African Journal of
Sciences and Traditional Medicine

ISSN : 3434-6031

Index: Harvard, Boston, Sydney University, Dimensions, Lens, ResearchGet Scilit, Semantic, Google Scholar, Base etc

https://doi.org/10.58578/AJSTM.v1i1.3502

# Assessment of Fish Fauna In Oguta Lake, Imo State, Niger Delta, Eastern Nigeria

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**Article Info:**

| Submitted: | Revised: | Accepted: | Published: |
|---|---|---|---|
| Aug 25, 2024 | Jul 11, 2024 | Jul 23, 2024 | Jul 30, 2024 |

## Abstract

A fifty-seven (57) week investigation was carried out from September, 2019 to September, 2020 covering wet and dry seasons, to determine the fish fauna and its nomenclature in the Oguta Lake, Imo state, Niger Delta, eastern Nigeria. This research work was aimed at providing information on the fish stock and fish identification. During the assessment, fish samples were randomly collected from fishers twice weekly from five sampling stations along the River. The fishes collected were counted, and identified with identification keys. Species diversity and catches were analyzed using analysis of variance (ANOVA $P<0.05$) and Pearson correlation (2 tailed). The diversity and relative abundance were determined using standard methods. Results revealed that, the River was composed of 43 fish species belonging to 18 families, 10 orders and 29 genera from a total catch of 4,250. Fish species diversity was reported highest in the family Cichlidae (18.60%), Characidae (13.95%), Mormyridae and Bagridae (9.30%), Mochokidae (6.98%), Citharinidae; Clariidae; Schilbeidae; Polypteridae and Channidae (4.65%), Cyprinidae; Distichodontidae; Notopteridae; Hepsetidae; Malapteruridae; Osteoglossidae; Protopteridae and Gymnarchidae (2.33%). Fishing gears used were cast nets , gill nets, gura net traps, seine nets, drag nets, dugout canoe, drift nets, longlines, hooks and lines, baskets; spears. This river showed high fish species

diversity, although some species showed higher diversity values than others due to fish gear types, mesh size, duration and station. There was a very high correlation of fish species in station 2, 3 and 4; there was no correlation of species in station 5 with stations 4, 3, 2 and 1. This study could serve as a baseline data to relevant bodies in the management and sustainability of the fisheries resources. The human activities along the Oguta Lake should be checked to avoid undue alteration of the ecosystem and subsequently the fishing grounds and fish species habitats. The fish species of this lake is said to be endangered of its fish species abundance and distribution.

**Keywords:** Taxonomy, Anthropogenic Activities, Fish Biology, Biodiversity, Conservation and Management

## INTRODUCTION

Taxonomy is the science of classification and naming of living organisms. The classification of organisms attempts to reflect relations between them and work on a hierarchical system by which an organism is placed in categories of decreasing level, from kingdom to species. These categories are known as taxa: singular: taxon; hence taxonomy (Nelson, 1996). The word taxonomy originated from a Greek word "*taxis"*, meaning arrangement, and nomos, meaning law. The science of biological taxonomy is responsible for discovering, describing, classifying, naming and treating each species as the basic unit. Species are given names in accordance to the protocol set by Linnaeus' binomial nomenclature system (Enghoff, 2009). Fishes are animals that live and swim in the water, cool blooded, breathe using gills, have backbones and have various fins instead of limbs. Fish fauna is all of the fish life present in a particular region, habitat, or geographical area. Fishery resources play important role in the development of nations that are endowed with lots of natural marine and fresh water ecosystems like Nigeria, since fishes are obligate aquatic organisms. Apart from being a cheap source of safe animal protein, fishery resources contain other essential nutrients required by the body for healthy living (Sikoki and Otobotekere, 1999).

