

FISHERIES OF THE WEST COAST OF INDIA

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OFFSHORE FISHERIES

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THE utilization of the fishery wealth available in the seas around India was confined until recently to the inshore region extending less than ten miles from the shore, the offshore region being left mostly untouched. This was partly because of the want of mechanization of the craft and gear, and partly because of the want of sufficient knowledge of the availability of good catches in the offshore grounds. While various exploratory surveys conducted before Independence such as those of the "Golden Crown" (1908-11) in the Bay of Bengal, the "William Carrick" (1921-22) off the Bombay and Kathiawar coasts and the "Lady Goschen" (1927-30) off the east and west coasts of southern India had given indications of the existence of considerable fishery resources in the Indian offshore waters, these surveys were all of a relatively short duration and because of this and other factors they did not succeed in inducing the fishing industry to take to any regular exploitation of those waters. The intensive exploratory survey and development work carried out during the past ten years has broken new ground and while much work is still to be done, it now appears that offshore fishing has come to stay. Not only has the existence of certain productive offshore fishing grounds been verified but private enterprise has also taken over the exploitation of some of these grounds by the use of trawlers or other types of large fishing vessels. A gradually increasing number of small vessels and country craft have also been mechanized during recent years, particularly in the Bombay State and these frequently fish in the near-offshore grounds with very good results.

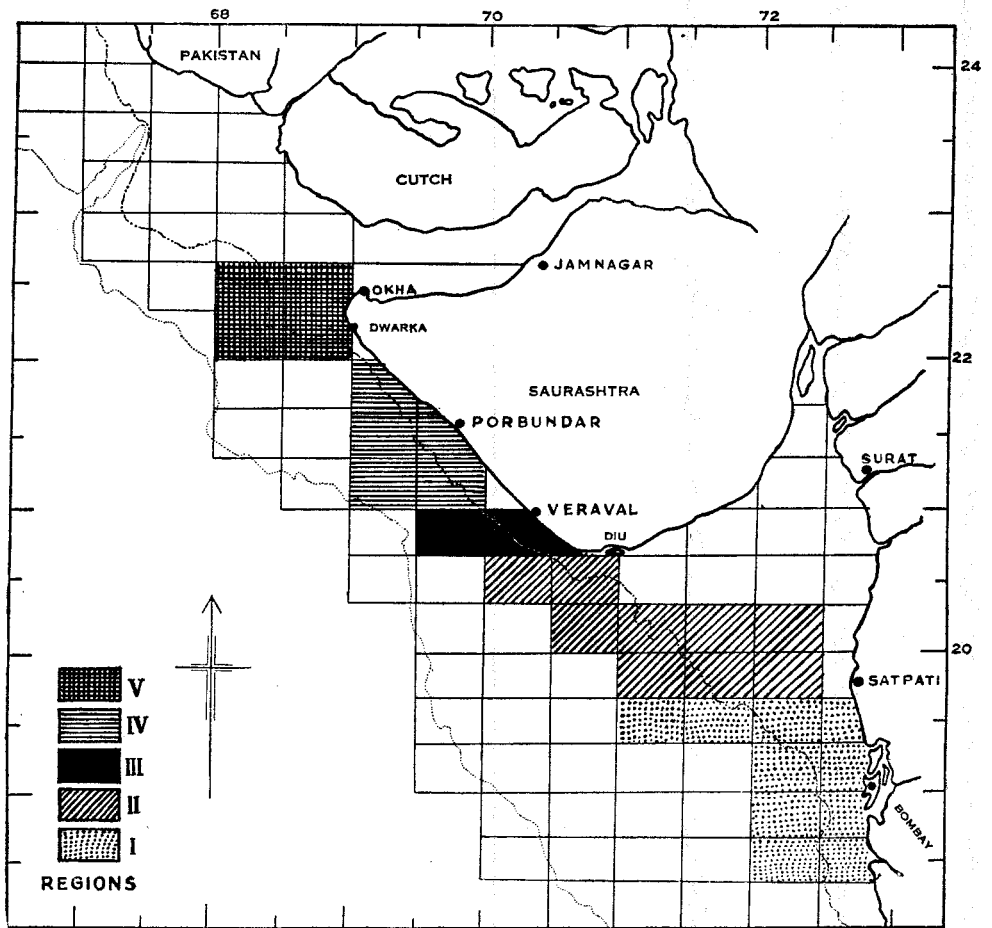
One of the main factors contributing to this development in the field of offshore fisheries has been the sponsoring of sustained exploratory surveys by Governmental agencies with the help of foreign experts and equipment wherever necessary. The Government of India opened the Deep Sea Fishing Station in 1946 and initiated offshore fishing experiments off the Bombay and Saurashtra coasts in January 1948. After experimenting with certain types of craft and gear in the different grounds, it has been possible to chart a considerable portion of the offshore waters of this region and also

