

DETERMINATION OF THE RELATIVE FISHING POWERS (POWER FACTORS) OF THE VESSELS OF THE GOVERNMENT OF INDIA DEEP SEA FISHING STATION, BASED AT BOMBAY.

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INTRODUCTION

The Government of India Deep Sea Fishing Station at Bombay and the Offshore Fishing Stations at Veraval, Mangalore, Cochin, Visakhapatnam and Tuticorin have been employing in the exploratory fishing operations different types of power vessels which vary greatly in their gross tonnage, net tonnage, brake horse power, length of body, draught etc. even though most of them use more or less the same or similar types of otter trawls. It is well known that, suitably geared a larger boat would generally bring about a greater fishing mortality than a smaller one in a unit amount of time when fishing in the same ground. The capacity of a vessel to catch more or to catch less as compared with another vessel is independent of the density of the population and is related in some way to the makeup of the vessel itself. In computing catch statistics of different vessels, 'standardisation of fishing time according to their fishing powers' (Beverton and Holt 1957, P. 172) being essential, the present work has been attempted based on available data from the exploratory fishing operations of the vessels *viz.*, 'Jheenga', 'Bumili' and 'Meera' from Bombay.

VESSELS, GEAR AND CATCH DATA PERTAINING TO SIMULTANEOUS OPERATIONS

'Jheenga' and 'Bumili' are motor fishing vessels, the former of 48.67 gross tonnage, 15.7 net tonnage, 51.2' length, 17.5' beam and 6.0' draught, with a diesel engine of 153 BHP; and the latter 34.5 of gross tonnage, 10.01 net tonnage, 47.4' length, 16.74' beam and 5.52' draught with a diesel engine of 135 BHP. 'Meera' is a motor launch 9.95 gross tonnage, 5.75 net tonnage, 34' length, 10.95' beam and 3.7' draught with a diesel engine of 60 BHP.

During the period for which the data have been presented here, 'Jheenga' was operating 13, 14, 15 m. Russian trawls and 14, 15, 16 m. D.S.B. Indian trawls; 'Bumili' 13, 14 m. Russian trawls and 13, 14 m. D.S.B. Indian trawls; 'Meera' 13, 14 m. Russian trawls and 11, 12, 13 m. D.S.B. Indian trawls. All these are otter trawls and there is no marked difference between any one type and another in their mode of operation.

'Jheenga' being a bigger vessel, of higher BHP, of higher tonnage and of steadier performance has been chosen as the standard vessel with which the other

two have been compared for ascertaining their relative fishing powers or their power factors. The ratio of the catches obtained in 100 hours of fishing effort by each of the different vessels operating in the same area at the same time is considered to represent their relative power factors (Beverton and Holt *loc. cit.* P. 173). No experimental trawling has been undertaken exclusively for this study, but all instances of simultaneous fishing in the same areas in the same months either by all the three vessels or any two of them have been taken from the

TABLE I

Catch data of simultaneous fishing operations, 1962-64

Year/Month	Area	'Jheenga'		'Bumili'		'Meera'	
		Catch kg. (C.P.H.)	Effort in hrs.	Catch kg. (C.P.H.)	Effort in hrs.	Catch kg. (C.P.H.)	Effort in hrs.
1962	18-72:6D	804	9.92	4775	32.00	7328	49.16
January	6E	(81.00)		(149.20)		(149.00)	
		490	2.25	425	2.00	106	1.00
		(217.70)		(212.50)		(106.00)	
	5D	1291	7.34	2567	13.16	1729	13.25
		(175.80)		(195.10)		(130.50)	
	5E	..	..	406	3.50	308	2.00
				(116.00)		(154.00)	
February	19-72:3A	1186	9.00	82	2.00	..	..
		(131.80)		(41.00)			
	3B	223	2.00	119	2.00	..	..
		(111.50)		(59.50)			
	2B	2449	16.00	880	6.00	..	..
		(153.10)		(146.60)			
	2C	2246	13.50	2105	14.50	..	..
		(166.40)		(145.20)			
1C	2760	16.50	2067	10.00	..	..
	(167.30)		(206.70)				
	18-72:6C	1259	8.50	281	2.00	..	..
		(148.10)		(140.50)			
	6D	965	6.00	2006	19.16	7992	47.92
		(160.80)		(104.70)		(166.70)	
	6E	..	..	61	2.00	1115	5.25
				(30.50)		(212.30)	
March	19-72:1C	939	3.25	316	2.00	..	..
		(288.92)		(158.00)			
	1D	434	1.50	..	..	240	1.25
		(289.33)				(192.00)	

TABLE I—Contd.

