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TUNA FISHERIES OF THE EXCLUSIVE ECONOMIC ZONE OF INDIA: Biology and Stock Assessment

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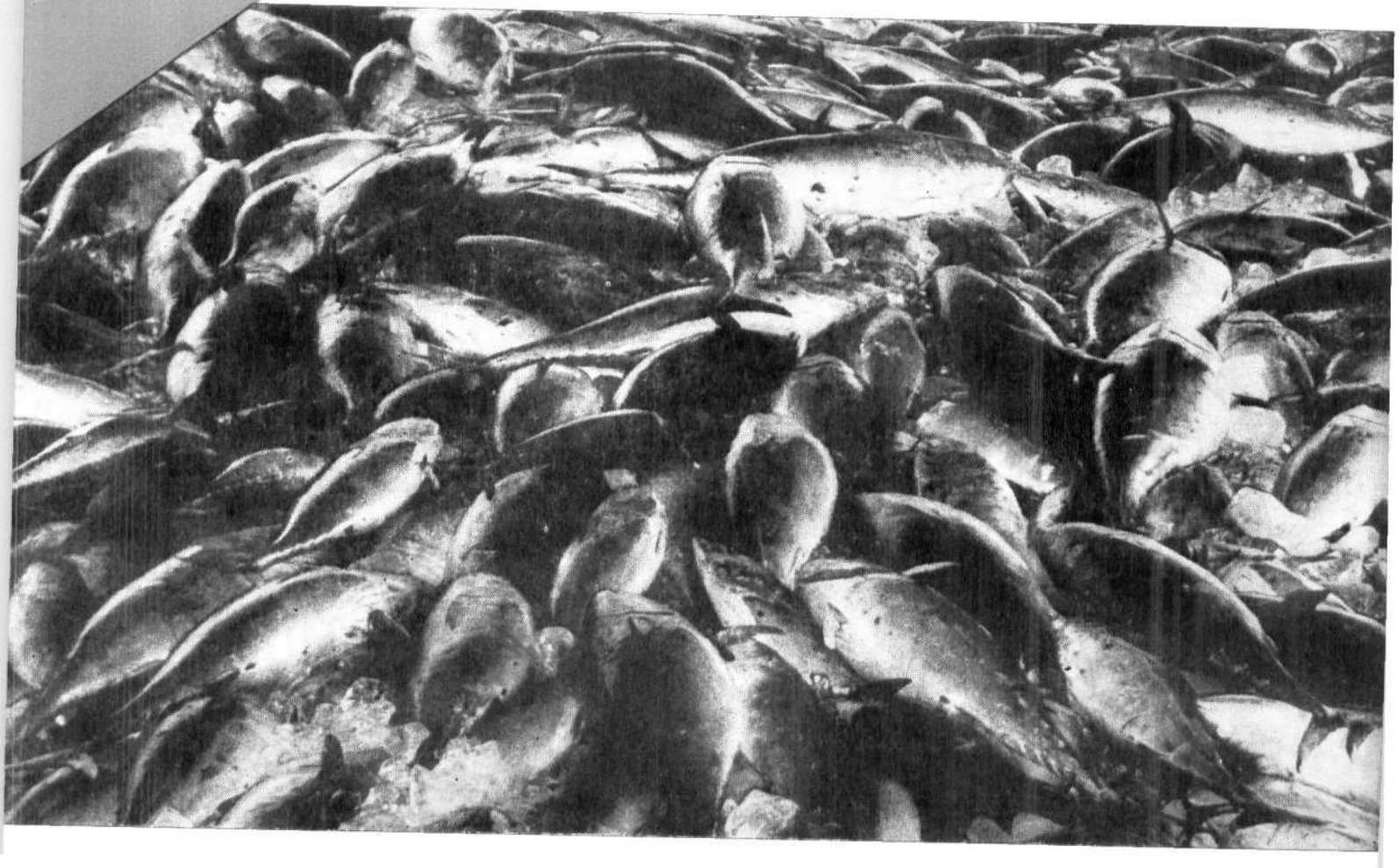

