

PRELIMINARY OBSERVATIONS ON THE FISHERY OF BOMBAYDUCK
HARPODON NEHEREUS IN THE GULF OF KUTCH

MOHAMMAD ZAFAR KHAN

Veraval Research Centre of C.M.F.R. Institute, Veraval.

ABSTRACT

The fishery for Bombayduck in the Gulf of Kutch is well organised and is conducted on the pattern of that of Bombay and Saurashtra coasts. The total Bombayduck landings from the gulf are estimated between 8,000 to 10,000 tonnes; the major landing centres being Modhwa, Navinar, Bhadreswar and Takkara. The boats engaged are Machchwa type and nonmechanised. The bag net, locally known as 'Gunja,' is used, which is similar to the 'dol' net. Raciation studies on samples from Kutch and Jaffrabad revealed that the fish from these places differ significantly in 6 morphometric characters.

INTRODUCTION

All-India total landings of the species *Harpodon nehereus* was 87,075 t in 1977, of which Maharashtra and Gujarat contributed over 95%. However, the catch from Kutch region was not included in the all-India estimate of fish landings.

The fish exhibit discontinuous distribution. Three stocks of Bombayduck have been recognised so far, two on the west coast and one on the east coast (Bapat 1970). A number of workers have contributed on various aspects on the fishery and biology of the species. Setna (1939 and 1949) and Gokhale (1957) gave an account of the craft and gear and the fishing methods in the Bombay and Saurashtra regions. Raj (1954) studied the peculiar distribution of the fish in relation to the 80°F of isotherm of July and the monsoon condition prevailing in the area. A comprehensive review of the fishery and biology of the fish was done by Bapat (1970). Based on the results of fishing of 'Sagar Pravasi' of Directorate of fisheries, Gujarat, Gokhale (1957) reported the occurrence of Bombayduck in commercial quantities in the Gulf of Kutch, between 3 to 15 fathoms. But there was no organised fishing for Bombayduck in the region till 1973.

A visit to the fishing villages in the Gulf of Kutch was therefore made, during second fortnight of January 1978, to evaluate the magnitude of Bombayduck fishery in the region. The fishery is found to be more or less well organised and conducted on the pattern of Bombay and Saurashtra coasts. Earlier, the fishing was confined to intertidal zone.

OBSERVATION AND CONCLUSION

The fishing for Bombayduck is conducted on a regular basis, by the fishermen of the villages, Salaya, Modhwa, Lajja, Navinar, Sikkadia, Jarpara, Luni, Bhadreshwar, Vandi, Sangad, Tuna and Takkara, in the Kutch region (Fig. 1), from four landing centres, viz, Modhwa, Navinar, Bhadreshwar and Takkara. Navinar and Takkara are difficult to approach. The fishermen are illiterate Muslims with poor socio-economic conditions.

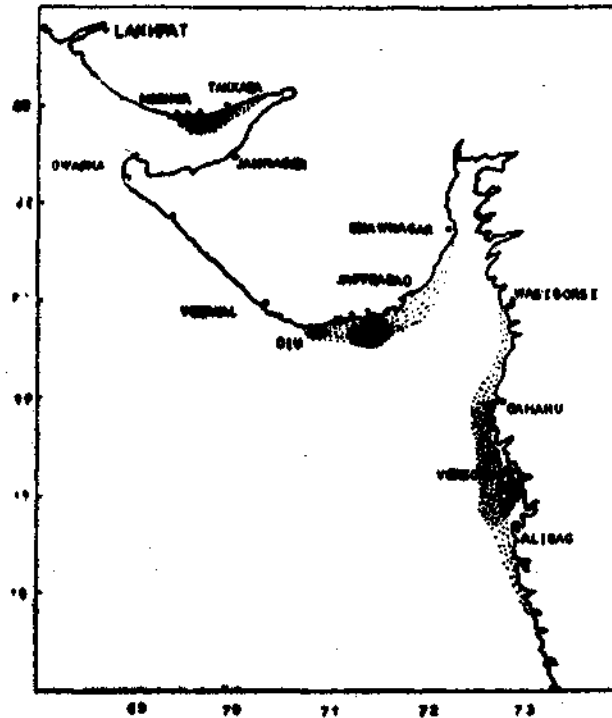


FIG. 1. Map of Maharashtra-Gujarat coasts showing Bombayduck fishing areas (dotted portions).

