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Efficiency and Selectivity of Monofilament Gillnet for Three Commercially Important Cichlids Species in Erelu Reservoir, Oyo, Nigeria

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Abstract

Gillnet selectivity is crucial for the effective and sustainable management of fisheries. However, there is a knowledge gap on gillnet selectivity for commercially important Tilapia species in Erelu Reservoir. This study estimated the selectivity parameters of commonly used monofilament gillnets for three commercially important cichlid species in Erelu Reservoir. The reservoir was divided into upper, middle and lower zones based on geographical location. Fleet of monofilament gill nets mesh sizes: 38.1, 50.8, 63.5, 76.2, 88.9, 101.6 and 127.0 mm were randomly set in each zone on a monthly basis for 21 months covering two wet and dry seasons, respectively. The catches were identified, counted and efficiency of each gillnet estimated for *Oreochromis niloticus*, *Sarotherodon galileaus* and *Pelmatolapia mariae* by calculating the catch-per-unit effort. The selectivity parameters such as Selection Factor (SF) and Selection Variance (SV) for each combined gillnets were determined from regression analysis while the Common Length of Selection (CLS) and optimum selection length were obtained from selectivity curve. The size at first maturity of the cichlids were determined using length frequency analysis wizard. Highest and least catch per unit effort for *Oreochromis niloticus* (76.2mm;127.0mm), *Sarotherodon galileaus* (76.2mm;127.0mm) and *Pelmatolapia mariae* (63.5mm;38.1mm) were 13.57g/m; 0.20g/m, 8.29g/m; 0.10g/m and 4.65g/m; 0.40g/m, respectively. The SF, CLS and SV for the combined gillnet 76.2mm/63.5mm were 0.21;17.5cm; 2.91 and 0.19; 16.5cm and 1.86 for *Oreochromis niloticus* and *Pelmatolapia mariae,* respectively. The optimum selection length of 18.83cm (*Oreochromis niloticus*), 19.04cm (*Sarotherodon galileaus*) and 17.12cm (*Pelmatolapia mariae*), respectively were recorded for 76.2mm gillnet. Considering the size at first maturity of 17.9± 0.6cm, 16.5±0.2 and 15.0±0.3cm for *Oreochromis niloticus*, *Sarotherodon galileaus* and *Pelmatolapia marie*, respectively mesh size of 76.2mm will be appropriate for sustainable exploitation of these *tilapia spp.* in Erelu Reservoir.

Keywords: Catch, Gillnet, Management, Selectivity.

Introduction

Fish stock assessment determines the long-term biological reference point and also gives short and long-term estimates of the effects on yield and biomass of different strategies of the fishery exploitation (Kareem, 2017). In order to make prediction about the future of a fish stock, information on the status of the stock as well as the dynamics of the fisheries should be available. In standing water such as reservoir, sampling by gillnetting is the most widely used technique to collect fish assemblage data. The most widely proposition of gillnet sampling is to assess how catches relate to fish abundance, diversity and size distribution (Argent and Kimmel, 2005). It is assumed that if they are taken in a standardized manner, gillnet catches (CPUE) appropriately monitor trends of fish assemblages both in time and space (CEN, 2005). The efficiency of gillnet made its usage for monitoring fish population in lakes, (Colven, 2002) reservoirs (Ozekinci *et al*., 2007) and marine environments (Murphy and Willis, 1996) indispensable. Cadima (2003) also reported that fish stock assessment ensure the availability of appropriate database and analysis of available data for exploitation strategies for short and long-term projection of yield biomass.

It also determines the long-term biological reference point and estimates the short and long-term effects on yield and biomass of different strategies of the fishery exploitation.

Small – scale artisanal fishermen extensively use gillnets in the fresh, brackish and coastal waters of Nigeria (Solarin and Kusemiju, 2003; Emmanuel, 2008). Gillnets are commonly used in selectivity studies to estimate the abundance and size structure of fish populations. Knowledge of the size selectivity of fishing gear types is crucial to fisheries management in order to maximize a sustainable yield (Oginni *et al*., 2006; Emmanuel *et al*., 2008). Catch per unit of effort (CPUE) remain an important variable in fisheries sciences, as it provides means to monitor population size trends (Solomon *et al*., 2018), relative abundance of species in different habitats and sites (Gryska *et al*., 1998), as well as to compare efficiency of different fishing gear (Simasiku *et al*., 2017).

