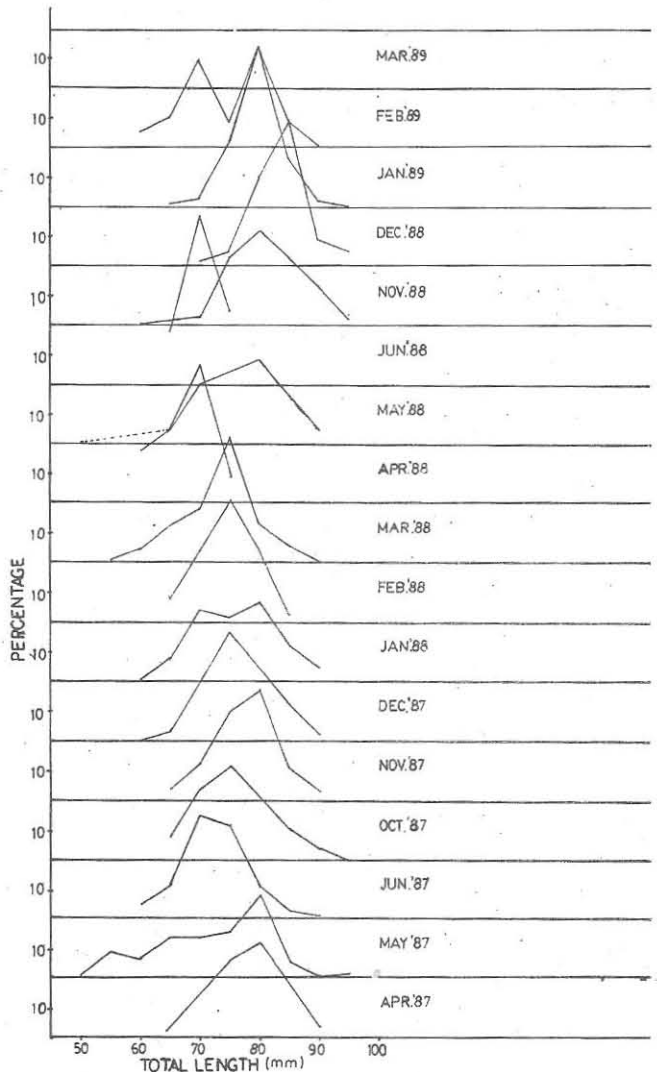


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