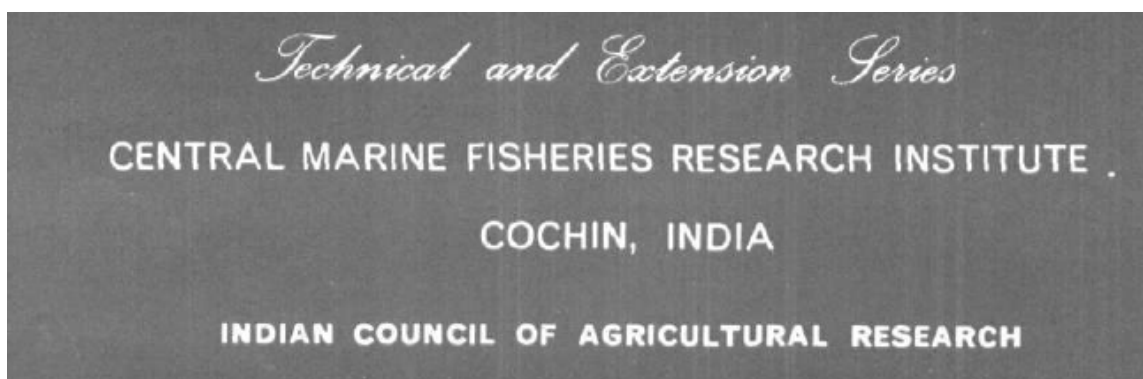


**Abbreviation - Mar. Fish. Infor. Serv. T & E Ser., No. 54 : 1983
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The MARINE FISHERIES INFORMATION SERVICE: Technical and Extension Series envisages the rapid dissemination of Information on marine and Brackish water fishery resources and allied data available with the Fishery Data Centre 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.



BY-CATCH OF SHRIMP TRAWLERS IN GREATER BOMBAY*

Introduction

With the introduction of mechanized trawling operations, Maharashtra, with a coast line of 720 km, occupies an important place in the export oriented prawn fishing industry of India. The state stands second in penaeid prawn landings with an annual average (1971-80) of 27,000 tonnes, contributing to 25% of the all-India catch of penaeids.

Traditionally, the penaeid prawns have been caught by fixed bag nets "Dol". But during the last two decades, shrimp trawling has made rapid strides to contribute to bulk of its production. As in other areas, at Bombay also along with prawns large quantities of fishes both quality as well as cheaper fishes are landed as by-catch, a general report of which has appeared in these columns (Mar. Fish. Inf. Ser. T & E Ser. 28, 1981).

Sassoon Dock and New Ferry Wharf are two important bases in Greater Bombay for commercial trawling. The present account attempts to give a picture of the trawl fishery with special reference to prawns and by-catches during 1979-82.

The primary data were collected by the technical staff of the fishery resources assessment division. The manuscript was critically gone through by Dr. M.J. George. The authors record their thanks to them.

Craft and gear

Wooden boats of about 13.5 m in length with fish hold and fitted with 80 to 100 H.P. engines operate from these two bases. The number of boats operating from New Ferry Wharf is about 200-250, whereas from Sassoon Dock it is about 250 to 300. However, the duration of fishing operations differs. At Sassoon Dock, the absence from port is from 24 to 48 hours with actual fishing of 16 to 24 hours. At New Ferry Wharf, the absence lasts from 45 to 60 hours of which 32 to 36 hours are spent in actual fishing. Mostly boats belonging to Gujarat fishermen operate from the latter centre.

Fishing grounds extend from Ratnagiri in the South to Dahanu in North (17°-20°N and 72°-73°E). Some times the boats from New Ferry Wharf operate beyond Dahanu also. All the boats use 16 to 23 m otter trawl with head rope of varying length and cod end mesh of 25 mm.

Fishing season

At New Ferry Wharf the fishing season lasts from September to May. From June to August the fishing operations are suspended because of the rough sea conditions due to S.W. monsoon. At Sassoon Dock, the fishing season is identical but for the fact that during the monsoon period also some trawlers are operated in the nearshore waters.

Fishery

Total landings for both the centres varied from 38041.2 tonnes in 1979-80 to 42682.9 tonnes in 1981-82. The total landing for the entire period was 122921.7 tonnes (Table I) of which prawns constituted 31.3%. The by-catch contributed to the rest.

