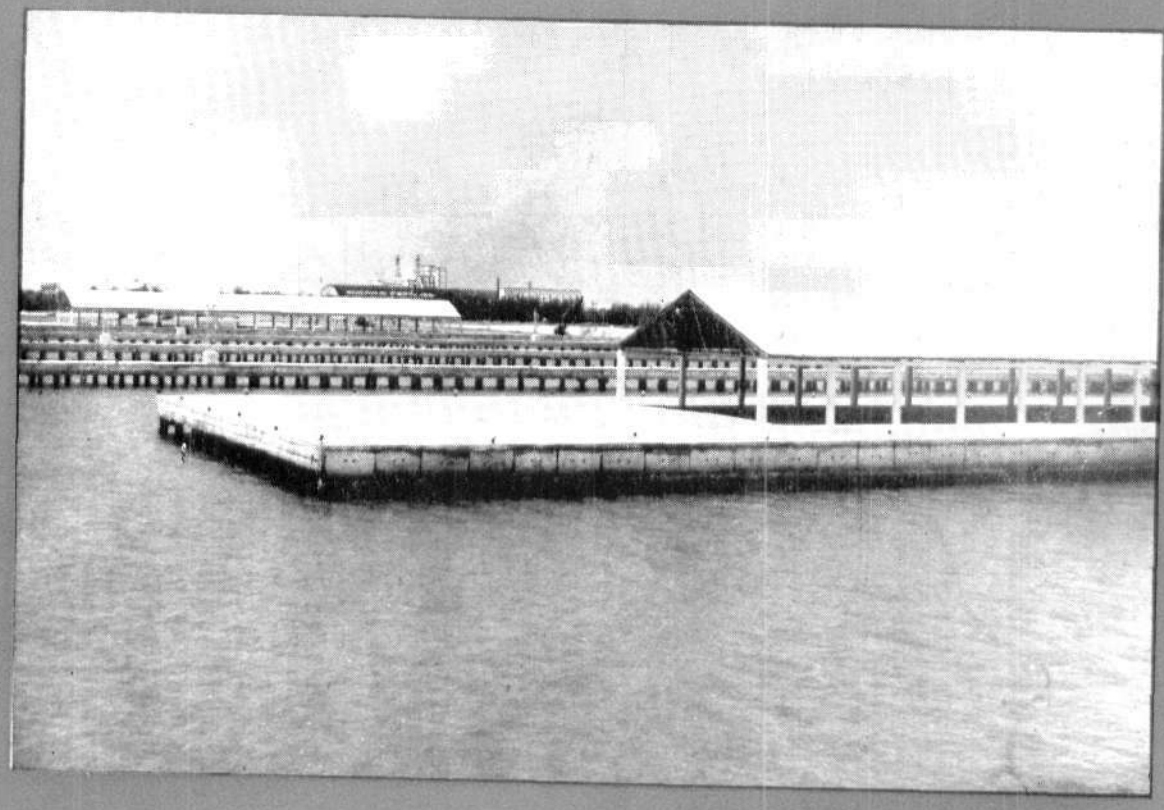
MARINE FISHERIES INFORMATION SERVICE



No. 83
MAY 1988

Technical and Extension Series

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE
COCHIN, INDIA

INDIAN COUNCIL OF AGRICULTURAL RESEARCH

THE MARINE FISHERIES INFORMATION SERVICE: Technical and Extension Series envisages the rapid dissemination of information on marine and brackish water fishery resources and allied data available with the National Marine Living Resources Data Centre (NMLRDC) and the Research Divisions of the Institute, results of proven researches for transfer of technology to the fish farmers and industry and of other relevant information needed for Research and Development efforts in the marine fisheries sector.

Abbreviation – *Mar. Fish. Infor. Serv., T & E Ser.*, No. **83**: 1988

CONTENTS

Front cover photo:

The newly-constructed fisheries harbour complex at Kakinada.

Back cover photo:

The present trawler landing centre in Upputeru canal at Kakinada.

MARINE FISH CALENDAR

V. KAKINADA*

V. Sriramachandra Murty, M. K. Bandyopadhyay and P. Ramalingam

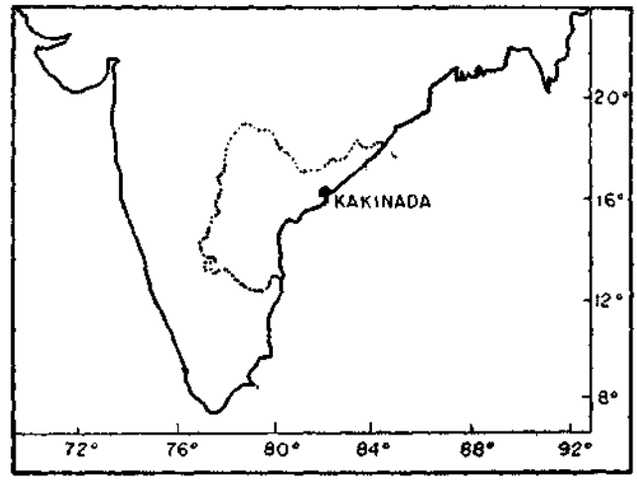
Kakinada Research Centre of CMFRI, Kakinada

Introduction

The Research Centre of the Central Marine Fisheries Research Institute at Kakinada has been carrying out investigations on various exploited marine fisheries resources of the region. As a part of these investigations, data on effort and catches of different groups of fishes have been collected from important landing centres. Commercial trawling off Kakinada was started in 1964 and since then, monitoring of catches has been carried out on a regular basis and the details of effort and catches of different groups during the period 1969–'78 were published *(Mar. Fish. Infor. Serv., T & E Ser., No.* **31**, 1981). The mechanised boats use shrimp trawl with a cod end mesh size of 15–20 mm and there is fishing round the year.

Data of the period 1981–'85 from the trawlers and 1980–'82 from indigenous gear and published information on different species from Kakinada are used for the present fish calendar. Data on effort and catch from each gear separately, of the corresponding months are pooled and the catch per unit (boat/gear) effort for each month calculated. The data are analysed separately for trawl catch from Kakinada and gill net catch from Uppada. The data of shore seine, boat seine and drag net from Uppada are pooled and considered under the head "other units".

Since a great majority of fish families are represented by several species, data on catches are collected family-wise. In the case of dominant families, however, detailed data on species composition and biology of dominant species are available. In such cases information pertaining to different species is provided in the Calendar. In case where imformation on species is not available, group-wise data under respective families are given. In certain cases family-wise data are not available and in these cases information on 2–3 closely related families are given together.



CARANGIDAE

Popular English Name	:	Scad/Horse mackerel/ Trevallies
Vernacular Name (Telegu)	:	'Paralu'/'Pilladugulu'
Annual average catch	:	1,779 t
Percentage in total catch	:	13.8
Fishing methods and their contribution	:	Trawl net : 10.2% Gill net : 3.5% Other units : 5.5%

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

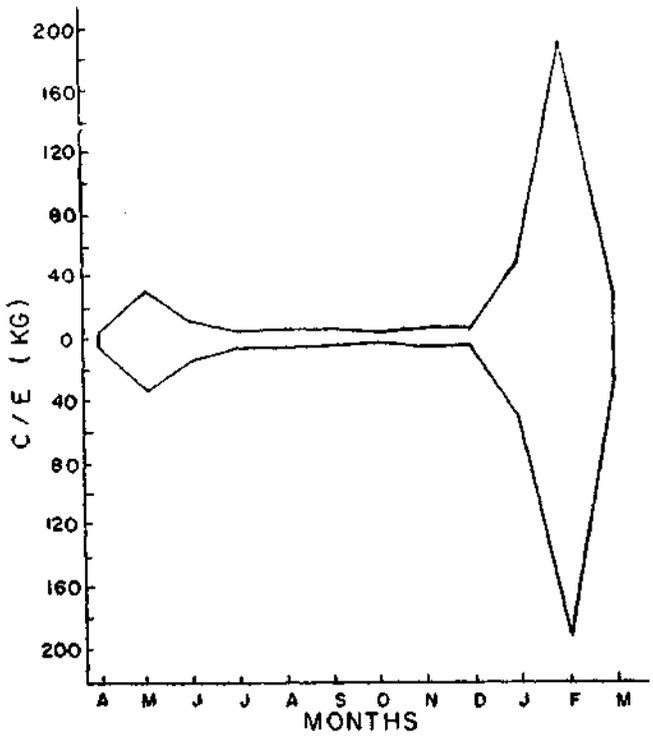


Fig. 1. Seasonal abundance of carangids in trawl catch.

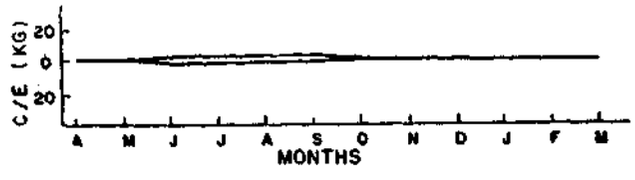


Fig. 2. Seasonal abundance of carangids in gill net catch.

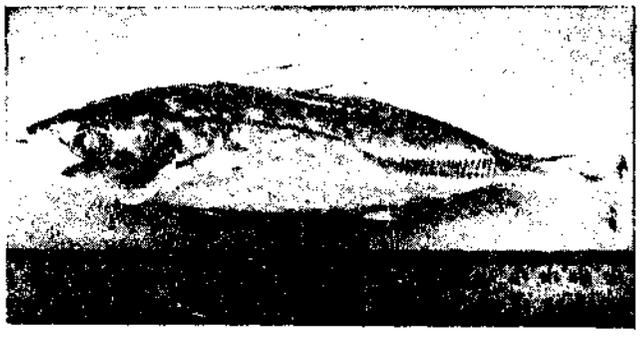


Fig. 3. *Decapterus russelli.*

Scientific Name	:	*Decapterus russelli*
Vernacular Name	:	'Pilladugulu'
Gear	:	Trawl net
Percentage in the catch of the group	:	83.0
Peak period of occurrence	:	Jan. - Apr.
Depth of occurrence	:	10 – 80 m
Length range in commercial fishery	:	52 – 217 mm
Size at first maturity	:	150 mm
Spawning season	:	Dec. – Jun.

CARCHARHINIDAE

Popular English Name	:	Sharks
Vernacular Name (Telugu)	:	'Sorralu'
Annual average catch	:	253 t
Percentage in total catch	:	2.0
Fishing methods and their contribution	:	Gill net : 13.2%
		Trawl net : 0.3%
Peak period of occurrence	:	Feb. - May and Oct. – Nov.
Depth of occurrence	:	5 – 50 m

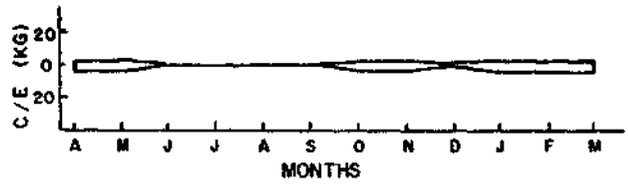


Fig. 4. Seasonal abundance of sharks in trawl catch.

CHIROCENTRIDAE

Popular English Name	:	Wolf herring
Vernacular Name (Telugu)	:	'Mulluvala'
Annual average catch	:	54 t
Percentage in total catch	:	0.4
Fishing methods and their contribution	:	Gill net : 3.6%
Peak period of occurrence	:	Jul. – Sep.
Depth of occurrence	:	3 – 70 m

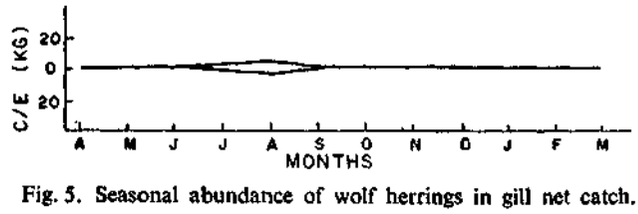


Fig. 5. Seasonal abundance of wolf herrings in gill net catch.

CLUPEIDAE

Popular English Name	:	Sardines/Lesser sardines/ Shad
Vernacular Name (Telugu)	:	'Kavallu'
Annual average catch	:	462 t
Percentage in total catch	:	3.6
Fishing methods and their contribution	:	Gill net : 11.5%
		Trawl net : 1.6%
		Other gears : 4.0%
Peak period of occurrence	:	Jan. – Nov.
Depth of occurrence	:	1 – 60 m

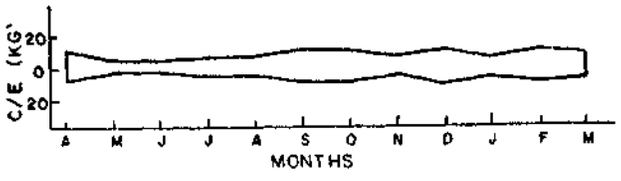


Fig. 6. Seasonal abundance of *Thryssa* in trawl catch.

