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THE PRESENT STATUS OF COASTAL TUNA FISHERY AT VIZHINJAM, TRIVANDRUM COAST

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Introduction

The coastal tuna fishery of Kerala, which has been yielding about 6,000 tonnes annually in recent years, constitutes 32% of the total tuna landings of the country. A district-wise analysis of the tuna production during 1979 - '81 indicated that 70% of the total tuna landings in the state was from the coastal fishery along Trivandrum district. At Vizhinjam, where fishing goes on all through the year, coastal tunas constitute a major pelagic fish resource accounting for 20% of the total marine fish landings. Since the prime requirement of tuna fishery development in the area seems to be the improvement of the existing small-scale fishery sector. knowledge on the present status of the fishery appears to be a basic necessity for the planning of further development in this sector. In addition, when the fishery harbour under construction at Vizhinjam becomes operational, mechanised fishing for tunas is bound to increase in the area and this also requires information on the catch trend and seasons of abundance of various species for the management of fishing fleet.

Fishing gear and craft

The chief gears employed for tuna are drift net and hooks and lines which are operated either from catamaran or dugout canoe. From 1983, introduction of traditional crafts fitted with outboard motors started gaining momentum in the small-scale fishery sector at Vizhinjam. Of late, the gears for tuna are mainly operated from fibre-glass coated plywood built boats of about 5.5 m OAL with outboard motors. Consequently, the effort of non-motorised traditional crafts declined considerably. The area of fishing for motorised crafts was about 20–25 km off Vizhinjam at a depth range of 60 to 80 m and that of non-motorised crafts was confined to about 10 km from the shore at a depth range of 40–50 m. In this study, a fishing trip was taken as a unit of effort and since both the gears employed were found to be almost equally effective for catching tuna, no attempt was made to standardise the trips employing different gears.

Annual production

The annual tuna catch and the total fish catch during 1983-'87 are given in Fig. 1. The catch ranged from 472 t in 1983 to 2,037 t in 1985 with the annual average at 1,401 t. The year-wise percentage of tuna catch in relation to total catch and the catch per trip of tunas is shown in Fig. 2. It is seen that the percentage contribution of tunas in the total fish catch ranged from 7.3 in 1983 to 21.6 in 1987 and averaged to 17.2. The annual catch of tunas per trip varied from 4.8 kg in 1983 to 24.8 kg in 1986. A marked increase in the catch as well as the catch rate of tunas was evident from 1984 onwards.

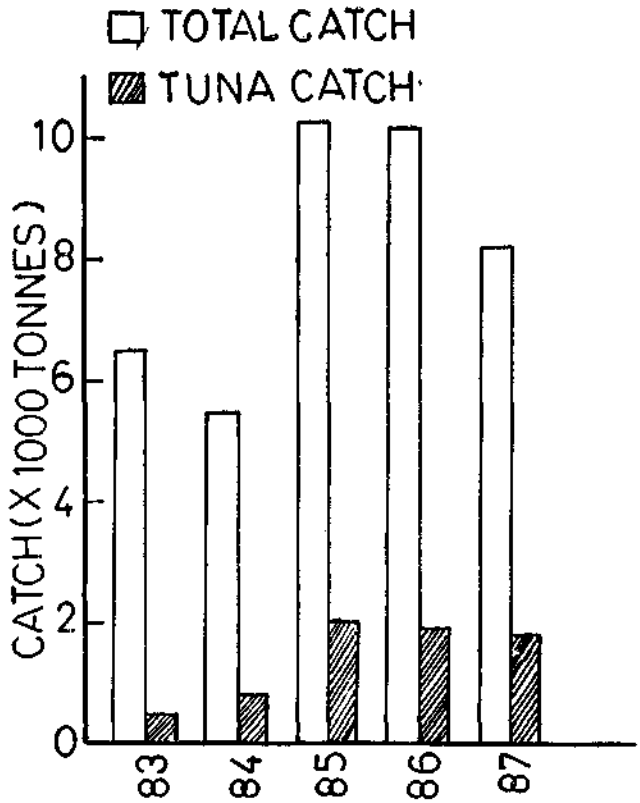

Fig. 1. Year-wise total fish catch and tuna catch at Vizhinjam during 1983-'87.