Year/Month	Area	'Jheenga'		'Bumili'		'Meera'	
		Catch kg. (C.P.H.)	Effort in hrs.	Catch kg. (C.P.H.)	Effort in hrs.	Catch kg. (C.P.H.)	Effort in hrs.
	18-72:6D	881 (117.46)	7.50	7542 (193.20)	39.04	10808 (155.00)	69.75
	5D	..	..	84 (42.00)	2.00	1040 (122.30)	8.50
	2D	140 (70.00)	2.00	1136 (206.50)	5.50	..	..
	2E	289 (128.44)	2.25	2828 (188.50)	15.00	..	..
	1E	2606 (162.87)	16.00	6253 (171.30)	36.50	..	..
	1F	1090 (136.25)	8.00	418 (209.00)	2.00	..	..
April	19-72:1D	..	..	422 (187.50)	2.25	467 (133.00)	3.50
	18-72:6D	4125 (210.60)	19.58	4359 (183.50)	23.75	6517 (118.30)	55.08
	6C	557 (159.10)	3.50	360 (240.00)	1.50	..	..
	6E	..	..	814 (147.90)	5.50	106 (70.70)	1.50
	5D	434 (72.30)	6.00	..	..	3196 (131.40)	24.33
May	18-72:6D	4372 (273.40)	16.00	610 (305.00)	2.00	2842 (63.80)	44.50
	6C	..	..	460 (230.00)	2.00	968 (121.00)	8.00
	6E	..	..	305 (203.50)	1.50	260 (65.00)	4.00
June	18-72:6D	613 (153.30)	4.00	..	..	700 (59.56)	11.75
	5D	3140 (153.20)	20.50	..	..	611 (53.13)	11.50
October	18-72:6D	420 (210.00)	2.00	2941 (309.50)	9.50	..	..
	6E	7883 (463.70)	17.00	7110 (312.50)	22.75	458 (98.30)	4.66
	5D	8321 (432.20)	19.25	1426 (950.70)	1.50	..	..
	5E	16213 (599.40)	27.05	9897 (409.00)	24.20	725 (79.10)	9.17

TABLE I—Contd.

Year/Month	Area	'Jheenga'		'Bumili'		'Meera'	
		Catch kg. (C.P.H.)	Effort in hrs.	Catch kg. (C.P.H.)	Effort in hrs.	Catch kg. (C.P.H.)	Effort in hrs.
November	18-72:6D	9758 (342.30)	28.50	8224 (357.50)	23.00	1661 (201.20)	8.25
	6E	372 (248.00)	1.50	..	..	370 (234.10)	1.58
	6C	1020 (680.00)	1.50	1078 (341.10)	3.16	430 (215.00)	2.00
	5D	8726 (387.80)	22.50	1359 (371.30)	3.66	10125 (176.10)	57.50
	5E	1440 (576.00)	2.50	..	..	1010 (135.40)	7.50
December	18-72:6D	14793 (346.00)	42.75	269 (179.30)	1.50	..	..
	6E	555 (370.00)	1.50	159 (159.00)	1.00	..	..
	5D	727 (363.50)	2.00	11147 (251.00)	44.41	..	..
1963	18-72:6D	4260	21.00	8432	29.00	176	2.17
January	6C	(202.80) 3647 (297.70)	12.25	(290.70) 1928 (275.40)	7.00	(81.80) ..	..
	18-72:6D	..	..	863 (230.10)	3.75	2035 (82.80)	24.57
February	5D	..	..	2829 (201.60)	14.03	5306 (112.90)	47.00
	5E	..	..	515 (137.30)	3.75	202 (57.70)	3.50
	21-70:1A	760 (506.70)	1.50	1094 (2188.00)	0.50	..	..
March	20-70:6A	2553 (537.50)	4.75	1309 (1309.00)	1.00	..	..
	6B	2925 (487.50)	6.00	2019 (897.30)	2.25	..	..
	5B	930 (620.00)	1.50	836 (668.80)	1.25	..	..
	5C	987 (759.20)	1.30	1002 (1002.00)	1.00	..	..
	18-72:6D	953 (317.70)	3.00	1992 (173.20)	11.50	5856 (157.80)	37.11
	6E	870 (193.30)	4.50	..	..	343 (85.70)	4.00

TABLE I—Contd.

