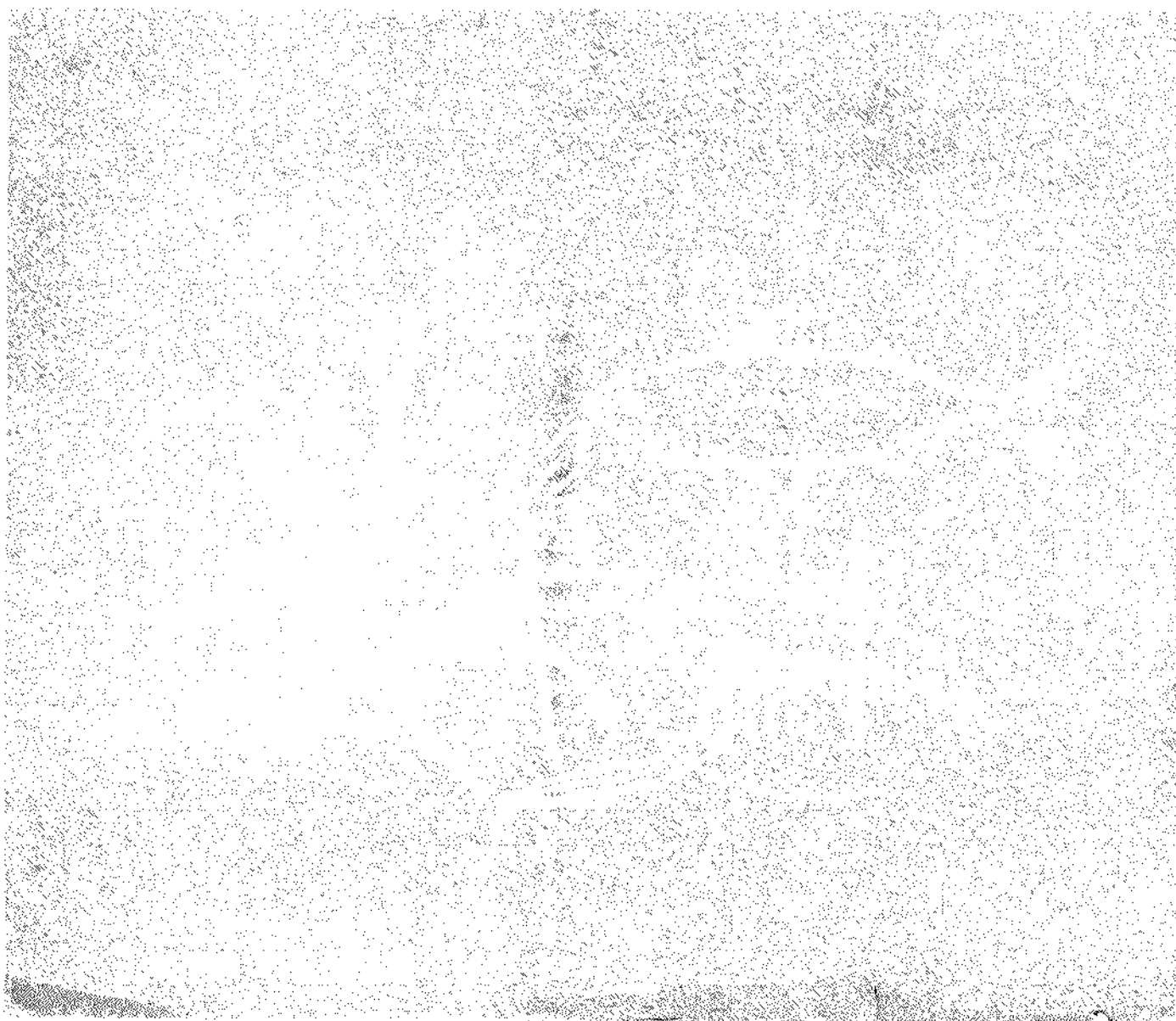


PROCEEDINGS OF THE SYMPOSIUM  
ON  
**LIVING RESOURCES**  
*of*  
**THE SEAS AROUND INDIA**



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# OFFSHORE FISHERY RESOURCES OF THE BAY OF BENGAL FROM SANDHEADS TO GOPALPUR

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## ABSTRACT

The paper deals with the fishery resources, species composition and seasonal fluctuations of the Bay of Bengal from Sandheads to Gopalpur with special reference to depth and nature of bottom. The fishing grounds covered by Kalyani I to V in the areas between Sandheads and Gopalpur from the very commencement of the exploratory fishing by the Government of West Bengal have been charted and the potentiality of these grounds assessed. The results of night trawling compared with the day catches are presented.

## INTRODUCTION

A review of the trawling operations conducted in Indian waters has been given by Jayaraman *et al.* (1959) while dealing with the trawl fisheries of Bombay and Saurashtra waters. Naidu (1938) has made a survey of the fisheries of Bengal and Naumov (1961) has reported on the general fishery resources chiefly of the areas between Visakhapatnam and Gopalpur. The data collected from the Fisheries Directorate of the Government of West Bengal have been given in the "Report of the Deep Sea Fishing activities of the West Bengal trawlers from 1951-60"\* by the Central Marine Fisheries Research Institute and this report deals with the total catch from the areas between Sandheads and Gopalpur in general during 1951-60 and in addition the species-wise composition during 1957-60 are given. The present study, based on the analysis of the results of the trawling operations during 1959-62, has been undertaken to assess the fishery resources, species composition and the seasonal fluctuations in the catch and catch/unit of effort in the different fishing grounds with reference to depth and nature of bottom. Such a study may be useful for commercial enterprise. The length range and maturity conditions of the major fishes have been included in the present study. Besides, the fishing grounds trawled from 1951-62 are charted and presented.

Since no statistics on trawling hour was available the catch/unit of effort reported here relates to catch/voyage. Such information was gathered whenever the authors went on board and the catch/hour and catch/haul were calculated.

## METHOD

Haddock type of otter trawl was the net used by the vessels Kalyani I-V. Tables I and II give dimensions of the gear employed and the specifications of the trawlers.

The details of the sampling design and the method of estimating the trawler catches have already been dealt with by the senior author (Kuthalingam, 1962).

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\* *Indian Fish. Bull.*, 1961, 8 (4): 5-25. Data compiled by the Senior author.

## AREA OF OPERATION

The area fished by the trawlers, Kalyani I-V in the Bay of Bengal from the very commencement of the fishing operation (1950 onwards) has been divided into several rectangular areas and numbered (Fig. 1) based on the latitude and longitude gathered from the log sheets. Each region has a total

TABLE I  
*Specifications of trawl*

Particulars	Specification	Mesh size in inches
Head line length	90'	..
Bottom line length	118'	..
Length of winch	20'	..
Length of square	12'	4"
Length of Belly	16'	4"
Length of tunnel	50'	3-3½"
Cod end length	14'	2" Using double twine
Otter board	4½' × 3'	..
Bridle rope	240'	..
Trawl rope	100-200 fathoms and more	..

TABLE II  
*Specifications of vessels*

Particulars	Name of the vessels				
	Kalyani I	Kalyani II	Kalyani III	Kalyani IV	Kalyani V
Length	22.6 m	22.2 m	30.9 m	30.9 m	30.9 m
Beam	6.3 m	5.9 m	5.4 m	5.4 m	5.4 m
Draft	9'	9'	11'	11'	11'
Gross tonnage	91.98	75.84	107.82	107.82	107.82
Horse power	260	260	300	300	300
Trawling speed (in knots)	3-4	3-4	3-4.5	3-4.5	3-4.5
Speed of vessel (in knots)—					
Loaded	8-9	8-9	8-9	8-9	8-9
Unloaded	9-10	9-10	9-10	9	9
Capacity of refrigerated fish hold	64 tons fish, 33 tons ice	55 tons fish, 35 tons ice	70 tons of iced fish	70 tons of iced fish	70 tons of iced fish

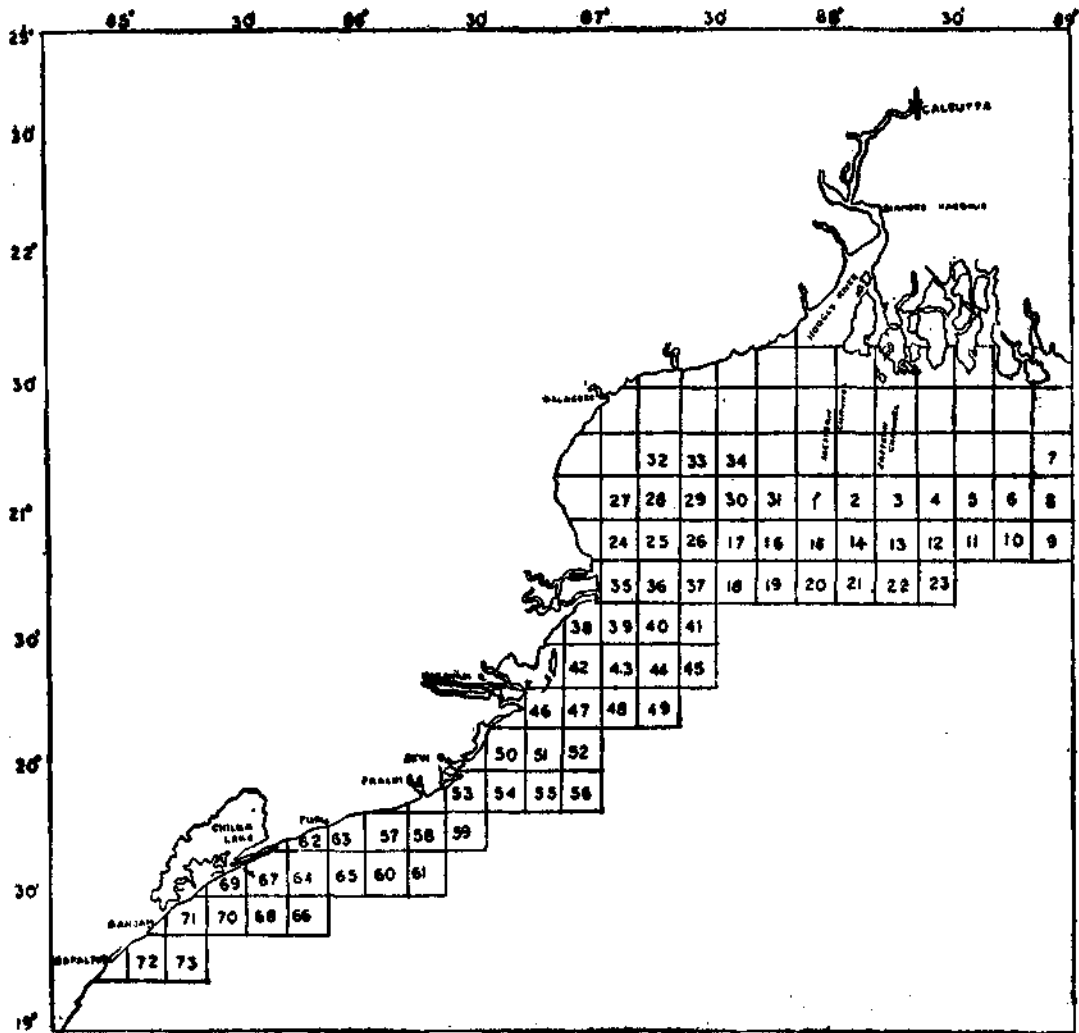


FIG. 1. Offshore fishing grounds.