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FISHERY AND BIONOMICS OF TUNAS AT CALICUT

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Fishing operations by drift nets were in vogue off the Malabar region on a medium scale since the beginning of this century. Four types of drift nets operated aboard the canoes or non-mechanised boats were extant since that time ; they were : (1) a thick large-meshed and heavy (325 mm mesh size) hemp drift net locally called 'Sraavu vala' (shark nets) employed for the apture of large sharks, sawfish, billfishes, etc. from deep waters, (2) a thin big-meshed (12-20 cm mesh) hemp drift net called 'Thirandi vala' (Rayfish net) used mainly for the capture of rayfishes, skates and sawfish from the nearshore waters, (3) a small-meshed (7-8.5 cm) cotton-made or hemp drift net called 'Kandadi vala' used for the capture of small sized cybiids, *Chirocentrus*, pomfrets, sharks, sawfish, tachysurids, large carangids and mackerel and, (4) a slightly bigger meshed hemp drift net called 'Odu vala' (9-12 cm mesh) used for the capture of big-sized fishes such as cybiids, tunas, tachysurids, pomfrets, *Chirocentrus*, carangids, chorinemids, *Rachycentron*, sphyraenids, and medium-sized sharks.

After the thirties of this century, the 'Sraavu vala' became obsolete. The 'Thirandi vala' and 'Kandadi vala' operations were continued till about the end of the fifties only, all along the Kerala Coast. Hence the big-meshed hemp 'Odu vala' gained importance since the sixties and continues so till date with the change that the hemp has been replaced by nylon webbing. At the Calicut centre itself 40 or 50 such hemp drift net units were in operation. Similarly a good number of them are under operation at Chowghat, Tanur, Beypore, Pudiappa, Quilandy, Badagara, Mahe, Tellicherry, Cannanore, Palayangadi, Kasaragod in Kerala (Fig. 1) and Ullal and Malpe in Karnataka with the aid of non-mechanised canoes. These units were operating largely during the post-monsoon months

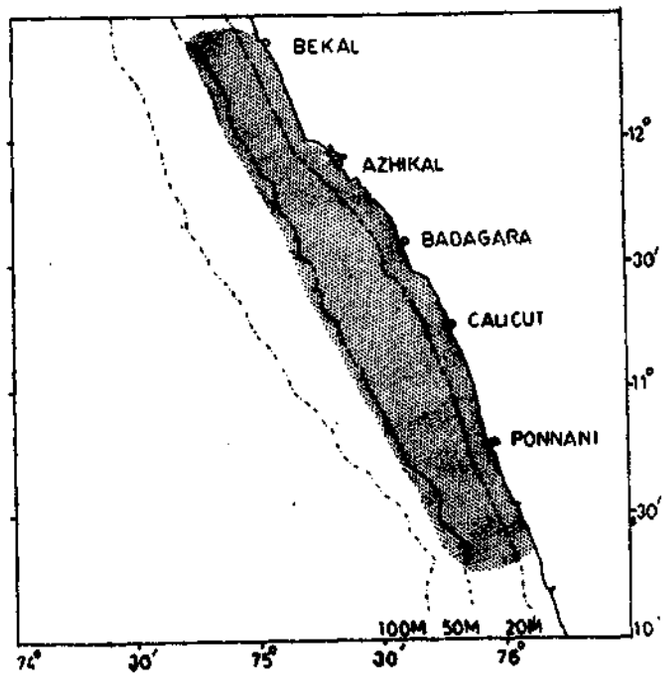

Fig. 1. Operational area of drift gillnetters off Calicut.

i.e., till the end of February or March and occasionally during the pre-monsoon period (from March till end of May). The maximum number operated was from September to January.