to prove that the Japanese method of fishing known as *bull-trawling* is much more profitable than the older method of *otter-trawling* for catching the fishes of these grounds. The exploratory vessels have been gradually increased in number and the survey has been extended since 1957 to the southern part of the Arabian Sea also. The Government of West Bengal launched an exploratory programme in 1950 with two trawlers to study the fishable grounds in the northern part of the Bay of Bengal and have been continuing the work with five trawlers at present. The Travancore Government sponsored some deep sea fishing experiments off the south-west coast of India in 1949-50 and this confirmed the belief held before, that fairly good fisheries exist in the offshore waters west of Travancore and also in the waters adjoining the well-known Wadge Bank which has been profitably exploited by Ceylon for a long time. The former Saurashtra Government also participated in the survey and exploitation of the offshore waters adjoining its territory.

Of the various grounds covered by the above surveys, those off the Bombay and Saurashtra coasts are the best exploited at present. While exploratory work by the Government vessels showed new banks besides revealing new boundaries and compositional features in the already known banks, the practicability of offshore fishing as a commercial proposition was proved by the experiments of the Japanese trawler *Taiyo Maru No. 17* which operated in these grounds for about four years from 1951. For instance, during the period of about one year from 28th November 1951 to the 25th November 1952 this 277-ton vessel, actually fishing for 211 days with a total crew of 23 men and officers and using the older method of *otter-trawling*, was able to catch 939 tons of fish (excluding the cheap fish usually thrown out after each haul) and to realise net sale proceeds of Rs. 4,49,385. After the success of this venture and the success of *bull-trawling* experiments by Government vessels, an Indo-Japanese firm, "The New India Fisheries Ltd." has started regular exploitation of these banks using two pairs of *bull-trawlers*.

One of the current achievements in the field of offshore fisheries research is the collection and compilation of catch statistics relating to different offshore fishing grounds that are now being exploited or explored. These data are available from the very commencement of the recent exploratory operations, and considered along with other necessary data, will be very helpful in understanding the trends of the fisheries in future. For the purpose of charting, the fishable waters are divided into a number of rectangular areas as shown in Fig. 1 based on latitude and longitude, and in relation to each

one of these areas the catch details are calculated. But while these individual areas are important in the primary charting and assessment of catch trends, it is each fishing bank or region as a whole that should be considered for understanding the broader trends and general behaviour of the fisheries. Such banks or regions are distinguished from one another on the basis of the compositional features of the fisheries and peculiarities of the grounds. Five regions are recognised off the Bombay and Saurashtra coasts: (1) the Bombay region extending southward to $18^{\circ} 20' N.$ lat. and towards the north and north-east upto $19^{\circ} 40' N.-71^{\circ} E.$; (2) the Cambay region, extending from south-west to north-east from $72^{\circ} 30' E.-19^{\circ} 40' N.$ to $70^{\circ} E.-20^{\circ} 40' N.$; (3) the Veraval region, a narrow strip of about 20 miles width extending seaward from the coast upto $69^{\circ} 30' E.$; (4) the Porbunder region, extending north-eastwards from the previous region up to $22^{\circ} N.-69^{\circ} E.$;



Exploratory offshore fishing regions of the Bombay and Saurashtra Coasts.

(5) the Cutch gulf or the Dwaraka region bounded by the latitudes 22° N. and 22° 40' N. and the longitudes 68° E. and 69° E.

