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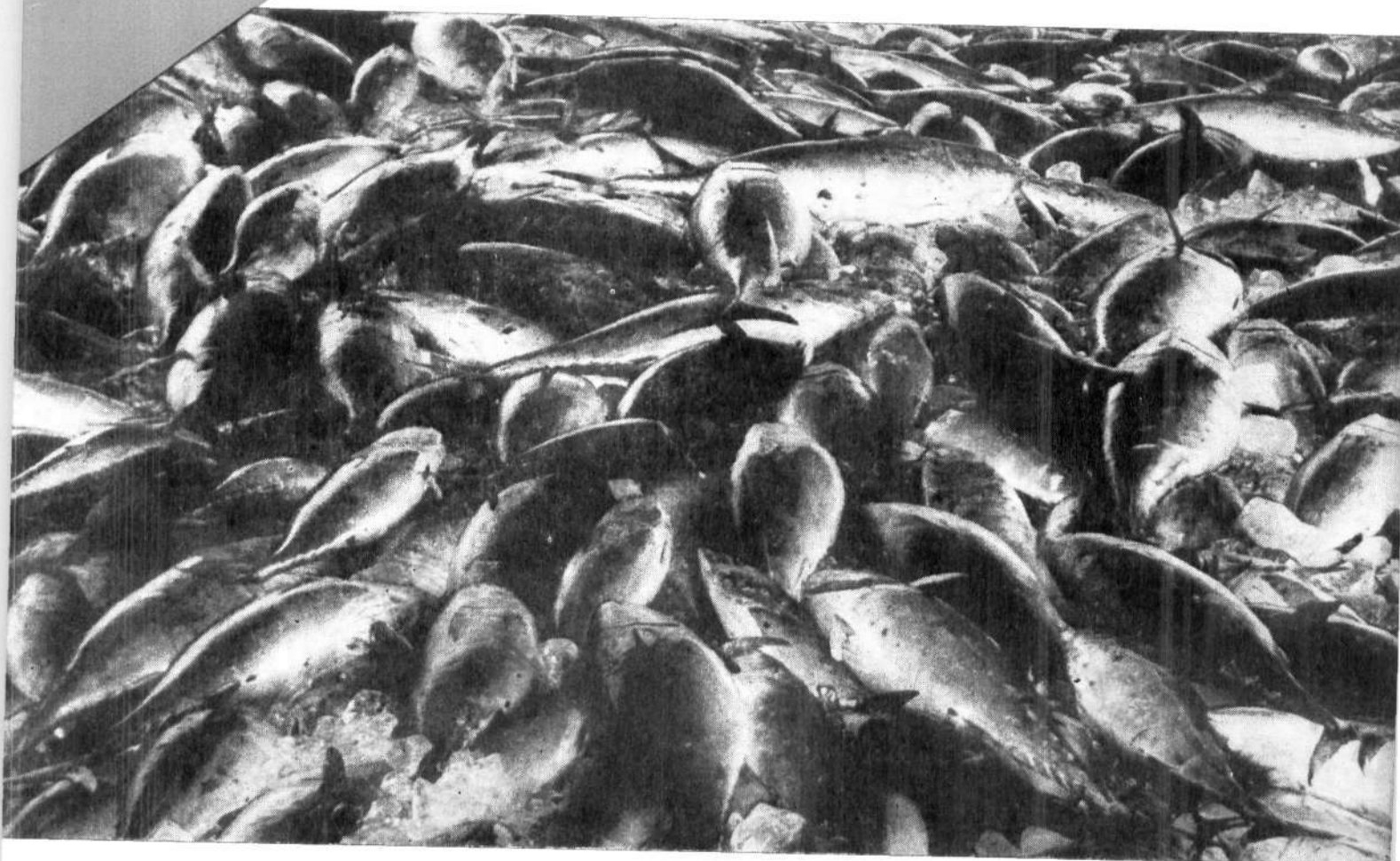
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**TUNA FISHERIES OF THE EXCLUSIVE ECONOMIC ZONE  
OF INDIA: Biology and Stock Assessment**

Edited by : E. G. SILAS



**CENTRAL MARINE FISHERIES RESEARCH INSTITUTE**

(Indian Council of Agricultural Research)

P.B. No. 2704, Cochin 682 031, India

## OBSERVATIONS ON TUNA FISHERY AT RATNAGIRI-MALWAN AREA, NORTH-WEST COAST OF INDIA

E. G. SILAS, P. P. PILLAI AND PON. SIRAI MEETAN

*Central Marine Fisheries Research Institute, Cochin, 682 031*

Ratnagiri and Malwan, on the coast of Maharashtra State, support a good tuna fishery which is of considerable importance to the local fishermen. Except for the preliminary note by Ranade (1961), no scientific information is available on the tuna fishery of this coast. With a view to enhance our knowledge on the fishery and biology of tunas from this area, a survey was conducted by the Central Marine Fisheries Research Institute during September to December, 1979. The present account deals with the relevant information collected during the period of survey and thereafter.

### FISHERY

The tuna landings of this area for the years 1979-1982 are shown in Fig. 1. During 1979, peak catch was recorded in August, in 1980 it was in October. In 1981 distinct peak in landings was noted during November and in 1982 it was in October. It is evident from the trend of landings that in this area tuna fishery commences from August and peak landings are recorded during the September-November period.

The main gear employed in this area is the drift gill net ('Kedar Jal'). Nets of different mesh sizes are employed in the tuna fishery such as 'Parse' (13 cm mesh size), 'Kandali Jal' (11.5 cm mesh size) and 'Vagri Jal' (9 cm mesh size). The size of the net varies from 120-180 m and depth from 2.5 to 3.0 m. During operation, different units are plied together and proper floats and sinkers are attached. Out-trigger canoes of 4.8 m and mechanised boats of 7.8 to 8.5 m are employed in the drift gillnet fishery in this area.