Oguta Lake, is the largest natural lake in southern Eastern Nigeria, is located in a depression within extended east floodplain of the river Niger downstream of Onitsha, in the Oguta Local Government Area in Imo state of Nigeria. It is within the rain forest although the archetype forest around the lake has since been replaced by oil palm trees and other agro forestry species such as Irvingia musa etc. The town of Oguta has a population of 2, 298 million according to the National Census of 2006; it is situated on the east bank

of the lake. Oguta Lake is a fresh water lake. It receives perennial drainage from River Njaba, Utu and Awbuna, which have their source in the Awka-Orlu Costa in north central Imo state. It also receives outflow from the central Niger. Oguta Lake drains into the river orashi, a main river on the east bank flood plain at the Niger and which conveys river Niger's flood water directly to the Niger delta (Ita, 1993). Oguta Lake has the maximum depth of 8.0m and a mean depth of 5.5m, with a water surface area that varies from 180 ha in the dry season to 300 ha at the peak of the raining season. Water level varies over a range of 2.7m between these two seasons (Ita, 1993). The lake contains 258 species of phytoplankton in 107 genera. The lake supports 40 fish species such as *Chrysichthys sp., Alestes sp., Coptodon sp., Citharinus sp., Moryrus sp., Synodontis sp., Schille sp., Hemichromis sp., Sarotherodon sp*. The lake is of immerse importance to the people of Oguta and the state government. It is the source of municipal and domestic water supply especially during the dry season, fishing and other economic activities, such as sporting activity, transport and tourism development, while some community members worship a deity associated with it, god of the lake (Omin, 1993).

Gillnets constitute over 96% of the total gear developed in the region. In Oguta lake, gillnets constitute the dominant gear deployed in the water body (Ohaturuonye *et al.,* 2017). As the human population increases, the demand for fish protein increases even in exponential manner with the concomitant increase in the exploitation of the natural fish stock in the wild which often leads to in appropriate and unfriendly fishing technique which exacerbate the declining fish yield. Despite the negative impact of this scenario in management and sustainable development of fish resources in the lake, data on fish taxonomy is largely non- existent. However, studies on fish have been mostly on fisheries ecology, biology and distribution but little is known on fish systematic. There is therefore a wide gap in our knowledge of Nigerian inland water fishes in terms of taxonomic content (Chindah and Osumkpe, 1994; RPI. (1985); Wright, 1986).

**Aim of the Study**

The main aim of this research was to undertake the taxonomic study on fish fuana in Oguta Lake in Imo state.

**Objectives of the Study**

In achieving this aim the following specific objectives are to:

i. Conduct comprehensive fish sampling in all habitats in Oguta Lake.

ii. Identify fish species in Oguta Lake.

iii. Ascertain new fish species in Oguta Lake.

iv. Determine fish Abundance and fish species diversity in Oguta Lake.

**Fish Species Taxonomy and Systematics**

Adaka *et al.* (2016) researched on the diversity and distribution of freshwater fishes in Oguta Lake, Southeast Nigeria. They reported a total of 1,989 fish species comprising 6 orders, 22 genera, and 32 species spread into 18 families. The Perciformes, Cichlidae and Tilapia zillii were the most abundant fish order, family and species, respectively. They also stressed that the Lake is of ecological significance in accommodating some threatened species like Erpetoichthys calabaricus and serving as a source of broodstock of Clarias gariepinus for fish farming (aquaculture).

Igbani and Uka (2019) researched on the fish diversity, abundance and fishing activities in the upper Ekole River, Bayelsa state, Niger Delta, Nigeria. They identified a total of 70 fish species belonging to 37 families, 16 orders and 52 genera. *Kryptopterus bicirrhis* (16.42%), *Sierrathrissa leonensis* (15.06%), *Chrysichthys nigrodigitatus* (7.09%), *Brycinus macrolepidotus* (4.11%), *Macrobrachium macrobrachion* (2.58%), *Eutropius niloticus* (2.51%), *Mormyrus macropthalmus* (2.22%), *Citharinus citharus* (2.04%), *Schilbe mystus* (1.96%), *Synodontus budgetti* (1.94%), *Distichodus rostratus* (1.77%), *Mormyrus rume* (1.76%), *Tilapia zillii* (1.69%), *Synodontus membranaceous* and *Bagrus filamentosus* (1.55%), *Cyprinus barbus* (1.53%), *Xenomystus nigri* (1.41%), *Erpetoichthys calabaricus* and *Mormyrus anguilloides* (1.34%), *Marcusenius deboensis* (1.29%), *Protopterus annectens* (1.26%), *Synodontis gambiensis* (1.22%), *Oreochromis niloticus* (1.21%), *Ctenopoma petherici* (1.18%), *Hyperopisus bebe* (1.15%), *Gnathonemus petesii* (1.13%), *Caranx hippos* and *Hepsetus odoe* (1.10%), *Homarus americanus* (1.09%), *Alestes baremoze* (1.08%), *Parachanna africana* (0.99%), *Mastacembelus longicuada* (0.94%), *Marcusenius senegalensis* (0.88%), *Synodontis batensoda* (0.87%), *Sarotherodon melanotheron* (0.85%), *Parachanna obscura* (0.82%), *Hemichromis fasciatus* (0.80%), *Phractolaemus ansorgii* (0.77%), *Gnathonemus tamandua* (0.69%), *Hippopotomyrus psittacus* (0.67%), *Hippopotomyrus pictus* (0.65%), *Oreochromis aureus*