The most important commercial fishes of these grounds are *dara* (*Polydactylus indicus*), *ghol* (*Pseudosciaena diacanthus*), *koth* (*Otolithoides brunneus*), *wam* (*Muraenesox talabonoides*) and *karkara* (*Pomadasys hasta*). Considerable quantities of *dhoma* (small sciaenids dominated by *Otolithus* spp.), catfishes and rays are caught in certain grounds but are sometimes rejected by the commercial vessels in favour of more profitable kinds of fishes. Among other fishes of value that occur in the trawl catches of these grounds may be mentioned the sharks and skates, *rawas* (*Eleutheronema tetradactylum*), *surmai* (*Scomberomorus* spp.), *pomfrets* (*Pampus argenteus*, *P. chinensis* and *Parastromateus niger*), *tamb* (*Lutjanus* spp.), *chand* (*Drepane punctata*), *kati* (*Pellona* spp.), *datali* (*Chirocentrus dorab*), *bombil* (*Harpodon nehereus*), *Synagris* sp., *Psettodes erumei*, ribbonfish, prawns & lobsters and cuttlefish.

Table I shows the total quantities of all fish caught by the Bombay-based trawlers from the different offshore fishing grounds during the years 1949-50 to 1954-55 and Table II shows the quantities of seven selected categories of fishes caught by these trawlers in the Dwaraka region during the same years. A general decrease in the catches is noticed in these tables for the year 1954-55. This is mainly due to reduced fishing effort by the trawlers operating in the area and the total withdrawal of one of them.

TABLE I*

Total takings (in lb.) of all fish from the different offshore trawling grounds during the years 1949-50 to 1954-55

Regions	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55
Bombay ..	1,21,481	33,655	2,05,313	1,43,069	1,57,545	121
Cambay ..	2,61,576	3,85,346	4,34,327	6,65,301	4,00,447	48,775
Veraval ..	6,105	3,608	3,91,342	1,74,767	82,559	56,497
Porbandar ..	196	..	3,04,426	1,88,347	2,55,836	2,09,920
Dwaraka ..	..	..	12,69,878	12,50,392	20,31,773	1,59,417

* The figures given in Tables I to IV have been taken from the data compiled by the Bombay^{Sub} Station of the Central Marine Fisheries Research Station; 1 lb. = 0.454 kg.

A good indicator of the abundance and availability of the fishes in the trawling grounds is the catch per unit effort. Tables III and IV show the

TABLE II

Takings (in lb.) of seven principal categories of fishes from the Dwaraka trawling grounds during the years 1951-52 to 1954-55

Year	<i>Dara</i>	<i>Ghol</i>	<i>Koth</i>	<i>Wam</i>	<i>Karkara</i>	Catfish	Elasmo- branches
1951-52 ..	2,06,819	1,40,237	48,800	32,391	2,09,055	80,819	1,81,112
1952-53 ..	3,61,335	1,03,310	3,04,760	27,507	1,30,617	1,53,588	74,087
1953-54 ..	4,60,208	1,78,856	4,39,263	71,498	2,53,247	1,55,527	1,66,140
1954-55 ..	56,112	6,938	31,754	2,961	10,459	11,782	8,920

catch rates of all fish in the different regions and the catch rates of five selected categories of fishes in the Dwaraka region respectively, during the years 1953-54 and 1954-55, when the 135-ton cutters *Ashok* and *Pratap* carried out *bull-trawling* experiments. The high catch rates of some of the regions will be easily noticed in these tables.

