MARINE FISHERIES INFORMATION SERVICE

Technical and Extension Series

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE

COCHIN, INDIA

INDIAN COUNCIL OF AGRICULTURAL RESEARCH

No. 9

May, June, July 1979

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.

Abbreviation - *Mar. Fish. Infor. Serv. T & E Ser., No.* 9: 1979

CONTENTS

Cover photo: A scene of fire at malpe fishing harbour.

MALPE FISHING HARBOUR INFERNO: AN IMPACT ANALYSIS*

An unprecedented fire disaster, in which 196 mechanised fishing boats were gutted, took place at Malpe, a major fishing harbour in Karnataka State in the afternoon of 19th July, 1979. Malpe is situated about 65 km by road north of Mangalore, wherein there was a large concentration of purse-seiners and other mechanised boats. The total loss due to this havoc has been estimated at 2.3 crores of rupees.

Fire incident

The fishing season having ended by the middle of June, a large number of purse-seine boats and trawlers were docked in the yard covering an area of about 8 hectares. The fire started at about 3 P. M. in the north-western side of the present fish landing jetty east of the new fishing harbour under construction. It is reported that the fire was caused by sparks from the welding work carried out by some mechanics on one of the boats. The fire spread rapidly due to dry weather prevailing in the place for three days prior to the incident. Added to this, the bone dry thatched leaves that covered the boats and the winds from the western side helped the fire to engulf the whole area in a short time. Two fire engines from Udipi and three from Mangalore came to the spot and were engaged in the task of extinguishing the fire. There were loud explosions and flames of fire as a result of the bursting of drums and this prevented the local people in helping the rescue team in its work. It was brought under full control only by the afternoon of 20th July. By that time, most of the boats were gutted.

The entire yard presented a bizarre spectacle when we visited the area, with partly and fully burnt mechanised boats with parts of engines strewn about. Fully burnt sailing crafts, boat building yards and remnants of salt bags were also observed. Fortunately there was no loss of life, as the fire started when the people were away during the noon recess.

Assessment of damage and its immediate impact

Based on the personal visits made by us at the site of the accident and also from information gathered from boat owners and different agencies, it was found that altogether 198 vessels were completely burnt, 40 of them purse-seiners (43½ footers), 140 trawlers (mostly 30 and 32 footers) and 18 sailing vessels. One purse-seiner and 15 trawlers were partly damaged (Table 1.)

Table 1. *Details of the loss caused by fire at Malpe*

Items	Fully damaged	Partly damaged	Total No. damaged	No. saved	Loss caused (in lakh rupees)
Purse-seiners	40	1	41	4	110
Trawlers	140	15	155	39	92
Sailing vessels	18	—	18	—	10
Boat building yards	5	—	5	—	7
Salt godowns	6	—	6	—	10
Sheds with dried fish	120	—	120	—	

However, 4 purse-seiners and 39 trawlers were saved. In addition, 5 boat building yards, 6 salt go-downs and 120 sheds housing dried fish, nets requiring mending etc were gutted. Some of the sheds which served as tea and pan stalls were also destroyed in the fire. The total loss is estimated at Rs. 2.3 crores.

Table 2. *Insurance coverage of the vessels damaged by fire*

Vessels	No. damaged	No. insured	Percentage of vessels under insurance cover
Purse-seiners	41	41	100
Trawlers	155	105	68
Sailing vessels	18	Nil	Nil

*Prepared by T. Jacob and G. Venkataraman in association with M. V. Pai and staff of Fishery Resources Assessment Division and Mangalore Research Centre of C. M. F. R. I.

A team of senior officers from Fishery Resources Assessment Division and from Mangalore Research Centre of C. M. F. R. I. was immediately sent to the scene of the fire disaster at Malpe fishing harbour to make an assessment of the damage and its impact on the fishing industry. This report, an outcome of their study is based on first hand information gathered by the team on the spot as well as from various agencies connected with the fishing industry and gives an objective assessment of the situation – E. G. Silas, Director.

Though the total loss to the nation on account of the fire disaster is to the tune of Rs. 2.3 crores, the individual loss of the owners of mechanised vessels was much less. All the 41 purse-seiners and 105 out of 155 trawlers lost in the fire were insured (Table 2). Owners of sailing vessels, boat building yards, salt godowns and sheds suffered a total loss amounting to Rs. 27 lakhs. About 2000 crew were affected because of the destruction of the boats in which they were employed. Luckily the nets used by the mechanised vessels, particularly purse-seine nets, costing about Rs. 1.5 lakhs each, were saved because they were kept by the owners in their houses as it was off season.

Relief and rehabilitation measures

The Karnataka State Government have constituted a committee to assess the damage caused by the fire and identify the actual sufferers for extending financial assistance. Shri P. F. Rodrigues, Hon'ble Minister for Fisheries visited the spot and assured the fishermen that apart from the funds which the State Government proposed to give, additional funds from the Central Government would be sought.

A Public Relief Committee has been formed under the Chairmanship of Shri T. A. Pai, Hon'ble Union Minister for rendering immediate relief to the victims of the fire disaster. Representatives of the banks from Dakshina Kannada area met at Malpe on 24-7-'79 to chalk out a programme of financial help for the fire victims. The Deputy Commissioner, Dakshina Kannada and officials from Agricultural Refinance Development Corporation (ARDC) also participated in the meeting. Shri T. Jacob and Dr. M. V. Pai from C. M. F. R. I. attended the meeting as observers.

For a proper understanding of some of the relief measures it would be useful to give a brief account of the cost structure of the mechanised boats and the procedure followed by the banks in advancing loans to the boat owners for constructing the same.

Table 3. *Cost of different types of vessels (in rupees)*

Type of vessel	32′ Trawler	36′ Trawler	43½′ purse-seine
Hull	50,000	70,000	1,65,000
Engine	50,000	70,000	1,00,000
Other accessories	8,000	10,000	35,000
Net	10,000	10,000	1,50,000
Total	1,18,000	1,60,000	4,50,000

The cost of a 32′ and 36′ trawler, including the net, works out to Rs. 1.18 and Rs. 1.60 lakhs respectively while that of a 43½′ purse-seiner works out to Rs. 4.50 lakhs based on the prices prevailing in 1978. However, these costs are likely to go up by about 25% at present.

The banks advance loans to the owners of mechanised boats to the extent of 75% of the cost of the boats, the seed capital of 25% coming from the boat owners. ARDC finances the bank to the extent of 80% of the project cost at 8% interest and the bank in turn charges 11% interest to the boat owners. The repayment of the loan by the boat owners to the bank is generally spread over a period of five years with 8 instalments in a year. The instalments are generally paid during the period from October to May. The Karnataka State Fisheries Development Corporation also provides financial assistance to the fishermen by way of loans and by giving subsidy for raising the seed capital.

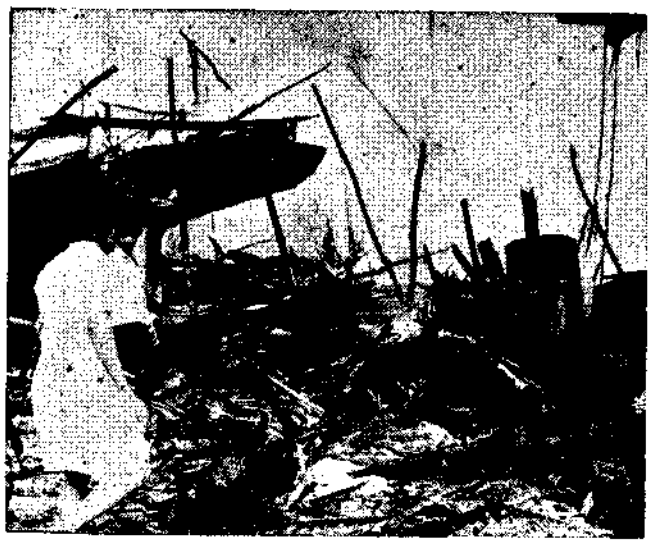
The banks extend loans to the boat owners after receiving the feasibility reports on the concerned project from competent authorities. The boats, thus obtained through bank loans, are compulsorily registered and insured and the boat owners pay the premium through the banks. The monsoon months extending from June to August are treated as laid up period and if in this period the boats go for fishing the insurance companies, in general, do not take any responsibility for the loss incurred.

In this context it is seen that the loss suffered by the boat owners at Malpe is considerably mitigated, as most of the boats lost in the fire disaster were purchased through bank loans with proper insurance cover.

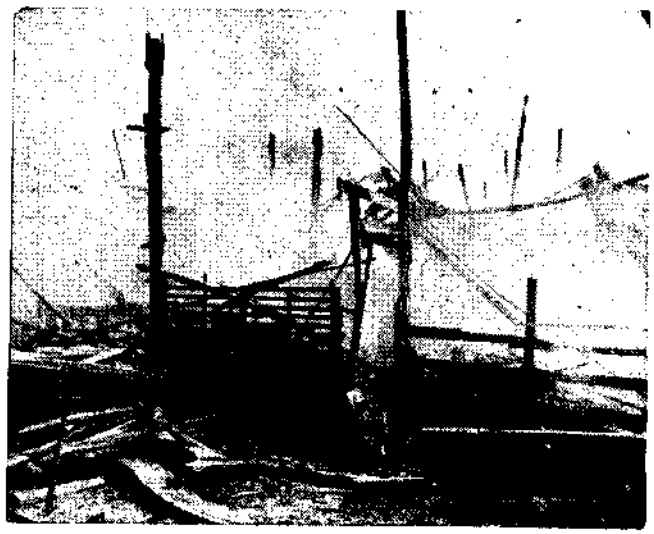
The Karnataka State Government intends to make ex-gratia payments ranging from Rs. 100 to 400 to the deserving persons for which an assessment of the individual cases has already been taken up.

The State Government are favourably considering the question of relief in excise duties and sales tax in the purchase of engines for the boats. The Government are also taking steps to procure wood like wild jack, from within and outside the State and supply the same at concessional rates for building new boats.

At the bankers meeting it was suggested that second hand boats in good condition both within Karnataka and in the neighbouring states of Kerala and Goa may be procured, as the availability of quality wood needed for the building of boats is limited. It



INFERNO



AFTERMATH

would also enable the fishermen to go in for fishing in the ensuing fishing season iteself. It was suggested that the possibility of obtaining fibre glass/steel vessels might be explored. For such of the boats which have not been insured, the Karnataka State Fisheries Development Corporation has been requested to write off the seed capital and to give subsidy to raise fresh seed capital. The bankers, on their part, would add up the unpaid loans to the new loans to be repaid in easier instalments.

ARDC may consider financing the loans upto 100% including the margin money. They are proposing to extend financial assistance to fish hawkers, persons engaged in fish drying, curing etc. Preferential treatment is likely to be shown to Rampani group of fishermen in regard to issue of loans, material etc. since they belong to weaker sections of the community.

The Relief Committee will be addressing the companies manufacturing marine diesel engines to supply the same at concessional rates to the victims of the disaster.

Owners of sailing vessels, boat building yards and sheds have not insured their properties and the Government may consider extending subsidy to them based on the merits of the individual cases.

This disaster has brought about the need to insure all the mechanised and non-mechanised boats in the country. Registration of the boats will facilitate the financing agencies in giving loans for the boats and in insuring them. This will also be of help in obtaining information regarding additions to the various categories of boats from year to year, in tracing the whereabouts of the boats and in formulating fishery management policies. As a first step, registration of all the fishing boats in the country should be made compulsory.

In the background of the tragedy it is necessary to think in terms of planning safety measures wherever there is a large concentration of fishing boats, similar to those observed in industrial establishments. The Fisheries and Fire Service Departments should formulate and enforce suitable safety measures so that the recurrence of such disasters can be prevented.

Projection regarding revival of Malpe fishing activities

The magnitude of the disaster is quite high; nevertheless this has been compensated to some extent by the fact that it took place during the offseason giving some time for the fishermen to recoup themselves for fishing in the ensuing fishing season. Action is already taken by the concerned authorities to remove the debris and clear the area so that activities relating to construction of new boats and repairing of damaged ones could be started. While complete recouping of fishing activities by Malpe boat owners will take at least two years, they are expected to make a beginning in this direction in about three to four months with the proposed supply of second hand wooden boats and operation of repaired boats.

On an average about 400 boats consisting of 325 trawlers and 75 purse-seiners used to land their catches at Malpe harbour and out of these, 155 trawlers and 41 purse-seiners have been lost. This would reduce the catch from trawlers by 48% and purse-seiners by 55%. During the last fishing season the catch landed by purse-seiners has been estimated at 14,600 tonnes and by trawlers at 3,400 tonnes valued at Rs. 2.58 and 1.39 crores respectively. Due to the loss of purse-seiners and trawlers as mentioned above, the reduction in the catch would amount to about 8,000 and 1,600 tonnes valued at Rs. 1.42 and 0.67 crores respectively, the total loss amounting to Rs. 2.09 crores. However, it is expected that the reduction in the total catch by the loss of boats at Malpe would be made up by the likely landings of mechanised boats coming from other regions in addition to the operation of second hand wooden boats that would be supplied to the boat owners who have lost their boats. Hence it is hoped that the fall in fish production would be substantially resotred by the end of 1979. Consequently, the bulk of the people connected with the fishing industry like head load workers, fish hawkers, fish curers, tea stall owners etc. are expected to be rehabilitated by the end of the year.

A member of C. M. F. R. I. staff has been deployed to gather information relating to the progress made towards the normalisation of fishing activities in the affected area. This would enable monitoring of the process of rehabilitation in the coming months.