In the Ratnagiri area, the major drift gillnet landing centres are Vijayadurgh, Golap, Mirkirwada, Rajwada and Kurla towards the south of Ratnagiri and Kalbadevi, Jaigod, Kudli Budhul, Asgoli and Dhabol towards the

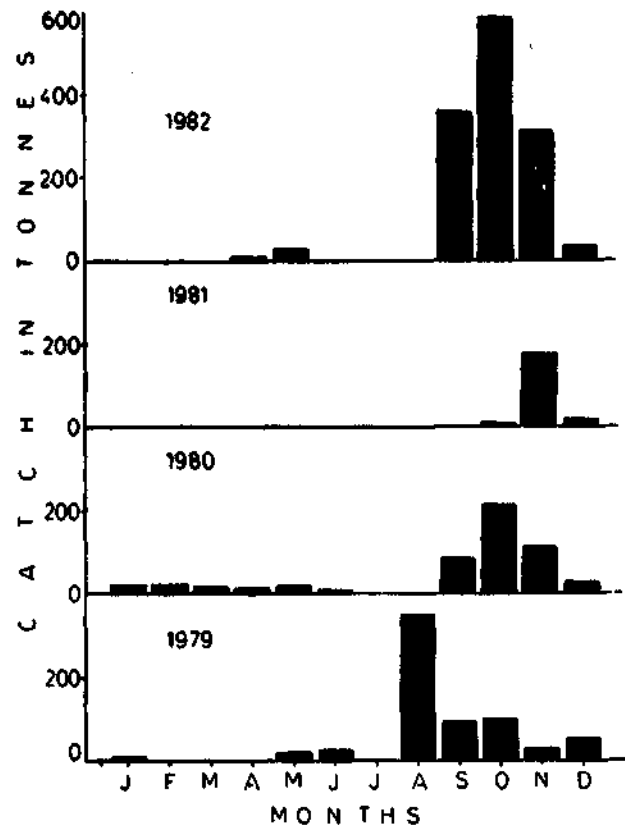


Fig. 1. Tuna landings in the Ratnagiri-Malwan Area, 1979-82.

north. In the Malwan area, the major landing centres for the drift gillnet fishery are Dendi, Tarkali, Ijmailkudin Kochra, Navabhag, Mooth and Kervada in the southern part and Hirle, Appay, Mithnambri and Devagad in the northern part. It was observed that most of the fishes landed are marketed fresh and a part is sundried and transported to internal markets.

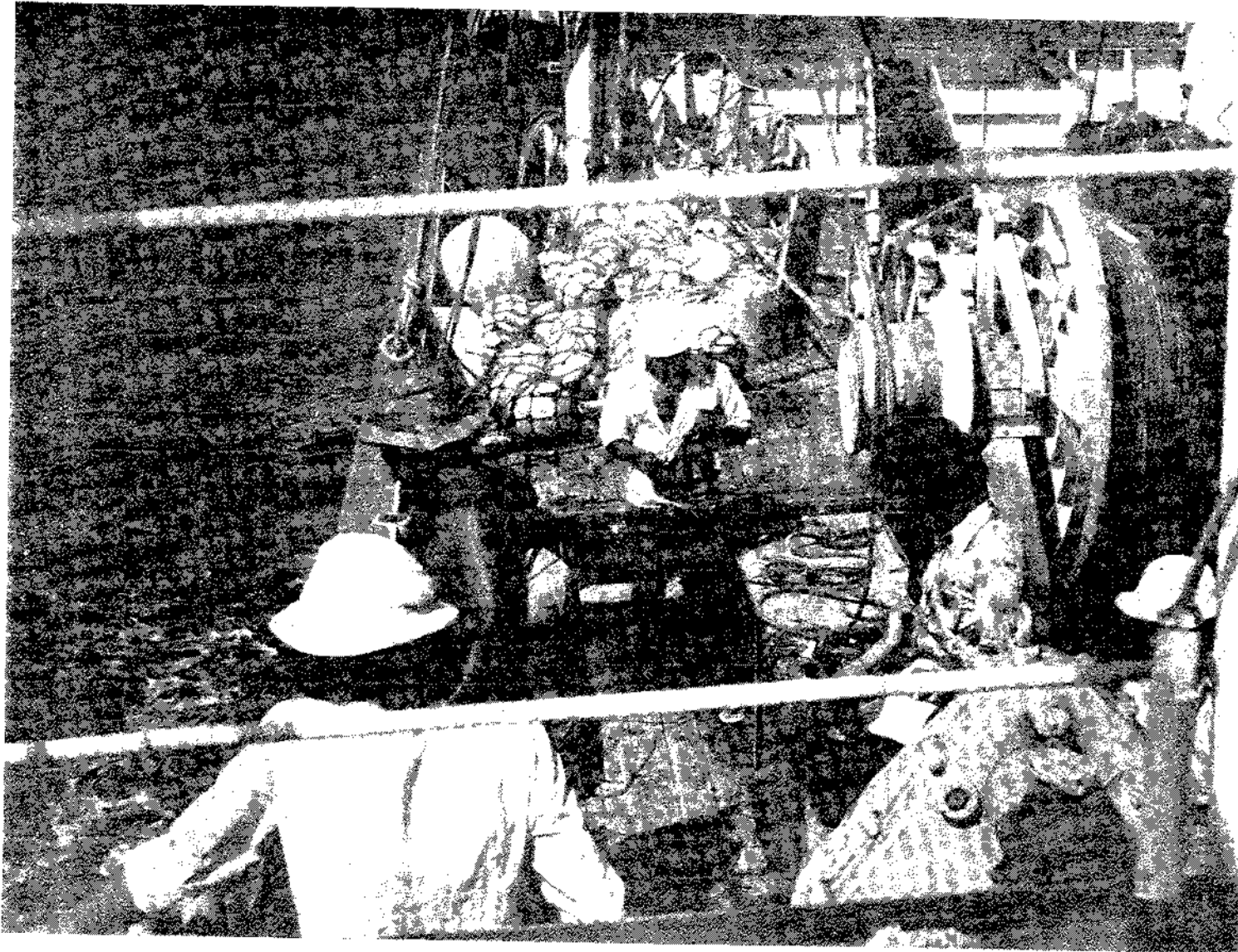


PLATE 1. Tuna longline being hauled in on board M.V. *Prashikshani*, the longline vessel of CIFNET, Cochin.



PLATE II. Longline caught marlin being harpooned prior to taking on board M.V. *Prashikshani*.