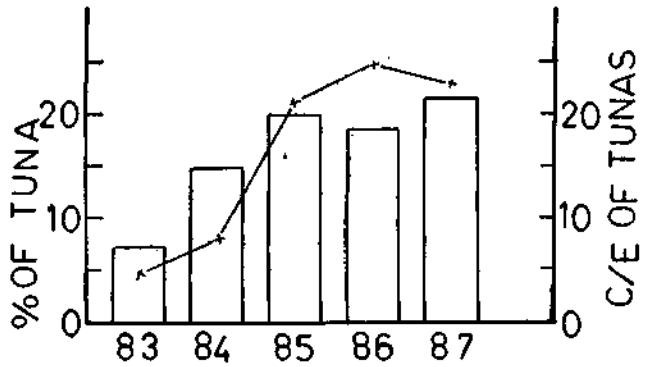

Fig. 2. Year-wise percentage of tuna in the total fish catch and catch per effort (C/E) of tuna in kg during 1983–'87.

Seasonal pattern of tuna fishery

The month-wise tuna catch, effort and catch per unit effort based on pooled data during 1983–'87 are shown in Fig. 3. The average monthly catch varied between 70.0 t in February to 230.4 t in October with the monthly average at 116.8 t. The catch per trip

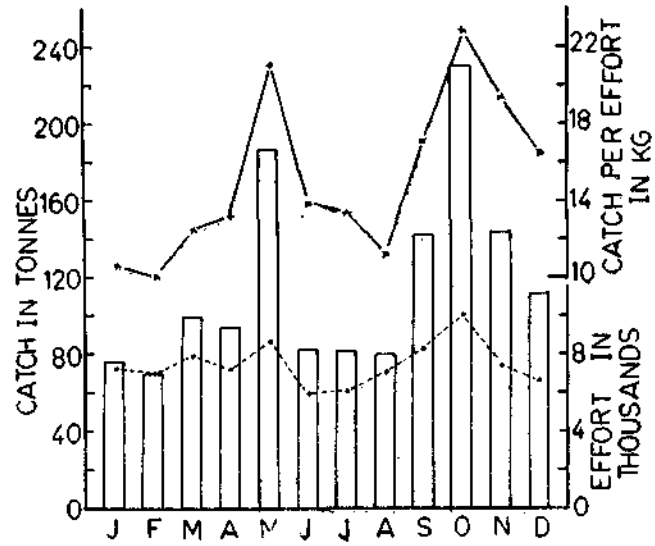

Fig. 3. Month-wise average catch (tonnes), effort and catch per effort (C/E) in kg of tunas during 1983–'87.

ranged between 9.9 kg in February to 22.8 kg in October with an overall monthly catch per trip of 15.6 kg. The peak fishing seasons were May and September-November period.

Gear-wise production

As generally understood, drift nets and hooks and lines are not operated for tunas alone. The percentage of tuna catch in the total fish catch brought by the gears operated from motorised and non-motorised crafts is

