MARINE FISH CALENDAR

XII. MANDAPAM*

P. Livingston, M. Sivadas and M. Badrudeen

Mandapam Regional Centre of CMFRI, Mandapam Camp

Introduction

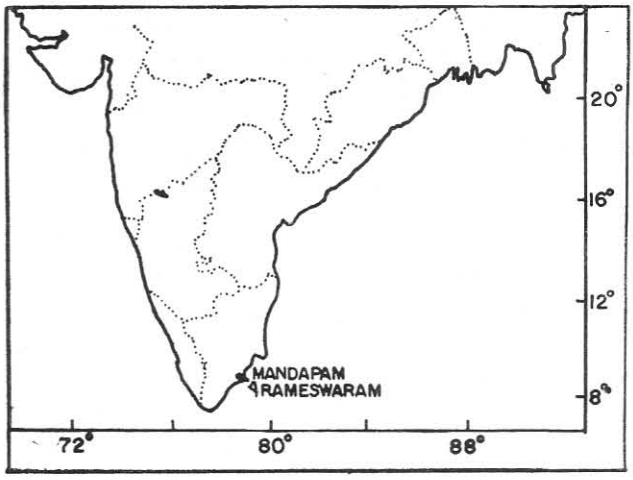
The Ramanathapuram District with a coastline of 261 km, covering the sea-front of Gulf of Mannar and Palk Bay, ranks foremost in marine fish production of Tamil Nadu State. Sustaining high levels of organic production, the seas along the coast have lucrative fishing grounds with greater profusion of finfishes, shellfishes, seaweeds and other economically important organisms. The fishery resources of the region in the fifties and sixties were mainly exploited by the indigenous crafts and gears in the near shore waters extending to a depth of 10–15 m. With the fishery technological advancement, and establishment of infrastructural facilities, the annual marine fish production of the District increased from 30,000 t to over 60,000 t during the past one and half decades.

Mechanised fishing boats are operated from 16 centres, majority of them being concentrated at Mandapam, Pamban and Rameswaram. Need-based berthing facilities for the mechanised fishing vessels and processing facilities are also available at these centres. The traditional crafts and gears are mainly operated in the other fish landing centres.

About 1,000 trawlers and over 5,000 non-mechanised boats are employed in the marine fisheries of this area. In recent years, several of the non-mechanised boats are fitted with either inboard or outboard engines.

Bottom trawl nets and the indigenous gears such as drift gill nets, hooks and lines, perch traps, shore-seines, fixed bagnets and other nets are employed in the fishery. In recent years several types of gears modified from the conventional basic gears are introduced into the fisheries of the region.

The fishing activities of the region are greatly influenced by the monsoon in the Palk Bay and Gulf of Mannar. During the southwest monsoon period (June–September) the fishery operations are greatly concentrated in the Palk Bay as it remains calm and offers favourable conditions. During the northeast monsoon (October–February), however, the fishing activities are shifted to the Gulf of Mannar region as the sea on the Palk Bay side gets rough. The Gulf of Mannar is open and deeper as compared to Palk Bay. The inshore region of the Gulf of Mannar (5–25 m depth) is beset with rocky patches with intervening sand and mud flats while that of Palk Bay (5–15 m depth), is mostly muddy.



Over 12 important groups of fishes constitute the commercial fisheries of Mandapam and Rameswaram region. The most important of these are: silver bellies, elasmobranchs, croakers, clupeids, goat fishes, perches, cat fishes, lizard fishes and carangids. At Mandapam, the annual fish production by trawlers fluctuated between 2,533 t in 1980 and 7,218 t in 1984, the average catch being 5,557 t. Silver bellies (2,692 t) accounted for 48% of the total trawler catches. In the order of abundance, penaeid prawns ranked second forming 12% of the catch. Croakers and elasmobranchs contributed to the tune of

*Consolidated by N. Gopinatha Menon and K. Balachandran, CMFRI, Cochin.

270 and 240 t, respectively, the percentage composition of the group being 4–5% of the total yield of fish from the centre. Goat fishes, carangids, cat fishes, flat fishes, clupeids and other miscellaneous fishes together accounted for about 1,700 t (30%).

Although a few gill netters were operating at Rameswaram in 1981 and 1982, the principal units operated at present are the trawlers. The annual fish landing of the centre was seen fluctuating from 14,378 t in 1980 to 28,836 t in 1983 with the average registering at 22,065 t. Here also, silver bellies form the major group exploited, contributing to over 51% of the total trawler catch. The annual yield of silver bellies showed great fluctuations from 7,474 t to 14,800 t, during 1980-1984 period. The other important group of fishes exploited at the centre are elasmobranchs (2,933 t; 13.3%), croakers (2,000 t; 9.5%) and penaeid prawns (2,067 t; 9.4%). The other groups of fishes constituting the catch comprise mainly of goat fish, carangid, cat fish, flat fish, clupeid, cephalopod and crab. Those together contributed to an average of 3,660 t (16.6%) in the total catch.

The indigenous gears operating from Mandapam and Rameswaram centres catch, by and large, fishes from the pelagic and columnar regions. The important groups of fishes exploited in this sector are clupeids formed by *Sardinella albella, S. gibbosa,* mackerel and carangids. Anchovies and seer fishes support to a seasonal fisbery in this region. The annual production of these fishes, as observed elsewhere in the coast have shown wide fluctuation.

The fish calendar of Mandapam–Rameswaram presented in this report deals with elasmobranchs, silver bellies, carangids, mackerel and perches which form the main constituents of the commercially exploited fishes of the region.

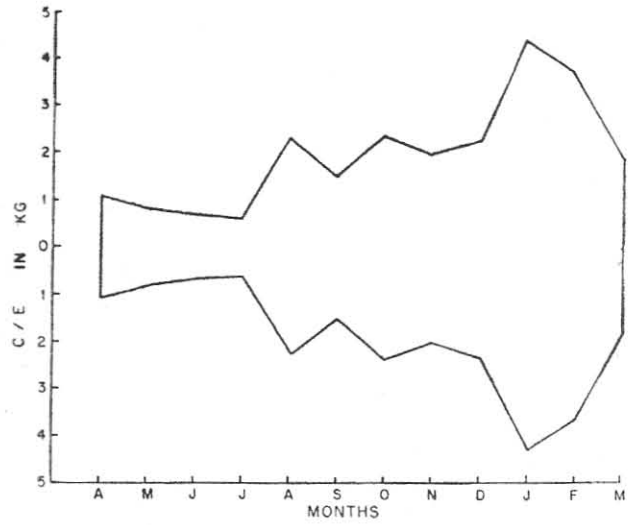


Fig. 1. Seasonal abundance of carangids in the trawling grounds

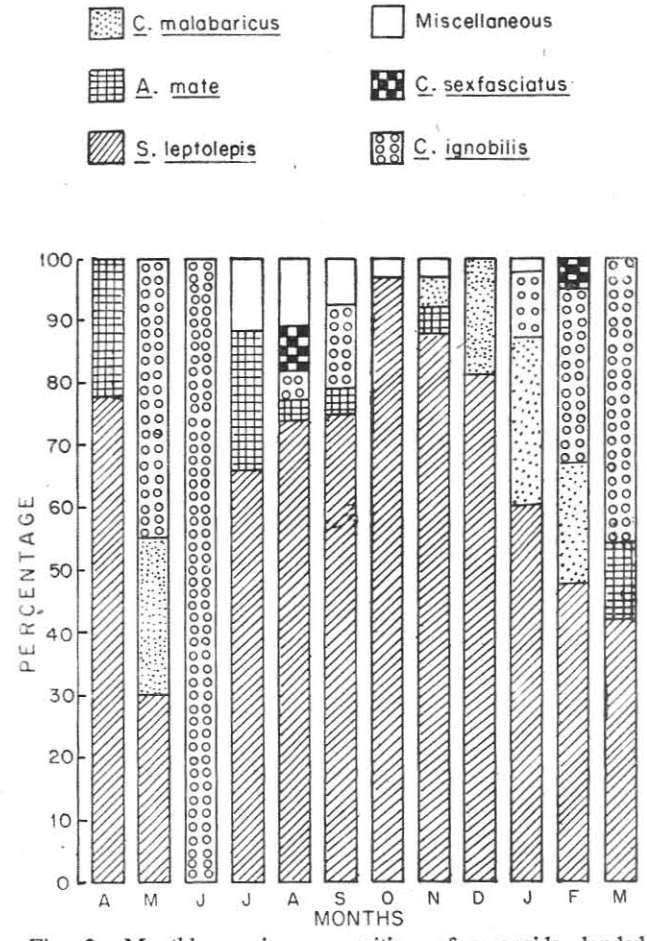


Fig. 2. Monthly species composition of carangids landed by trawlers.

CARANGIDAE

Popular English Name	:	Horse mackerel/ Scads/Leather jackets
Vernacular Name (Tamil)	:	'Parai'
Annual average catch	:	128 t
Percentage in total catch	:	42
Fishing methods and their contribution	:	Trawl net : 2%
		Shore seine : 40%

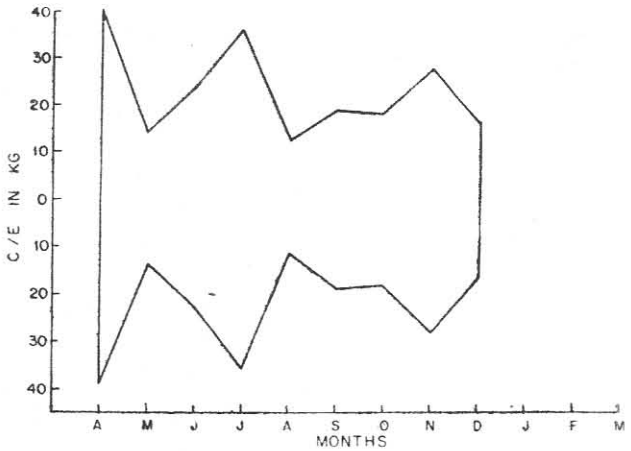


Fig. 3. Seasonal abundance of carangids in the inshore waters.

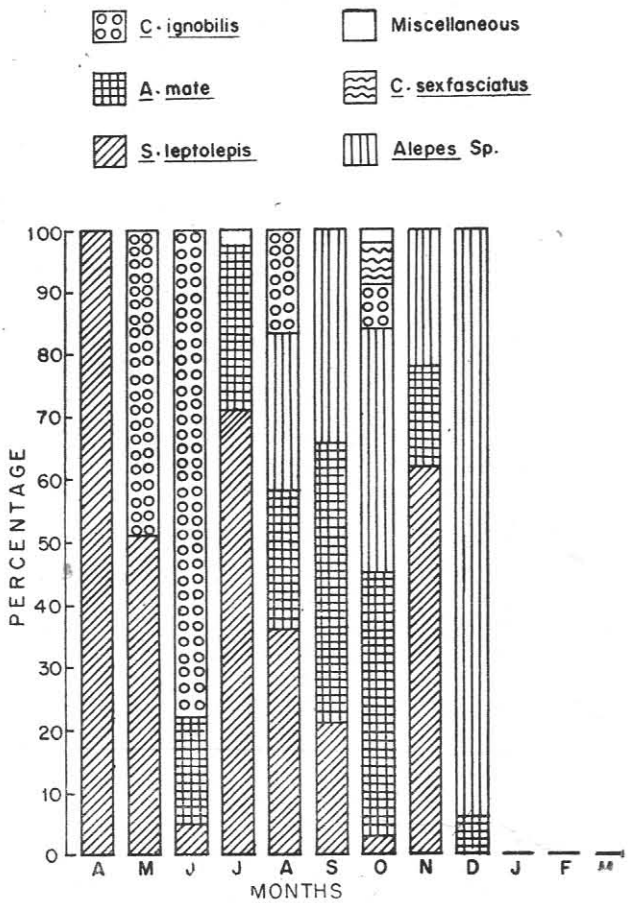


Fig. 4. Monthly species composition of carangids landed by shore seine.

