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Gillnet Selectivity and Abundance in the *Parailia pellucida* (Boulenger, 1901) (Schilbeidae) Fishery of the Freshwater Reaches of the Lower Nun River, Niger Delta, Nigeria

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Abstract: Gillnet selectivity and abundance of the *Parailia pellucida* fishery in the freshwater reaches of the lower Nun River was investigated using gillnets of 8, 12 and 15 mm classified as Small (SMS), Medium (MMS) and Large (LMS) mesh sizes, respectively. The nets exhibited selectivity with SMS catches ranging from 4.0-5.1 cm and mean of 4.70 cm Standard Length (SL), MMS between 5.0 and 6.5 cm and a mean of 5.6 cm SL, while that of the LMS gill net ranged from 6.0-10.5 cm with a mean of 7.3 cm SL. Apart from size selectivity, there was a significant difference in abundance and biomass of *P. pellucida* with mesh size of gill net used ($p<0.05$, $t = 1.969$, $df = 2$, $N = 144$) such that the LMS consisted of the highest abundance of 6,762 (74.4%) and biomass of 29.485 g (84.0%), the MMS 2.381 specimen (25.2%) and biomass of 5.238 g (14.8%), while the SMS constituted the least abundance of 269 (2.8%) and biomass of 409 g (1.9%). The mean monthly abundance and biomass were: SMS -11.21 (17.09 g), MMS -85.58 (217.21 g) and LMS -281.75 (1.230 g).

Key words: Gill net selectivity, abundance, *P. pellucida* fishery, lower Nun river, Niger Delta, Nigeria

INTRODUCTION

Fishing techniques are varied and include nearly all the basic fishing methods such as gillnets, cast nets, beach seines, traps, fishing stakes and bag nets. The basic operational fishing unit is the canoe, which although, occasionally manned by one man or woman, usually carries two, three or even more depending on the gear being used in artisanal fisheries.

The choice of a fishing gear to be used in a given fishery depends on factors such as species being fished (whether pelagic, demersal etc.), value judgement of the fisher, fishing depth and characteristics of the seabed if gear is to be worked in contact with the bottom. Schilbeids can be caught with both atalla lift net and gill net but better with the gill net since the atalla lift net is only very efficient in near shore waters and not suitable for mid rivers. Selectivity of fish gear affects the intra specific diversity of fish population by selecting against certain traits such as large size, fast growth and schooling behavior (Ryman, 1991). There is poor information on gillnet selectivity and catch/biomass of Schilbeids most especially on *P. pellucida* which underscores this investigation aimed at determining the best stretched mesh size for rational exploitation of the species in the lower Nun River, Nigeria.

MATERIALS AND METHODS

Study area: This study was carried out along the freshwater reaches of the lower Nun River around Anyama community Lat. 4°51'N and 4°54'N; Long 6°11'E and 6°13'E (Fig. 1) in Southern Ijaw Local Government Area Bayelsa State, Niger Delta, Nigeria covering an area of about 2.180 km^2. The concave bank in the study area is moderately steep sloping with loamy bottom while the convex bank is relatively shallow and sandy. The average depth of water at the sampling locations, that is, the convex, central and concave sections of the river was 2.7, 5.4 and 7.8 m, respectively in the dry season and 6, 8.75 and 11.20 m, respectively during the rainy season. The tidal influence is very mild during the dry season. However, a slightly reversed flow occurs during the rising tide at the peak of the dry season. During the

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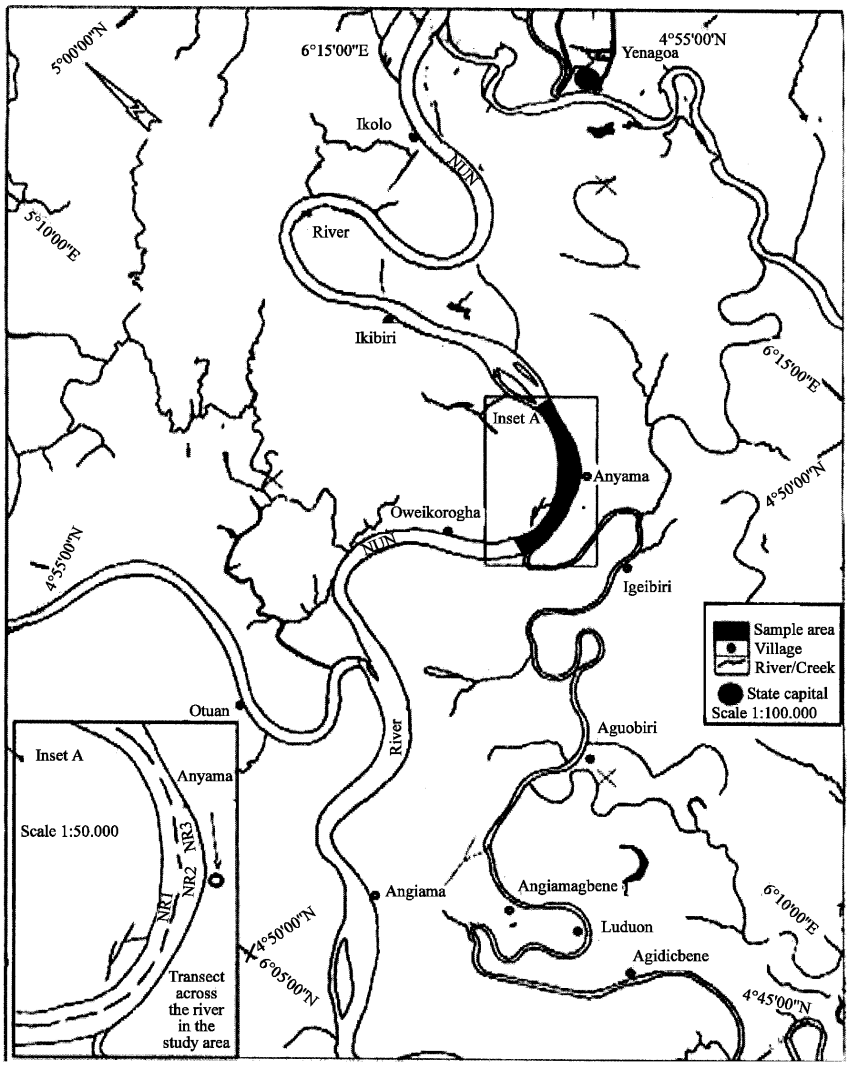