A few mechanised boats with nylon drift nets have been operating since the seventies by migrant fishermen from Kanyakumari, Tamil Nadu off the Kerala and Karnataka coasts. At Calicut and Cochin also, these migrant fishermen regularly operated the drift net (nylon) units despite severe protests from the local fishermen. Their industrious seafaring fishing efforts gave a boost to the drift net operations all along the

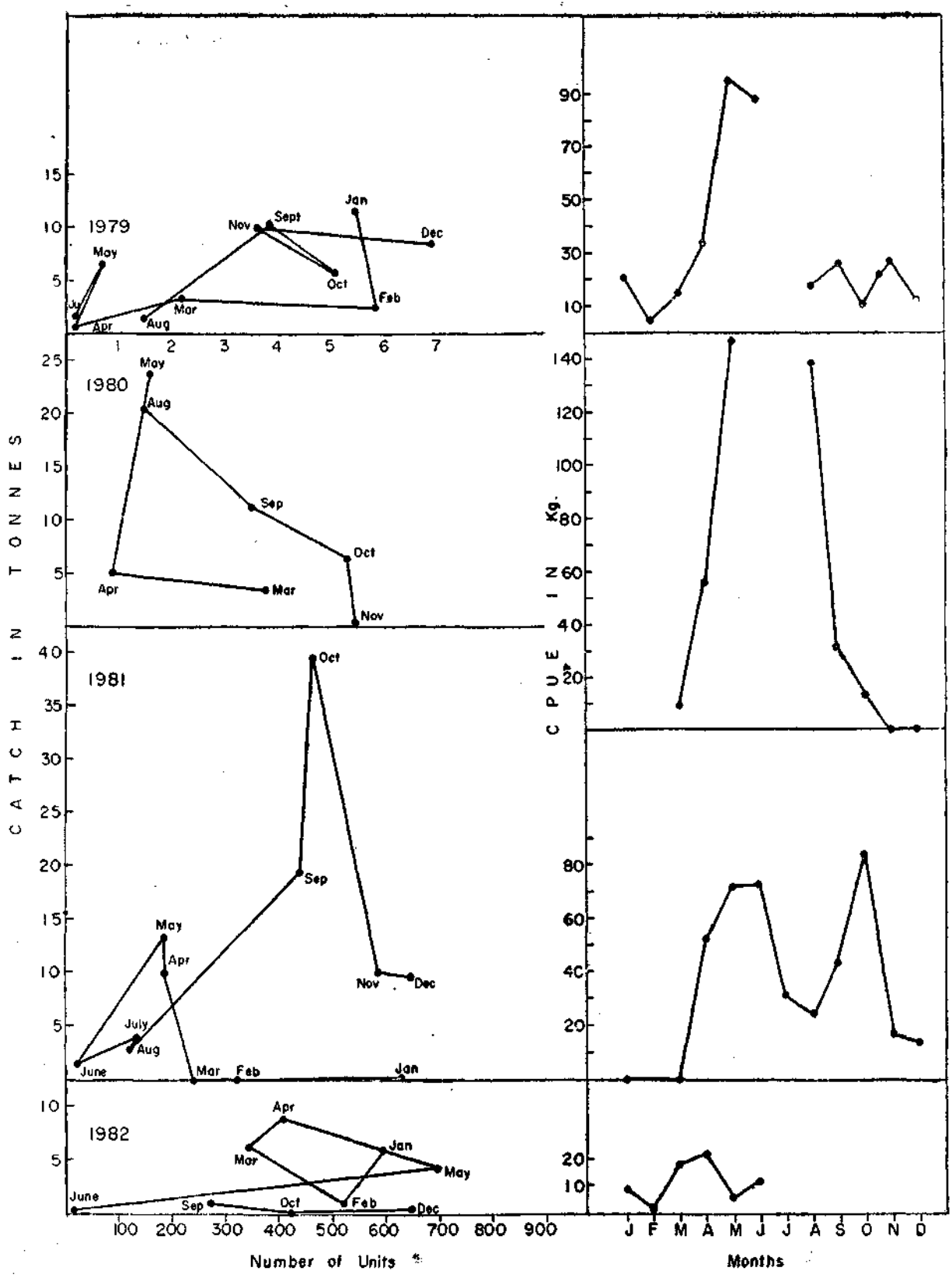

Fig. 2. Catch—effort relationship and catch per unit effort of tunas at Calicut, 1979-'82.

