

SEX-RATIO IN OIL SARDINE

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The studies on the sex-ratios of oil sardine spread over eleven seasons indicated that the females have a higher rate of growth, hence their preponderance in the various length groups of the population. The stabilisation of the oil sardine fishery in the recent years appears to have a close relation with the dominance of females in the 0-year class which supports the fishery.

During a study of the biology of oil sardine, *Sardinella longiceps* Valenciennes which extended over a period of eleven years the sex-ratios of fish caught in the Mangalore area by the non-selective gear, viz., cast net, shore-seines (*kairampani* and *rampani*) and boat-seines, were determined. The cumulative annual distribution of males and females in the various length groups for 1960-61 through 1970-71 is given in Fig. 1. It is seen that the maximum total length attained by the males and females in general was more or less the same (212 mm); however, the data reveal that in most of the years the size attained by the females was larger than the males. The average length attained by the males and females for the eleven-year period works out to be 190.6 and 195.6 mm respectively. However, what is of interest is the significant variations in

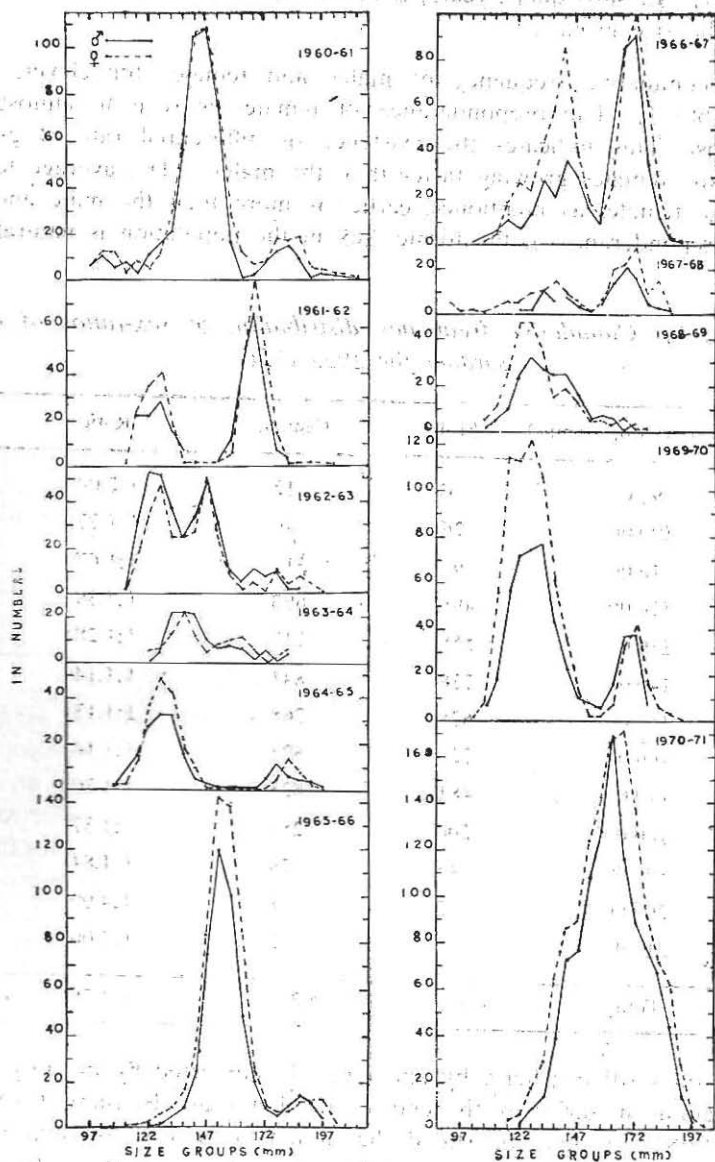


FIG. 1. Frequency distribution of males and females of oil sardine during 1960-61 to 1970-71.

the sex-ratios of various length groups. It is apparent that from 1960-61 to 1964-65 the proportion of males and females in most of the size groups was

of even order. In subsequent years, females outnumbered the males practically in most of the size groups.

The cumulative frequency of males and females for eleven years is given in Table 1. The preponderance of females is seen in almost all the length groups. This indicates the existence of differential rate of growth in oil sardine, the females growing faster than the males. The average length attained by the female, as mentioned earlier is more than the male and to this extent the preponderance of the former sex in the population is naturally to be expected.

TABLE 1. *Cumulative frequency distribution of sex-ratios of oil sardine for 1960-1971*

Size Groups (mm)	Male	Female	Ratio
90.00	6	12	1:2.00
100.00	26	46	1:1.77
110.00	190	317	1:1.67
120.00	498	693	1:1.39
130.00	558	717	1:1.28
140.00	738	841	1:1.14
150.00	678	768	1:1.13
160.00	722	821	1:1.14
170.00	481	623	1:1.30
180.00	206	283	1:1.37
190.00	43	79	1:1.84
200.00	2	8	1:4.00
210.00	1	2	1:2.00
Total	4,149	5,210	1:1.26

The oil sardine fishery, by and large, is supported by the 0-year group; the fish attaining maturity by the end of the first year (Bensam, 1968; Radhakrishnan, 1968). It may be stated that a length of 150-160 mm is reached during the first year since the size at first maturity is at about the same size range (Dhulkhed, 1964; Antony Raja, 1969). With this in view, the oil sardine were grouped under pre-and post-spawning categories to determine the pattern of distribution of sex-ratios (Table 2). The data revealed that the proportion of females was higher in the majority of the years in both the groups. This may be one of the reasons for the stabilisation of the oil sardine fishery since late-fifties.

TABLE 2. Sex-ratio in pre-and post spawning groups of oil sardine during 1960-61 to 1970-71.

Years	Pre-spawning (90.0 to 150.0 mm)			Post-spawning (160.0 to 210.0 mm)		
	Males	Females	Sex ratio	Males	Females	Sex ratio
1960-61	438	473	1:1.05	55	97	1:1.76
1961-62	110	131	1:1.05	155	186	1:1.20
1962-63	327	262	1:0.80	43	35	1:0.81
1963-64	101	77	1:0.76	21	29	1:1.38
1964-65	135	183	1:1.35	36	33	1:0.92
1965-66	333	434	1:1.30	124	172	1:1.39
1966-67	180	338	1:1.88	272	303	1:1.11
1967-68	39	79	1:2.03	61	101	1:1.66
1968-69	181	231	1:1.28	11	14	1:1.27
1969-70	399	635	1:1.59	100	107	1:1.07
1970-71	451	561	1:1.24	577	739	1:1.28
Total	2,694	3,394	1:1.26	1,455	1,816	1:1.25

There is some striking similarity between the stock of oil sardine and Peruvian anchoveta (Gulland, 1968). It appears that the fishery of oil sardine is based on the stock which has just completed one year of its life. The appearance of small fishes in fishery late in the season (January and February) suggests that they belong to the current year's brood (Dr. S. Z. Qasim, in personal communication). This also supports the view that the growth during the first year is very fast, and the fish reaches about 150-160 mm at the end of the first year. After attaining maturity the growth seems to slow down considerably. Qasim (1966) states that "the preponderance of one sex in the population is because of growth rate. Further growth probably leads to increasingly less effect from predation and this may influence the sex-ratios in favour of the sex growing faster". This seems to be applicable in the case of oil sardine as well as would be seen from the foregoing account.

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