The authors are thankful to the Karnataka State Fisheries and Revenue officials and Shri K. R. Pai, Manager, Corporation Bank, Malpe for the co-operation extended during their visit.

* * *

INDUCED BREEDING OF THE INDIAN WHITE PRAWN PENAEUS INDICUS*

A steady supply of spawners is an essential requirement for effective planning of the operations in a penaeid prawn hatchery. Although all the culturable species of penaeid prawns grow in brackish water ponds, the females do not attain sexual maturity in this environment. In nature, the adults migrate from the brackish waters to the sea where they attain sexual maturity and spawn. Hence, the difficulty in obtaining the fully ripe spawners of the desired species from the sea as and when required, and the high cost of fishing and transporting them, are some of the main constraints in the development of hatcheries for large scale culture operations. To overcome this difficulty research is being undertaken in many countries to induce maturation of penaeid prawns under controlled conditions and to domesticate them. One of the techniques employed for the purpose is the ablation of the eye stalk in which the organs that secrete and store the gonad inhibiting hormones are situated. It has been tried with varying degrees of success on the tiger prawn by Alikunhi and his group at Jepara, Indonesia in 1975, Aquacop team at Polynesia in 1975, SEAFDEC at Philippines in 1978 and by Halder in India in 1978. This note reports the successful application of the method for inducing maturation in the Indian white prawn *Penaeus indicus* for the first time. The work was carried out at the Narakkal Prawn Culture Laboratory of the Central Marine Fisheries Research Institute, Cochin.

Pond reared *Penaeus indicus*, 30–38 mm in carapace length were used in the experiments. An electrocautery apparatus was used for eye stalk removal and the females were kept with an equal number of unablated males in 12′ diameter plastic pools fitted with a seawater recirculation system operated by air-lift pumps. They were fed with clam meat and mysids. Bilateral ablation of eyestalk which was tried initially resulted in very rapid maturation of the ovary but the prawns died without releasing the eggs. Then unilateral eye stalk ablation was tried and it proved very effective.

The results of the experiments carried out during the period October, 1978 to June, 1979 are summarised below.

The number of eye stalk ablated females	157
No. that attained full maturity	34
No. that spawned	28
No. of spawnings which gave rise to healthy larvae	22
No. of spawnings which resulted in unfertilized eggs	6

The females attained full maturity usually within 11–14 days after unilateral eye stalk ablation. The hatching rate (egg to nauplius) varied from 16.7 to 97.7%. Out of the 22 successful spawnings, 15 registered more than 60% hatching rate and 10 more than 80%. The number of eggs spawned varied from 10,620 to 1,66,950 per spawner depending on whether the spawning was partial or complete. Two of the eye ablated spawners rematured and spawned (one of them for a second time and the other for a third time). The interval between two successive spawnings was about 20 days. The nauplii that hatched out were grown to the juvenile stage (26–30 mm) in the laboratory; the larvae showed normal growth without any structural deformities.

Penaeus monodon, *Metapenaeus dobsoni* and *Parapenaeopsis stylifera* have also been induced to mature and spawn by the eye ablation technique in our laboratory.

The full details of the experiments reported in this short communication will be presented along with the results of the on-going experiments elsewhere.

*Prepared by M. S. Muthu and A. Laxminarayana, C. M. F. R. I., Cochin.

TRENDS IN TOTAL MARINE FISH PRODUCTION IN INDIA - 1978*

The total marine fish production in India during 1978 was estimated at 1.40 million tonnes as compared to 1.26 million tonnes recorded during 1977, showing an increase of about 0.14 million tonnes (11.42%). Except Andhra Pradesh, all the maritime states recorded higher landings during the year (Table 1). The bulk of the increase in the total marine fish production during 1978 was accounted for by the increase observed in the states of Karnataka and Kerala, to the tune of about 0.56 lakh and 0.28 lakh tonnes respectively.

Table 1. *Statewise marine fish landings in India (in tonnes) during the year* 1977 *and* 1978.

Sl. No.	State	1978	1977
1.	West Bengal	12,754	6,689
2.	Orissa	39,670	15,072
3.	Andhra Pradesh	82,116	1,00,756
4.	Tamil Nadu	2,12,899	2,06,046
5.	Pondicherry	6,828	6,462
6.	Kerala	3,73,339	3,45,037
7.	Karnataka	1,52,860	97,152
8.	Goa	27,111	24,731
9.	Maharashtra	2,84,244	2,64,452
10.	Gujarat	2,01,929	1,89,638
11.	Andamans	7,077	1,532
12.	Lakshadweep	2,780	2,215
	TOTAL	14,03,607	12,59,782

Pelagic and demersal group of fishes

The specieswise catch details are shown in Table 2. The pelagic group of species consists of *Chirocentrus*, oil sardine, other sardines, *Hilsa ilisha*, other *Hilsa*, anchovies and white baits, other clupeids, Bombay duck, *Hemirhamphus & Belone*, flying fish, ribbon fish, carangids, mackerel, seer fish, tunnies, *Sphyraena*, mullets, and *Bregmaceros* spp. The elasmobranchs, eels, catfishes, lizard fishes, perches, red mullets, polynemids, sciaenids, silver bellies, *Lactarius*, pomfrets, soles, prawns, lobsters and cephalopods form the demersal group. The statewise distribution of pelagic and demersal group of fishes is shown in Table 3 and Fig. 1.

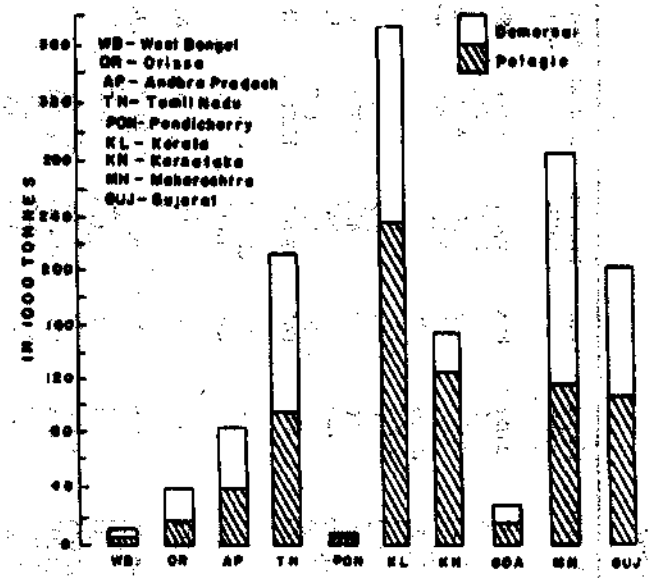


Fig. 1. Pelagic and demersal catch in different states during 1978

Kerala landed highest catch of pelagic fishes during 1978 followed by Karnataka, Maharashtra, Gujarat and Tamil Nadu in the order of abundance. In respect of demersal fishes, Maharashtra contributed the maximum catch, followed by Kerala, Tamil Nadu and Gujarat.

All India production during 1969 to 1978

The total all India marine fish production and its species composition for the years 1969 to 1978 is shown in Table 4. The production showed a steady increase from 1969 to 1971 and then a fluctuating trend from 1972 to 1978. While a minimum of 9,13,630 t. was recorded in 1969, a maximum of 14,22,693 t. was recorded in 1975. The production during 1978 formed about 99% of the maximum production recorded in 1975. The trends in marine fish production in the various maritime states of India are also whown in tables 5 to 17.

Statewise production

West Bengal

The total marine fish catch in West Bengal increased sharply by about 6,000 t. (Table 1) registering a 90%

*Prepared by the Fishery Resources Assessment Division

Table 2. *Statewise composition of marine fish landings in India during* 1978 *(In tonnes)*

Sl. No.	Name of fish	West Bengal	Orissa	Andhra Pradesh	Tamil Nadu	Pondicherry	Kerala	Karnataka	Goa	Maharashtra	Gujarat	Andamans	Lakshadweep	Total	Total for 1977
1.	Elasmobranchs	125	3,386	8,704	15,121	199	9,302	2,051	863	10,072	11,511	89	198	61,621	62,216
2.	Eels	—	3	1,082	325	—	38	8	55	5,384	1,886	—	—	8,781	12,997
3.	Catfishes	151	1,794	3,281	5,252	168	9,125	2,831	1,356	11,081	4,159	33	—	39,231	53,504
4.	*Chirocentrus*	217	1,073	1,262	1,736	111	1,298	247	78	3,059	1,869	40	—	10,990	11,909
5.	a. Oil sardine	—	—	—	36	—	1,19,937	46,707	1,398	—	—	—	—	1,68,078	1,50,130
	b. Other sardines	4	2,514	7,685	21,050	1,184	11,713	2,572	5,151	868	—	97	—	52,838	65,724
	c. *Hilsa ilisha*	193	7,737	2	161	—	182	9	3	1,558	49	—	—	9,894	4,189
	d. Other *Hilsa*	28	848	1,349	4,166	108	69	30	2	466	5,703	31	—	12,800	14,651
	e. *Anchoviella*	24	1,169	7,810	7,447	521	21,203	443	5	340	—	92	—	39,054	34,033
	f. *Thrissocles*	774	175	1,824	4,719	258	1,898	919	1,308	1,821	608	—	—	14,304	9,929
	g. Other clupeids	1,174	1,330	1,794	3,043	281	973	872	645	13,608	13,282	18	—	37,020	41,458
6.	a. *Harpodon nehereus*	1,365	314	1,099	—	—	21	4	27	68,781	53,870	—	—	1,25,481	85,236
	b. *Saurida & Saurus*	—	5	1,057	1,100	132	6,246	92	279	1,815	82	—	—	10,808	8,525
7.	*Hemirhamphus & Belone*	11	13	60	759	—	281	41	56	51	1	61	144	1,478	2,311
8.	Flying fish	—	4	65	1,092	480	—	—	2	5	—	—	33	1,681	643
9.	Perches	—	173	1,945	9,241	487	24,989	174	781	6,951	4,174	234	163	49,312	31,799
10.	Red mullets	—	2	335	1,963	109	171	31	—	344	2	—	27	2,984	2,422
11.	Polynemids	87	1,287	1,075	706	27	35	3	1	1,909	339	—	—	5,469	3,929
12.	Sciaenids	1,772	5,198	5,597	14,239	374	13,045	1,728	3,256	17,202	33,968	—	—	96,379	99,887
13.	Ribbon fish	681	336	5,505	28,664	139	24,207	404	504	10,400	6,944	1	—	77,785	42,407
14.	a. *Caranx*	2	68	2,000	3,104	218	7,197	202	1,803	1,899	270	133	60	16,956	30,666
	b. *Chorinemus*	38	815	665	971	33	148	13	56	300	320	—	—	3,359	4,119
	c. *Trachynotus*	—	—	—	84	—	19	3	—	—	—	—	—	106	80
	d. Other carangids	—	—	87	171	—	72	43	—	50	—	—	—	423	219
	e. *Coryphaena*	—	—	24	18	3	19	—	—	—	—	—	—	64	226
	f. *Elacate*	—	3	53	239	—	166	55	52	—	—	—	—	568	429
15.	a. *Leiognathus*	297	256	2,174	30,281	372	3,040	4,241	704	323	—	89	—	41,777	34,504
	b. *Gazza*	—	—	—	104	—	—	—	—	—	—	—	—	104	61
16.	*Lactarius*	—	12	684	840	—	1,533	198	443	836	3,360	—	—	7,906	10,961
17.	Pomfrets	282	5,714	2,445	789	50	1,614	1,957	367	13,050	15,141	25	—	41,434	35,127
18.	Mackerel	—	196	2,520	1,453	179	25,917	50,704	3,371	787	—	106	—	85,233	62,136
19.	Seerfish	54	1,059	2,600	4,700	41	3,354	1,463	691	2,915	3,734	127	41	20,779	21,119
20.	Tunnies	—	609	328	1,169	3	6,548	614	300	1,939	451	57	1,875	13,893	13,005
21.	*Sphyraena*	—	4	43	2,147	25	721	276	7	388	—	80	18	3,709	2,423
22.	*Mugil*	—	3	237	829	26	1	1	32	102	1,264	131	—	2,626	2,269
23.	*Bregmaceros*	—	—	—	—	—	—	—	—	21	163	—	—	184	30
24.	Soles	24	103	347	1,580	109	7,276	1,820	417	1,676	268	—	—	13,620	10,810
25.	a. Penaeid prawns	605	2,599	8,031	13,327	245	45,034	8,422	1,647	41,091	7,938	265	—	1,29,204	96,472
	b. Non-penaeid prawns	663	12	1,532	585	71	394	18	26	44,255	3,096	—	—	50,652	73,992
	c. Lobsters	—	—	20	249	2	38	39	13	607	339	—	—	1,307	1,217
	d. Crabs & other crustaceans	—	4	477	9,290	251	2,176	741	531	148	584	—	—	14,202	20,068
26.	Cephalopods	30	4	297	1,042	36	6,516	1,346	124	4,557	1,959	—	20	15,931	10,005
27.	Miscellaneous	4,153	848	6,021	19,107	586	16,823	21,538	757	13,585	24,595	5,368	201	1,13,582	91,945
	TOTAL	12,754	139,670	82,116	2,12,899	6,828	3,73,339	1,52,860	27,111	2,84,244	2,01,929	7,077	2,780	14,03,607	12,59,782

Table 3. *Statewise distribution of pelagic and demersal group of fishes during* 1978 *(in tonnes)*

Sl. No.	State	Pelagic	Demersal	Total
1.	West Bengal	6,769	5,985	12,754
2.	Orissa	18,669	21,001	39,670
3.	Andhra Pradesh	39,941	42,175	82,116
4.	Tamil Nadu	96,411	1,16,488	2,12,899
5.	Pondicherry	3,949	2,879	6,828
6.	Kerala	2,36,604	1,36,735	3,73,339
7.	Karnataka	1,22,945	29,915	1,52,860
8.	Goa	15,936	11,175	27,111
9.	Maharashtra	1,14,847	1,69,397	2,84,244
10.	Gujarat	1,05,542	96,387	2,01,929

rise over that of the previous year. Sciaenids, other clupeids, non-penaeid prawns, ribbon fish, and Bombay duck mainly contributed to the higher landings, the increase being about 950, 470, 390, 380 and 300 t. respectively. Table 5 shows the species composition of marine fish landings in West Bengal during 1976 to 1978. Prior to 1976 no separate estimates were available for West Bengal alone. However the estimates for West Bengal and Orissa were combined and the same are shown in Table 6 for the years 1969 to 1975.