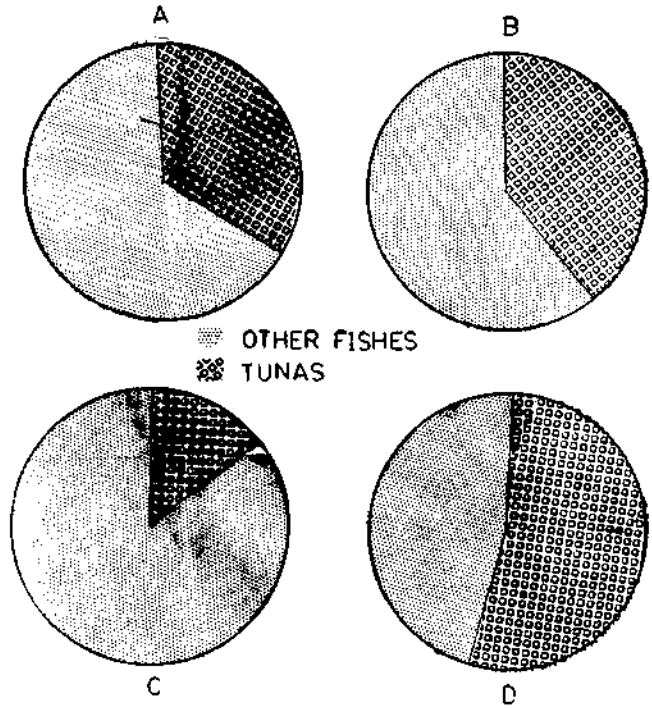

Fig. 4. Percentage of tunas and other fishes in different gears during 1983–'87. (A) Drift net (non-motorised craft), (B) Drift net (Motorised craft), (C) Hooks and line (non-motorised craft) and (D) Hooks and line (motorised craft).

given in Fig. 4. Motorised crafts brought better proportion of tuna catch. It is seen that 53.5% of the catch brought by hooks and lines operated from motorised crafts and 39.1% of the catch brought by drift net operated from motorised crafts were tunas, whereas the corresponding figures for their non-motorised counterparts were 34.2 and 14.1% respectively.

The year-wise percentage contribution of tunas in the total tuna catch by different gears is shown in Fig. 5. The change over from non-motorised to motorised traditional crafts for tuna fishing was evident from 1984 onwards. The gears operated from motorised crafts which landed only about 28% of the tuna catch in 1983, caught about 94% of the tuna catch in 1987. For the overall period 1983-'87, hooks and lines operated by motorised crafts contributed the bulk of the catch (46.8%) followed by drift net operated from motorised crafts (33.1%). The contributions of hooks and lines and drift nets operated from non-motorised crafts were 10.6 and 9.5% respectively for the period. The average monthly catch, effort and catch per unit effort of tunas in different gears for the period 1983-'87 is shown in Fig. 6.

(a) *Drift net:* The gear was operated in all the years from motorised as well as non-motorised crafts.

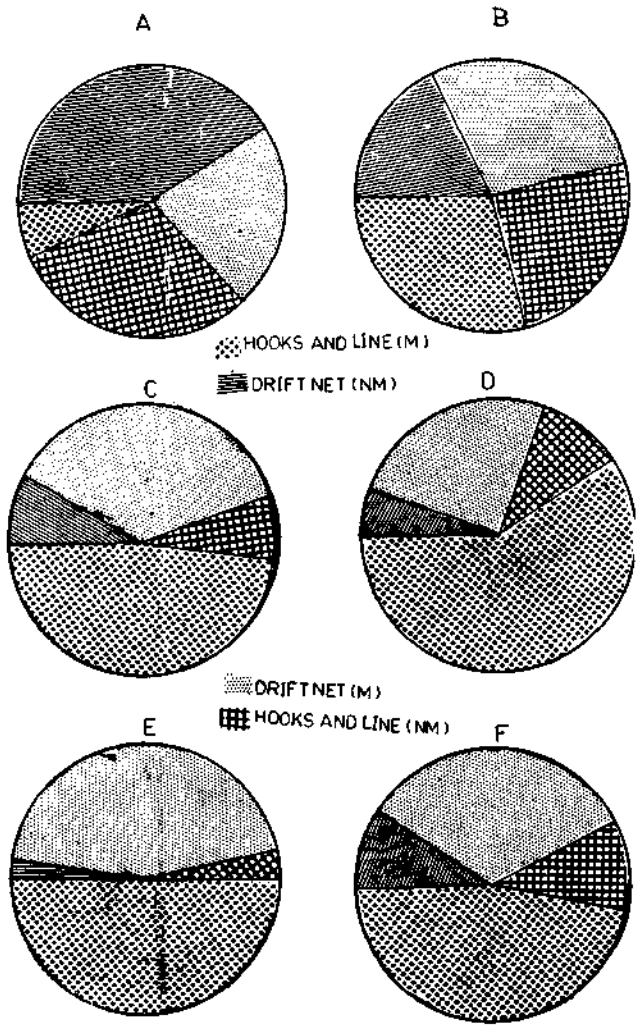

Fig. 5. Percentage contribution of tunas by different gears in the total tuna catch. '(M)' indicates gear operated from motorised craft and '(NM)' indicates gear operated from non-motorised craft. (A) 1983, (B) 1984, (C) 1985. (D) 1986, (E) 1987 and (F) Average for the period 1983–'87.