west coast and consequently the following major developments took place in the drift net fishery :

(1) The use of mechanised boats for drift net fishing as well as use of towing up and down the fishing grounds, eight or ten non-mechanised drift netter canoes at a stretch on a single fishing day (from the afternoon to the ensuing forenoon). This has effectively extended the operational range of the canoes to the deeper shelf waters where normally fishes such as the tunas and related spp., billfishes, cybiids, and other large pelagics occur.

(2) It has caused an overall increase in the number of drift net units operating during all fishing days.

(3) It has caused a recent increase in the size dimensions of the drift nets to cope up with the operations at greater depths, also replacing the cotton-made and the hempen nets with the nylon ones.

(4) Consequent on the coverage of deeper, richer and productive waters catches by the mechanised gill netters have now a days recorded considerable improvements. All these have widened the spectrum of our knowledge of the abundance and distribution of the various larger fishes which are not normally available to the less developed artisanal gears operating in the inshore waters. Hence, they in a cumulative way, have helped in the development of our gill net fishery for the tunas, billfishes and larger pelagics.

Effort, catch and cpue

In Calicut the tuna fishery starts in the month of September and lasts until February and sometimes until April. The gear employed is drift net which is mainly used for seerfishes. During the period under consideration the tuna fishery at Calicut yielded an annual catch ranging from 25 to 111 tonnes with an average of 76.7 tonnes (Fig. 2). Maximum catch was recorded in the year 1981 and minimum in 1982. Best returns per boat (31.78 kg) were realised in the year 1977 and in 1982 the cpue was the lowest (6.59 kg).

Species composition

E. affinis constituted more than 90% of the catch of tunas, while *A. thazard*, *T. tonggol* and *S. orientalis*, also occurred in the catches (Fig. 3).