(0.64%), *Labeo senegalensis* (0.63%), *Synodontis nigrita* (0.62%), *Tilapia guineensis* (0.58%), *Polypterus senegalus* (0.56%), *Macrobrachium vollenhovenii* (0.55%), *Gymnallabes typus* (0.53%), *Clarias gariepinus* (0.46%), *Chrysichthys aluuensis* (0.41%), *Heterosis niloticus* (0.39%), *Sarotherodon galilaeus* (0.38%), *Eleotris senegalensis* (0.35%), *Pantodon buchholzi* (0.34%), *Heterobranchus bidorsalis* (0.33%), *Polycentropsis abbreviata* (0.30%), *Gymnarchus niloticus* (0.26%), *Marcusenius cyprinoides* (0.22%), *Clarias anguillaris* (0.18%), *Malapterurus electricus* (0.14%), *Aplocheilichthys spilauchen* (0.12%), *Lates niloticus* (0.11%), *Pila globosa* (0.07%), *Bellamya bengalensis* (0.06%), *Cynoglossus senegalensis* and *Bostrychus africana* (0.04%), Iphigenia brasiliensis (0.03%), *Eleotris vittata* (0.02%), *Tagelus peruvianus* and *Chaceon maritae* (0.01%).

Nwadukwe, (2000) researched on biometry composition and abundance of fish species in River Nun, Niger Delta. The fish samples were taken from the catch of the fishermen operating in the river. He recorded 14 fish species: *Mormyrus rume, Mormyrus macrophthalamus, Oreochromis niloticus, Malepterus electricus, Clarias gariepinus, Clarias angullaris, Parachanna obscura, Synodontis bateroda, Heterobranchus longifillis, Alestes dentexseithente, Auchenoglanis occidentalis, Sarotherodon galililalus, Heterotis niloticus, and Tilapia zilli* belonging to seven families.

Francis *et al.* (2014) researched on the fish families of Oguta Lake, South Eastern Nigeria, and sustainability Issues. They reported fish catch consist of 5 orders, 15 families, 21 genera and 28 species. Bagridae, Characidae, Anabantidae, Citharinidae and Notopteridae were dominant families in terms of numbers; in terms of species, Cichlidae was most dominant (5 species). In descending order number of species identified were: three each, for Mormyridae, Characidae and Mochokidae; and a species or two for each of the remaining 11 families, indicating that there could be high risk of complete wipe out of such families under sudden adverse environmental conditions. They observed a potential source of socio-economic development to surrounding communities the anthropogenic activities on this lake should be defined in order to forestall the gradual and continuous loss of its useful services. They recommended the management of Oguta Lake to curtail the negative impacts of anthropogenic activities on the lake's aquatic resources through appropriate management approaches, such as Eco-Community-Based Approaches, including Integrated and Adaptive management measures, as there seemed to be some kind of shift, to a reduction in the lake's fish assemblage.