However, the gillnets selectivity of most tropical fish are poorly known (Tesfaye, 2019). Gillnets is the most widely used fishing gear among fishers in Erelu reservoir. However, a disturbing decline in catches has been observed in the past few years in the reservoir and efforts at addressing this trends

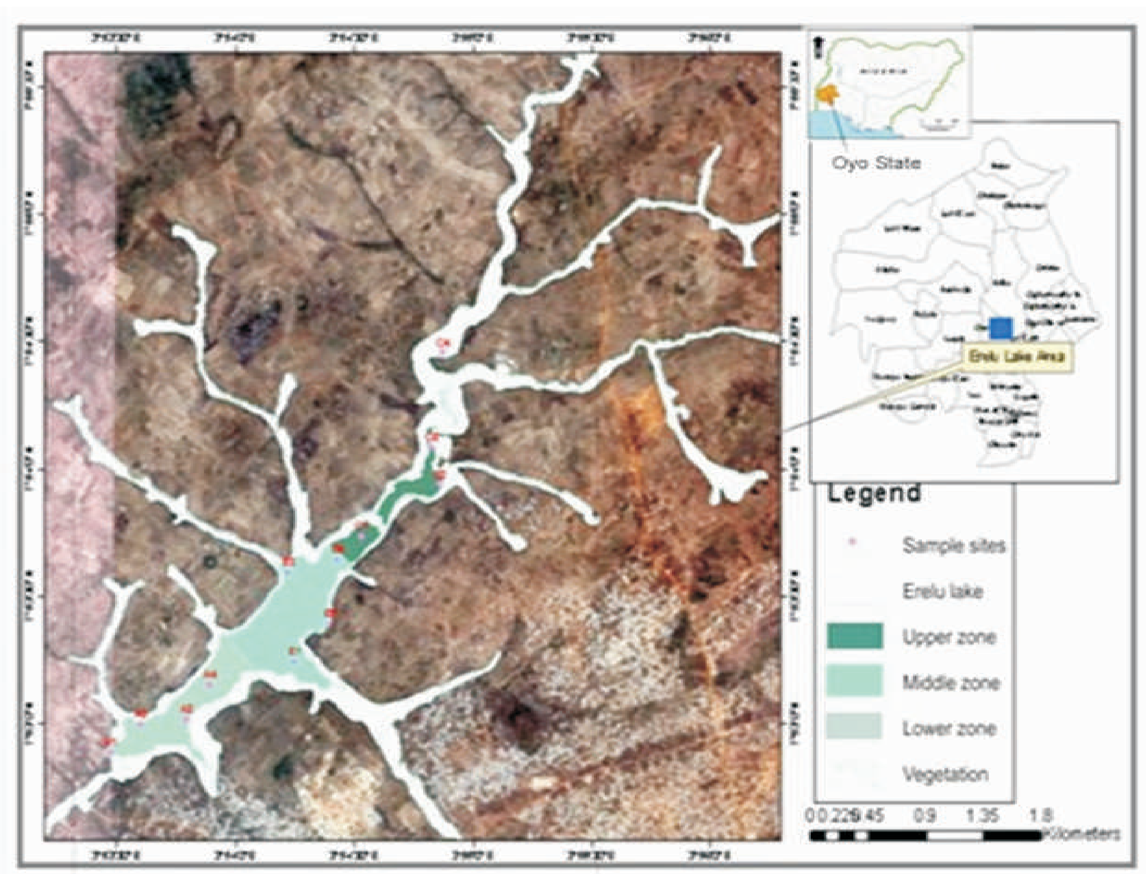

Figure 1: Map of Erelu reservoir showing sampling points

require adequate information on the impact of various meshes of gillnet on sustainable fish production. Therefore, this study investigated the efficiency and selectivity parameters of gillnet for *Oreochromis niloticus*, *Sarotherodon galileaus* and *Pelmatolapia mariae* in Erelu Reservoir with a view to determine the appropriate mesh size that will promote responsible fishing activities.

Material and Methods

Description of the study area

Erelu dam is one of the dams built by the then Western region government to supply portable water to Oyo and its environs. It lies between latitude 07^{0} 53'and 07^{0} 5'longitude 03^{0} 53' and 03^{0} 55' as shown in Figure 1. The dam was built in 1962 on Awon River along Oyo/Iseyin axis and fed by the following tributaries: Isuwin, Oroki, Ogbagba, Oloro, Elesin, Awon and Abata (Ufoegbune *et al*., 2011).The impoundment area of the dam is 3158600 m^{2} and the catchment area is 243.36 km. The dam is about 6.4 km from the heart of Oyo town.

Fish sampling

The reservoir was stratified into upper, middle and lower zones based on geographical location while three sampling stations were randomly selected in each of the zones. Fleet of monofilament gill nets mesh sizes: 38.1, 50.8, 63.5, 76.2, 88.9, 101.6 and 127.0 mm were randomly set in each of the three stations per zone on a monthly basis for 21 months covering two wet and two dry seasons, respectively.

Fish sampling lasted for a period of twenty-one months (July, 2013 to March, 2015). The sampling was carried out on graded gillnets consisting: 38.1mm, 50.8mm, 63.5, 76.2mm, 88.9mm, 101.6mm and 127.0mm, each measured 30m long and 3m deep. The nets were set randomly and simultaneously at each zone at 1900 hours and fish caught were retrieved the following morning between 0700 and 0900 hours. *Oreochromis niloticus*, *Sarotherodon galileaus* and *Pelmatolapia mariae* catches from each fleet of specific mesh size were retrieved into pre-labelled plastic container, counted and recorded. Identification was made with the aid of relevant texts (Idodo-Umeh, 2003; Olaosebikan and Raji, 2013).

Efficiency and selectivity of gillnets

Efficiency of gillnet was estimated for each of these fish species by calculating the catch-per-unit effort according to Balik and Cubuk (2001).