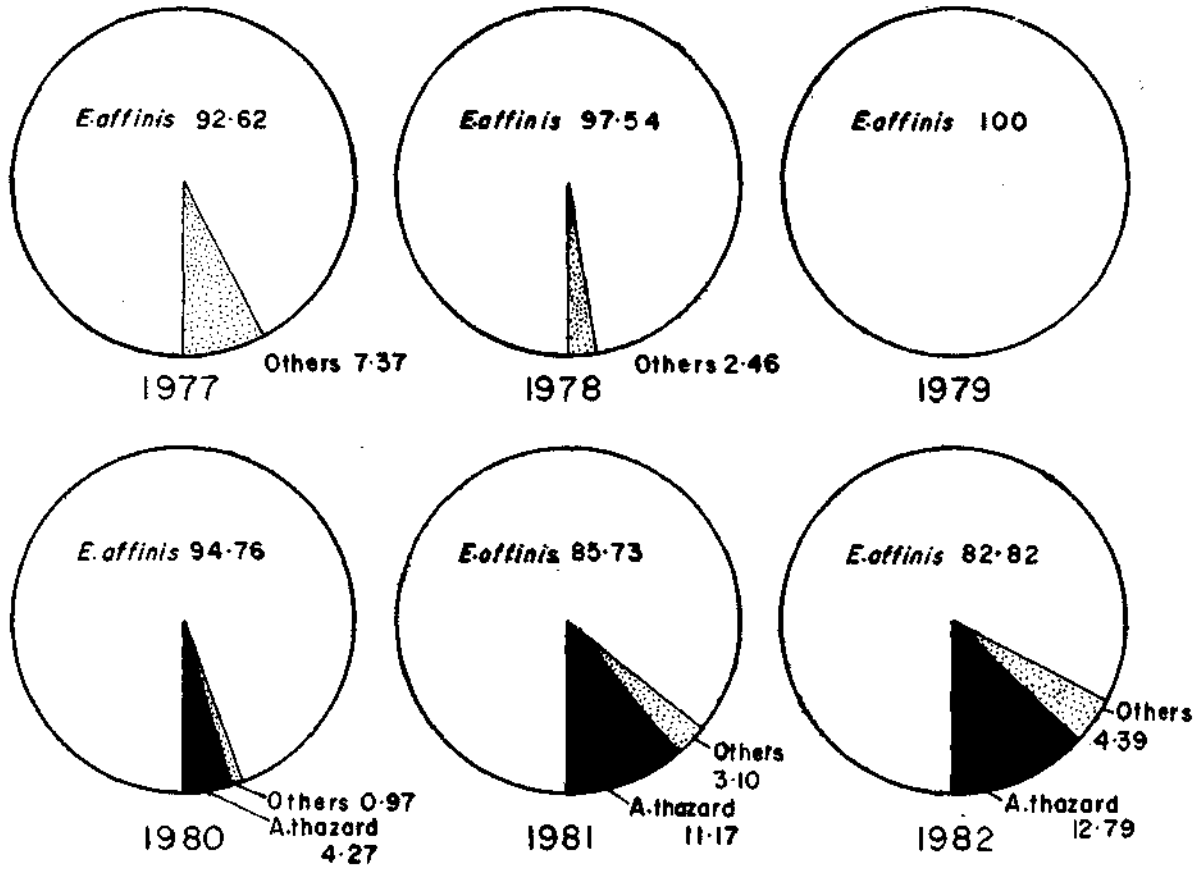

Fig. 3. Percentage composition of tunas at Calicut, 1979-'82.