Nwadiaro, (1989) studied and described 98 species of fish occurring in Lake Oguta, Imo State, and South-Eastern Nigeria. The fisheries potential of this lake includes *Cichlidae,*

*Bagridae, Notoptenidae, Characidae, Hepsetidae, and Claridae.* Others were *Mormyridae* and *Eliotridae*. The major species included *Tilapia zilli, Tilapia mariae, Hemichromis spp, Chrysichthys nigrodigitatus, Hepsetis odoe, Alestes nurge, and Mormyrus spp*. Nwadiaro, 1984 also reported 67 species of fish comprising 52 genera and 37 families in River Sambriero. Young, 1990 carried out a systematic study of rivers Sambriero and Orashi and reported 453 fishes belonging to 25 families, 30 genera distributed unevenly into 36 species from both rivers. She noted that only families- *Clupeidae, Characidae, Bagridae, Cichlidae, Polynemidae, and Scliaenidae* were common to both rivers.

Akari, (2002) studied the distribution, abundance, food and feeding habits of *Chrysichthys nigrodigitatus* in the upper Orashi River. They observed that the fish species are very common, abundant and of major commercial importance. A fish species 457 weighing 76.9kg were used during the time of the research. The fishes were more populated in the wet period to the sunny period. The actual length ranged from 10cm to 46cm while the body weight is between 50g and 900g.

## MATERIALS AND METHODS

### Location

The study was conducted at Oguta Lake, also known as Ohamiri, is one of the inland fresh water drainage basins within South-Eastern Nigeria. It lies approximately within (Latitudes $5^{0}42^{1}24^{11}$N) and (Longitudes $6^{0}47^{1}33^{11}$E). About linear in shape, the lake receives inputs from Rivers Njaba, Awbana and Orashi, while the fourth river, Utu flows in only during the rainy season (April to November). A relatively small and shallow water body, the water volume increases tremendously during the rains; its maximum surface area being 2.48 $km^2$ with a depth of 9.30m (Ogunkoya, 2007).

### Experimental Procedure

### Sampled Location

The study is designed to have five sampling stations covering the upper part of Oguta Lake as shown in Fig.3.1. The selected stations were numbered, thus: Station 1-Onu Utu, Station 2-Onu Okposha, Station 3-Ogbe Hause, Station 4-Osemotor, and Station 5-Ede Ngwugwu.

### Collection of Fish Samples/Specimens

Fish specimens were collected two (2) times weekly working with local fisher folks during low and high tide and catch were collected on landing sites. The stations were sampled for fish with the fisher folks twice a week (Tuesdays and Saturdays) using nets of different mesh types and traps. The study was carried out from September, 2019 to September, 2020 (52 weeks) covering wet and dry seasons.