Orissa

The total marine fish production in Orissa showed a significant increase of about 24,600 t. as compared to 1977 (Table 1). Part of this contribution (about 10,000 t.) came from landings at Paradeep. The increase was mainly due to the higher landings of sciaenids *Hilsa ilisha,* pomfrets, penaeid prawns and elasmobranchs to the extent of 4,900, 4,800, 4,700, 1,800 and 1,700 t. respectively. Table 7 shows the species composition of marine fish landings in Orissa for the years 1976 to 1978. The species details of marine fish catch for the years 1969 to 1975 are shown in Table 6, combined with that of West Bengal.

Andhra Pradesh

A decline of about 19,000 t. (19%) in the total catch was noticed in this state during 1978 (Table 1). This was due to the set back in the fisheries of sciaenids, silver bellies, non-penaeid prawns, other sardines, ribbon fish, catfishes and *Caranx* spp., the decrease in their landings being 4,600, 3,700 3,600, 3,300, 3,000, 2,400 and 2,000 t. respectively. However an increase was observed in the landings of elasmobranchs, penaeid prawns and mackerel to the tune of about 2,200, 1,800 and 1,500 tonnes respectively. Table 8 shows the species composition of marine fish landings in Andhra Pradesh for the years 1969 to 1978.

Table 5. *Composition of marine fish landings in West Bengal during* 1976 *to* 1978 *(In tonnes)*

Sl. No.		Name of fish	1976	1977	1978
1.		Elasmobranchs	493	73	125
2.		Eels	1	1	—
3.		Catfishes	785	134	151
4.		*Chirocentrus*	251	107	217
5.	a.	Oil sardine	—	—	—
	b.	Lesser sardines	12	—	4
	c.	*Hilsa ilisha*	799	96	193
	d.	Other *Hilsa*	—	—	28
	e.	*Anchoviella*	6	4	24
	f.	*Thrissocles*	1,397	365	774
	g.	Other clupeids	1,790	705	1,174
6.	a.	*Harpodon nehereus*	2,253	1,060	1,365
	b.	*Saurida & Saurus*	—	—	—
7.		*Hemirhamphus & Belone*	—	—	11
8.		Flying fish	—	—	—
9.		Perches	1	—	—
10.		Red mullets	—	—	—
11.		Polynemids	69	25	87
12.		Sciaenids	4,066	819	1,772
13.		Ribbon fish	701	306	681
14.	a.	*Caranx*	—	—	2
	b.	*Chorinemus*	37	12	38
	c.	*Trachynotus*	—	—	—
	d.	Other carangids	—	—	—
	e.	*Coryphaena*	—	—	—
	f.	*Elacate*	—	—	—
15.	a.	*Lelognathus*	219	13	297
	b.	*Gazza*	—	—	—
16.		*Lactarius*	—	1	—
17.		Pomfrets	586	143	282
18.		Mackerel	—	—	—
19.		Seer fish	287	32	54
20.		Tunnies	—	—	—
21.		*Sphyraena*	—	—	—
22.		*Mugil*	2	—	—
23.		*Bregmaceros*	—	—	—
24.		Soles	—	—	24
25.	a.	Penaeid prawns	2,139	602	605
	b.	Non-penaeid prawns	2,708	269	663
	c.	Other crustaceans	—	—	—
26.		Cephalopods	—	—	30
27.		Miscellaneous	6,809	1,920	4,153
		TOTAL	25,411	6,689	12,754

Tamil Nadu

A marginal increase of about 7,000 t. was seen in the total landings in Tamil Nadu as compared to 1977 (Table 1). An interesting feature noticed was the heavy landings of ribbon fish and silver bellies resulting in an increase in the catch by about 24,000 t. and 12,000 t. respectively. These two groups had shown a decline in 1977 as compared to 1976. The other groups that contributed to the increase in the total landings were penaeid prawns, *Thrissocles* spp, perches and red mullet, the increase in their landings being about 5,100, 1,700,

Table 4. *Composition of marine fish landings in India during* 1969 *to* 1978 *(In tonnes)*

Sl. No.		Name of fish	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1.		Elasmobranchs	35,442	44,048	41,348	46,237	44,917	66,054	65,230	54,605	62,216	61,621
2.		Eels	3,052	6,983	4,056	4,509	3,869	4,011	5,710	8,296	12,997	8,781
3.		Catfishes	26,903	50,631	48,858	42,443	52,642	76,196	68,689	43,540	53,504	39,231
4.		*Chirocentrus*	9,337	9,158	9,366	9,532	11,090	9,026	11,813	10,368	11,909	10,990
5.	a.	Oil sardine	1,74,249	2,26,997	2,09,261	1,27,568	1,44,395	1,26,676	1,59,240	1,69,262	1,50,130	1,68,078
	b.	Lesser sardines	52,467	55,220	61,283	44,629	1,08,523	83,921	1,12,117	1,00,000	65,724	52,838
	c.	*Hilsa ilisha*	661	1,050	1,769	1,409	404	4,248	8,897	7,842	4,189	9,894
	d.	Other *Hilsa*	7,873	9,492	10,361	12,229	11,918	7,541	7,567	8,482	14,651	12,800
	e.	*Anchoviella*	31,436	24,400	19,516	18,699	25,394	41,507	30,744	30,069	34,033	39,054
	f.	*Thrissocles*	9,009	14,087	10,801	11,130	13,194	11,433	9,997	17,660	9,929	14,304
	g.	Other clupeids	26,316	26,439	24,100	28,490	35,350	43,226	52,786	57,164	41,458	37,020
6.	a.	*Harpodon nehereus*	76,276	78,443	71,508	51,570	64,345	61,138	99,614	87,075	85,236	1,25,481
	b.	*Saurida & Saurus*	3,043	2,813	3,687	4,748	4,049	12,520	14,323	5,292	8,525	10,808
7.		*Hemirhamphus & Belone*	981	1,814	1,018	687	1,110	4,574	1,980	1,169	2,311	1,478
8.		Flying fish	4,039	2,844	9,179	1,415	6,388	1,012	1,832	1,439	643	1,681
9.		Perches	12,865	13,913	12,993	15,247	21,513	36,837	35,232	18,162	31,799	49,312
10.		Red mullets	3,475	2,118	3,881	6,004	3,925	7,009	2,641	5,216	2,422	2,984
11.		Polynemids	3,480	7,168	7,252	7,100	9,248	10,637	14,044	14,573	3,929	5,469
12.		Sciaenids	35,041	41,903	36,903	40,159	87,682	79,261	1,14,535	87,581	99,887	96,379
13.		Ribbon fish	31,722	26,984	44,690	36,225	53,106	63,029	57,330	64,542	42,407	77,785
14.	a.	*Caranx*	21,415	18,412	20,592	27,009	25,298	19,316	23,005	25,745	30,666	16,956
	b.	*Chorinemus*	2,443	2,120	2,109	2,952	2,827	3,797	3,380	3,322	4,119	3,359
	c.	*Trachynotus*	149	143	17	2	189	122	64	35	80	106
	d.	Other carangids	7	966	304	308	129	91	207	1,572	219	423
	e.	*Coryphaena*	237	254	59	222	228	286	411	261	226	64
	f.	*Elacate*	309	518	347	403	529	229	221	383	429	568
15.	a.	*Leiognathus*	44,038	49,275	32,510	32,314	48,127	50,902	39,813	42,445	34,504	41,777
	b.	*Gazza*	102	154	156	78	41	338	424	966	61	104
16.		*Lactarius*	4,546	4,697	5,313	7,579	13,912	8,913	11,848	12,045	10,961	7,906
17.		Pomfrets	24,176	17,589	21,000	19,007	22,052	22,421	24,987	37,701	35,127	41,434
18.		Mackerel	91,837	1,39,206	2,04,575	1,08,971	79,423	37,462	45,947	65,497	62,136	85,233
19.		Seer fish	11,516	13,410	18,339	21,210	19,700	19,841	18,897	20,159	21,119	20,779
20.		Tunnies	3,445	3,015	6,032	5,760	5,678	10,839	11,285	19,322	13,005	13,893
21.		*Sphyraena*	1,996	1,530	1,271	2,367	3,415	4,862	2,150	2,388	2,423	3,709
22.		*Mugil*	2,693	2,428	3,737	1,559	3,138	4,497	3,515	2,613	2,269	2,626
23.		*Bregmaceros*	1,684	2,196	4,345	5,488	4,213	1,872	1,043	380	30	184
24.		Soles	11,991	13,364	11,380	9,718	14,642	18,917	12,044	10,088	10,810	13,620
25.	a.	Penaeid prawns	72,133	89,857	72,109	78,361	1,36,514	1,14,934	1,41,713	1,14,640	96,472	1,29,204
	b.	Non-penaeid prawns	33,964	31,834	76,734	85,488	66,955	55,244	79,038	76,787	73,992	50,652
	c.	Lobsters	—	—	—	—	—	—	2,991	2,532	1,217	1,307
	d.	Crabs & other crustaceans	5,670	10,832	9,612	11,599	12,508	16,663	19,893	19,999	20,068	14,202
26.		Cephalopods	769	1,184	1,505	1,026	1,394	3,677	7,889	10,826	10,005	15,931
27.		Miscellaneous	30,843	36,118	37,513	48,598	56,266	72,718	97,607	90,812	91,945	1,13,582
		TOTAL	9,13,630	10,85,607	11,61,389	9,80,049	12,20,240	12,17,797	14,22,693	13,52,855	12,59,782	14,03,607

Table 6. *Composition of marine fish landings in West Bengal & Orissa during 1969 to 1975 (in tonnes)*

Sl. No.	Name of fish	1969	1970	1971	1972	1973	1974	1975
1.	Elasmobranchs	492	1,167	325	829	833	1,672	1,450
2.	Eels	—	—	8	24	43	84	4
3.	Catfishes	191	446	315	525	534	1,232	3·383
4.	*Chirocentrus*	1,025	1,163	464	334	737	565	687
5. a.	Oil sardine	247	—	2	—	38	4	—
b.	Lesser sardines	3,905	3,058	2,044	1,442	2,035	1,740	957
c.	*Hilsa ilisha*	47	289	104	37	162	3,513	5,254
d.	Other *Hilsa*	22	—	77	7	203	207	181
e.	*Anchoviella*	900	510	316	673	768	362	207
f.	*Thrissocles*	234	806	222	374	160	785	1,608
g.	Other clupeids	2,737	7,112	1,342	819	3,408	2,122	3,436
6. a.	*Harpodon nehereus*	1,348	818	1,031	924	1,984	1,326	3,043
b.	*Saurida & Saurus*	26	89	10	9	3	5	6
7.	*Hemirhamphus & Belone*	5	6	3	4	1	—	5
8.	Flying fish	—	—	—	—	—	—	—
9.	Perches	4	30	121	50	104	38	201
10.	Red mullets	34	—	5	10	4	20	14
11.	Polynemids	50	258	88	88	136	313	224
12.	Sciaenids	1,274	2,617	2,727	2,479	1,323	1,671	4,474
13.	Ribbon fish	581	1,470	825	530	902	550	1,252
14. a.	*Caranx*	372	844	91	79	132	27	237
b.	*Chorinemus*	100	91	70	74	172	212	165
c.	*Trachynotus*	—	—	—	—	—	—	—
d.	Other carangids	—	—	—	—	—	1	2
e.	*Coryphaena*	—	—	—	—	—	—	—
f.	*Elacate*	—	—	—	—	—	16	1
15. a.	*Leiognathus*	937	891	317	921	438	399	552
b.	*Gazza*	—	—	4	—	—	—	—
16.	*Lactarius*	5	58	8	29	7	24	6
17.	Pomfrets	423	426	643	634	728	1,110	2,501
18.	Mackerel	28	1,764	398	102	80	211	116
19.	Seer fish	612	826	338	329	769	1,169	554
20.	Tunnies	—	1	42	28	46	9	16
21.	*Sphyraena*	—	6	9	6	1	5	3
22.	*Mugil*	13	37	23	68	18	40	44
23.	*Bregmaceros*	—	—	—	—	—	—	—
24.	Soles	45	57	8	41	24	100	30
25. a.	Penaeid prawns	5,638	2,994	1,414	1,471	2,565	2,322	2,920
b.	Non-penaeid prawns	—	22	86	—	486	1,165	2,787
c.	Other crustaceans	—	3	1	3	60	45	8
26.	Cephalopods	2	3	89	7	7	—	2
27.	Miscellaneous	1,582	3,541	4,462	2,380	3,825	3,028	9,431
	TOTAL	22,879	31,403	18,032	15,330	22,736	26,092	45,761

1,300 and 1,100 t. respectively. However, a decline was noticed in the landings of catfishes, white baits, other sardines, mackerel, elasmobranchs, *Caranx* spp., tunnies, crabs and other crustaceans and seer fish, the decrease in their catch being 10,000, 5,900, 5,200, 4,200, 3,200, 3,000, 2,100, 1,700 and 1,700 t. respectively. The species composition of marine fish landings in Tamil Nadu during 1969 to 1978 is shown in Table 9.