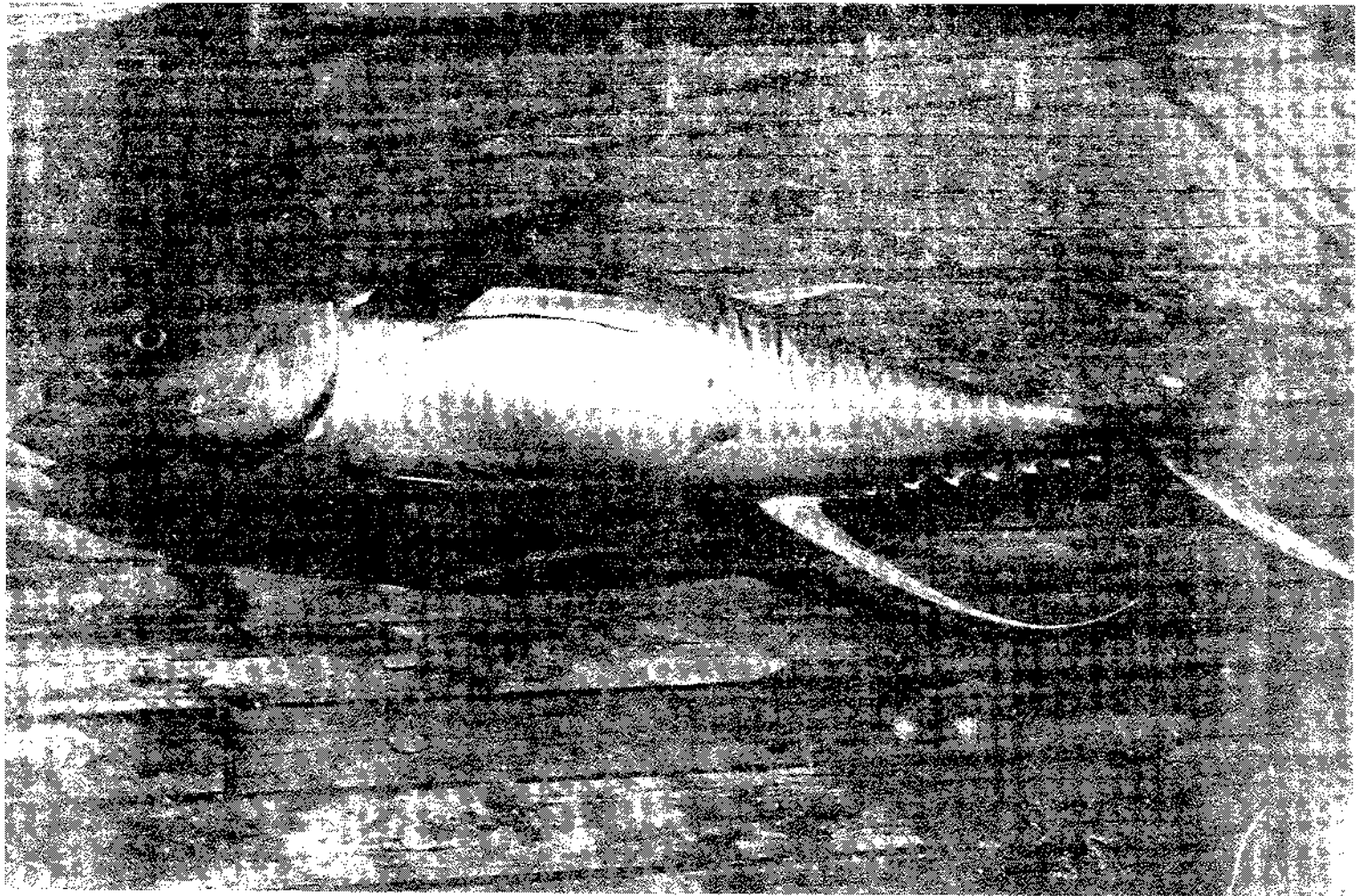


PLATE III. Yellowfin tuna, *Thunnus albacares* taken by longline.



PLATE IV. Yellowfin tuna, *Thunnus albacares* taken by longline, another view.



PLATE V. Yellowfin tuna catch on board M/V *Prashikshani*.

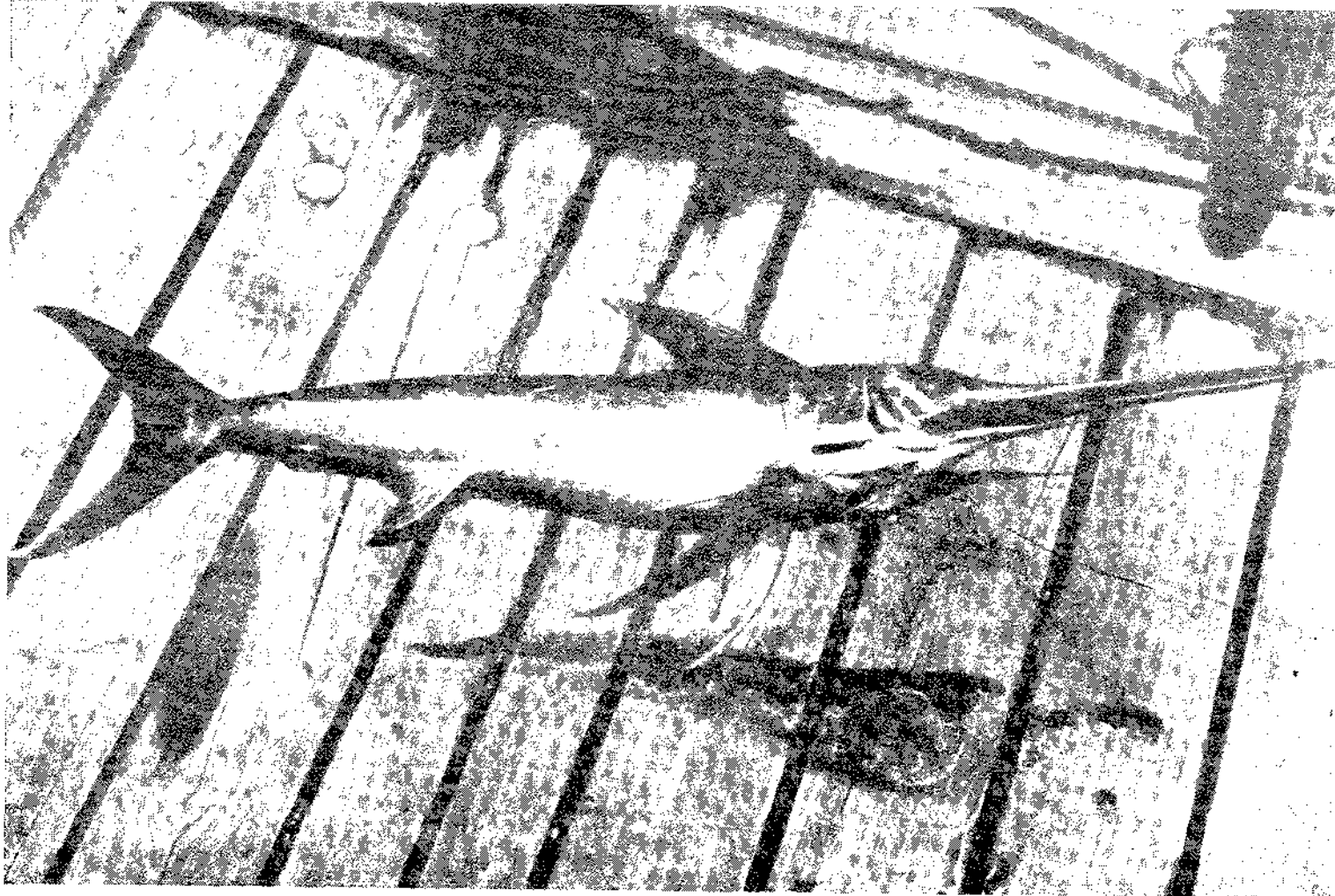


PLATE VI. Young swordfish, *Xiphus gladius* taken by longline.