TABLE III

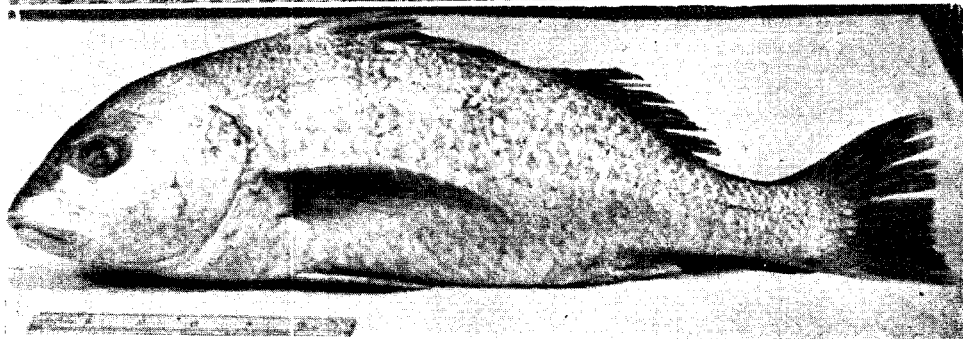
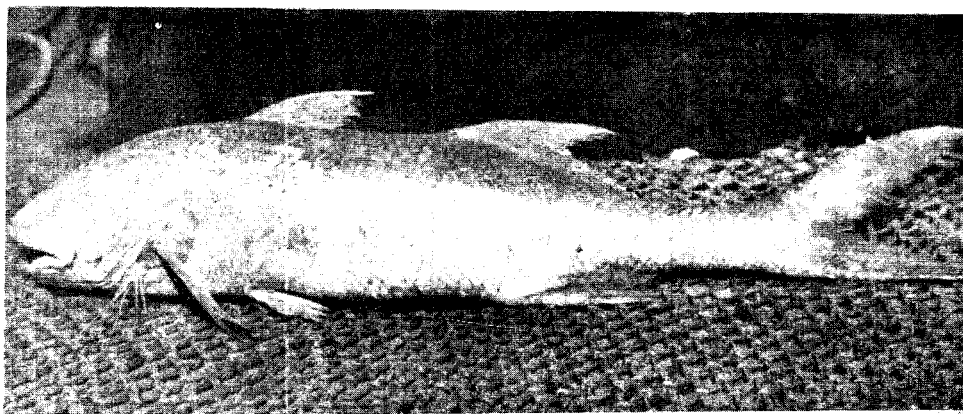
Catch of all fish (in lb.) per trawling hour, by the cutters Ashok and Pratap from the different regions

Regions	Years	Dec.	Jan.	Feb.	March	April	May
Bombay ..	1953-54	836.8*	309.4	1,137.1*	695.4	..	535.6
	1954-55	..	80.7*	..	..	..	..
Cambay ..	1953-54	655.8*	225.1	..	311.4*	..	320.1
	1954-55	..	1,359.2	545.7*	312.5*	2,478.8*	1,120.0*
Veraval ..	1953-54	785.3*	663.8	..	1,213.0*	..	568.2
	1954-55	..	1,388.4	..	1,423.3	1,280.2	2,246.7*
Porbundar ..	1953-54	..	1,651.1*	..	896.6*	1,009.2	605.4
	1954-55	..	742.0	1,776.0	1,561.6	1,084.8	..
Dwaraka ..	1953-54	958.8	1,335.1	1,332.4	1,695.5	1,241.8	1,526.5
	1954-55	..	1,327.1	3,059.2	1,314.4	914.3*	..

* Less than 10 trawling hours.

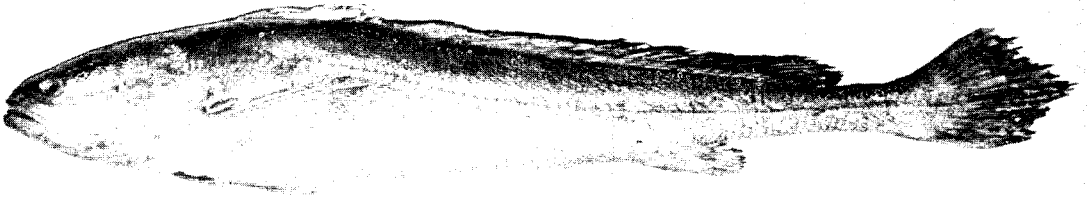
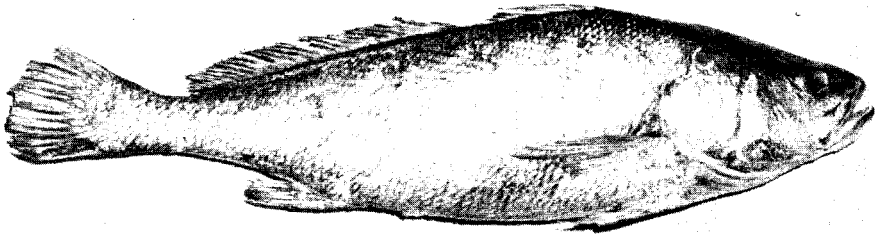
The Dwaraka or the Cutch gulf region has so far proved to be the richest of the five trawling grounds, yielding both the best landings and the highest average catch rates per unit of effort. This ground is also the best for the trawl fisheries of *dara* and *koth* which are characteristic of this region.