Pondicherry

A slight increase of about 400 t. in the total landings was noticed in this Union Territory as compared to 1977 (Table 1). The landings of flying fish, other clupeids, penaeid prawns and sciaenids showed an increase of about 480, 280, 140 and 120 t. respectively. The catch of *Caranx* spp., mackerel and *Lactarius*, however, showed a decline of about 270, 200 and 180 t. respectively. Table 10 shows the species composition of marine fish landings in Pondicherry during 1969 to 1978.

Kerala

In Kerala, the total marine fish landings during 1978 showed an increase of 28,000 t. over that of 1977 (Table 1). This increase was contributed by the higher landings of ribbon fish, white baits, perches, mackerel, penaeid prawns and elasmobranchs, the increase in their landings being 17,000, 11,000 11,000, 6,000, 5,000 and 3,500 t. respectively. The landings of other sardines, *Caranx* spp., silver bellies, crabs and pomfrets, however, showed a decline of 9,000 ,8,500, 5,000, 2,500 and 2,000 t. respectively. The species composition of marine fish landings in Kerala during 1969 to 1978 is shown in Table 11.

Table 7. *Composition of Marine fish landings in Orissa during* 1976 *to* 1978 *(In tonnes)*

Sl. No.		Name of fish	1976	1977	1978
1.		Elasmobranchs	2,974	1,658	3,386
2.		Eels	1	—	3
3.		Catfishes	1,988	1,035	1,794
4.		*Chirocentrus*	517	752	1,073
5.	a.	Oil sardine	—	—	—
	b.	Lesser sardines	1,657	1,227	2,514
	c.	*Hilsa ilisha*	5,477	2,948	7,737
	d.	Other *Hilsa*	129	492	848
	e.	*Anchoviella*	339	486	1,169
	f.	*Thrissocles*	106	197	175
	g.	Other clupeids	772	778	1,330
6.	a.	*Harpodon nehereus*	87	86	314
	b.	*Saurida & Saurus*	1	5	5
7.		*Hemirhamphus & Belone*	1	—	13
8.		Flying fish	—	—	4
9.		Perches	31	55	173
10.		Red mullets	1	1	2
11.		Polynemids	244	406	1,287
12.		Sciaenids	333	312	5,198
13.		Ribbon fish	130	174	336
14.	a.	*Caranx*	147	103	68
	b.	*Chorinemus*	237	386	815
	c.	*Trachynotus*	—	—	—
	d.	Other carangids	—	—	—
	e.	*Coryphaena*	2	1	—
	f.	*Elacate*	—	9	3
15.	a.	*Leiognathus*	378	233	256
	b.	*Gazza*	1	—	—
16.		*Lactarius*	1	18	12
17.		Pomfrets	10,699	1,018	5,714
18.		Mackerel	425	195	196
19.		Seer fish	940	672	1,059
20.		Tunnies	84	37	609
21.		*Sphyraena*	1	3	4
22.		*Mugil*	5	—	3
23.		*Bregmaceros*	—	—	—
24.		Soles	6	72	103
25.	a.	Penaeid prawns	688	802	2,599
	b.	Non-penaeid prawns	100	17	12
	c.	Other crustaceans	23	6	4
26.		Cephalopods	27	—	4
27.		Miscellaneous	1,271	888	848
		TOTAL	29,823	15,072	39,670

Table 8. *Composition of marine fish landings in Andhra Pradesh during* 1969 *to* 1978 *(In tonnes)*

Sl. No.		Name of fish	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1.		Elasmobranchs	3,969	4,038	4,530	7,400	8,354	11,394	9,977	6,688	6,450	8,704
2.		Eels	93	387	107	110	270	451	1,837	205	438	1,082
3.		Catfishes	3,088	2,346	2,724	3,651	10,780	15,890	9,824	6,131	5,662	3,281
4.		*Chirocentrus*	1,460	1,462	1,439	2,248	2,635	2,281	2,920	1,837	1,217	1,262
5.	a.	Oil sardine	—	—	—	—	125	564	131	112	—	—
	b.	Other sardines	13,371	19,097	19,949	7,587	11,928	31,520	32,994	23,220	10,972	7,685
	c.	*Hilsa ilisha*	2	67	796	220	45	—	70	280	41	2
	d.	Other *Hilsa*	1,084	892	769	3,087	2,783	2,347	930	1,815	1,654	1,349
	e.	*Anchoviella*	5,399	5,035	1,332	2,005	4,865	9,869	7,037	11,309	8,947	7,810
	f.	*Thrissocles*	2,791	1,310	953	1,111	2,486	1,895	1,776	1,763	1,398	1,824
	g.	Other clupeids	4,585	2,685	6,004	8,892	9,184	10,195	7,536	8,410	2,363	1,794
6.	a.	*Harpodon nehereus*	152	220	778	297	221	125	359	214	960	1,099
	b.	*Saurida & Saurus*	445	93	112	504	386	267	242	166	875	1,057
7.		*Hemirhamphus & Belone*	33	323	208	17	3	194	24	14	135	60
8.		Flying fish	29	464	247	52	105	2	1	—	84	65
9.		Perches	538	643	1,466	1,485	1,470	2,213	4,888	1,751	2,727	1,945
10.		Red mullets	193	238	372	447	220	305	721	553	315	335
11.		Polynemids	920	615	1,570	2,185	1,393	2,231	1,836	1,813	698	1,075
12.		Sciaenids	6,874	4,091	5,954	7,277	7,576	12,358	11,682	10,891	10,182	5,597
13.		Ribbon fish	9,970	6,473	7,432	3,585	3,761	11,834	11,701	12,443	8,546	5,505
14.	a.	*Caranx*	1,958	2,529	2,484	2,425	2,589	2,901	3,498	3,047	4,003	2,000
	b.	*Chorinemus*	262	202	533	552	1,056	1,620	1,790	1,820	530	665
	c.	*Trachynotus*	—	—	—	—	—	—	6	1	—	—
	d.	Other carangids	—	36	15	—	—	—	6	5	78	87
	e.	*Coryphaena*	8	74	17	106	36	101	251	89	137	24
	f.	*Elacate*	30	21	2	38	56	2	25	14	7	53
15.	a.	*Leiognathus*	2,428	2,541	2,247	2,971	2,806	4,830	11,268	3,876	5,903	2,174
	b.	*Gazza*	—	6	—	1	3	12	101	48	—	—
16.		*Lactarius*	1,306	975	841	1,396	982	1,914	2,513	1,718	1,132	684
17.		Pomfrets	2,205	2,017	3,591	4,165	4,087	3,945	5,697	4,088	2,529	2,445
18.		Mackerel	1,588	2,090	1,402	5,396	2,519	1,734	1,593	2,084	1,040	2,520
19.		Seer fish	2,951	3,608	3,352	5,830	4,054	4,438	5,277	3,412	3,261	2,600
20.		Tunnies	193	135	293	495	141	683	664	334	449	328
21.		*Sphyraena*	150	8	70	88	18	19	119	187	108	43
22.		*Mugil*	288	141	543	118	255	1,848	954	892	170	237
23.		*Bregmaceros*	—	—	—	—	—	—	—	—	—	—
24.		Soles	103	91	79	215	187	220	305	56	680	347
25.	a.	Penaeid prawns	4,307	5,004	8,917	5,145	8,170	9,857	7,152	8,833	6,266	8,031
	b.	Non-penaeid prawns	1,757	1,886	288	437	669	2,842	3,523	2,275	5,109	1,532
	c.	Lobsters	—	—	—	—	—	—	102	3	2	20
	d.	Crabs & other crustaceans	114	97	95	279	364	934	605	329	719	477
26.		Cephalopods	70	663	114	67	61	165	151	242	408	297
27.		Miscellaneous	2,812	1856	2,385	2,596	2,901	4,818	3,552	8,353	4,561	6,021
		TOTAL	77,526	74,459	84,010	84,480	99,544	1,58,818	1,55,638	1,31,321	1,00,756	82,116

Table 9. *Composition of marine fish landings in Tamil Nadu during 1969 to 1978 (In tonnes)*

Sl. No.		Name of fish	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1.		Elasmobranchs	13,030	18,974	16,913	12,960	12,844	23,025	20,614	19,039	18,327	15,121
2.		Eels	263	219	147	47	121	296	110	620	232	325
3.		Catfishes	4,026	7,158	7,219	5,353	9,861	10,322	7,469	5,033	15,205	5,252
4.		*Chirocentrus*	3,950	3,618	2,952	2,320	3,178	1,625	1,811	2,058	2,475	1,736
5.	a.	Oil sardine	18	46	45	146	45	—	—	—	714	36
	b.	Lesser sardines	17,581	16,963	23,562	21,051	26,059	15,430	35,610	25,169	26,259	21,050
	c.	*Hilsa ilisha*	116	15	191	170	10	14	121	22	343	161
	d.	Other *Hilsa*	2,569	2,336	2,804	2,088	1,349	681	1,158	2,331	5,784	4,166
	e.	*Anchoviella*	11,990	7,726	5,162	4,378	9,105	10,745	10,873	7,869	13,388	7,447
	f.	*Thrissocles*	3,395	4,183	4,968	5,278	4,821	4,645	3,127	8,362	3,008	4,719
	g.	Other clupeids	2,397	2,323	2,193	3,107	3,706	2,815	5,406	15,851	2,692	3,043
6.	a.	*Harpodon nehereus*	99	2	13	48	235	—	1	—	14	—
	b.	*Saurida & Saurus*	1,636	1,213	1,395	923	871	1,196	1,026	823	572	1,100
7.		*Hemirhamphus & Belone*	426	813	492	403	675	3,949	1,482	717	1,574	759
8.		Flying fish	3,768	2,103	8,375	1,290	6,221	726	1,657	1,232	526	1,092
9.		Perches	7,590	5,857	5,743	6,350	4,914	8,426	8,153	5,341	7,918	9,241
10.		Red mullets	948	1,164	1,268	1,311	1,010	1,959	1,566	626	832	1,963
11.		Polynemids	1,551	1,921	1,615	906	1,806	877	1,339	1,944	1,592	706
12.		Sciaenids	8,586	10,045	5,495	6,221	10,607	9,943	10,096	10,562	13,756	14,239
13.		Ribbon fish	6,500	6,833	10,897	10,498	9,625	8,369	17,782	19,054	4,594	28,664
14.	a.	*Caranx*	8,642	6,541	8,486	7,109	5,624	5,188	6,225	7,082	6,120	3,104
	b.	*Chorinemus*	1,089	1,218	1,343	1,045	843	1,541	1,090	646	1,465	971
	c.	*Trachynotus*	143	143	11	—	—	2	—	28	73	84
	d.	Other carangids	3	24	24	29	9	2	8	907	22	171
	e.	*Coryphaena*	220	178	41	24	32	77	65	105	58	18
	f.	*Elacate*	218	169	31	280	75	101	87	217	230	239
15.	a.	*Leiognathus*	22,789	27,071	18,913	21,564	22,133	23,906	20,142	29,664	17,783	30,281
	b.	*Gazza*	94	74	5	62	34	28	29	6	54	104
16.		*Lactarius*	1,028	977	640	1348	2,823	722	1,822	775	740	840
17.		Pomfrets	1,647	1,786	834	461	1,705	720	1,303	822	628	789
18.		Mackerel	1,893	2,040	2,983	7,838	8,843	2,639	5,826	10,488	5,674	1,453
19.		Seer fish	2,461	2,926	5,032	6,010	5,763	5,178	4,100	3,784	6,424	4,700
20.		Tunnies	1,368	788	1,044	658	624	1,691	1,785	2,923	3,238	1,169
21.		*Sphyraena*	1,445	1,383	875	997	858	800	1506	1,554	1,702	2,147
22.		*Mugil*	940	769	817	266	1,449	261	1,566	285	923	829
23.		*Bregmaceros*	—	—	—	—	—	—	—	—	—	—
24.		Soles	662	672	689	518	683	1,247	785	909	908	1,580
25.	a.	Penaeid prawns	5,526	4,724	3,637	4,885	4,504	8,060	11,460	8,864	8,197	13,327
	b.	Non-penaeid prawns	288	540	62	148	1,285	46	573	169	159	585
	c.	Lobsters	—	—	—	—	—	—	465	525	286	249
	d.	Crabs & other crustaceans	4,789	4,420	6,059	9,518	7,719	9,752	13,896	16,413	11,018	9,290
26.		Cephalopods	293	77	389	248	426	955	2,953	1,451	1,375	1,042
27.		Miscellaneous	5,899	5,484	7,255	7,297	9,924	7,754	16,128	11,808	19,204	19,107
		TOTAL	1,51,876	1,55,516	1,60,619	1,55,153	1,82,419	1,75,713	2,21,215	2,26,078	2,06,046	2,12,899

Karnataka

A record catch of 1.53 lakhs t. was noticed during 1978 in this state (Table 1) which was due to the increase in the number of purse-seine operations which alone caught about 75,000 t. of fish during 1978. The landings of mackerel, oil sardine, penaeid prawns, silver bellies, other sardines and pomfrets showed an increase of 24,500, 15,600, 5,100, 2,600, 2,400 and 1,700 t. respectively. Table 12 shows the species composition of marine fish landings in Karnataka during 1969 to 1978.