Catch per unit effort was calculated by dividing the total catch by the length of the nets and finally dividing by the number of night the net was deployed:

CPUE = $\Sigma(Y/n)/N$ (Balik and Cubuk, 2001)

CPUE = catch-per-unit effort

Y = weight of fish caught (g) by gillnet of specific mesh size

n = total length of the gillnet (m)

N = number of trials (times net is deployed)

The selectivity of gillnet was estimated using Holt method (Holt, 1963) as explained by Sparre and Venema (1998). $Lm \alpha M$ ($Lm = SF*M$)

Where Lm is the optimum length, M is the mesh size and SF (selection factor) is the constant of proportionality.

In such cases, given catches obtained by the smaller mesh size (M_A) and the larger mesh size (M_B), the optimum length (L_A) corresponding to M_A and optimum length (L_B) corresponding to M_B can be estimated from the catch by length class of each mesh (C_A –catch in mesh M_A and C_B - catch in mesh M_B) through a linear regression of the form $y = a + bx$, where:

$y = \ln(C_B/C_A)$.. (1)

The ratio (C_B/C_A) is called the catch ratio

$x = L$ (fish length).................................... (2)

Then, the expected linear regression equation as relationship between catch and fish length

$\mathrm{Ln}(C_B/C_A) = a + bL$................................ (3)

The intercept and the slope obtained from the regression analysis were used to estimate the selection factor (SF) and the variance (S^2) as it is required. The selection factor (SF) was used to estimate the optimum length.

The selection factor (SF), the constant of proportionality of optimum length and mesh size can be estimated as:

$SF = -2a / b (M_A + M_B)$............................ (4)

Where: M_A is mesh size of the smaller net (mm)
M_B is mesh size of the larger net (mm)

The intercept "a" and the slope "b" of the regression equation (8) can then be used to estimate the optimum lengths from equations 9 and 10 below:

$L_A = -2a*M_A / b (M_A + M_B)$ or $SF* M_A$….. (5)

$L_B = -2*M_A / b (M_A + M_B)$ or $SF* M_B$......... (6)

The Selection variance (SV) was estimated by:
$S^2 = [2a (M_A - M_B)] / [b^2 (M_A + M_B)]$ .... (7)

OR

$S^2 = SF*(M_B - M_A) / b$................................ (8)

Points on the selection ($S_{A \text{ or } B}$) curves or the probability of capture (P) at a given fish length (L) was calculated by using:
$S_A = \exp [- (L - L_A)^2 / 2*S^2]$ …………… (9)

$S_B = \exp [- (L - L_B)^2 / 2*S^2]$ ……………..… (10)

Meanwhile, when using more than two gillnets the above procedures will be modified as follows the common selection factor (SF), of the combined mesh sizes will be estimated as:

$SF = \Sigma[(x(i)*y(i)] / \Sigma x(i)^2$

Where: I = 1, 2, 3……

$y (i) = -2*a_{(i)} / b_{(i)}$ .... (12)

a (i) and b(i) are the intercept and slope of each mesh sizes respectively

$x (i) = m_{(i)} + m_{(i)+1}$ .... (13)

$m_{(i)}$ is the mesh size of each gillnet used.

The common standard deviation is estimated by finding the mean of all standard deviations.

Then, the optimum selection length (L_{m1} and Lm_2) of each mesh size is estimated as:

$L_m(i) = SF*m(i)$ .... (14)

Where: i = 1, 2, 3……

Therefore, Common Length of Selection (CLS) from selection curve using the formula:

$$CLS = L_{m1} + L_{m2}/2$$

Holt (1963) gave the expected values of selection or probability of capture of S_A and S_B as a fraction which lies between 0 and 1: $0 < S_{A \text{ or }} S_B \leq 1$.

The length/frequency analysis wizard by Rainer Froese (2004) was used to determine the size at first maturity for *O. niloticus*, *S. galileaus* and *P. mariae* in the reservoir.

Results

Table 1 shows the gillnets catch of the three dominant species using seven different gillnet variants. A total of 2092 fish specimens were collected and the mean size of *O. niloticus*, *S. galilaeus* and *P. mariae* was not significantly different ($p < 0.05$), despite a wider size range observed for *O. niloticus* (Table 1). Catch sizes in 63.5 mm (n = 726) and 76.2 mm (n = 714) were substantially higher than for other mesh sizes. Using the collected catch data, the gillnet efficiency parameters of mesh sizes 38.1, 50.8, 63.5, 76.2, 88.9, 101.6 and 127.0 mm were estimated for the three species. The result indicated that the efficiency of various gillnet mesh sizes deployed to monitor fish assemblage in Erelu reservoir differed considerably ($p < 0.05$), although overlapping in fish length sizes among different mesh sizes were prominent. Figures 2 and 3 depicts spatial and seasonal catch composition of *O. niloticus*, *S. galileaus* and *P. mariae*, respectively in Erelu reservoir.