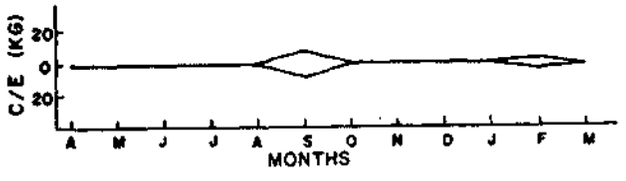


Fig. 7. Seasonal abundance of *Thryssa* in other units.

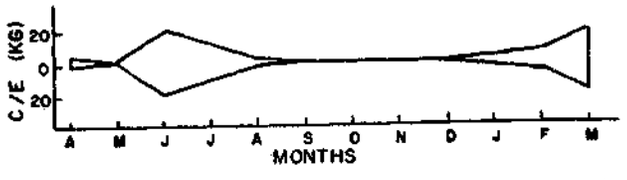


Fig. 8. Seasona abundance of lesser sardines in trawl catch.

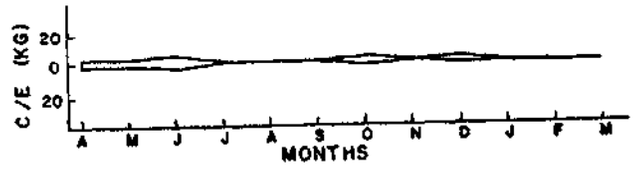


Fig. 9. Seasonal abundance of lesser sardines in gill net catch.

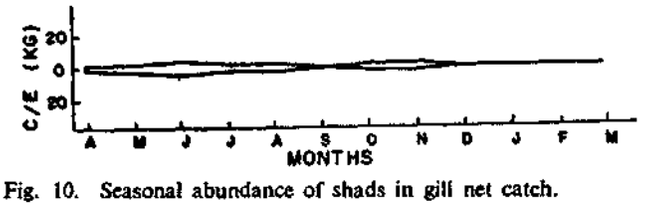


Fig. 10. Seasonal abundance of shads in gill net catch.

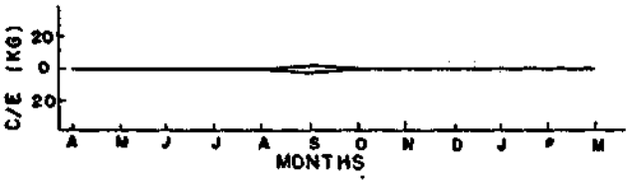


Fig. 11. Seasonal abundance of other clupieds in gill net catch.

CYNOGLOSSIDAE, SOLEIDAE, PSETTODIDAE AND BOTHIDAE

Popular English Name	:	Flat fish
Vernacular Name (Telugu)	:	'Tamnaratta'
Annual average catch	:	318 t
Percentage in total catch	:	2.5
Fishing methods and their contribution	:	Trawl net : 1.9%
Peak period of occurrence	:	Dec. – May
Depth of occurrence	:	5 – 50 m

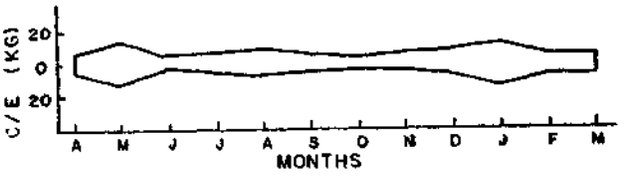


Fig. 12. Seasonal abundance of flat fishes in trawl catch.

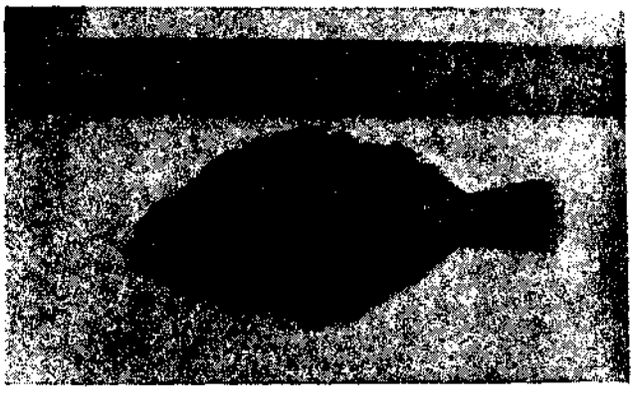


Fig. 13. *Psettodes erumei.*

Scientific Name	:	*Psettodes erumei*
Vernacular Name	:	'Yeddunalika'
Gear	:	Trawl net
Percentage in the catch of the group	:	100
Peak period of occurrence	:	Dec. - Feb.
Depth of occurrence	:	5 - 50 m
Length range in commercial fishery	:	—
Size at first maturity	:	—
Spawning season	:	—

DUSSUMIERIDAE

Popular English Name	:	Rainbow sardine
Vernacular Name (Telugu)	:	'Moravalu'
Annual average catch	:	20 t
Percentage in total catch	:	0.1
Fishing methods and their contribution	:	Gill net : 1.1% Other units : 0.9%

Fig. 14. *Dussumieria acuta.*

Scientific Name	:	*Dussumieria acuta*
Vernacular Name	:	'Moravalu'
Gear	:	Gill net/Other units
Percentage in the catch of the group	:	100
Peak period of occurrence	:	Oct. – Dec.
Depth of occurrence	:	Upto 50 m
Length range in commercial fishery	:	—
Size at first maturity	:	—
Spawning season	:	—

ENGRAULIDAE

Popular English Name	:	White bait/Anchovies
Vernacular Name (Telugu)	:	'Nettallu'/'Poravalu'
Annual average catch	:	1,104 t
Percentage in total catch	:	8.6
Fishing methods and their contribution	:	Trawl net : 6.1% Gill net : 2.0% Other units : 12.5%

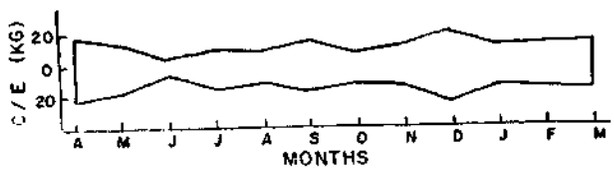


Fig. 15. Seasonal abundance of white bait in trawl catch.

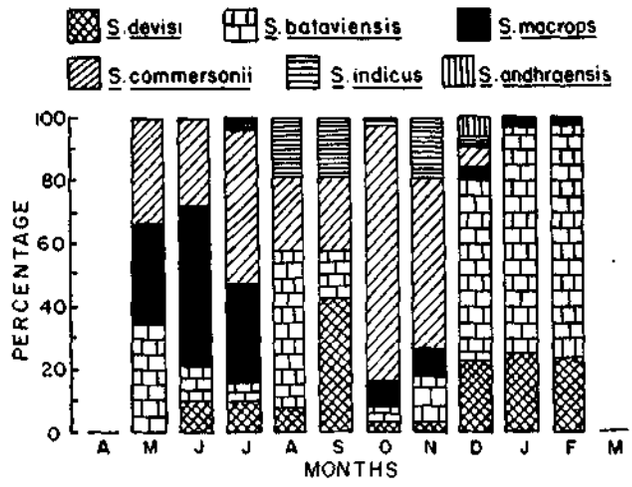


Fig. 16. Monthwise species composition of white bait in trawl catch.

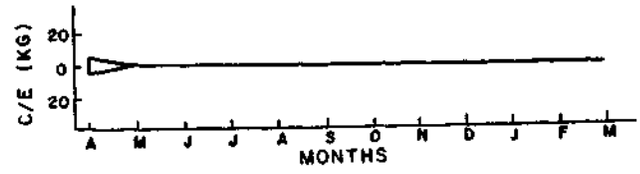


Fig. 17. Seasonal abundance of white bait in other units.

Fig. 18. *Stolephorus bataviensis.*

Scientific Name	:	*Stolephorus bataviensis*
Vernacular Name	:	'Nettallu'
Gear	:	Trawl net/Gill net/ Other units
Percentage in the catch of the group	:	41.1
Peak period of occurrence	:	Jan.–May and Jul.–Sep.
Depth of occurrence	:	Upto 50 m
Length range in commercial fishery	:	40 - 109 mm
Size at first maturity	:	—
Spawning season	:	—

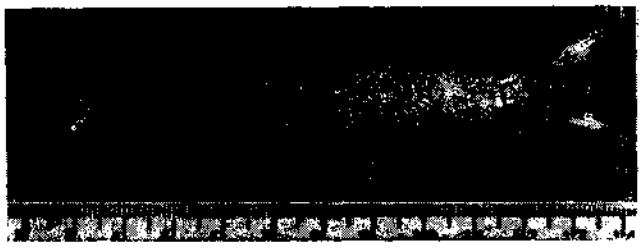


Fig. 19. *Stolephorus commersonii.*

Scientific Name	:	*Stolephorus commersonii*
Vernacular Name	:	'Nettallu'
Gear	:	Trawl net/Gill net/ Other units
Percentage in the catch of the group	:	23.4
Peak period of occurrence	:	Jan.-May and Jul.-Sep.
Depth of occurrence	:	Upto 50 m
Length range in commercial fishery	:	70 - 139 mm
Size at first maturity	:	—
Spawning season	:	—

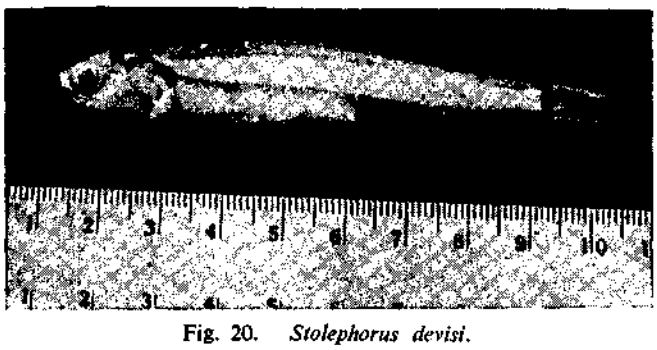


Fig. 20. *Stolephorus devisi.*

Scientific Name	:	*Stolephorus devisi*
Vernacular Name	:	'Nettallu'
Gear	:	Trawl net/Gill net/ Other units
Percentage in the catch of the group	:	15.9
Peak period of occurrence	:	Jan.-May and Jul.-Sep.
Depth of occurrence	:	Upto 50 m
Length range in commercial fishery	:	55 - 94 mm
Size at first maturity	:	—
Spawning season	:	—

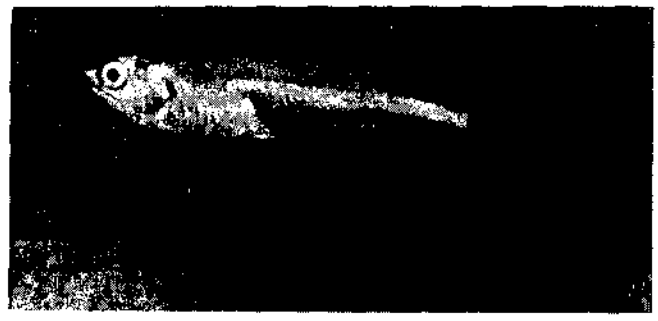


Fig. 21. *Stolephorus macrops.*

Scientific Name	:	*Stolephorus macrops*
Vernacular Name	:	'Nettallu'
Gear	:	Trawl net/Gill net/ Other units
Percentage in the catch of the group	:	15.0
Peak period of occurrence	:	Jan.-May and Jul.-Sep.
Depth of occurrence	:	Upto 50 m
Length range in commercial fishery	:	50 - 100 mm
Size at first maturity	:	—
Spawning season	:	—

HARPODONTIDAE

Popular English Name	:	Bombay duck
Vernacular Name (Telugu)	:	'Vanamattalu'
Annual average catch	:	155 t
Percentage in total catch	:	1.2
Fishing methods and their contribution	:	Trawl net : 0.9%
		Gill net : 0.4%
		Other units : 0.3%

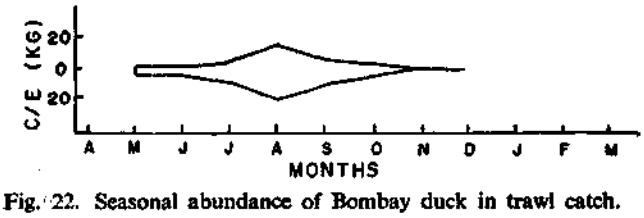


Fig. 22. Seasonal abundance of Bombay duck in trawl catch.

