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Meshsize Selectivity of Multifilament Gillnet at Fakun Village, North of Lake Jebba

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ABSTRACT

Studies on the meshsize selectivity of multifilament gillnet at Fakun village North of Lake Jebba were carried out. Four different meshsizes (76, 101, 126 and 177 mm) of multifilament nets were used in the construction of the gillnet with hanging ratio 0.5 each. Daily catch from the nets were examined for seven weeks. The fish caught comprised of nine species belonging to six families. The result of analysis of variance of the number of species caught showed significant difference ($p < 0.05$) among the different meshsizes of the gillnet. The catch mean weight for each meshsize (76, 101, 126 and 177 mm) was 266.91, 285.54, 305.10 and 349.02, respectively also the relative percentage of number of species caught by each of meshsize was 39.48% for 76 mm, 23.58% for 101 mm, 22.44% for 126 mm and 14.48% for 177 mm which depicts the selectivity in the catch of the gillnets in this experiment.

Key words: Meshsize selectivity, gillnet, Fakun village, Lake Jebba

INTRODUCTION

The effectiveness of a gillnet depends on various factors which include meshsize, exposed net area, location, mesh shape, hanging ratio, visibility and type of netting materials in relation to stiffness and breaking strength (Van Brandt, 1984).

Gillnet is very popular among artisanal fishermen in Nigeria. More than 75% of the fishermen in the inland coastal water in Nigeria uses gillnet at one time or another within a fishing season (Reed *et al.*, 1967).

Knowledge of the efficiency of gillnet is important for estimation of fish population in stock assessment. The effects of technical innovation by fishers on the efficiency of gillnet is quantified for proper fisheries management. Netting material type has been shown to greatly influence catches. Transparent monofilament netting material is effective as gillnet in clear water. This is because the net is invisible to the fish. Visible nets tend to be avoided by fish. In turbid water however, the difference in structure and colour of gillnet material is usually very small (Nedelec, 1975).

Gillnets are passive gears but can be used as active gears by dragging through water with the aid of two boats. They can be set passively on the surface, middle or bottom of water. The catchability and selectivity of gillnets depend on its hanging. One way of estimating the selectivity of gillnet is by comparing the catch with that of a relatively unselective gear such as the trawl net or the purse seine (Hamley, 1975).

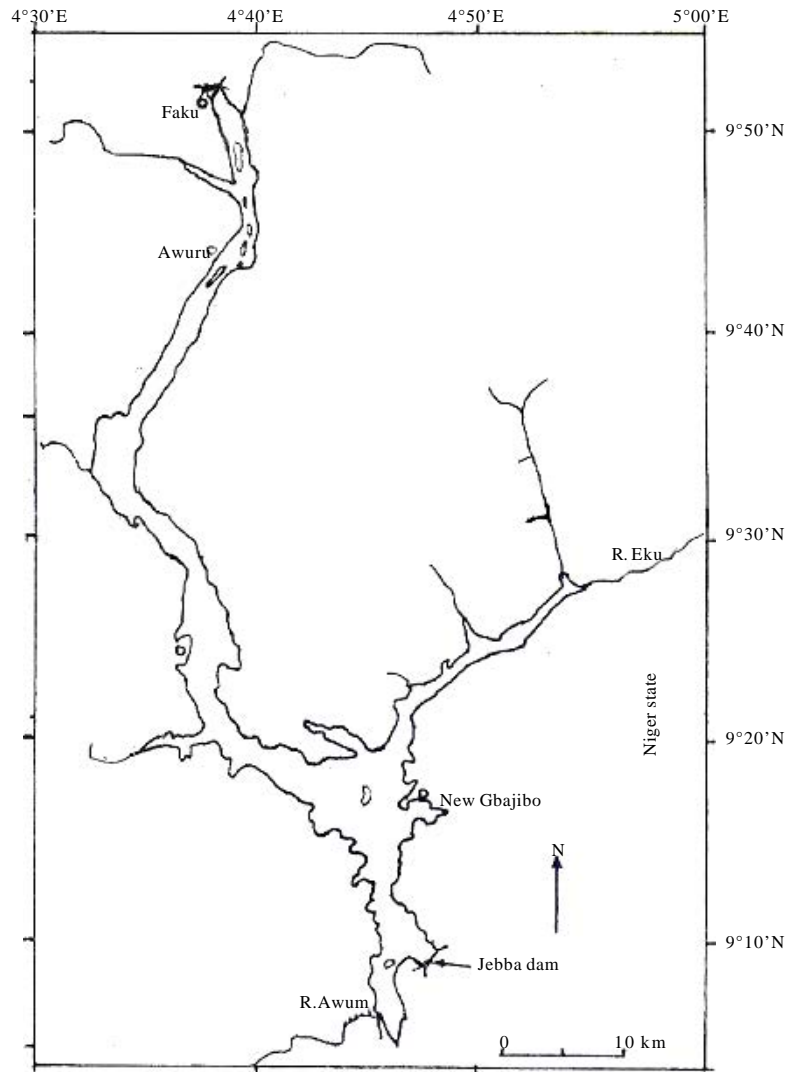


Fig. 1: Map of Jebba Lake with Fakun at the extreme North

At Fakun fishing village the people indulge in fishing practice at both subsistence and commercial level and in doing this they use different meshsize of gillnet ranging from less than 1" (25 mm) and above which has the ability of catching young and juvenile fish. Keeping this in mind, this study was carried out in order to:

- Assess the size selection potential of multifilament gillnet using 3" (76 mm) 4" (101 mm) 5" (126 mm) and 7" (177 mm) meshsize
- Assess the efficiency of each of the meshsize based on their catch per unit effort
- Make necessary recommendation for the appropriate meshsize suitable for the water body

MATERIALS AND METHODS

Study area: The study was conducted at Fakun fishing village North of Jebba Lake (Fig. 1) which is in the Savannah zone, North-western Nigeria.

Construction material and fabrication method: Four gillnets each measuring 15 m in length and 3 m depth were constructed using the following materials; white nylon (polyamide-PA) multifilament netting of twinesize 210d/2 (46tex) and meshsizes of 76, 101, 126 and 177 mm and mounted at 50% (E = 0.5).

Line and ropes: The same sizes of head and foot-ropes were used for the four nets. This was made of Kuralon (polyvinyl-alcohol (PVA)) rope of thickness No. 8.

Accessories: Cylindrically shaped synthetic corks of dimension 70×30 mm and each weighing 30 g were used as float for all the net and were spaced at 5 m interval. Flat lead sheet was caught into pieces of dimension 150×30 mm each weighing 100 g and attached to the foot rope as sinkers with spacing interval corresponding to that of floats.

Experimental design: The nets were ganged together randomly using randomized numbering technique to form a fleet of four gangs of net. The nets were set in the evening (between 1730-1830 GMT) and hauled in the following morning (between 0800-0900 GMT) thereby maintaining a soaked time of about 15 h.

Data collection: The catch from all nets were carefully removed as the nets were been hauled into the boat, separated according to the net's meshsize and sorted into species using fish identification keys prepared by Olaosebikan and Raji (2004) as taxonomic guide.

RESULTS

Fish catch: Nine fish species belonging to six families were caught (Table 1). These are; *Brycinus nurse*, *Alestes brevis*, *Distichodus rostratus*, *D. brevipinnis*, *Citharinus citharus*, *Bagrus bayad*, *Synodontis membranaceous*, *Tilapia zilli* and *Oreochromis niloticus*.

Number and biomass of fish caught: The number and biomass of fish species caught are shown on Table 2. The total number of fish caught was 352 of which the highest relative percentage (39.48%) was recorded by net with 3" (76 mm) meshsize followed by 4" (101 mm) with 23.58% and 22.44% for 5"(126 mm) meshsize. The least relative percentage of 14.48% was recorded from the net with 7" (177 mm) meshsize.

A total fish weight of 102.70 kg was caught (Table 2). The highest relative percentage (36.12%) was recorded from the net with 3" (76 mm) meshsize followed by 5" (126 mm) meshsize with 23.47% and 4" (101 mm) meshsize with 23.08%. The least relative percentage of total weight of fish caught was recorded from the net with 7" (177 mm) meshsize (17.33%). The mean weights for

Table 1: Fish species caught by the gillnet

Family	Species
Characidae	<i>Brycinus nurse</i> , <i>Alestes brevis</i>
Distichodontidae	<i>Distichodus rostratus</i> and <i>Distichodus brevipinnis</i>
Citharinidae	<i>Citharinus citharus</i>
Bagridae	<i>Bagrus bayad</i>
Mochokidae	<i>Synodontis membranaceous</i>
Cichlidae	<i>Tilapia zilli</i> and <i>Oreochromis niloticus</i>

Table 2: Summary of the number and weight of fish species caught in all the meshsizes during the experimental period

Species	3" (76 mm)		4" (126 mm)		5" (177 mm)		7" (177 mm)		Total	
	No	Wt (g)	No	Wt (g)	No	Wt (g)	No	Wt (g)	No	Wt (g)
<i>Brycinus nurse</i>	4	1600	2	1000					6	2600
<i>Alestes brevis</i>	5	2000	3	1200	1	600			9	3800
<i>Distichodus rostratus</i>	10	6000	2	1500	1	500	1	800	14	8800
<i>Distichodus brevoipinnis</i>	8	4000	3	2000	3	2500	2	1000	16	9500
<i>Citharinus citharus</i>	12	6000	6	3500	6	4000	3	3000	27	16500
<i>Bagrus bayad</i>	3	3000	3	3500	4	4000	6	4000	16	14500
<i>Synodontis membranaceus</i>	30	8000	25	7000	25	7500	17	7000	97	29500
<i>Tilapia zilli</i>	32	3000	20	2000	21	2500	10	1000	83	8500
<i>Oreochromis niloticus</i>	35	35000	19	2000	18	2500	12	1000	84	9000
Total	139	37100	83	23700	79	24100	51	17800	352	102700
Mean weight		266.91		285.54		305.10		349.02		
Relative percentage	39.48	36.12	23.58	23.08	22.44	23.47	14.48	17.33		
No. of species	9		9		8		7			
Species diversity index	1		1		0.88		0.77			