The annual effort from non-motorised crafts ranged from 2,097 in 1987 to 14,036 in 1983, with the average at 8,602 units. A reduction in the effort was seen from 1984 onwards. Maximum catch (196.2 t) was noted in 1983 and the minimum (37.8 t) in 1987, with the annual average at 133.3 t. Eventhough the effort expended and the tuna catch brought by drift net operated from non-motorised crafts showed steep decline through 1983–'87, the catch per unit effort did not show the corresponding decline. It ranged from 14.0 kg (1983 and '84) to 20.3 kg (1985) with the average at 15.5 kg. The gear was operated in all the months except July–August and it was intense during April–May and October - November. April – June and September-November yielded comparatively good catch rate of tunas. May was the best month of tuna catch by drift net operated from non-motorised crafts.

Eventhough drift net operation from motorised crafts was observed in all the years, it intensified conspicuously from 1985 onwards. The annual effort ranged from 2,590 units in 1983 to 27,058 units in 1987 with the average annual at 15,970 units. The decline in the effort of drift net from non-motorised crafts coincided with the increase in the effort of the same gear from motorised crafts. The annual tuna catch ranged from 102.8 t in 1983 to 779.3 t in 1987, with the annual average at 463.5 t. The catch per unit effort ranged from 22.1 kg in 1986 to 40.2 kg in 1984, with the annual average at 29.0 kg. It could be seen that the catch per trip of tunas from drift nets operated from motorised crafts was almost double of that operated from non-motorised crafts. Motorised crafts operated drift nets during all the months and the peak efforts were expended during May and September–October. The maximum tuna catch was obtained during May–June and September–October. Prior to 1987, drift nets were not operated during the peak southwest monsoon months *viz.* July–August. It is interesting to note that the operation of drift nets during these months in 1987, yielded comparatively good catch and catch rates of tunas.

(b) *Hooks and line:* The annual effort of hooks and line operated from non-motorised crafts declined from 1,37,439 units in 1984 to 8,540 units in 1987 with the average annual at 54,012 units. Tuna catch also declined from 201.4 t in 1984 to 59.8 t in 1987 with an annual average catch of 149.1 t. The catch per trip ranged from 1.5 kg in 1984 to 13.4 kg in 1986 and averaged to 2.8 kg for the overall period. A significant aspect noted here was the increase in catch rate with the decrease in fishing effort from 1984 onwards.

Hooks and line fishing from motorised crafts intensified from 1985. The annual effort ranged from 5,124 units in 1983 to 39,873 units in 1987 with an annual average effort of 24,437 units. Here also, the increase in the effort of motorised units from 1985 onwards coincided with the decrease in the effort of non-motorised units. The annual tuna catch varied between 31.3 t in 1983 to 1,130.1t in 1986 and averaged to 655.2 t. The catch per trip ranged from 6.1 kg in 1983 to 33.8 kg in 1986 with the annual average at 26.8 kg. It is seen that the catch per trip of tunas increased with the increase in effort till 1986, but showed a slight decline in 1987. A conspicuous increase in the catch per trip of tunas was seen in the motorised units when compared to that from non-motorised units. Maximum effort of this