Craft and Gear: A total of 250 boats are under operation. Most of the boats are Machchwa type, nonmechanised, in the range of 2-3 tonnes.

The bag net used in the fishery is made up of polyethylene monofilament plastic twine. They are 20-25 fathoms in length. The floats used are of hard plastic instead of wooden barrels as used in Bombay and Saurashtra coasts. The number of floats depends upon the length of head rope. The net is tied to anchors weighing 120 Kg on each side. No cotton net is in use in this region in contrast to Bombay and Saurashtra coasts, where the cotton nets are still in

vogue. This probably indicates that the Bombayduck fishery off the Kutch region is of recent origin and rather sophisticated than that of Bombay and Saurashtra coast.

Fishery: There is no fishing during neep tide, and hence, fishing is restricted to 20 days in a month. The fishing activity is confined to a narrow belt of 5-10 fathoms at Modhwa, while at Bhadreshwar and Takkara it is extended up to 15 fathoms. Four hauls are taken a day at Modhwa, where the catch is brought to the shore after every haul as the fishing is close by. But at Bhadreshwar and Takkara two to four hauls are brought back at a time. The fishing season generally extends from October to March.

An estimated catch of 13,500 Kg and 28,000 Kg of Bombayduck were landed at Modhwa and Bhadreshwar, respectively, on the observation day. A total of 397 fish were measured. The size composition, average size of the fish and average weight of hundred fish are given in Table 1. The juvenile fish in the size group of 30-90 mm were abundant at Bhadreshwar (73%), compared to Modhwa (45%).

Based on observations and enquiries, a total of 8,000 to 10,000 tonnes of Bombayduck was estimated to land per year from the Gulf of Kutch region, which is, however, a conservative estimate.

Morphometric and meristic studies: Thirty fish in the size group of 191-210 mm were taken for racial studies from Kutch and Jaffrabad. Among the various characters, 10 morphometric and 2 meristic characters were taken into consideration for the analysis.

The difference between the two means of a single morphometric character from each population was analysed by 't' test, to interpret the significance of difference between the two populations.

An estimated pooled variance $(\delta)^2$ was obtained from the two samples for each characteristic by using the following formula.

$$\begin{aligned} \text{Pooled Variance } (\delta)^2 &= \frac{\sum (MR_1 - IR_1)^2 + \sum (MR_2 - IR_2)^2}{N_1 + N_2 - 2} \\ &= \frac{\sum (MR_1 - IR_1)^2 + \sum (MR_2 - IR_2)^2}{2(N-1)} \end{aligned}$$

Where $N_1 = N_2 = N$

MR_1 indicates the mean value of characteristics in the samples from Kutch region.

MR_2 indicates the mean value of characteristics in the samples from Jaffrabad region.

IR₁ indicate the individual readings of the characteristics in the samples from Kutch region.

IR₂ indicates the individual reading of the characteristics in the samples from Jaffrabad region.

N indicates the number of observations which are equal in both the places.

TABLE 1. *Size composition of Bombayduck during January, 1982.*

Size groups (mm)	Centres			
	Modhwa		Bhadreshwar	
	No.	%	No.	%
30-45	7	3.2	18	9.8
45-60	63	29.3	88	48.1
60-75	20	9.3	17	9.3
75-90	8	3.7	11	6.0
90-105	1	0.4	3	1.6
105-120	—	—	4	2.2
120-135	1	0.4	1	0.5
135-150	—	—	2	1.1
150-165	—	—	2	1.1
165-180	1	0.4	—	—
180-195	1	0.4	1	0.5
195-210	5	2.3	7	3.8
210-225	13	6.0	10	5.5
225-240	43	20.0	12	6.6
240-255	23	10.7	5	2.7
255-270	16	7.4	2	1.1
270-285	8	4.9	—	—
285-300	3	1.4	—	—
300-315	1	0.4	—	—
Total	214	—	183	—
Average size (mm)	156	—	94	—
Weight of 100 fish (Kg)	4.556	—	1.215	—

Further, the 't' value was computed by using the following formula.

$$t = \frac{MR_1 - MR_2}{\delta \sqrt{\frac{1}{N_1} + \frac{1}{N_2}}} = \frac{MR_1 - MR_2}{\delta} \sqrt{\frac{N}{2}}$$

Where $N_1 = N_2 = N$

The 't' will have $N + N - 2$ degree of freedom.