The efficiency of seven different gillnet variants used for sampling of *Oreochromis niloticus* are presented in Table 2. In 38.1 mm mesh size, 39 individual *O. niloticus* having 1967.2 g with catch per unit effort of 1.04 g/m and length range of 8 – 14 cm were caught. The catch-per-unit effort for 50.8mm gillnet was 1.57g/m and 65 individual *O. niloticus* of length range 10 – 16 cm were retrieved, 63.5 mm captured 295 fishes with efficiency of 11.03 g/m. The mesh size 76.2 mm was the most efficient for *O. niloticus* with the catch-per-unit effort of 13.57 g/m and 307 individual fish weighing 25637.2g. Mesh size 101.6mm caught 72 fishes with catch per unit effort of 5.78 g/m and weight of 10926.3 g. The least efficient gillnet was 127.0mm mesh with 378.4g consisting of only two individual fish. The catch-per-unit effort for this net was 0.20g/m.

Table 1: Gillnets catch (n) of the three fish species using different stretched mesh in Lake Erelu

Species	n	Mesh sizes (mm)							Total length (cm)	
		38.1	50.8	63.5	76.2	88.9	101.6	127.0	Mean	Range
O. niloticus	898	39	65	295	307	118	72	02	16.84 ± 1.15	12.0 – 35.5
S. galilaeus	687	50	54	223	248	84	27	01	18.30±1.92	9.8 – 29.4
P. mariae	507	32	60	208	159	40	08	-	16.94±2.10	9.6 – 26.2

*Significant at 5% level ($p < 0.05$)

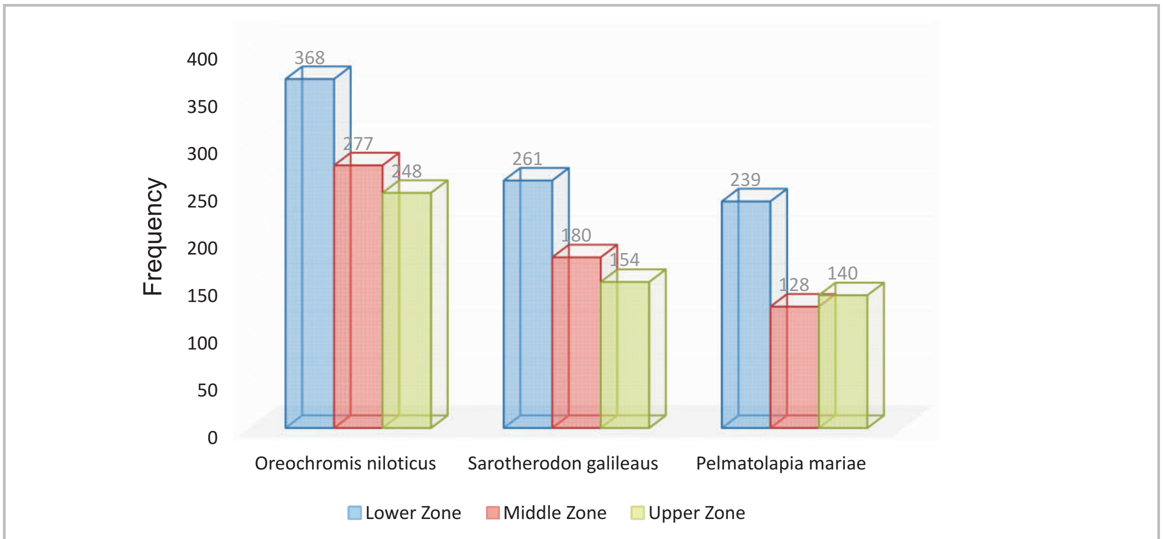

Figure 2: Spatial catch composition in numbers of *O. nloticus*, *S. galileaus* and *P. mariae* in Erelu Reservoir

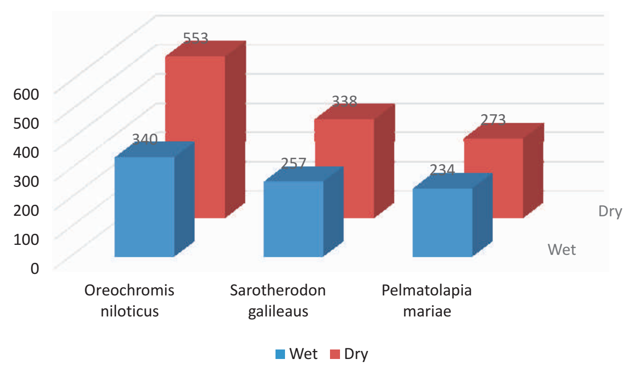

Figure 3: Seasonal catch composition in numbers of *O. niloticus*, *S. galileaus* and *P. mariae* in Erelu Reservoir

Table 2: Efficiency of gillnets used for sampling of *Oreochromis niloticus* in Erelu Reservoir

Mesh size (mm)	Total catch (Number)	Weight (g)	CPUE (g/m)
38.1	39	1967.2	1.04
50.8	65	4004.0	1.57
63.5	295	20843.4	11.03
76.2	307	25637.2	13.57
88.9	118	13536.0	7.16
101.6	72	10926.3	5.78
127.0	02	378.4	0.20

Values from Tables 1 and 2 were used to estimate the selection factor, selection variance, optimum length and the common length of selection. The selection factor (SF) for the combined gillnet M_1 and M_2 mesh sizes for *Oreochromis niloticus* was 0.24 while the variance was 2.03. The optimum length of *O. niloticus* for combined nets M_1 and M_2 were 9.28 cm and 12.3 cm, respectively and the common length of selection was 11.50 cm. However, M_3 and M_4 had optimum length of 16.14 cm and 18.83 cm respectively (Table 3). The selection factor was 0.21 with variance of 2.91. The common length of selection for each of the combined net M_4/M_3 and M_6/M_5 were 17.50 cm and 29.00 cm respectively (Figure 4).