Year/Month	Area	'Jheonga'		'Bumili'		'Meera'	
		Catch kg. (C.P.H.)	Effort in hrs.	Catch kg. (C.P.H.)	Effort in hrs.	Catch kg. (C.P.H.)	Effort in hrs.
April	6C	537 (97.60)	5.50	..	..	432 (123.40)	3.50
	5D	753 (150.60)	5.00	..	..	2570 (103.40)	24.85
	18-72:6D	663 (221.00)	3.00	7063 (172.20)	41.00	..	..
	6B	600 (300.00)	2.00	95 (54.30)	1.75	..	..
	5D	2997 (399.50)	7.50	6015 (214.30)	27.60	..	..
May	18-72:6C	1489 (458.10)	3.25	1769 (221.10)	8.00	..	..
	6D	8580 (481.20)	17.83	9299 (224.90)	41.22	552 (154.20)	3.58
	5C	2423 (330.50)	7.33	..	..	175 (350.00)	0.50
June	5D	7127 (367.00)	19.42	2042 (188.50)	10.80	7085 (136.00)	52.09
	18-72:5C	5401 (379.80)	14.25	..	..	215 (143.30)	1.50
	5D	897 (206.90)	4.33	2225 (267.00)	8.33	1390 (273.60)	5.08
	5E	45 (22.50)	2.00	..	..	155 (40.60)	3.83
	18-72:6D	5696 (315.04)	18.08	..	..	3621 (116.05)	31.20
November	5D	7507 (411.34)	18.25	..	..	507 (123.66)	4.10
	18-72:6C	..	..	2441 (183.08)	13.33	191 (127.34)	1.54
	6D	3701 (247.97)	14.92	3174 (146.32)	21.61	894 (76.08)	11.75
	5D	160 (80.00)	2.00	988 (126.81)	7.71	..	..
	5E	380 (116.89)	3.25	610 (132.98)	4.58	88 (53.01)	1.60
1964	18-72:6D	6599	28.75	8137	53.92	4629.5	52.25
January		(229.53)		(150.53)		(88.42)	

TABLE I—Contd.

Year/Month	Area	'Jheenga'		'Bumili'		'Meera'	
		Catch kg. (C.P.H.)	Effort in hrs.	Catch kg. (C.P.H.)	Effort in hrs.	Catch kg. (C.P.H.)	Effort in hrs.
February	6E	687 (109.92)	6.25	370 (92.50)	4.00	283 (51.45)	5.50
	18-72:6D	2190 (107.72)	20.33	2267 (180.20)	12.58	3600 (79.00)	45.57
	1D	1454 (351.30)	3.00	1570 (258.22)	6.00	..	..
March	18-72:6D	1273 (135.19)	9.42	1776 (116.46)	15.25	4163 (56.07)	72.24
	6E	1134 (167.94)	6.75	734 (65.24)	11.25	1667 (61.18)	27.47
April	5E	..	..	69 (39.42)	1.75	433 (58.36)	7.42
	18-72:6D	333 (111.00)	3.00	6569 (101.97)	64.42	3031 (61.80)	49.06
	6E	469 (117.20)	4.00	1490 (83.44)	18.00	2143 (64.00)	33.54
	5E	..	..	420 (105.00)	4.00	87 (16.30)	5.33
May	18-72:6E	2701 (231.47)	11.66	2406 (165.93)	14.50	..	..
	6D	16526 (271.03)	60.75	6691 (142.36)	47.00	6115 (105.30)	58.07
	5E	645 (429.96)	1.50	1044 (47.00)	8.25	287 (47.80)	6.00
	5D	2158 (261.55)	8.25	..	..	266 (66.50)	4.00
June	18-72:6C	1526 (181.44)	8.41	599 (149.75)	4.00	..	..
	6D	4394 (200.36)	21.91	3764 (75.02)	50.17	130 (65.00)	2.00
	5D	263 (87.66)	2.00	435 (217.50)	2.00	..	..
TOTAL		212714 (276.67)	768.83	182172 (189.45)	961.59	119745.5 (110.39)	1084.76
Catch per 100 hrs.		27667		18945		11039	
Ratio (power factor)		1.00		0.68		0.39	

catch data of the exploratory fishing operations for this purpose and ratios obtained on the basis of averages per hundred hours of fishing by different vessels.

For the purpose of the Government of India exploratory fishing operations the inshore and offshore regions have been divided into major areas of 1° latitude by 1° longitude; each of these is subdivided into 36 smaller squares or subareas at 10 minute latitude by 10 minute longitude; the subareas are thus 10 × 10 miles each. The major areas and the subareas covered by these vessels in these studies are shown in the inset text fig. 2B from which the naming given as 18-72:6D, 5C etc. is self explanatory. The major areas considered here are 21-70, 20-70, 19-72 and 18-72 and the subareas under them and the catch particulars in each month are as in Table I.

RESULTS OF CATCH ANALYSIS

For all areas for 1962-64 the ratio of the catches per 100 hours of operation by three vessels is as 1.00:0.68:0.39. Based on the data in Table I, graphs are drawn as shown in fig. 1 representing average catch for 100 hours of fishing by each vessel. The actuals of the catches shown against the effort in hours in each month for each vessel have varied widely. The variation in the monthly values of catch in general increases with reduction in hours of fishing effort, but tends to decrease with the increase in effort, approximating the values on the graph for 100 hours of fishing by each vessel.