New Ferry Wharf

This centre accounted for 47.4% of the total landings. The catch varied from 17157.6 to 22751.7 tonnes during 1979-80 and 1980-81 respectively (Table I). The catch/fishing trip correspondingly ranged from 895.6 to 1128.5 kg during the same period. The prawn component was 33.1% (Table II).

Monthly variations in effort, catch and CPUE were observed during all the years (Fig. I). During 1979-80 the catches showed a fluctuating pattern with a pronounced peak in December. In the following year a steady increase in the catch was noticed upto December. The catch declined thereafter except for a secondary peak in April. During 1981-82 the fishery showed an upward trend upto January after which it gradually declined. The highest CPUE was seen coinciding with the maximum catch except during 1980-81 when the peak of CPUE occurred in November.

Sassoon Dock

This centre accounted for 52.6% of the total landing. The catch ranged from 19446.0 tonnes (CPUE 856.8 kg) during 1980-81 to 24326.5 tonnes (CPUE 1052.0 kg) during 1981-82 (Table I). Prawns constituted 29.6% on an average.

Month-wise, the catch revealed an upward trend till October. In the next year the catch showed wide fluctuations till March after which a gradual decline was observed. The best catch was in August. A secondary peak occurred in March and later in November. The following year also experienced wide variations in catch

* Prepared by Chakraborty S.K., Deshmukh V.D., Kuber Vidyasagar and Ramamurthy S. (in alphabetical order).

TABLE I

Catch in tonnes and cpue in kg.

Year	New Ferry Wharf			Sassoon Dock			Total		
	Effort (trips)	Catch	Catch/ Effort Kg.	Effort (trips)	Catch	Catch/ Effort Kg.	Effort (trips)	Catch	Catch/ Effort Kg.
1979-80	19159	17157.6	895.6	21572	20883.6	968.1	40731	38041.2	933.96
1980-81	20252	22751.7	1128.5	22697	19445.9	856.8	42949	42197.6	982.5
1981-82	19398	18356.4	946.3	23106	24326.5	1052.8	42504	42682.9	1004.21
Total	58809	58265.7	990.78	67375	64656.0	959.6	126184	122921.7	974.15
Average	19603	19421.9	990.7	22458	21552.0	959.6	42061	40973.9	974.15

TABLE II

Year-wise catch composition of different categories of fishes and their percentages in parenthesis at New Ferry Wharf

	1979-80	1980-81	1981-82	Average	Rank
Elasmobranch	1747.95 (10.19)	1014.22 (4.46)	971.32 (5.30)	1244.50 (6.41)	6
Eels	186.41 (1.09)	362.11 (1.60)	2086.93 (11.37)	878.48 (4.52)	7
Cat fishes	1198.08 (6.98)	499.81 (2.20)	851.65 (4.64)	849.85 (4.38)	8
Nemipterus	623.43 (3.63)	319.6 (1.40)	411.23 (2.24)	451.42 (2.32)	10
Sciaenids	2930.45 (17.08)	3167.74 (13.92)	2339.12 (12.74)	2812.44 (14.48)	2
Ribbon Fishes	1651.62 (9.63)	1984.85 (8.72)	1712.89 (9.33)	1783.12 (9.18)	4
Quality Fishes	1839.44 (10.72)	963.48 (4.24)	940.5 (10.57)	1581.14 (8.14)	5
Prawns	5327.21 (31.05)	8801.13 (38.68)	5175.88 (28.2)	6434.74 (33.13)	1
Other Crustaceans	251.95 (1.47)	291.59 (1.28)	229.32 (1.25)	257.62 (1.33)	11
Cephalopods	849.16 (4.95)	493.43 (2.17)	698.27 (3.80)	680.29 (3.50)	9
Miscellaneous	551.87 (3.21)	4853.77 (21.33)	1939.27 (10.56)	2448.30 (12.61)	3
TOTAL	17157.57 (100.00)	22751.73 (100.00)	18356.38 (100.00)	19421.90 (100.00)	