SOME IMPORTANT FISHES OF THE BOMBAY AND SAURASHTRA OFFSHORE GROUNDS



1. Dara (*Polydactylus indicus*). 2. Karkara (*Pomadour hastata*).

SOME IMPORTANT FISHES OF THE BOMBAY AND
SAURASHTRA OFFSHORE GROUNDS



3. Ghol (*Pseudosciaenidae*). 4. Wam (*Muraenesoxidae*).
5. Koth (*Otolithoideae*).

TABLE IV

Catch of Dara, Ghol, Koth, Wam and Karkara per trawling hour by Ashok and Pratap in the Dwaraka region

Fish	Year	Dec.	Jan.	Feb.	March	April	May
<i>Dara</i>	1953-54	398.3	706.8	755.1	214.2	243.6	67.4
	1954-55	..	338.1	1,371.1	233.4	455.9*	..
<i>Ghol</i>	1953-54	56.8	44.3	51.3	201.0	208.6	143.5
	1954-55	..	57.8	93.9	158.5	48.9*	..
<i>Koth</i>	1953-54	126.5	124.3	85.8	35.0	34.4	1.4
	1954-55	..	108.2	322.0	288.5	65.7	..
<i>Wam</i>	1953-54	16.4	16.6	18.1	95.4	128.7	59.5
	1954-55	..	20.6	46.5	51.3	53.1*	..
<i>Karkara</i>	1954-55	..	194.8	94.5	86.6	30.6	..

* Less than 10 trawling hours.

The *Wam* fishery has been best in the Cambay and Veraval regions. *Ghol* occurs in some quantities in all the regions. *Karkara* is mainly caught in the Porbundar and Dwaraka regions. Catfishes, sharks and rays form a good proportion of the catches in the Bombay and Cambay regions.

The bulk of the yield of all these grounds has been seen to be in the neighbourhood of the 20 fathom line; *dara* and *koth* show greater abundance on the landward side of this line while *ghol*, *wam* and *karkara* occur more on the seaward side. It has also been noticed that the trawler catches tend to be better during day time than during night time and also better during the neap-tide period than during the spring-tide period. A study of the catch rate trends along with the temperature distribution charts has indicated the possibility of there being certain optimum temperatures limiting the abundance of the different fishes even within the limited ranges found in our waters. The hydrological studies made at Bombay have also indicated the possibility of seasonal upwelling in the coastal waters between 20° N. and 21° N. latitude and to a less extent up to 22° N. latitude during the period December to February. These mixing phenomena must be of great importance in determining the fertility of these waters.

The *dara* and *koth* fisheries of the Dwaraka region are mainly constituted by juveniles and immature adults. Biological work on these and other species of importance has been receiving attention at the Bombay Substation of the Central Marine Fisheries Research Station.