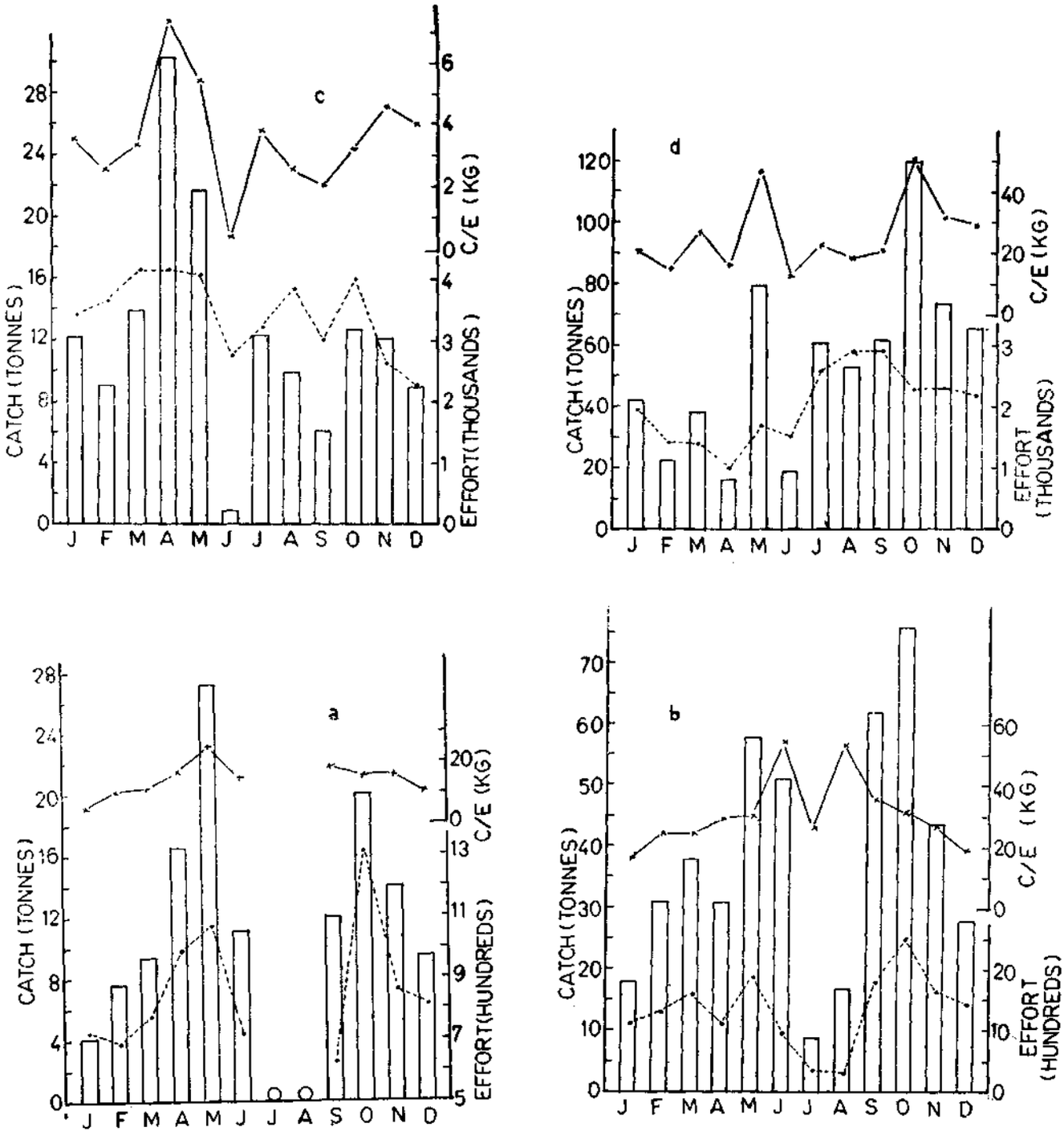

Fig. 6. Gear-wise average catch (tonnes), effort and catch per effort (C/E) in kg of tunas during 1983–'87 ('0') at the baseline indicates non-operation of the gear). (a) Drift net (non-motorised craft), (b) Drift net (motorised craft), (c) Hooks and line (non-motorised craft), (d) Hooks and line (motorised craft).

unit was expended during July–December. Maximum tuna catch and catch rates were noted during May and October–November.