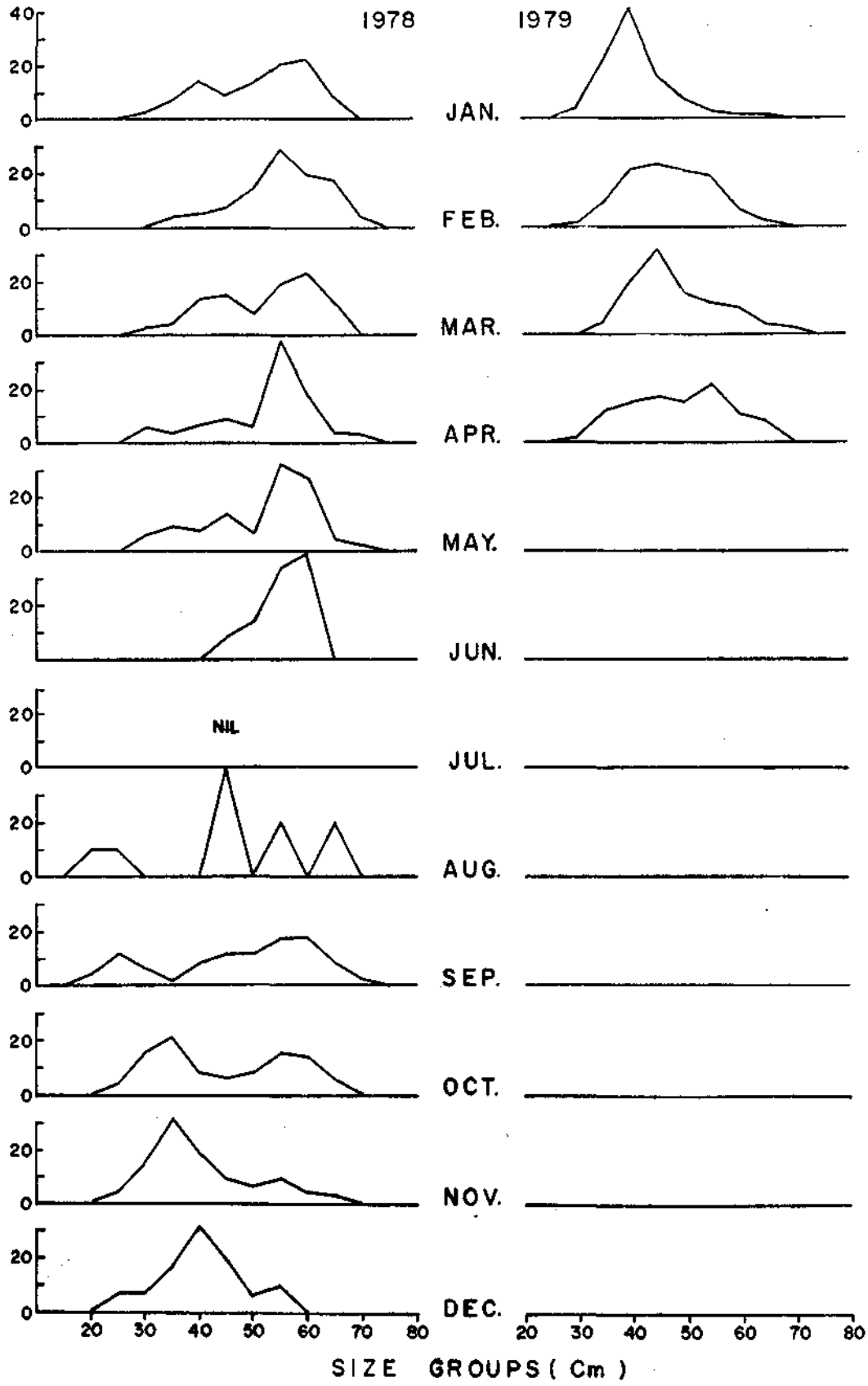

Fig. 4. Monthly length frequency distribution of *E. affinis* at Calicut, 1978-'79.