The CPUE of *Sarotherodon galilaeus* differed significantly on the various mesh sizes tested (Table 4) ($P < 0.05$). The highest CPUE 8.29g/m was recorded in 76.2mm net for *Sarotherodon galilaeus* which also coincided with the highest number of fish captured (248). The length of fish in this category fall within size range 14 – 26cm. The second most efficient net was 63.5mm with CPUE of 7.28g/m and total biomass of 13764.3 and 233 individual *Sarotherodon galilaeus*. The least number was recorded in 127.0mm with CPUE of 0.10g/m and only one individual catch (Table 4). Whereas, mesh sizes 50.8mm and 88.9mm caught 54 and 84 *S. galilaeus* with length range and CPUE of 10 – 16cm and 16 – 28cm, 1.05g/m and 3.92g/m, respectively.

Table 3: Gillnet selectivity parameters for *Oreochromis niloticus*

Selectivity Parameter	Value
Mesh size: 50.8/38.1	
Selection factor (SF):	0.24
Variance:	2.03
Optimum length: Lm_1	9.28
: Lm_2	12.38
Common length of selection:	11.50
Mesh size: 76.2/63.5	
Selection factor (SF):	0.21
Variance:	2.91
Optimum length: Lm_3	16.14
: Lm_4	18.83
Common length of selection:	17.50
Mesh size: 101.6/88.9	
Selection factor (SF):	0.28
Variance:	7.86
Optimum length: Lm_5	28.18
: Lm_6	31.70
Common length of selection:	28.50