ELASMOBRANCHS

Popular English Name	:	Sharks/Rays/Skates
Vernacular Name (Tamil)	:	'Surah'/'Thirukai'
Annual average catch	:	2,689.7 t
Percentage in total catch	:	4.79
Gear-wise annual average catch	:	Trawl net : 1,896.6 t Gill net : 765.9 t Hooks & line : 27.2t
Fishing methods and their contribution	:	Trawl net : 70.50% Gill net : 28.48% Hooks & line: 1.01%

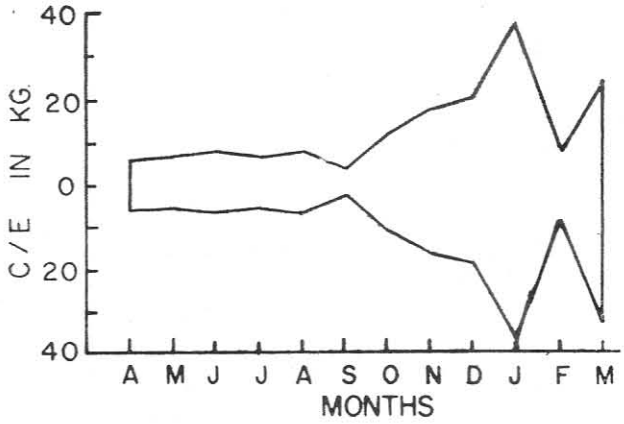


Fig. 5. Seasonal abundance of elasmobranchs in trawl nets.

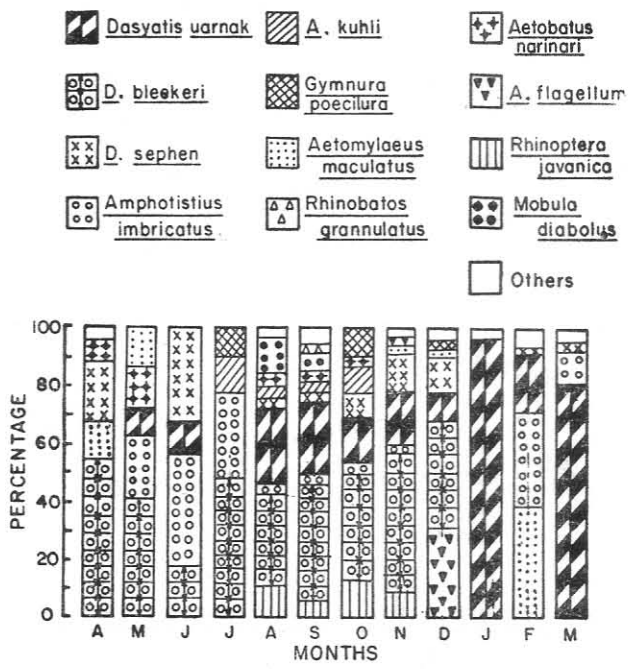


Fig. 6. Monthly species composition of elasmobranchs in trawl nets.

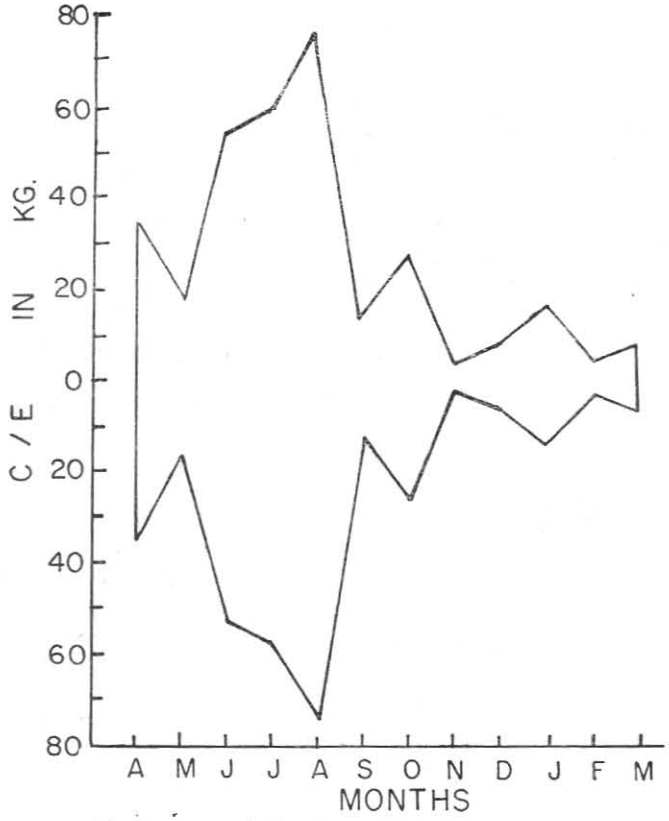


Fig. 7. Seasonal abundance of sharks in gill nets.

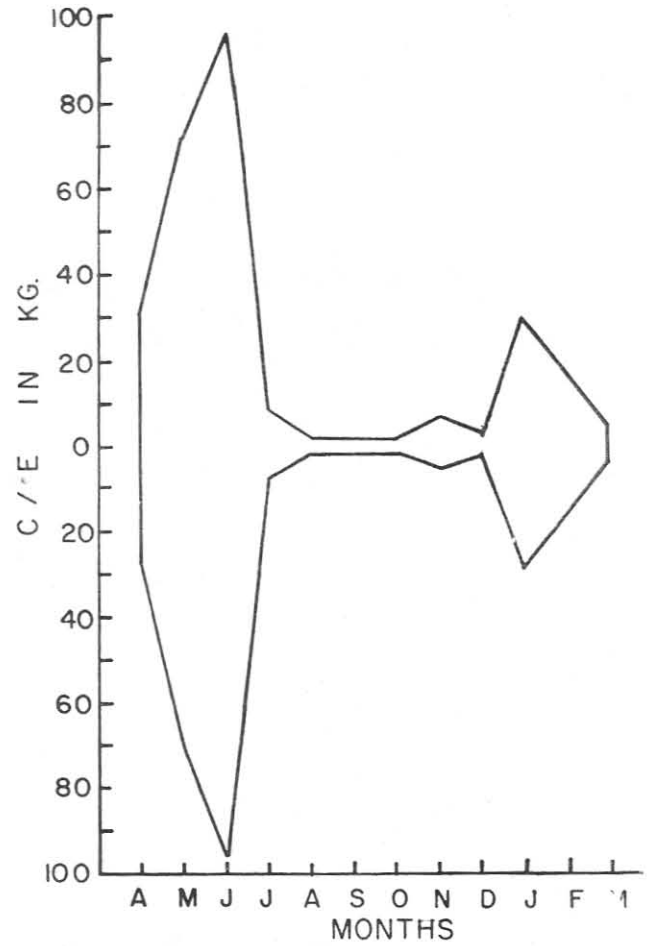


Fig. 8. Seasonal abundance of rays in gill nets.

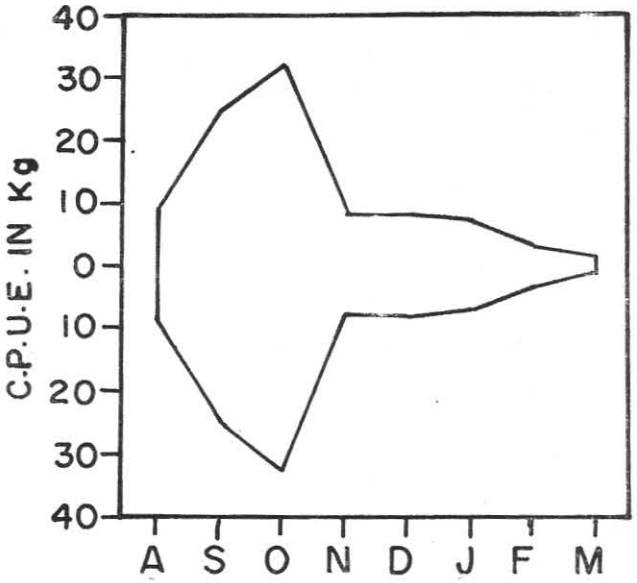


Fig. 9. Seasonal abundance of sharks in hooks and line.

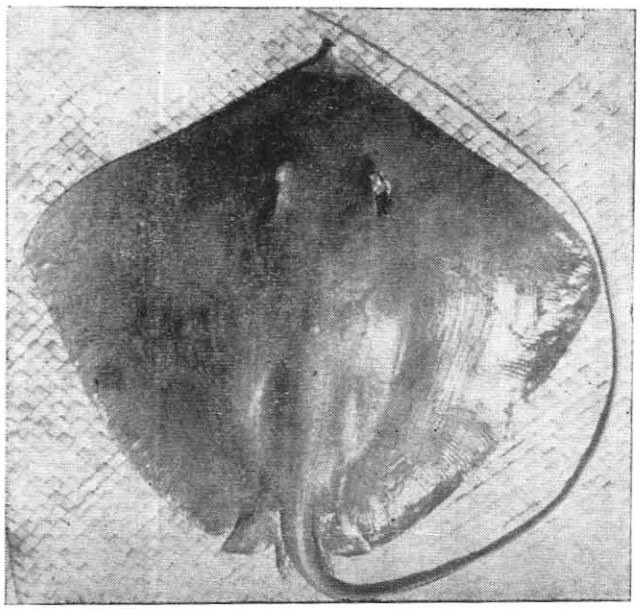


Fig. 10. *Dasyatis bleekeri.*

Scientific Name	:	*Dasyatis bleekeri*
Vernacular Name	:	'Manal thirukai'
Gear	:	Trawl net
Percentage composition in the gear	:	Trawl net : 28.3
Peak period of occurrence	:	Mar. – Dec.
Depth of occurrence	:	10 - 20 m
Length range in commercial fishery	:	145 – 1,060 mm
Size at first maturity	:	670 mm
Spawning season	:	Apr. and Sep.

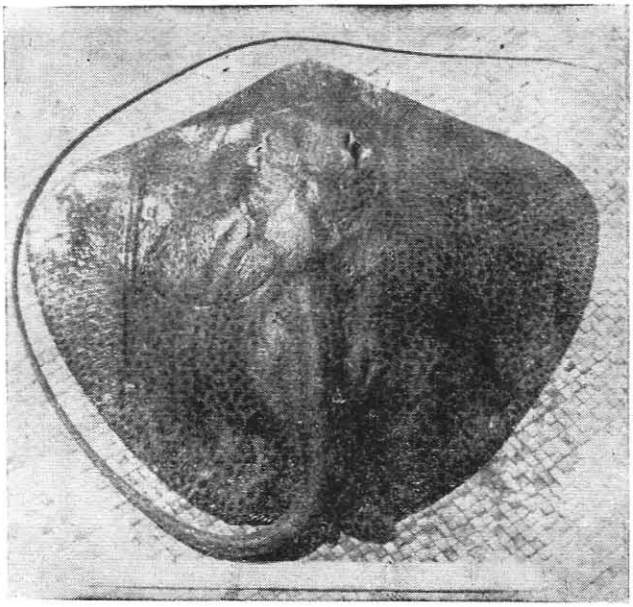


Fig. 11. *Dasyatis uarnak.*

Scientific Name	:	*Dasyatis uarnak*
Vernacular Name	:	'Puliyan thirukai'
Gear	:	Trawl net
Percentage composition in the gear	:	Trawl net : 27.1
Peak period of occurrence	:	Aug. – Mar.
Depth of occurrence	:	10 – 20 m
Length range in commercial fishery	:	215 – 1,200 mm
Size at first maturity	:	760 mm
Spawning season	:	Dec. and Jul.

