

THE BOMBAY DUCK (*HARPODON NEHEREUS*) FISHERY DURING 1950-72

A. K. KESAVAN NAIR* AND G. BALAKRISHNAN
Central Marine Fisheries Research Institute, Cochin-18.

ABSTRACT

The Bombayduck catch forms about 7% of the total all India landings. 97% of the catches of this fish comes from the coast of Maharashtra and Gujarat. Difference is observed in the pattern of seasonal variations along the Maharashtra and Gujarat coasts though the peak and trough periods for the two states coincide. The annual landings varied between 7 and 128 thousand tonnes during the 1950-72 period. After 1959 the bulk of the fishery appears to have shifted from Maharashtra to the Gujarat coast. During the 1960-72 period, it was the Gujarat catch that determined the trends in the landings of this fish for the country as a whole.

The abundance of Bombay duck along the Maharashtra coast seems to have decreased considerably. On the Gujarat coast the exploitation seems to be less intense. It is possible to increase the yield on the Gujarat coast by increasing the effort. By shifting the fishing effort partly from the Maharashtra to the Gujarat coast and by prolonging the fishing season of the Gujarat coast (which at present is relatively short), it will be possible to reduce the fishing pressure on the Maharashtra coast and to expand the fishery of the Gujarat Coast.

INTRODUCTION

In India, among the commercially important fishes, Bombay duck (*Harpodon nehereus*) ranks next only to oil sardine and mackerel, the annual average catch during 1968-72 being about 72,000 tonnes, forming 7% of the total all-India marine fish landings. The average annual landings of this fish is worth about Rs. 75 million, when valued at Re. 1 per kg. Outside India, Bombay duck forms a fishery on the east coast of Africa, Malaya, Indonesia and China (Rao 1969). Maharashtra and Gujarat together contribute 97% of the total Bombayduck catch (average for the period 1968-72). At present the fishery is not found along the coasts of Karnataka, Kerala and Tamil nadu. Thus, it has a discontinuous distribution. As explained by Bapat (1970), the factors responsible for the discontinuous distribution of this fish, as indicated by various authors, are: (i) the distribution and movements of the favourite food organisms (ii) the variations in salinity along the coasts of India and (iii) the

* Present address: Central Institute of Fisheries Technology, Cochin-2.

fluctuations in the surface temperature of sea water. According to him, the surface temperature is the principal factor governing the distribution of Bombay duck in India.

The annual landings of Bombay duck do not show large fluctuations, especially after 1960. In the sixties, the fishery stabilized around 75-80 thousand tonnes. The catch per unit of effort has decreased progressively and the average size of the fish in landings has decreased (CMFRI 1972). It is, therefore, necessary at this stage to examine the level of fishing in relation to the stock. Nair (1970) has discussed the trend of this fishery by fitting a second degree curve and has indicated a declining trend. The involvement of gears of different size and crafts of different types, makes it very difficult to obtain a standard unit of effort, and make a satisfactory assessment of the stock at this stage. In this communication the annual landings of this fish from 1950 to 1972 are presented and the possibility of developing the fishery is discussed.

METHOD OF COLLECTION OF DATA

The continuing sample surveys of the Central Marine Fisheries Research Institute give statewise annual landings of this fish from 1950 onwards. The method of collection of data which is the same for all fishes has already been given by Krishnan Kutty *et al* (1973) and Nair *et al* (1973). The quarterwise landings used in this paper are also taken from the CMFRI survey reports. These figures for the years 1950-68 have already been published (CMFRI 1969).

THE SEASONAL VARIATIONS

Table 1 gives the quarterwise landings of Bombay duck from 1968 to 1972. From this, the landings are found to be the highest in the fourth quarter (October-December) and the lowest in the third quarter (July-September) both in Maharashtra and Gujarat. In Maharashtra, the landings in the second quarter (April-June) are found to be higher than those in the first quarter (January-March) and in Gujarat it is just the reverse. A movement of the fish from North to South towards the closure of the season i.e., April-June, may possibly be a reason for this.

ANNUAL VARIATIONS

Fig. 1 gives the annual landings of this fish from 1950 to 1972. During this period, the lowest catch was recorded in 1957 (7,000 tonnes) and the highest in 1956 (about 128,000 tonnes). The fishery showed some fluctuations till 1960; but after this year the landings declined for two or three years and then stabilized. After the fifties, the lowest catch was recorded in 1972 (51,000 tonnes). It can be seen that prior to 1960, the landings from the Maharashtra coast were greater in magnitude than those from the Gujarat coast for almost all the years. The average annual landings for the 1950-59 period were 32,000

TABLE 1. *Quarterwise landings of Bombay duck in Maharashtra and Gujarat during 1967-1972.*

(Figures in tonnes)