Species composition

Seven species of tunas occurred in the fishery. The overall relative abundance by weight of the species is

given in Fig. 7. The bullet tuna *Auxis rochei* contributed the bulk of the catch (45.3%) followed by the little tunny *Euthynnus affinis* (34.5%). The other

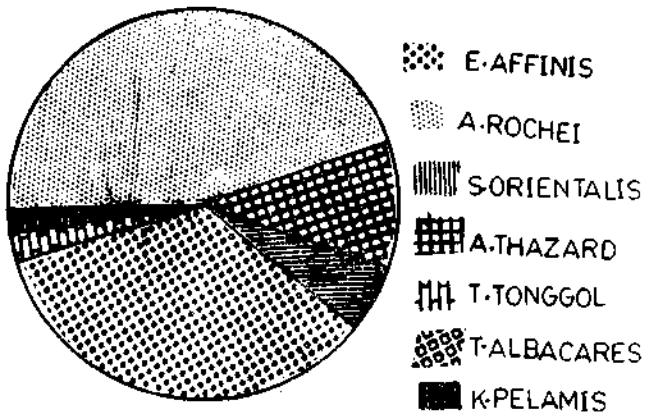

Fig. 7. Species composition of tunas (all gears together) during 1983–'87.

species in the order of abundance were *Auxis thazard* (10.2%), *Sarda orientalis* (5.5%), *Thunnus tonggol* (2.5%), *T. albacares* (1.5%) and *Katsuwonus pelamis* (0.5%).

Gear-wise abundance of species

The gear-wise species composition of tunas during the period is shown in Fig. 8. In drift net operated from motorised and non-motorised crafts, *E. affinis* dominated the catch, followed by *A. thazard,* whereas in hooks and line operated from motorised and non-motorised crafts, *A. rochei* was the dominant species followed by *E. affinis*. A significant aspect noted here

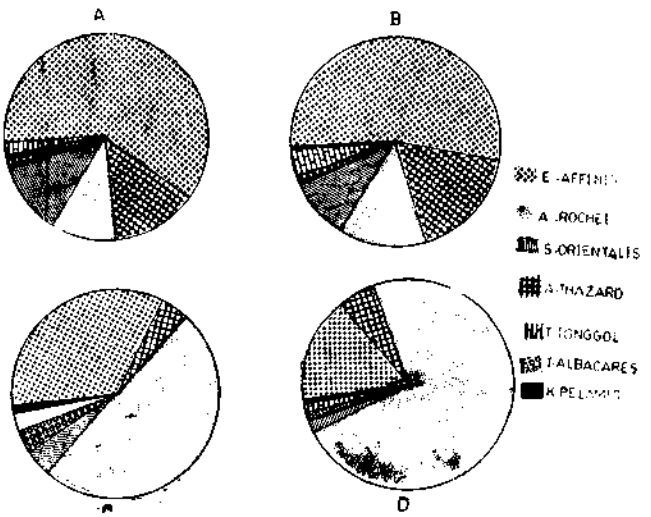

Fig. 8. Gear-wise species composition of tunas during 1983–'87. (A) Drift net (non-motorised craft), (B) Drift net (motorised craft), (C) Hooks and line (non-motorised craft) and (D) Hooks and line (motorised craft).

was the abundance of *A. rochei* in hooks and lines operated from motorised crafts, where it formed about 74% of its total catch.

In drift net (non-motorised craft) *E. affinis* was abundant during May and October, *A. thazard* and *A. rochei* during April and *S. orientalis* during September–October. In the same gear operated from motorised crafts also *E. affinis* was abundant during May and October, *A. thazard* in February-April, *A. rochei* in September and November and *S. orientalis* in September. In hooks and lines operated from non-motorised crafts, *E. affinis* was caught abundantly in April and *A. rochei* during April-May. In the same gear operated from motorised crafts, *E. affinis* was caught in good quantities during March, May and November, *A. thazard* during March and *A. rochei* during May and July to December.

Seasonal abundance of species

The seasonal trend of different species is shown in Fig. 9. Two fishing seasons were noted for *E. affinis viz.* April–June and September–November with peak landings during May and October. The fishing season for *A. thazard* was February–April with peak catch in May. May and July to December were the best months for *A. rochei* with peak catch in October. *S. orientalis* was caught in good quantities during May to October with peak catch in September. The months of maximum availability of *T. albacares* were January and October, those for *T. tonggol* June, October and November and those for *K. pelamis* January and October.