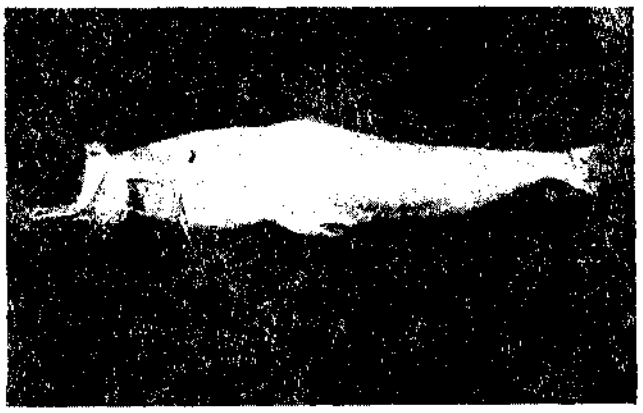


Fig. 23. *Harpodon nehereus.*

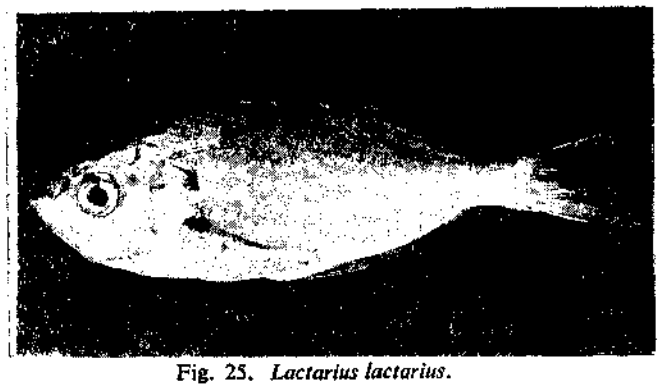


Fig. 25. *Lactarius lactarius.*

Scientific Name	:	*Harpodon nehereus*
Vernacular Name	:	'Vanamattalu'
Gear	:	Trawl net/Gill net/ Other units
Percentage in the catch of the group	:	100
Peak period of occurrence	:	May – Oct.
Depth of occurrence	:	Upto 60 m
Length range in commercial fishery	:	170 – 300 mm
Size at first maturity	:	—
Spawning season	:	—

LACTARIDAE

Popular English Name	:	White fish
Vernacular Name (Telugu)	:	'Sudumulu'
Annual average catch	:	85 t
Percentage in total catch	:	0.7
Fishing methods and their contribution	:	Trawl net : 0.5%

Scientific Name	:	*Lactarius lactarius*
Vernacular Name	:	'Sudumulu'
Gear	:	Trawl net
Percentage in the catch of the group	:	100
Peak period of occurrence	:	Jul. – Sep.
Depth of occurrence	:	5 - 50 m
Length range in commercial fishery	:	—
Size at first maturity	:	—
Spawning season	:	—

LEIOGNATHIDAE

Popular English Name	:	Silver bellies/Pony fish
Vernacular Name (Telugu)	:	'Karalu'
Annual average catch	:	1,347 t
Percentage in total catch	:	10.5
Fishing methods and their contribution	:	Trawl net : 7.9% Other units : 6.7%

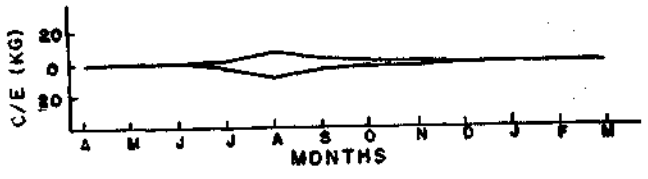


Fig. 24. Seasonal abundance of *Lactarius* in trawl catch.

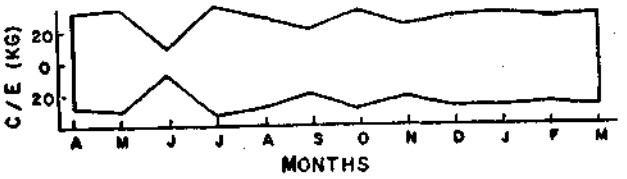


Fig. 26. Seasonal abundance of silver bellies in trawl catch.

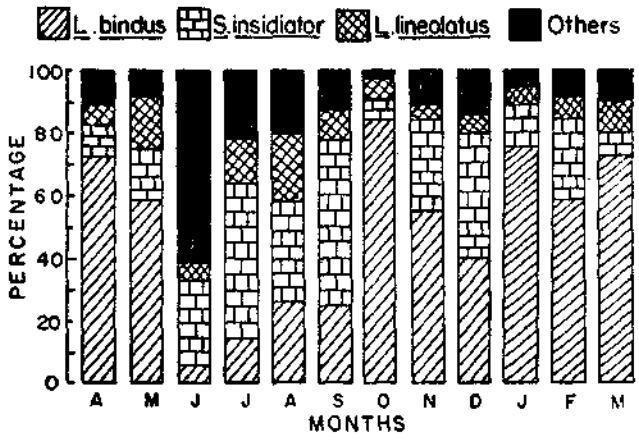


Fig. 27. Monthwise species composition of silver bellies in trawl net.

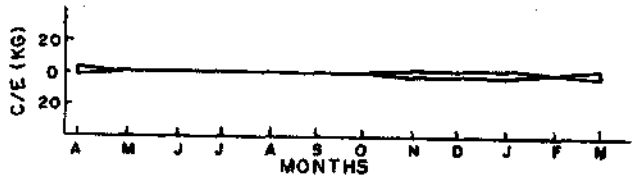


Fig. 28. Seasonal abundance of silver bellies in gill net catch.

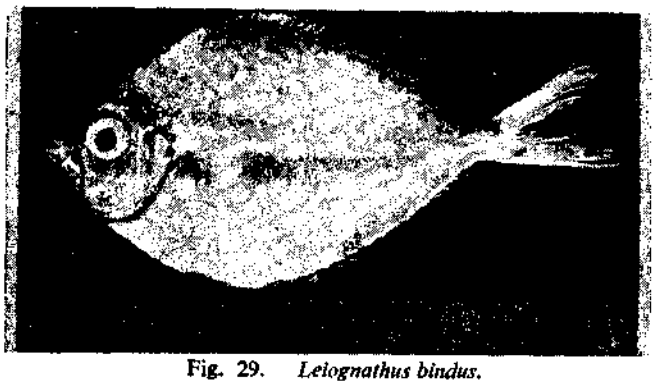


Fig. 29. *Leiognathus bindus.*

Scientific Name	:	*Leiognathus bindus*
Vernacular Name	:	'Karalu'
Gear	:	Trawl net/Other units
Percentage in the catch of the group	:	45.2
Peak period of occurrence	:	Jan.-May and Oct.-Dec.
Depth of occurrence	:	5 – 50 m
Length range in commercial fishery	:	17 – 129 mm
Size at first maturity	:	80 mm
Spawning season	:	Dec. – Feb.

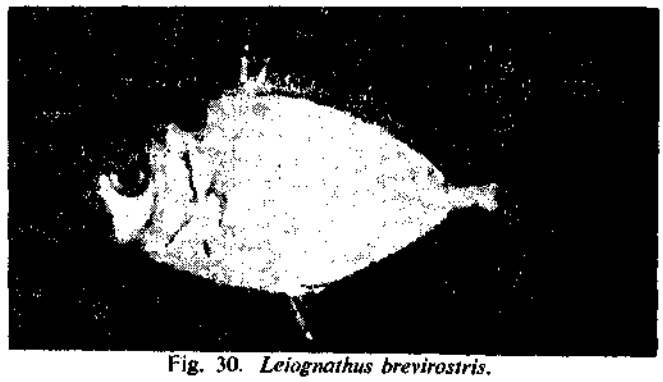


Fig. 30. *Leiognathus brevirostris.*

Scientific Name	:	*Leiognathus brevirostris*
Vernacular Name	:	'Karalu'
Gear	:	Trawl net/Other units
Percentage in the catch of the group	:	4.4
Peak period of occurrence	:	Feb., Jun., Jul. and Nov.
Depth of occurrence	:	5 – 50 m
Length range in commercial fishery	:	60 - 105 mm
Size at first maturity	:	—
Spawning season	:	—

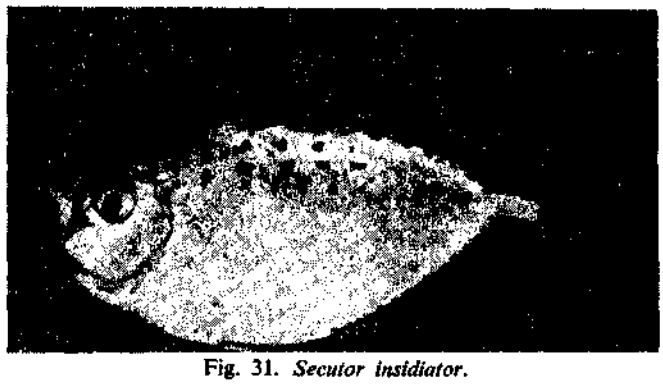


Fig. 31. *Secutor insidiator.*

Scientific Name	:	*Secutor insidiator*
Vernacular Name	:	'Chukka karalu'
Gear	:	Trawl net/Other units
Percentage in the catch of the group	:	30.0
Peak period of occurrence	:	Jun. – Sep.
Depth of occurrence	:	5 – 50 m
Length range in commercial fishery	:	20 - 117 mm
Size at first maturity	:	90 mm
Spawning season	:	Jan. – Mar.

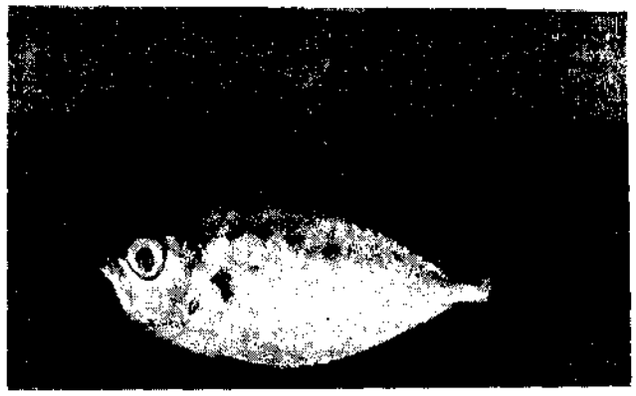


Fig. 32. *Gazza minuta.*

Scientific Name	:	*Gazza minuta*
Vernacular Name	:	'Karalu'
Gear	:	Trawl net/Other units
Percentage in the catch of the group	:	4.7
Peak period of occurrence	:	May, Aug. and Dec.
Depth of occurrence	:	5 – 50 m
Length range in commercial fishery	:	62 - 137 mm
Size at first maturity	:	—
Spawning season	:	—

LUTJANIDAE, SERRANIDAE AND POMADASYIDAE

Popular English Name	:	Snappers/Reef cods/ Grunters
Vernacular Name (Telugu)	:	'Erragorasa'/ 'Rathibontha'/'Goraka'
Annual average catch	:	427 t
Percentage in total catch	:	3.3
Fishing methods and their contribution	:	Trawl net : 2.5%
Peak period of occurrence	:	Feb., May and Jul.
Depth of occurrence	:	5 – 50 m

Fig. 33. Seasonal abundance of perches (Lutjanidae, Serranidae *etc.*) in trawl catch.

MULLIDAE

Popular English Name	:	Goat fish
Vernacular Name (Telugu)	:	'Gaddam gulivindalu'
Annual average catch	:	200 t
Percentage in total catch	:	1.6
Fishing methods and their contribution	:	Trawl net : 1.2%
Peak period of occurrence	:	Jul.–Sep. and Nov.–Dec.
Depth of occurrence	:	5 – 50 m

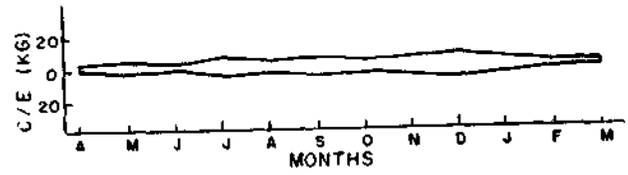


Fig. 34. Seasonal abundance of goat fishes in trawl catch.