In Table II, based on split-up figures for each year the same data are shown with the corresponding values of the power factors. It may be seen that the power factor of 'Bumili' varied from 0.56 in 1964 to 0.79 in 1962 with that for 1963 approximating the average value for 1962-64. The power factor value of 'Meera' for 1962-64 does not significantly vary from the values for individual years, the range in difference being (-) 0.06 in 1964 to (+) 0.09 in 1962.

TABLE II

Yearwise catch and relative power factors of vessels for all areas

	'Jheenga'		'Bumili'		'Meera'	
	Catch kg.	Effort in hrs.	Catch kg.	Effort in hrs.	Catch kg.	Effort in hrs.
1962	103521	369.14	85291	383.54	61118	452.90
Catch kg. per 100 hrs.		28044		22238		13495
Ratio (Relative power factor)		1.00		0.79		0.48

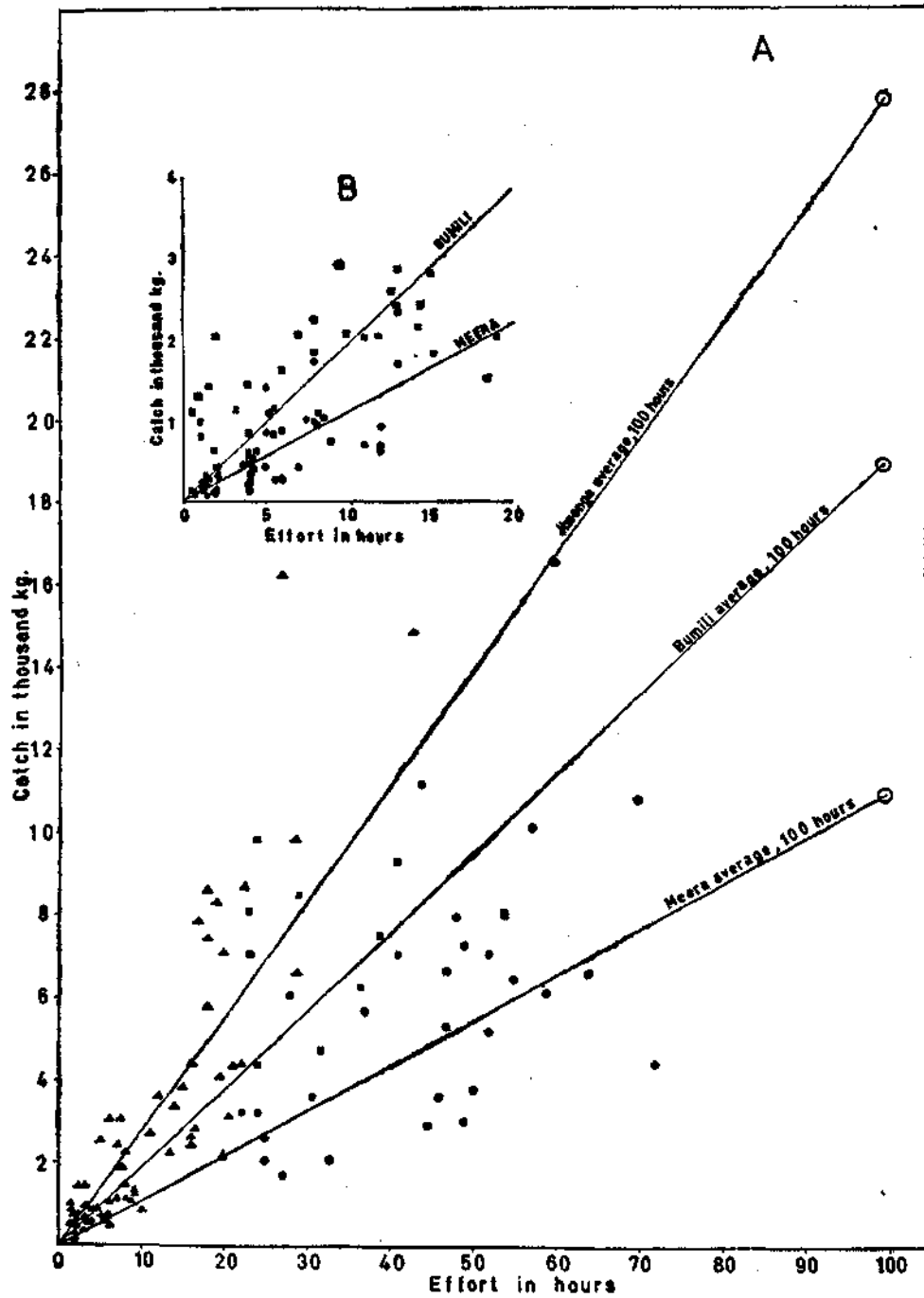


FIG. 1 Text Fig. 1-A: Results of monthly simultaneous fishing operations in all areas for 1962-64 by Government of India vessels at Bombay. Triangles indicate monthly catch effort values for 'Jheenga', squares for 'Bumili' and solid circles for 'Meera'.

