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The Study of Longline Design Techniques and Specification in Escravos Estuary of Delta State, Nigeria

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ABSTRACT

The study of longline design techniques and specification in the Escravos estuary within okerenkoko axis, Delta State, Nigeria was studied in three major fishery communities (Okerenkoko, Benigbene, and Kurutie) between May 2023 and July 2023. Types of longlines were identified. The result revealed that long line material used in the study area consisted of R50-150 tex polyamide twines for surface-set longlines with hook sizes of No.15-17 and R50-250 tex with hook sizes of No. 12-14 for bottom-set longlines (MLR) in the study Area The length of mainline longlines ranged between 250-500m surface set and 500-1000m. The bottom set and branch line (BLR) range between 20-30cm surface set and 130-160cm. The bottom set has a range of 200-300 branch lines (snots) attached to the main lines by the weaver's knots in both surface and bottom set longlines. The results revealed that floats and sinkers) were the material types used as floats and sinkers in both the two longlines weights of Styrofoam/worn-out bathroom slippers ranged between 15-30g, whereas sinkers weighed between 50-250g space interval in longlines for the floats and sinkers ranged between 3-5m, while quantity number ranged between 50-125 in the three stations the same design characteristics and specifications, both in line/ropes and accessories in the study area.

Keywords: Fishing Gear, Longlines, Escravos Estuary, Design techniques

1. INTRODUCTION

Reviewing the history of the artisanal fishing gear of Nigeria shows that the most comprehensive report was that of FAO (2005) and Binyotubo, (2019), which dealt exhaustively on the type and specification of the various fishing gear used in the coastal and brackish waters of Nigeria. Several types of fishing gears have been designed, fabricated, tried, and possibly modified to suit particular fishing grounds or operations. FAO 2005) and Binyotubo (2011) noted that fishing gear design specification recommended standard for specifying and designing the various components of fishing gear, which may not necessarily be scale or exact.

However, the specification should give the essential impression to any expert who wishes to construct such gear without necessarily sighting the gear. Bailay, *et al*., (2020) and Binyotubo *et al* (2022), reported that ropes are extensively used in the fishing gear construction and operation. They provide the framework and linear strengthening components in the fabrication of longline and constitute the mainline and branch line and buoy line of large Floats are used to keep the fishing gear in the desired position and to maintain the desired shape during the operation, and buoys are attached to the fishing gear to show its location.

Adimula Fasakin, (2004) desirable properties for floats and buoys are high buoyancy resistance to the influence of water pressure on buoyancy, long service life, ease of manufacture and low unit cost. Longline and hook and line they are used to keep the branch line vertically, close to the surface of fishing. Bigelow, *et al,* (2006) ,Avanwaler (2003) and Carruthers *et al,(2009)*.Sinkers are used in tandem with the floats to give fishing gear the desired shape, fishing orientation and fighting position as in longline: to keep the mouth of the gear vertical open and maintain good ground contact as in longline, and to increase the sinking speed and vertical stretch of longline efficiency (catchability) of a longline is defined as the proportion of the total population of a certain size-class, which is caught and retained by a unit operation of the gear which selectivity is the relative efficiency per size (Okafor, 2020).

A comprehensive study on design techniques and specification of Longline fishing gear is scanty in the Escravos Estuary around Okerenkoko and Kurutie axis of Delta State, Nigeria. This study is therefore carried out to investigate the design techniques and specification of longline fishing in Escravos Estuary so that proper management advisory can be formulated to maintain the resilience of the design techniques and specification of longline fishing in the study area.

2. MATERIALS AND METHODS

The Study Area

The study area is located in Escravos Estuary around Okerenkoko and Kurutie axis in Warri South-West Local Government Area of Delta State, Nigeria. The Escravos Estuary is situated between latitude 5^0 30' 0'' N and $5^0$50'0''N and Longitude $5^0$10'0''E and 5^0 40'0''E (Figure 1). The area is characterized by active beaches on the seaward sides. The surrounding Escravos Estuary is characterized by a tropical climate with well demarcated rainy and dry seasons. The dry season stretches from November to April while the rainy season is usually from May to October (Opule, 2000).