extent of 100 square miles. The vessel had to cross a distance of about 128 statute miles in the Hooghly\* River to reach the fishing ground. The following regions are recognised:

- |                        |     |       |
|------------------------|-----|-------|
| 1. Sandheads           | ... | 1-23  |
| 2. Off Balasore        | ... | 24-34 |
| 3. Off Mahanadi        | ... | 35-49 |
| 4. Off Devi and Prachi | ..  | 50-56 |
| 5. Off Black Pagoda    | ..  | 57-61 |
| 6. Off Puri            | ..  | 62-66 |
| 7. Off Chilka          | ..  | 67-71 |
| 8. Off Gopalpur        | ..  | 72-73 |

\* The term 'Hooghly' is applied to the 174 miles stretch of the tidal portion of the 'Bhagirathi' the 1st offshoot of the Ganga flowing towards the Bay of Bengal.

During the season 1958-59 the trawlers concentrated fishing mostly in regions 4 and 5. However, during 1959-60 the vessels did the major fishing in region 5. In the year 1960-61, in region 3 fishing activity was concentrated and it was found to be one of the best fishing grounds for quality catches belonging to "A." class. Subsequently practically all the fishing was done in the region Arab. The nature of sea bottom of the different fishing grounds is given in Table V.

#### CLASSIFICATION OF THE CATCH

According to the market value the trawler catches were classified into three categories; "A", "B" and "C" classes by the Directorate of Fisheries, Government of West Bengal. "A" class includes commercially important catches: pomfrets, prawns, big sized (above 10") perches, sciaenids, polynemids and scombroids; "B" class comprises leiognathids, clupeids, mullids, mugilids, kurtids, muraenids, scombroids and big-sized tachysurids; "C" class includes trichiurids, synodontids, scopelids, sole fishes, sharks, rays and skates.

#### ANALYSIS OF THE TRAWLING DATA

##### *Total yield and the fluctuations of the catch*

The estimated catch during 1959-62 amounted to 906403.23 kg. 1961-62 was found to be the best fishing period and a total of 508031.04 kg. was caught during this year. This was reported to be the highest catch during these years. 237719.30 and 160652.89 kg of fish were caught during 1959-60 and 1960-61 respectively. A progressive increase in the yield of the marine catches with the approach of the winter season was also noticed. During December-February alone 735415.54 kg of fish were caught which formed about 63% of the total catch. The fluctuations of the catch per unit of effort in the total catch for the different months are presented in Fig. 2. January was found to be the most productive month.

Seasonal fluctuations of the catch per unit of effort of the different categories of fishes are given in Fig. 3. It is evident from Fig. 3, that "B" class dominated the catch constituting 90.53% whereas "A" and "C" classes were represented as 5.96 and 3.51% respectively of the total catch. December and January were observed to be the best fishing months from the point of view of quality and quantity of catches. Fishing was not attempted during May-July due to rough and unfavourable weather conditions in the Bay.

##### *Catch in relation to depth*

The fishing was confined to the trawler, Kalyani I-V, at Sandheads, off Balasore, Mahanadi, Devi and Prachi Rivers and off Black Pagoda, Puri and Chilka between depths of 5-40 fathoms. This range of depth has been subdivided into smaller depth ranges of 5 fathoms and the results are given in Fig. 4.

It is obvious from the data presented that "A" class fishes were more between depths of 5-15 fathoms with a well-defined peak between 10-15 fathoms. Large quantities of "B" class fishes were found between depths of 15-25 fathoms. "C" class catches were more abundant between depths of 25-35 fathoms. During 1959-60 and 1961-62 the highest catch was recorded between 30-35 fathoms depth while during 1960-61 it was in the 25-30 fathoms depth range. During the first two years the maximum catch was noticed at 20-25 fathoms depth while in the third year it was at the 15-20 fathoms depth. Generally the catch was observed to be poor beyond 35 fathoms.

##### *Vessel-wise catch*

The available information regarding the fishing operations of Kalyani I-V is presented in Table III. Among these five vessels, Kalyani I did not go out for fishing due to major engine troubles after 1958-59. Though Kalyani II had undertaken only six voyages during 1959-60 yet the catch/voyage and

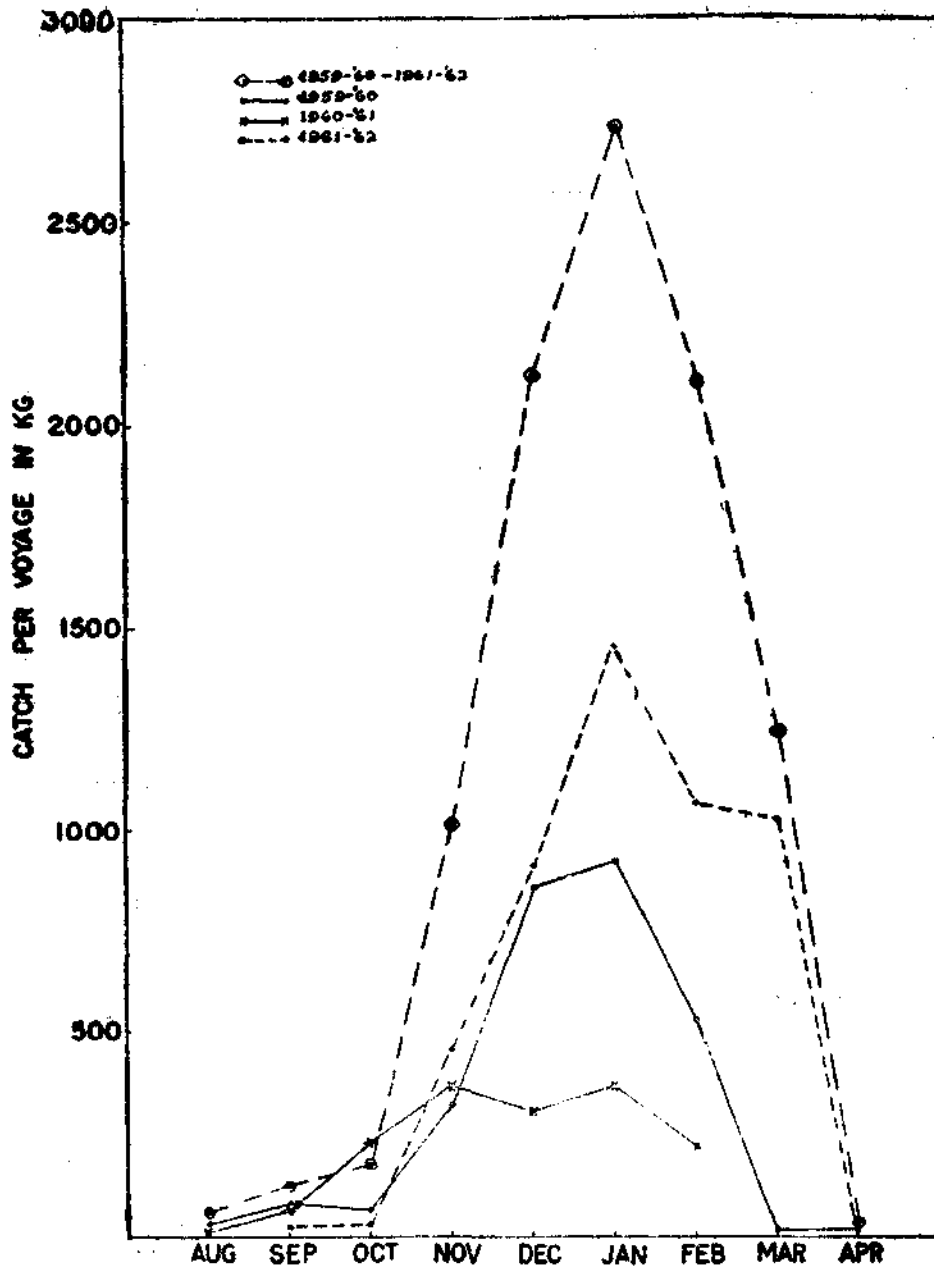


FIG. 2. Seasonal fluctuations of the total catches from August 1959 to April 1962.

catch/day in kg worked out to be far better than Kalyani III, IV and V. Kalyani III and IV showed better fishing efficiency during 1960-61 and 1961-62 respectively. Though Kalyani V made the highest number of fishing voyages with a catch of 308974.16 kg, the average catch/voyage was less compared to Kalyani III which made only 27 voyages but brought 347948.41 kg. No definite conclusion could be drawn regarding the fishing efficiency of Kalyani II since very few fishing trips were made by this vessel,