Year	Region	Period				Total
		First quarter	Second quarter	Third quarter	Fourth quarter	
1967	Maharashtra	2,028	5,846	2,925	17,324	28,123
	Gujarat	9,483	354	1,393	33,076	44,806
1968	Maharashtra	1,436	5,385	1,604	17,279	25,704
	Gujarat	9,733	1,056	2,007	40,880	53,676
1969	Maharashtra	947	5,260	1,172	17,792	25,171
	Gujarat	13,408	4,901	1,343	29,832	49,484
1970	Maharashtra	1,691	2,105	5,725	24,209	33,730
	Gujarat	17,204	3,839	409	15,166	43,618
1971	Maharashtra	2,836	1,316	7,795	22,046	33,993
	Gujarat	10,052	1,530	69	24,029	35,680
1972	Maharashtra	2,422	1,354	3,825	13,645	21,246
	Gujarat	2,879	432	198	25,502	29,011

tonnes for Maharashtra and 25,000 tonnes for Gujarat (Table 2). During the 1960-72 period the Gujarat landings have exceeded the Maharashtra landings in all the years. Consequently, while before 1959, it was the Maharashtra catches that determined the trends in the all India landings of Bombay duck, after this year it has been the Gujarat landings that determined the trends in the yield of landings for the country as a whole.

TABLE 2. *Average annual landings in tonnes.*

Region	Period	
	1950-59	1960-72
Maharashtra	32,000	27,000
Gujarat	25,000	52,000
All India	60,000	80,000

Fig. 2 shows the percentage contribution of Gujarat and Maharashtra to the all-India landings of the Bombay duck. While Gujarat's contribution varied from 25% (in 1950) to 73% (in 1964), Maharashtra's varied from 26% (in 1963 and '64) to 73% (in 1952). The lower percentage values occurred during the earlier years for Gujarat and during the later years for Maharashtra showing again that the magnitude of the fishery is greater on the Gujarat coast than on the Maharashtra coast.

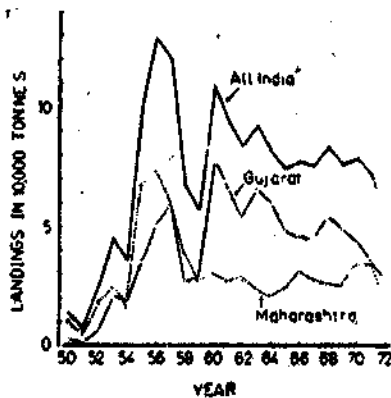


FIG. 1. Annual marine fish landings in India, Maharashtra and Gujarat.

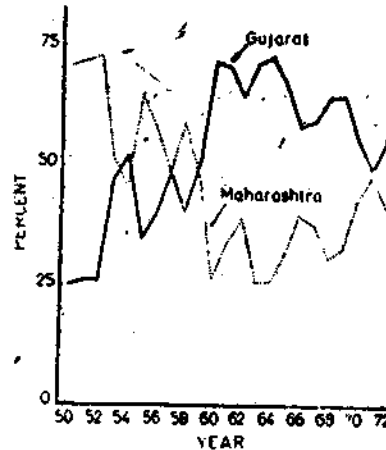


FIG. 2. Contributions (in percent) of Maharashtra and Gujarat states to the annual Bombayduck landings in India.

DISCUSSION

From Table 2 which gives the average annual landings and from the percentage contributions of Maharashtra and Gujarat during the earlier (1950-59) and later (1960-72) periods, it is found that while there was a slight decline (about 16%) in the average annual landings in the 1960-72 period in Maharashtra, there was almost a two-fold increase in Gujarat. The average landings for the country during 1960-72 exceeded that during 1950-59 by about 20,000 tonnes which was due to the increased quantities landed on the Gujarat coast. The reasons for the increased landings on the Gujarat coast when no such increase was seen on the Maharashtra coast is to be investigated.

The percentage of Bombay duck catch in the annual landings is plotted against the total annual landings in Fig. 3. It is found that as the total catch in Maharashtra and Gujarat increases, the percentage of Bombayduck catch decreases. Though a straight line may not be an adequate fit due to the sharp fall in the total catch after 1970, a relationship between the two exists. From

the figure it can be seen that the percentage contribution of Bombay duck in the total catch began to fall from 1969 onwards. In 1971 and 72, the fall was steeper. The decrease in the percentage contribution also coincided with an increase in the total catch. On making similar plots separately for Maharashtra and Gujarat (Figs 4 & 5) it is found from Fig. 4 that in Maharashtra the percentage contribution decreased when the total catch increased as in Fig. 3. In this State an increase in the total catch has not resulted in a proportionate increase in the

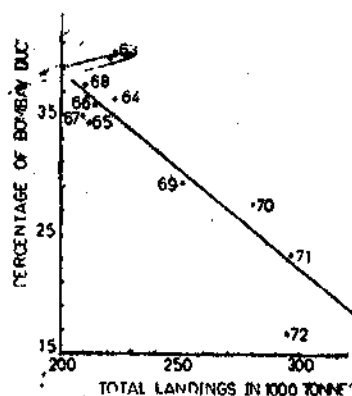


FIG. 3. The relationship between the percentage of Bombay duck in the total and the total landings in Maharashtra and Gujarat.