MURAENIDAE & CONGRIDAE

Popular English Name	:	Eel
Vernacular Name (Telugu)	:	'Pamulu'
Annual average catch	:	249 t
Percentage in total catch	:	1.9
Fishing methods and their contribution	:	Trawl net : 1.5%
Peak period of occurrence	:	Jul. – Nov.
Depth of occurrence	:	5 – 50 m

Fig. 35. Seasonal abundance of eel (Muraenidae and Congridae) in trawl catch.

NEMIPTERIDAE

Popular English Name	:	Threadfin bream
Vernacular Name (Telugu)	:	'Erragulivindalu'
Annual average catch	:	808 t
Percentage in total catch	:	6.3
Fishing methods and their contribution	:	Trawl net : 4.8%

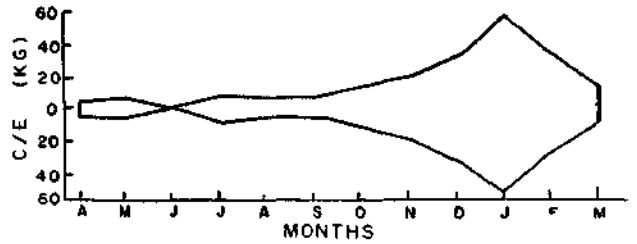


Fig. 36. Seasonal abundance of threadfin breams in trawl catch.

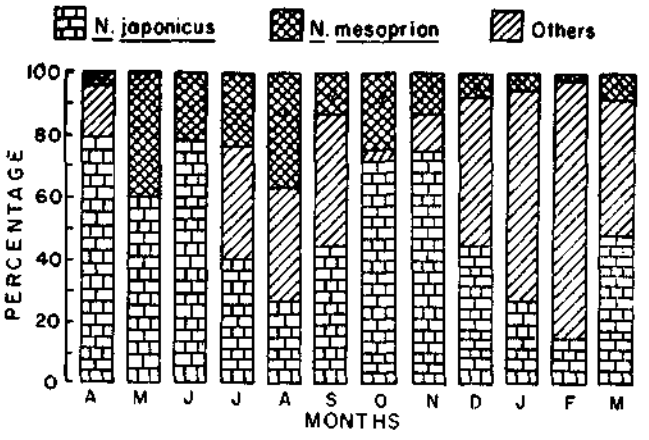


Fig. 37. Monthly species composition of threadfin breams in trawl catch.

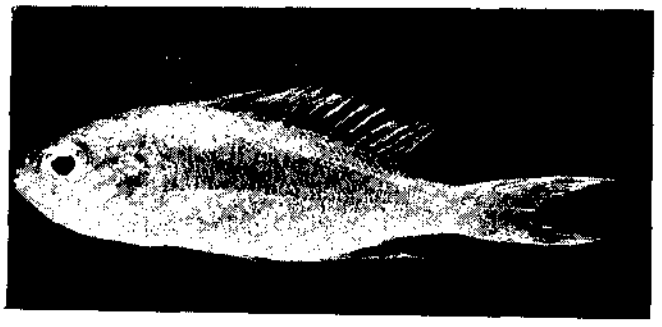


Fig. 38. *Nemipterus mesoprion.*

Scientific Name	:	*Nemipterus mesoprion*
Vernacular Name	:	'Erragulivindalu'
Gear	:	Trawl net
Percentage in the catch of the group	:	48.3
Peak period of occurrence	:	Dec. – Mar.
Depth of occurrence	:	10 - 80 m
Length range in commercial fishery	:	30 – 215 mm
Size at first maturity	:	100 mm
Spawning season	:	Dec. – Apr.

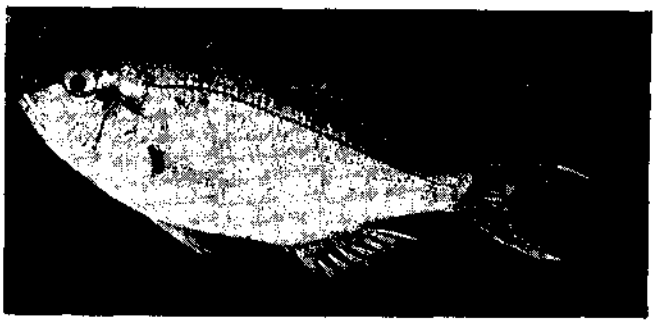


Fig. 39. *Nemipterus japonicus.*

Scientific Name	:	*Nemipterus japonicus*
Vernacular Name	:	'Erragulivindalu'
Gear	:	Trawl net
Percentage in the catch of the group	:	44.4
Peak period of occurrence	:	Nov. – Mar.
Depth of occurrence	:	10 - 80 m
Length range in commercial fishery	:	35 – 305 mm
Size at first maturity	:	125 mm
Spawning season	:	Aug. - Apr.

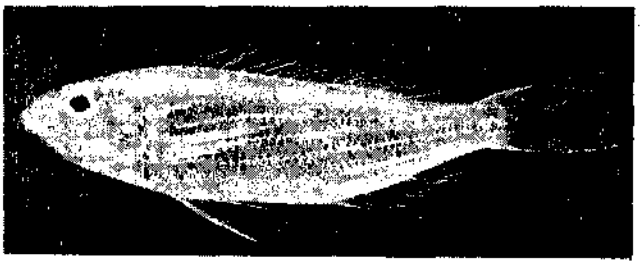


Fig. 40. *Nemipterus delagoae*

Scientific Name	:	*Nemipterus delagoae*
Vernacular Name	:	'Erragulivindalu'
Gear	:	Trawl net
Percentage in the catch of the group	:	2.0
Peak period of occurrence	:	Sep. – Dec.
Depth of occurrence	:	10 – 80 m
Length range in commercial fishery	:	90 – 250 mm
Size at first maturity	:	—
Spawning season	:	—

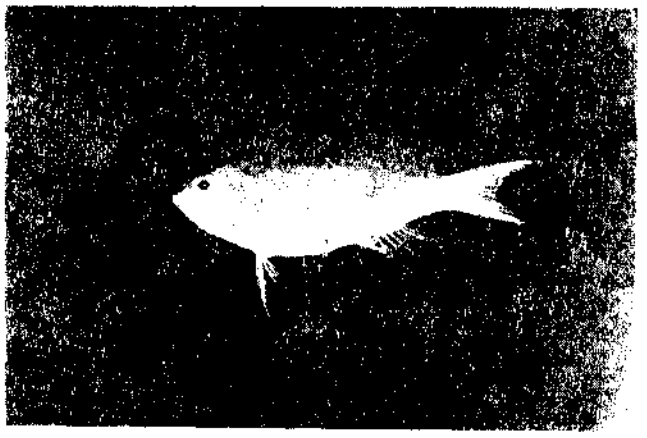


Fig. 41. *Nemipterus luteus.*

Scientific Name	:	*Nemipterus luteus*
Vernacular Name	:	'Erragulivindalu'
Gear	:	Trawl net
Percentage in the catch of the group	:	0.6
Peak period of occurrence	:	Jan.–Apr. and Jul.–Dec.
Depth of occurrence	:	10 - 80 m
Length range in commercial fishery	:	90 - 216 mm
Size at first maturity	:	---
Spawning season	:	—

NOMEIDAE

Popular English Name	:	Drift fish
Vernacular Name (Telugu)	:	'Channitichepa'
Annual average catch	:	845 t
Percentage in total catch	:	6.6
Fishing methods and their contribution	:	Trawl net : 5.0%

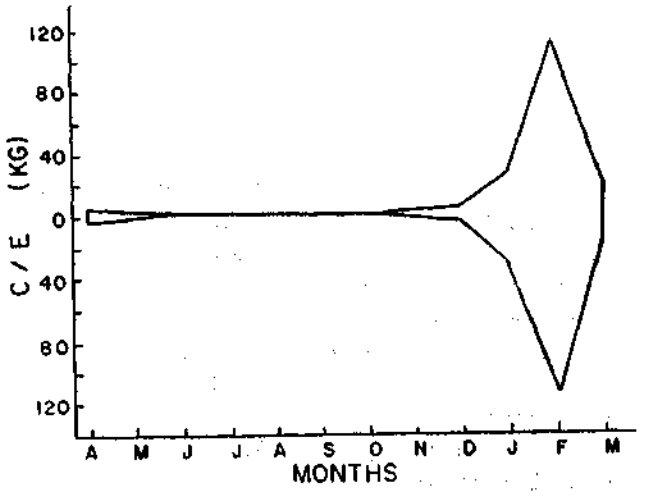


Fig. 42. Seasonal abundance of drift fishes in trawl catch.

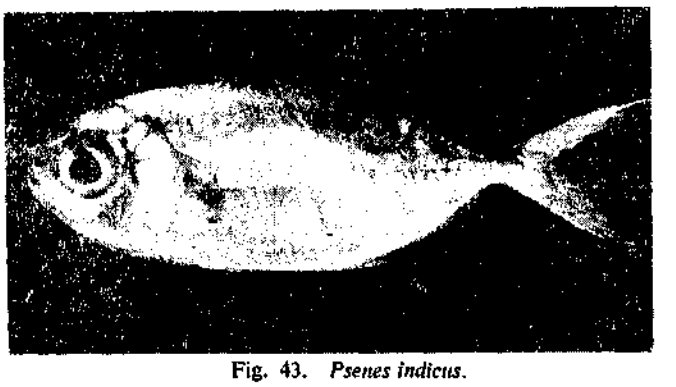


Fig. 43. *Psenes indicus.*

Scientific Name	:	*Psenes indicus*
Vernacular Name	:	'Channitichepa'
Gear	:	Trawl net
Percentage in the catch of the group	:	100
Peak period of occurrence	:	Oct. – Jan.
Depth of occurrence	:	5 - 70 m
Length range in commercial fishery	:	55 - 217 mm
Size at first maturity	:	—
Spawning season	:	—

POLYNEMIDAE

Popular English Name	:	Threadfins
Vernacular Name (Telugu)	:	'Maga'
Annual average catch	:	71 t
Percentage in total catch	:	0.6
Fishing methods and their contribution	:	Trawl net : 0.4%
Peak period of occurrence	:	Dec. – Feb.
Depth of occurrence	:	5 - 50 m

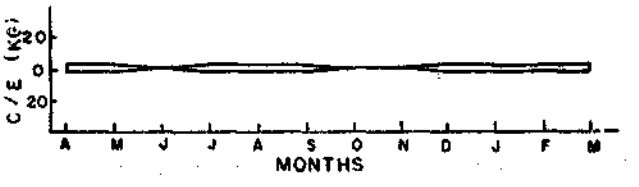


Fig. 44. Seasonal abundance of threadfins *(Polynemus)* in trawl catch.

SCIAENIDAE

Popular English Name	:	Croakers/Jew fish
Vernacular Name (Telugu)	:	'Gorasalu'
Annual average catch	:	1,039 t
Percentage in total catch	:	8.1

Fishing methods and their contribution : Trawl net : 6.3%
Gill net : 1.4%
Other units: : 2.1%

Fig. 45. Seasonal abundance of sciaenids in trawl catch.

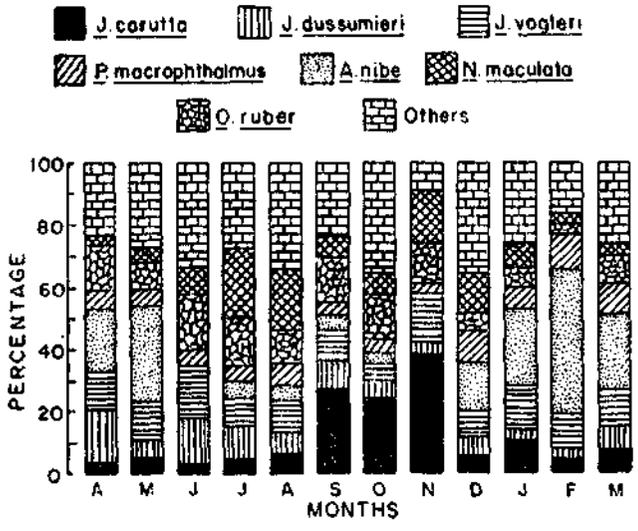


Fig. 46. Monthwise species composition of sciaenids in trawl catch.