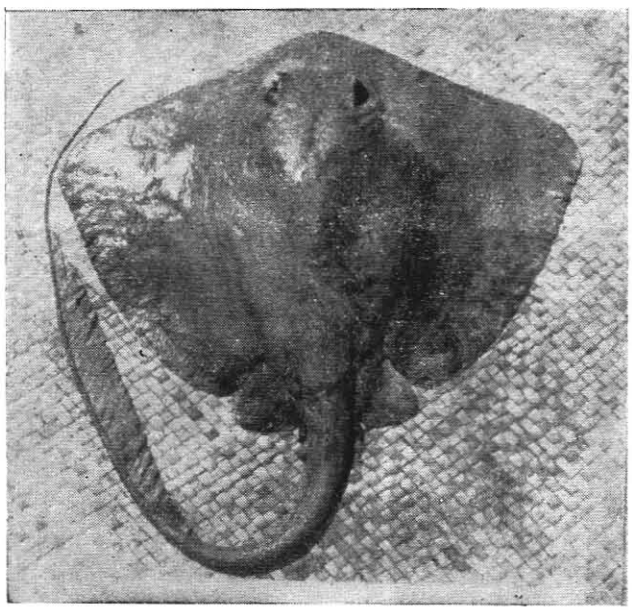


Fig. 12. *Dasyatis sephen.*

Scientific Name	:	*Dasyatis sephen*
Vernacular Name	:	'Auda thirukai'
Gear	:	Trawl net
Percentage composition in the gear	:	Trawl net : 10.12
Peak period of occurrence	:	Apr. – Jun. and Oct. – Dec.
Depth of occurrence	:	10 – 20 m
Length range in commercial fishery	:	180 – 1,460 mm
Size at first maturity	:	660 mm
Spawning season	:	Dec. – Jan.

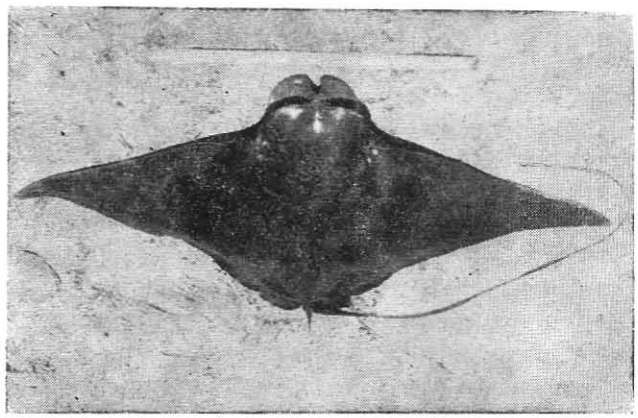


Fig. 13. *Rhinoptera javanica.*

Scientific Name	:	*Rhinoptera javanica*
Vernacular Name	:	'Valvadi thirukai'
Gear	:	Trawl net
Percentage composition in the gear	:	Trawl net : 3.33
Peak period of occurrence	:	Aug. – Nov.
Depth of occurrence	:	10 – 20 m
Length range in commercial fishery	:	480 – 1,500 mm
Size at first maturity	:	540 mm
Spawning season	:	Jan. – Feb.

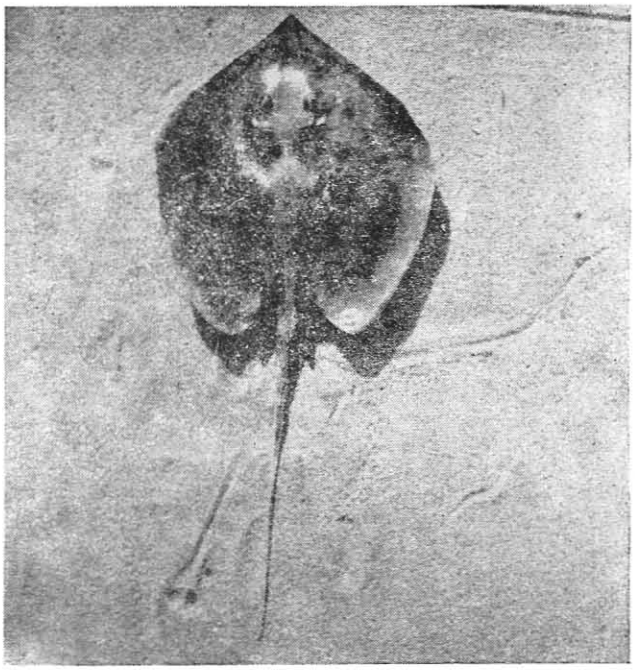


Fig. 14. *Amphotistius imbricatus.*

Scientific Name	:	*Amphotistius imbricatus*
Vernacular Name	:	'Senthirukai'
Gear	:	Trawl net
Percentage composition in the gear	:	Trawl net : 14.14
Peak period of occurrence	:	Feb. - Jul.
Depth of occurrence	:	10 – 20m
Length range in commercial fishery	:	140 – 249 mm
Size at first maturity	:	180 mm
Spawning season	:	Throughout the year

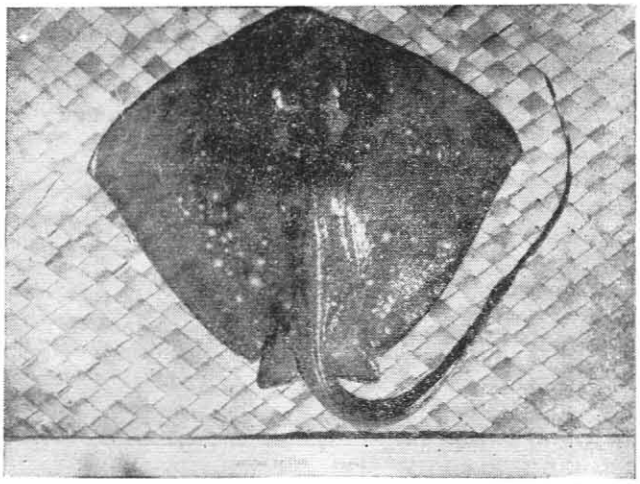


Fig. 15. *Amphotistius kuhli.*

Scientific Name	:	*Amphotistius kuhli*
Vernacular Name	:	'Katti Thirukai'
Gear	:	Trawl net
Percentage composition in the gear	:	Trawl net : 2.55
Peak period of occurrence	:	Aug. – Oct.
Depth of occurrence	:	10 – 20 m
Length range in commercial fishery	:	120 – 339 mm
Size at first maturity	:	240 mm
Spawning season	:	Jan. – Apr.

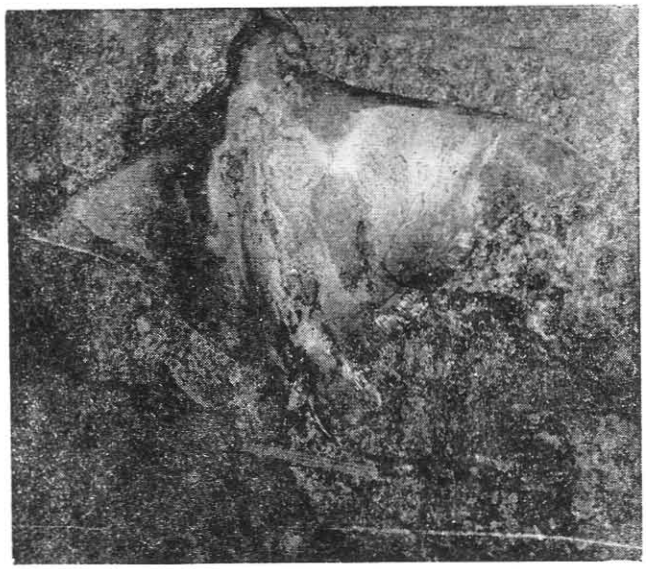


Fig. 16. *Aetobatus narinari.*

Scientific Name	:	*Aetobatus narinari*
Vernacular Name	:	'Kuruvi thirukai'
Gear	:	Trawl net
Percentage composition in the gear	:	Trawl net : 3.33
Peak period of occurrence	:	Apr. – May and Aug. – Nov.
Depth of occurrence	:	10 – 20 m
Length range in commercial fishery	:	520 – 1,060 mm
Size at first maturity	:	740 mm
Spawning season	:	Nov.

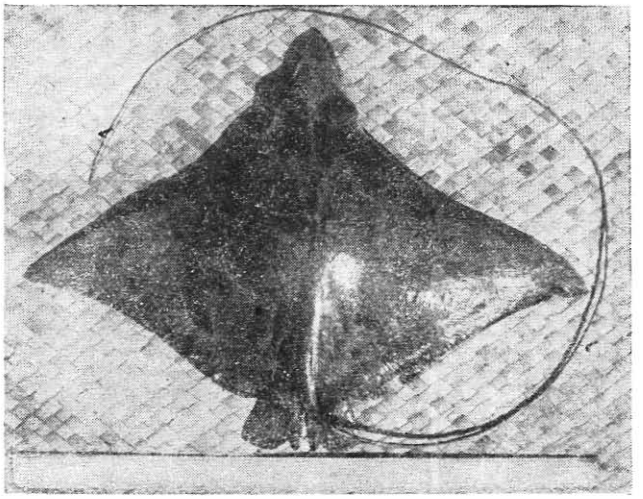


Fig. 17. *Aetobatus flagellum.*

Scientific Name	:	*Aetobatus flagellum*
Vernacular Name	:	'Sanguvayan thirukai'
Gear	:	Trawl net
Percentage composition in the gear	:	Trawl net : 2.81
Peak period of occurrence	:	Nov. – Dec.
Depth of occurrence	:	10 – 20 m
Length range in commercial fishery	:	420 – 1,300 mm
Size at first maturity	:	860 mm
Spawning season	:	Mar. – Apr.

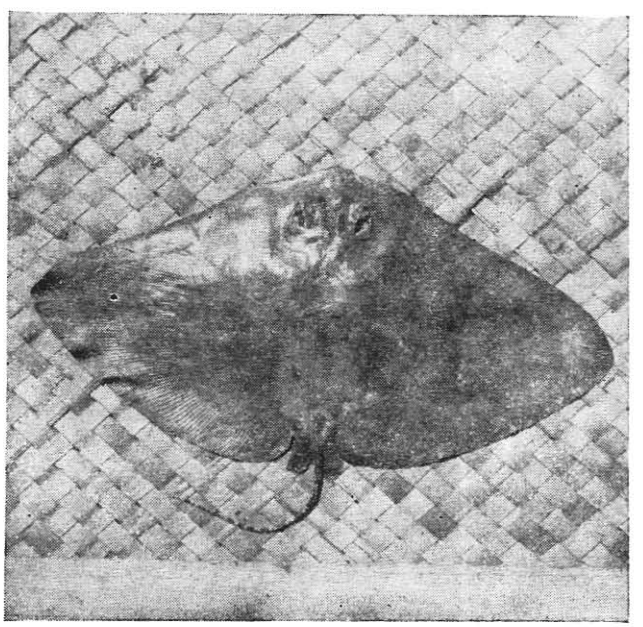


Fig. 18. *Gymnura poecilura.*

Scientific Name	:	*Gymnura poecilura*
Vernacular Name	:	'Atuvani thirukai'
Gear	:	Trawl net
Percentage composition in the gear	:	Trawl net : 2.24
Peak period of occurrence	:	Jul. and Oct.
Depth of occurrence	:	10 – 20 m
Length range in commercial fishery	:	240 – 960 mm
Size at first maturity	:	570 m
Spawning season	:	Mar. and Sep.