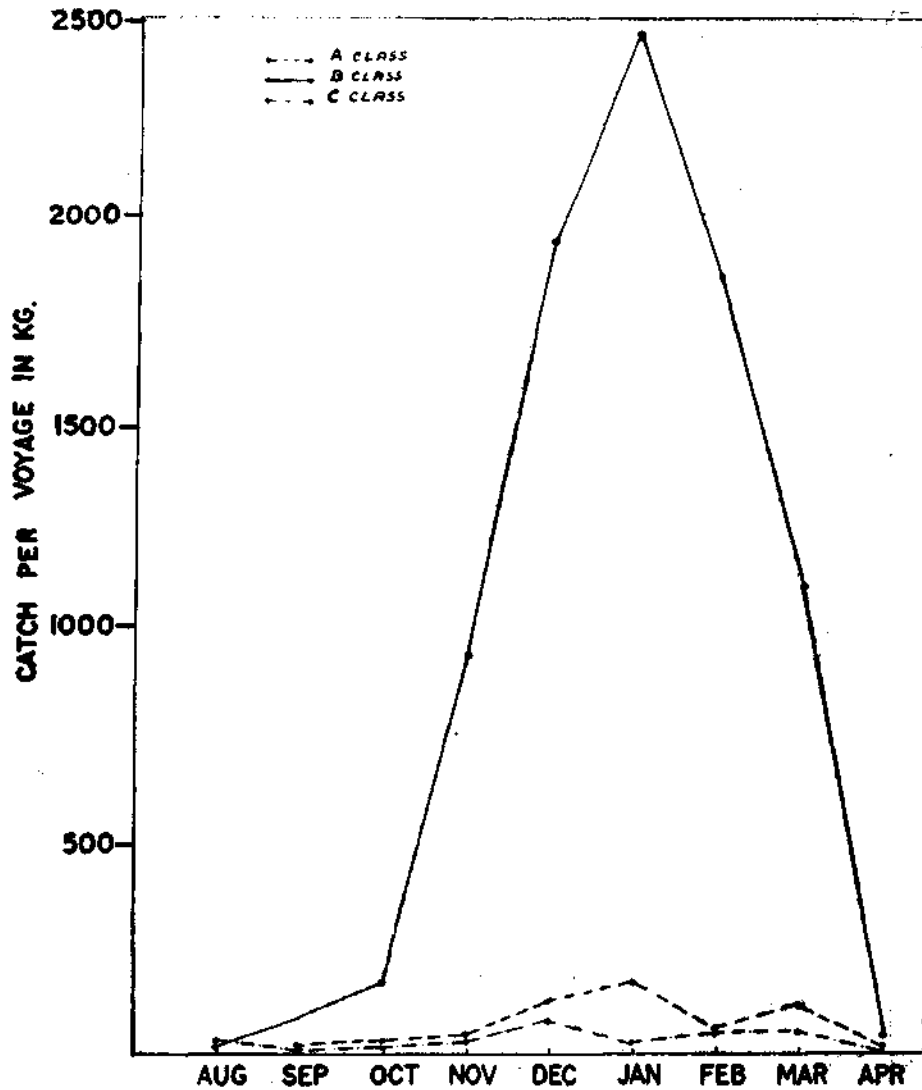


FIG. 3. Seasonal fluctuations of the total catches of "A", "B" and "C" class category of fishes from August 1959 to April 1962

A comparison of the catches of A, B, C class of fishes by these trawlers (Fig. 5) revealed that Kalyani III brought the maximum catch throughout.

*Abundance of the major categories of fishes in the different fishing grounds.*

Since the duration of trawling in each of the fishing grounds was not available from the skipper's log reports the catch/hour of the different categories of fishes at the various fishing grounds could be calculated only in respect of the voyages when the authors went on board. It has also been attempted to point out the abundance of the "A", "B" and "C" classes of fishes at the different fishing grounds for the rest of the voyages from the information gathered from the masters of the vessels.



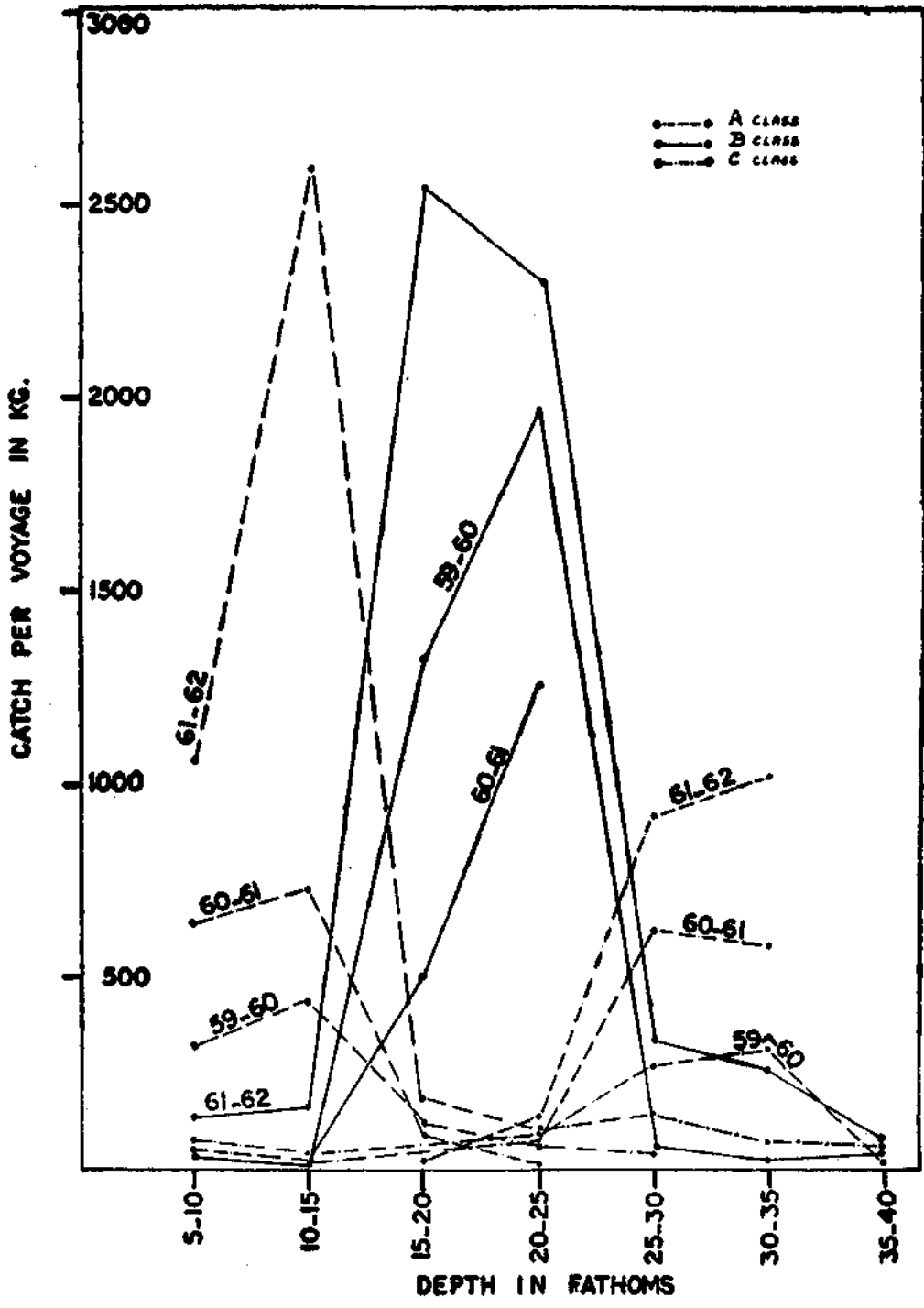


FIG. 4. Depth-wise variations in the distribution of the different categories of fishes.

TABLE III

*Year-wise and Trawler-wise fish landings*

Fishing Detail		1959-60			
Name of Fishing Vessel	Kalyani II	Kalyani III	Kalyani IV	Kalyani V	
Total catch in kg	84301·35	56933·92	30496·15	66007·90	
Total No. of voyages	6	7	7	5	
Total No. of days absence	44	83	63	52	
Catch per voyage in kg	14050·22	8133·42	4353·73	13201·58	
Catch per day in kg	1915·94	685·95	483·74	1269·38	
Fishing Detail		1960-61			
Name of Fishing Vessel	Kalyani II	Kalyani III	Kalyani IV	Kalyani V	
Total catch in kg	1354·88	72792·76	21538·48	64966·77	
Total No. of voyages	1	7	6	9	
Total No. of days absence	13	76	61	90	
Catch per voyage in kg	1354·88	10398·96	3589·74	7218·53	
Catch per day in kg	104·22	957·77	353·08	271·85	
Fishing detail		1961-62			
Name of Fishing Vessel	Kalyani II	Kalyani III	Kalyani IV	Kalyani V	
Total catch in kg	17180·90	187272·50	123210·64	180367·00	
Total No. of voyages	3	12	7	10	
Total No. of days absence	26	116	71	100	
Catch per voyage in kg	5726·96	156006·04	176001·52	18036·70	
Catch per day in kg	660·80	1614·43	1748·75	1863·67	

The data presented in Table IV relate to the 18 fishing trips undertaken by the authors spending 184 days making a total of 928 hauls in 920 hours. A close scrutiny of the catch/hour revealed that each of the fishing grounds was dominated by a particular category of fish. Very high yields of *Sciaena* spp., *Kurtus indicus*, *Leiognathus* and *Muraenesox talabonoides* were noted in regions I and III. These species seem to occur in rather deeper ranges of the regions exploited. Cat-fishes and clupeids were also found in area I. The yields of pomfrets in general was much higher in regions I and II. In areas V and VI perches were caught in large quantities. More yields of Bombay-ducks and prawns were obtained from region IV when compared to the other grounds.

The details of catch in respect of "A", "B" and "C" classes of fish which refers to the 62 voyages spending 611 days of fishing are furnished in Table V.