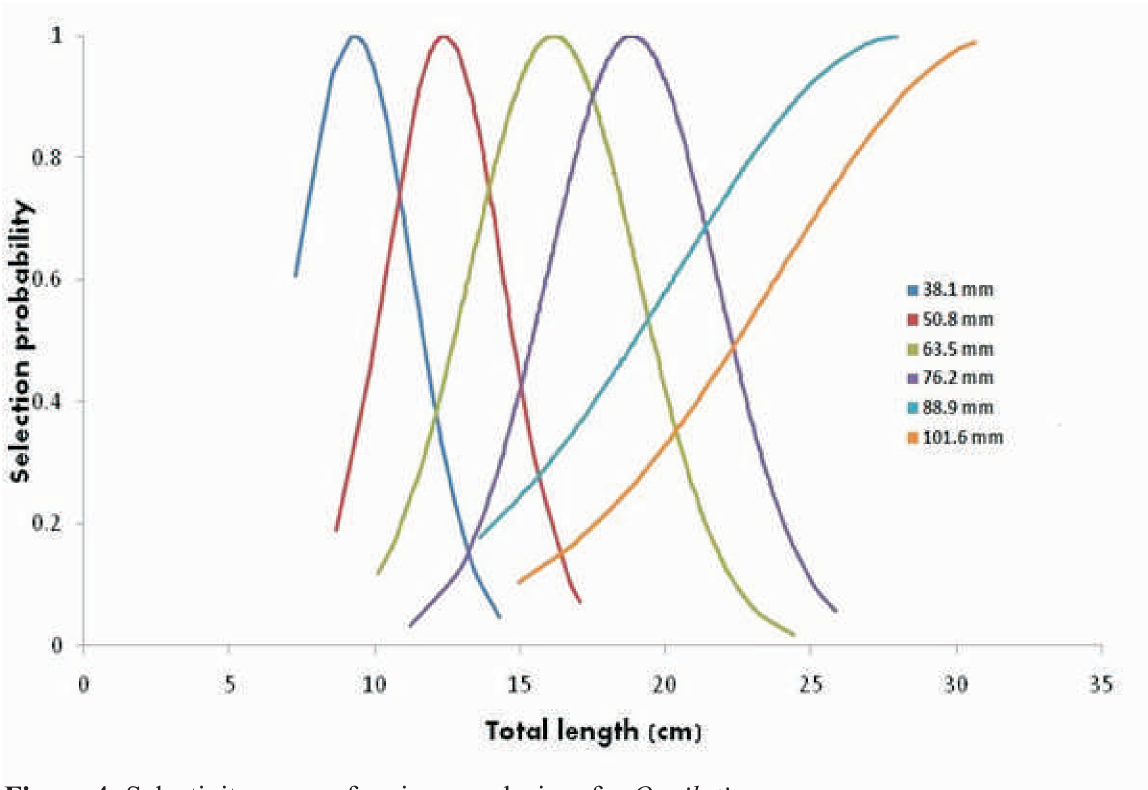

Figure 4: Selectivity curve of various mesh sizes for *O. niloticus*

The selection factor of 38.1/50.8mm for S.*galilaeus* was 0.21 and the optimum lengths of fish caught were 8.09 and 10.79cm respectively while the variance was 1.47. The common length of selection was however, 9.00cm (Table 5). The common length of selection for combined gillnet M_4/M_3 was 17.50cm while that of M_6/M_5 was 27.5cm (Figure 5). In the same vein, the selection factor, variance and common length of selection for M_4/M_3 and M_6/M_5 were 0.21, 3.42, 17.50cm and 0.25, 2.82, 27.50 respectively. The optimum lengths for M_3 and M_4 were 16.32cm and 19.04cm whereas the optimum lengths for gillnets M_5 and M_6 were 25.15cm and 27.50cm respectively.

Table 4: Efficiency of gillnets used to catch *Sarotherodon galilaeus* in Erelu Reservoir

Mesh size (mm)	Total catch (Number)	Weight (g)	CPUE (g/m)
38.1	50	655.6	0.35
50.8	54	1985.5	1.05
63.5	233	13764.3	7.28
76.2	248	15659.3	8.29
88.9	84	7407.6	3.92
101.6	27	3399.9	1.80
127.0	01	180.5	0.10

Table 5: Gillnet selectivity parameters for *Sarotherodon galilaeus*

Selectivity Parameter	Value
Mesh size: 50.8/38.1	
Selection factor (SF):	0.21
Variance:	1.47
Optimum length: Lm_1	8.09
: Lm_2	10.79
Common length of selection:	9.00
Mesh size: 76.2/63.5	
Selection factor (SF):	0.21
Variance:	3.42
Optimum length: Lm_3	16.32
: Lm_4	19.04
Common length of selection:	17.50
Mesh size: 101.6/88.9	
Selection factor (SF):	0.25
Variance:	2.82
Optimum length: Lm_5	25.15
: Lm_6	28.29
Common length of selection:	27.50

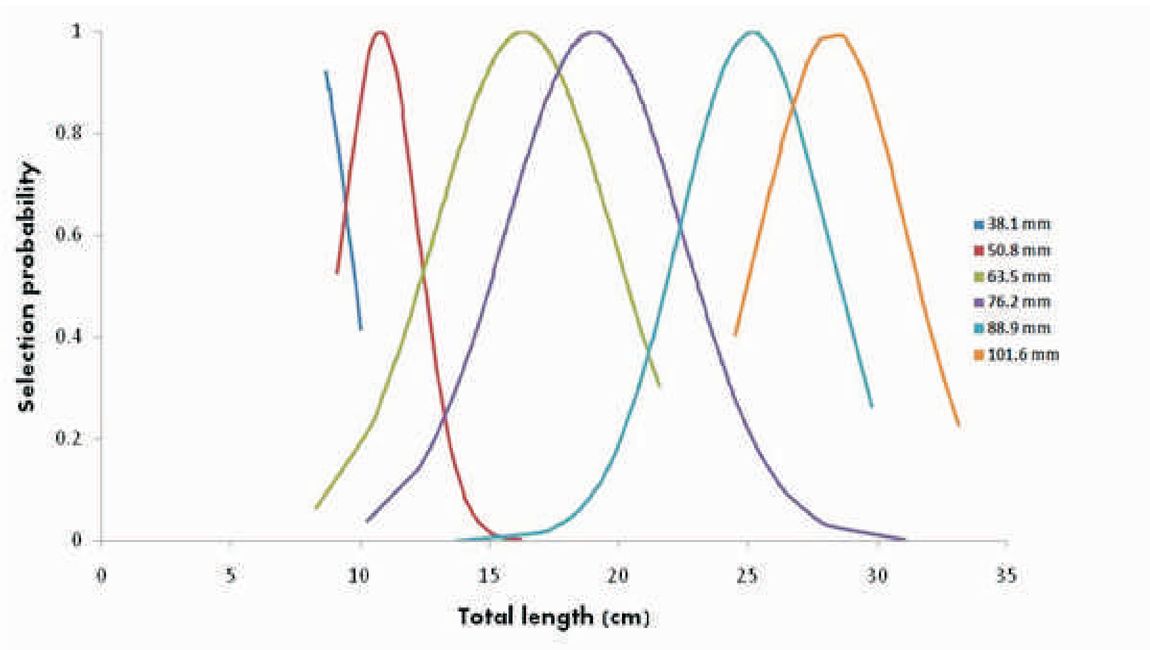

Figure 5: Selectivity curve of various mesh sizes for *S.galilaeus*

The CPUE, length range and the number of fish caught varied from one mesh size to the other. For instance, mesh size 38.1 mm with CPUE of 0.40 g/m caught a total of 32 samples of *P. marie* with length range 8 – 12 cm, 50.8 mm with CPUE of 0.96 g/m recorded 60 *samples* of length range 10 – 16 cm while the highest CPUE and number of 4.65 g/m and 208, respectively with length range 12 – 18 were recorded in 63.5mm. A total of 159 *P. marie* with CPUE and total length range of 4.62

g/m and14 – 20 cm, respectively were recorded in 76.2 mm gillnet (Table 6).

