SOME OBSERVATIONS ON THE FISHERY AND BIOLOGY OF *KURTUS INDICUS* (BLOCH) OF THE BAY OF BENGAL

BY M. D. K. KUTHALINGAM

(*Central Marine Fisheries Research Institute*)

INTRODUCTION

The family Kurtidae is represented by a single species, *Kurtus indicus* (Bloch) which formed one of the important commercial catches constituting 12·8% of the"B" class* category of fishes. The present account deals with the magnitude of the fishery during April 1959 to March 1962, seasonal fluctuations, variation in size, depth-wise variation of the catch in the different fishing grounds, income from the fishery, sex ratio and maturity and food habits. The details presented in this account although preliminary in nature are nevertheless valuable in the absence of any information regarding the fishery and biology of tnhis species.

MATERIAL AND METHOD

For the study which has provided material for this account, the author paid visits to fish landing centre-shore base station and collected data on composition of the catches, area of operations, depth range etc. The specimens for the biological studies were collected whenever the author went on board. The gear employed by Kalyani I-V was Haddock type of otter trawl.

A brief account of the method of estimating the catch is given as follows. Let Yij be the weight of the fish of particular species in the *jth* sample tray of the *ith* stratum. Then the estimated fish under the particular category is :

$$\hat{y} = \sum_{i} \frac{Ni}{ni} \sum_{j=i}^{ni} yij$$

where ni is the number of sample trays and Ni the total trays in the *ith* stratum (unloading). Details of the methodology are discussed elsewhere (Kuthalingam 1962).

ANALYSIS OF DATA

Table I represents the estimated catch of *Kurtus indicus* together with the fishing details. A total catch of 27,121·68 kg was landed during the period of observation. This species occurred in far greater abundance during 1959-60 and 1960-61 than in 1961-62.

*The trawler catches were classified into three categories *viz.*, A, B and C classes by the Directorate of Fisheries, Government of West Bengal, according to the market value.

"A" class :—Pomfrets, prawns, big sized perches, Sciaenids, Polynemids, and Scombroids.

"B" class :—Leiognathids, Clupeids, Mullids, Mugilids, Kurtids, Muraenids, and medium sized Sciaenids, Polynemids and perches.

"C" class :—Trichiurids, Synodontids, scopelids, tachysurids, sole fishes, sharks, rays and skates.

Though the total number of fishing days spent by these trawlers, Kalyani-IV, was found to be more during 1961-62, the highest catch/day of 58·45 kg of *Kurtus indicus* was caught during 1959-60.

TABLE I

Particulars*	1959-60	1960-61	1961-62	Total
Catch in Kg.	14262·32	11637·16	1222·20	27121·68
No. of voyage . . .	25	23	32	80
No. of fishing days . . .	244	240	313	797
Catch/voyage in Kg. . . .	570·4	506·0	38·1	339·02
Catch/day in Kg.	58·4	48·4	4·0	34·03

*Catch/hour and catch/haul could not be given due to lack of information from skippers' log reports.

The month-wise fluctuations in the catch/unit of effort can be seen from Table II. From the data analysed and presented it is evident that a progressive increase in the catch rate was noted with the approach of winter season December-February, February being the most productive period.

TABLE II

	Catch/unit of effort in Kg.											
Area	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Sand heads . .	..	..	6·2	..	..	..	8·2	5·6	7 4	6·4	8·2	2·5
Off Mahanadi .	..	..	..	..	..	22·5	27·5	50·0	78·0	88·0	130·0	24 0
Off Devi & Prachi	..	..	..	..	..	38·0	52·0	108·0	119·0	123·0	140·0	10·0
Off Black Pagoda .	4·2	..	..	..	..	..	..	4·2	6·8	7·2	21·0	10·8

Table III shows the variations in the size range together with the average weight of a standard basket in relation to the different fishing grounds. Specimens collected off Devi and Prachi rivers were larger in size ranging from 8·9 to 11·2 cm. The weight of a standard basket of *Kurtus indicus* off Devi and Prachi was found to be higher by 3·2 -7·0 kg. Lowest weight of 31·2 kg. per basket was observed in Sand heads region.

