Vertical Distribution of Fish in Surface and Bottom Gill Nets Operated in Gandhisagar Reservoir*

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The results of studies on the vertical distribution of *Catla catla, Labeo rohita, L.Calbasu, Cirrhinus mrigala, Mystus seenghala, Mystus aor, Silonia silondia,* and *Wallago attu* obtained in the surface and bottom operated drift gill nets in Gandhisagar reservoir, are presented.

It is reported that catla, rohu and mrigal are surface, column and bottom feeders respectively based on their feeding habits (Anon, 1983). Berst & Mcombie (1963), Parrish (1963), Sulochanan & Rao (1967) and Dawson *et al.* (1981) have stressed the importance of information on vertical distribution of fish in designing gill nets and its operation. Studies conducted on the vertical distribution of commercial varieties of fresh water fishes such as catla, rohu, mrigal and cat fishes caught in the surface and bottom operated drift gill nets, in Gandhisagar reservoir, is reported in the present paper.

Materials and Methods

Details of gill nets used for the studies is given in Table 1. Similar rigging features as described by Sulochanan *et al.*, (1968) was followed, in other respects. The nets were divided into three equal sections, namely, upper, middle and lower, by passing a coloured twine horizontally through the webbing at every 1.25 m interval, to facilitate the studies on vertical distribution of the catch.

A fleet of 30 gill net units was operated at a depth range of 5- 10 m, in the fishing area, in the lower reaches of the reservoir. Twelve fishing trips each were conducted for bottom and surface gill netting during the months of November-December 1985 and April-May 1986 respectively. Details of fish caught in the three different vertical

Table 1. *Details of the gill nets*

Twine size	Mesh size in bar (mm)	No.of meshes		Net size after hanging		Hanging coefficient		No.of units operated
		Length	Depth	Length m	Depth m	Horizontal	Vertical	
210/2/3	100	300	22	30	3.75	0.50	0.86	5
	200	250	11	30	3.75	0.50	0.86	5
210/1/3	80	375	27	30	3.75	0.50	0.86	5
	100	300	22	30	3.75	0.50	0.86	5
210/1/3	60	500	36	30	3.75	0.50	0.86	5
	80	375	27	30	3.75	0.50	0.86	5

* Formed part of the Ph.D thesis of the first author approved by the Vikram University, Ujjain

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Table 2. *Vertical distribution of catch in surface operated gill nets*

Name of species	Average weight kg	Gill net sections Upper section 0-1.25 m Number	Percentage	Middle section 1.25-2.50 m Number	Percentage	Lower section 2.5-3.75 m Number	Percentage	Total
Catla catla	5.50	31	8.90	250	65.27	102	26.64	383
Labeo rohita	3.50	35	26.12	38	28.36	61	45.52	134
Cirrhinus mrigala	3.00	-	-	12	37.50	20	62.50	32
Labeo calbasu	1.75	-	-	35	45.45	42	54.55	77
Mystus seenghala	1.50	120	25.10	162	33.90	196	41.00	478
Mystus aor	1.50	80	33.75	39	16.75	118	49.80	237
Silonia silondia	1.50	28	12.18	78	33.90	124	53.92	230
Wallago attu	2.50	50	23.70	79	37.44	82	38.86	211
Total no.of fishes and percentage (average)		344	19.40	693	38.00	745	41.80	1782

sections of the net was recorded species-wise, separately for bottom and surface operations, and pooled data, ignoring twine size and mesh size differences, was used for analysis. Chi-square test was applied to ascertain the significance of variance in catch amongst the different vertical sections of the net.

Results and Discussion

Vertical distribution of catch of different species, recorded separately for surface and bottom operated gill nets, is presented in Tables 2 & 3 respectively and the results of statistical analysis is given in Table 4.

In the surface operated gill nets, 41.8% of the total catch was obtained in the lower section followed by 38.9% and 19.3% in the middle and upper sections. Highest catch of *Mystus seenghala* (41.0%), *Silonia silondia*(53.9%),*Wallago attu* (38.9%), *Labeo rohita* (45.5%), *Cirrhinus mrigala* (62.5%) and *Labeo calbasu* (54.6%) was obtained in the lower section (2.50-3.75 m) of the surface operated gill nets followed by middle and upper sections.