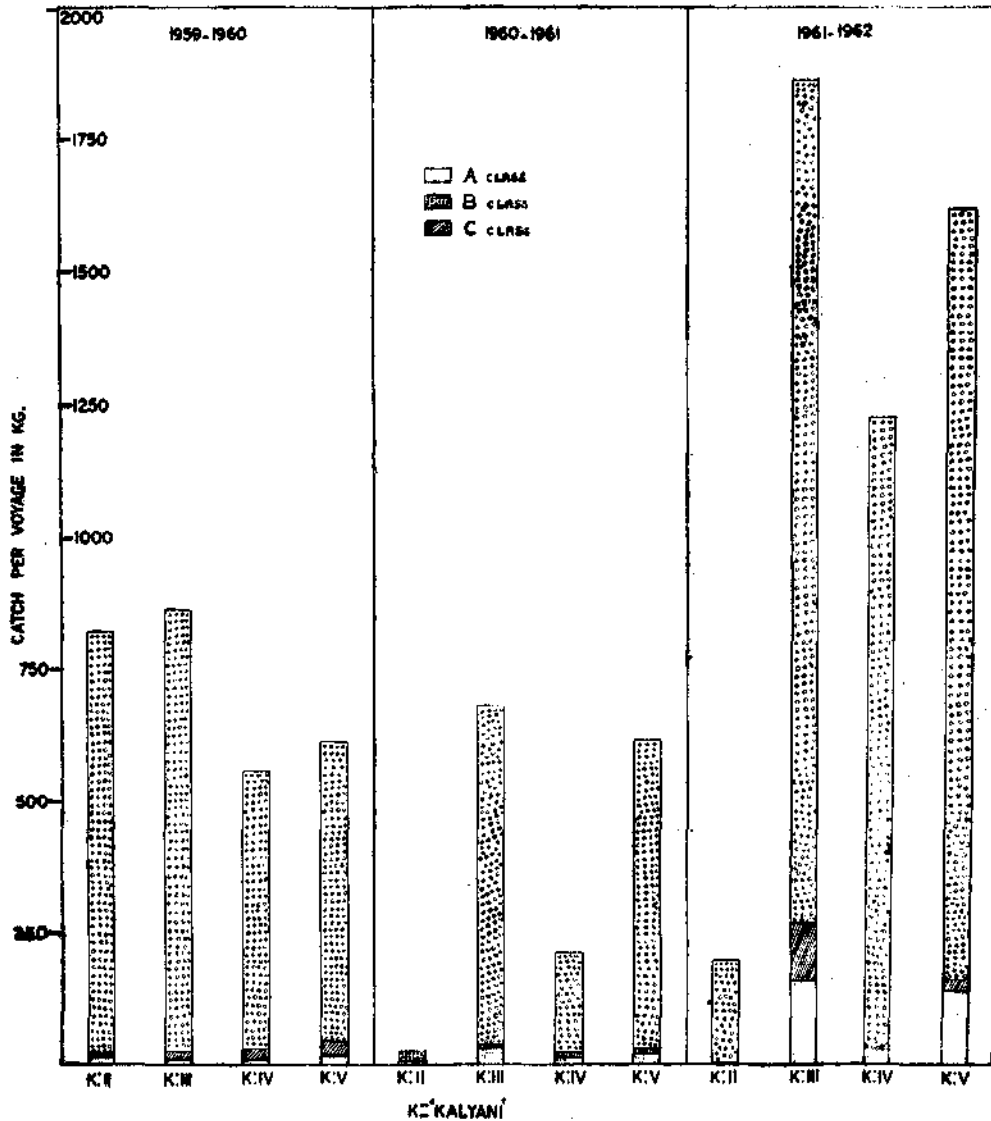


FIG. 5. Vessel-wise catch for the years 1959-60 to 1961-62.

During 1959-60, 50% of the yield was from off Devi and Prachi. In the succeeding year Black Pagoda was found to be the most productive ground, Devi, Prachi and Mahanadi forming the next important ones. During 1961-62, 29 out of the 32 voyages were attempted at the Sandheads and the catch was found to be extremely good. A comparative account of the productivity of the various fishing grounds during these years could not be given since there was no uniformity in fishing with regard to areas and duration. The data gathered however indicate very good fishing grounds off Devi and Prachi, Sandheads and off Mahanadi regions,

TABLE IV

*Region-wise catch/hour of major fish categories*

Region/Area	Depth range in fathom	Sciaenids	Eels	Pomfrets	<i>Kurtus indicus</i>	<i>Leig-nathus</i> spp.	Bombay duck	Catch per hour (kg)			
								Cat fish	Prawns	Clupeds	Perches
I. Sandheads	8-40	232.4	84.2	64.8	112.8	110.0	48.2	31.4	12.0	48.4	—
II. Off Mahanadi	10-15	198.6	..	127.4	28.0	12.2	...	...	6.4	...	2.8
III. Off Devi and Prachi	20-30	286.4	12.2	21.2	189.0	14.4	94.2	...	21.4	2.2	10.2
IV. Off Black Pagoda	20-25	178.2	28.4	8.4	42.2	8.2	128.0	...	62.4	1.0	12.2
V. Off Puri	15-20	28.4	...	...	11.2	2.4	21.4	..	10.2	..	98.2
VI. Off Chilka	20-22	96.4	4.8	..	5.4	0.9	6.4	11.2	...	..	47.8

TABLE V

*Region-wise catch/voyage of trawlers from 1959-62*

Period	Area of operation	Nature of bottom	Catch per voyage in kg.			Total catch per voyage in kg.
			A	B	C	
1959-60	Sandheads	S.M.	30.02	118.54	48.95	197.51
	Off Balasore	..	8.7	213.04	54.12	275.86
	.. Mahanadi	..	46.0	1593.44	17.1	1656.54
	.. Devi and Prachi	..	130.01	4016.4	89.52	4235.93
	.. Black Pagoda	..	38.0	2730.4	41.12	2809.52
	.. Puri Coast	S.C.	14.00	85.04	25.28	124.32
	.. Chilka	S.C.M.	22.02	160.01	27.04	209.05
1960-61	Sandheads	S.M.	34.8	87.0	..	121.74
	Off Balasore	..	..	21.74	...	21.74
	.. Mahanadi	..	434.22	782.6	183.48	1400.31
	.. Devi and Prachi	.. ..	8.26	1305.0	21.75	1334.79
	.. Black Pagoda	..	43.5	3754.29	13.05	3810.85
	.. Puri Coast	S.C. ..	..	137.17	8.26	145.83
	.. Chilka	S.C.M.	0.83	83.0	4.98	93.04
.. Gopalpur	S.C.	..	43.5	13.05	56.55	
1961-62	Sandheads	S.M.	1012.88	15454.9	424.15	16891.93
	Off Puri	S.C.M.	233.60	804.99	244.11	1289.70

S.M.—Sandy and Muddy; S.C.—Sandy Coral; S.C.M.—Sandy, Coral and Muddy.

## FISHERIES

The total quantities of the different species of fishes occurring in the fishery during the three years of study based on the data collected at the landing centres while the vessels were unloaded together with the seasonal fluctuations of the different groups among "A", "B" and "C" classes are discussed below. Information regarding length and maturity stages gathered from random samples is also included.

## "A" Class Fishes

*Stromatids*

The total yield of pomfrets is estimated as 38386.31 kg. and formed 68.6% of the "A" class catch. Of the three species of stromatids, *Pampus argenteus* formed the main bulk constituting 91.7%, whereas *Pampus chinensis* and *Parastromateus niger* were represented as 3.0 and 5.3% respectively. The pomfret fishery commenced by the beginning of the winter season (November) and reached a peak in December during 1959-60 and 1961-62 and in January during 1960-61. The fishery almost came to a close in March except in 1961-62 when a revival of the fishery was noticed in that month (Fig. 6). This year was the most productive for the pomfret fishery during the period under study.

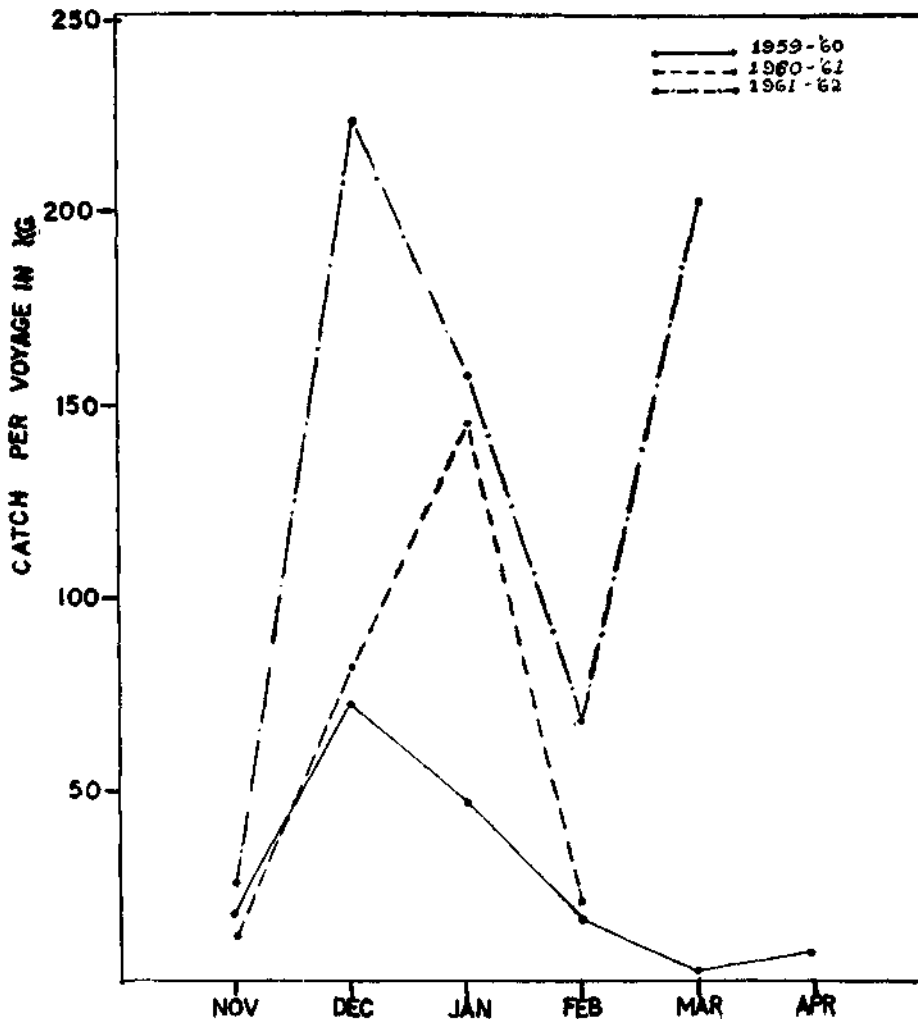


FIG. 6. Seasonal fluctuations of stromatids,

The size of *Pampus argenteus* varied from 4–27 cm. It was observed that fishes up to 12 cm were immature and a few were found to be maturing in the size range 13–15 cm. The percentage of maturing specimens among the 16–18 cm size-group was found to be more, constituting 88%. Gonads in stages II, III and V occurred among the specimens in the size group 19–21 cm. It may be pointed out here that specimens with spent gonads (VII stage) occurred for the first time in this size group indicating spawning. The occurrence of the juveniles ranging from 1.8–2.6 cm at Sandheads during March suggests that the spawning period may be during the winter season. Only immature specimens of *Pampus chinensis* and *Parastromateus niger* occurred and their sizes varied from 12–16 cm and 10.5–14.5 cm respectively.

It was generally observed that pomfrets occurred off the river mouths between depths of 5–15 fathoms. Analysis of the trawling data revealed that off Mahanadi River and the Sandheads region were good fishing grounds for *Pampus argenteus*; *P. chinensis* was found off Mahanadi, Devi and Prachi rivers, whereas *Parastromateus niger* was caught from the Sandheads and off Black Pagoda regions.

#### *Pomadasyids*

The estimated catch was 10016.69 kg, which constituted 17.8%. The monthly fluctuations of the catch are presented in Table VI. During 1959–60 the fishery was poor and the subsequent two years the peak period of this catch was in December. Among the different species *Pomadasyus hasta* and *P. maculatus* were the only representatives forming 65.8 and 34.2% respectively. Their respective size ranges were 12.5–18.5 cm and 15.5–21.5 cm. They were all immature.