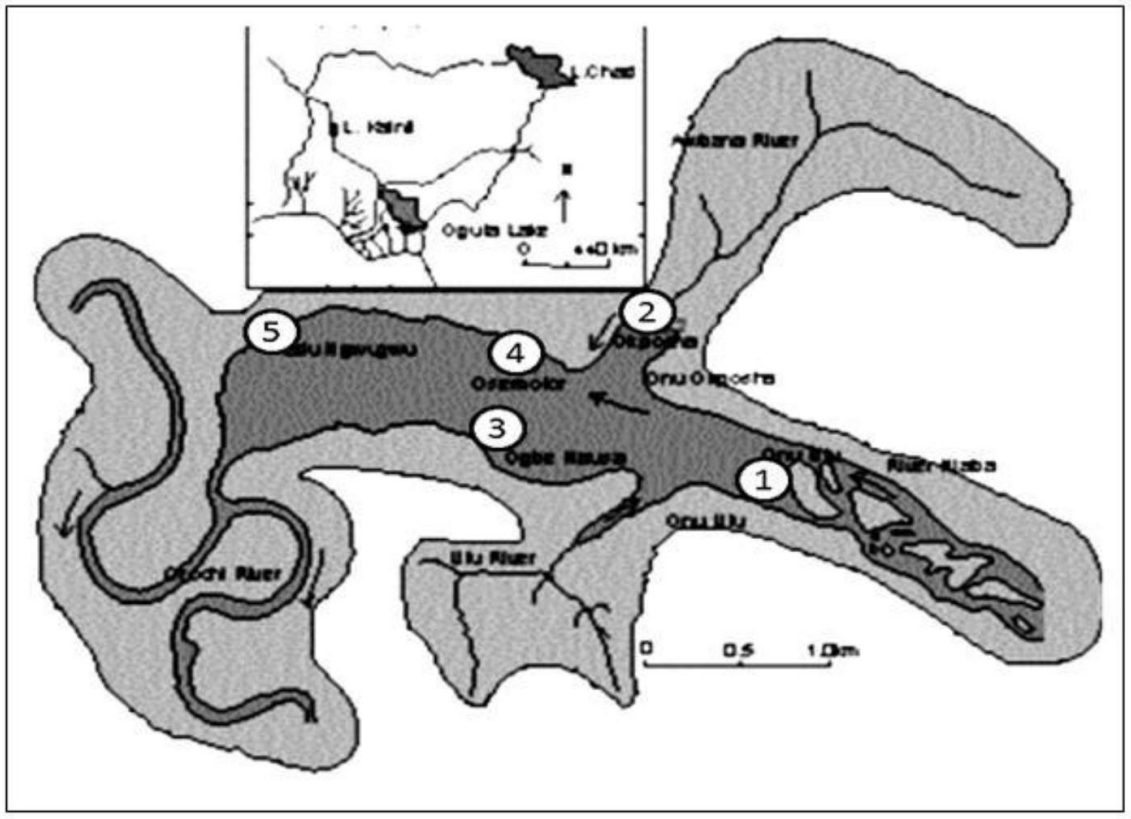


**Figure 1:** Map of Oguta showing the Associated Rivers and sampling stations.

### Fish Gear Used

The fishing gears used by the fishermen during the study period are Gillnets, Cast nets of different mesh types as well as fish traps.

### Fishing Craft Employed

The fishing craft was used by the engaged fishermen are one-man dugout canoe (Kayak) and unmotorized planked canoe, widely used among the fishermen in Oguta Lake.

**Fish Species Identification**

After the collection of the fish, the fish specimen was immediately photographed, noting it colors, and weight at the sampling site before preserving in 10% formalin and 90% of water, then transported to the Laboratory for further analysis where the species identification were performed by using keys from relevant authorities such as pictures and other recent websites (Froese and Pauley, 2013; Daget *et al.*, 1992).

**Laboratory Procedure**

In the laboratory, Morphometric measurements (Total length, Standard length and Weight) was taken and recorded to the nearest 0.1cm and 0.1g respectively, and Meristic counts (fins, scales, barbel, gills rakers, etc) were also taken and recorded.

**Fish Diversity Index**

Fish diversity index was determined using:

Igbani and Uka (2019)**:** derived formula below:

$$\text{Fsi (\%)} = \frac{Si}{\Sigma fsi} \chi \frac{100}{1}.$$

Where F = family or number of species families,

Si = individual number of fish species family.

**Fish Species Abundance Determination**

Abundance were determined by relative abundance method which involved counting the total number of fish species caught per sample site per time which were recorded and the relative abundance score of the species were estimated, thus: 1-50 = Rare (R), 51-100 = Few (F), 101-200 = Common (C), 201-400 = Abundant (A) and > 400 = Dominant (D) Allison *et al.*, (2003).

**Physico-Chemical Parameter Determination**

Water samples of the study area were collected during visits made, to determine various physical and chemical parameters of the study area. This was carried out using plastic containers with covers (sample bottles) in which the water samples were taken to the

laboratory for analysis. Parameters determined were: Water temperature, pH, Salinity/Conductivity; Dissolved Oxygen were measured in-situ (Igbani and Uka, 2019; Salcon, 1997).

### Data Analysis

Analysis of Variance (ANOVA: $P < 0.05$), Factorial Experimental Layout, Randomised Completely Block Design (RCBD) and Pearson correlation (at 0.01 level, (2-tailed) were used to analyse the species distribution among locations/stations.