TABLE III

Area	Length range in cm.	Average weight of a standard basket in Kg.
Off Black Pagoda	6·4—8·4	32·2
Off Devi & Prachi	8·9—11·2	38·4
Off Mahanadi	7·9—9·7	35·2
Sand Heads	2·5—4·2	31·2

The fishable regions in the Bay of Bengal have been divided into series of rectangular areas and numbered making use of the latitude and longitude. Each of these areas has a total extent of about 100 sq. miles and the areas fished by these vessels fall into the following regions (Fig. 1) :

Sand Heads	2—23
Off Balasore	24—34
Off Mahanadi	35—49
Off Devi & Prachi	50—56
Off Black Pagoda	57—61
Off Puri	62—66
Off Chilka	67—71
Off Gopalpur	72—73

The areas where this species was available are also shown in the Figure. Depth-wise distribution of *Kurtus indicus* in the different fishing regions together with the fishing details can be seen from Table IV. The yield in each of the fishing grounds is also presented. Appreciable quantities of this species were caught off Devi & Prachi, off Black Pagoda, off Mahanadi and Sandhead regions between depths of 10-80 metrers. The areas off Devi and Prachi yielded the maximum quantity of catch and the catch/unit of effort was calculated to be much higher than in other regions. The areas off Mahanadi ranked next in production. During 1959-'60 and 1960-'61 more concentration for fishing was paid off Devi and Prachi and Mahanadi regions whereas during 1961-62 only Sand heads area was trawled. A comparative account of the efficiency of fishing off Mahanadi and Sand heads could not be made since, the former region was not fished during the year 1961-62. Square numbers 50-56 were found to be the best grounds for *Kurtus indicus*. It is however indicated that beyond 25 meters the catch rate was poor. Negligible quantities of this species were also recorded in Square numbers 28, 65 and 70. The nature of sea bottom where glass fish was found in abundance was recorded to be sandy.