The selection factor for combined nets 38.1/50.8 was 0.23 and variance 2.40 while the optimum lengths were 8.78 cm and 11.71 cm for the individual net, respectively. The common length of selection of the paired nets was 10.00 cm (Table 7). On the hand, for the paired net 88.9/101.6, the common length of selection was 20.00 cm (Figure 4) while the variance and selection factor were 3.04 and 0.24, respectively. However, the combined gillnets 76.2/63.5 mm have values for selection factors, variance and common length of selection of 0.19, 1.86 and 16.50, respectively. The optimum length of *P. marie* caught by 63.5 mm was 14.73 cm while for 76.2 mm, the optimum length was 17.12 cm (figure 6).

Table 6: Efficiency of gillnets for *Pelmatolapia marie* in Erelu Reservoir

Mesh size (mm)	Total catch (Number)	Weight (g)	CPUE (g/m)
38.1	32	748.0	0.40
50.8	60	1806.2	0.96
63.5	208	8778.8	4.65
76.2	159	8727.1	4.62
88.9	40	3999.8	2.12
101.6	08	1197.6	0.63
127.0	-	-	-

Table 7: Gillnet selectivity parameters for *Pelmatolapia mariae*

Selectivity Parameter	Value
Mesh size: 50.8/38.1	
Selection factor (SF):	0.23
Variance:	2.40
Optimum length: Lm_1	8.78
: Lm_2	11.71
Common length of selection:	10.00
Mesh size: 76.2/63.5	
Selection factor (SF):	0.19
Variance:	1.86
Optimum length: Lm_3	14.73
: Lm_4	17.12
Common length of selection:	16.50
Mesh size: 101.6/88.9	
Selection factor (SF):	0.24
Variance:	3.04
Optimum length: Lm_5	17.12
: Lm_6	24.64
Common length of selection:	20.00

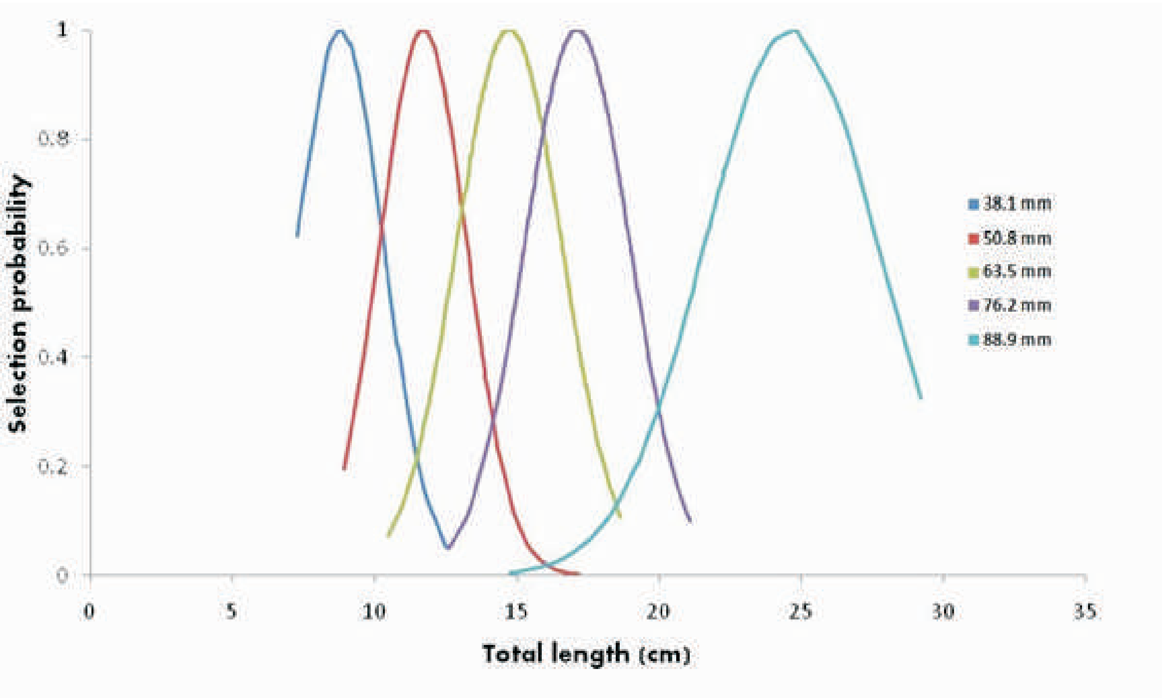

Figure 6: Selectivity curve of various mesh sizes of gillnets for *P. mariae*

Discussion

Fishing gear selectivity study is an important tool for fisheries management. Consequently, selectivity of gillnets as a major fishing gear among fishermen in various part of the world has received wide attention (Dankwa *et al*., 2014; Akongyuure *et al*., 2017). By regulating the mesh size of gillnet, the approximate minimum catch sizes of the target species can be known (Clavero *et al*., 2006). Fishery regulation recommends that organism could be sustainably harvested once they have been recruited to reproduction.