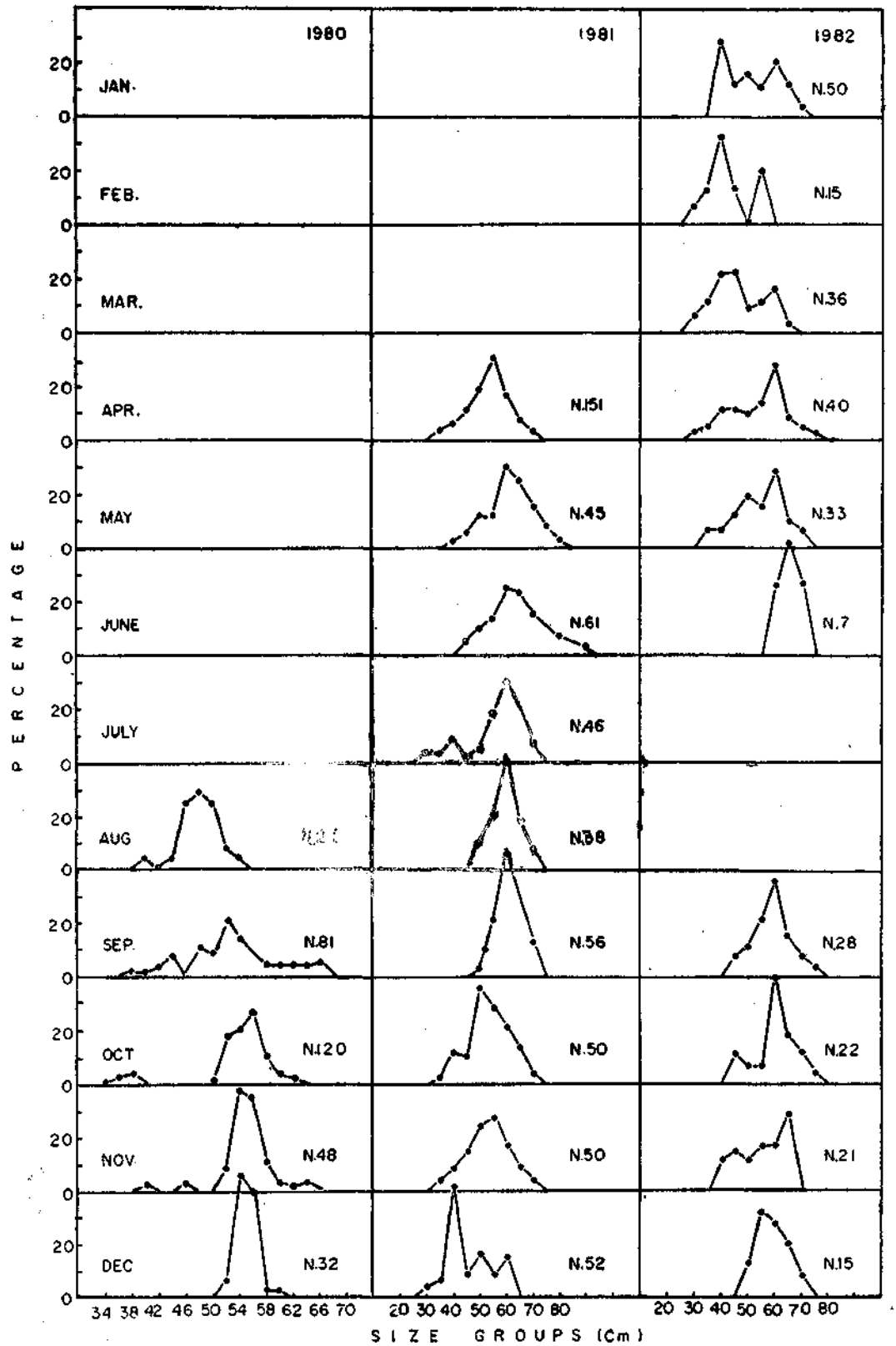

Fig. 5. Monthly length frequency distribution of *E. affinis* at Calicut, 1980-'82.