Impact of motorisation of traditional crafts

The motorisation programme which started gaining momentum from 1983, has clearly resulted in an increase in the catch and catch rate of tunas at Vizhinjam. The percentage contribution of tunas by different gears from 1983–'87 (Fig. 4) indicates that motorised crafts have largely replaced the non-motorised ones for hooks and line and drift net fishing. The increase in tuna catch from 1984 onwards (Fig. 2) was chiefly due to the better catch and catch rate of the motorised units. The catch rate of tunas by drift nets operated from motorised crafts was 29.0 kg as against the same of 15.5 kg from non-motorised units. Similarly hooks and lines operated from motorised crafts recorded a high catch rate of 26.8 kg in contrast to 2.8 kg of non-motorised crafts. The accessibility to new fishing grounds beyond the traditional areas seems to be the main reason for the higher catch rates of motorised crafts. Another significant aspect of motorisation was

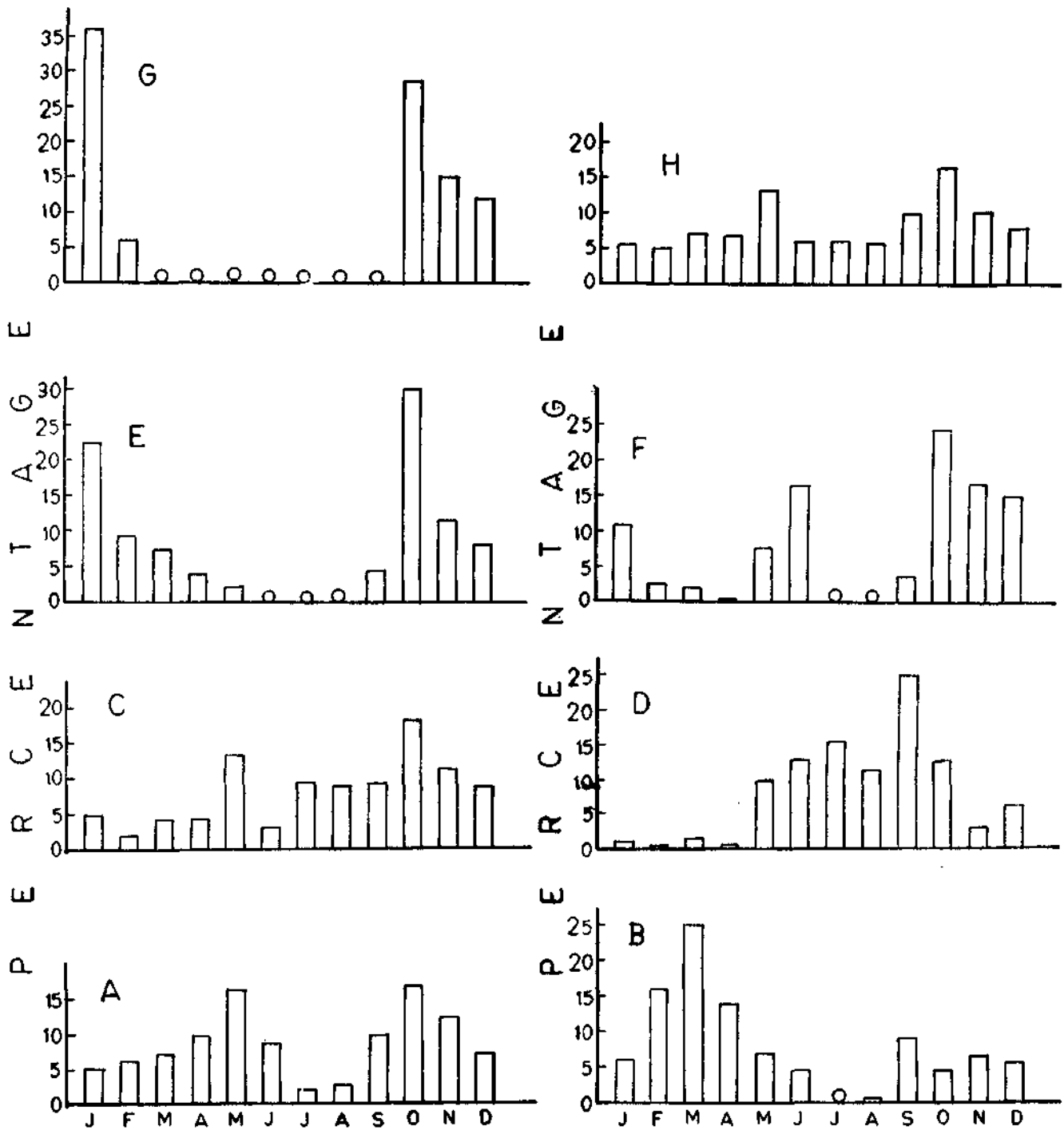

Fig. 9. Seasonal trend of tunas during 1983–'87 ('0') at the baseline indicates nil catch. (A) *E. affinis*, (B) *A. thazard*, (C) *A. rochei*, (D) *S. orientalis*, (E) *T. albacares*, (F) *T. tonggol*, (G) *K. pelamis* and (H) Total tuna catch.

the change in the pattern of species abundance of the tuna catch in the area. New fishing ground for *A. rochei* was exploited mainly after the introduction of motorisation. Consequently, *A. rochei* became the most abundantly exploited species instead of *E. affinis* which dominated the fishery prior to motorisation of crafts.

Conclusions and recommendations

(1) A conspicuous increase in the catch and catch rate of tunas was noted from 1984 onwards. The average annual catch of tunas during the period of study was 1,401 t which accounted for 17.2% of the total fish catch in the area.

(2) The peak fishing months for tuna were May and September–November.

(3) The motorisation of traditional crafts has resulted in an increase in the catch and catch rate of tunas in the area. Motorised units brought higher proportion of tuna in their catch. In the total tuna catch, hooks and line from motorised units brought 46.8% and drift nets from motorised units 33.1%. The catch rates in hooks and line and drift net were 26.8 kg and 29.0 kg as compared to 2.8 kg and 15.5 kg respectively of the non-motorised crafts.