Inset Fig. 1-B: Catch and effort values for 'Bumili' and 'Meera' for effort of less than 20 hours shown separately to avoid overcrowding.

TABLE II—Contd.

	'Jheenga'		'Bumili'		'Meera'	
	Catch kg.	Effort in hrs.	Catch kg.	Effort in hrs.	Catch kg.	Effort in hrs.
1963	66841	203.71	58540	260.96	31793	263.47
Catch kg. per 100 hrs.	32812		22433		12067	
Ratio (Relative power factor)	1.00		0.68		0.37	
1964*	42352	195.98	38341	317.09	26834.5	368.39
Catch kg. per 100 hrs.	21610		12092		7284	
Ratio (Relative power factor)	1.00		0.56		0.33	
1962—64	212714	768.83	182172	961.59	119745.5	1084.76
Catch kg. per 100 hrs.	27667		18945		11039	
Ratio (Relative power factor)	1.00		0.68		0.39	

*Data for six months only i.e. up to June.

In the foregoing account the relative power factors of the vessels as obtained from simultaneous fishing in all areas in each month have been considered, but it is generally believed that more dependable values could be expected if one particular area alone is chosen. Hence catches in the major area 18-72 and within that the subarea 18-72:6D which was fished almost all round the year in all years by these vessels have been analysed separately and the results obtained are given in Tables III and IV and Text fig. 2A. It may be seen that the power factor ratios obtained by the analysis of the catches from all areas treated together and those from the two above specified areas are almost the same.