## RESULTS AND DISCUSSION

### Fish Species Diversity

The species diversity (Table 1) showed a total of 43 fish species belonging to 18 families, 10 orders and 29 genera. The species diversity amongst the families found in the lake during the research work was reported in as Cichlidae (18.60%), Characidae (13.95%), Mormyridae and Bagridae (9.30%), Mochokidae (6.98%), Citharinidae; Clariidae; Schilbeidae; Polypteridae and Channidae (4.65%), Cyprinidae; Distichodontidae; Notopteridae; Hepsetidae; Malapteruridae; Osteoglossidae; Protopteridae and Gymnarchidae (2.33%). This showed that the fish diversity in this upper end of the river was high, although some species reported higher diversity values than others (Igbani and Uka, 2019; Abiodun and John, 2017; Adaka *et al*., 2016; Francis *et al*., 2014).

**Table 1: Fish Species Family Diversity of Oguta Lake, South East Nigeria**

| S/N | Species | Family | Order | Number of Fish Caught | Percentage Diversity (%) |
|---|---|---|---|---|---|
| **1.** | *Papyrocranus afer* | Notopteridae | Osteoglossiformes | 108 | 2.33 |
| **2.** | *Heterotis niloticus* | Osteoglossidae | Osteoglossiformes | 62 | // |
| **3.** | *Mormyrus rume* | Mormyridae | Mormyriformes | 95 | 9.30 |
| **4.** | *Marcusenius ihuysi* | Mormyridae | Mormyriformes | 87 | // |
| **5.** | *Petrocephalus bane* | Mormyridae | Mormyriformes | 141 | // |
| **6**. | *Mormyrops deliciosus* | Mormyridae | Mormyriformes | 94 | // |
| **7.** | *Gymnarchus* | Gymnarchidae | Mormyriformes | 48 | 2.33 |

| | | | | | |
|---|---|---|---|---|---|
| | *niloticus* | | | | |
| **8.** | *Polypterus senegalus* | Polypteridea | Polypteriformes | 99 | 4.65 |
| **9.** | *Polypterus bichir lapradei* | Polypteridea | Polypteriformes | 89 | // |
| **10.** | *Citharinus cithathus* | Citharinidae | Characiformes | 212 | // |
| **11.** | *Citharinus latus* | Citharinidae | Characiformes | 40 | // |
| **12.** | *Alestes baremoze* | Characidae | Characiformes | 128 | 13.95 |
| **13.** | *Hydrocynus vittatus* | Characidae | Characiformes | 83 | // |
| **14.** | *Hydrocynus forskahlii* | Characidae | Characiformes | 87 | // |
| **15.** | *Hydrocynus brevis* | Characidae | Characiformes | 92 | // |
| **16.** | *Brycinus nurse* | Characidae | Characiformes | 86 | // |
| **17.** | *Brycinus leuciscus* | Characidae | Characiformes | 94 | // |
| **18.** | *Distichodus rostratus* | Distichodontidae | Characiformes | 117 | 2.33 |
| **19.** | *Labeo Senegalensis* | Cyprinidae | Cypriniformes | 134 | // |
| **20.** | *Parailia pellucid* | Schilbeidae | Siluriformes | 127 | 4.65 |
| **21.** | *Schilbe mystus* | Schilbeidae | Siluriformes | 100 | // |
| **22.** | *Clarias gariepinus* | Claridae | Siluriformes | 152 | // |
| **23.** | *Clarias anguillaris* | Claridae | Siluriformes | 92 | // |
| **24.** | *Auchenoglanis biscutatus* | Bagridae | Siluriformes | 55 | 9.30 |
| **25.** | *Auchenoglanis occidentalis* | Bagridae | Siluriformes | 80 | // |
| **26.** | *Chrysichthys nigrodigitatus* | Bagridae | Siluriformes | 101 | // |
| **27.** | *Chrysichthys auratus* | Bagridae | Siluriformes | 88 | // |
| **28.** | *Synodontis nigrita* | Mochokidae | Siluriformes | 84 | 6.98 |
| **29.** | *Synodontis budgetti* | Mochokidae | Siluriformes | 76 | // |
| **30.** | *Synodontis membranaceous* | Mochokidae | Siluriformes | 134 | // |
| **31.** | *Malapteruridae electricus* | Malapteruridae | Siluriformes | 150 | 2.33 |
| **32.** | *Chromidotilapia guentheri* | Cichlidae | Perciformes | 185 | 18.60 |
| **33.** | *Hemichromis faciatus* | Cichlidae | Perciformes | 213 | // |
| **34.** | *Coptodon mariae* | Cichlidae | Perciformes | 161 | // |
| **35.** | *Coptodon zillii* | Cichlidae | Perciformes | 78 | // |