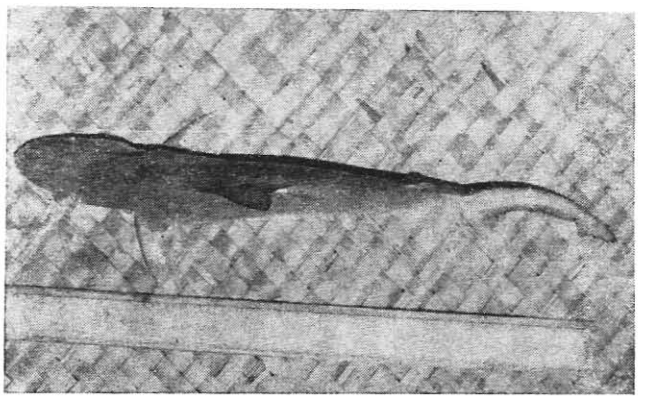


Fig. 19. *Scoliodon palasorrah.*

Scientific Name	:	*Scoliodon palasorrah*
Vernacular Name	:	'Pal chura'
Gear	:	Gill net/Hooks and line/Trawl net
Percentage composition in the gear	:	Gill net : 10.0 Hooks & line : 4.0 Trawl net : 0.5
Peak period of occurrence	:	Apr. – Oct.
Depth of occurrence	:	10 – 40 m
Length range in commercial fishery	:	220 – 1,500 mm
Size at first maturity	:	1,285 mm
Spawning season	:	Apr.

LEIOGNATHIDAE

Popular English Name	:	Silver bellies
Vernacular Name (Tamil)	:	'Kaaral'
Annual average catch	:	14,720 t
Gear-wise annual average catch	:	Shore seine : 5 t Trawl net : 14,715 t
Fishing methods and their contribution	:	Shore seine : — Trawl net : 70%

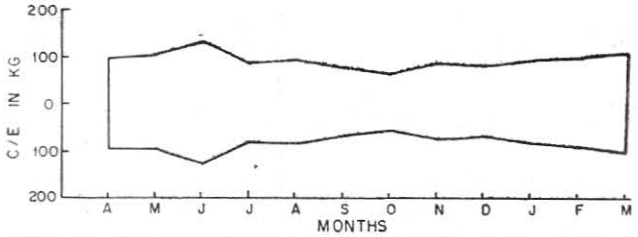


Fig. 20. Seasonal abundance of silver bellies by trawl nets.

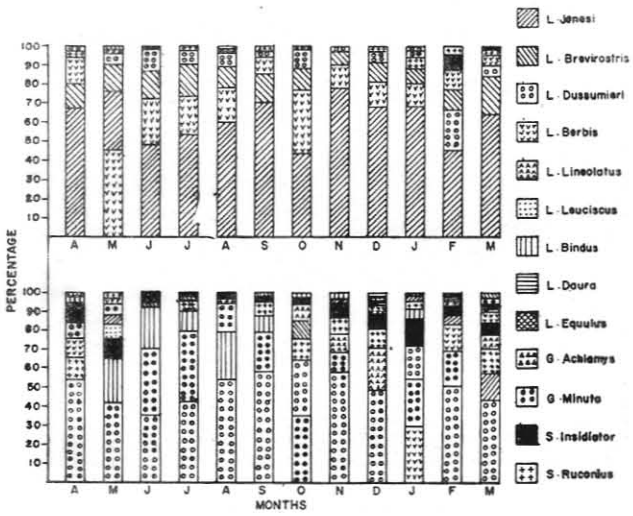


Fig. 21. Monthly species composition of silver bellies landed by trawl nets (upper panel – Palk Bay, lower panel - Gulf of Mannar)

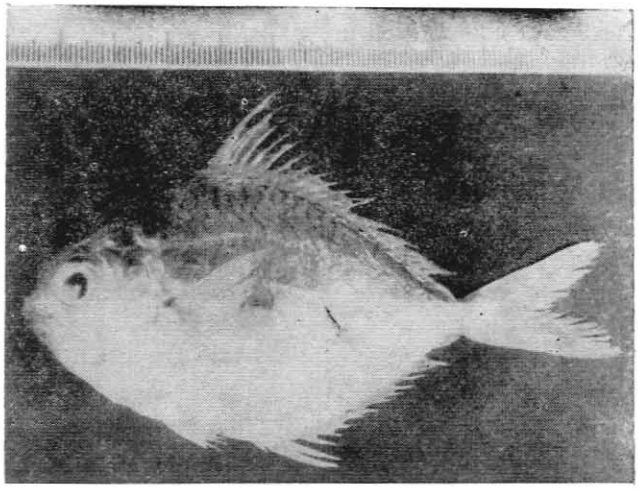


Fig. 22. *Leiognathus jonesi*

Scientific Name	:	*Leiognathus jonesi*
Vernacular Name	:	'Saluvatti kaaral'
Gear	:	Trawl net/ Shore seine
Peak period of occurrence	:	Throughout the year
Depth of occurrence	:	5 - 20 m
Length range in commercial fishery	:	35 – 95 mm
Size at first maturity	:	Males : 70 mm Females : 65 mm
Spawning season	:	Throughout the year

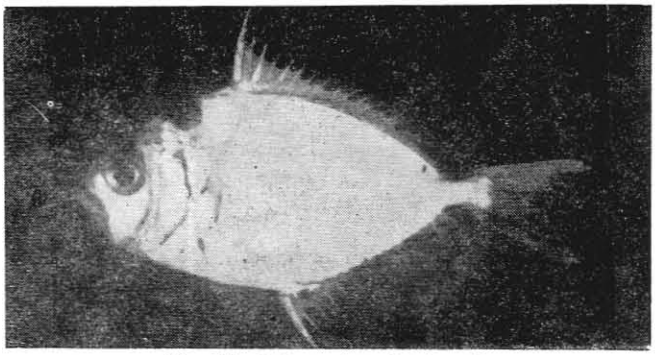


Fig. 23. *Leiognathus brevirostris.*

Scientific Name	:	*Leiognathus brevirostris*
Vernacular Name	:	'Mandai kaaral'
Gear	:	Trawl net/ Shore seine
Peak period of occurrence	:	Throughout the year
Depth of occurrence	:	12 - 15 m
Length range in commercial fishery	:	45 – 95 mm
Size at first maturity	:	Male : 68 mm Female : 63 mm
Spawning season	:	May. – Jun. and Oct. – Nov.

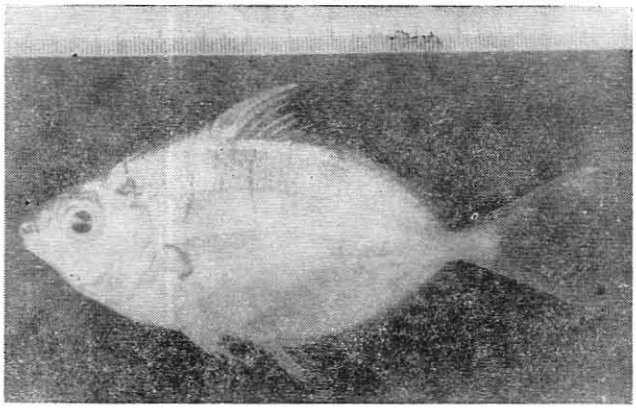


Fig. 24. *Leiognathus dussumieri.*

Scientific Name	:	*Leiognathus dussumieri*
Vernacular Name	:	'Vari kaaral'
Gear	:	Trawl net/Shore seine/ Gill net
Peak period of occurrence	:	Throughout the year

Depth of occurrence	:	20–40 mm
Length range in commercial fishery	:	40 – 90 mm
Size at first maturity	:	Males : 78 mm Females : 83 mm
Spawning season	:	Apr. – May and Nov. - Dec.

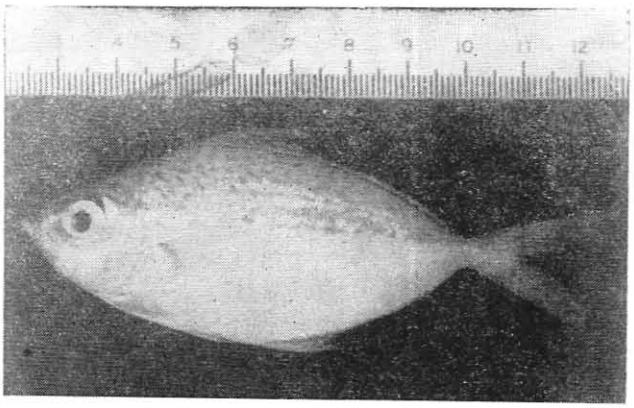


Fig. 25. *Leiognathus berbis.*

Scientific Name	:	*Leiognathus berbis*
Vernacular Name	:	'Oosi kaaral'
Gear	:	Trawl net/Shore seine
Peak period of occurrence	:	Throughout the year
Depth of occurrence	:	3–8 m
Length range in commercial fishery	:	60 – 90 mm
Size at first maturity	:	—
Spawning season	:	—

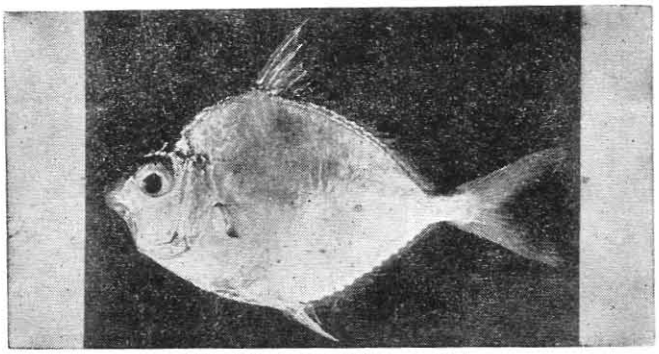


Fig. 26. *Leiognathus equulus.*

Scientific Name	:	*Leiognathus equulus*
Vernacular Name	:	'Porumand kaaral'
Gear	:	Trawl net/Gill net
Peak period of occurrence	:	Throughout the year
Depth of occurrence	:	10 - 25 m
Length range in commercial fishery	:	125 - 200 mm
Size at first maturity	:	—
Spawning season	:	Jan. - Mar. and May

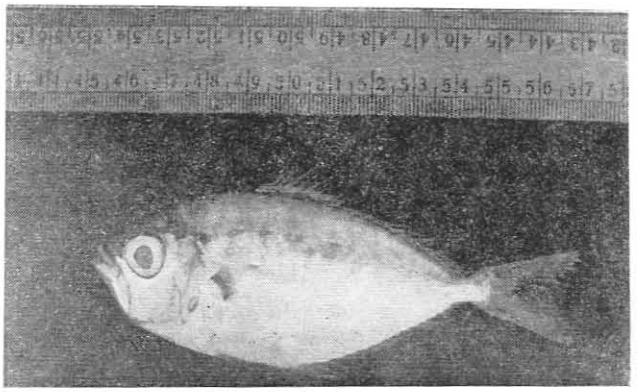


Fig. 27. *Gazza minuta.*

Scientific Name	:	*Gazza minuta*
Vernacular Name	:	'Kuthipu kaaral'
Gear	:	Trawl net/Shore seine
Peak period of occurrence	:	Throughout the year
Area	:	Gulf of Mannar
Depth of occurrence	:	7–20 m
Length range in commercial fishery	:	45 – 115 mm
Size at first maturity	:	—
Spawning season	:	Jan. – Apr. and Aug. - Dec.