Goa

An increase of 2,400 t. in the total landings was observed during 1978 as compared to 1977 (Table 1). While the catch of other sardines, *Thrissocles* spp., *Caranx* spp., oil sardine and seer fish increased by 1,100, 1,000, 650, 600 and 600 t. respectively, the landings of mackerel declined by about 4,300 t. The species composition of marine fish landings in Goa during 1969 to 1978 is shown in Table 13.

Maharashtra

In Maharashtra, the total marine fish landings increased by about 20,000 t. (Table 1) This was mainly brought about by the higher landings of Bombay duck, the increase in the landings being 18,000 t. The other important groups that contributed to the rise in the landings were penaeid prawns (14,000t.), ribbon fish (4,000 t.), cephalopods (4,00t.) perches (4,000t.), catfish

Table 10. *Composition of marine fish landings in Pondicherry during 1969 to 1978 (In tonnes)*

Sl. No.		Name of fish	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1.		Elasmobranchs	277	436	848	492	322	186	129	165	352	199
2.		Eels	188	17	103	1	2	3	4	6	5	—
3.		Catfishes	139	148	360	72	122	65	55	66	137	168
4.		*Chirocentrus*	185	266	277	153	291	58	50	63	63	111
5.	a.	Oil sardine	—	—	—	—	—	—	—	—	—	—
	b.	Lesser sardines	1,530	1,752	1,807	724	500	1,203	1,046	1,839	1,156	1,184
	c.	*Hilsa ilisha*	—	—	5	—	—	—	31	—	—	—
	d.	Other *Hilsa*	6	74	159	93	157	173	277	121	43	108
	e.	*Anchoviella*	2,284	2,480	697	439	695	692	412	178	548	521
	f.	*Thrissocles*	400	805	338	442	619	519	337	565	405	258
	g.	Other clupeids	513	501	106	141	66	71	50	1	—	281
6.	a.	*Harpodon nehereus*	2	—	—	—	—	—	—	—	—	—
	b.	*Saurida & Saurus*	101	111	276	122	103	26	44	105	103	132
7.		*Hemirhamphus & Belone*	—	1	26	3	—	21	55	2	4	—
8.		Flying fish	218	253	492	42	18	110	142	165	3	480
9.		Perches	234	252	510	277	405	132	389	769	391	487
10.		Red mullets	35	104	132	66	121	76	100	77	32	109
11.		Polynemids	27	26	16	15	20	25	14	26	5	27
12.		Sciaenids	895	481	391	546	626	250	212	434	258	374
13.		Ribbon fish	698	322	96	402	434	236	314	428	143	139
14.	a.	*Caranx*	589	233	1,004	311	227	472	610	501	490	218
	b.	*Chorinemus*	26	3	22	—	—	2	—	2	5	33
	c.	*Trachynotus*	—	—	—	—	—	—	—	—	—	—
	d.	Other carangids	—	—	—	—	—	—	—	—	—	—
	e.	*Coryphaena*	8	1	—	—	3	5	—	7	2	3
	f.	*Elacate*	—	—	7	—	—	—	—	—	1	—
15.	a.	*Leiognathus*	556	661	593	412	546	249	511	482	318	372
	b.	*Gazza*	—	—	—	—	—	—	—	—	7	—
16.		*Lactarius*	77	83	53	17	2	12	30	121	175	—
17.		Pomfrets	127	105	48	67	82	24	13	44	53	50
18.		Mackerel	500	510	650	3,317	2,649	2,317	2,259	1,598	398	179
19.		Seer fish	33	83	76	25	46	68	23	28	34	41
20.		Tunnies	2	2	16	1	—	9	—	1	—	3
21.		*Sphyraena*	14	35	97	3	1	28	27	15	9	25
22.		*Mugil*	—	46	7	15	19	1	31	4	14	26
23.		*Bregmaceros*	—	—	—	—	—	—	—	—	—	—
24.		Soles	36	63	119	65	214	48	125	254	78	109
25.	a.	Penaeid prawns	614	447	289	177	33	27	62	93	103	245
	b.	Non-penaeid prawns	—	—	1	5	8	2	2	—	2	71
	c.	Lobsters	—	—	—	—	—	—	25	33	20	2
	d.	Crabs & other crustaceans	156	92	178	408	194	201	260	516	296	251
26.		Cephalopods	25	9	52	22	20	28	58	211	62	36
27.		Miscellaneous	142	222	603	105	137	359	453	1,203	747	586
		TOTAL	10,637	10,624	10,454	8,980	8,682	7,698	8,150	10,123	6,462	6,828

(3,000 t.) and elasmobranchs (2,000 t.). The landings of non-penaeid prawns, other clupeids and pomfrets, however, declined by about 23,000, 9,000 and 4,000 t. respectively. Table 14 shows the species composition of catch in Maharashtra during 1969 to 1978.

Gujarat

The total landings in this state crossed 2 lakhs t. mark during the year. The catch of Bombay duck, pomfrets, other clupeids, perches, non-penaeid prawns and seer fish registered an increase of 22,000, 6,000, 4,000, 3,000, 2,000 and 2,000 t. respectively. A decline in the landings of ribbon fishes, eels, elasmobranchs, sciaenids, catfish, *Lactarius* and crabs & other crustaceans was also noticed to the extent of 7,000 ,6,600, 6,000, 6,000, 5,000, 4,000 and 2,000 t. respectively. The species composition of marine fish landings in Gujarat for the years 1969 to 1978 is shown in Table 15.

Andamans

The total landings in Andamans showed an increase of about 5,500 t. during 1978 as compared to 1977, which is due to higher input of effort (Table 1). Since the distribution of various species that accounted for 5,368 t. is not available the same is shown under miscellaneous in Table 2. (The landings of penaeid prawns, however, showed an increase of about 200 t.). The species composition of marine fish catch in Andamans for the year 1969 to 1978 is shown in Table 16.

Table 11. *Composition of marine fish landings in Kerala during 1969 to 1978 (In tonnes)*

Sl. No.		Name of fish	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1.		Elasmobranchs	5,759	7,490	4,889	6,986	8,852	10,338	10,292	7,308	5,796	9,302
2.		Eels	9	1	31	5	3	49	12	10	6	38
3.		Catfishes	6,245	16,380	15,189	12,636	17,438	33,526	32,603	12,743	7,947	9,125
4.		*Chirocentrus*	308	877	464	397	544	860	605	807	547	1,298
5.	a.	Oil sardine	1,39,983	1,91,683	1,94,977	1,04,426	1,22,783	1,02,135	97,183	1,23,937	1,17,356	1,19,937
	b.	Lesser sardines	9,485	6,139	11,403	6,790	62,421	31,335	33,652	34,305	20,754	11,713
	c.	*Hilsa ilisha*	—	—	9	19	—	—	10	12	36	182
	d.	Other *Hilsa*	—	13	6	3	39	33	—	—	14	69
	e.	*Anchoviella*	10,846	7,948	10,842	10,672	8,940	19,463	11,432	9,987	10,105	21,203
	f.	*Thrissocles*	1,166	4,610	2,349	2,001	1,663	1,321	1,638	2,732	1,648	1,898
	g.	Other clupeids	1,589	1,566	1,668	1,346	1,158	1,323	998	1,174	512	973
6.	a.	*Harpodon nehereus*	—	—	1	43	45	18	—	—	—	21
	b.	*Saurida & Saurus*	546	1,066	1,395	1,426	1,136	8,839	11,294	99	5,169	6,246
7.		*Hemirhamphus & Belone*	83	30	97	88	185	331	278	141	281	281
8.		Flying Fish	—	3	2	—	1	2	—	1	—	—
9.		Perches	2,340	4,336	3,663	3,939	8,663	20,970	14,741	3,069	14,121	24,989
10.		Red mullets	1,548	279	1,573	2,960	1,537	3,881	23	2,577	240	171
11.		Polynemids	142	22	569	24	570	3	105	122	69	35
12.		Sciaenids	3,195	5,792	4,145	6,137	11,723	9,220	16,811	6,955	11,965	13,045
13.		Ribbon fish	7,446	4,922	17,380	10,459	23,897	30,192	15,175	7,687	7,440	24,207
14.	a.	*Caranx*	3,542	2,563	4,952	14,848	14,283	5,260	7,190	10,478	15,673	7,197
	b.	*Chorinemus*	55	77	49	817	48	72	135	265	540	148
	c.	*Trachynotus*	6	—	6	2	—	—	6	—	7	19
	d.	Other carangids	4	38	3	36	36	73	85	6	78	72
	e.	*Coryphaena*	1	1	1	92	153	94	61	56	28	19
	f.	*Elacate*	51	118	299	76	52	35	62	106	158	166
15.	a.	*Leiognathus*	14,019	16,167	8,609	5,042	18,388	17,518	5,211	2,727	7,708	3,040
	b.	*Gazza*	—	—	21	15	4	5	—	—	—	—
16.		*Lactarius*	1,301	1,443	2,991	3,034	6,663	2,904	983	468	823	1,533
17.		Pomfrets	1,177	693	2,416	1,932	1,809	1,500	1,181	799	3,712	1,614
18.		Mackerel	29,981	54,659	95,164	34,516	19,780	10,335	14,930	19,978	19,968	25,917
19.		Seer fish	1,010	1,731	2,800	1,386	1,690	4,909	4,065	5,936	3,250	3,354
20.		Tunnies	978	1,226	3,043	3,626	2,699	5,927	5,845	12,880	6,705	6,548
21.		*Sphyraena*	339	79	174	1,125	2,333	3,865	396	494	353	721
22.		*Mugil*	64	154	549	91	103	955	74	26	38	1
23.		*Bregmaceros*	—	—	—	—	—	—	—	—	—	—
24.		Soles	10,039	10,212	8,807	6,119	8,551	12,771	6,932	3,567	5,728	7,276
25.	a.	Penaeid prawns	34,334	36,940	31,294	35,866	84,770	59,815	77,207	34,478	40,150	45,034
	b.	Non-penaeid prawns	34	14	1,519	711	981	1,014	755	55	174	394
	c.	Lobsters	—	—	—	—	—	—	31	50	40	38
	d.	Crabs & other crustaceans	435	556	523	158	1,781	2,886	1,797	1,316	4,621	2,176
26.		Cephalopods	164	86	473	350	339	2,175	3,342	872	4,973	6,516
27.		Miscellaneous	6,923	12,966	11,002	15,419	12,208	14,305	43,696	22,824	26,254	16,823
		TOTAL	2,94,787	3,92,880	4,45,347	2,95,618	4,48,269	4,20,257	4,20,836	3,31,047	3,45,037	3,73,339

Lakshadweep

In Lakshadweep, the total landings increased by 565 t. during 1978 as compared to 1977. The landings of tunnies showed an increase of about 700 t. The catch of elasmobranchs and perches, however, declined by about 100 t. and 50 t. respectively. Table 17 shows the species composition of marine fish landings in Lakshadweep during 1969 to 1978.

Major groups of fishes

From Table 2 it is seen that oil sardine contributed to the maximum percentage in the total landings during 1978 recording about 1,68,078 t. (11.98%). The other important groups of species in the order of abundance are penaeid prawns (1,29,204 t.-9.21%), Bombay duck (1,25,481 t.-8.94%), sciaenids (96,379 t.-6.87%), mackerel (85,233 t.-6.07%), ribbon fish (77,785 t.-5.54%), non-penaeid prawns (50,654 t. -3.61%), perches (49,312 t.-3.51%) and silver bellies (41,881 t.-2.98%).