This group of fishes occurred abundantly off Puri between depths of 12–20 fathoms and in stray quantities off Black Pagoda and Sandheads regions between depths of 10–30 fathoms.

#### *Prawns and Acetes*

These amounted to 6384.10 kg. *Penaeus indicus* and *Metapenaeus* spp. along with *Acetes* spp. constituted 11.3%. *Penaeus indicus* formed the main bulk constituting 80.2%. *Metapenaeus* spp. and *Acetes* spp. were represented by 13.4 and 6.4% respectively. The prawn fishery commenced in November and came to an end generally in March (Table VII). During 1959–60 stray catches of prawns were recorded in April. January represented the peak period of the fishery.

TABLE VI

Month-wise catch/voyage returns of *Pomadasyus* spp.

	Catch/voyage of <i>Pomadasyus</i> spp. in kg.								
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1959–60	..	..	..	37.2	14.3	..	6.0	..	..
1960–61	..	..	103.5	51.4	336.0	..	84.2	896.6	..
1961–62	26.5	..	..	133.0	239.3	265.0	265.0	82.0	..

During 1961–62 a good catch of *P. indicus* ranging from 10.5–21.5 cm in size was obtained in January at Sandheads region between depths of 10–12 fathoms. Generally, the depth range of 8–15 fathoms off Black Pagoda and off Devi and Prachi rivers formed good fishing grounds for *P. indicus* (16.5–22.5 cm). *Metapenaeus* spp. (7.6–10.5 cm) and *Acetes* spp. were found more towards Mahanadi river mouth between depths of 5–8 fathoms.

TABLE VII  
Month-wise catch voyage returns of *Penaeus* spp.

	Catch/voyage of <i>Penaeus</i> spp. in kg.								
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1959-60	..	..	..	102.3	104.07	101.6	81.0	..	149.0
1960-61	..	..	..	49.7	87.5	91.3	81.0	6.1	..
1961-62	..	..	..	109.0	103.9	362.1	30.6	52.0	..

*Other varieties*

Specimens of *Scomberomorus* spp., *Eleutheronema tetradactylum*, *Drepane punctata*, *Lutjanus* spp., *Pseudosciaena diacanthus*, *Otolithus ruber* and *Polydactylus indicus* measuring 23.5-26.5, 40-42.5, 15.5-18.5, 50.5-55.5, 60.5-70.5, 34.5-44.5 and 40.5-42.5 cm respectively together constituted 2.3% and their seasonal fluctuations are presented in Table VIII. The estimated catch was 1306.65 kg.

TABLE VIII  
Month-wise catch/voyage returns of *Scomberomorus*, etc., for 1959-62

		Catch/voyage in kg.								
		Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1959-60	<i>Scomberomorus</i> spp.	..	..	..	..	9.4	..	..	..	..
	<i>Polynemus</i> spp.	..	..	..	..	9.5	..	..	..	..
	<i>Drepane punctata</i>	..	..	..	..	1.2	..	..	1.8	..
	<i>Lutjanus</i> spp.	1.5	..	..	2.0	..	..	6.0	..	..
	<i>Pseudosciaena diacanthus</i>	..	..	..	..	..	..	2.2	..	..
	<i>Otolithus</i> spp.	..	..	2.5	..	..	..	..	..	..
1960-61	<i>Scomberomorus</i> spp.	..	..	..	..	5.6	..	..	..	..
	<i>Polynemus</i> spp.	..	..	..	..	..	..	..	1.8	..
	<i>Drepane punctata</i>	..	..	..	..	..	..	4.7	..	..
	<i>Lutjanus</i> spp.	..	..	103.5	..	..	..	34.4	..	..
	<i>Pseudosciaena diacanthus</i>	..	..	11.5	..	1.3	..	0.9	..	..
	<i>Otolithus</i> spp.	..	..	10.0	..	1.3	..	..	..	..
1961-62	<i>Polynemus</i> spp.	..	..	..	..	9.5	..	..	..	..
	<i>Drepane punctata</i>	..	..	..	..	1.2	..	..	..	..
	<i>Lutjanus</i> spp.	..	1.4	..	..	..	46.1	14.6	..	1.2
	<i>Pseudosciaena diacanthus</i>	..	..	..	..	..	8.0	..	..	..
	<i>Otolithus</i> spp.	..	..	..	..	..	8.0	..	..	..

## "B" Class Fishes

*Sciaenids*

The total catch of sciaenids was estimated as 471381.47 kg, which formed the major fishery of the trawler catches comprising 57.5% of the "B" class catch. The highest catch of 261878.26 kg of sciaenids was during 1961-62. A peak period in their abundance was noticed in January 1962 (Fig. 7).

The family Sciaenidae was represented in the catches by fourteen species of which the most dominant were *Johnius dissumieri*, *J. carutta*, and *J. aeneus*. The other sciaenids were *J. coibor*,

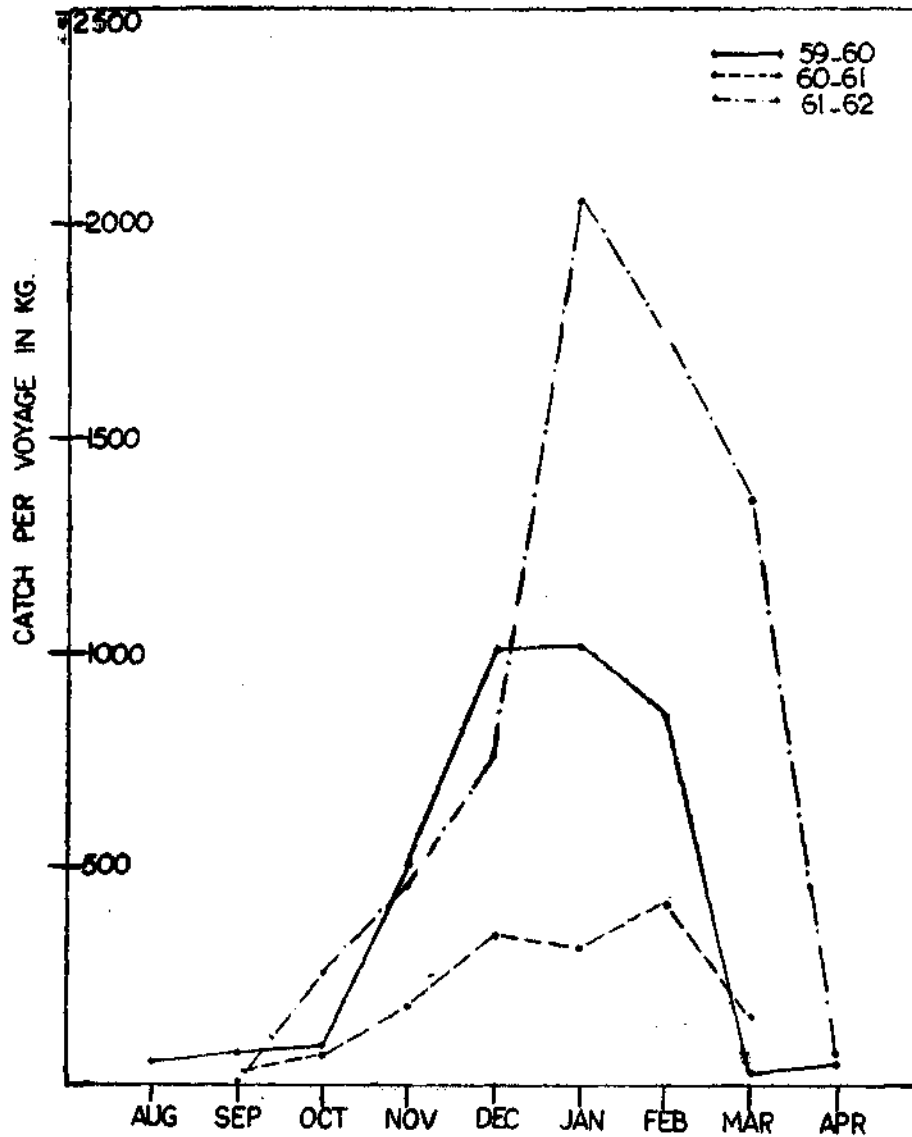


FIG. 7. Seasonal fluctuations of sciaenids.



*J. soldado*, *J. diacanthus*, *Otolithus ruber*, *O. argenteus*, *Umbrina russelli* and *U. macropterus*. Among these *J. dussumieri* dominated constituting 46.8%. Next in importance were *J. carutta* (18.3%), *J. aneus* (12.3%) and *Otolithus ruber* (3.2%). The other sciaenids mentioned above constitute the rest of the bulk.

From the length frequency data gathered it was noted that the size ranges of *Johnius dussumieri*, *J. carutta* and *J. aneus* were respectively 4.5–21.5 cm, 10.2–16.2 cm and 11.2–15.5 cm. The highest yield of this fishery was taken in regions off Devi and Prachi and Sandheads between depths of 8–20 fathoms. Males dominated the catches constituting 68%. *J. dussumieri* measuring less than 13 cm was found to be immature and the catch was generally dominated by such individuals. Those between 13.5–15.2 cm were maturing and fishes above this size range were found to have fully mature gonads. Ripe specimens were collected during January and February. Mature specimens of *J. carutta* were obtained during December 1960 and January 1961 (14.5–15.5 cm). It is probable that both these species breed during the winter season. Only immature individuals of *J. aneus* occurred in the catch throughout.

### Clupeids

The monthly fluctuations of the clupeid fishery are presented in Fig. 8. The estimated catch was 94775.93 kg, which constituted 11.6% of the "B" class category of fishes. The catch during 1961–62 was the highest. The peak period of the fishery was in January. Clupeids were caught in larger quantities in the Sandheads regions between depths of 10–12 fathoms. Stray records of catches were also observed off Devi and Prachi rivers and Black Pagoda regions.