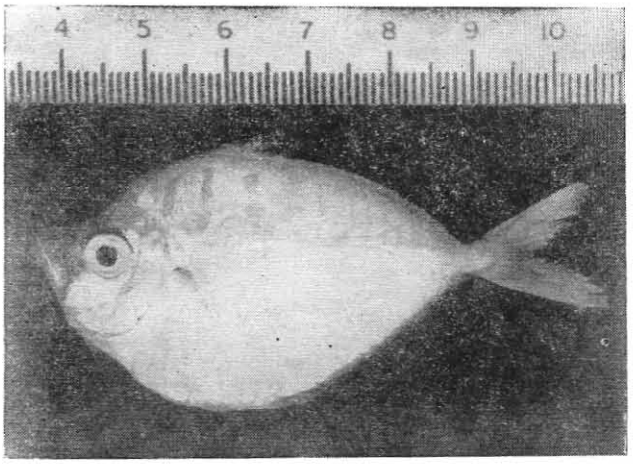


Fig. 28. *Secutor ruconius.*

Scientific Name	:	*Secutor ruconius*
Vernacular Name	:	'Pottu kaaral'
Gear	:	Trawl net/Shore seine
Peak period of occurrence	:	Throughout the year
Depth of occurrence	:	5 – 20 m
Length range in commercial fishery	:	40 – 50 mm
Size at first maturity	:	45 mm
Spawning season	:	Oct. – Dec.

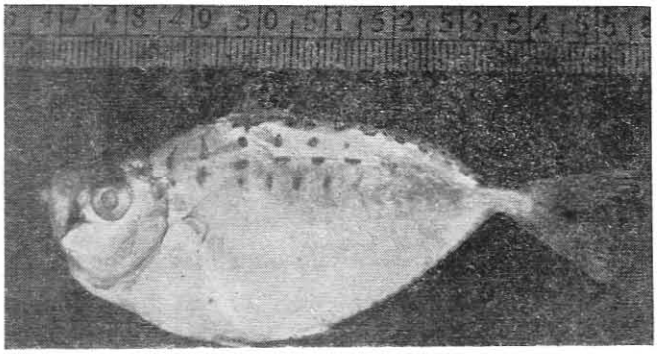


Fig. 29. *Secutor insidiator.*

Scientific Name	:	*Secutor insidiator*
Vernacular Name	:	'Kaana kaaral'
Gear	:	Trawl net/Gill net
Peak period of occurrence	:	Throughout the year
Depth of occurrence	:	7-20 m
Length range in commercial fishery	:	15 - 85 mm
Size at first maturity	:	70 mm
Spawning season	:	Oct. - Feb.

SCOMBRIDAE

Popular English Name	:	Indian mackerel
Vernacular Name (Tamil)	:	'Kumula'
Annual average catch	:	32 t
Percentage in total catch	:	43
Fishing methods and their contribution	:	Drift gill net : 23%
		Shore seine : 20%

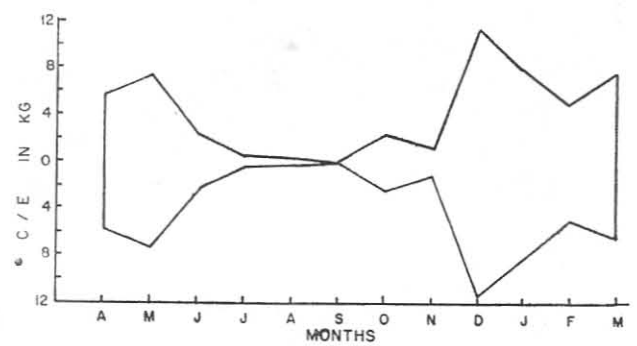


Fig. 30. Seasonal abundance of mackerel in the gill net fishery.

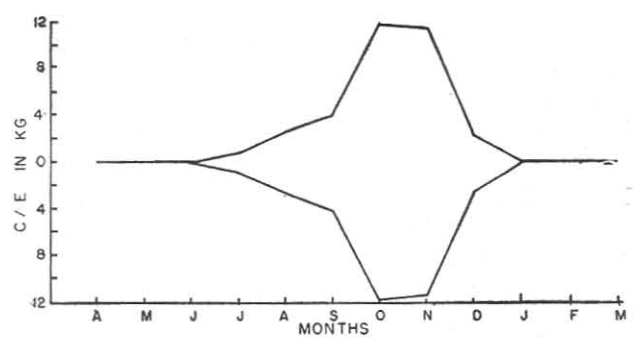


Fig. 31. Seasonal abundance of mackerel in the shore seine fishery.

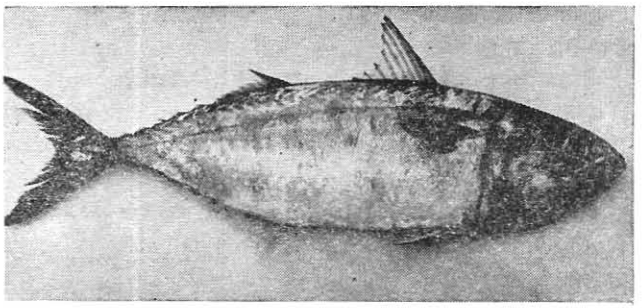


Fig. 32. *Rastrelliger kanagurta.*

Scientific Name	:	*Rastrelliger kanagurta*
Vernacular Name	:	'Kumula'
Gear	:	Drift gill net/ Shore seine
Percentage in the catch of the group	:	100
Peak period of occurrence	:	Sep. - Mar.
Depth of occurrence	:	5 - 18 m
Length range in commercial fishery	:	220 - 240 mm
Size at first maturity	:	—
Spawning season	:	Jun. - Jul. and Jan. - Mar.

SERRANIDAE, SIGANIDAE, SCARIDAE AND LETHRINIDAE

Popular English Name	:	Perches
Vernacular Name (Tamil)	:	'Kalava'/'Oramin'/ 'Kilinjan'/'Velamin'
Annual average catch	:	260.7 t

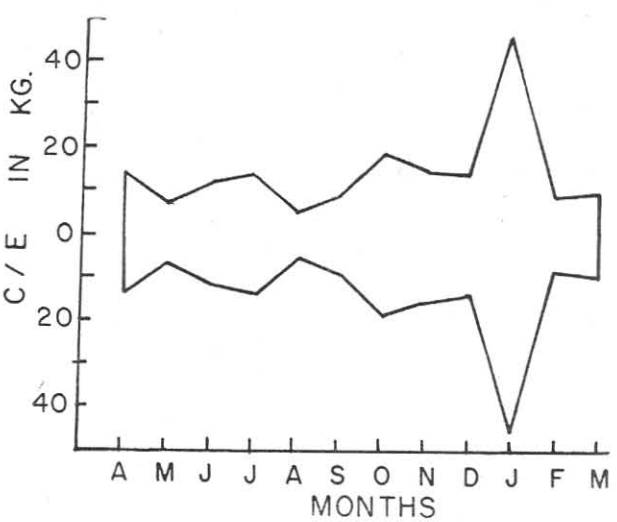


Fig. 33. Seasonal abundance of perches in perch trap.

Percentage in total catch : 0.46
Fishing methods and their contribution : Hooks & line : 80.9%
Trap : 19.1%

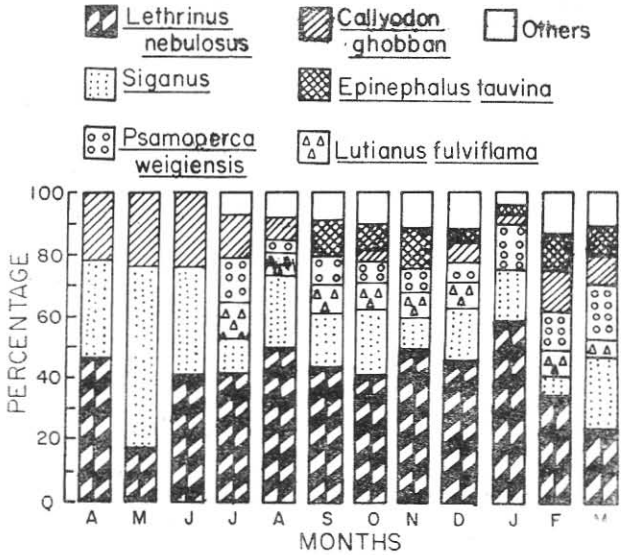


Fig. 34. Monthly species composition of perches in the perch trap.

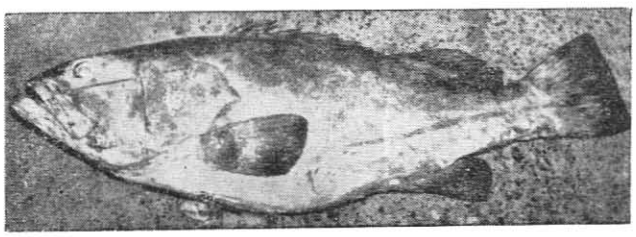


Fig. 35. *Epinephelus tauvina.*

Scientific Name : *Epinephelus tauvina*
Vernacular Name : 'Pulli Kalava'
Gear : Trap/Hooks & line
Percentage composition in the catch of the group : Trap : 3.9
Hooks & line : 16
Peak period of occurrence : Oct. – Mar.
Depth of occurrence : 10 – 30 m
Length range in commercial fishery : 180 – 790 mm
Size at first maturity : —
Spawning season : —

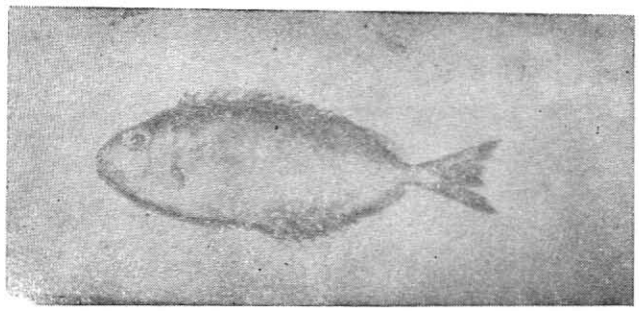


Fig. 36. *Siganus canaliculatus.*

Scientific Name : *Siganus canaliculatus*
Vernacular Name : 'Oramin'
Gear : Trap/Hooks & line
Percentage composition in the gear : Trap : 19.9
Hooks & line : 3.0
Peak period of occurrence : Oct. – May
Depth of occurrence : 2–5 m
Length range in commercial fishery : 150 – 300 mm
Size at first maturity : —
Spawning season : —

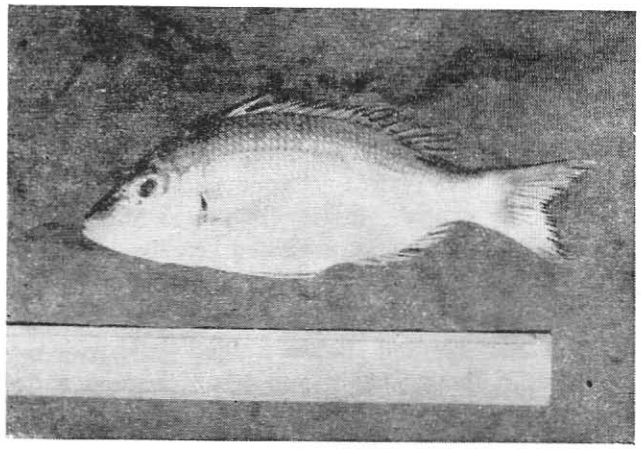


Fig. 37. *Lethrinus nebulosus.*

Scientific Name : *Lethrinus nebulosus*
Vernacular Name (Tamil) : 'Velamin'
Gear : Trap/Gill net/ Hooks & line/ Trawl net
Percentage composition in the catch of the group : Trap : 45.7
Gill net : 16.0
Hooks & line : 28.0
Peak period of occurrence : Oct. – Mar.
Depth of occurrence : 10 – 30 m

Length range in commercial fishery : 70 – 320 mm
Size at first maturity : —
Spawning season : —

