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

*K.N. Kartha and K.S.Rao

*School of Studies in Zoology Vikram University, Ujjain - 456010*

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 |

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

| Name of species | Average weight kg | Gill net sections | | | | | | Total |
|---|---|---|---|---|---|---|---|---|
| | | Upper section 0-1.25 m | | Middle section 1.25-2.50 m | | Lower section 2.5-3.75 m | | |
| | | Number | Percentage | Number | Percentage | Number | Percentage | |
| 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 silon-*

*dia*(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 | | | | | | Total |
|---|---|---|---|---|---|---|---|---|
| | | Upper section 0-1.25 m | | Middle section 1.25-2.50 m | | Lower section 2.50-3.75 m | | |
| | | Number | Percentage | Number | Percentage | Number | Percentage | |
| 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.

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