Oil sardine

The landings of oil sardine during 1978 showed an increase of about 18,000 t. as compared to 1977. This was due to higher landings in the states of Kerala, Karnataka and Goa. During the years 1969 to 1978, the oil sardine catch showed wide fluctuations (Table 4 & Fig. 2). A minimum of about 1,27,000 t. was recorded

Table 12. *Composition of marine fish landings in Karnataka during* 1969 *to* 1978 *(In tonnes)*

Sl. No.	Name of fish	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1.	Elasmobranchs	1,130	1,416	2,753	4,587	1,690	2,007	1,726	1,489	3,238	2,051
2.	Eels	8	—	—	8	8	8	81	—	3	8
3.	Catfishes	3,857	9,220	1,331	3,184	2,372	2,011	3,222	4,279	5,162	2,831
4.	*Chirocentrus*	151	124	176	343	219	684	412	184	717	247
5. a.	Oil sardine	33,580	33,834	11,836	15,610	15,495	20,784	52,701	41,451	31,145	46,707
b.	Lesser sardines	3,962	2,034	491	1,563	1,164	228	775	641	180	2,572
c.	*Hilsa ilisha*	1	21	18	785	50	459	1	—	44	9
d.	Other *Hilsa*	29	94	14	5	33	1	10	30	113	30
e.	*Anchoviella*	236	142	97	124	235	51	10	54	174	443
f.	*Thrissocles*	189	1,009	180	575	263	1,079	344	900	831	919
g.	Other clupeids	976	966	365	698	690	957	568	457	1,677	872
6. a.	*Harpodon nehereus*	20	53	10	1	17	5	2	7	4	4
b.	*Saurida & Saurus*	2	75	351	18	—	3	75	187	385	92
7.	*Hemirhamphus & Belone*	161	182	38	27	18	5	36	87	57	41
8.	Flying fish	—	—	—	1	—	—	—	—	—	—
9.	Perches	52	67	132	177	122	203	727	454	1,489	174
10.	Red mullets	—	31	9	65	3	—	3	145	19	31
11.	Polynemids	20	20	1	69	8	16	3	—	3	3
12.	Sciaenids	1,187	1,885	1,313	2,114	1,013	3,208	1,853	3,216	2,762	1,728
13.	Ribbon fish	144	280	330	748	138	303	219	583	237	404
14. a.	*Caranx*	1,585	860	440	516	1,226	771	746	656	760	202
b.	*Chorinemus*	25	—	5	286	12	72	55	80	506	13
c.	*Trachynotus*	—	—	—	—	—	115	49	—	—	3
d.	Other carangids	—	—	—	—	—	11	92	—	41	43
e.	*Coryphaena*	—	—	—	—	—	—	23	—	—	—
f.	*Elacate*	9	11	8	3	220	54	31	32	1	55
15. a.	*Leiognathus*	1,909	1,334	1,321	795	2,659	2,058	1,240	4,086	1,631	4,241
b.	*Gazza*	—	—	—	—	—	—	—	—	—	—
16.	*Lactarius*	292	562	487	899	1,740	1,546	495	216	101	198
17.	Pomfrets	341	354	866	618	1153	303	213	438	249	1,957
18.	Mackerel	13,253	46,337	64,047	32,249	35,468	9,696	12,469	22,455	26,214	50,704
19.	Seer fish	720	1,552	2,506	2,498	1,313	1,532	776	1,341	1,831	1,463
20.	Tunnies	109	4	515	134	124	394	212	576	622	614
21.	*Sphyraena*	5	—	21	32	130	26	14	9	3	276
22.	*Mugil*	64	38	—	12	33	—	8	6	—	1
23.	*Bregmaceros*	—	—	—	—	—	—	—	—	—	—
24.	Soles	325	628	656	1,594	626	2,377	373	637	985	1,820
25. a.	Penaeid prawns	3,980	7,538	4,420	8,058	8,235	12,695	3,074	2,594	3,335	8,422
b.	Non-penaeid prawns	—	1	—	17	1	1	—	—	—	18
c.	Lobsters	—	—	—	—	—	—	12	8	4	39
d.	Crabs & other crustaceans	26	34	1,763	346	934	1,742	2,540	156	207	741
26.	Cephalopods	57	11	7	25	19	20	175	3,067	965	1,346
27.	Miscellaneous	7,388	6,219	7,217	13,892	14,053	10,838	2,129	4,762	11,457	21,538
	TOTAL	75,793	1,16,936	1,03,724	92,676	91,484	76,263	87,494	95,283	97,152	1,52,860

in 1974 and a maximum of about 2,27,000 t. was recorded in 1970. The oil sardine catch during 1978 accounted for 74% of the highest recorded in 1970

Penaeid prawns

During 1978, the penaeid prawns catch recorded an increase of about 33,000 t. Except Gujarat all the maritime states of India recorded comparatively higher landings. The catch of penaeid prawns showed year to year fluctuations from 1969 to 1978 (Table 4 & Fig.3). While a minimum of 72,109 t. was recorded in 1971, a maximum of 1,41,713 t. was seen in 1975. During 1978 the penaeid prawn landings formed 91% of the highest recorded in 1975.

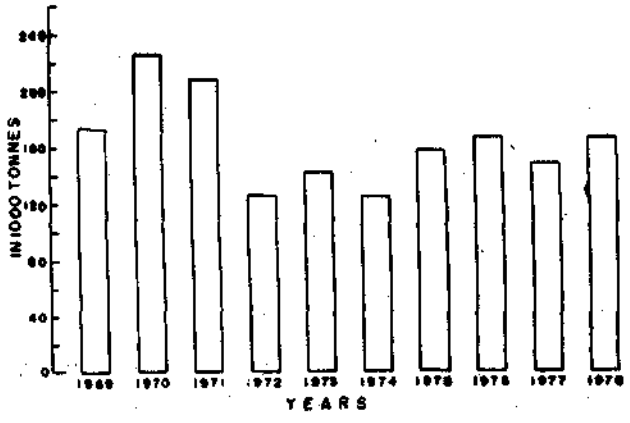


Fig. 2. Landings of oil sardine during 1969 to 1978.

Table 13. *Composition of marine fish landings in Goa during 1969 to 1978 (In tonnes)*

Sl. No.		Name of fish	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1.		Elasmobranchs	138	163	229	299	199	387	572	1,038	625	863
2.		Eels	—	—	—	—	—	—	64	1	—	55
3.		Catfishes	115	85	84	281	230	348	1,367	834	918	1,356
4.		*Chirocentrus*	3	11	13	21	34	78	32	54	32	78
5.	a.	Oil sardine	—	1,134	1,994	3,793	3,426	2,106	7,526	1,385	807	1,398
	b.	Lesser sardines	1,343	2,694	72	2,165	1,272	1,172	3,914	11,100	4,066	5,151
	c.	*Hilsa ilisha*	—	—	—	—	—	—	—	—	—	3
	d.	Other *Hilsa*	—	—	—	—	—	—	—	—	1	2
	e.	*Anchoviella*	35	34	44	123	146	—	31	—	9	5
	f.	*Thrissocles*	—	—	—	—	—	81	123	290	293	1,308
	g.	Other clupeids	50	36	260	8	120	276	419	667	520	645
6.	a.	*Harpodon nehereus*	—	2	2	—	—	—	10	46	20	27
	b.	*Saurida & Saurus*	4	1	—	—	—	1	151	25	239	279
7.		*Hemirhamphus & Belone*	—	—	—	—	—	—	—	8	13	56
8.		Flying fish	—	—	—	—	—	—	—	—	—	2
9.		Perches	4	—	—	26	4	9	45	310	505	781
10.		Red mullets	—	1	—	—	6	34	77	—	—	—
11.		Polynemids	—	4	15	13	13	44	63	—	1	1
12.		Sciaenids	86	97	106	280	171	883	3,048	2,640	2,779	3,256
13.		Ribbon fish	134	60	23	12	48	111	355	1,123	449	504
14.	a.	*Caranx*	2	—	—	4	2	952	1,078	794	1,149	1,803
	b.	*Chorinemus*	1	1	—	—	—	4	—	100	44	56
	c.	*Trachynotus*	—	—	—	—	—	—	—	3	—	—
	d.	Other carangids	—	—	—	—	—	—	—	—	—	—
	e.	*Coryphaena*	—	—	—	—	—	—	—	—	—	—
	f.	*Elacate*	—	—	—	—	—	—	—	—	23	52
15.	a.	*Leiognathus*	471	332	156	287	152	1,420	604	896	458	704
	b.	*Gazza*	—	—	—	—	—	—	—	3	—	—
16.		*Lactarius*	7	14	5	113	170	373	189	338	375	443
17.		Pomfrets	8	15	24	31	24	96	102	100	296	367
18.		Mackerel	23,872	14,585	35,258	19,999	7,616	7,905	6,779	6,448	7,661	3,371
19.		Seer fish	34	36	108	67	66	273	222	501	213	691
20.		Tunnies	—	2	—	—	—	—	2	23	107	300
21.		*Sphyraena*	1	—	—	—	—	—	—	—	—	7
22.		*Mugil*	4	—	—	18	—	5	124	4	46	32
23.		*Bregmaceros*	—	—	—	—	—	—	—	—	—	—
24.		Soles	284	119	64	221	95	196	16	137	335	417
25.	a.	Penaeid prawns	559	627	279	561	785	1,448	1,762	4,643	1,436	1,647
	b.	Non -penaeid prawns	—	—	—	—	—	—	—	—	24	26
	c.	Lobsters	—	—	—	—	—	—	6	3	7	13
	d.	Crabs & other crustaceans	5	5	11	7	20	86	227	971	637	531
26.		Cephalopods	—	—	—	5	—	14	96	142	164	124
27.		Miscellaneous	399	678	1,233	1,770	1,141	1,232	166	341	479	757
		TOTAL	27,559	20,736	39,980	30,104	15,740	19,534	29,170	34,968	24,731	27,111

Bombay duck

Bombay duck landings during 1978 registered an increase of about 40,000 t. as compared to 1977. Maharashtra and Gujarat contributed higher landings during the year. During 1969 to 1978 the landings of Bombay duck showed wide fluctuations (Table 4 & Fig. 4). A minimum of 51,570 t. was recorded in 1972, while a maximum of 1,25,481 t. was recorded in 1978 which is the highest recorded in this decade.

Sciaenids

The landings of sciaenids during 1978 showed a marginal decline of about 3,500 t. as compared to 1977.

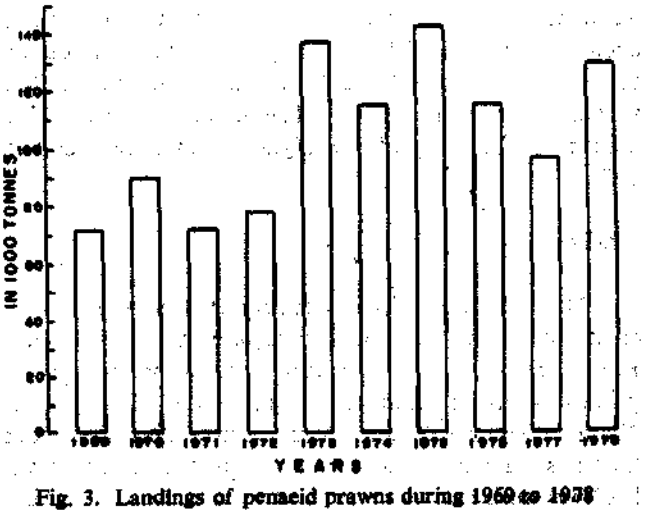


Fig. 3. Landings of penaeid prawns during 1969 to 1978

Table 14. *Composition of marine fish landings in Maharashtra during 1969 to 1978 (In tonnes)*

Sl. No.		Name of fish	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1.		Elasmobranchs	6,835	4,374	4,470	5,937	7,624	6,538	8,167	7,089	7,746	10,072
2.		Eels	2,339	5,396	2,864	3,190	2,026	674	1,101	4,168	3,849	5,384
3.		Catfishes	6,776	10,817	18,052	12,821	9,226	7,240	8,236	9,522	8,318	11,081
4.		*Chirocentrus*	1,655	720	1,207	1,268	2,152	1,135	2,936	2,409	2,634	3,059
5.	a.	Oil sardine	399	300	407	3,593	2,483	1,083	1,699	2,377	108	—
	b.	Lesser sardines	1,223	3,404	1,864	2,877	3,077	1,238	3,103	1,963	1,024	868
	c.	*Hilsa ilisha*	34	—	22	13	89	4	16	154	352	1,558
	d.	Other *Hilsa*	1,012	1,542	1,121	1,399	849	800	1,152	661	978	466
	e.	*Anchoviella*	68	484	990	209	573	272	533	209	269	340
	f.	*Thrissocles*	699	745	1,574	1,236	3,008	869	927	1,276	1,679	1,821
	g.	Other clupeids	8,342	6,493	8,781	9,484	15,018	13,892	21,172	16,944	22,782	13,608
6.	a.	*Harpodon nehereus*	25,171	33,730	33,993	21,246	34,179	29,989	51,645	49,470	50,803	68,781
	b.	*Saurida & Saurus*	283	165	148	577	987	637	218	1,089	1,135	1,815
7.		*Hemirhamphus & Belone*	251	432	127	108	117	33	52	30	32	51
8.		Flying fish	—	1	49	13	1	2	2	—	—	5
9.		Perches	1,694	2,084	853	1,379	3,195	2,111	2,484	1,460	2,973	6,951
10.		Red mullets	675	268	514	1,133	987	701	103	497	171	344
11.		Polynemids	611	3,287	987	2,174	2,333	1,797	1,628	4,125	862	1,909
12.		Sciaenids	10,733	12,906	13,339	11,299	14,319	17,453	20,576	19,781	17,086	17,202
13.		Ribbon fish	4,794	4,968	6,562	8,544	13,363	9,585	9,435	10,052	6,338	10,400
14.	a.	*Caranx*	3,899	4,383	2,280	1,371	804	2,535	2,240	1,179	1,167	1,899
	b.	*Chorinemus*	876	276	87	171	445	179	145	121	230	300
	c.	*Trachynotus*	—	—	—	—	189	5	3	3	—	—
	d.	Other carangids	—	868	134	29	84	4	—	654	—	50
	e.	*Coryphaena*	—	—	—	—	4	9	11	2	—	—
	f.	*Elacate*	1	199	—	6	126	21	15	—	—	—
15.	a.	*Lelognathus*	906	242	231	268	955	473	200	—	358	323
	b.	*Gazza*	—	74	126	—	—	293	293	—	—	—
16.		*Lactarius*	529	585	288	322	760	431	431	643	247	836
17.		Pomfrets	12,776	4,210	5,787	6,858	8,209	6,683	8,351	17,979	17,295	13,050
18.		Mackerel	20,685	17,198	4,650	5,507	2,368	2,587	1,860	1,944	875	787
19.		Seer fish	2,570	1,496	1,509	2,089	1,769	1,434	1,850	2,116	3,220	2,915
20.		Tunnies	123	278	292	294	743	286	274	463	312	1,939
21.		*Sphyraena*	27	—	—	54	21	21	17	50	—	388
22.		*Mugil*	286	74	72	55	65	22	30	191	48	102
23.		*Bregmaceros*	1,684	2,196	4,345	5,488	4,213	1,806	1,043	380	30	21
24.		Soles	410	1,440	904	553	2,737	502	487	1,553	1,245	1,676
25.	a.	Penaeid prawns	14,545	28,920	18,974	20,173	16,894	14,712	24,653	40,772	26,675	41,091
	b.	Non-penaeid prawns	31,235	28,425	74,637	83,952	63,455	50,025	69,012	63,702	66,978	44,255
	c.	Lobsters	—	—	—	—	—	—	245	419	434	607
	d.	Crabs & other crustaceans	144	5,625	979	487	687	973	550	51	93	148
26.		Cephalopods	147	326	368	282	501	298	482	2,488	596	4,557
27.		Miscellaneous	4,283	3,430	1,718	3,543	6,061	5,609	9,242	25,615	15,510	13,585
		TOTAL	1,68,720	1,92,361	2,15,305	2,20,002	2,26,696	1,84,961	2,56,619	2,93,601	2,64,452	2,84,244

An analysis of catch trends during 1969 to 1978 shows a wide flucutation (Table 4 & Fig. 5). While a minimum of 36,903 t. was recorded in 1971, a maximum of 1,14,535 t. was recorded in 1975. The landings during 1978 accounted for 84% of the highest catch recorded in 1975.