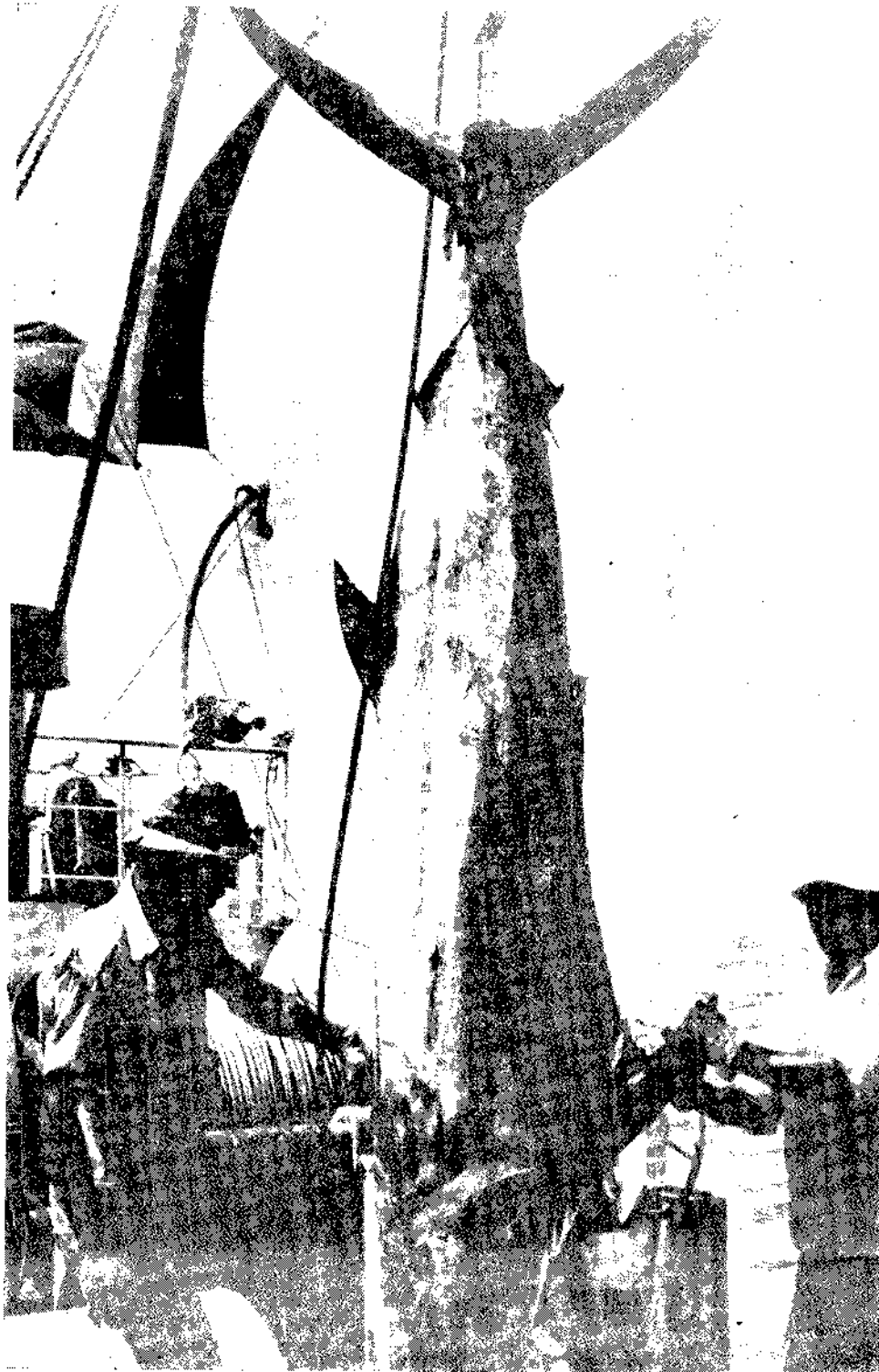


PLATE VII. Striped marlin, *Tetrapturus aulax* on board M/V Prashikshani.