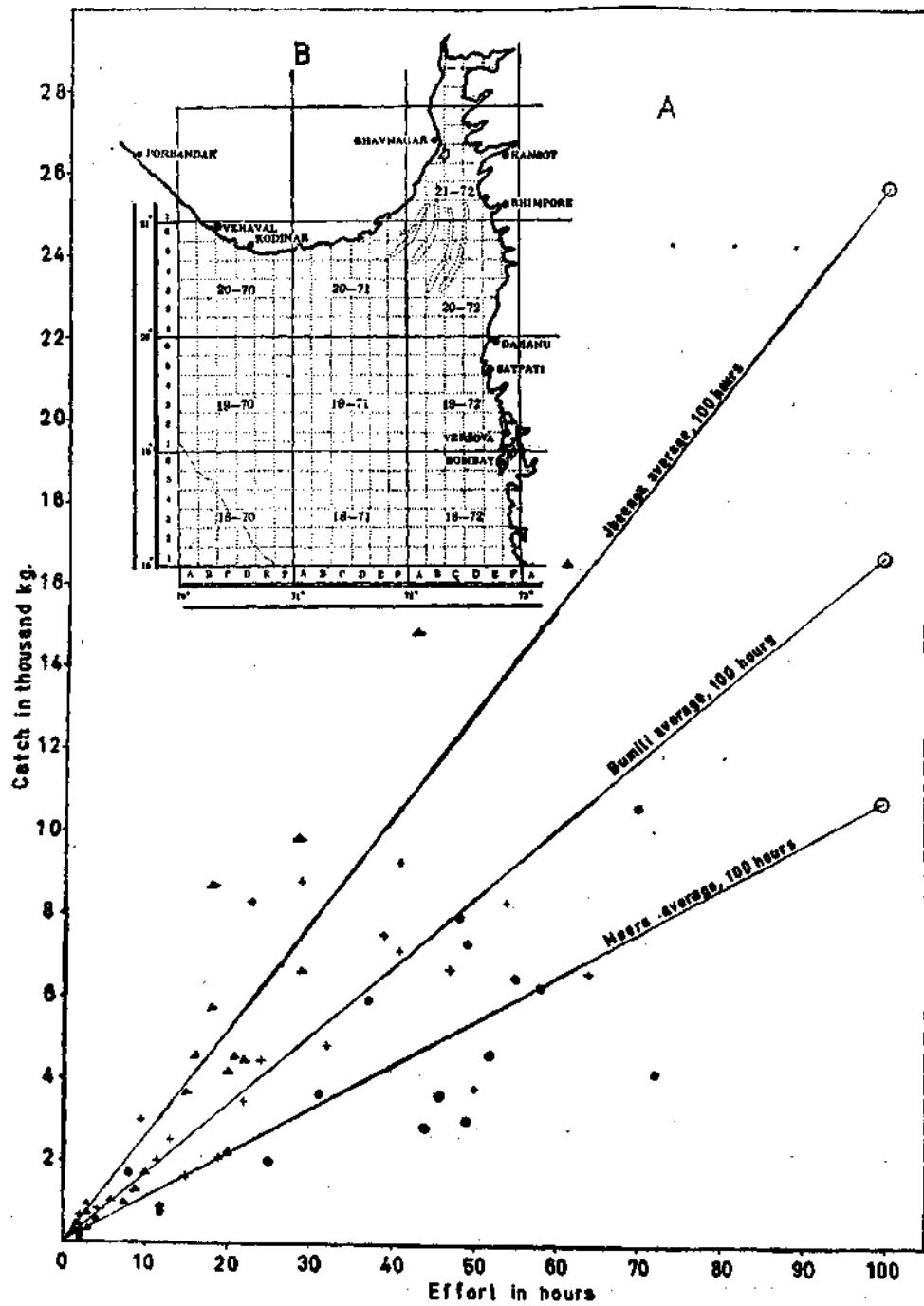


FIG. 2 Text Fig. 2-A: Results of monthly simultaneous fishing operations in 18-72: 6-D to 1962-64. Triangles representing values for 'Jheenga', crosses for 'Bumili' and solid circles for 'Meera'.
Inset Fig. 2-B: Showing fishing areas.

TABLE III

Yearwise catch and relative power factors of vessels operating in the major area 18-72

	'Jheenga'		'Bumili'		'Meera'	
	Catch kg.	Effort in hrs.	Catch kg.	Effort in hrs.	Catch kg.	Effort in hrs.
1962	93284	307.39	79300	344.78	60411	448.15
Catch kg. per 100 hrs. .	30347		23000		13480	
Ratio (power factor) .	1.00		0.76		0.44	
1963	58686	188.66	52280	254.96	31793	263.47
Catch kg. per 100 hrs. .	31107		20505		12067	
Ratio (power factor) .	1.00		0.66		0.39	
1964	42352	195.98	38341	317.09	26834.5	368.39
Catch kg. per 100 hrs. .	21610		12092		7284	
Ratio (power factor) .	1.00		0.56		0.34	
1962-64	194322	692.00	169921	916.83	119038.5	1080.01
Catch kg. per 100 hrs. .	28083		18534		11022	
Ratio (power factor) .	1.00		0.66		0.39	

For 1962-64 period if the power factor values of 'Bumili' and 'Meera' in 18-72 major area are compared with those of all areas it will be seen that in the case of the former vessel the value differs by (-) 0.02 and in the latter it remains exactly the same. For the same period, if 18-72:6D area is compared with all areas, the power factor value of 'Bumili' differs by (-) 0.03 and that of 'Meera' by (+) 0.03.

In the major area 18-72, the power factor values for 'Bumili' and 'Meera' for 1963 are the same as those for 1962-64; those of 'Bumili' differ by (+) 0.10 in 1962 and (-) 0.10 in 1964; and of 'Meera' by (+) 0.05 in 1962 and (-) 0.05 in 1964.

TABLE IV

*Yearwise catch and relative power factors of vessels operating in the area
18-72: 6D only*

	'Jheenga'		'Bumili'		'Meera'	
	Catch kg.	Effort in hrs.	Catch kg.	Effort in hrs.	Catch kg.	Effort in hrs.
1962	36731	136.25	30726	149.95	37848	286.40
Catch kg. per 100 hrs. . .	26959		20491		13215	
Ratio (power factor) . .	1.00		0.76		0.49	
1963	23853	77.83	30823	148.03	13134	110.38
Catch per 100 hrs. . .	30648		20815		11899	
Ratio (power factor) . .	1.00		0.68		0.39	
1964	31315	144.16	29204	243.34	21668.5	279.19
Catch per 100 hrs. . .	21722		12001		7761	
Ratio (power factor) . .	1.00		0.55		0.36	
1962-64	91899	358.24	90753	541.37	72650.5	675.97
Catch per 100 hrs. . .	25653		16764		10748	
Ratio (power factor) . .	1.00		0.65		0.42	

In 18-72:6D power factor value of 'Bumili' differs by (+) 0.11 in 1962, (+) 0.03 in 1963 and (-) 0.10 in 1964; and 'Meera' by (+) 0.07 in 1962, (-) 0.3 in 1963 and (-) 0.06 in 1964 from the respective values for 1962-64.