| | | | | | |
|---|---|---|---|---|---|
| **36.** | *Coptodon guineensis* | Cichlidae | Perciformes | 44 | // |
| **37.** | *Oreochromis niloticus* | Cichlidae | Perciformes | 114 | // |
| **38.** | *Oreochromis aureus* | Cichlidae | Perciformes | 57 | // |
| **39.** | *Sarotherodon galilaeus* | Cichlidae | Perciformes | 101 | // |
| **40.** | *Protopterus annectens* | Protopteridae | Lepidosireniformes | 163 | 2.33 |
| **41.** | *Hepsetus odoe* | Hepsetidae | Gonorynchiformes | 129 | // |
| **42.** | *Parachanna obscura* | Channidae | Ophiocepaliformes | 145 | 4.65 |
| **43.** | *Parachanna africanus* | Channidae | Ophiocepaliformes | 75 | // |
| | **TOTAL** | | | **4,250** | |

**Fish Species Abundance**

A total of 4,250 fishes were caught along the Oguta Lake during the period of sampling. The relative abundance (Table 2) of all species is as reported in a descending numerical order. *Hemichromis faciatus* (5.01), *Citharinus citharus* (4.99), *Chromidotilapia guentheri* (4.35), *Protopterus annectens* (3.84), *Coptodon mariae* (3.79), *Clarias gariepinus* (3.58), *Malapteruridae electricus* (3.53), *Parachanna obscura* (3.41), *Petrocephalus bane* (3.32), *Labeo Senegalensis* and *Synodontis membranaceous* (3.15), *Hepsetus odoe* (3.04), *Alestes baremoze* (3.01), *Parailia pellucid* (2.99), *Distichodus rostratus* (2.75), *Oreochromis niloticus* (2.68), *Papyrocranus afer* (2.54), *Chrysichthys nigrodigitatus* and *Sarotherodon galilaeus* (2.38), *Schilbe mystus* (2.35), *Polypterus senegalus* (2.33), *Mormyrus rume* (2.24), *Mormyrops deliciosus* and *Brycinus leuciscus* (2.21); *Clarias anguillaris* and *Hydrocynus brevis* (2.16), *Polypterus bichir lapradei* (2.09), *Chrysichthys auratus* (2.07), *Hydrocynus forskahlii* and *Marcusenius ihuysi* (2.05), *Brycinus nurse* (2.02), *Synodontis nigrita* (1.98), *Hydrocynus vittatus* (1.95), *Auchenoglanis occidentalis* (1.88), *Coptodon zillii* (1.84), *Synodontis budgetti* (1.79), *Parachanna africanus* (1.76), *Heterotis niloticus* (1.46), *Oreochromis aureus* (1.34), *Auchenoglanis biscutatus* (1.29), *Gymnarchus niloticus* (1.13), *Coptodon guineensis* (1.04), *Citharinus latus* (0.94).

The highest species abundance is in *Hemichromis faciatus* (5.01%), while the least is in *Citharinus latus* (0.94%) (Igbani and Uka, 2019; Adaka *et al.*, 2016; Francis *et al.*, 2014).