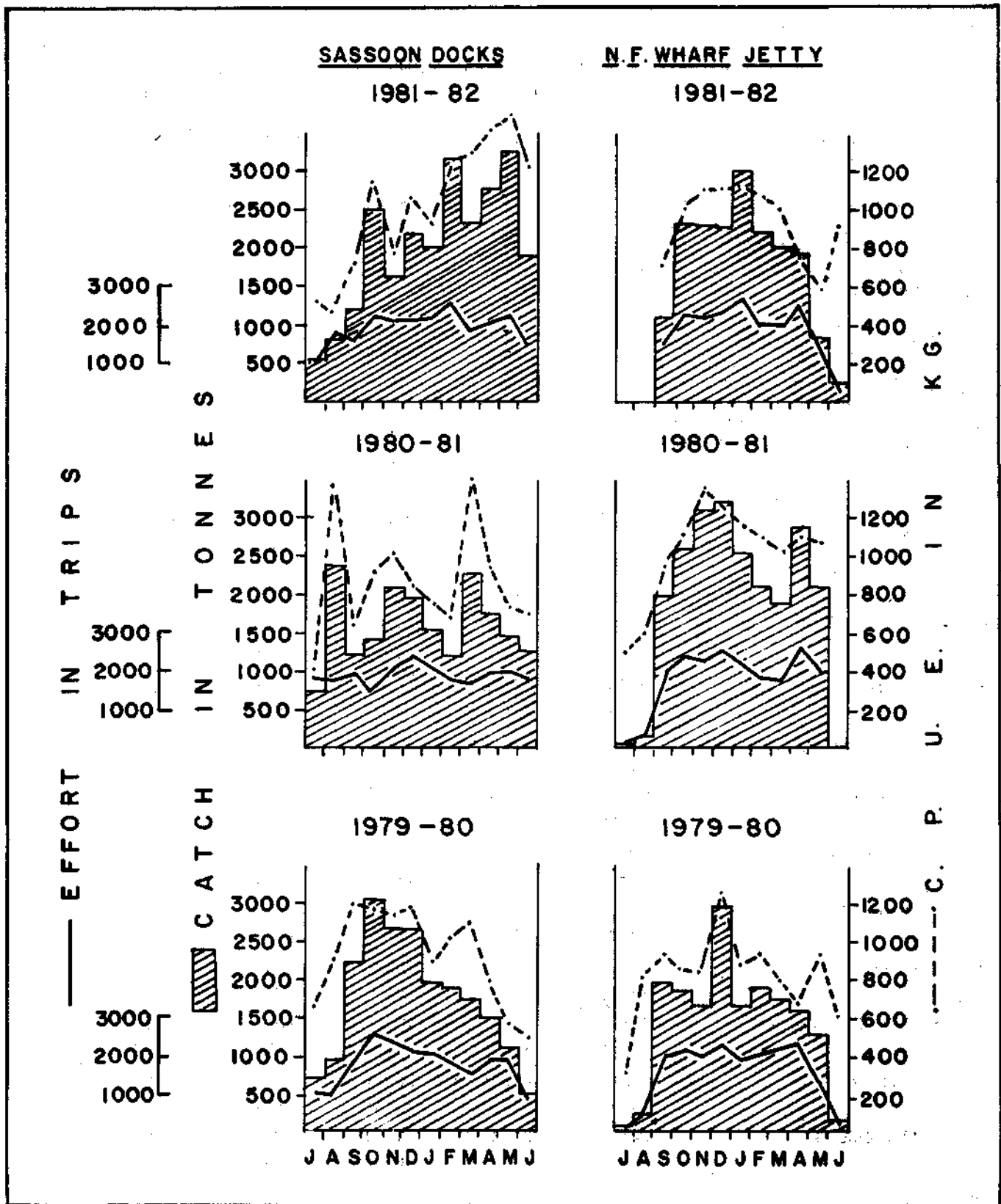


Fig. 1. Seasonal variations of catch, effort and C.P.U.E. at New Ferry Wharf and Sassoon Dock.

with three periods of abundance in October, February and May in the increasing order. The CPUE also showed more or less similar fluctuations with the peak occurring mostly during March and May (Fig. 1).

Catch composition

The catch has been grouped into prawns and the rest as by-catches consisting of fishes, cephalopods and other crustaceans (Plate I). The estimated catch of the various groups and their percentage composition at the two centres is given in Table II and III to show their annual variations.

By-catch

Fishes contributed to 62% and 64.5% respectively at New Ferry Wharf and Sassoon Dock. These are represented by a number of groups of species whose month-wise and species-wise fluctuations are given in Fig. 2 and 3.