Middle section contributed maximum catch of *Catla catla*(65.3%) followed by lower (26.6%) and upper section (8.1%) Catch of *Mystus aor* was maximum (49.8%) in the lower section followed by upper and middle sections. Variance of catch amongst the lower, middle and upper sections of the gear, in respect of all species except *Cirrhinus mrigala* and *L. calbasu*, was found to be statistically significant.

In the bottom operated gill nets, 43.6% of the total catch was caught in the upper section followed by 36.9% in the middle

Table 3. *Vertical distribution of catch in bottom operated gill nets*

Name of species	Average Weight kg	Gill net sections: Upper section 0-1.25 m Number	Percentage	Middle section 1.25-2.50 m Number	Percentage	Lower section 2.50-3.75 m Number	Percentage	Total
Catla catla	7.50	342	49.85	262	38.70	82	11.95	686
Labeo rohita	2.50	94	48.45	85	43.80	15	7.75	194
Cirrhinus mrigala	2.00	57	29.53	62	32.12	75	38.35	194
Labeo calbasu	2.00	54	32.54	68	40.96	44	26.50	166
Mystus seenghala	1.50	40	43.48	38	41.30	14	15.22	92
Mystus aor	1.50	52	53.06	14	14.28	32	32.66	98
Silonia silondia	1.50	34	43.05	23	29.11	22	27.84	79
Wallago attu	2.50	29	28.72	42	41.58	30	29.70	101
Total No. of fishes and percentage (average)		702	43.60	594	36.89	314	19.51	1610

Table 4. *Statistical analysis of the catch landed in surface and bottom gill nets*

Name of species	Chi-square value	Degrees of freedom	Level of significance
Surface gill nets:			
Catla catla	195.07	2	$p < 0.001$
Labeo rohita	9.00	2	$p < 0.05$
Cirrhinus mrigala	2.00	1	NS
Labeo calbasu	0.64	1	NS
Mystus seenghala	18.24	2	$p < 0.001$
Mystus aor	39.51	2	$p < 0.001$
Silonia silondia	59.88	2	$p < 0.001$
Wallago attu	8.93	2	$p < 0.05$
Bottom gill nets:			
Catla catla	154.88	2	$p < 0.001$
Labeo rohita	57.55	2	$p < 0.001$
Cirrhinus mrigala	2.72	2	NS
Labeo calbasu	5.29	2	NS
Mystus seenghala	13.51	2	$p < 0.001$
Mystus aor	21.90	2	$p < 0.001$
Silonia silondia	3.43	2	NS
Wallago attu	2.09	2	NS

NS - not significant

and 19.5% in the lower sections. Highest catch of *Catla catla* (49.9%), *Labeo rohita* (48.5%), *Mystus seenghala* (43.5%) and *Silonia silondia*(43.1%) was realised in the upper sections (0-1.25 m) followed by middle and lower sections. Catch of *Cirrhinus mrigala* was highest in the lower section (38.4%), *Mystus aor* was represented maximum (53.1%) in the upper section while *Wallago attu* and *Labeo calbasu* was best represented in the middle section. The difference in catch among the three vertical sections of the bottom-operated gill nets, in respect of *Catla catla, Labeo rohita, Mystus seenghala* and *M.aor* was found to be statistically significant.

Gill nets currently in operation in Gandhisagar reservoir has a fishing height of only 3.0 m. Based on the present study on the vertical spread of catch in the surface and bottom operated gill nets, it could be suggested that an increase in the fishing height of gill nets operated in Gandhisagar from 3.0 to 3.75 m may beneficially reflect in the gill net catches.

The authors wish to express their gratitude to Director, Central Institute of Fisheries Technology, Kochi-29 for his kind permission to publish this paper and to Shri H.Krishna Iyer for the help rendered in statistical analysis of the data.

References

Anon (1983) *Inland Fish Marketing in India. Case studies of selected major reservoirs.* Centre for Management in Agriculture IIM Ahamedabad, IVb, 238

Berst, A.H. & Mcombie, A.M. (1963) *J.Fish. Res. Bd Can.*, **20**, 735

Dawson, P., Sita Rama Rao, J. & Sreekrishna, Y. (1981) *Fish.Technol.* **18**, 143

Parrish, B.B (1963) *Inst. Comm.North Atlantic.* Fish Spl. Pub. **5**, 166

Sulochanan, P. & Rao, K.K. (1967) *Indian J.Fish.* **11**, 9

Sulochanan, P., George, V.C. & Naidu, R.M. (1968) *Fish.Technol.* **5**, 81.