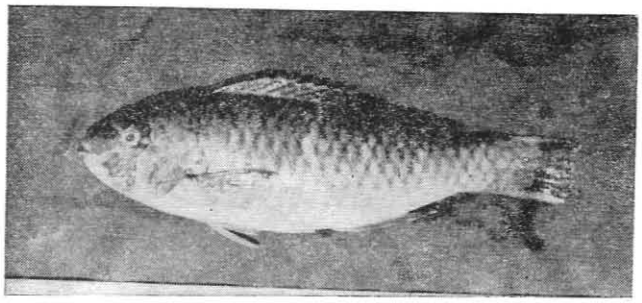


Fig. 38. *Callyodon ghobban.*

Scientific Name : *Callyodon ghobban*
Vernacular Name : 'Kilinjan'
Gear : Trap/Hooks & line
Percentage composition in the catch of the group : Trap : 8.9
Peak period of occurrence : Nov. – May
Depth of occurrence : 2 – 5 m
Length range in commercial fishery : 150 – 300 mm
Size at first maturity : —
Spawning season : —

MARINE FISH CALENDAR

XIII. MINICOY*

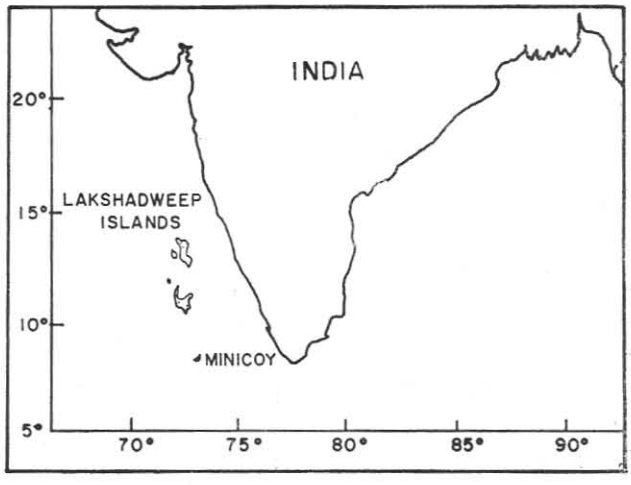
P. P. Pillai, G. Gopakumar and K. K. Kunhikoya
Minicoy Research Centre of CMFRI, Minicoy

Introduction

Despite the fact that tuna fishery at Minicoy (Long. 73° 00′ E, Lat. 8°17′ N) has been reported earlier, the seasonality of total marine fish production and trend of effort is little known. In view of this a 'Marine Fish Calendar' for Minicoy is presented here based on the data collected during April, 1984 to March, 1987.

Pole and line and surface trolling gears were responsible for about 95.85% and 4.14% respectively of the total fish landed; catch by hooks and line was negligible (0.01%). Trend of effort indicate that pole and line operations are more prevalent during post and premonsoon seasons, whereas maximum effort by troll line recorded was during monsoon months. Productive period for pole and line fishery is during October–May and for surface trolling June to September with a secondary maximum in February.

Pooled average C/E by pole and line fishery also indicate the same trend of that of the effort with primary peak during November-December and secondary one during March–April period. Catch per effort trend for troll line fishery was more or less uniform throughout the period eventhough maximum effort expended was during the monsoon months. High catch rate recorded during February was the reflection of the effort put in during February, 1986.



In the pole and line fishery, skipjack tuna *(Katsuwonus pelamis)* contributed, on an average, about 90% of the total marine fish catch. Yellowfin tuna *(Thunnus albacares)* represented by sub-adults (young) occurred

* Consolidated by N. Gopinatha Menon and K. Balachandran, CMFRI, Cochin.

mainly during the postmonsoon period. Other components of the catch included rainbow runner *(Elagatis bipinnulatus)*, little tuna *(Euthynnus affinis)*, dolphin fish *(Coryphaena hippurus)* and small pelagic sharks in their order of abundance.

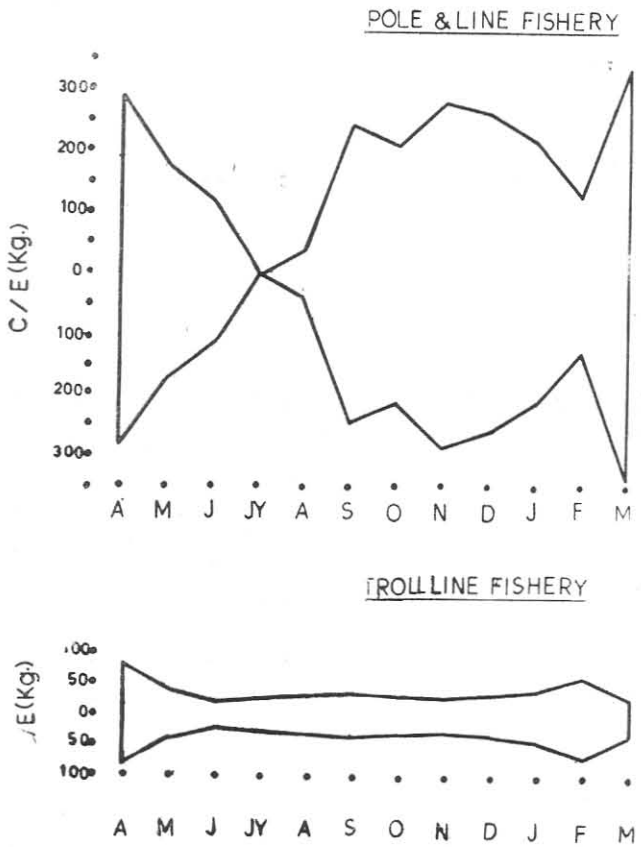


Fig. 1. Seasonal abundance of pole and line and troll line fishery at Minicoy.

Species diversity was high in the troll line catches; average annual pattern of occurrence of different species in their order of abundance was: yellowfin tuna (sub-adults 38.7%), skipjack tuna (23.5%), *Acanthocybium solandri* (wahoo) (10.4%), pelagic sharks (7.3%), *Istiophorus platypterus* (sail fish) (5.4%), *Caranx* sp. (3.9%), *Elagatis bipinnulatus* (2.3%), *Sphyraena* sp. (1.8%), *Euthynnus affinis* and *Auxis thazard* (0.4%), *Gymnosarda unicolor* (0.4%), *Coryphaena hippurus* (0.4%) and others (5.5%). A noticeable feature in the troll line fishery was the abundant occurrence of wahoo during postmonsoon months and young yellowfin tuna during premonsoon months.

Factors such as sea surface temperature, surface currents, wind pattern, availability and abundance of live-baits, tuna behaviour in the fishing ground and presence of floatsam objects exert considerable influence on the fluctuation in the availability of tunas which is the mainstay of marine fishery at Minicoy.

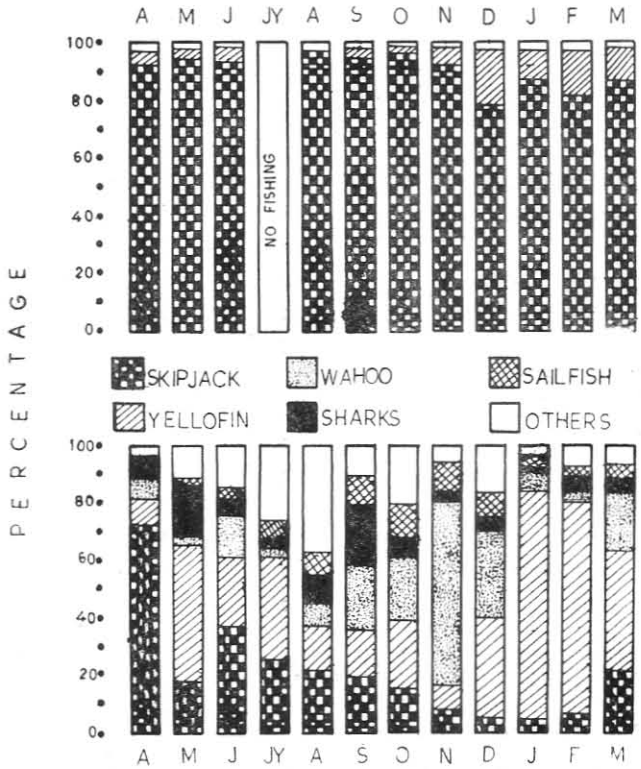


Fig. 2. Monthwise species composition of pole and line fishery and troll line fishery at Minicoy (upper panel – pole and line fishery and lower panel - troll line fishery).

CARANGIDAE

Popular English Name	:	Rainbow runner
Vernacular Name (Mahl)	:	'Maniya'
Annual average catch	:	2.44 t
Percentage in total catch	:	0.37
Fishing methods and their contribution	:	Pole & line : 73.7%
		Troll line : 26.3%

CORYPHAENIDAE

Popular English Name	:	Dolphin fish
Vernacular Name (Mahl)	:	'Fiyala'
Annual average catch	:	0.17 t
Percentage in total catch	:	0.03
Fishing methods and their contribution	:	Pole & line : 100%

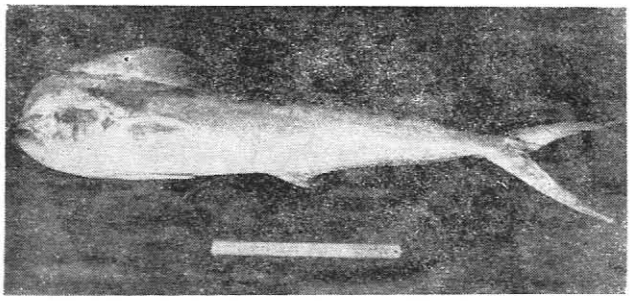


Fig. 3. *Coryphaena hippurus.*

Scientific Name	:	*Coryphaena hippurus*
Vernacular Name	:	'Fiyala'
Gear	:	Pole & line
Percentage in the catch of the group	:	100
Peak period of occurrence	:	Nov.
Depth of occurrence	:	Surface
Length range in commercial fishery	:	550 – 580 mm
Size at first maturity	:	—
Spawning season	:	—

GALEIDAE

Popular English Name	:	Sharks
Vernacular Name (Mahl)	:	'Katta fulimiaru'
Annual average catch	:	2.12 t
Percentage in total catch	:	0.33
Fishing methods and their contribution	:	Troll line : 95%
		Pole & line : 5%

ISTIOPHORIDAE

Popular English Name	:	Sail fish
Vernacular Name (Mahl)	:	'Funhibaru'
Annual average catch	:	1.50 t
Percentage in total catch	:	0.23
Fishing methods and their contribution	:	Troll line : 100%

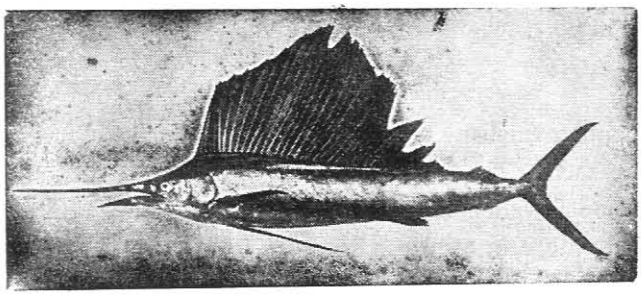


Fig. 4. *Istiophorus platypterus.*

Scientific Name	:	*Istiophorus platypterus*
Vernacular Name	:	'Funhibaru'
Gear	:	Troll line
Percentage in the catch of the group	:	100
Peak period of occurrence	:	Jul. – Nov.
Depth of occurrence	:	Surface
Length range in commercial fishery	:	700 – 1,250 mm
Size at first maturity	:	—
Spawning season	:	—

SCOMBRIDAE

Popular English Name	:	Tuna/Wahoo
Vernacular Name (Mahl)	:	'Kalibila'/'Kannali'/ 'Latti'/'Ragondi'/ 'Digu'
Annual average catch	:	645.09 t
Percentage in total catch	:	98.96
Fishing methods and their contribution	:	Pole & line : 96.9%
		Troll line : 3.1%

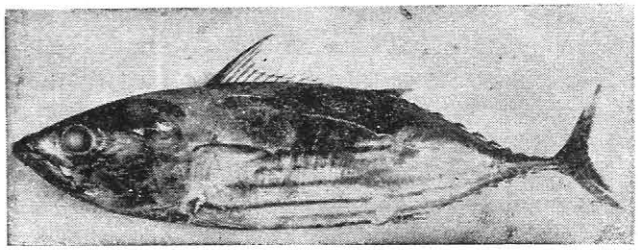


Fig. 5. *Katsuwonus pelamis.*

Scientific Name	:	*Katsuwonus pelamis*
Vernacular Name	:	'Kalibila'
Gear	:	Pole & line/Troll line
Percentage in the catch of the group	:	88.60
Peak period of occurrence	:	Dec. – Apr.
Depth of occurrence	:	—
Length range in commercial fishery	:	300 – 720 mm
Size at first maturity	:	430 mm
Spawning season	:	Oct. – Mar. and May – Oct.