Elasmobranchs: Although occurring throughout the year, they were most abundant during October to January. During March and April also they were common in the catches. Exceptionally high catch of 809 tonnes was netted in March 81 from Sassoon Dock

TABLE III

Year-wise catch composition of different categories of fishes and their percentages in parenthesis at Sassoon Dock

	1979-80	1980-81	1981-82	Average	Rank
Elasmobranch	1309.52 (6.32)	2113.30 (10.86)	1164.53 (4.78)	1529.11 (7.09)	7
Eels	140.17 (0.67)	72.49 (0.37)	107.59 (0.44)	106.75 (0.49)	11
Cat fishes	1865.42 (8.93)	1478.86 (7.60)	2633.71 (10.82)	1992.66 (9.24)	3
Nemipterus	1744.16 (8.35)	700.16 (3.6)	2501.52 (10.28)	1648.62 (7.64)	5
Sciaenids	3611.21 (17.29)	4894.35 (25.16)	3352.00 (13.77)	3952.52 (18.33)	2
Ribbon Fishes	1540.23 (7.37)	1430.05 (7.35)	1983.03 (8.20)	1651.10 (7.66)	4
Quality Fishes	2052.80 (9.82)	587.88 (3.02)	2178.37 (8.95)	1606.35 (7.45)	6
Prawns	6642.32 (31.8)	6127.47 (31.51)	6359.25 (26.14)	6376.34 (29.58)	1
Other Crustaceans	150.03 (0.71)	91.52 (0.47)	197.16 (0.81)	146.23 (0.67)	10
Cephalopods	983.07 (4.70)	483.61 (2.48)	1882.76 (7.73)	1116.48 (5.18)	9
Miscellaneous	844.84 (4.04)	1466.21 (7.53)	1966.55 (8.08)	1425.86 (6.61)	8
TOTAL	20883.17 (100.00)	19445.93 (100.00)	24326.47 (100.00)	21552 (100)	

comprising of 34.6% of the total catch. The elasmobranchs ranked sixth and seventh in abundance at New Ferry Wharf and Sassoon Dock respectively.

Eels: This group is represented by a single species *Muraenasox telabonoides* locally known as "Wam" and is caught only seasonally. At Sassoon Dock the fishery generally commences from November and continues upto June, whereas the seasonal abundance at New Ferry Wharf was very erratic. At Sassoon Dock, they were abundant in January, December and March-April respectively whereas at New Ferry Wharf the abundance was in May, March-April and January

respectively during 1979-80, '80-81 and '81-82. The eels were relatively more abundant at New Ferry Wharf with an annual average catch of 878.5 tonnes (4.5%). The fishery was exceptionally good at this centre during 1981-82.

Cat Fish: These ranked third in abundance contributing on an average of 9.2% of the catch at Sassoon Dock. At New Ferry Wharf they were far less abundant (4.4%). The fishery, mainly constituted by *Arius dussumieri*, *A. sona* and *Osteogeneosis militarias* was at the peak generally during September-January. However, during 1981-82 it was observed during February-May.