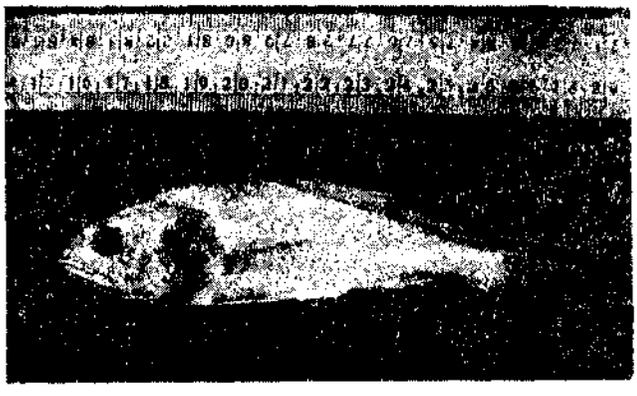


Fig. 47. *Atrobucca nibe.*

Scientific Name : *Atrobucca nibe*
Vernacular Name : 'Karrimoothigorasa'
Gear : Trawl net
Percentage in the catch of the group : 20.1
Peak period of occurrence : Jan. – May
Depth of occurrence : 5 – 60 m
Length range in commercial fishery : 90 – 235 mm
Size at first maturity : 147 mm
Spawning season : Oct. – Jun.

Fig. 48. *Johnius carutta.*

Scientific Name : *Johnius carutta*
Vernacular Name : 'Charagorasa'
Gear : Trawl net
Percentage in the catch of the group : 11.3
Peak period of occurrence : Sep. – Nov.
Depth of occurrence : 5 – 50 m
Length range in commercial fishery : 75 – 225 mm
Size at first maturity : 155 mm
Spawning season : Jan. – Jun.

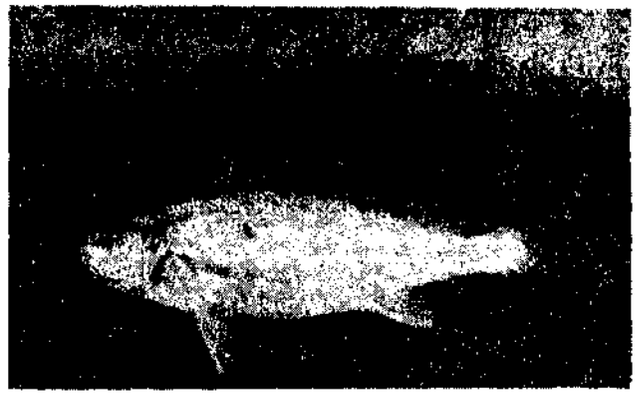


Fig. 49. *Johnius dussumieri.*

Scientific Name	:	*Johnius dussumieri*
Vernacular Name	:	'Gorasa'
Gear	:	Trawl net
Percentage in the catch of the group	:	7.4
Peak period of occurrence	:	Apr. – Jul.
Depth of occurrence	:	5 – 50 m
Length range in commercial fishery	:	81 - 168 mm
Size at first maturity	:	110 mm
Spawning season	:	Mar. - Aug.

Fig. 50. *Johnius vogleri.*

Scientific Name	:	*Johnieops vogleri*
Vernacular Name	:	'Gorasa'
Gear	:	Trawl net
Percentage in the catch of the group	:	10.7
Peak period of occurrence	:	Jan. – Jun.
Depth of occurrence	:	5 – 50 m
Length range in commercial fishery	:	90 – 238 mm
Size at first maturity	:	190 mm
Spawning season	:	Nov. – Jun.

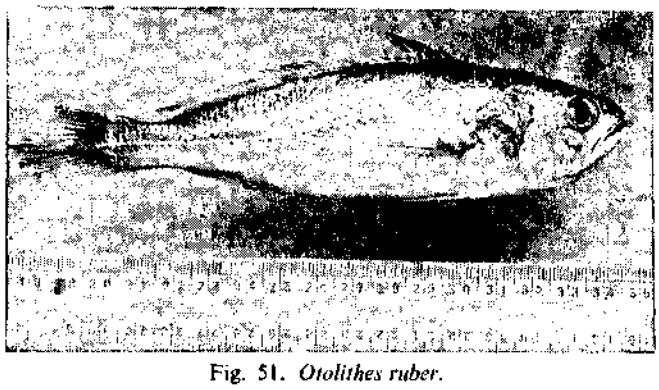


Fig. 51. *Otolithes ruber.*

Scientific Name	:	*Otolithes ruber*
Vernacular Name	:	'Pallagorasa'
Gear	:	Trawl net
Percentage in the catch of the group	:	9.6
Peak period of occurrence	:	Apr. - Nov.
Depth of occurrence	:	5 - 50 m
Length range in commercial fishery	:	30 – 250 mm
Size at first maturity	:	—
Spawning season	:	—

Fig. 52. *Nibea maculata.*

Scientific Name	:	*Nibea maculata*
Vernacular Name	:	'Nallagorasa'
Gear	:	Trawl net
Percentage in the catch of the group	:	7.9
Peak period of occurrence	:	Jul. - Aug.
Depth of occurrence	:	5 - 50 m
Length range in commercial fishery	:	—
Size at first maturity	:	—
Spawning season	:	—

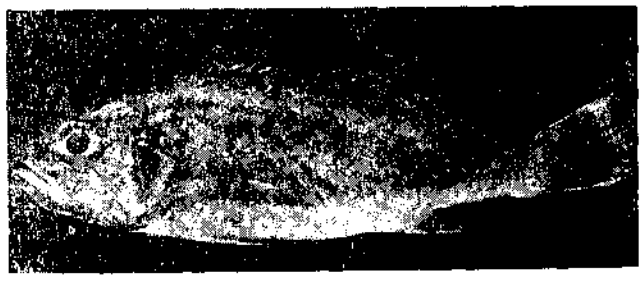


Fig. 53. *Pennahia macrophthalmus.*

Scientific Name	:	*Pennahia macrophthalmus*
Vernacular Name	:	'Gorasa'
Gear	:	Trawl net
Percentage in the catch of the group	:	6.3
Peak period of occurrence	:	Jan. – Mar. and Dec.
Depth of occurrence	:	5 – 70 m

Length range in commercial fishery : 40 – 260 mm
Size at first maturity : 147 mm
Spawning season : Oct.- Jun.

SCOMBRIDAE

Popular English Name : Seer fish/Mackerel/ Tuna
Vernacular Name (Telugu) : 'Vanjiram'/'Kanaguada-thalu'/'Suralu'
Annual average catch : 839 t
Percentage in total catch : 6.5
Fishing methods and their contribution : Gill net : 48.0%
Trawl net : 0.6%
Other units : 5.7%

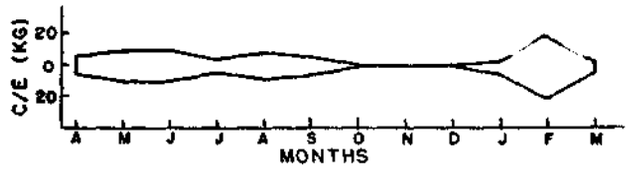


Fig. 54. Seasonal abundance of seer fishes in gill net catch.

Fig. 55. Seasonal abundance of tunas in gill net catch.

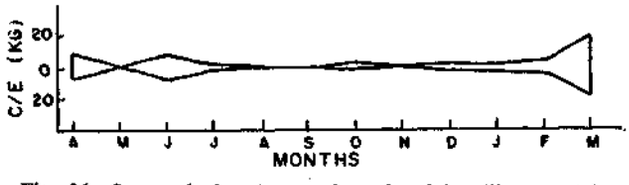


Fig. 56. Seasonal abundance of mackerel in gill net catch.

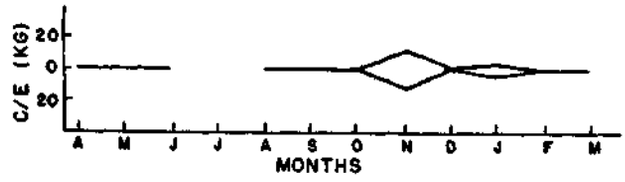


Fig. 57. Seasonal abundance of mackerel in other units.

Fig. 58. Seasonal abundance of mackerel in trawl catch.

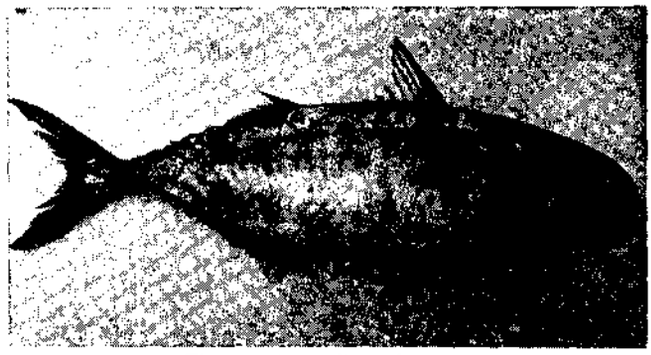


Fig. 59. *Rastrelliger kanagurta.*

Scientific Name : *Rastrelliger kanagurta*
Vernacular Name : 'Kangadathalu'
Gear : Gill net/Trawl net/ Other units
Percentage in the catch of the group : Gill net : 37.3
Trawl net : 99.0
Other units : 99.0
Peak period of occurrence : Jan. – Apr. and Aug.–Dec.
Depth of occurrence : Upto 80 m
Length range in commercial fishery : 35 - 235 mm
Size at first maturity : —
Spawning season : —

SPHYRAENIDAE

Popular English Name : Barracuda
Vernacular Name (Telugu) : 'Kaijarmatta'
Annual average catch : 117 t
Percentage in total catch : 0.9
Fishing methods and their contribution : Gill net : 1.0%
Trawl net : 0.6%
Other units : 0.6%
Peak period of occurrence : Dec. - Jun.
Depth of occurrence : Upto 80 m

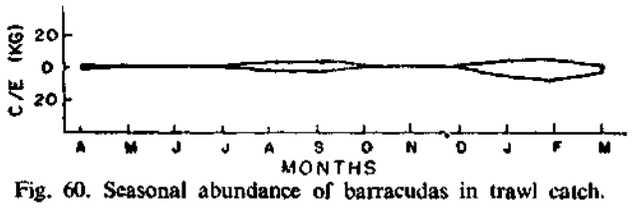


Fig. 60. Seasonal abundance of barracudas in trawl catch.

STROMATEIDAE

Popular English Name	:	Pomfrets
Vernacular Name (Telugu)	:	'Chandua'
Annual average catch	:	44 t
Percentage in total catch	:	0.3
Fishing methods and their contribution	:	Gill net : 0.7% Trawl net : 0.2%

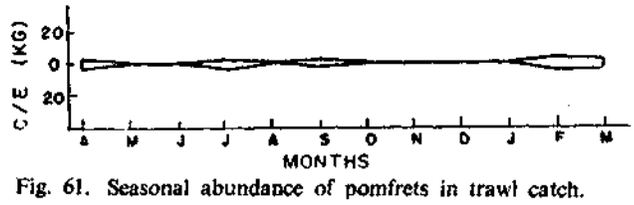


Fig. 61. Seasonal abundance of pomfrets in trawl catch.