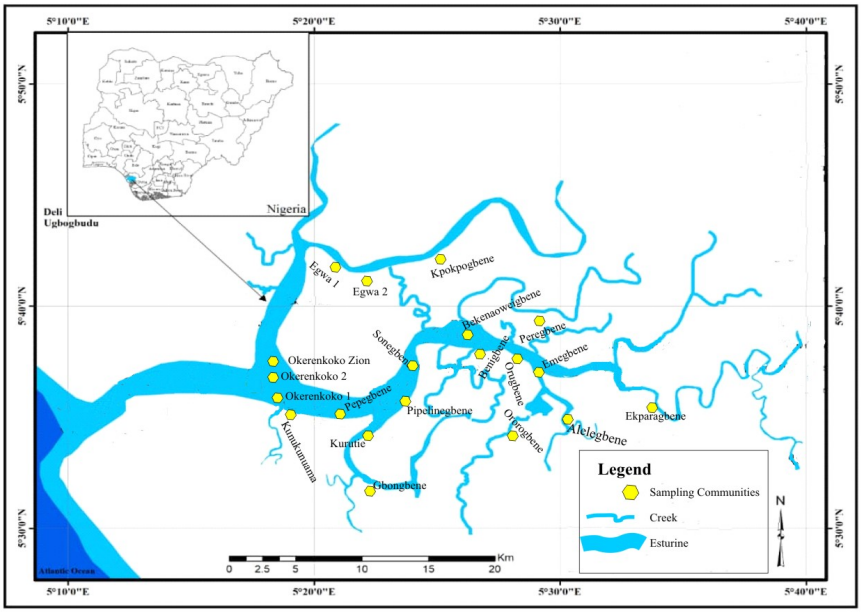

Figure 1: Map of the Study Area
Source: Field Survey, 2023

Sampling Procedure

Three sampling stations along the main course of the Escravos Estuary were selected for the study, namely Station 1 Okerenkoko, Station 2 Benigbene and Station 3 Kurutie. Fish samples were collected biweekly for six consecutive months from May, 2023 to October, 2023 from the three sampling stations with the assistance of local artisanal fishers using different longlines. The fish species caught were sorted, counted, and identified into families and species using fish identification guides and fish monographs.

3. RESULTS AND DISCUSSION

Design Techniques and Specification

The results of the design characteristics and specification of longlines used at the three stations in Escravos Estuary around Okerenkoko and Kurutie axis are presented in Table 1 and Fig.1. The result revealed that line material used in the study area consisted of R50-150 tex polyamide twines for surface-set longlines with hook sizes of No.15-17 and R50-250 tex with hook sizes of No. 12-14 for bottom-set longlines (MLR) in the study Area. The length of mainline longlines ranged between 250-500m surface set and 500-1000m. The bottom set and branch line (BLR) range between 20-30cm surface set and 130-160cm. The bottom set has a range of 200-300 branch lines (snots) attached to the main lines by the weaver's knots in both surface sets and bottom set longlines. Twist directions of all the mainlines and branch lines in the longlines of all the three stations were all in Z and S twist directions as shown in Plate I. The results revealed that floats (Styrofoam/Worn-out bathroom slippers) and sinkers (stone pebble) were the material types used as floats and sinkers in both the two longlines.

Weights of Styrofoam/worn-out bathroom slippers ranged between 15-30g, whereas sinkers weighed between 50-250g, the space interval in longlines for the floats and sinkers ranged between 3-5m, while the quantity number ranged between 50-125 in the three stations.

Table 1: Design Specification and Characteristics of Longlines used in the three

Stations in Escravos Estuary around Okerenkoko and Kurutie axis.

Station	Types of longlines	SG	MLR	BLR	NBL	SHB	HS	NF	NS
Okerenkoko	Surface set	Line shape	250-500m	20-30cm	200-300	15, 17	J shape	200-300	50-75
	Bottom set	Line shape	500-1000m	130-160cm	300-500	12, 13	J shape	150-250	75-125
Benigbene	Surface set	Line shape	250-500m	20-30cm	200-300	15, 17	J shape	200-300	50-75
	Bottom set	Line shape	500-1000m	130-160cm	300-500	12, 13	J shape	150-250	75-125
Kurutie	Surface set	Line shape	250-500m	20-30cm	200-300	15, 17	J shape	200-300	50-75
	Bottom set	Line shape	500-1000m	130-160cm	300-500	12, 13	J shape	150-250	75-125

Key:

SG: Line shape
MLR: Mainline length range (m)
BLR:: Branchline length range (cm)
NBL: No of Branchline
SHB: Size of Hook in the Branchline
HS: Hook Shape
NF: No of floats
NS; No of Sinker
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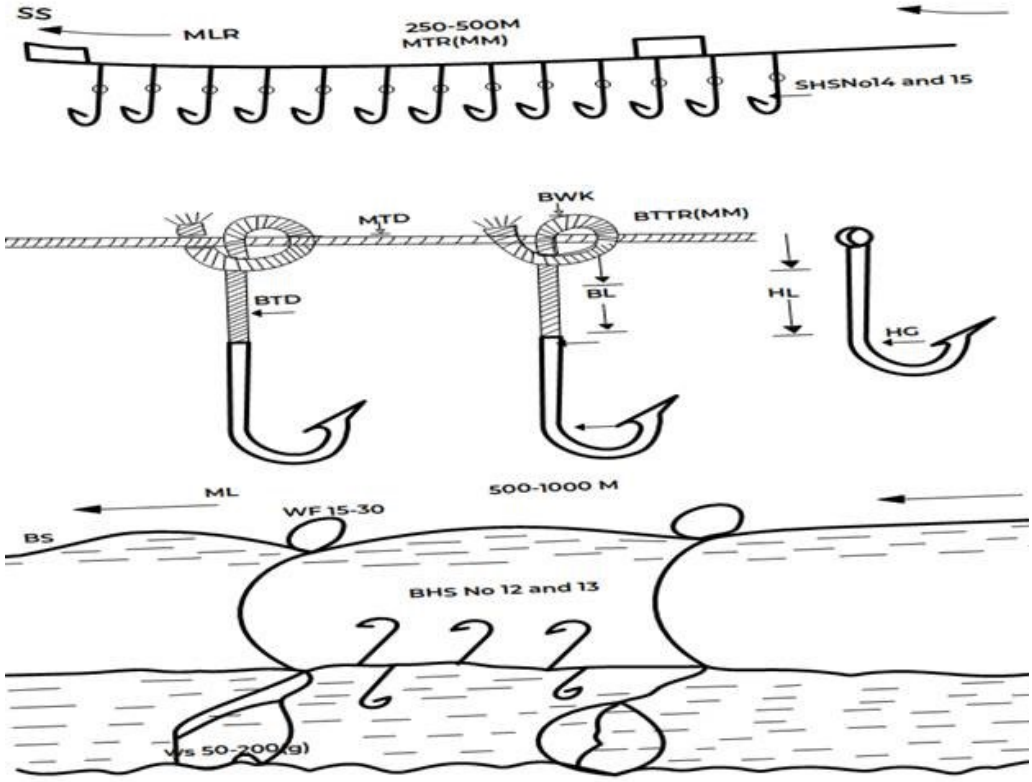

Plate 1: Design Characteristics and Specification of Longline

4. DISCUSSION

Two types of longlines were observed (surface – set and bottom-set longlines) corresponding to those reported by Acosta (1994) in the coral reef areas. Materials used for constructing longlines in the study area were polyamide (PA), which are of high quality and standard. However, Ahmed (2005) and Binyotubo (2011) had reported the use of polyamide (PA), in the construction of longlines within Okerenkoko and Kurutie axis of Escravos Estuary. The number of branch lines ranged from 200-500 and the distance was between 100cm to 150cm. Udolisa (1994) reported that long line fisheries of Lagos coast, the number of branch lines ranges from 500-1000 and the distance of 150-200cm. The observation is in line with the finding of du Feu, (1994), and Araoye (1999) who observed that the accessories of floats and sinkers, their total number and weights and the arrangement of those floats and sinkers along the length of longlines were necessary for endowing the long line with the required buoyancy.

5. CONCLUSION

1. 1)The design characteristics and specification of the two different categories of longlines used at three stations in the Escravos Estuary have the same design characteristics and specification, both in line/ropes and accessories.
2. 2) The ranges of hook sizes that were used in the study area were in line with the Federal Government Inland Fisheries Decree of 1992 (Restriction on use of fishing gear).

6. RECOMMENDATIONS

Based on the results, the following recommendations are suggested to enhance the Longlines fishery:

1. The Long lines hook sizes are recommended to be used in the study area.
2. Further studies should be carried out to look at different types of hook sizes, soaking time, and concerning catch.

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