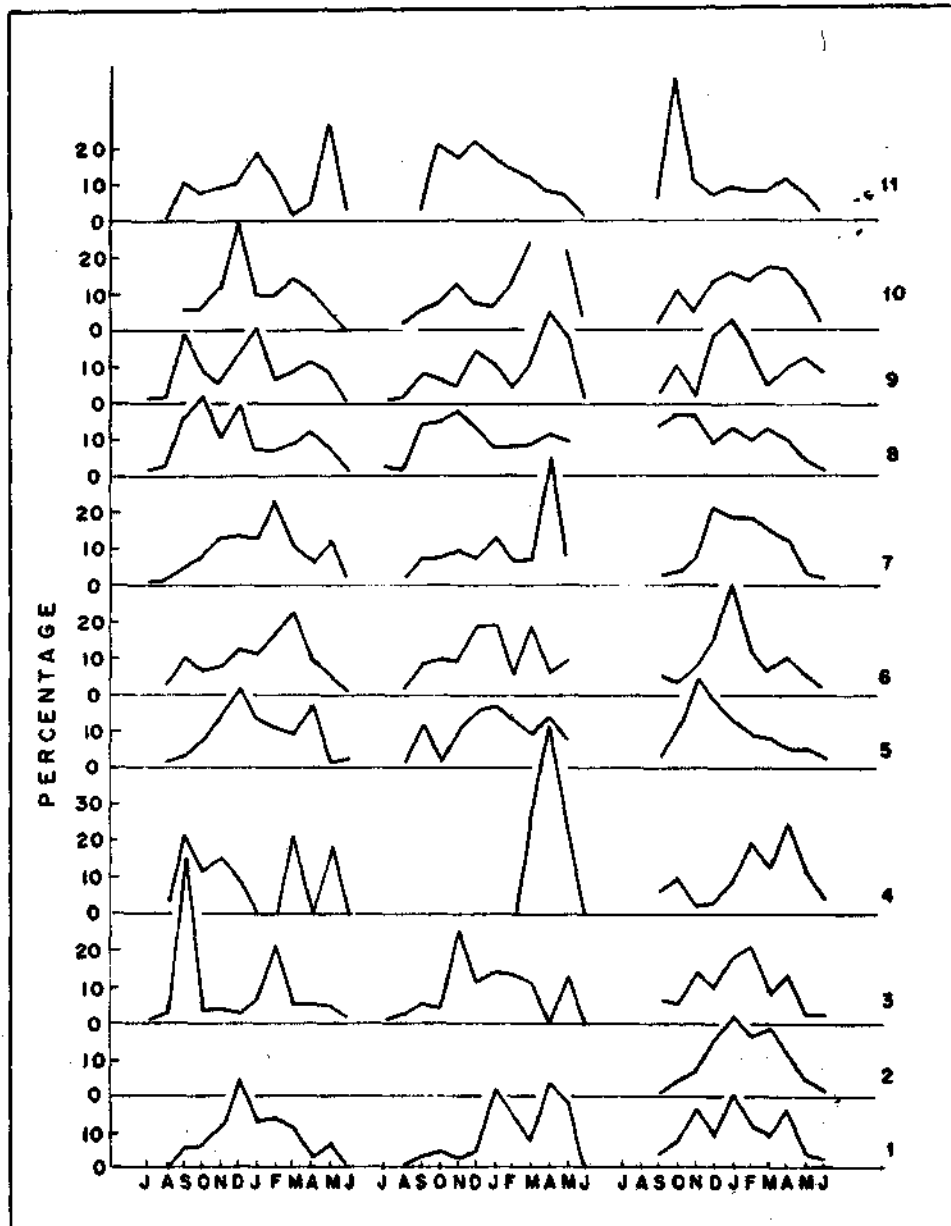


Fig. 2. Distribution pattern of major categories in the shrimp trawl at New Ferry Wharf.
 1. Elasmobranchi 2. Eels 3. Cat fish 4. Nemipterus 5. Sciaenids 6. Ribbon fish
 7. Quality fish 8. Prawns 9. Other crustaceans 10. Cephalopods 11. Miscellaneous