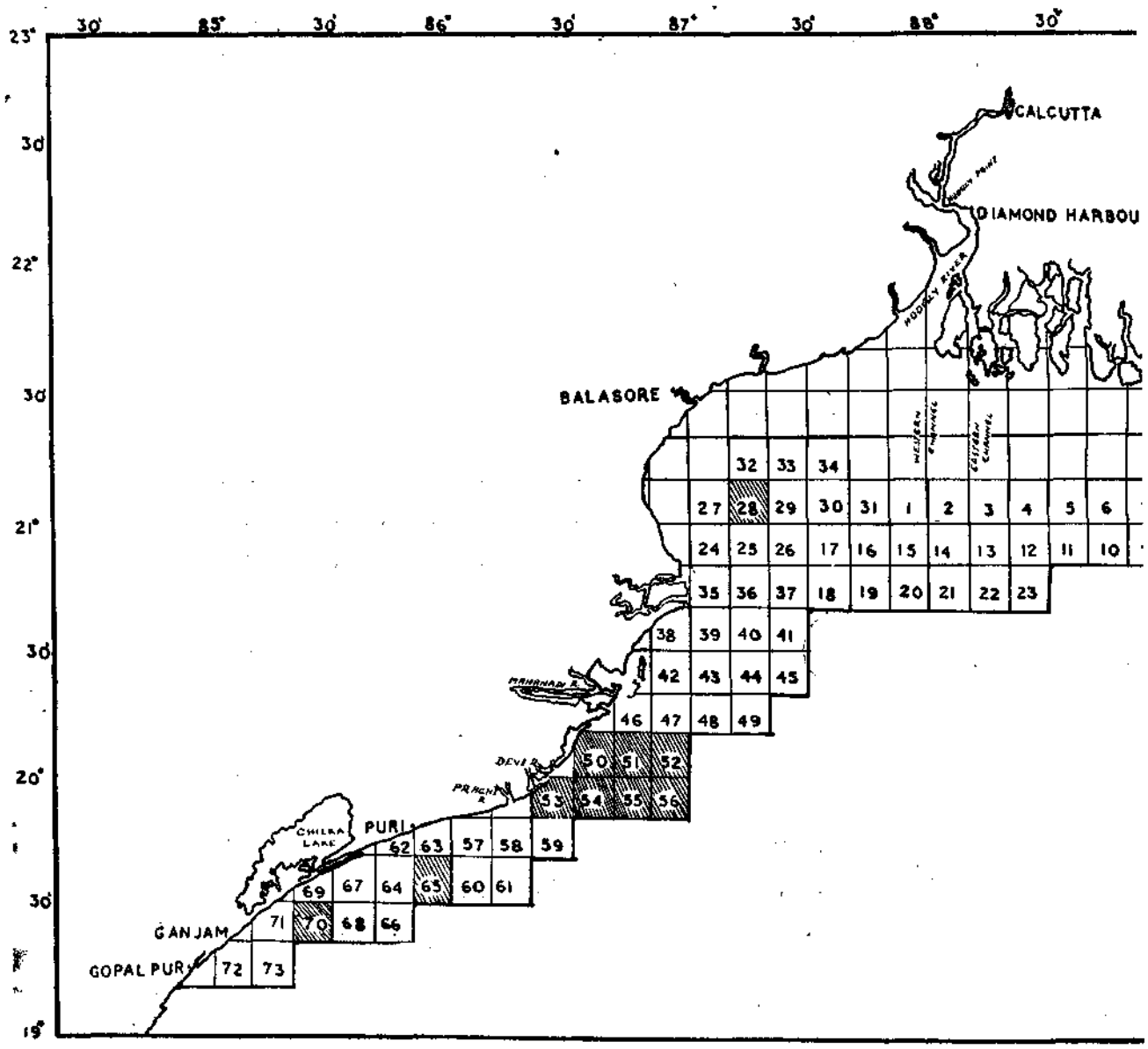

Fig. 1. Offshore fishing ground of the Bay of Bengal from Sand heads to Gopalpur.

Income from the Fishery

Month-wise income from *Kurtus indicus* was estimated and presented in Table V together with the rate per basket (each basket weighed 37 Kg. approx.). The total income from this fishery during this period was calculated as Rs. 10,125·79 nP.

TABLE IV

Year	Area	Depth range in meter	Nature of bottom	Total No. of voyage	Total catch in Kg.	Catch/unit of effort in Kg.
1959-60	Off Black Pagoda . .	16—24	Sand & Muddy	6	913·80	152·30
	Off Devi & Prachi .	18—24	Sandy	7	10806·52	1543·78
	Off Mahanadi . .	10—34	Sandy	7	2220·00	317·13
	Sand heads . . .	20—60	Sandy	5	322·00	64·4
1960-61	Off Black Pagoda . .	16—40	Sand & Muddy	3	530·00	176·66
	Off Devi & Prachi .	16—24	Sandy	7	8137·00	1162·42
	Off Mahanadi . .	16—32	Sandy	6	2027·00	337·63
	Sand heads . .	20—50	Sandy	6	943·16	157·19
1961-62	Sand heads . .	20—80	Sand & Muddy	30	1222·20	40·74

TABLE V

Months	1959-60		1960-61		1961-62	
	Yield in Rupees	Rate per basket	Yield in Rupees	Rate per basket	Yield in Rupees	Rate per basket
September . . .	126·48	21·00	..	..	..	..
October . . .	151·78	18·75	238·67	30·00	..	..
November . . .	269·43	18·50	203·50	15·00	513·32	15·50
December . . .	2,158·55	14·50	396·77	15·50	..	..
January . . .	2,142·36	12·25	717·83	14·00	..	..
February . . .	228·64	8·50	2,848·83	14·00	..	..
March	17·70	11·00	96·87	14·00	..	..
April	15·50	10·00	..	..	..	..
TOTAL .	5,110·00	..	4,502·47	..	513·32	..