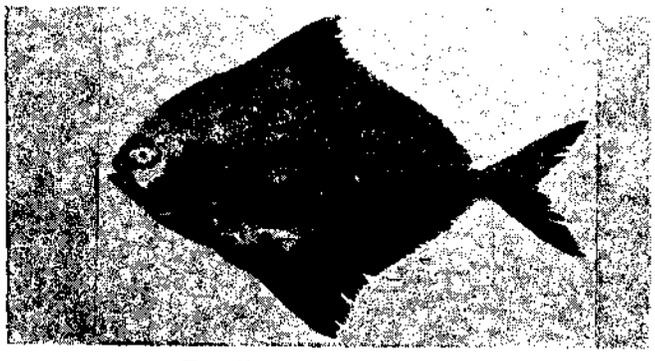


Fig. 62. *Parastromateus niger.*

Scientific Name	:	*Parastromateus niger*
Vernacular Name	:	'Nalla chandua'
Gear	:	Gill net/Trawl net
Percentage in the catch of the group	:	—
Peak period of occurrence	:	Feb. – May, Aug. and Nov.
Depth of occurrence	:	5 – 50 m
Length range in commercial fishery	:	—
Size at first maturity	:	—
Spawning season	:	—

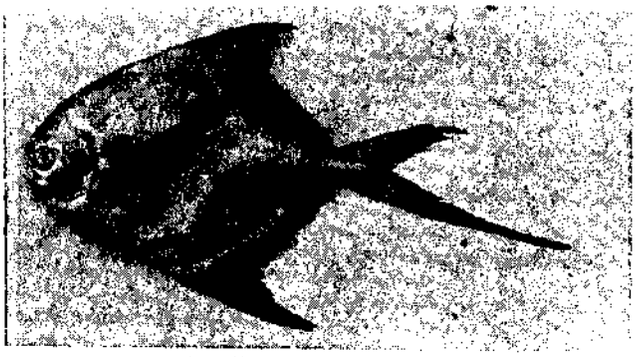


Fig. 63. *Pampus argenteus.*

Scientific Name	:	*Pampus argenteus*
Vernacular Name	:	'Tella chandua'
Gear	:	Gill net/Trawl net
Percentage in the catch of the group	:	—
Peak period of occurrence	:	Apr. – Jul. and Dec.
Depth of occurrence	:	5 – 50 m
Length range in commercial fishery	:	—
Size at first maturity	:	—
Spawning season	:	—

SYNODONTIDAE

Popular English Name	:	Lizard fish
Vernacular Name (Telugu)	:	'Bade mattalu'
Annual average catch	:	358 t
Percentage in total catch	:	2.8
Fishing methods and their contribution	:	Trawl net : 2.1% Gill net : 0.1%

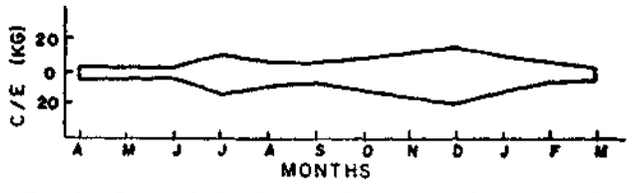


Fig. 64. Seasonal abundance of lizard fishes in trawl catch.

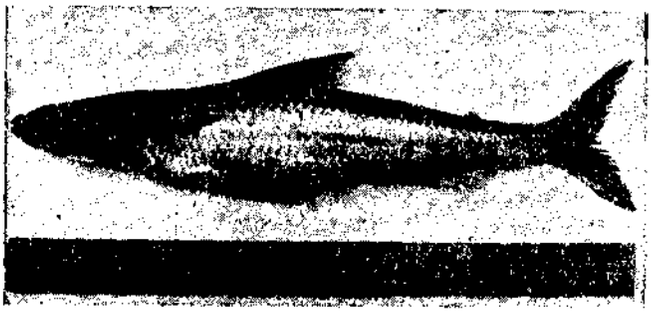


Fig. 65. *Saurida tumbil.*

Scientific Name	:	*Saurida tumbil*
Vernacular Name	:	'Bade mattalu'
Gear	:	Trawl net/Gill net
Percentage in the catch of the group	:	40
Peak period of occurrence	:	Jan., Jul. and Oct.- Dec.
Depths of occurrence	:	5 - 70 m
Length range in commercial fishery	:	170 - 350 mm
Size at first maturity	:	—
Spawning season	:	—

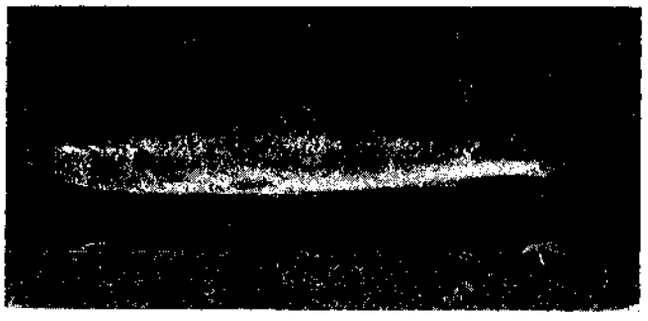


Fig. 66. *Saurida undosquamis.*

Scientific Name	:	*Saurida undosquamis*
Vernacular Name	:	'Bade mattalu'
Gear	:	Trawl net/Gill net
Percentage in the catch of the group	:	20
Peak period of occurrence	:	Jan., Jul. and Oct.- Dec.
Depth of occurrence	:	5 - 70 m
Length range in commercial fishery	:	—
Size at first maturity	:	—
Spawning season	:	—

RHINOBATIDAE

Popular English Name	:	Shovel-nose ray/Skate
Vernacular Name (Telugu)	:	'Teku'
Annual average catch	:	61 t
Percentage in total catch	:	0.4
Fishing methods and their contribution	:	Trawl net : 0.4%
Peak period of occurrence	:	Dec. - Mar.
Depth of occurrence	:	3 - 80 m

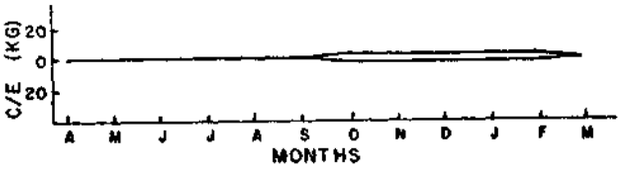


Fig. 67. Seasonal abundance of skates in trawl catch.

TACHYSURIDAE

Popular English Name	:	Cat fish
Vernacular Name (Telugu)	:	'Jellalu'/'Jella'
Annual average catch	:	459 t
Percentage in total catch	:	3.6
Fishing methods and their contribution	:	Trawl net : 2.6%
		Gill net : 1.7%
Peak period of occurrence	:	Jan. - Jun.
Depth of occurrence	:	5 - 80 m

Fig. 68. Seasonal abundance of cat fishes in trawl catch.

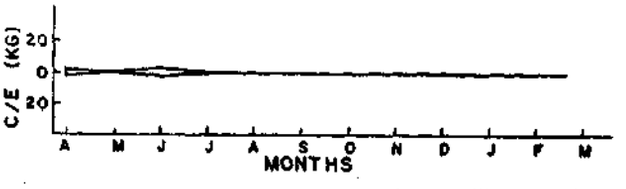


Fig. 69. Seasonal abundance of cat fishes in gill net catch.

TRICHIURIDAE

Popular English Name	:	Ribbon fish
Vernacular Name (Telugu)	:	'Savallu'
Annual average catch	:	1,405 t
Percentage in total catch	:	10.9
Fishing methods and their contribution	:	Trawl net : 7.1%
		Gill net : 2.4%
		Other units : 49.3%

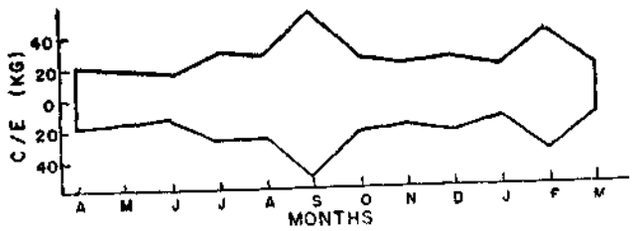


Fig. 70. Seasonal abundance of ribbon fish in trawl catch.

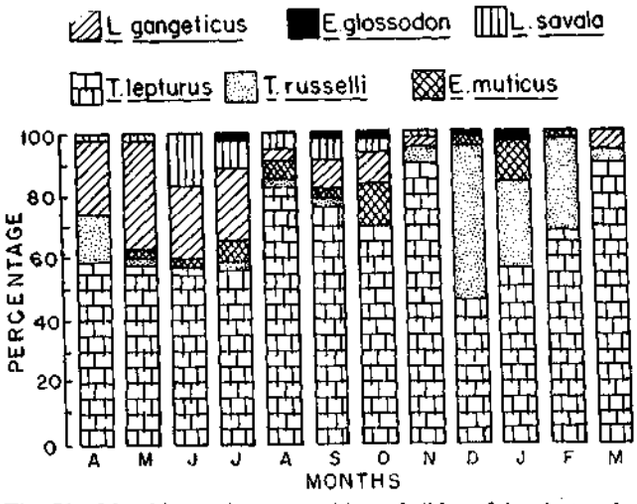


Fig. 71. Monthly species composition of ribbon fishes in trawl catch.

Fig. 72. Seasonal abundance of ribbon fish in gill net catch.

Fig. 73. Seasonal abundance of ribbon fish in other units.

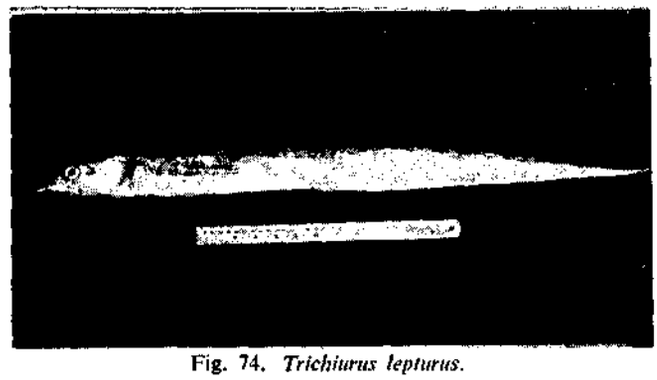


Fig. 74. *Trichiurus lepturus.*

Scientific Name	:	*Trichiurus lepturus*
Vernacular Name	:	'Patti savallu'
Gear	:	Trawl net
Percentage in the catch of the group	:	73
Peak period of occurrence	:	Oct. – Dec.
Depth of occurrence	:	5 – 50 m
Length range in commercial fishery	:	165 – 1,150 mm
Size at first maturity	:	525 mm
Spawning season	:	Feb. – Jun.

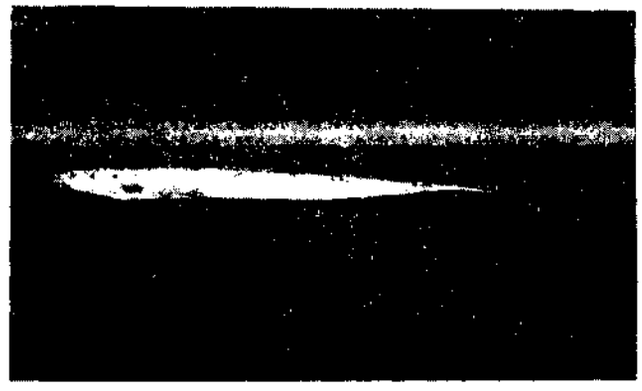


Fig. 75. *Lepturacanthus gangeticus.*

Scientific Name	:	*Lepturacanthus gangeticus*
Vernacular Name	:	'Savallu'
Gear	:	Trawl net
Percentage in the catch of the group	:	12.9
Peak period of occurrence	:	Jan. – Dec.
Depth of occurrence	:	5 – 50 m
Length range in commercial fishery	:	195 – 585 mm
Size at first maturity	:	—
Spawning season	:	May – Jul.

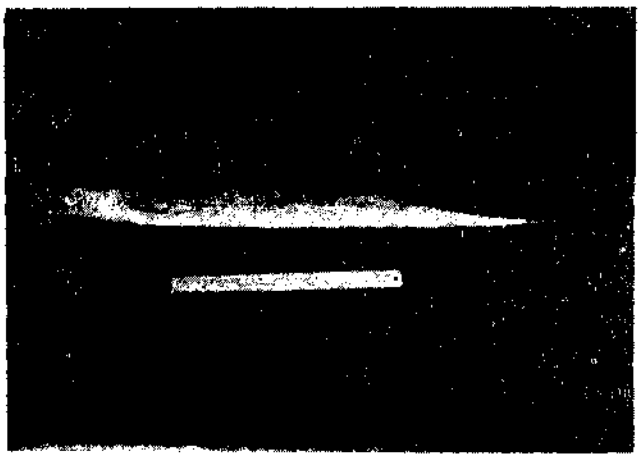


Fig. 76. *Lepturacanthus savala.*

Scientific Name	:	*Lepturacanthus savala*
Vernacular Name	:	'Savallu'
Gear	:	Trawl net
Percentage in the catch of the group	:	4.6
Peak period of occurrence	:	Jul. - Aug.
Depth of occurrence	:	5 - 50 m
Length range in commercial fishery	:	200 - 700 mm
Size at first maturity	:	—
Spawning season	:	—

Fig. 77. *Eupleurogrammus muticus.*

Scientific Name	:	*Eupleurogrammus muticus*
Vernacular Name	:	'Savallu'
Gear	:	Trawl net
Percentage in the catch of the group	:	4.2
Peak period of occurrence	:	Jul. - Aug.
Depth of occurrence	:	5 - 50 m
Length range in commercial fishery	:	160 - 460 mm
Size at first maturity	:	—
Spawning season	:	May - Nov.