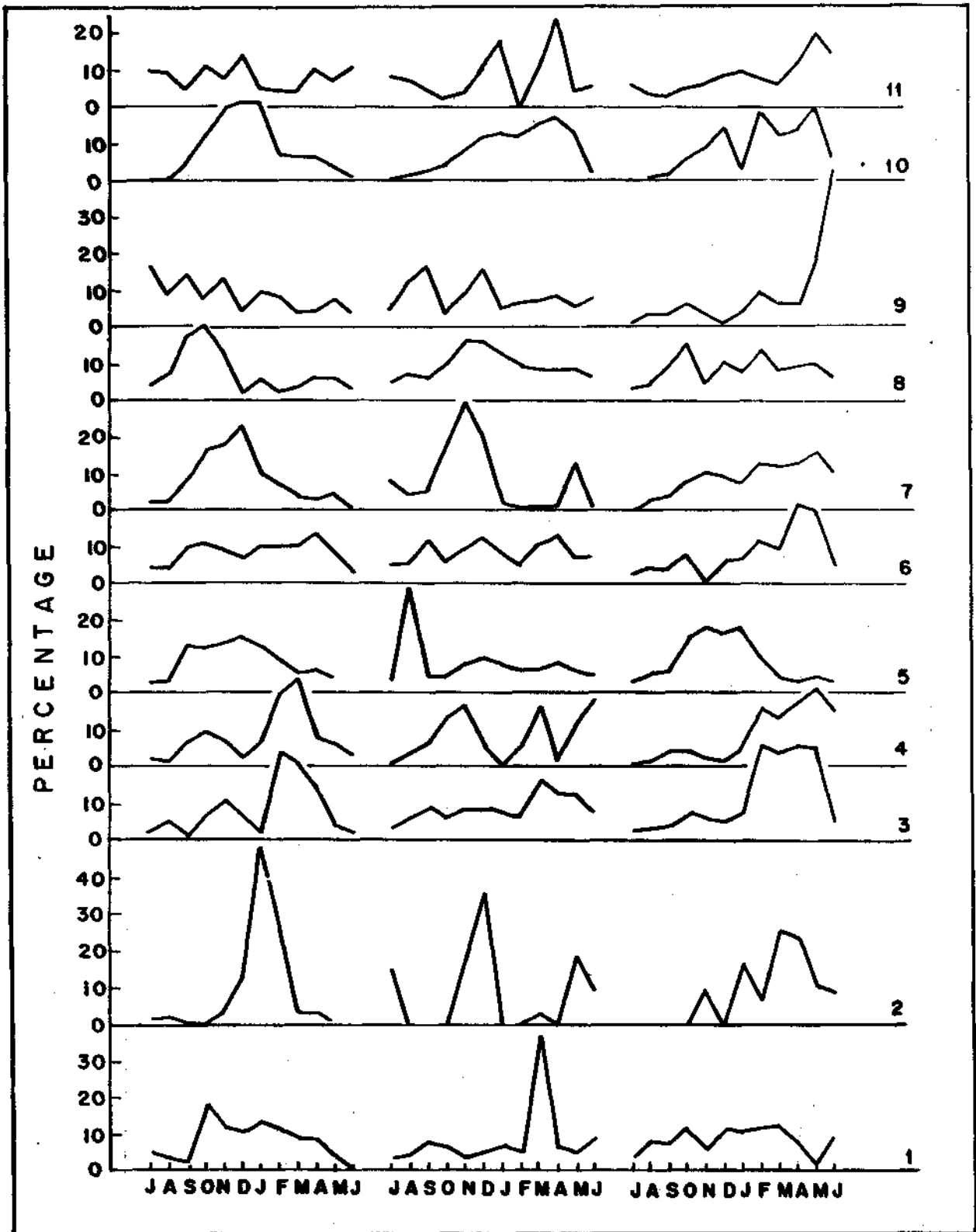


Fig. 3. Distribution pattern of major categories in the shrimp trawl at Sasson Dock.
 1. Elasmobranch 2. Eels 3. Cat fish 4. Nemipterus 5. Sciaenids 6. Ribbon fish
 7. Quality fish 8. Prawns 9. Other crustaceans 10. Cephalopods 11. Miscellaneous.



Catfish



Cephalopods



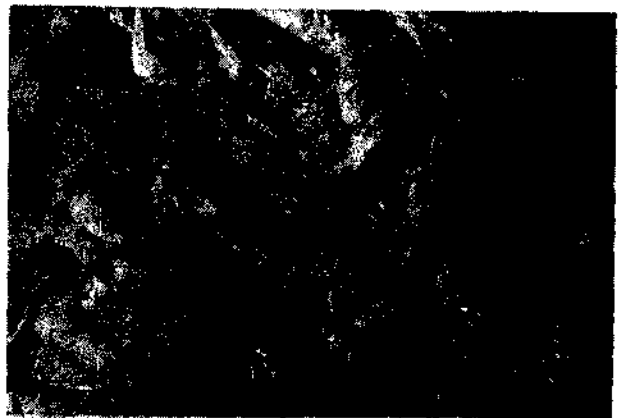
Nibea diacanthus



Lobster



Sciaenids



Prawns

Nemipterus: Locally known as 'Rani' three species viz. *Nemipterus japonicus*, *N. mesoprius* and *N. delogoae* occur in the catch, of which the first one is the most abundant. Ranked as fifth in abundance at Sassoon Dock, the average annual catch was estimated to be 1648.6 tonnes forming 7.6%. At New Ferry Wharf the fishery accounted only for 451.4 tonnes forming 2.3%. Generally there appeared to be two periods of abundance, February-May and September-November the former being the maximum.