For the period of 1962-64 if the power factor values are corrected to first decimal place, 'Jheenga', 'Bumili' and 'Meera' are in the ratio of 1.0:0.7:0.4 in

all areas as also in the major area 18-72 and the subarea 18-72:6D. While most of the power factor values for individual years in the Tables II to IV are very close to the corrected values, a few extreme cases in respect of 'Bumili' fall within a range of error of (-) 21% to (+) 13% and of 'Meera' (-) 17.5% to 22.5%.

RELATIONSHIP BETWEEN POWER FACTORS AND CERTAIN PERMANENT CHARACTERISTICS OF VESSELS

Having ascertained the relative fishing power factors of these vessels it is necessary to find whether there is any permanent characteristic in these vessels which varies proportionally to the relative fishing powers so that, this particular characteristic can be made use of as an index for large scale conversion of statistics of fishing time of all vessels to standard units. The gross tonnage or BHP are usually taken into account of which the former is considered more reliable.

In Table V certain permanent characteristics of the vessels and their ratios are given. In respect of BHP, the index shown for 'Meera' is the same as its relative power factor ratio, but in case of 'Bumili' it is very much higher. In regard to gross tonnage, the index for 'Bumili' is just the same as the relative power factor, but in case of 'Meera' it is low. The net tonnage ratios of these vessels are closely similar to the respective relative power factor values. Length of the vessel does not give a dependable index of its fishing power.

TABLE V

Power factor in relation to certain permanent features of vessels

	'Jheenga'	'Bumili'	'Meera'
Power factor	1.0	0.7	0.4
B.H.P.	153	135	60
Ratio	1.00	0.88	0.39
Gross tonnage	48.67	34.53	9.95
Ratio	1.00	0.71	0.20

TABLE V—Contd.

	'Jheenga'	'Bumili'	'Meera'
Net tonnage	15.70	10.01	5.71
Ratio	1.00	0.64	0.36
Length	51.21'	47.40'	34.00'
Ratio	1.00	0.93	0.66

GENERAL CONSIDERATIONS

One of the main objectives of the exploratory fishing is the assessment of the relative potentialities of the fishing grounds. With vessels of different capacities this assessment is possible if their relative power factors are known. If 'Jheenga' has fished 40,000 kg. in area 'A', 'Bumili' 30,000 kg. in area 'B' and 'Meera' 20,000 kg. in area 'C' in a unit amount of time during the same period, the relative assessment of the grounds for that period is as follows:

$$\text{Areas A:B:C} = \frac{40,000}{1.0} : \frac{30,000}{0.7} : \frac{20,000}{0.4} = 1.00:1.07:1.25$$

From the above it is seen that as compared with 'A' and 'B' the ground 'C' wherefrom only about a fourth of the total catch has been obtained is potentially the richest of the three.

Supposing in the exploratory fishing operations, a ground has proved to yield in a particular period very good total catch by one vessel and if we are to exploit the region by using other vessels, it is possible to estimate approximately the amount of catch that could reasonably be expected relative to the respective power factor values. In a similar way catch under particular categories of fish in the total catch also can be separately estimated for each area by one or more vessels.

The power factor ratios in table V vary to some extent from the ratios of certain permanent characteristics of the vessels. Possibly for each vessel for each characteristic a constant or correction factor could be introduced as given below to enable that characteristic being made use of as an index for standardising fishing time. The correction factor in each case has been worked out by dividing the power factor value by BHP ratio or gross tonnage ratio etc. These are

arbitrary adjustments which aim at bringing the variables to approximate their relative power factor values.

Power factor of vessel 'A'

Power factor of vessel 'B'

Correction factor × Permanent characteristic of 'A'.

Correction factor × Permanent characteristic of 'B'

or

Power factor of 'Bumili'	0.79×135 (B.H.P.)
Power factor of 'Jheen'	1.00×153 (B.H.P.)
Power factor of 'Meera'	2.0×9.95 (gross tonnage)
Power factor of 'Jheenga'	1.0×48.67 (gross tonnage)
Power factor of 'Bumili'	1.09×10.1 (net tonnage)
Power factor of 'Jheenga'	1.00×15.7 (net tonnage)
Power factor of 'Meera'	0.61×34.0 (length in feet)
Power factor of 'Bumili'	0.75×47.4 (length in feet) etc.

As cited by Beverton and Holt (1957, pp. 177) gross tonnages of the vessels are taken as indices of their fishing power by other workers (Hickling 1946, Margetts 1949). Gulland (1956) has observed that, within a wide range of tonnage classes, there is little difference of fishing powers of trawlers of the same tonnage class but of different ages. 'Jheenga', 'Bumili' and 'Meera' being much used vessels and especially 'Bumili' fairly often being subject to major or minor repairs, have apparently not been able to fish to their efficiency as expected from the values of either gross tonnage or BHP ratios. In the following lines the fishing time in actual catch data for the year 1963-64 for these three vessels has been readjusted according to their gross tonnage, net tonnage or BHP values. Both the corrected and uncorrected values are given below for comparison.