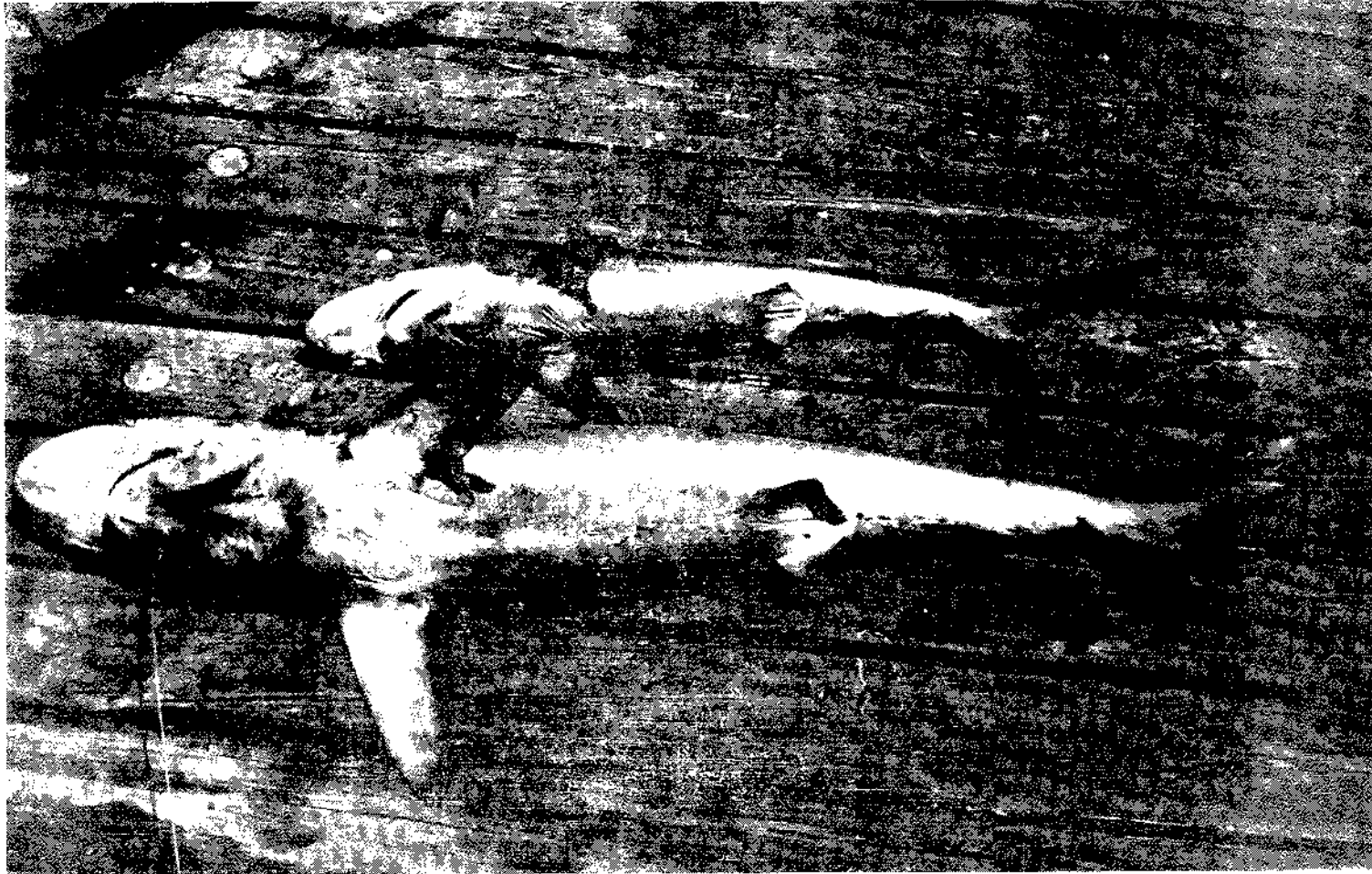


PLATE VIII. Black tip shark, *Carcharinus melanoptera* on board M:V *Prashikshani*.

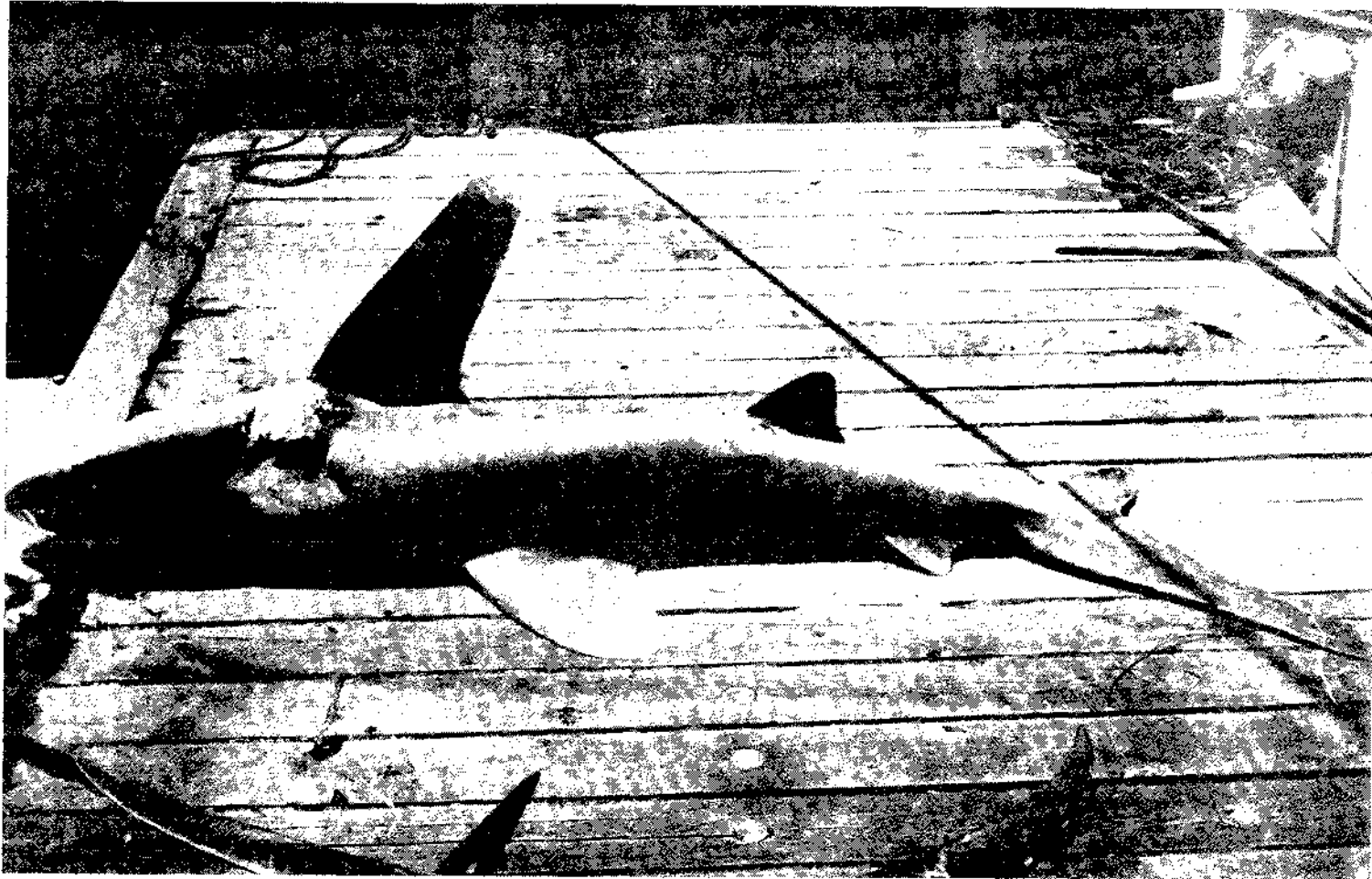


PLATE IX. White tip shark, *Carcharinus longimanus* on board M-V Prashikshani.