Sciaenids: Of all the by-catch components, sciaenids are the most abundant group occurring at both the centres almost throughout the year. Locally, known as 'Dhoma', it includes smaller sciaenids. Species in order of abundance are *Johnius macrorhynchus*, *Johniops vogleri*, *Otolithus cuvieri*, *O. ruber* and *Johniops dussumieri*. Average annual catch of this group at New Ferry Wharf and Sassoon Dock was 2812.4 and 3952.0 tonnes forming 14.5% and 18.3% respectively of the total catch. Their abundance at New Ferry Wharf was noticed in December and April, September and January and November and at Sassoon Dock in September and December, August and October-January during 1979-80, 1980-81 and 1981-82 respectively at the two centres.

Ribbon Fish: Locally known as 'Wakti' they are represented by *Trichiurus lepturus* and *T. savala* in the trawl catches regularly. They ranked fourth in abundance at both the centres with mean annual catch of 1783.1 and 1651.1 tonnes at New Ferry Wharf and

Sassoon Dock respectively. Bulk of the catch was obtained during January-April.

Quality Fishes: These include pomfrets, carangids, perches, clupeids, polynemids and *Nibea diacanthus* etc. which, though individually contributed to a small fishery, but as a group occupied fifth place in abundance at New Ferry Wharf (1581.1 tonnes and 8.1%) and sixth place at Sassoon Dock (1606.4 tonnes and 7.5%). Clupeids contributed to 4.7% and 3% at Sassoon Dock and New Ferry Wharf respectively. The other major component among the quality fish was *Nibea diacanthus* (10.6%) at New Ferry Wharf.

Prawns: These form the largest component at both the centres. The mean annual catch was 6434.7 and 6376.3 tonnes with 33.2% and 29.6% of the catch at New Ferry Wharf and Sassoon Dock respectively. The fishery had a peak during October/November and a secondary peak during March/April (Fig. 2 and 3).

Penaeids contributed to the bulk of prawn landings. They were represented mainly by *Parapenaeopsis stylifera*, *Solenocera* spp., *Metapenaeus affinis* and *M. monoceros*. Other species of minor importance were *M. brevicornis*, *Metapenaeopsis stridulans*, *P. sculptilis* and *Penaeus* spp. Non-penaeids were represented by *Nematopalaemon tenuipes* and *Acetes indicus*. The species-wise fluctuations of the shrimp catch is given in Fig. 4.