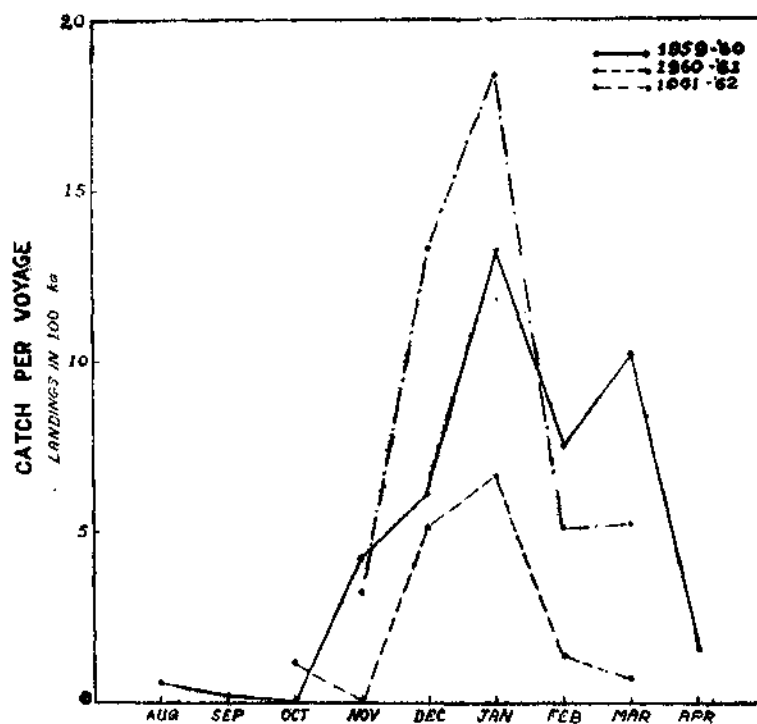


FIG. 8. Seasonal fluctuations of clupeids.

Among the different species of clupeids, *Pellona indica* formed the major species constituting 58.2%. The specimens examined ranged from 4.5–21.5 cm and were observed to be in an

immature condition. *Opisthopterus tardoore* and *Raonda russeliana* formed the next important species constituting 18.2 and 16.6% respectively and their length ranged from 8.5–22.5 and 10.5–18.2 cm respectively. The other clupeids together constituted 7.0% and were represented by *Ilisha* sp., *Coilia* spp., *Anchoiella* spp., *Thrissocles* spp., *Dussemeria* spp. and *Sardinella* spp. It is of interest that four specimens of Indian oil sardine (*Sardinella longiceps*) measuring 11.5–12.2 cm were recorded from the trawler catches off Devi and Prachi regions. They were found to be in an immature stage.

#### *Leiognathids*

The total yield of leiognathids was calculated to be 67712.21 kg, which constituted 8.3% of the "B" class catches. Though this fishery does not form a regular catch of the trawlers, their occurrence in huge quantities now and then suggests the shoaling behaviour. It is seen from Fig. 9 that November represented the peak month for the fishery. A very good catch of *Leiognathus* spp. was

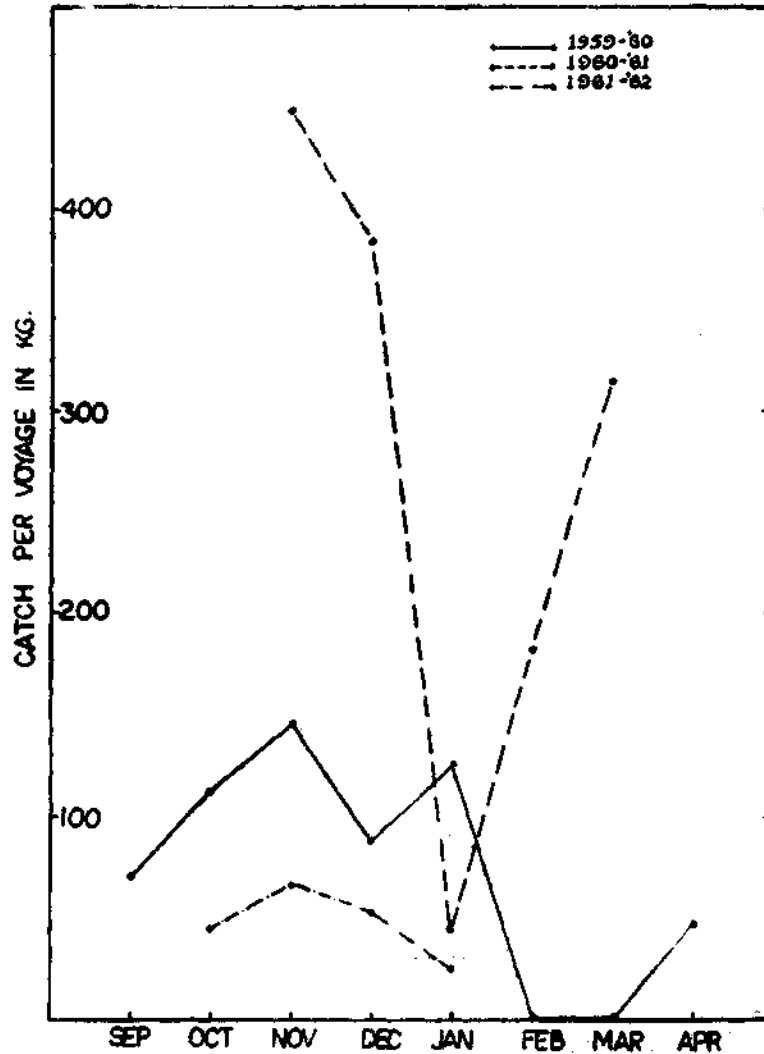


FIG. 9. Seasonal fluctuations of *Leiognathids*.

caught during November 1960-61 off Puri coast between depths of 8-18 fathoms. This species was also recorded occasionally at Sandheads and off Black Pagoda regions. Among the various species, *L. splendens* and *L. insidiator* formed the main bulk constituting 36.6 and 32.4% respectively. The size range of these species was 8.5-11.5 and 7.8-12.5 cm respectively. *L. daura*, *L. brevirostris* and *Gazza minuta* together constituted the rest of the bulk.

#### *Kurtids*

*Kurtus indicus*, the only representative of Kurtidae, formed 3.3% of the "B" class category of the trawler catches. This is one of the esteemed table fishes much relished by the people of West Bengal and the total catch was estimated at 27121.68 kg. The monthly fluctuations of the catches are presented in Fig. 10. The peak periods of the fishery for the three years were respectively in January, February and November.

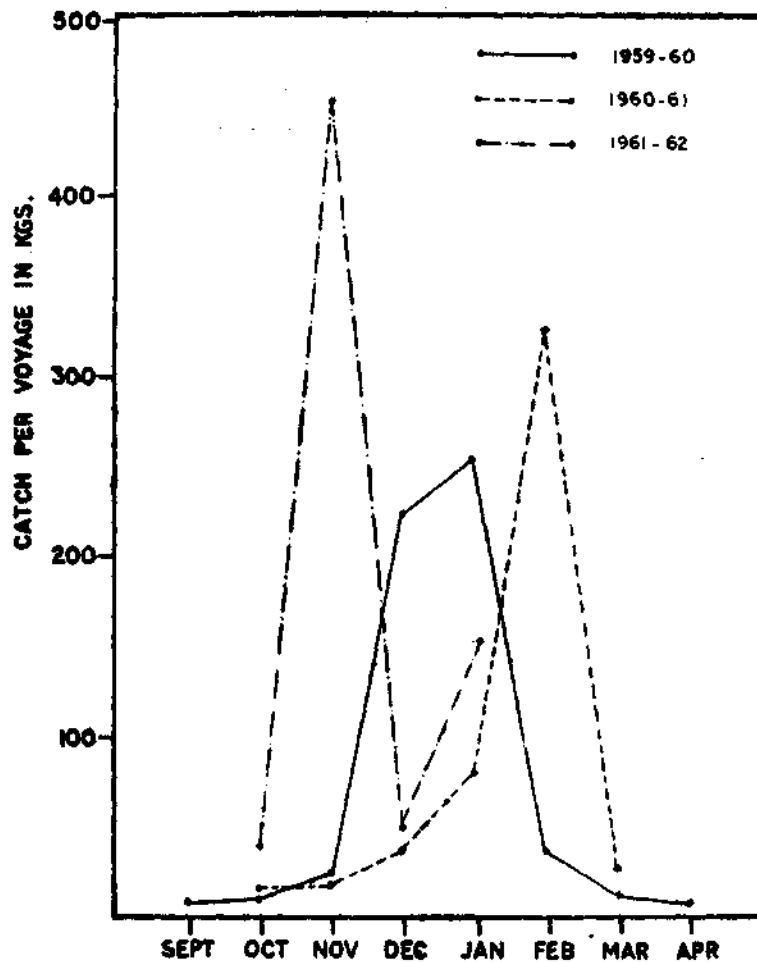


FIG. 10. Seasonal fluctuations of *Kurtus indicus*.

The predominance of this fish was noted off Devi and Prachi river mouths and Sandheads region between depths of 8-25 fathoms. 60% of the catches were recorded off Devi and Prachi river mouths, the specimens ranging between 4.8-10 cm whereas large specimens measuring 10.5-12.5 cm were

found in the Sandheads region contributing 35% of the catch. Regions off Black Pagoda and Mahanadi rivers contributed to the rest. Females were found to dominate the catch (62%). Most of the specimens examined were found to be in immature stage. 22 specimens ranging from 10.8-12.5 cm caught in the Sandheads region in January of 1961-62 were in advanced stage of maturity (stage V). No specific inference regarding spawning could be made with the existing data.

#### *Nemipterids*

These formed 3.2% of the "B" class variety with a catch of 26370.75 kg for the three years. The monthly fluctuations are presented in Table IX. About 85% of the catch was obtained from the Sandheads region between 10-30 fathoms. *Nemipterus japonicus* was the only species recorded occurring in the catch during November-January with a peak in November. The area off Devi and Prachi rivers contributed to the rest of the bulk. The specimens ranged from 16.5-19.5 cm and they were found to be immature.

TABLE IX  
Month-wise catch/voyage returns for *Nemipterus* sp. during 1959-62

	Catch/voyage of <i>Nemipterus</i> sp. in kg.								
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	Apr.
1959-60	..	..	..	..	18.0	..	..	..	2.0
1960-61	..	..	..	..	..	..	4.0	..	..
1961-62	..	..	..	2041.6	637.6	894.4	656.0	1721.5	..

#### *Tachysurids*

A total of 17873.80 kg of cat-fishes was landed comprising 2.2% of the "B" class catches. Table X shows the monthly fluctuations. This group showed a steady increase in the landing reaching the maximum in January. 75% of the catch was caught from the Sandheads region at depths of 8-25 fathoms. *Pseudarius jella*, *Tachysurus maculatus* and *T. caelatus* were the important representatives of which *P. jella* alone formed 80% and *T. maculatus* and *T. caelatus* 12 and 8% respectively. *P. jella* ranged from 15.5-22.5 cm and *T. maculatus* and *T. caelatus* measured 12.5-14.5 and 11.5-15.5 cm respectively. They were all found to be immature.