Mackerel

The mackerel landings during 1978 showed an increase of about 23,000 t. as compared to 1977. While Kerala, Karnataka and Andhra Pradesh recorded comparatively higher landings of mackerel, Goa, Tamil Nadu, Pondicherry and Maharashtra recorded poor landings. From Table 4 and Fig. 6 it is seen that the landings during 1969 to 1978 showed wide fluctuations.

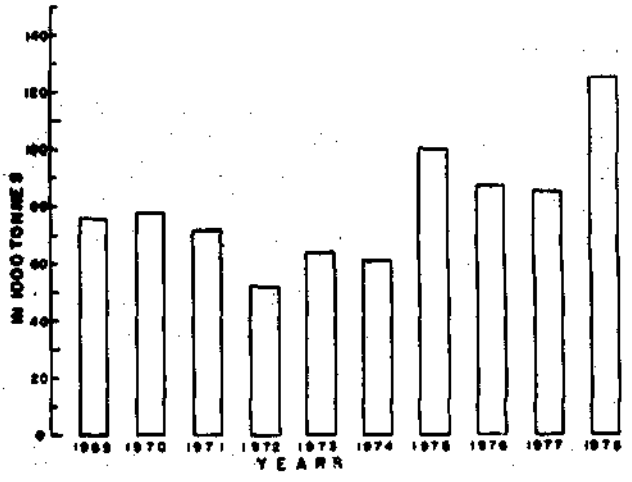


Fig. 4. Landings of Bombay duck during 1969 to 1978

Table 15. *Composition of marine fish landings in Gujarat during 1969 to 1978 (In tonnes)*

Sl. No.	Name of fish	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1.	Elasmobranchs	3,657	5,755	6,249	6,572	3,995	10,227	11,930	7,896	17,565	11,511
2.	Eels	152	963	796	1,124	1,396	2,446	2,497	3,283	8,463	1,886
3.	Catfishes	2,453	4,021	3,570	3,905	2,071	5,548	2,514	2,140	8,958	4,159
4.	*Chirocentrus*	592	905	2,363	2,435	1,295	1,722	2,325	2,155	3,327	1,869
5. a.	Oil sardine	23	—	—	—	—	—	—	—	—	—
b.	Lesser sardines	21	33	43	368	—	—	—	8	—	—
c.	*Hilsa ilisha*	461	658	624	165	48	258	3,394	1,098	329	49
d.	Other *Hilsa*	3,150	4,540	5,405	5,536	6,500	3,292	3,846	3,367	5,547	5,703
e.	*Anchoviella*	—	—	—	9	—	—	130	—	—	—
f.	*Thrissocles*	135	619	217	113	174	239	117	269	105	608
g.	Other clupeids	5,111	4,751	3,372	3,983	1,995	11,557	13,192	11,098	9,458	13,282
6. a.	*Harpodon nehereus*	49,484	43,618	35,680	29,011	27,664	29,675	44,554	34,998	32,289	53,870
b.	*Saurida & Saurus*	—	—	—	1,169	563	1,546	1,267	2,797	42	82
7.	*Hemirhamphus & Belone*	1	2	1	5	2	5	3	101	104	1
8.	Flying fish	—	—	—	—	—	127	—	—	—	—
9.	Perches	265	498	383	1,394	2,403	2,462	3,261	4,641	1,213	4,174
10.	Red mullets	8	—	—	—	1	1	—	680	779	2
11.	Polynemids	159	1,015	2,391	1,626	2,969	5,331	8,832	6,230	268	339
12.	Sciaenids	2,211	3,989	3,433	3,806	40,324	24,275	45,781	28,698	39,968	33,968
13.	Ribbon fish	1,455	1,656	1,145	1,447	938	1,849	1,097	12,341	14,180	6,944
14. a.	*Caranx*	736	371	771	229	242	1,068	1,012	1,642	1,002	270
b.	*Chorinemus*	9	252	—	7	251	95	—	14	401	320
c.	*Trachynotus*	—	—	—	—	—	—	—	—	—	—
d.	Other carangids	—	—	128	214	—	—	14	—	—	—
e.	*Coryphaena*	—	—	—	—	—	—	—	—	—	—
f.	*Elacate*	—	—	—	—	—	—	—	14	—	—
15. a.	*Lelognathus*	8	8	82	—	—	2	1	908	—	—
b.	*Gazza*	—	—	—	—	—	—	—	—	—	—
16.	*Lactarius*	—	—	—	421	765	987	5,379	7,765	7,349	3,360
17.	Pomfrets	5,468	7,978	6,781	4,234	4,249	8,029	5,612	2,116	9,174	15,141
18.	Mackerel	15	—	1	—	—	—	—	—	—	—
19.	Seer fish	1,030	1,043	2,524	2,850	4,110	686	1,879	1,634	2,022	3,734
20.	Tunnies	—	—	1	1	268	579	546	734	332	451
21.	*Sphyraena*	—	—	—	36	29	54	26	9	154	—
22.	*Mugil*	1,006	1,116	1,674	847	1,116	1,291	600	1,097	900	1,264
23.	*Bregmaceros*	—	—	—	—	—	66	—	—	—	163
24.	Soles	86	82	54	392	1,525	1,456	2,991	2,969	729	268
25. a.	Penaeid prawns	2,622	2,653	2,873	2,013	10,550	5,970	13,395	11,497	8,861	7,938
b.	Non-penaeid prawns	651	946	141	218	70	149	2,386	7,778	1,260	3,096
c.	Lobsters	—	—	—	—	—	39	2,105	1,491	424	339
d.	Crabs & other crustaceans	1	—	3	393	749	5	10	224	2,471	584
26.	Cephalopods	1	—	—	3	1	7	611	2,286	1,439	1,959
27.	Miscellaneous	1,277	1,555	1,454	1,320	5,700	24,266	12,468	7,316	10,525	24,595
	TOTAL	82,248	89,027	82,159	75,846	1,21,963	1,45,309	1,93,775	1,71,294	1,89,638	2,01,929

A minimum of 37,462 t. was recorded in 1974 and a maximum of 2,04,575 t. recorded during 1971. The landings in 1978 formed only 42% of the highest catch recorded in 1971.

Ribbon fish

During 1978, the landings of ribbon fish showed an increase of about 35,000 t. Except Andhra Pradesh and Gujarat all the maritime states of India recorded higher landings during the year. The landings during 1969 to 1978 (Table 4 & Fig. 7) showed wide fluctuations, the minimum being in 1970 (26,984 t.) and the maximum in 1978 (77,785 t.) which is the highest recorded in this decade.

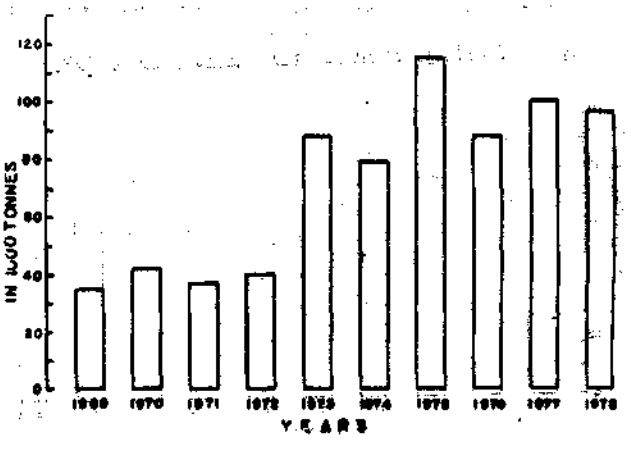


Fig. 5. Landings of sciaenids during 1969 to 1978

Non-penaeid prawns

The catch of non-penaeid prawns during the year declined by about 23,000 t. This was due to reduced landings in the states of Maharashtra and Andhra Pradesh. Some increase was, however, seen in the landings in the states of Gujarat, West Bengal, Tamil Nadu and Pondicherry. From Table 4 and Fig. 8 it is seen that the landings of non-penaeid prawns during 1969 to 1978 showed year to year fluctuations. While a minimum of 31,834 t. was recorded in 1970, the maximum was noticed in 1972 (85,488 t.) The landings during 1978 represented 59% of the highest catch recorded in 1972.

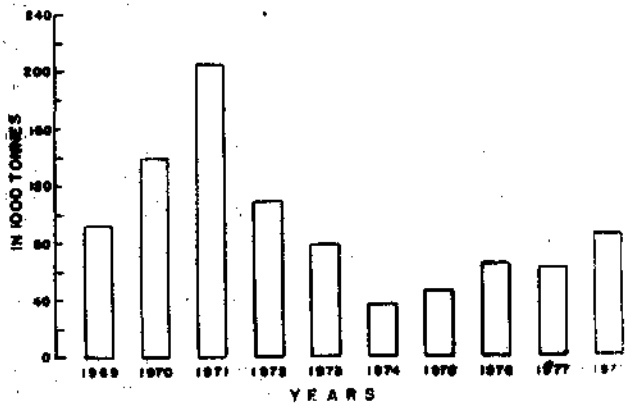


Fig 6. Landings of mackerel during 1969 to 1978

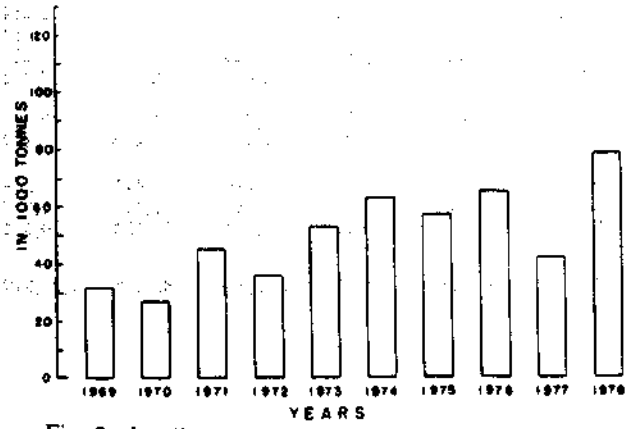


Fig. 7. Landings of ribbon fish during 1969 to 1978

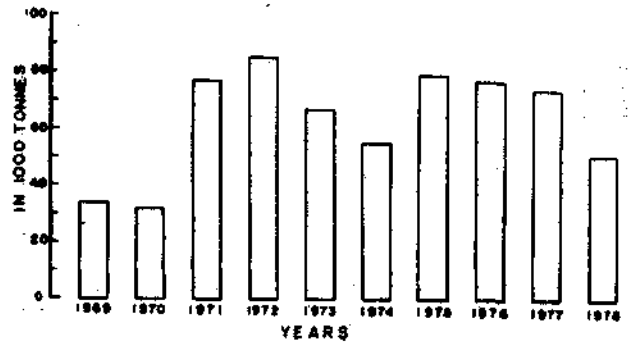


Fig. 8. Landings of non-penaeid prawns during 1969 to 1978

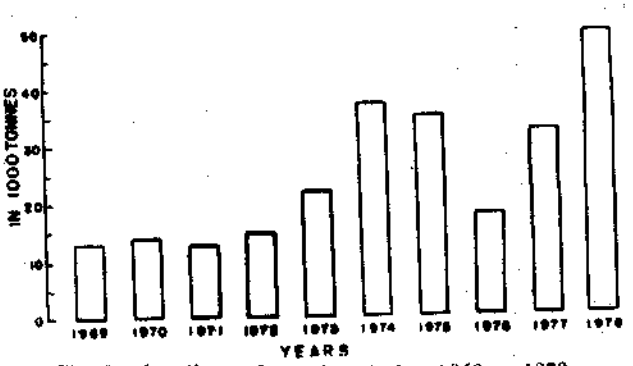


Fig. 9. Landings of perches during 1969 to 1978

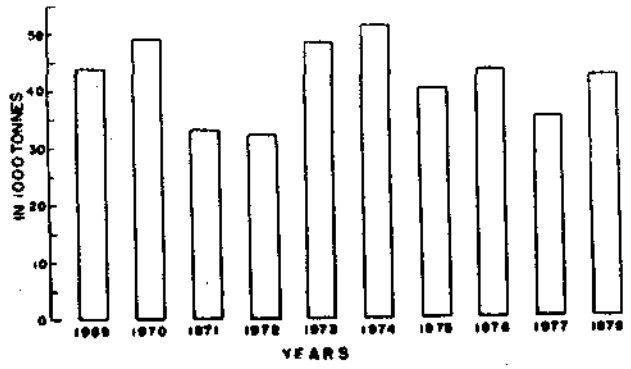


Fig. 10. Landings of silver bellies during 1969 to 1978

Perches

The landings of perches during 1978 recorded an increase of about 17,500 t. as compared to 1977. Except Andhra Pradesh and Karnataka, all the maritime states of India recorded higher landings during the year. The landings during 1969 to 1978 showed fluctuations as seen in Table 4 and Fig. 9. A minimum of 12,865 t. was recorded in 1969 and a maximum of 49,312 t. was registered in 1978.