Table 3: Relationship between total number of fish caught and percentage mode of capture

Species	Total No.	Gilling/wedging		Entangling/emeshing	
		No	Percentage	No	Percentage
<i>Brycinus nurse</i>	6	3	3.37	3	1.14
<i>Alestes brevis</i>	9	5	5.62	4	1.52
<i>Distichodus rostratus</i>	14	4	4.49	10	3.80
<i>Distichodus brevoipinnis</i>	16	5	5.62	11	4.18
<i>Citharinus citharus</i>	27	7	7.87	20	7.60
<i>Bagrus bayad</i>	16	10	11.24	6	2.28
<i>Synodontis membranaceus</i>	97	50	56.18	47	17.87
<i>Tilapia zilli</i>	83	3	3.37	80	30.42
<i>Oreochromis niloticus</i>	84	2	2.23	82	31.18
Total	352	89		263	
Relative percentage			25.92		74.08

3" (76 mm), 4" (101 mm), 5" (126 mm) and 7" (177 mm) were 266.91, 285.40, 305.10 and 349.02 g, respectively. The species diversity index were 1, 1, 0.88 and 0.77 for 3" (76 mm) 4" (101 mm) 5" (126 mm) and 7" (177 mm), respectively.

Table 3 showed the relationship between the total number of fish caught and percentage mode of capture and it was observed that the higher relative percentage for mode of capture was recorded by entangling/enmeshing with 74.08% while gilling/wedging had the least with 25.92%. The result of analysis of variance of the number of fish species caught by each meshsize showed there was significant difference ($p < 0.05$).

DISCUSSION

The fish species caught in each of the meshsize nets (Table 1) shows a diverse fishery nature. The difference in relative quantities of each type of fish caught by each meshsize of the gill nets could be attributed to the selectivity of the gill net due to differences in meshsize.

Comparison of the result of the quantities of fish caught by each of the nets' meshsize (Table 2) show that the highest by number and biomass was recorded in the net with 3" (76 mm) meshsize. This might be due to the meshsize of the net which has the ability of catching only those species of fish that had grown up to it meshsize which were more compare to other fish sizes. The effectiveness of the gear to select a particular species had been found to be a product of two probabilities:

- That of encountering of the gear by fish
- That of retaining of caught fish by the gear

In this study, the population of fish in the Lake was unknown so the retention rate of the net was the factor used in estimating the catch characteristics of each meshsize of the gill nets.

There is significant variation in the mean weight of fish caught in each net type. The 3" (76 mm) gill net which caught more fish than 7" (177 mm) gill net had a lower mean weight (266.91 g) than the 7" (177 mm) gill net (349.02). This indicates the ability of the larger meshsize net to retain large sized fish. Ita (1998) and Du Feu and Abiodun (1999) gave a trend which shows that the larger the meshsize of gill net, the bigger the size of fish caught.

The slight difference in species diversity index of the fish caught in 5" (126 mm) and 7" (177 mm) meshsize nets (0.88 and 0.77, respectively) depicts that both nets are comparable with relation to species selection properties.

CONCLUSION

In view of the result from this study, the gill net with meshsize 3" (76 mm) is considered the best among others, because it was more efficient both in mode of capture and selectivity of different species of fish. It is therefore recommended for artisanal fishers in Lake Jebba to improve their catch and leaving a balance ecosystem. However, there is need to modify the meshsize used to prevent the catching of under-sized, juvenal fish.

REFERENCES

- Du Feu, T.A. and J. Abiodun, 1999. Fisheries statistics of Kainji Lake, Northern Nigeria, Nov. 1994-Dec. 1998. Technical Report Series 13, Nigerian-German Kainji Lake Fisheries Promotion Project, New Bussa, Niger State, Nigeria, April 1999.
- Hamley, J.M., 1975. Review of gillnet selectivity. *J. Fish. Res. Board Canada*, 32: 1943-1969.
- Ita, E.O., 1998. The current status of fish stocks and fisheries in Kainji Lake, 1996. Nigerian-German (GTZ) Kainji Lake Fisheries Promotion Project, Technical Report, December 1998, pp: 45.
- Nedelec, C., 1975. *FAO Catalogue of Small-Scale Fishing Gear*. Food and Agriculture Organization of the United Nations by Fishing News (Books) Ltd., London, England, ISBN: 9780852380772, Pages: 191.
- Olaosebikan, B.D. and A. Raji, 2004. *Field Guide to Nigerian Freshwater Fishes*. 2nd Edn., Federal College of Freshwater Fisheries Technology, New Bussa, Nigeria, Pages: 111.
- Reed, W., J.B. Hopson, A.J. Jonathan and I. Yaro, 1967. *Fish and Fisheries of Northern Nigeria*. 1st Edn., Ministry of Agriculture, Northern Nigeria, Kaduna, Pages: 226.
- Van Brandt, A., 1984. Entangling Nets. In: *Fish Catching Methods of the World*, Van Brandt, A. (Ed.). Fishing New Books Ltd., London, pp: 418.