	'Jheenga'	'Bumili'	'Meera'
Catch in Kg.	222,304	70,314	43,165.5
Actual fishing hrs. (C.P.H.)	776.18 (286.40)	417.01 (167.73)	460.54 (93.72)
Gross tonnage hours uncorrected.	776.18×48.61 = 37,776.68	417.01×34.53 = 14,399.36	460.54×9.95 = 4,582.37

	'Jheenga'	'Bumili'	'Meera'
Gross tonnage hours corrected.	776.18×48.61 =37,776.68	417.01×34.53 $\times 0.99 =$ 14,259.50	$460.54 \times 9.95 \times$ $2.00 = 9,164.75$
Catch per ton hour in kg. uncorrected.	$\frac{222,304}{37,776.68} = 5.88$	$\frac{70,314}{14,399.36} = 4.88$	$\frac{43,165.5}{4,582.37} = 9.42$
Catch per ton hour in kg. corrected.	Do.	$\frac{70,314}{14,259.50} = 4.93$	$\frac{43,165.5}{9,164.75} = 4.71$
Net tonnage hours uncorrected.	776.18×15.7 =12,186.03	417.01×10.01 =4,174.27	460.54×5.71 =2,629.68
Net tonnage hours corrected	Do.	417.01×10.01 $\times 1.09 =$ 4,549.95	$460.54 \times 5.71 \times$ $1.11 =$ =2,918.95
Catch per net ton hour uncorrected in kg.	$\frac{222,304}{12,186.03} = 18.24$	$\frac{70,314}{4,174.27} = 16.84$	$\frac{43,165.5}{2,629.68} = 16.41$
Catch per net ton hour in kg. corrected.	Do.	$\frac{70,314}{4,549.95} = 15.45$	$\frac{43,165.5}{2,918.95} = 14.79$
BHP Hours uncorrected	776.18×153 =118,755.54	417.01×135 =56,296.35	460.54×60 =27,632.40
BHP hours corrected	Do.	417.01×135 $\times 0.79$ =44,474.12	$460.54 \times 60 \times$ 1.03 =28,461.37
Catch per BHP hour in Kg. uncorrected.	$\frac{222,304}{118,755} = 1.87$	$\frac{70,314}{56,296.35} = 1.25$	$\frac{43,165.5}{27,632.40} = 1.56$
Catch per BHP hour in Kg. corrected.	Do.	$\frac{70,314}{44,474.12} = 1.58$	$\frac{43,165.5}{28,461.37} = 1.52$

As catch per hour values by different vessels under Government of India exploratory fishing programme vary widely, the vessels being of different capacities, it is necessary to estimate their relative fishing powers to enable standardising fishing time, which undoubtedly serves to check up tentative conclusions that we may arrive at in certain quantitative assessments.

SUMMARY

1. The relative fishing power factors of M.F.V. 'Jheenga', M.F.V. 'Bumili' and M.L. 'Meera' of the Government of India Deep Sea Fishing Station have been determined on the basis of data available from the exploratory fishing operations by these vessels during 1962-64.

2. 'Jheenga' has been taken as the standard vessel with which the other two have been compared. All instances of simultaneous fishing in the same areas in the same months by these vessels have been considered. The ratio of the catches obtained in 100 hours of fishing effort by each of the different vessels is taken as representing the respective power factor.

3. The power factor values for the vessels in all areas for 1962-64 period have been compared with those for individual years. This comparison has been extended to values obtained for operations in the major area 18-72 and the sub-area 18-72:6D. It has been concluded that the power factor values of 'Jheenga', 'Bumili' and 'Meera' are in the ratio of 1.0:0.7:0.4.

The power factor values have been compared with the gross tonnage, net tonnage, BHP and length ratios for the purpose of finding out suitable indices which are proportionate to the relative power factor values.

4. Certain arbitrary adjustments have been suggested while making use of these variables as indices of fishing powers.

5. General applicability of the results to standardisation of fishing effort, assessment of relative fisheries potentialities of areas etc. have been discussed.

ACKNOWLEDGEMENTS

We wish to express our gratitude to Dr. S. Jones, Director, Central Marine Fisheries Research Institute for the kind encouragement received from him while the work was in progress and also for the permission he has accorded to make use of the relevant data from the monthly offshore reports issued from the Institute from time to time. We are thankful to Shri S. Miskieth, Superintending Engineer and the floating staff of the Government of India Deep Sea Fishing Station, Bombay for making available the necessary information regarding vessels and their operations in presenting this paper.

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