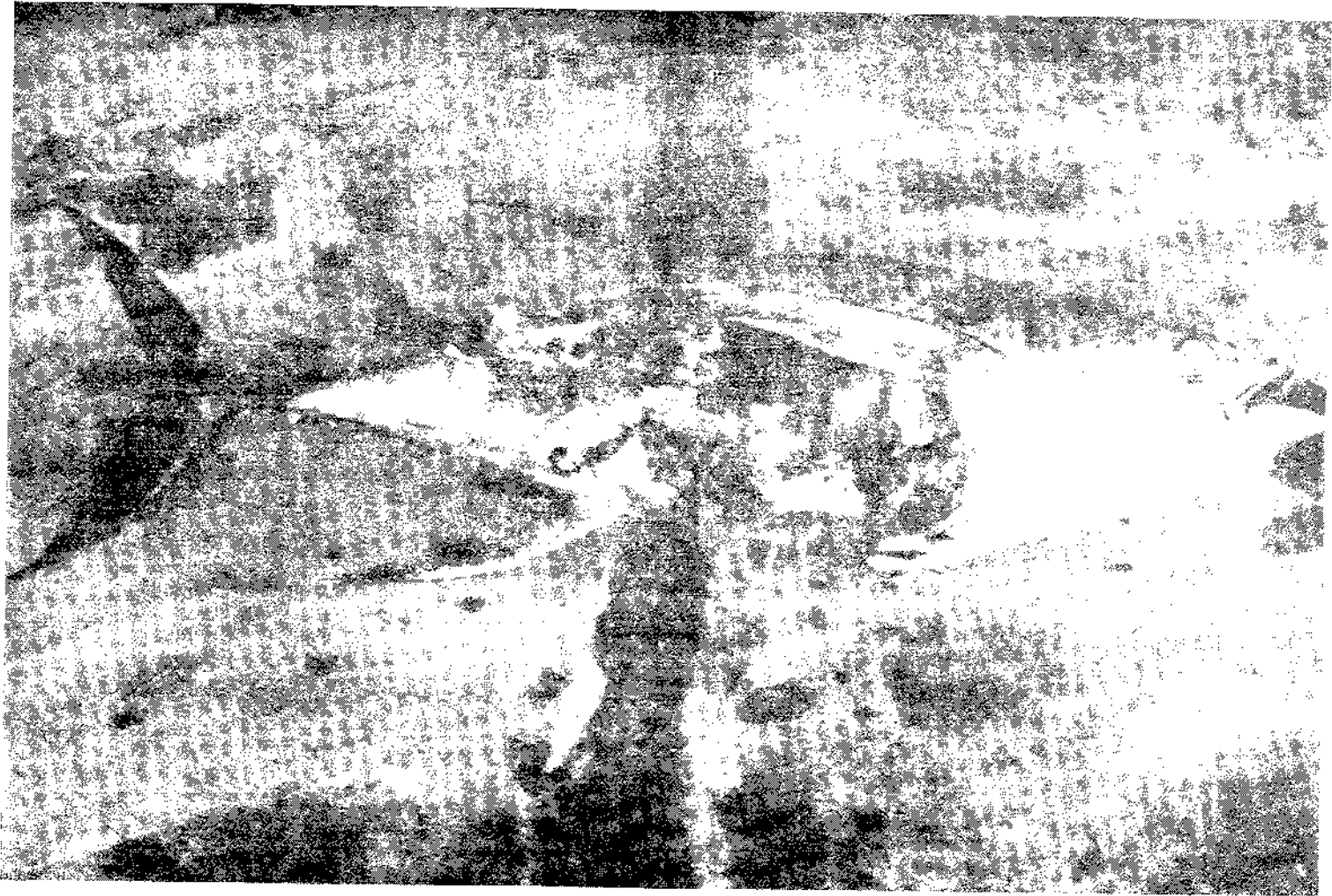


PLATE X. Shark-eaten yellowfin tuna, *Thunnus albacares* on board M.V. Prashikshani.