In the Kerala offshore waters, experiments were conducted in 1949-50 with the vessels *Chandrika* and *Ashok Kumari* (Dory-fishing or mother-ship operations), *Sagarakumari* and *Kanyakumari* (mainly otter-trawling). The trawling ground was between longitudes 77° E. and 77° 45' E. and latitudes 7° 40' N. and 8° 15' N. in what has been described as the northward extension of the Wadge Bank. The mother-ship operations consisted of towing a number of the smaller boats to the offshore fishing grounds and allowing them to fish by the use of hooks and lines. This was carried out in two grounds, namely, in the north in an area lying between longitudes 76° E. and 76° 30' E. and latitudes 8° 30' N. and 9° 15' N., and in the south between latitudes 7° 45' N. and 8° N. and longitudes 76° 45' E. and 77° 45' E. (excluding the Wadge Bank proper). While both these operations did not appear attractive commercially, they did indicate the existence of good fisheries of species such as *Epinephelus* spp., *Lutjanus malabaricus*, *L. argentimaculatus*, *Carcharinus limbatus* and *Pristis cuspidatus*. Almost all the species obtained by line fishing were obtained from the trawling grounds also, there being many additional species. Of these some of the first class fishes were *Lethrinus nebulosus*, *L. reticulatus*, *L. ornatus*, *Parupeneus trifasciatus*, *Epinephelus areolatus*, *Lutjanus johni* and *Scomberomorus commersonii*. The quantitative results of the trawling operations have not been published.

During 1957, the Government vessels *Ashok*, *Pratap* and *Durga* started exploratory work off the Kerala coast in co-ordination with the schooners of the Indo-Norwegian foundation, with Cochin as base. The highest monthly catch rate by *Ashok* and *Pratap* (bull-trawling) during 1957-58 was obtained in December (1215 kg. per hour), exploring mainly between Alleppey and Quilon. In one voyage during this month the catch rate was reported to be as high as 1429 kg. per hour. The work of the *Durga* and the Norwegian vessels appears to have indicated so far that the best period for trawling for prawns in the near-grounds up to 20 fathoms is May-June and December-January. In December, prawns formed 54.7% of the catches of *Durga*. The catches of all the offshore fishing vessels working at Cochin are being analysed regularly and efforts are being made for charting the different offshore grounds of this region in detail.

The analysis of the data of the Bengal trawlers, *Kalyani I* to *V* has also been taken up recently at Calcutta. The regions at present explored include the following grounds: (1) the Black Pagoda region, (2) the Sand Head region, (3) the Tiger Point, (4) the False Bay Point, (5) off the Devi River mouth, (6) off the Prachi River mouth and (7) off the Baitarani River mouth. *Kurtus indicus* was abundant in several of these grounds, the other important

fishes including pomfrets, sciaenids, perches, ribbonfish, elasmobranchs, eels and prawns. The best grounds during the first half of 1957-58 were those of the Devi and Prachi River mouths yielding 1231 and 1092 lb. respectively per hour of fishing.

Both exploratory and research programmes on offshore fisheries are expected to be substantially expanded and intensified in the future. The existing offshore fisheries such as those of sharks, seer and the flying-fish require to be investigated for further development. The tunas deserve particular attention on account of their value in foreign markets. While their economic importance is yet to be realised in our country, as many as five species of the tuna group seem to be present in our seas and some of them have long been known to occur in the currently exploited areas yielding on an average about 3,500 tons of fish per year. They are caught off the Ratnagiri coast, off the Kerala coast, around the Laccadive Islands, off Tuticorin, and roundabout the Andaman Islands. Reports of tuna shoals are occasionally heard from masters of fishing and other vessels as sighted at various regions in the Indian waters. It seems very likely that exploratory work in this direction may lead to fruitful results.

Several grounds which were located in the past have to be looked for again. On the east coast for instance, the *Lady Goschen* was reported to have found some offshore fishing grounds not known before and it was claimed that these grounds were superior at that time in quality and value to those of the west coast offshore fisheries; they even seem to have attracted the attention of Japanese fishing interests from the distance of thousands of miles. Unfortunately the work that was so promising could not be continued owing to unsurmountable technical and administrative difficulties, and further exploration of the east coast grounds is still to be made. It is expected that this gap will be covered when the projected offshore fishing stations at Tuticorin and Visakhapatnam are opened.

On the west coast, the exploratory survey needs to be extended to cover the Kanara and Ratnagiri coasts and the regions around the Laccadive Islands. It is also necessary that offshore exploration and research should include programmes on the mackerel and the oil-sardine which form ^{our} most important marine fisheries at present. Such studies should help in understanding the fluctuations in the occurrence of these fishes in the inshore waters if not in finding new fishable stocks of them in the offshore waters. It is expected that the proposed increase in the offshore fishing activities will provide opportunities for the implementation of such programmes also.