The 'p' values obtained for the 12 characters from 't' distribution table are given in Table 2. The data indicate that the two populations are significantly different with reference to the six morphometric characters. Among the six characters, length from snout to anus and diameter of eye are highly significant ($P < 0.01$); depth at caudal peduncle, interorbital space and total length are significantly different ($P < 0.05$); the difference in depth of body at the origin of anal fin is most significant ($P < 0.001$). No significant difference however is noticed in respect of the other characters.

TABLE 2. Showing the mean value of the different characteristics at the two regions along with the results of the test of significance.

Characteristics	Mean value (mm)		Results of the significance different between the mean value at the two regions 'p' value.	Significant/ Not significant
	Kutch	Jaffrabad		
Total Length	241.8	251.2	$P < 0.05$	Significant at 5% level
Length from snout to anus	146.2	152.26	$P < 0.01$	Significant at 1% level
Length from snout to first dorsal fin	84.86	86.53	$P > 0.05$	Not significant
Length from snout to second dorsal fin	164.4	166.73	$P > 0.05$	Not significant
Diameter of eye	3.6	4.0	$P < 0.01$	Significant at 1% level
Interorbital space	10.1	10.73	$P < 0.05$	Significant at 5% level
Depth of body at caudal peduncle	11.73	12.33	$P < 0.05$	Significant at 5% level
Depth of body at origin of anal fin	22.6	24.7	$P < 0.001$	Significant at 0.1% level
Length of lower jaw	36.5	37.7	$P > 0.05$	Not significant
Length of Head	45.3	46.6	$P > 0.05$	Not significant
Number of dorsal fin rays	12.2	12.1	$P > 0.05$	Not significant
Number of anal fin rays	14.47	14.26	$P > 0.05$	Not significant

The above findings suggest that the population of Kutch and Saurashtra coasts may belong to two different stocks, which is not improbable due to the distance which separates the two regions. It has already been observed that the greater the distance between two places of occurrence, the more the number of characters (Bapat 1970) that differ significantly. However, a detailed study on the fishery, biology and composition of the stock is needed for understanding the size and character of the resource.

ACKNOWLEDGEMENT

I am grateful to Dr. S. V. Bapat, Joint Director, and Shri K. V. Narayana Rao, Head of Fishery Biology Division, Central Marine Fisheries Research Institute, Cochin - 18, for critically going through the manuscript and suggesting improvements. Thanks are also due to Shri P. K. R. Nair, Superintendent of Fisheries, Bhuj, and Shri K. C. C. Nair, Fisheries Assistant, Mandavi, for their help during the field investigations.

REFERENCES

- BAPAT, S. V. 1970. The Bombayduck, *Harpodon nehereus* (Ham). *Bull. Cent. Mar. Fish. Res. Inst.*, 21: 1-66.
- DOWNIE, N. M. AND R. W. HEATH. 1970. *Basic statistical methods*. Harper & Row, Publisher, Inc. New York: 167-187.
- GOKHALE, S. V. 1957. Operation of the 'dol' net of the Saurashtra coast. *J. Bombay nat. Hist. Soc.*, 54: 714-725.
- RAJ, B. S. 1954. The problem of the apparent discontinuous distribution of *Harpodon nehereus* (Ham). *Proc. Indian Acad. Sci.* 40: 58-68.
- SETNA, S. B. 1939. Marine Fisheries of the province of Bombay. *J. Bombay nat. Hist. Soc.*, 41: 340-368.
- SETNA, S. B. 1949. Bombay fisherman's ingenuity. *J. Bombay nat. Hist. Soc.*, 48: 444-453.