SEX RATIO AND MATURITY

A random sample of 2507 specimens of this species was collected from the different fishing regions and the details of the length, sex ratio, maturity etc. are presented in Table VI. Out of the 2507 individuals 1437 were males and 1070 females. Details of the dominant maturing stages in each of the fishing grounds are also calculated and presented. Fully mature and fishes in spent conditions were not represented. The specimens grouped in the maximum stages of maturity recorded *viz.*, Stage III were found to be maturing. Specimens in this stage occurred only off Devi and Prachi rivers and off Mahanadi. Juveniles were caught only in the Sand heads region.

TABLE VI

Year	Area	Total No. of fish examined	Length range in cm.	Sex Ratio ♂	♀	Dominant maturing stages ♂			♀	
1959-60	Off Black Pagoda .	362	6·0–8·0	158	104	I (60·5)	II (39·5)		II (100)	
	,, Devi & Prachi .	782	8·9–10·5	482	300	I (35·2)	II (40·7)	III (24·1)	II (68·2)	III (31·8)
	,, Mahanadi . .	184	7·4–9·5	98	86	I (78·2)	III (22·8)		II (88·2)	III (11·8)
	Sand heads . . .	98	3·2–4·0	70	28		Indet			Indet
1960-61	Off Black Pagoda .	136	6·4–8·4	38	98		II (100)		I (51·8)	II (48·2)
	,, Devi & Prachi .	628	8·0–11·2	388	240	II (40·8)	III (59·2)			II (100)
	,, Mahanadi . .	280	7·9—9·0	126	154	I (100)				I (100)
	Sand heads . . .	78	3·0–3·5	38	40		Indet			Indet
1961-62	Sand heads . . .	59	2·5–4·2	39	20		,,			,,

The figures within ( ) indicate %

FOOD AND FEEDING HABITS

Fig. 2 represents the food chart. It is observed from the figure that feeding intensit was found to be high, with the specimens caught off Devi and Prachi regions and the diet was composed of *Penaeus* larvae, *Acetes* sp., *Anomuran* larvae Cirripede larvae, copepods (*Acartia* sp., *Euterpina* spp., *Oithona* sp., *Macrosetella* sp., *Temora* sp., *Paracalanus* sp., and *Harpacticus* sp.) and Diatoms (*Coscinodiscus*, *Pleurosigma* and *Planktoniella*). Analysis of the stomach contents of specimens collected from off Mahanadi revealed that *Acetes* spp., dominated the food items. Apart from this amphipods, prawns and squilla larvae and copepods (*Pseudodiaptomus* sp. *Temora* sp., *Acartia* sp., *Corycaeus* sp., and *Pontella* sp.) were also recorded. The vegetative composition of the diet was represented by *Rhizosolenia* sp., *Fragilaria* sp., *Trichodesmium* spp. and *Synedra* sp. The stomach contents of fishes collected from off Black Pagoda showed that copepods dominated