TRYGONIDAE & MYLIOBATIDAE

Popular English Name	:	Rays
Vernacular Name (Telugu)	:	'Teku'
Annual average catch	:	312 t
Percentage in total catch	:	2.4
Fishing methods and their contribution	:	Trawl net : 1.9%
Peak period of occurrence	:	Nov. - Apr.
Depth of occurrence	:	5 - 50 m

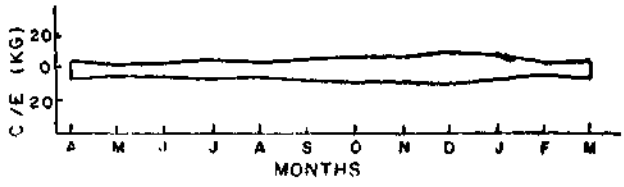


Fig. 78. Seasonal abundance of rays in trawl catch.

SALINITY CHANGES IN THE ESTUARY AND THE COASTAL SEA ADJACENT TO THE PORTMOUTH AT COCHIN*

Introduction

The Vembanad Lake south of Cochin to which five major rivers join, and with its permanent connection with the Arabian Sea at Cochin provides excellent opportunities to observe the influence of the coastal sea over the estuary and *vice versa*. As the rivers of the region are rainfed and seasonal the estuary has no other influence to upset its seasonal rhythm. On the other hand, the Cochin mouth being a permanent one, facilitates unhindered flow of seasonal flood water into the sea as well as the saline water into the estuary by tidal effect. The coastal sea plays a predominant role in determining the characteristics of the estuary except during incessant heavy rain during the southwest monsoon season. The flow from and into the sea ensures the exchange of water and effective dispersal of pollutants. The Cochin mouth is situated in a strategic position between the southern and the northern parts of the Vembanad Lake and consequently the flow in and out of the two parts of the lake occurs simultaneously.

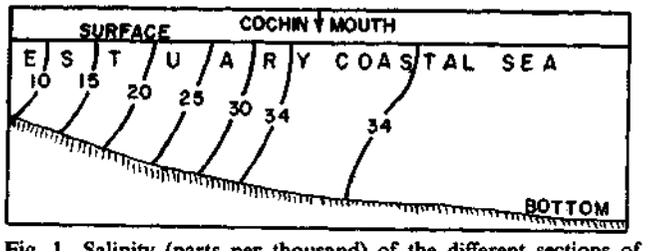


Fig. 1. Salinity (parts per thousand) of the different sections of the estuary and the coastal sea in the pre and postmonsoon season (Not according to scale).

The premonsoon and the postmonsoon conditions of salinity depicted in Fig. 1 show that during the summer months the waters in the Vembanad Lake and the adjacent coastal sea are vertically well mixed with salinity values increasing from the head of the estuary to the Cochin mouth. The salinity of the lower estuary is almost the same as that of the coastal sea during this period.

The southwest monsoon that normally sets in over Kerala early in June floods the rivers. The flood water, being lighter than the receiving saline water, flows at the surface towards the sea and on its way erodes and replaces a little of the water below (Fig. 2). Consequently, as the season advances the area having the properties of the flood water both at the surface and

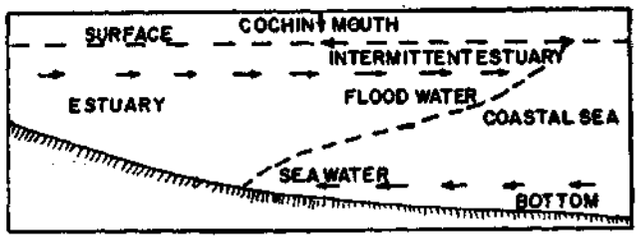


Fig. 2. Vertical distribution of the flood and the sea water in the estuary and the coastal sea during the Southwest monsoon season (Not according to scale).

the bottom extends from the head towards the lower estuary. The water flowing out through the Cochin mouth being still lighter than the coastal sea water entrains a little of the latter from below while it spreads over a wide area as a 'plume' adjacent to the Cochin mouth, turning the coastal region into a functional extension of the estuary. Thus, the Cochin coastal region where the 'plume' layer spreads over the more denser coastal sea water resembling closely a saltwedge estuary in its flow characteristics, becomes an *'intermittent estuary'* during the occurrence of the 'plume' though this area lies outside the limits which normally marks the boundaries of an estuary. The boundary between the 'plume' and the sea water is well marked by the change in the colour from a highly turbid surface to clear bright greenish blue.

As the riverine discharge into the Vembanad Lake and the outflow through the Cochin mouth decrease considerably in the post-monsoon season, the sea water invading the region along the bottom rises to the surface and subsequently the transient estuary in the coastal region disappears and the different stretches of the estuary regain their characteristics of the premonsoon season.

* Prepared by S. Muthusamy, C. P. Ramamirtham, N. P. Kunhikrishnan, L. R. Khambadkar, A. Nandakumar and A.V.S. Murty, CMFRI, Cochin.

STOMATOPOD RESOURCES OF THE SOUTH KANARA COAST DURING 1983-'86*

Introduction

Among the crustaceans exploited by commercial nets, perhaps, stomatopods are economically the least important. They are not consumed in our country at present due to their lesser flesh content as well as the presence of large number of spines on the body. The landings of stomatopods have been exceptionally high in Karnataka particularly along the South Kanara coast. Around 50% of the all India stomatopod catch is obtained from Karnataka alone.

In the sixties and early seventies, stomatopods, locally known as 'pucha' or 'puchi', were used to be thrown out into the sea by shrimp trawlers due to lack of space on board. Of late, it has been found that it is a good raw material for converting into fish meal, poultry feed and manure, and hence there is a lot of demand for the same by the fish meal plants. It also fetches a reasonable price in recent years. In the present account an appraisal of the fishery and utilisation of this valuable resource is attempted based on the data collected during 1983-'86.

Craft and gear

There is no craft or gear as such exclusively used for catching stomatopods. Generally, it is being obtained as incidental catches by mechanised boats while trawling for prawns.

Fishing seasons

Eventhough trawling commences in September, stomatopods start appearing in the catch only in November along the South Kanara coast and last till May or early June.

Stomatopod landing

Mangalore

The annual catch amounted to 2,649.5 t with a catch per boat day of 64.2 kg during 1983-'84 (Table 1). The following season witnessed 115% increase in stomatopod landings as compared to the previous season. The catch was to the tune of 5,495.2 t (97.9 kg/boat day) during this period. The 1985-'86 season registered a fall in stomatopod landings by 818.0 t and the catch was 4,677.2 t but the catch/boat day was 108.8 kg.

Table 1. *Monthwise stomatopod landings by shrimp trawlers during* 1983-'84, 1984-'85 *and* 1985-'86 *seasons at Mangalore*

	1983-'84		1984-'85		1985-'86	
Month	No. of units	Catch (t)	No. of units	Catch (t)	No. of units	Catch (t)
Sep.	2,627	—	4,995	—	338	—
Oct.	630	—	2,028	—	496	—
Nov.	2,713	1.0	4,123	14.1	2,130	90.0
Dec.	4,131	411.7	9,416	940.0	4,680	558.3
Jan.	7,174	748.7	9,585	1,595.7	7,626	952.8
Feb.	6,228	585.5	7,720	1,005.2	8,733	1,036.2
Mar.	6,240	318.9	7,325	886.3	6,732	687.6
Apr.	5,340	263.8	7,049	686.3	7,125	939.8
May	6,204	319.9	3,887	367.6	5,126	412.5
Jun.	—	—	—	—	—	—
Total	41,287	2,649.5	56,128	5,495.2	42,986	4,677.2

Stomatopods formed 24.8% (1983 - '84 season) to 37.2% (1985-'86 season) of the trawl landings at Mangalore (Fig. 1).

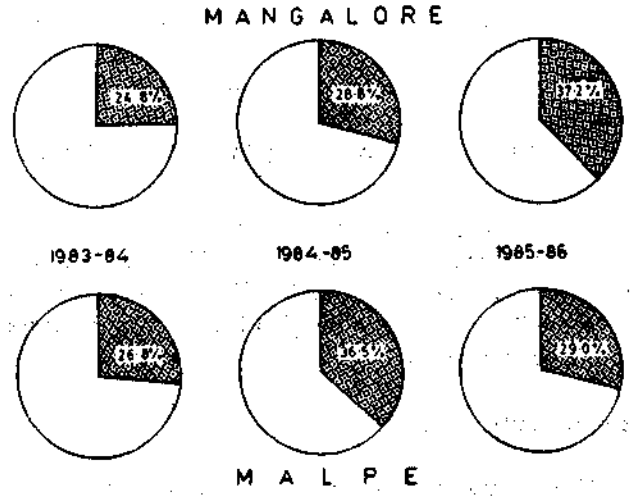


Fig. 1. Percentage contribution of stomatopods in total trawl landings during various seasons at Mangalore and Malpe Fisheries Harbour.

* Prepared by K. K. Sukumaran, Mangalore Research Centre of CMFRI, Mangalore.

Eventhough stomatopods are landed from November to May, generally peak catches are obtained during November–February. The maximum catches were obtained in January '84 (747.7 t), January '85 (1,595.7 t) and February '86 (1,036.2 t) at this centre.

Malpe Fisheries Harbour

It is estimated that 1,729.2 t of stomatopods with a catch/boat day of 46.3 kg were landed at this centre during 1983-'84 (Table 2). The fishery registered 180% improvement during the following season (1984-'85) and the catch amounted to 4,847.5 t (103 kg/boat day). During 1985–'86 season, the fishery showed a fall by 36.0 % and the catch was to the tune of 3,102.3 t with a catch/boat day of 94.8 kg. It is seen that stomatopods contributed from 26.8% (1983–'84 season) to 36.5% (1984–'85) of the trawl landings at this centre (Fig. 1).

Table 2. *Monthwise stomatopod landings by shrimp trawlers during* 1983–'84, 1984–'85 *and* 1985–'86 *seasons at Malpe*

	1983–'84		1984–'85		1985–'86	
Month	No. of units	Catch (t)	No. of units	Catch (t)	No. of units	Catch (t)
Sep.	5,275	—	10,987	—	3,875	—
Oct.	450	—	4,030	—	1,560	—
Nov.	3,204	17.9	4,800	210.7	2,438	246.9
Dec.	3,553	500.3	5,150	911.5	3,300	325.5
Jan.	4,342	408.4	6,600	1,906.7	2,350	211.2
Feb.	4,121	238.1	3,520	655.7	3,294	257.3
Mar.	4,622	149.8	2,704	464.3	4,150	542.3
Apr.	4,163	242.6	4,725	517.7	6,450	906.2
May	7,622	172.1	3,308	180.9	5,310	612.9
Jun.	—	—	—	—	—	—
Total	37,352	1,729.2	45,824	4,847.5	32,727	3,102.3

Generally peak catches were obtained during December–February and in April. The highest landings were recorded in December '83 (500.3 t), January '85 (1,906.7 t) and April '86 (906.2 t) during the three seasons under study.

Species composition

The stomatopod fishery is exclusively supported by a single species namely *Oratosquilla nepa* all along the coast.

Fig. 2. Stomatopods - a close up view.

Disposal of the catch

At Mangalore, the entire catch in a boat is auctioned as a lot. It is usually purchased by some agents who in turn supply it to the fish meal plants at Ullal nearby.

At Malpe Fisheries Harbour, a few baskets are auctioned together or the whole catch is auctioned as a lot by fishermen themselves. Often it is seen that stomatopods are auctioned along with prawns (small varieties) to fetch a better price instead of sorting out and auctioning them separately.

Fig. 3. Sun dried stomatopods packed in gunny bags ready for transportation at Malpe Fisheries Harbour.

Utilisation

The stomatopods are mostly sun-dried in the harbour premises (Figs. 2 & 3). After drying they are packed in gunny bags and sold as manure or to nearby fish meal plants for converting into poultry feed.

The price of stomatopods vary from Rs. 750 to 1,500 per tonne in the raw condition and Rs. 2,000 to 3,000 in the dried condition.

Eventhough the flesh content in squilla is relatively low, the protein content is very high, and hence the possibility of consuming it as food or converting it into food products may be seriously thought of.

Feasibility studies have been already carried out by Central Institute of Fisheries Technology, Cochin and Central Food Technological Research Institute, Mysore for extracting *chitosan*, a highly valuable commercial product, from the exoskeleton of stomatopods in the recent past. Unfortunately, nobody has come forward to take up the production of *chitosan* on a commercial scale, perhaps due to the high cost involved in its production.