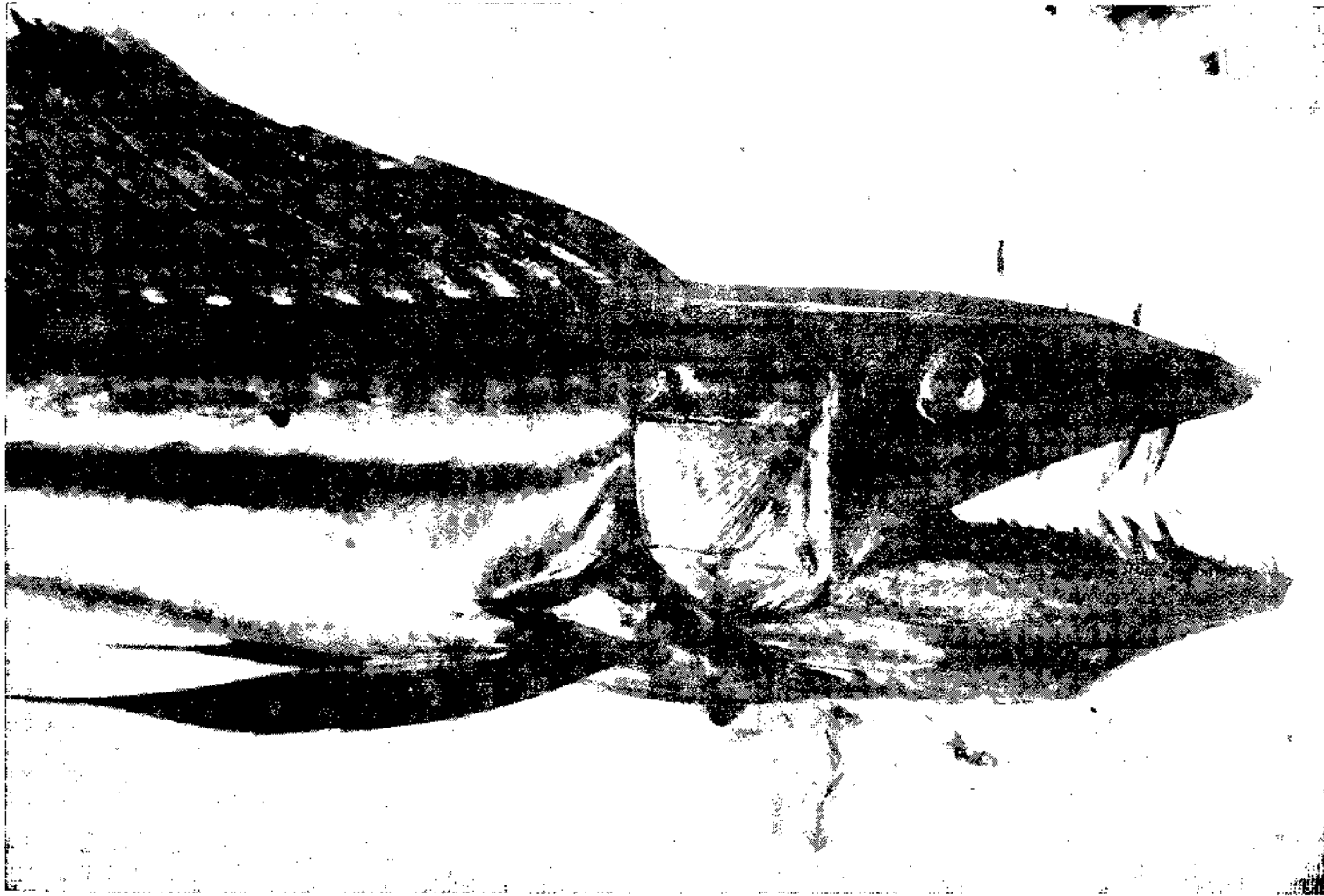


PLATE XI. Head of lancet fish, *Alepisaurus ferox* taken by longline. (Photos by P. P. Pillai).

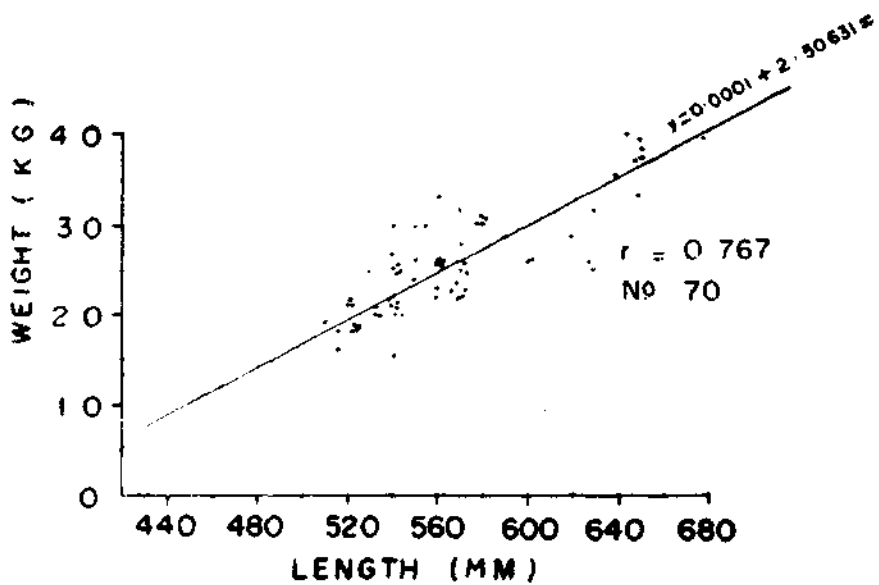
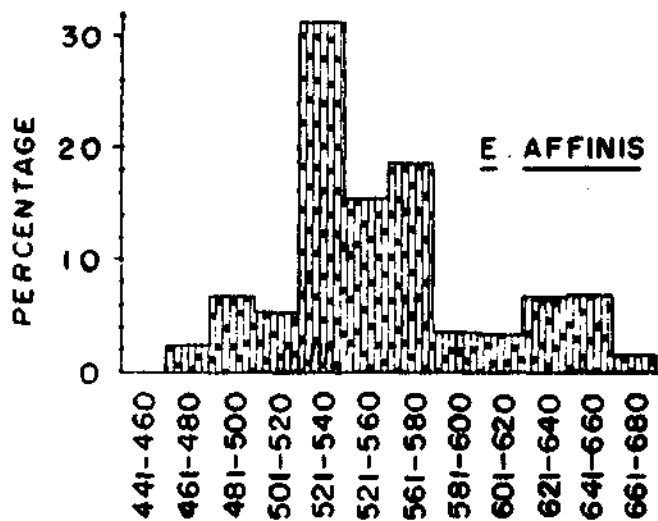


Fig. 2. Length frequency distribution (percentage) and length-weight relationship of *E. affinis* at Ratnagiri-Malwan Area.