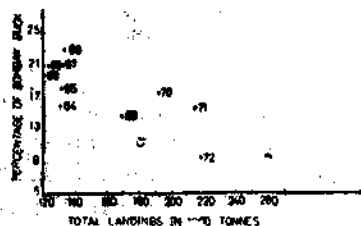


FIG. 4. The relationship between the percentage of Bombay duck in the total and the total landings in Maharashtra.

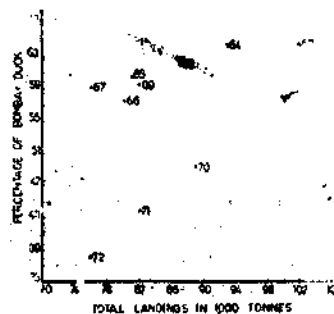


FIG. 5. The relationship between the percentage of Bombay duck in the total and the total landings in Gujarat.

Bombayduck catch. On the other hand, Fig. 5 shows that in Gujarat, the percentage of Bombay duck has increased with the total catch in general. The figure shows that the plotted points form two distinct groups, one for the period 1964-69 and the other for 1970-72. As the two sets of points are found to lie on either side of two straight lines, two arbitrary straight lines are fitted to these

points. For the 1970-72 period the total landings show a continuous decrease. The percentage contributions are all above 57% for the 1964-69 period and all below 50% for the 1970-72 period. However, as the slope of the second straight line is greater than that of the first one, the rate of increase in the percentage contributions for an increase in the total catch is relatively greater for the 1970-72 period than that for the 1964-69 period.

In Maharashtra and Gujarat, as such pelagic fishes like the oil sardine and the mackerel are not present, an increase in the total catch requires an increase in the effort. This is so because when more effort is applied even when a particular fish is not available it is possible to catch some other species. In other words, it is possible to take the total catch as an approximate index of effort. Thus, the fact that the ratio of the Bombay duck catch to the total catch decreases when the total catch increases (Fig. 4) shows that fishing is affecting the stock along the Maharashtra coast. From 1969 onwards, a rapid expansion in the fishery can be noted from the increased total landings on this coast. It can be seen that the catch of all fishes increased from 124,000 tonnes in 1968 to 169,000 tonnes in 1969 (an increase of about 36%) and there after kept up this trend. The average for the 4-year period 1965-68 is 130,000 tonnes and for the 1969-72 period, 200,000 tonnes which shows an increase of about 54%. Bapat and Alawani (1973) too have pointed out that fishing is intense on the Maharashtra coast (for a period of 8-9 months a year) and that a marginal decrease in the catch per unit of effort in Bombayduck fishery is observed on this coast. As another symptom of possible overfishing they have indicated that the percentage of mature fish in the catches of Versova (one of the important fish landing centres on the Maharashtra coast) has declined.

On the Gujarat coast the situation is different. Here, as the total catch has steadily decreased, it can be inferred that the effort put in has also decreased. This is further supported by the fact that there is a natural protection for the fishery for 6-8 months in Gujarat because, along this coast the fishery is mainly operated for 4-6 months (Bapat and Alawani 1973). Thus, it appears that though there is a possible overfishing on the Maharashtra coast, it is possible to develop the Bombayduck fishery along the Gujarat coast. A shifting of the fishing effort from Maharashtra to the Gujarat coast will help reduce the fishing pressure on the former coast and intensify the fishing on the latter. The question of extending the fishing season on the Gujarat coast from 4-6 months is also to be considered, as at present the fishing season on the Gujarat coast is relatively short.

ACKNOWLEDGEMENT

We are grateful to Dr K. V. Sekharan for the modifications suggested and to Dr R. V. Nair, Director of the Institute for encouragement.

REFERENCES

- BAPAT, S. V. 1970. The Bombay duck, *Harpondon nehereus* (Ham.). *Bull. Cent. Mar. Fish. Res. Inst.*, 21: 1-66.
- BAPAT, S. V. AND S. A. ALAWANE. 1973. The Bombay duck fishery of Maharashtra with special reference to Versova. *Indian J. Fish.* 20 (2): 562-574.
- C.M.F.R.I. 1969. Marine Fish Production in India. *Bull. Cent. Mar. Fish. Res. Inst.*, 13: 1-144.
- C.M.F.R.I. 1972. 25 years of marine Fisheries Research. Hand book released on the occasion of the Silver jubilee of the Central Marine Fisheries Research Institute.
- KRISHNAN KUTTY, M., A. K. KESAVAN NAIR AND S. Z. QASIM. 1973. An evaluation of the sampling design adopted by the Central Marine Fisheries Research Institute for estimating marine fish production of India. *Indian J. Fish.*, 20: (1): 16-34.
- RAO, K. VIRABHADRA. 1969. Distribution pattern of the major exploited marine fishery resources of India. *Bull. Cent. Mar. Fish. Res. Inst.*, 6: 1-69.
- NAIR A. K., KESAVAN, K. BALAN AND B. PRASANNA KUMARY. 1973. The fishery of the oil sardine (*sardinella longiceps*) during the past 22 years.
- NAIR, R. V. 1970. Is there overfishing of our inshore fishery resources? *Seafood Export Journal* vol. VII No. 4.