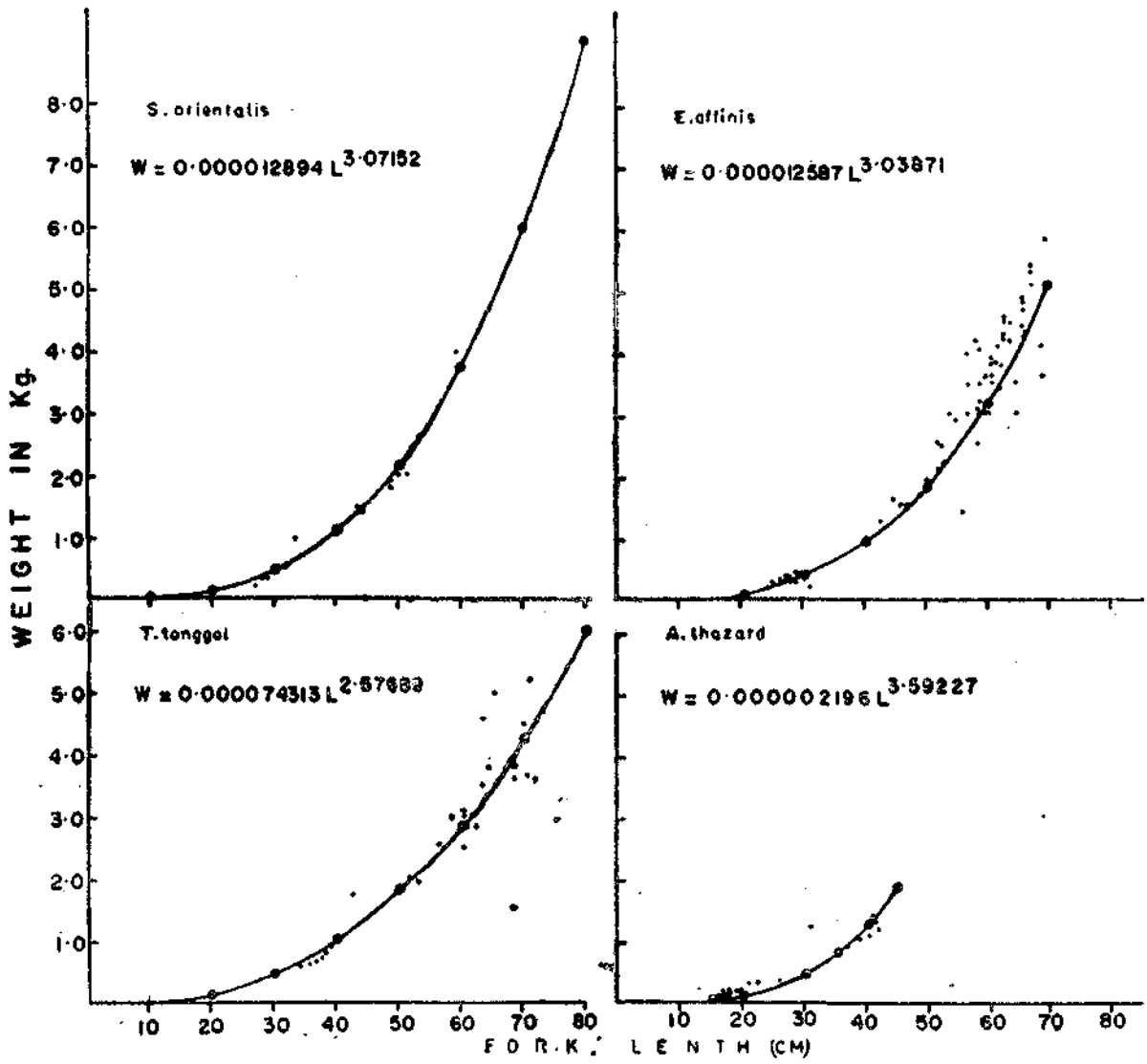

Fig. 6. Length-weight relationship of *S. orientalis, E. affinis, T. tonggol* and *A. thazard* at Calicut.

Length frequency distribution

E. affinis landed at Calicut had a length ranging from 20-70 cm (Fig. 3). In January 1978 the modes were at 40 cm and 60 cm. The mode at 60 cm persisted till September. The mode of 40 cm shifted to 45 cm in March and persisted till August. Another mode at 55 cm which appeared in February persisted till December. A mode at 25 cm appeared in September and shifted to 40 cm by December and to 45 cm by March 1979. A mode at 48 cm which appeared in August, 1980 shifted to 54 cm by December. In 1981 April the mode was at 55 cm which shifted to 60 cm in May and persisted till September. In October a mode appeared at 50 cm and shifted to 55 cm by November. In December, 1981 another mode appeared at 40 cm and shifted to 50 cm by May 1982 (Fig. 5).

The mode at 25 cm in September, 1978 which shifted to 45 cm by March 1979 showed a monthly average growth rate of 3.33 cm. The mode at 48 cm in August 1980 which shifted to 54 cm by December 1980 indicates an average monthly growth rate of 1.5 cm. The mode at 55 cm in April 1981 which shifted to 60 cm by September 1981 indicates a monthly average growth rate of 1 cm. The mode at 40 cm in December 1981 which shifted to 50 cm by May, 1982 indicates a monthly growth rate of 2 cm. Thus after 45 cm the growth may be about 1.5 cm per month as against 3.33 cm before that size.

The fishery is supported by *E. affinis* of size above 40 cm and below 60 cm.

Length-weight relationship

Length-weight relationship of *E. affinis*, *S. orientalis*, *T. tonggol* and *A. thazard* were estimated and the results are given in Fig. 6. The correlation coefficients are also given. Their values range from 0.96-0.99 indicating almost perfect correlation. The values for different species studied are as follows :

E. affinis $W = 0.0000\,1365\ L^{3.03871}$

S. orientalis $W = 0.0000\,12894\ L^{3.07152}$

T. tonggol $W = 0.0000\,74313\ L^{2.57889}$

A. thazard $W = 0.00000\,2196\ L^{3.59227}$

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