Silver bellies

During 1978, the landings of silver bellies showed an increase of about 7,000 t. Barring Andhra Pradesh, Kerala and Maharashtra all the maritime states of India registered increased landings during 1978. From Table 4 and Fig. 10 it is seen that the landings showed minor fluctuations from year to year during 1969 to 1978. While a minimum of 32,392 t. was recorded during 1972, a maximum of 51,240 t. was obtained in 1974. The landings during 1978 formed about 82% of the highest recorded in 1974.

Table 16. *Composition of marine fish landings in Andamans during 1969 to 1978 (In tonnes)*

Sl. No.		Name of fish	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1.		Elasmobranchs	18	21	22	18	33	27	48	72	90	89
2.		Eels	—	—	—	—	—	—	—	1	—	—
3.		Catfishes	13	10	14	15	8	14	15	19	28	33
4.		*Chirocentrus*	8	12	11	13	5	18	35	33	38	40
5.	a.	Oil sardine	—	—	—	—	—	—	—	—	—	—
	b.	Lesser sardines	42	46	48	62	67	55	66	86	86	97
	c.	*Hilsa ilisha*	—	—	—	—	—	—	—	—	—	—
	d.	Other *Hilsa*	1	1	6	11	5	7	13	28	25	31
	e.	*Anchoviella*	38	41	36	67	67	53	79	118	103	92
	f.	*Thrissocles*	—	—	—	—	—	—	—	—	—	—
	g.	Other clupeids	16	6	9	12	5	18	9	—	11	18
6.	a.	*Harpodon nehereus*	—	—	—	—	—	—	—	—	—	—
	b.	*Saurida & Saurus*	—	—	—	—	—	—	—	—	—	—
7.		*Hemirhamphus & Belone*	6	9	17	13	10	9	16	35	53	61
8.		Flying fish	—	—	—	—	—	—	—	—	—	—
9.		Perches	75	74	79	87	103	114	157	142	196	234
10.		Red mullets	—	—	—	—	—	—	—	2	4	—
11.		Polynemids	—	—	—	—	—	—	—	—	—	—
12.		Sciaenids	—	—	—	—	—	—	—	5	—	—
13.		Ribbon fish	—	—	—	—	—	—	—	—	—	1
14.	a.	*Caranx*	44	56	64	87	106	81	108	125	134	133
	b.	*Chorinemus*	—	—	—	—	—	—	—	—	—	—
	c.	*Trachynotus*	—	—	—	—	—	—	—	—	—	—
	d.	Other carangids	—	—	—	—	—		—	—	—	—
	e.	*Coryphaena*	—	—	—	—	—	—	—	—	—	—
	f.	*Elacate*	—	—	—	—	—	—	—	—	—	—
15.	a.	*Lefognathus*	23	28	41	54	50	47	80	117	97	89
	b.	*Gazza*	—	—	—	—	—	—	—	—	—	—
16.		*Lactarius*	—	—	—	—	—	—	—	—	—	—
17.		Pomfrets	4	5	10	7	6	11	14	30	30	25
18.		Mackerel	22	23	22	47	100	38	115	77	111	106
19.		Seer fish	32	51	46	75	91	63	85	93	119	127
20.		Tunnies	7	9	12	9	13	7	9	13	37	57
21.		*Sphyraena*	8	13	18	18	13	26	25	49	76	80
22.		*Mugil*	28	53	52	69	80	74	84	101	130	131
23.		*Bregmaceros*	—	—	—	—	—	—	—	—	—	—
24.		Soles	—	—	—	—	—	—	—	—	—	—
25.	a.	Penaeid prawns	8	10	12	12	8	28	28	39	45	265
	b.	Non-penaeid prawns	—	—	—	—	—	—	—	—	—	—
	c.	Other crustaceans	—	—	—	—	—	—	—	—	—	—
26.		Cephalopods	—	—	—	—	—	—	—	—	—	—
27.		Miscellaneous	19	32	50	104	84	230	118	149	119	5,368
		TOTAL	412	500	569	780	854	920	1,104	1,334	1,532	7,077

Table 17. *Composition of marine fish landings in Lakshadweep during 1969 to 1978 (In tonnes)*

Sl. No.		Name of fish	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1.		Elasmobranchs	137	214	120	157	171	253	329	354	296	198
2.		Eels	—	—	—	—	—	—	—	—	—	—
3.		Catfishes	—	—	—	—	—	—	1	—	—	—
4.		*Chirocentrus*	—	—	—	—	—	—	—	—	—	—
5.	a.	Oil sardine	—	—	—	—	—	—	—	—	—	—
	b.	Lesser sardines	4	—	—	—	—	—	—	—	—	—
	c.	*Hilsa ilisha*	—	—	—	—	—	—	—	—	—	—
	d.	Other *Hilsa*	—	—	—	—	—	—	—	—	—	—
	e.	*Anchoviella*	—	—	—	—	—	—	—	—	—	—
	f.	*Thrissocles*	—	—	—	—	—	—	—	—	—	—
	g.	Other clupeids	—	—	—	—	—	—	—	—	—	—
6.	a.	*Harpodon nehereus*	—	—	—	—	—	—	—	—	—	—
	b.	*Saurida & Saurus*	—	—	—	—	—	—	—	—	—	—

(Contd.)

Table 17 *(Contd.)*

7.		*Hemirhamphus & Belone*	15	16	9	19	99	27	29	33	58	144
8.		Flying fish	24	20	14	17	42	43	30	41	30	33
9.		Perches	69	72	43	83	130	159	186	193	211	163
10.		Red mullets	34	33	8	12	36	32	34	58	29	27
11.		Polynemids	—	—	—	—	—	—	—	—	—	—
12.		Sciaenids	—	—	—	—	—	—	2	—	—	—
13.		Ribbon fish	—	—	—	—	—	—	—	—	—	—
14.	a.	*Caranx*	46	32	20	30	63	61	61	94	65	60
	b.	*Chorinemus*	—	—	—	—	—	—	—	—	—	—
	c.	*Trachynotus*	—	—	—	—	—	—	—	—	—	—
	d.	Other carangids	—	—	—	—	—	—	—	—	—	—
	e.	*Coryphaena*	—	—	—	—	—	—	—	—	—	—
	f.	*Elacate*	—	—	—	—	—	—	—	—	—	—
15.	a.	*Lelognathus*	—	—	—	—	—	—	5	—	—	—
	b.	*Gazza*	—	—	—	—	—	—	—	—	—	—
16.		*Lactarius*	—	—	—	—	—	—	—	—	—	—
17.		Pomfrets	—	—	—	—	—	—	—	—	—	—
18.		Mackerel	—	—	—	—	—	—	—	—	—	—
19.		Seer fish	63	58	48	51	29	91	66	87	41	41
20.		Tunnies	665	571	774	514	1,020	1,254	1,932	1,291	1,166	1,875
21.		*Sphyraena*	7	6	7	8	11	18	17	20	15	18
22.		*Mugil*	—	—	—	—	—	—	—	—	—	—
23.		*Bregmaceros*	—	—	—	—	—	—	—	—	—	—
24.		Soles	—	—	—	—	—	—	—	—	—	—
25.	a.	Penaeid prawns	—	—	—	—	—	—	—	—	—	—
	b.	Non-penaeid prawns	—	—	—	—	—	—	—	—	—	—
	c.	Other crustaceans	—	—	—	—	—	—	—	—	—	—
26.		Cephalopods	10	9	13	17	20	15	19	40	23	20
27.		Miscellaneous	119	134	134	172	232	279	224	361	281	201
		TOTAL	1,193	1,165	1,190	1,080	1,853	2,232	2,931	2,572	2,215	2,780

BOOKS

World fish farming: Cultivation and Economics. By E. E. Brown, AVI Publishing Company Inc., West port, Connecticut, pp. 397, 1977.

This is a compilation of contributions from ten authors, describing breifly aquaculture developments in about 28 countries, amply supported by tables and diagrams. It would be more of use to students of fish farming than the actual practitioner. But it would serve as a good introduction for any one who wants to know about localities of fish culture, details of fish production in different areas and possibility of future developments in fish culture.

Culture aspects of 93 species of fish, 7 species of prawns and 6 species of cray fish are discussed. Pond, raceway, fjord, cage, net and other culturing methods are presented. New techniques such as the submersible net cage of Japan are also presented along with illustrations. Data regarding economics such as producer prices, marketing margins and consumer prices are also given which would be useful for private and public aquaculturists and fisheries economists.

Fisheries Mathematics. Edited by J. H. Steele Academic Press, Newyork pp,198, 1977.

This book contains the proceedings of a conference organised at the Marine Laboratory, Aberdeen during November, 1975. A wide range of topics is covered, power computarised marine cartography to fish migration, with the main emphasis on recent mathematical developments related to the management of marine fish resources. Some of these problems concern the effect of fishing on the total stock, while others define the energy requirements of swimming for individual fish, an important component of our understanding of the capture of fish by nets. Theoretical aspects in the design of these nets are also discussed. This broad survey of fisheries mathematics will be of considerable value to marine biologists, marine physicits, applied mathematicians and those interested in mechanics and biomechanies.

NEWS — INDIA AND OVERSEAS

Export of marine products from India during 1978

Sl. No.	Item	Quantity (in tonnes)	Value (in 1000 Rs.)
1.	Frozen shrimp	51,223	17,90,644
2.	Frozen froglegs	3,570	84,251
3.	Frozen lobster tails	691	45,668
4.	Fresh and frozen fish	9,931	63,396
5.	Frozen cuttle fish	979	16,591
6.	Canned shrimp	204	9,149
7.	Dried shrimp	4	75
8.	Dried fish	6,311	32,135
9.	Other items	5,033	79,665
	TOTAL	77,946	21,21,574

Source: The Marine Products Export Development Authority

Deepsea base near Bombay

The Government of Maharashtra plans to build a deepsea fishing harbour at Agardanda, south of Bombay. The project includes a 1000 m jetty and facilities for repairs, ice making, cold storage, freezing and fish meal production. It is expected to be completed in about two years.

The state Government also wants processors now operating at Sassoon Dock to shift to Dighi. The Dock itself is to be expanded by constructing a wharf 350 m long. At present about 400 boats operate from this congested dock daily.

Hermaphrodite trout

Scientists at the National Institute for Agronomical Research in France have succeeded to breed bisexual trout which produce both eggs and sperms, according to a report in New Scientist (January 14, 1978), The breeding process is simple and requires feeding young normal trout with small doses of substances which act on the biological sex differentiation. About 30 percent of those treated became bisexual within two to three years.

Each bisexual trout can produce about 1000 normal trout and experiments are just starting to find out exactly how the process benefit fish farms by giving rise to trout of superior quality.

World Fishing 27 (2): Feb. 1978

Assessment of fish stocks

The present 200–miles Exclusive Economic Zone era is leading to world wide redistribution of fishing effort and a search for new fishing grounds. Not only the big fleets of large trawlers that will be seeking new grounds, but there will be increased level of activity in the small scale fisheries also. Therefore, it is timely that FAO has brought out Technical Paper No. 176 on the subject of fish stock assessment, which is a vital prerequisite to fisheries development, large or small scale.

The paper is entitled "Methods of measuring stock abundance other than by the use of commercial catch and effort data". It describes and evaluates the use of trawl surveys, acoustic estimation, sighting and aerial surveys, egg and larval surveys and tagging in measuring fish stocks. The author is Ulltang of Bergen Institute of Marine Research.

World Fishing 27 (2): Feb. 1978

Sea farming in Soviet Russia

At a National Conference on Farming the Sea held in USSR in early 1978 it was mentioned that over 150 fish farms and associated undertakings are now in operation in the Soviet Union. Culture in sea areas are showing very high production compared to the richest production from traditional fishing grounds. In some of the sea farms the production ranges from 27.5 to 32.5 t. of fish per acre and 5 to 6 kg of mussels per sq. m.

Soviet fish breeders annually place about 1000 million artificially-bred salmon fry into lakes and rivers and also export fry to 23 other countries. Artificially bred Russian salmon introduced into the Barents Sea and White Sea are often caught off the Norwegian and British Coasts. Pacific humpback are hoped to become available in the Baltic Sea.

Mussels are also being farmed in lagoons around the Sea of Azov, and in the Black Sea. The Far Eastern continental shelf has been found to be well suited for the cultivation of trepangs, sea scallops, oysters, shrimps and algae.

World Fishing 27 (7): July 1978.

Compiled and prepared by M. J. George, S. K. Dharmaraja and G. Subbaraju
Published by Dr. M. J. George, Senior Scientist on behalf of the Director, Central Marine Fisheries Research Institute Cochin-682 018