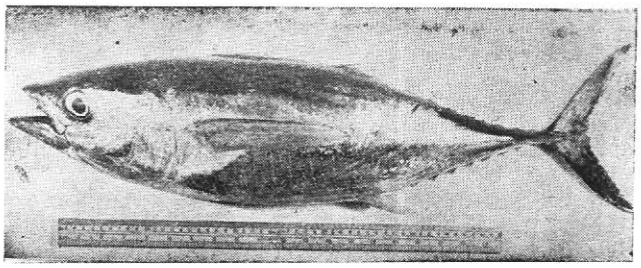


Fig. 6. *Thunnus albacares.*

Scientific Name	:	*Thunnus albacares*
Vernacular Name	:	'Kannali'
Gear	:	Pole & line/Troll line
Percentage in the catch of the group	:	10.79
Peak period of occurrence	:	Dec. – May
Depth of occurrence	:	Surface
Length range in commercial fishery	:	320 – 1,020 mm
Size at first maturity	:	—
Spawning season	:	—

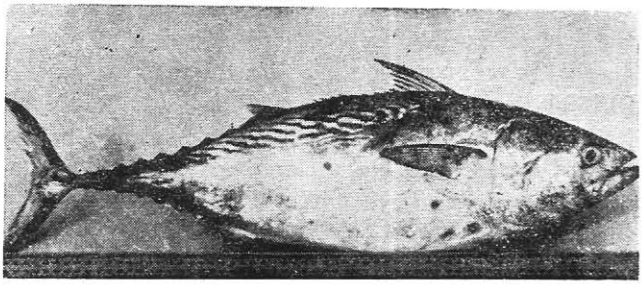


Fig. 7. *Euthynnus affinis.*

Scientific Name	:	*Euthynnus affinis*
Vernacular Name	:	'Latti'
Gear	:	Pole & line
Percentage in the catch of the group	:	0.13
Peak period of occurrence	:	Dec. – Apr.
Depth of occurrence	:	Surface
Length range in commercial fishery	:	460 – 580 mm
Size at first maturity	:	—
Spawning season	:	—

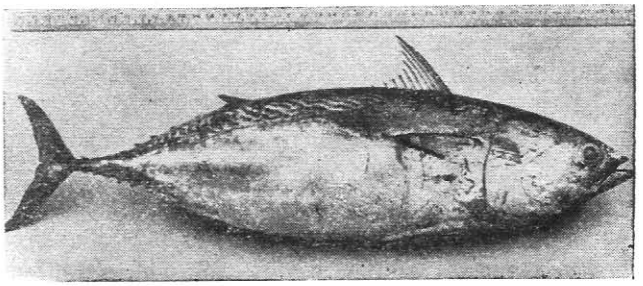


Fig. 8. *Auxis thazard.*

Scientific Name	:	*Auxis thazard*
Vernacular Name	:	'Ragondi'
Gear	:	Pole & line/Troll line
Percentage in the catch of the group	:	0.04
Peak period of occurrence	:	Dec. – Apr.
Depth of occurrence	:	—
Length range in commercial fishery	:	350 – 370 mm
Size at first maturity	:	—
Spawning season	:	—

SPHYRAENIDAE

Popular English Name	:	Barracuda
Vernacular Name (Mahl)	:	'Fandiarutholi'
Annual average catch	:	0.51 t
Percentage in total catch	:	0.08
Fishing methods and their contribution	:	Troll line : 100%

The author of article 2 in MFIS No. 88 for October, 1988 informs that the state-wise, quarter-wise and district-wise data for oil sardine landings have been compiled by Shri K. C. Yohannan of the Fisheries Resources Assessment Division of CMFRI.

—EDITORS

RECENT DEVELOPMENTS IN PRAWN AND FISH CULTURE IN ANDHRA PRADESH

M. S. Muthu, K. A. Narasimham, K. Gopalakrishna* and A. K. Sharma**

Central Marine Fisheries Research Institute, Cochin

The pace of development in the brackishwater prawn culture and intensive fresh water fish culture in Andhra Pradesh from 1980 onwards has been phenomenal compared to other states in the country. The abundant water resources in the deltaic regions of the Godavari and Krishna rivers, the enterprising nature of the people, the insatiable demand for fresh water fish in West Bengal and the expanding export market for frozen prawns led to a virtual explosion in fish and prawn culture activities in the State. This tremendous pace of progress received a set back in the middle of August, 1986 when the flood waters of the Godavari breached the bunds of the culture ponds leading to the loss of fish and prawn stocks.

In this context, as members of a team constituted by the Indian Council of Agricultural Research, the authors toured during early September, 1986 the districts of East Godavari, West Godavari and Krishna with the objectives: (1) to prepare a contingent plan for fisheries development, particularly for brackishwater aquaculture and (2) to identify the areas where the fish farmers need assistance by way of inputs and technology so that the concerned agencies can render necessary assistance.

Brackishwater prawn culture

Since 1982 there has been rapid increase in the culture of tiger prawn *Penaeus monodon* in brackishwater ponds in the coastal areas of East Godavari, West Godavari and Krishna districts. Polekurru Estate and Amalapuram Taluk in East Godavari, Dharbarevu, Vemuladevi, Vempa, Dussumarru, Perupalem, Mutyala palli and Losari in West Godavari and Divi, Machilipatnam and Bantumilli taluks in Krishna District are the important areas where pawn culture ponds are developed. The estimated areas under prawn culture are given in Table 1.

Table 1. *Extent (ha) of brackishwater prawn farms*

Districts	Govt./ Co-op.	Private	Total
East Godavari	167.0	112.5	279.5
West Godavari	207.0	350.0	557.0
Krishna	15.0	318.8	333.8
Total	389.0	781.3	1,170.3

East Godavari: At Polekurru the prawn farms are being developed in the mangrove area, adjoining the brackishwater creeks which are rich in prawn seed resources. The seed of *P. mondon* are collected from these creeks and sold at Rs. 30–60/1,000. A very successful 30 ha pump-fed farm has achieved a production of 1,000 kg/ha/per crop of 7–8 months duration with an average of 650 kg/ha/crop. Here only one crop per year is feasible as the salinity touches > 40 ppt during the summer months. Prawn seed are stocked 50,000/ha and harvested at 25–30 g size. Ponds are fertilised with cow dung and superphosphate and the prawns are fed with blood clam meat, trash fish, dried prawn head waste *etc.*

The Bay of Bengal Programme (BOBP) had developed a 5 ha prawn farm at Polekurru and their experiment has highlighted the advantages of growing prawns in pump-fed ponds over tide-fed ponds in this region. In the Polekurru area there are about 1,000 ha of land that can be developed into pump-fed brackishwater ponds.

In Amalapuram Taluk, pump-fed brackishwater farms covering 40 ha have been developed by local entrepreneurs. Here the annual salinity ranges from 12 to 20 ppt and *P. monodon* collected from nearby creeks are stocked in the ponds and fed with rice bran, groundnut oil cake and cotton seed cake. The prawns, on harvest attained a size of 30–40 nos/kg and the production rate was low at 250 kg/ha/4 months. The low production may be due to the absence of animal protein in the feed given to the prawns.

* Brackishwater fish farm, Central Institute of Fisheries Education, Kakinada, Andhra Pradesh.

** Freshwater fish farm, Central Institute of Fisheries Education, Balabhadrapuram, E.G. District, Andhra Pradesh.

Fig. 1

Fig. 2

Fig. 3

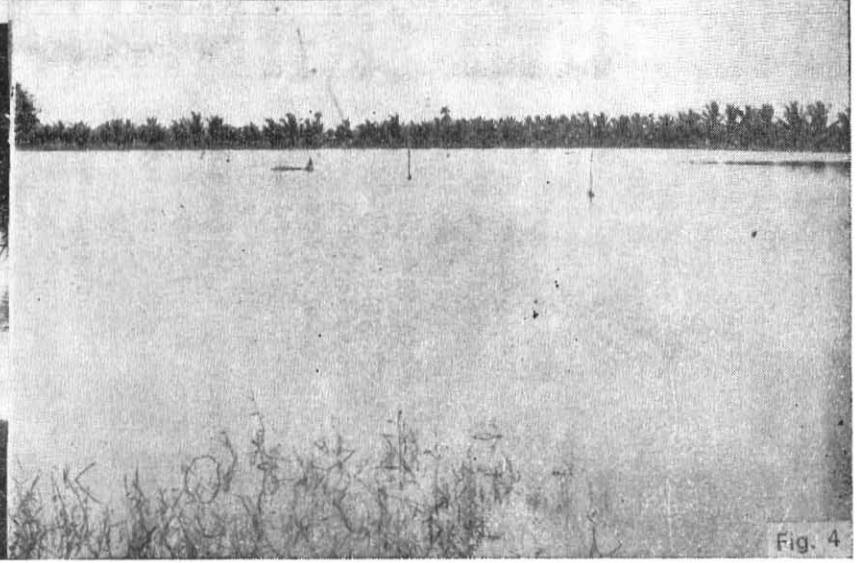


Fig. 4

Fig. 1. Nursery ponds for raising carp fingerlings in East Godavari District.
Fig. 2. Fish ponds bordering the agricultural drains near Bhimavaram.
Fig. 3. Farmers show keen interest in learning about fish culture.
Fig. 4. A large fish pond in Kolleru region.

West Godavari: In this district the areas adjoining the Gunupudi drain and Upputeru have saline soil and are not suitable for paddy cultivation. Hence the paddy field owners are rapidly converting them into prawn culture fields especially after an enterprising farmer of Dussumarru in 1982 obtained 250 kg of large (20–25 nos/kg head on) *P. monodon* in 4 months culture period from a 0.4 ha paddy field which was converted into a prawn culture pond. Since then, 300 ha of prawn ponds have sprung up in Chinnagaruvu, Vempa, Dussumarru and Perupalem. All these ponds have been developed by the agriculturists with their own resources. The ponds vary in size from 0.5 to 3.0 ha and have a 10 m wide and 60 cm deep peripheral trench and a central platform. The ponds are pump-fed, maintaining a depth of 30 to 60 cm over the platform and 90 to 120 cm in the trenches. Cement pipes fixed in the bunds are used for draining the ponds. The cost of construction is said to be Rs. 12,500–15,000/ha. The problem with this area is that the prawn production depends on the salt content of the soil rather than the salinity of the water which is almost fresh except during May–June when it is around 5–10 ppt. After the first food crop in 1982 prawn production declined in succeeding years to 200–250 kg/ha/crop mainly due to loss of soil salinity by leaching. This problem can be overcome by utilizing the sub-soil water (which is found to be brackish even during the monsoon season) to replenish the ponds when the drain water is almost fresh. At Dussumarru, from another 3 ha pond from which people were taking freshwater for drinking purposes, the authors collected 12–15 cm size *P.monodon*. The pond was not stocked with prawn seed, but was totally submerged during the floods. This was a remarkable example of *P. monodon* surviving in freshwater ponds where the soil is slightly saline.