Gillnet catches in this current study exhibited very low catches in smaller mesh size (38.1 mm) and larger mesh sizes (101.6 and 127.0 mm), which was indicative of gillnet selection by sizes. The reason for more catches in 63.5 mm and 76.2 mm mesh sizes observed in the present study could be attributed to their vulnerability to these mesh size gillnets. These mesh sizes (101.6 and 127.0 mm), in economic terms were more effective in catching higher number and fish weight, indicating the ability of medium mesh size gillnets to retain more fish, both by gilling and entangling medium-size fish. These results are similar to those of Carol and Garcia-Berthou (2007), who noted the highest catch by weight was observed from the medium mesh size gillnet used in 13 Reservoirs in Catalonia. Also, the efficiency and selectivity of gillnets for *O. niloticus, S. galilaeus, and T. marie* in Erelu lake followed trends documented by Pusty and Borowski (1997). Several other authors such as Oginni *et al.* (2007), Ozenkinci *et al.* (2007), Vandergoot *et al.* (2011) and Dan-kashiya (2013) equally reported similar findings with variation in the weight of catches recorded.

Rojo – Vázquez *et al*. (2001) estimated gillnet selectivity, and catch efficiency for *Microlepidotus brevipinnis* using gillnets of 7.62 and 8.89 cm of mesh size. A total of 457 organisms were caught with the 7.62 cm mesh size, and 592 with the 8.89 mesh size.This result considerably varied from 307 and 118 *Oreochromis niloticus* obtained using 76.2 mm and 88.9 mm gillnets, respectively. Generally, the various mesh sizes of gillnet caught relatively wide ranges of lengths and modal length of the species caught gradually increased with increasing mesh sizes (Petrokis and Stergious, 1996; Oginni, 2006). Also, gillnet mesh sizes were discovered to be negatively correlated with the number of catches recorded in line with report of Muthmainah *et al*., (2014). The values of variance obtained for the combined gillnet for the dominant fish species increased from smaller gillnet to the bigger one and ranged between 1.47 to 7.86. This is an expression of wider selection range of the nets as supported by Næsje *et al*., (2004). Similar results have been well documented by various studies including Ozenkinci *et al.* (2007), Hutubessy (2011) and Akongyuure *et al.* (2012). These authors attest to the fact that wider selection range gives the probability of capturing a wider group of fish in the water.

Selection factor is an index related to escapement factor expressing the relation between the 50% point (the fish length at which a particular gear allows 50 % of the fish to escape) and the size of the mesh involved. According to Andreev (1962), the selection factor is a very important constant and usually varies between 5 and 10. However, the values of common selection factors in this study ranged between 0.19 and 0.28. This result was comparatively low to the value range of 2.59 and 2.89 obtained by Oginni *et al* (2007) for monofilament gillnet operation on *Sarotherodon galilaeus* in Iwo reservoir, Nigeria. Hutubessy (2011) and Akongyuure e*t al.* (2012) equally reported similar findings with higher selection factors for monofilament gillnets in their studies.

The length at which a particular mesh size of gillnet is effective is referred to as the optimum length; at this length a mesh size has the highest point of selection. Below and above the optimum length, the number of catch of a particular mesh size decreases. The range in optimum length for all the mesh sizes used in this work indicated that the optimum length increased from smaller mesh sizes to the bigger mesh sizes for each species sampled. This allowed bigger size of fish to be caught and immature fish to escape as the bell shape of the selection range is shifted to the right. Revill *et al.,* (2009) made similar observation in their respective study. The optimum catch length of 28.57, 32.65, 36.73, 40.81 and 44.89 cm obtained using 35, 40, 45, 50 and 55mm gillnet for *Capoeta trutta* by Ali *et. al.* (2014) was higher than 8.78 cm, 11.71 cm and 14.73 cm obtained for *P. marie* in this study with 38.1, 50.8 and 63.5mm gillnet, respectively.

It was equally observed that optimum length of gillnet mesh size is species- dependent. That is, it changes with each species of fish, even when the same mesh size of gillnet is used. In this study, the optimum selection length gradually increased with increasing mesh size in all the species. As observed, 50.8 mm had an optimum length of 12.38 cm total length for *O. niloticus* and 10.79 cm for *S. galilaeus* while 63.5 mm had an optimum length of 16.14 cm for *O. niloticus* and 16.32 cm for *S. galilaeus*. This increasing pattern may be due to the change in body proportion as a result of sexual maturity (Dayaratne, 1988). This observation corroborates the work of Hutubessy (2011) who observed an optimum length of 19.97cm total length for *Oxeye scad* with gillnet mesh size of 50.8mm. This result also conforms with the work of Akongyuure *et al.,* (2012) who observed optimum length of 19.7cm for *Synodontis membraneaceus* and 18.2cm for *Schilbe mystus* with mesh size of 50mm. This result hence, confirmed that optimum length of a mesh size must be estimated for individual fish species, to know the appropriate mesh size for fishing the stock. In addition, it was observed that optimum length of a fish species is not constant when estimated with different combination of mesh sizes. This observation was in concordance with the works of Oginni *et al.* (2006), Ozenkinci *et al.* (2007) and Hutubessy (2011).

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