It is high time that researches are directed to evolve low cost technologies for the manufacture of cheap food products from stomatopods and also for the extraction of highly priced *chitosan* on a commercial basis thereby utilising this plentiful resource in an advantageous manner.

SOME ASPECTS ON THE FISHERY AND BIOLOGY OF PERISCOPE SHRIMP FROM BOMBAY WATERS*

Introduction

The Periscope shrimp *Atypopenaeus stenodactylus* Stimpson constitutes a fishery at Versova by 'dol' net. The annual average landing was reported to be 105 tonnes at this centre constituting about 3.3% of total 'dol' net landings of prawns at this centre (Kunju, 1967, *Proc. Symp. Crust.*, 4: 1382–97). The fishery is seasonal lasting from November to May. A comparative study of fishery of this little known species is given for the years 1983 and 1984 at Versova and Sassoon Dock.

The area of operation for *A. stenodactylus* at Sassoon Dock is off Murud-Harnai coasts of Maharashtra. The operational depth may range from 27 to 70 m.

The landings at Versova were estimated for 'dol' landings considering each boat net combination as a fishing unit. At Sassoon Dock only mechanised country craft trawlers that brought medium sized penaeids such as *Metapenaeopsis stridulans* during March–May were considered for study and estimation of the landings of periscope shrimps. The monthwise landings by 'dol' net at Versova are given in Table 1.

The percentage of this species in total prawn landings by 'dol' at Versova was estimated at 3.5 and 2.8 respectively for 1983 and 1984. The considerable decline in the magnitude of catches at Versova during 1984 may be attributed to the general decline in catches of prawns.

Table 1. *Monthwise landings of Periscope shrimp by 'dol' net at Versova during* 1983–'84

Month	Catch (kg) 1983	1984
January	21,500	2,005
February	11,500	3,015
March	21,000	4,015
April	21,500	3,010
May	31,500	2,010
June	—	—
July	—	—
August	—	—
September	—	—
October	—	—
November	48,500	2,000
December	51,290	2,427
Total	2,06,790	18,482

* Prepared by M. Aravindakshan and J. P. Karbhari, Bombay Research Centre of CMFRI, Bombay.

The landings by trawlers at Sassoon Dock are given in Table 2.

Table 2. *Landings of Periscopc shrimp by trawlers at Sassoon Dock.*

Months	Catch (kg.) 1983	1984
March	4,415	4,210
April	3,315	3,118
May	2,274	3,577
Total	10,004	10,905

The quantity landed at Sassoon Dock was much less than that landed at Versova. This might be due to the escaping of juveniles through the large meshes of the net (3 cm) as compared to that of 'dol' nets (1 cm) and also due to the different depth ranges where the nets were operated. At Sassoon Dock the landings constituted 1.5% of total prawn landings.

Variations were noticed with regard to size range and sex ratio at each centre. The total length was found to range from 22–38 mm at Versova with a sex ratio of 1:3 with female dominance (Table 3). In trawler landings at Sassoon Dock, females were always dominant. A size range of 40–65 mm was noticed for the specimens from trawler catches at Sassoon Dock.

Table 3. *Month-wise sex ratio of* A. stenodactylus *at Versova and Sassoon Dock*

Place	Month	1983 Male %	1983 Female %	1984 Male %	1984 Female %
Versova	January	48	52	46	54
,,	February	50	50	50	50
,,	March	43	57	42	58
,,	April	50	50	50	50
,,	May	60	40	48	52
,,	June	—	—	—	—
,,	July	—	—	—	—
,,	August	—	—	—	—
,,	September	—	—	—	—
,,	October	—	—	—	—
,,	November	50	50	48	52
,,	December	48	52	52	48
Sassoon Dock	March	30	70	22	78
,,	April	20	80	15	85
,,	May	22	78	18	82

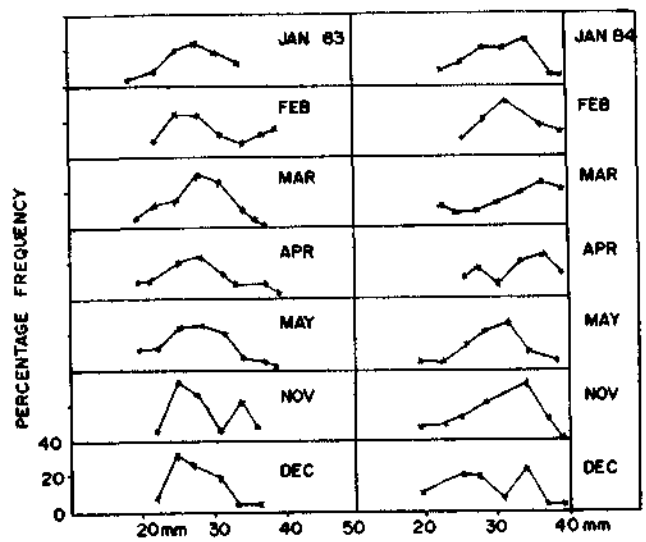


Fig. 1. Length frequency distribution of *Atypopenaeus stenodactylus* Stimpson at Versova (Dol net).

'Dol' catch

The dominant mode at 25 mm was noticed in November and December 1983. During the other months the main mode remained at 28 mm for 'dol' net at Versova. In 1984 the dominant mode was at 35 mm for January, November and December. During other months,chief mode was at 33 mm with slight progression in March and April when the mode stood at 38 mm (Fig. 1).

Trawler catch

In 1983 the mode at 56 mm had dominated in March which more or less continued upto April. It shifted to 60 mm in May. During 1984 dominant mode at 58 mm was found to continue in April and May (Fig. 2).

Of the 620 specimens of size range 22-65 mm analysed crustacean appendages, sand grains and debris constituted the major food items.

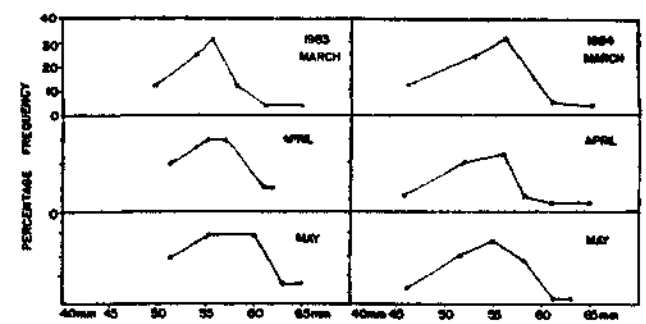


Fig. 2. Length frequency distribution of *Atypopenaeus stenodactylus* Stimpson at Sassoon Dock (Trawl net).

The crustacean appendages were mainly of copepods and decapod crustaceans. This formed about 75% of the food injested. Sand grains and debris constituted 20% and foraminifera 5% of the total stomach contents.

The specimens found in 'dol' nets were immature. Mature females were rarely noticed. In trawler landings which were mostly females, the percentage of mature specimens was as high as 80%. This indicated that the species spawned during these months. The sudden appearance of this species in November in 'dol' catches at Versova suggests their shoreward movement from deeper waters where spawning takes place.

This species being small, does not attract a ready market in fresh conditions. The 'dol' catches are sun-dried whereas trawl net landings are sold along with medium sized penaeids.

ON A SEASONAL HOOKS AND LINE FISHERY WITH CATAMARANS ALONG CALICUT COAST*

Though information on catamarans and associated hooks and line fishery along the southern part of south-west coast and east coast is fairly adequate (Anon. 1981, *Mar. Fish. Infor. Serv., T & E Ser.*, 69: 23-28), we have practically no information on the same along the Malabar coast. The present report embodies a brief account on the catamaran fishery at Calicut during November and December, 1986.

The catamaran fishermen of Trivandrum and Kanyakumari coasts migrate along the Malabar coast for fishing during October to January. During this period the weather becomes unfavourable for fishing in their traditional fishing grounds due to northeast wind. They even go upto Karwar braving the sea in their catamarans driven by sail, and catch quality fishes using hooks and line. During this season, as fish landing by local fishing gears along the Calicut coast is poor, their catches fetch good price.

At Calicut each catamaran is operated by two fishermen (Fig. 1). They use two sets of hooks and lines (Fig. 2). The hooks are about 8 cm long made of iron rod of 1.5 mm thickness. The baitfish is attached to the hook and is covered with a metallic cap (Fig. 3).

Fig. 2. Hooks and line used by the catamaran fishermen.

* Prepared by R. S. Lal Mohan and K. Nandakumaran, Calicut Research Centre of CMFRI, Calicut.

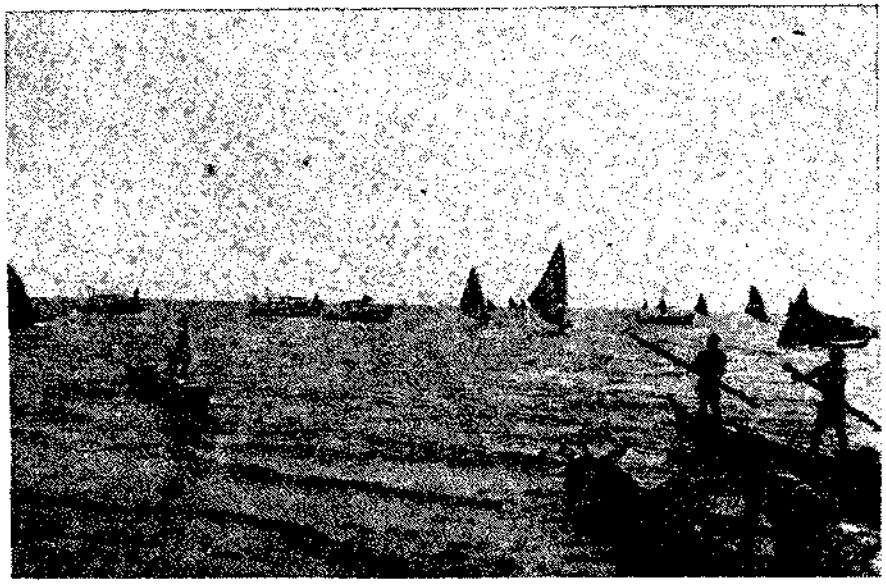


Fig. 1. Catamarans with sails off Calicut coast (Puthhiappa).

Fig. 4. Part of the landings - *Scomberomorus commerson* and *Sphyraena barracuda*.

Fig. 5. A part of the catch of *Sepia pharaonis* by hooks and line.

Fig. 6. *Sphyraena* spp. bound for the market.

Table 1. *Estimated catch of fishes by catamarans with hooks and line at Calicut during* 1986

Species	Catch (kg)		Length range (cm)	Average catch per trip (kg)	Species composition %
	November 1986	December 1986			
Scomberomorus commerson	15,540	27,668	72–152	11.09	45.3
Sphyraena spp.	11,000	33,596	51–92	10.41	46.8
Rachycentron canadus	1,835	2,899	132–150	1.25	5.0
Sepia pharaonis	1,125	1,712	19–26	0.75	2.9
Total	29,600	65,875			

The hooks along with the bait are tied to a monofilament of 1 mm thickness and released as the catamaran sails. The commonly occurring fishes such as oil sardine, mackerel, and *Stolephorus* sp. are used as baits. Usually fishes with bright colouration are preferred.

The catamarans are launched in the morning and they return at about 1600 hrs. They take about three hours to reach the fishing grounds and almost the same time for the return journey. The actual fishing period will be about 4–5 hours. The northeast wind is utilised for sailing.

At Calicut during the present observations the catamaran fishermen landed their catches from the last week of October to December, 1986. The fishing was mainly done along the rocky beds about 12 to 15 km away from the shore at a depth of 20-30 m. These areas proved to be a rich fishing ground for quality fishes like *Scomberomorus commerson, Sphyraena spp., Rachycentron canadus* and *Sepia pharaonis*. The average catch per trip was 23.5 kg for the period.

It may be pointed out that though the local gill net fishermen do not get good catches during this season, the hooks and line fishermen obtain fairly good catch (Table 1, Figs. 4, 5 & 6). This indicates scope for diversification of craft and gear in the area during this season. But, the catamaran fishermen had to leave the place before the end of the season as the local gill net fishermen objected to their fishing.

Fig. 3. Hook with bait fish.

Edited by Dr. K. J. Mathew, Mr. I. David Raj and Mr. G. S. D. Selvaraj. Published by Dr. K. J. Mathew on behalf of the Director Central Marine Fisheries Research Institute, Cochin-682 031. Printed at PAICO, Cochin-31.