TABLE X  
Month-wise catch/voyage returns of *Tachysurids* during 1959-62

	Catch/voyage of <i>Tachysurids</i> in kg.								
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	Apr.
1959-60	2.2	..	..	..	..	..	..	..	..
1960-61	..	4.2	..	165.5	50.5	..	15.2	..	..
1961-62	56.0	60.8	88.9	108.0	300.0	796.3	571.8	1516.5	962.0

*Lactarids*

The estimated landing of *Lactarius lactarius*, the only representative of this group in the fishery, was 13180.92 kg and constituted 1.6% of the "B" class catches and the fluctuations are shown in Table XI. The peak period of the fishery was in December. 92% of the catch was recorded from off Chilka and off Black Pagoda between depths of 8-25 fathoms. Stray catches were also noted in Sandheads region between depths of 10-20 fathoms. The size range was from 10.5-21.5 cm. Specimens measuring less than 13.5 cm were found to be immature. Those specimens measuring 18.5-21.5 cm were found to be in advanced stage (stage V) of maturity.

TABLE XI

Month-wise catch/voyage returns of *Lactarius lactarius* during 1959-62

	Catch/voyage of <i>Lactarius lactarius</i> in kg.								
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1959-60	..	..	..	..	419.2	..	3.8	..	..
1960-61	..	..	..	..	284.4	142.2	11.6	77.4	..
1961-62	..	..	..	..	1174.1	310.6	283.4	..	..

*Mullids*

The total catch of mullids was 18551.04 kg and formed 2.3% of the "B" class catch and their fluctuations are represented in Table XII. The highest catch was recorded during 1961-62. The peak period of the fishery was noticed in February. Off Black Pagoda and off Chilka were found to be very good fishing grounds for mullids. The family Mullidae was represented by *Parupeneus indicus* (10.5-14.5 cm) and *Pseudupeneus cinnabarinus* (9.5-12.6 cm) of which the former dominated constituting 58.8% of the catch.

TABLE XII

Month-wise catch/voyage returns of Mullids during 1959-62

	Catch/voyage of Mullids in kg.								
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1959-60	..	177.5	..	..	92.0	75.0	..	..	..
1960-61	..	..	260.6	..	136.7	168.7	179.4	101.5	..
1961-62	..	..	..	..	..	642.8	1013.3	197.8	..

*Muraenids*

The total catch of muraenids was estimated as 15773.66 kg which represented 1.9% of the "B" class catch. This group was represented by a single species *Muraenesox talabonoides*. Good catches of eels were obtained from off Devi and Prachi rivers and Sandheads region between 20-35 fathoms. The fishery during 1961-62 was the best (Table XIII). The species examined ranged between 95.5-158.8 cm.

TABLE XIII

Month-wise catch/voyage returns of *Muraenesox talabonoides* during 1959-62

	Catch/voyage of <i>Muraenesox talabonoides</i> in kg.								
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1959-60	12.7	214.7	74.0	27.6	63.1	74.6	145.5	..	..
1960-61	..	37.0	274.5	..	..	..	216.0	129.0	..
1961-62	87.0	116.0	486.0	1,868.0	449.3	219.8	43.6	133.2	..

*Carangids*

13527.6 kg of carangids were caught during the period under observation and this constituted 1.2% of the "B" class catch. The fishery was generally observed to be poor during 1959-60 and 1960-61 (Table XIV). The areas off Chilka and off Devi and Prachi river mouths were found to be good fishing grounds for carangids. Among the different species of the family Carangidae, *Megalaspis cordyla* formed the main bulk constituting 68%. The length ranged between 13.5-15.2 cm and they were all immature. Abundant catches of *Megalaspis cordyla* were taken during December and January 1961-62 off Chilka between depths of 8-12 fathoms. *Selar mate*, *S. kalla* and *Caranx sansui* were the other species of carangids caught.

TABLE XIV

Month-wise catch/voyage return of Carangids during 1959-62

	Catch/voyage of Carangids in kg								
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1959-60	..	..	..	..	4.4	..	..	..	2.2
1960-61	..	..	..	..	99.9	38.9	149.0	43.8	..
1961-62	..	..	..	..	105.0	804.1	684.0	410.5	660.0

*Percoids*

Perches were not represented in the catches regularly. They formed 1.2% of the "B" class catches and the total yield amounted to 9731.82 kg during 1959-62 and the monthly fluctuations are given in Table XV. The regions off Puri coast and off Gopalpur were noted for perches. It was observed that small-sized perches (*Therapon jarbua*, *Eutherapon theraps* and *Serranus* spp.) ranging from 8.5-11.5 cm formed the main bulk of the catches off Puri between depths of 10-18 fathoms whereas large-sized perch *Lutjanus* spp. (25.5-38.8 cm) off Gopalpur between 8-22 fathoms.

*Miscellaneous fishes*

The landings of the miscellaneous categories were estimated at 43048.01 kg and constituted 5.2% of the "B" class catches. The fluctuations in the miscellaneous varieties are presented in Table XVI. This includes "A" class fishes (*Scomberomorus* spp.) and *Pomadasys* spp. measuring less than 14 cm and all the "B" class fishes measuring less than 8 cm. *Sillago sihama*,

TABLE XV

Month-wise catch/voyage returns of Percoids during 1959-62

	Catch/voyage of Percoids in kg.								
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1959-60	..	37.0	558.0	..	91.6	..	4.5	..	..
1960-61	..	..	54.6	..	7.3	65.8	93.0	60.0	..
1961-62	..	..	..	..	72.2	25.0	201.0	..	..

TABLE XVI

Month-wise catch/voyage returns of miscellaneous fishes during 1959-62

Species	Catch/voyage (Miscellaneous) in kg.									
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
1959-60										
<i>Scomberomorus</i> spp.	0.6	..	..	1.6	..	..	..	..	..	..
<i>Lutjanus</i> spp.	..	2.2	..	..	..	..	..	1.2	..	..
<i>Polynemus</i> spp.	..	..	..	..	38.4	..	..	..	..	..
<i>Chirocentrus</i> spp.	..	..	..	..	2.4	..	..	2.4	..	..
<i>Sillago sihama</i>	1.2	..	3.2	..	1.2	..	..	0.4	..	..
<i>Cynoglossus</i> spp.	4.4	..	6.6	..	8.6	..	12.4	..	15.8	16.2
<i>Mugil</i> sp.	2.2	..	1.6	1.2	..	4.2	..	3.2	..	..
<i>Cypselurus</i> sp.	1.8	..	..	..	..	..	..	..	3.2	..
<i>Ephippus orbis</i>	1.2	3.2	..	..	7.4	..	1.2	..	..	..
<i>Drepane punctata</i>	3.2	1.2	..	2.4	..	..	..	..	4.2	..
1960-61										
<i>Scomberomorus</i> spp.	..	..	..	..	..	..	2.2	..	4.2	..
<i>Lutjanus</i> spp.	..	..	..	1.4	..	..	1.2	..	..	..
<i>Polynemus</i> spp.	..	2.4	..	..	51.2	76.5	2.8	..	..	..
<i>Chirocentrus</i> spp.	..	..	1.2	..	..	..	..	..	..	..
<i>Hemirhamphus</i> spp.	..	..	2.2	..	..	4.2	..	3.2	..	..
<i>Cynoglossus</i> spp.	20.2	28.4	60.2	30.2	40.2	32.0	..	6.2	80.2	70.1
<i>Mugil</i> spp.	..	..	1.4	1.2	..	2.4	..	8.2	..	..
<i>Cypselurus</i> spp.	..	..	..	1.4	..	2.4	..	8.2	..	..
<i>Ephippus orbis</i>	..	2.8	..	..	..	..	..	3.2	..	..
<i>Drepane punctata</i>	..	..	..	..	..	19.7	..	5.7	..	..
<i>Rastrélliger kanagurta</i>	..	..	..	..	..	..	..	..	..	..
1961-62										
<i>Scomberomorus</i> spp.	..	..	..	..	..	6.7	..	..	..	..
<i>Lutjanus</i> spp.	4.2	..	..	..	975.2	25.1	200.0	..	..	..
<i>Polynemus</i> spp.	6.4	..	..	..	..	..	115.0	..	..	..
<i>Chirocentrus</i> spp.	1.2	..	..	..	..	0.4	..	..	..	..
<i>Sillago sihama</i>	0.4	2.2	..	..	0.4	..	2.2	..	..	1.6
<i>Hemirhamphus</i> spp.	..	..	..	..	1.2	..	..	..	3.2	..
<i>Cynoglossus</i> spp.	..	48.4	..	220.0	..	30.0	..	40.2	30.2	..
<i>Mugil</i> spp.	..	4.8	..	..	..	..	..	..	..	2.2
<i>Cypselurus</i> spp.	..	..	4.2	..	..	..	..	..	..	2.2
<i>Ephippus orbis</i>	..	..	2.2	..	..	..	3.2	..	..	..
<i>Drepane punctata</i>	..	4.2	..	..	..	2.4	..	..	4.2	..
<i>Rastrélliger kanagurta</i>	..	..	..	252.6	54.3	..	352.5	161.8	..	..

*Hemiramphus* spp., *Cynoglossus* spp., *Mugil* spp. and *Cypselurus* spp., *Drepane punctata*, *Ephippus orbis* were also included with the miscellaneous catches irrespective of their sizes. Their size ranges were respectively 10.5–13.5 cm, 19.0–25.5 cm, 12.8–14.5 cm, 9.5–11.5 cm, 13.5–15.5 cm, 11.5–12.6 cm, and 10.5–11.5 cm. A remarkable feature is the occurrence of the Indian mackerel (*Rastrelliger kanagurta*) in the deeper regions of the Bay of Bengal between 21–40 fathoms during November 1961–62 at Sandheads Region. The mackerel ranged between 18.5–21.5 cm. and were in the stage V of maturity.

#### "C" Class Fishes

##### Sharks, Rays and Skates

Since the elasmobranchs occurred in the catches rather irregularly, their monthly fluctuations are presented in Table XVII. Sharks, rays and skates accounted for 45.8% of the "C" class catch (14340.44 kg). Sharks formed the main bulk (39.3%) and were represented by *Scoliodon sorrakowah*, *Eulamia melanoptera* and *Sphyrna zygaena*. They ranged in size between 10.5–41.5, 20.0–50.8 and 28.5–50.5 cm respectively. Rays formed 6.3% and were represented by *Rhynchobatus djiddensis*. Skates were represented by 1.2% and the specimen was identified as *Raja mamillidens*. It was generally observed that skates and rays were more in the Sandheads region and off Mahanadi river mouth between depths of 8–30 fathoms.