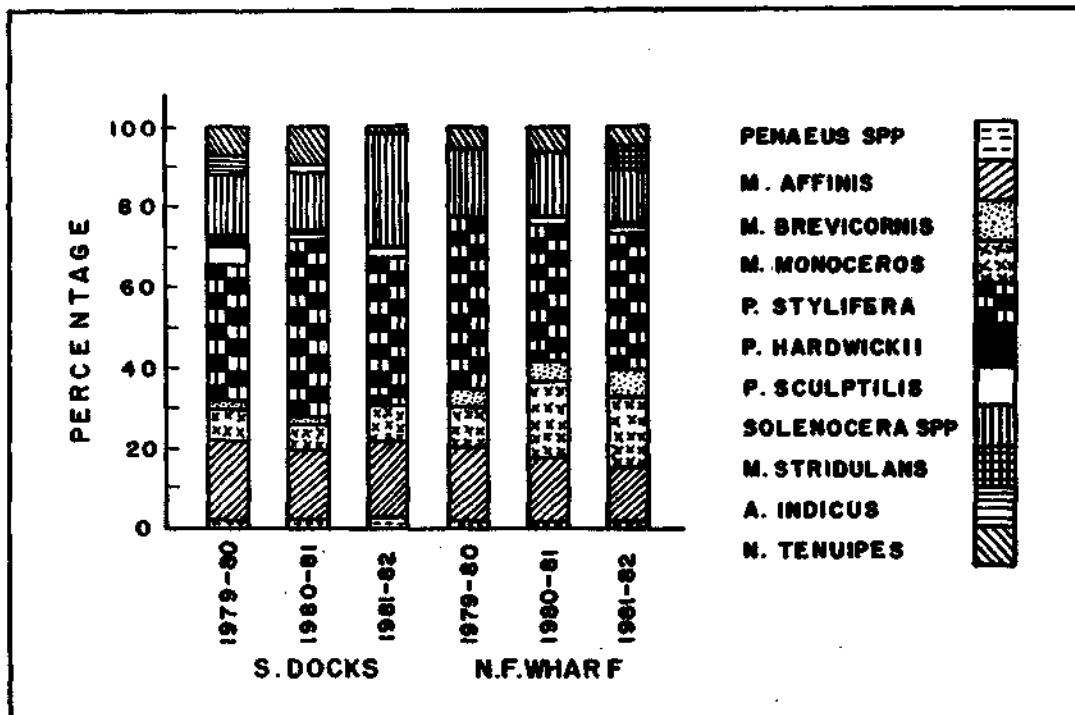


Fig. 4. Annual fluctuations of the species in the shrimp catch.

Other Crustaceans: An average of 257.6 and 146.2 tonnes were landed at New Ferry Wharf and Sassoon Dock respectively, represented by lobsters mainly *Panilurus polyphagus* and *Thenus orientalis* and crabs in negligible quantities. Lobsters were more common during September-December, January and April-May at New Ferry Wharf.

Cephalopods: Locally known as 'Makul', they occurred throughout the year in the trawl catches except during the monsoon months. Represented by squids, *Loligo duvauceli* and cuttle fish *Sepia aculeata* and *S. pharaonis*, they formed 3.5% and 5.2% of the catch at New Ferry Wharf and Sassoon Dock respectively. Good catches of cuttle fishes were observed from October to December and of squids from January to April.

Miscellaneous: Several other species of fishes such as Bombay duck, *Saurida* sp. seer fish, Tunnies, flat fishes *Upeneus* spp. etc. collectively accounted for 2448.3 tonnes contributing to 12.6% of the catch at New Ferry Wharf. At Sassoon Dock, miscellaneous fishes formed 1425.86 tonnes amounting to 6.6 per cent.

Marketing and disposal

Because of the availability of fish hold facilities on the trawlers and cleaner wharf at the landing site, the catch is landed in fairly good condition. The catches are auctioned daily at the landing centre itself. For this reason there is no consistency in the price structure. From the fishermen the catch goes to the middlemen who purchase the fish in auction. From there on, it is sorted out both size and quality wise and handed over to processors. This is done mainly in the case of items with export value like prawns, lobsters, cephalopods and quality fishes. Because of the middle men the fishermen get less profit out of the catch. Rest of the fish is transported to various markets for local consumption. Thus most of the by-catch is utilized for human consumption as observed by George et al (*Mar. Fish. Infr. Ser. T & E Ser. No. 28, 1981*), nothing from the trawler catches is wasted. The

estimated annual value of the catch at the auction site of both the centres was Rs. 404 million. Of this the prawns accounted for about 42%, lobsters 14%, quality fishes 19% and cephalopods 3%.

Remarks

The present study revealed that the fishing effort over the three years remained more or less steady at both the centres. This is a good sign as there is no increase of fishing pressure on the stocks. The fishery at Sassoon Dock registered an upward trend whereas at New Ferry Wharf, it showed fluctuating trends with 1980-81 recording the maximum catch. Most of the species constituents had the peak during October-April, following the south-west monsoon period. Compared to New Ferry Wharf, Sassoon dock was a better landing centre from the point of view of total catch. However, the catch per fishing trip was more at the former because the boats from this centre expended more hours of fishing coupled with wider operational range of fishing grounds. Eels, lobsters and miscellaneous fishes comprising of flat fish, tunnies etc. registered significantly higher catch at New Ferry Wharf showing that the grounds fished by these trawlers supported a comparatively rich fishery for these varieties.

Though this study did not indicate any adverse trend in the fishery, continued monitoring of the resources is necessary for scientific management of the fishery.

Further, it could be inferred that though the cheaper fishes formed the bulk of the by-catch, it contributed to only 22% of the annual value. These varieties are consumed either fresh or dried in domestic markets. Thus the fishermen's income is largely dependent on crustaceans, cephalopods and quality fish for export. It would therefore be advisable to go in for better product development out of the cheaper varieties to ensure better utilization in internal markets which would ultimately benefit the primary producers of the sea in getting better returns from the catches.