Fig. 1: The lower Nun river, Niger Delta, showing the sample area and sampling stations (NR1-Convex; NR2-Middle; NR3-Concave)

flood period, there is a swift one-directional flow in the study area. The flood sets in from about the end of May and receedes about the 4th week of October. Flood height ranges between 2.7 and 4.0 m with a mean of 3.35m.

Biological sampling: *Parailia pellucida* was sampled twice a month for 24 months at 2 weeks intervals with three gill nets of 8, 12 and 15 mm stretched mesh sizes, respectively that measured 35 m in length and 3 m in width, with a surface area of 105 m^2. The 3 drift gillnets were operated simultaneously from three canoes operated by 2 persons each, one to paddle and the other to set and retrieve the net during sampling. Sampling was done at the surface, mid-water and bottom through buoyancy control of the gill nets following the determination of the average depth of the study area. To fish at mid-water and bottom levels, the floats on the head line were reduced, while the sinkers on the weighted bottom line were appropriately increased to suspend the net at the desired level.

Sampling lasted for 3 h during each sampling trip. On landing, the specimens caught were counted and weighed separately according to the respective mesh sizes of the gill nets used, using a kitchen top loading balance.

RESULTS

The nets exhibited significant difference in selectivity ($p<0.05$, $t = 1.969$, $df = 2$, $N = 144$), with the SMS catches

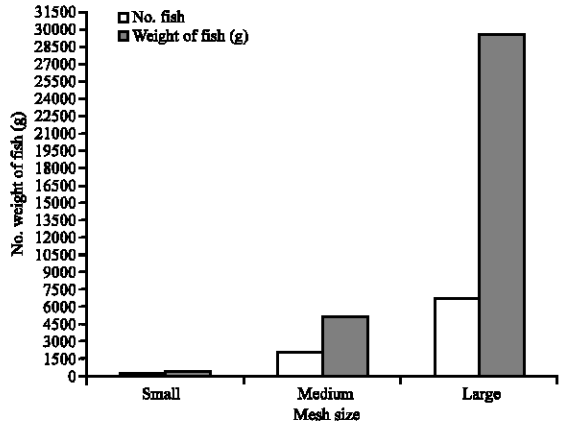

Fig. 2: Gill net selectivity and abundance of *P. pellucida* in the lower Nun River, Niger Delta

ranging from 4.0-5.1 cm and mean of 4.70 cm Standard Length (SL), MMS between 5.0 and 6.5cm and a mean of 5.6 cm SL, while that of the LMS gill net ranged from 6.0-10.5 cm with a mean of 7.3 cm SL.

Out of a total abundance of 9.432 specimens caught and biomass of 35.140 g, the 15 mm mesh size (LMS) constituted the highest abundance of 6.782 (72%) and biomass of 29.485 g (83.91%). It was followed by the 12 mm (MMS) with an abundance of 2.381(25.2%) and biomass of 5.238 g (14.8%), while the least of 269 specimens forming 2.8% with a biomass of 409 g (1.9%) was realized from the 8 mm (SMS) gillnet. The results are shown in Fig. 2. The mean monthly abundance and biomass of *P. pellucida* for the 24 months sampled were: SMS -11.21 (17.09 g), MMS -85.58 (217.21 g) and LMS -281.75 (1.230 g).

DISCUSSION

The selection trend showed the 15 mm mesh size as the most efficient for the *P. pellucida* fishery in the freshwater reaches of the lower Nun River system. The sizes of *P. pellucida* in this study (4.0-10.5 cm SL) are comparatively smaller than Olatunde (1977) Kainji Lake population. This may be due to the bigger mesh sized gillnets (12-25 mm) used in the Kainji Lake. Loubens (1973) also recorded a higher proportion of total catch of Schilbeids from gill nets of 20 and 25 mm stretched mesh sizes in the Chari River Deltaic zone. The smallest specimen of 4.0 cm observed in the 8.0 mm mesh size net in this study represents the least fishable size in the *P. pellucida* fishery of the lower Nun River below which, undersized pre-recruitment fish may be caught which is likely to threaten the sustainability of the fishery.

Gill net is reported as one of the most efficient gear with higher selectivity than other gear (Hopson, 1968 in Lake Chad; Alfred-Ockiya, 1996 in Kolo Creek). The high selectivity was attributed to morphometric projections. However, Allison *et al.* (1997) observed the least relative abundance of 3.54% from drift gill net and the bulk catch of 76.34% from seine net while cast net constituted 20.11% of the fish assemblage of Elechi Creek in Rivers State of the Niger Delta, Nigeria and attributed the poor selection to its passive nature compared to the rest of the gear used.

CONCLUSION

The study has revealed that gillnets of 15 mm stretched mesh size are most efficient in the *P. pellucida* fishery in the lower Nun River. However, a combination with those of 12 mm mesh size may be more effective in catching a wider spectrum of fish sizes.

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