TABLE XVII

Month-wise catch/voyage returns of sharks and rays during 1959–62

	Catch/voyage of sharks and rays in kg.								
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1959–60	..	31.2 (2.2)	74.0	37.2	212.8	22.4	2.4	..	(7.2)
1960–61	..	..	159.0	..	225.0	116.4	200.8	192.0	..
1961–62	197.0	(1070.0)	(520.0)	316.6 (151.3)	378.8	247.5 44.9	..	757.7	(82.0)

The figures in brackets indicate the catch/voyage of sharks.

##### Bombay duck, (*Harpodon nehereus*)

The total estimated catch was 2982.00 kg and formed 9.5% of the "C" class catch. December was the peak period of the catch (Table XVIII). The size range was between 15.5–23.5 cm and the specimens were found to be immature. Bombay ducks were caught from off Mahanadi, Devi and Prachi river mouths in the shallow regions of depth 5–10 fathoms.

##### Cat-fishes

Cat-fishes constituted 12.7% of the "C" class catch. *Pseudarius jella* was the species dominating the catch, and accounted for 4900.17 kg out of the total estimated catch of 4,987.7 kg of cat-fishes. The specimens examined were in immature stage and their size ranged between 8.5–12.5 cm. Cat-fishes were predominating in the Sandheads region in the depth range of 25–40 fathoms. The seasonal fluctuations are shown in Table XIX.



TABLE XVIII

*Month-wise catch/voyage returns of Harpodon nehereus during 1959-62*

	Catch/voyage of <i>Harpodon nehereus</i> in kg.									
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
1959-60	..	..	9.0	98.5	118.0	56.0	137.0	..	..	..
1960-61	..	..	6.2	..	213.2	..	4.2	4.8	9.4	..
1961-62	400.0	700.0	..	..	112.2	..	..	..	6.4	..

TABLE XIX

*Month-wise catch/voyage returns of Pseudarius jella during 1959-62*

	Catch/voyage of <i>Pseudarius jella</i> in kg.									
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	Apr.	May
1959-60	4.3	2.4	6.4	362.0	187.4	28.4	..	14.2	..	..
1960-61	1.8	..	187.0	187.0	120.0	..	24.0	64.2	48.2	..
1961-62	..	..	..	2.8	4.2	..	..	..	250.0	4.0

*Other varieties*

The total catch of the other categories of fishes belonging to "C" class includes also the miscellaneous varieties which were juveniles measuring less than 7 cm. and amounted to 8,951.08 kg constituting 32.0% of the "C" class catch. The trichiurids (*Trichiurus savala*, *T. haumela*), *Pristis* spp., flat fishes (*Cynoglossus lingua* and *Solea elongata*) and shrimps were represented by 0.84%, 4.84%, 4.42%, 2.85% and 15.68% respectively. The specimens of fishes examined ranged between 30.5-58.5 cm, 25.5-60.5 cm (excluding the rostrum), 18.5-20.5 cm respectively. Their seasonal fluctuations are presented in Table XX.

## EXPERIMENTAL NIGHT FISHING

Experimental night fishing was attempted in the regions I, and III to V occasionally in addition to the regular day trawling. The maximum number of hauls made during night was two, between 8 to 12 p.m. and 5-6 hauls between 5-30 a.m. and 5-30 p.m. More number of hauls could not be made in night time for want of facilities. However the catch/hour of trawling in night and day for the different categories of fishes (A, B and C) class was calculated and presented in Table XXI. It can be inferred from the table that the yield during day was more than in the night. Hickling (1946) reported that the catches were best at night while trawling the North Sea. Jayaraman *et al.* (1959) recorded the yield of day trawling was better than that of night trawling. Rounsefell and Everhart (1953) suggested that the lunar cycle influenced the size of the fish catches in the sea considerably. However with the existing data no definite conclusion could be made out.

TABLE XX

*Month-wise catch/voyage returns of Trichiurus spp., etc., during 1959-62*

Species	Catch/voyage in kg.									
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
1959-60										
<i>Trichiurus</i> spp.	6.8	..	..	..	24.2	5.6	..	2.2	..	..
Soles	..	2.7	..	1.2	..	5.6	2.2	..	..	..
<i>Pristis</i> spp.	0.7	..	19.2	18.5	..	..	4.5	1.2	..	..
Shrimps and <i>Acetes</i>	..	296.5	..	..	..	..	..	..	..	..
1960-61										
<i>Trichiurus</i> spp.	..	..	..	..	..	2.4	..	..	1.8	..
Soles	1.3	1.4	..	..	..	..	..	1.2	..	..
<i>Pristis</i> spp.	..	..	50.5	..	..	..	..	..	..	..
Shrimps and <i>Acetes</i>	..	..	..	..	..	..	..	..	..	..
1961-62										
<i>Trichiurus</i> spp.	..	..	..	..	..	2.6	..	..	..	..
Soles	..	2.4	..	..	..	2.6	3.5	1.7	1.6	..
<i>Pristis</i> spp.	..	..	22.2	..	..	432.8	..	..	..	..
Shrimps and <i>Acetes</i>	2.2	1.6	0.9	..	..	..	1.4	..	2.4	..

TABLE XXI

*Region-wise catch/hour returns in day and night hauls*

Area	Depth range in fathoms	Nature of bottom	Catch by class in kg per trawling hour					
			A		B		C	
			Day	Night	Day	Night	Day	Night
Sandheads	8-40	Sandy & Muddy	50.2	18.2	404.6	88.2	60.4	18.4
Off Mahanadi	10-15	"	42.6	14.2	286.4	62.8	20.4	..
Off Devi and Prachi	20-30	Sandy	36.6	4.8	326.4	54.6	104.4	21.2
Off Black Pagoda	20-25	Sandy & Muddy	60.2	18.4	384.2	64.8	320.0	26.2

## MARKETING, DISPOSAL AND INCOME FROM THE FISHERY

The catches brought by the trawlers were sold at the shore-base station by the West Bengal fisheries departmental staff in wholesale market, through auction and the minimum rates were fixed for A, B and C class at Rs. 52.50, 24.50 and 6.50 per 37 kg (one basket) respectively. This practice con-

TABLE XXII

*Proceeds of trawler catches during 1959-62*

Year Months	1959-60			1960-61		1961-62	
	Class	Total yield in Rupees	Rate per *37 kg	Total yield in Rupees	Rate per 37 kg	Total yield in Rupees	Rate per 37 kg
August	A	..	..	..	..	..	..
	B	375.51	14.00	..	..	..	..
	C	1.80	..	..	..	..	..
September	A	..	..	..	..	130.40	59.20
	B	587.44	21.00	..	..	846.65	21.63
	C	231.85	5.00	..	..	160.92	9.99
October	A	..	..	192.15	37.00	374.30	64.60
	B	3568.63	18.75	3129.30	30.00	8007.25	28.00
	C	22.37	5.50	102.54	15.00	1826.79	7.50
November	A	1272.89	43.75	962.32	30.00	1559.54	48.75
	B	14525.75	18.50	6920.75	15.00	34185.64	15.50
	C	300.00	5.50	52.60	10.00	160.66	5.33
December	A	4351.56	55.00	2987.20	46.00	10806.38	61.33
	B	22498.95	14.50	12109.01	15.50	27131.97	26.66
	C	260.18	6.00	427.78	6.00	220.48	5.00
January	A	2102.96	41.50	4617.86	43.00	11004.74	57.50
	B	22250.36	12.25	9165.80	14.00	56305.81	14.50
	C	150.68	6.00	134.95	6.00	727.05	10.00
February	A	849.93	41.00	915.02	43.00	6,666.51	48.00
	B	9209.29	8.50	14452.59	14.00	35027.58	16.00
	C	192.82	6.00	199.71	6.00	4,087.96	7.00
March	A	90.72	40.00	2568.34	43.00	10685.24	48.00
	B	106.80	11.00	8911.28	14.00	24719.91	16.00
	C	..	..	192.95	6.00	602.15	7.00
April	A	320.00	40.75	..	..	43.00	43.00
	B	739.51	18.75	..	..	581.00	14.00
	C	..	..	..	..	36.00	6.00
TOTAL		84000.00		70042.15		235,897.93	

\* One basket.

tinued up to 1957. During 1958 majority of the catches were auctioned directly at the shore-base station and a portion was also sent to the whole sale markets in Calcutta and Howrah and this practice continued till the end of 1959. A co-operative fish marketing and consumers' society was set up in 1960 and the entire catch was sold to this society. When the deep sea fishing board of the Government of West Bengal took charge in 1961 arrangements were made to auction major portion of the catch at the shore-base station and the remaining sold through the co-operative society and some were also sent to the Howrah and Calcutta markets.

Table XXII represents the month-wise income of A, B and C class fishes during the years 1959-60 to 1961-62. A total income of Rs. 389940.08 was realised of which Rs. 235897.93 was obtained during 1961-62 only. The income during 1959-60 was Rs. 84000.00 whereas during 1960-61 it was Rs. 70042.15. A comparison of the catches of the various categories of the fishes revealed that during 1960-61 the total yield of "A" class fish was very poor. "A" class were sold at Rs. 30-64.60, "B" class at Rs. 9-30.00 and "C" class at Rs. 5-9.99 per 37 kg.

#### SUMMARY

1. The fishery resources of the Bay of Bengal had been assessed from the material collected from the trawler catches landed at shore-base station. The results of the trawling operations in the Bay of Bengal from 1959-60 to 1961-62 are presented along with the specifications of the type of craft and gear employed.

2. Besides the total landings, the catch rate and the data relating to the chief categories of fishes, their distribution in relation to depth and nature of bottom are presented.

3. Annually, an average catch of 295340.77 kg of fish was landed of which "B" class formed the main bulk constituting 90.53%. It was observed that catches were more during the winter months November-February. The best yield was obtained in December.

4. The fishing grounds in the Bay of Bengal have been charted out from the data collected from the very commencement of the exploratory fishing, *i.e.*, 1951 onwards, by the Directorate of Fisheries, Government of West Bengal based on the trawling operations of Kalyani I-V. Eight trawling grounds have been recognised, namely, Sandheads, off Balasore, off Mahanadi, off Devi and Prachi rivers and off Black Pagoda, Puri, Chilka and Gopalpur.

5. Of the various fishing grounds Sandheads and off Mahanadi, Devi and Prachi rivers have been found to be very productive. It was also noted that the catch rates were high and the quality fishes were obtained mostly from these regions.

6. The analysis of the depth-wise distribution showed that the different categories of fishes have definite areas of occurrence: "A" class between 5-15 fathoms, "B" class between 15-25 fathoms and "C" class between 30-35 fathoms.

7. The length measurements as well as the maturity stages of the important categories of fishes are given.

8. Experimental night trawling showed in general that the yield in the night trawling was less than that in the day trawling.

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