(4) The operation of drift net during the peak southwest monsoon months *viz.* July–August which was done only during 1987, yielded comparatively good catch and catch rate of tuna.

(5) *Auxis rochei* was the most abundant species (45.3%) followed by *E. affinis* (34.5%), *A. thazard* (10.2%) and *S. orientalis* (5.5%). In drift net *E. affinis* dominated the catch, whereas in hooks and line *A. rochei* was the major species.

(6) The peak months of availability of *E. affinis* were May and October. The best available month of *A. thazard* was May, that of *A. rochei* was October and that of *S. orientalis* was September.

(7) New fishing ground for *A. rochei* was located after the introduction of motorisation.

(8) Judging by the catch and catch rate of tunas throughout the year as well as the increased yield of tunas by the exploitation of slightly distant fishing grounds by motorised traditional crafts, it is felt that tuna fishing offers further scope for development in the area.

(9) The chief requirement of tuna fishery development in India should be the development of small-scale fishery sector. In this context, the motorisation of small-scale sector at Vizhinjam, which conspicuously augmented the production of tunas is a trend worth encouraging by fisheries development agencies.

(10) Diversification of drift gill net fishery by the introduction of pablo type boats deserve urgent attention. A study of drift gill net fishing with pablo boats at Cochin revealed that in addition to tunas, quality by-catch of other pelagics such as seer fishes, sharks, carangids, pomfrets and cat fishes which fetch good price were caught by this fishing. The annual profit of drift gill net fishing was estimated to be Rs. 28,430.

(11) Introduction of boats for surface trolling and hooks and line fishing beyond 70m depth is another option for enhancing tuna production, especially of *E. affinis, A. thazard, A. rochei* and *T. tonggol* in the area.

(12) Small purse seiners (OAL 11.5–13.5 m) land good quantity of tunas from shelf waters. A regulated purse seine fishery for tuna along the southwest coast of India should yield good results. It is felt that when the harbour facilities at Vizhinjam are completed, introduction of small purse seiners may also prove economical.