The 207 ha District Rural Development Agency (DRDA) project established at Vemuladevi near Narsapur in 1980–'81 has not progressed well due to wrong selection of site, defective construction and lack of co-operation from the beneficieries. The ponds are now not in proper condition.

Krishna: In Machilipatnam Taluk, at Tallapaleru there are 3 ha of ponds under the Marine Products Export Development Authority (MPEDA), 12 ha under DRDA project and another 30 ha to be developed by the same agency. At Kanur-Pedapatnam, on the banks of the Lasbandha creek about 72 ha of mangrove area is to be developed into prawn ponds under the centrally sponsored scheme for the weaker sections. In the neighbourhood, private parties are developing another 40 ha of lands into prawn culture ponds. Abundant prawn seed, both of *P. monodon* and *P. indicus* are collected from the creeks and the peak periods of abundance of the seed of *P. monodon* are July–August and October–November.

In Divi Taluk the private farmers have constructed about 100 ha of prawn ponds and are culturing *P. monodon*. In Machilipatnam and Divi taluks the average production rate is 350 kg/ha/4–5 months in the case of *P. monodon* (20–25 g harvest size) and 450 kg/ha/4 months for *P. indicus* (12–15 g harvest size).

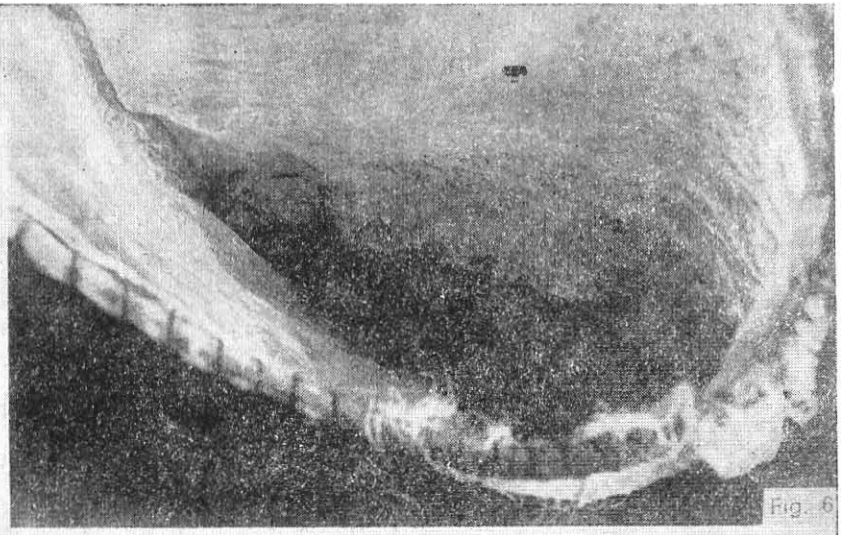
In Bantumilli Taluk, adjoining the Pedalanka drain the agriculturists are developing about 200 ha of land into prawn farms. The soil is saline and unsuitable for paddy cultivation and the salinity of the water in the Pedalanka drain ranges from 0–15 ppt. The ponds vary in size from 1–3 ha and are pump-fed. An interesting case of *P. indicus* culture in low salinity ponds is reported from this area. A farmer of Moolalanka village cultured *P. indicus* in a 1.6 ha pond for 4 months when the salinity in the pond was only 4.5 ppt. The prawns were stocked as 10 mm postlarvae and fed with cotton seed oil cake and rice bran. The harvest of *P. indicus* was 800 kg of size 50 - 80 nos/kg head on.

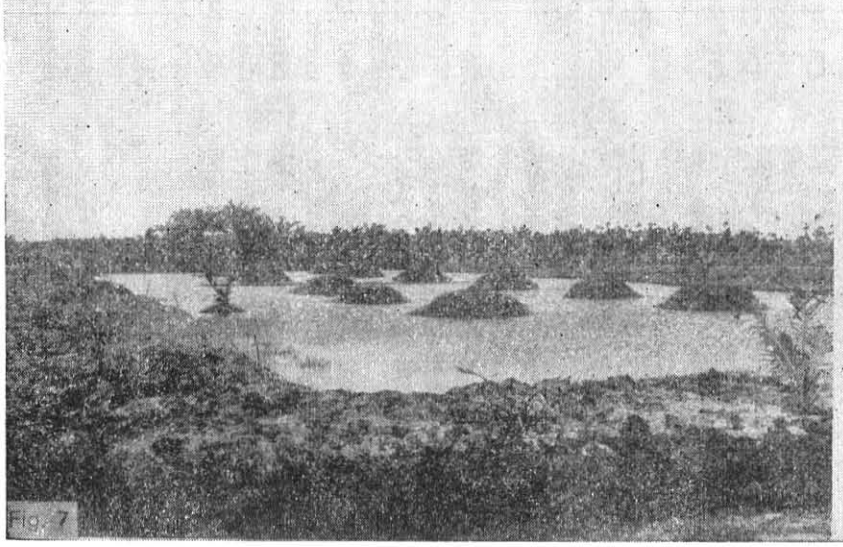
Freshwater fish culture

In the three districts there are no statistics regarding the acerage under freshwater fish culture. Based on enquiries it is estimated that atleast 30,000 ha of freshwater fish ponds have been developed in the state. There are about 150 fish seed farms covering about 250 ha in the private sector.

In the Kolleru Lake alone 869 ha under co-operative sector and about 10,000 ha in the private sector have been developed for freshwater fish culture.

The paddy fields adjoining the major irrigation canals in these districts are generally water logged during the major part of the year and are less productive than the neighbouring paddy fields. The farmers have converted these water logged fields into fish ponds by digging peripheral trenches (10–15 m wide and 1 m deep) and utilising the dug up soil to construct the bunds, thus minimising the cost. The undisturbed central portion of the pond remains as the platform over which 90 cm of water is maintained by pumping from the irrigation canals. The 180 cm water in the peripheral





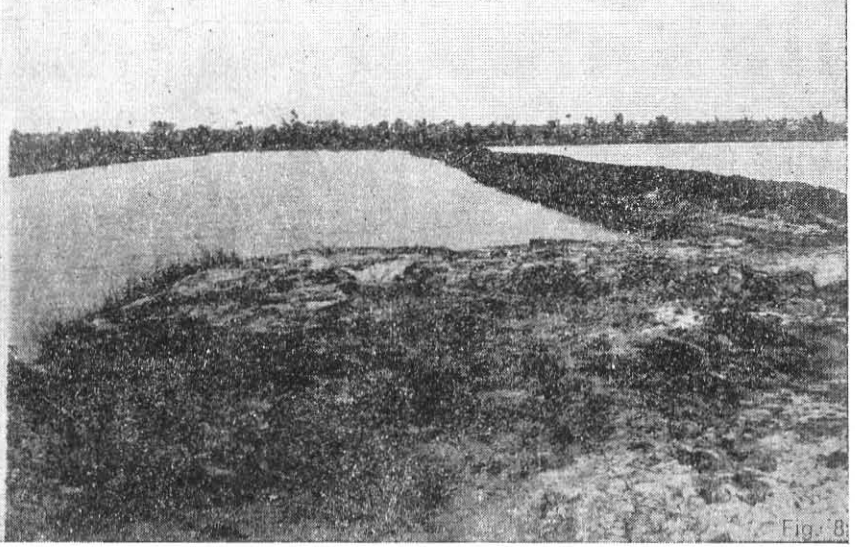


Fig. 5. Tiger prawn seed being collected from backwater creek near Perupalam.
Fig. 6. Tiger prawn seed in a dip net.
Fig. 7. A prawn pond with heaps of excavated earth inside the pond to reduce cost of construction.
Fig. 8. Prawn ponds in Bantumilli.

trenches provides protection to the fish from high temperature in summer. The fish are fed with a mixture of rice bran, deoiled rice bran and cotton seed oil cake/ ground nut oil cake. The feed is kept in bags (used for fertilizers) with holes burned in them. The bags are tied to poles planted in the ponds. The fish ponds vary in size from 1–20 ha. The larger ponds are in the Kolleru Lake.

Many private fish seed farms in the three districts have hatcheries for fish spawn production through induced breeding of major carps and common carp. Breeders are maintained in large, 2.4 to 3 m deep ponds. Depending upon the magnitude of the operation, the farmers use simple hapas, tin jar hatcheries or Chinese type hatcheries for producing the spawn. The hatchery operations are confined to about two months from the middle of June to the middle of August, when the breeders become mature.

The spawn is purchased by the small farmers from the hatcheries and reared to 20–30 mm length in nurseries for about a month and then sold to the fish farmers. This has become a very lucrative business for small farmers, since the inputs and the risks are minimal. The farmers rear them in the rearing ponds upto the fingerling stage and then either sell them to other farmers or stock them in their grow-out ponds. To get the maximum price the farmers maintain the fingerlings in the rearing ponds in a stunted condition throughout the year and transfer them to the grow-out ponds when they are 200–500 g in size. The large yearlings are stocked in low densities (1,500–2,000/ha) in the grow-out ponds so that they attain a marketable size of 1.5–2 kg within a period of eight months. Production from the well managed ponds amounts to 5,000 kg/year. Average production is around 3,000 kg/ha/year. All the fish farmers are dependent on the Calcutta market where the wholesale price of fish is around Rs. 40/kg during the festival season. Fish are packed in ice in baskets and transported by road to Calcutta; the journey takes 36-40 hrs.

In short, fish farming in these three districts has became a well organised and lucrative industry with different groups of people specialising in activites such as hatchery production of seed, nursery rearing and farming the fingerlings to marketable size.

Technical inputs required by the farmers

Apart from the state government, which is primarily concerned with the developmental activites through the co-operative sector, the MPEDA and the Central Institute of Fisheries Education (CIFE) have in no small measure contributed to the development of aquaculture in the three districts of Andhra Pradesh. For prawn culture, the former is extending assistance to farmers in the preparation of project reports, providing subsidy for pond construction, monitoring the culture ponds and rendering technical assistance. The CIFE is conducting training courses to the private farmers and those covered by the co-operative sector giving them technical guidance both in brackishwater prawn and fresh water fish culture. Nevertheless, to sustain the excellent progress made the following technical inputs are the urgent need of the hour.

Inputs for prawn culture

At present the farmers are dependent on the seed collected from the wild. The supply is irregular and the farmers are at the mercy of a few people who have monopolised the prawn seed collection and charge exhorbitant prices. Also the prawn seed are not sorted out properly and are usually mixed with the seed of predatory fishes such as *Lates, Elops etc.* Hence there is an immediate need to set up prawn hatcheries along the coast to meet the great demand for prawn seed. The Andhra Pradesh State Fisheries Department, CMFRI and MPEDA are seized of this problen and have taken steps to establish prawn hatcheries in the State. The CMFRI has developed the technology indigenously for hatchery production of prawn seed.

The next important input for promoting prawn culture is to produce prawn feed in pellet form economically by utilizing locally available inexpensive raw materials. At present vast majority of the prawn farmers, following the practice of the freshwater fish farmers, are feeding the prawns with a mixture of rice bran, deoiled rice bran, groundnut oil cake and cotton seed oil cake. This vegetarian diet is not sufficient for the prawns which are mixed feeders and injest a substantial amount of animal matter under natural conditions. By incorporating animal protein in the diet the growth of the prawns can be accelerated. We have very little information on the nutritional requirements of the prawns and the conversion ratio of the existing conventional feeds. The CMFRI made some progress in this direction and has evolved practical diets for postlarvae, juveniles and adult prawns. However, there is need to intensify this work and evaluate the feeds under field conditions prevailing in Andhra Pradesh. There is