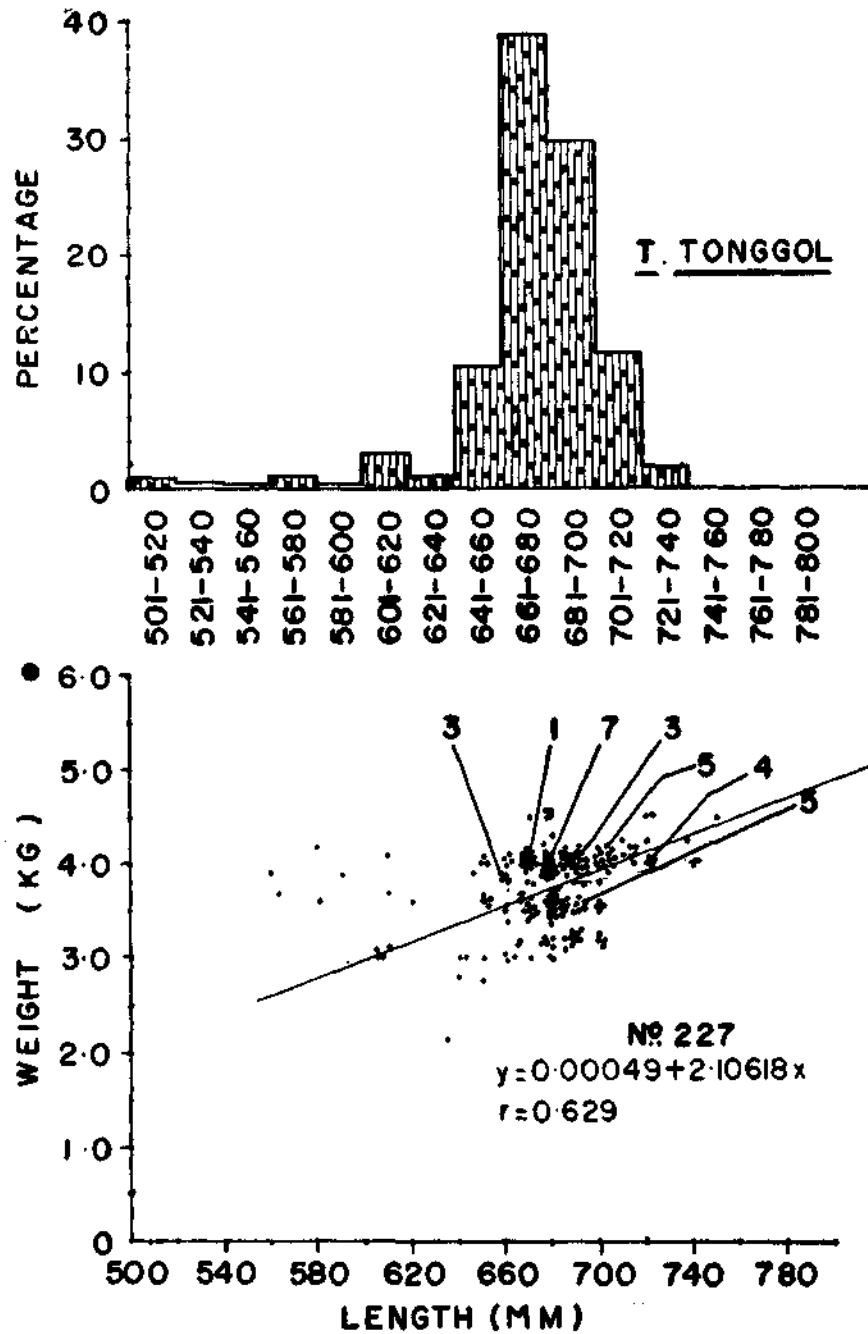


Fig. 3. Length frequency distribution (percentage) and length-weight relationship of *T. tonggol* at Ratnagiri-Malwan Area.

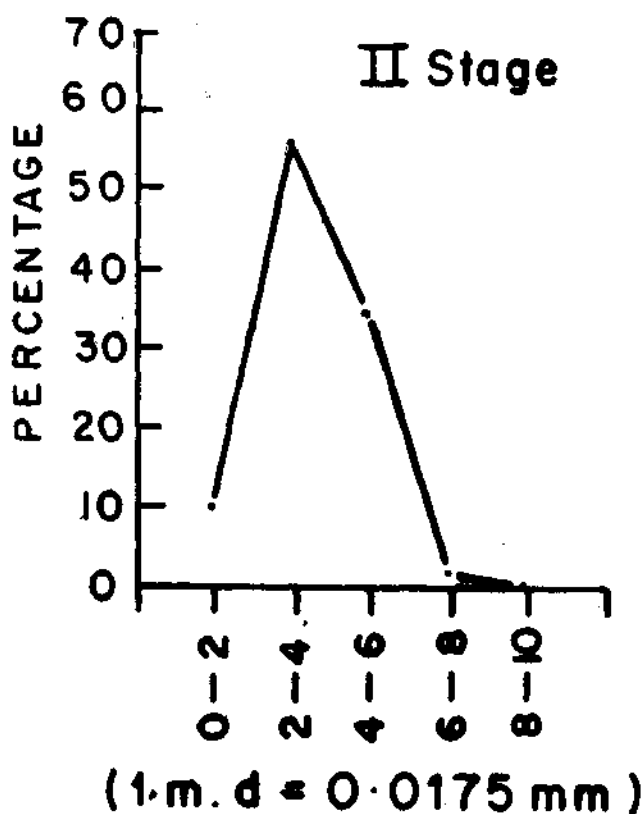


Fig. 4. Ova diameter frequency polygon of *T. tonggol* at Ratnagiri.

According to Ranade (1961) *Euthynnus affinis* and *Thunnus tonggol* form more than nine-tenth of the total catch of tunas landed at Ratnagiri. A study of the composition of species landed in this area indicates that the longtail tuna (*Thunnus tonggol*; 'Khavalya Gadar') constitute more than 60 per cent of the total tuna landings followed by the little tuna (*Euthynnus affinis*; 'Bibya Gadar') and frigate tuna (*Auxis thazard*; 'Gedari'). Occasionally young yellowfin tuna (*Thunnus albacares*; 'Peemp') are also taken by the drift gillnets.

#### BIOLOGY

During the period of observation, the main species landed were *T. tonggol* and *E. affinis*. The length distribution and length-weight relationship of 70 specimens of *E. affinis* and 227 specimens of *T. tonggol* were studied. Gill rakers of 33 specimens of *T. tonggol* collected from Ratnagiri have been examined for gill raker counts and ovaries from 36 females collected and ova diameter measured for estimating maturity stages.

*E. affinis* occurred in the size range 46-68 cm with a major mode at 54 cm. Another mode was also discernible at 57 cm (Fig. 2). The length-weight relationship of 70 specimens observed was (Fig. 2):

$$y = 0.001 + 2.50631 x, \text{ and the 'r' value was } 0.767.$$

*Thunnus tonggol* occurred in the size range 51-74 cm and a single mode was observed at 68 cm size (Fig. 3). The length-weight relationship of 227 specimens (Fig. 3) observed was:

$$y = 0.00049 + 2.10618 x, \text{ and the 'r' value was } 0.669.$$

The gillraker counts (33 samples) indicate that it was 7 or 8 in the upper limb and 17 or 18 in the lower limb. Silas (1967) has statistically examined the differences of the gill raker counts of *T. tonggol* from the Australian Coast and Gulf of Mannar and stated the possibility of the existence of distinct races of *T. tonggol* in this area. A comparison of gill raker counts presented by Serventy (1956) from Australian coasts, Silas (1967) and Ranade (1961) with the present observation indicate that there is distinct variation between the populations of *T. tonggol* from the Australian and Indian coasts (Table 1).

TABLE 1. Comparison of gill-raker counts between samples of *T. tonggol* from the Australian coasts, Gulf of Mannar and Ratnagiri coast

Author	Locality	Range and mean in gill raker counts	
		(Upper)	(Lower)
Serventy (1956)	Northern Australia	5-8 (6.1)	13-18 (15.74)
Serventy (1956)	Western Australia	5-8 (6.39)	14-18 (16.04)
Silas (1967)	Gulf of Mannar	6-7 (7.03)	16-19 (17.95)
Ranade (1961)	Ratnagiri coast	8	18
Present study	Ratnagiri coast	7-8 (7.21)	17-18 (17.44)

This is indicative of genetic difference and the possible existence of subpopulations of *T. tonggol*. This aspect needs further elucidation.

36 ovaries collected from the females of the length range 63-74 cm size were examined for ova diameter measurements. The major peak in size of the ova was at 0.035-0.070 mm indicating that all the specimens were in the stage II of maturity according to the definition of the stages of maturity by the ICES scale (Fig. 4).



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