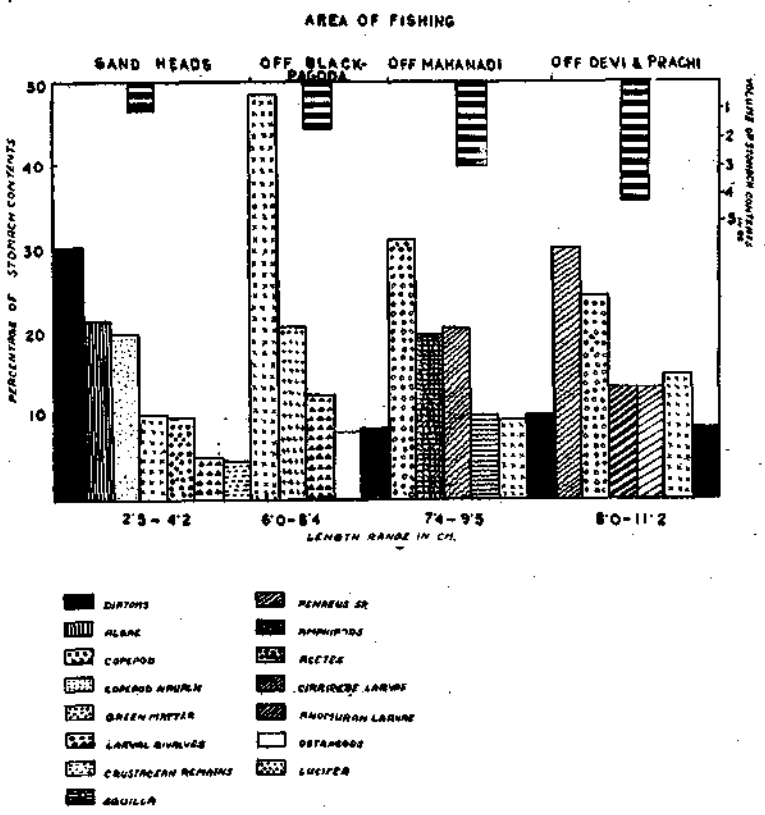

FIG. 2 represents the percentage composition of the different items of diet together with total average volume of food of *Kurtus indicus*.

the food. The common constituents of this items were *Oithona* sp., *Acartia* sp., *Pontella* sp. *Eucalanus* sp., *Paracalanus parvus* and *Corycaeus* sp., *Macrosetella* spp., *Labidocera* sp., *Temora* sp., *Calanopia* sp., *Acrocalanus* sp., nd *Pseudodiaptomus* sp. Larval bivalves and ostracods were also recorded. The different varieties of diatoms identified from the stomach contents were *Pleurosigma*, and *Asterionella* sp. The food of young forms of *Kurtus indicus* collected from Sand heads region consisted mainly of Diatoms—*Coscinodiscus* spp., *Nitzschia* spp., *Navicula* spp., *Mastogloria* sp. *Pleurosigma* sp., *Asterionella* sp. *Fragilaria* sp., *Synedra* sp., and *Gyrosigma* sp. The algae were recorded in the stomach contents and were represented by *Oscillatoria* sp., *Cladophora* sp., *Lngbya* sp., *Polysiphonia* sp., *Chaetomorpha* sp. and *Merismopedia* sp. Copepods belonging to the genus *Acartia*, *Oithona*., and *Paracalanus* were represented in the stomach contents. The green matter which was found very frequently is probably digested matter of algae or sea weeds. Apart from this, larval bivalves and crustacean remains were also found in the stomach.

SUMMARY

1. The results of the trawling operations in the Bay of Bengal during the three years, 1959-60 to 1961-62 are analysed and presented. The fishing grounds have been charted and eight trawling grounds have been recognised *viz.*, Sand heads, off Balasore, off Mahanadi, off Devi

and Prachi, off Black Pagoda, Puri, Chilka and Gopalpur. During 1961-62, trawling was done more in the Sand heads region than in other areas whereas during 1959-60 and 1960-61 there was greater concentration of fishing activities in the Devi and Prachi, Mahanadi and Black Pagoda regions.

2. Of the fishing regions the areas off Devi and Prachi have yielded the best landings as well as catch rate of *Kurtus indicus*. The area off Mahanadi ranked next in the yield.

3. The distribution of *Kurtus indicus* and its abundance in the various fishing grounds in relation to depth as well as the income from the fishery are discussed.

4. An account of the feeding habits, sex ratio and maturity and the size groups in relation to the depth range is also given.

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