**Table 2: Fish Species Abundance of Oguta Lake, South East Nigeria**

| S/N | Species | Family | Order | Number of Fish Caught | Relaative Abundance | Abundance Scores |
|---|---|---|---|---|---|---|
| **1.** | *Papyrocranus afer* | Notopteridae | Osteoglossiformes | 108 | 2.54 | **C** |
| **2.** | *Heterotis niloticus* | Osteoglossidae | Osteoglossiformes | 62 | 1.46 | **F** |
| **3.** | *Mormyrus rume* | Mormyridae | Mormyriformes | 95 | 2.24 | **F** |
| **4.** | *Marcusenius ihuysi* | Mormyridae | Mormyriformes | 87 | 2.05 | **F** |
| **5.** | *Petrocephalus bane* | Mormyridae | Mormyriformes | 141 | 3.32 | **C** |
| **6**. | *Mormyrops deliciosus* | Mormyridae | Mormyriformes | 94 | 2.21 | **F** |
| **7.** | *Gymnarchus niloticus* | Gymnarchidae | Mormyriformes | 48 | 1.13 | **R** |
| **8.** | *Polypterus senegalus* | Polypteridea | Polypteriformes | 99 | 2.33 | **F** |
| **9.** | *Polypterus bichir lapradei* | Polypteridea | Polypteriformes | 89 | 2.09 | **F** |
| **10.** | *Citharinus citharus* | Citharinidae | Characiformes | 212 | 4.99 | **A** |
| **11.** | *Citharinus latus* | Citharinidae | Characiformes | 40 | 0.94 | **R** |
| **12.** | *Alestes baremoze* | Characidae | Characiformes | 128 | 3.01 | **C** |
| **13.** | *Hydrocynus vittatus* | Characidae | Characiformes | 83 | 1.95 | **F** |
| **14.** | *Hydrocynus forskahlii* | Characidae | Characiformes | 87 | 2.05 | **F** |
| **15.** | *Hydrocynus brevis* | Characidae | Characiformes | 92 | 2.16 | **F** |
| **16.** | *Brycinus nurse* | Characidae | Characiformes | 86 | 2.02 | **F** |
| **17.** | *Brycinus leuciscus* | Characidae | Characiformes | 94 | 2.21 | **F** |
| **18.** | *Distichodus rostratus* | Distichodontidae | Characiformes | 117 | 2.75 | **C** |
| **19.** | *Labeo Senegalensis* | Cyprinidae | Cypriniformes | 134 | 3.15 | **C** |
| **20.** | *Parailia pellucid* | Schilbeidae | Siluriformes | 127 | 2.99 | **C** |
| **21.** | *Schilbe* | Schilbeidae | Siluriformes | 100 | 2.35 | **F** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *mystus* | | | | | |
| **22.** | *Clarias gariepinus* | Claridae | Siluriformes | 152 | 3.58 | **C** |
| **23.** | *Clarias anguillaris* | Claridae | Siluriformes | 92 | 2.16 | **F** |
| **24.** | *Auchenoglanis biscutatus* | Bagridae | Siluriformes | 55 | 1.29 | **F** |
| **25.** | *Auchenoglanis occidentalis* | Bagridae | Siluriformes | 80 | 1.88 | **F** |
| **26.** | *Chrysichthys nigrodigitatus* | Bagridae | Siluriformes | 101 | 2.38 | **C** |
| **27.** | *Chrysichthys auratus* | Bagridae | Siluriformes | 88 | 2.07 | **F** |
| **28.** | *Synodontis nigrita* | Mochokidae | Siluriformes | 84 | 1.98 | **F** |
| **29.** | *Synodontis budgetti* | Mochokidae | Siluriformes | 76 | 1.79 | **F** |
| **30.** | *Synodontis membranaceous* | Mochokidae | Siluriformes | 134 | 3.15 | **C** |
| **31.** | *Malapteruridae electricus* | Malapteruridae | Siluriformes | 150 | 3.53 | **C** |
| **32.** | *Chromidotilapia guentheri* | Cichlidae | Perciformes | 185 | 4.35 | **C** |
| **33.** | *Hemichromis faciatus* | Cichlidae | Perciformes | 213 | 5.01 | **A** |
| **34.** | *Coptodon mariae* | Cichlidae | Perciformes | 161 | 3.79 | **C** |
| **35.** | *Coptodon zillii* | Cichlidae | Perciformes | 78 | 1.84 | **F** |
| **36.** | *Coptodon guineensis* | Cichlidae | Perciformes | 44 | 1.04 | **R** |
| **37.** | *Oreochromis niloticus* | Cichlidae | Perciformes | 114 | 2.68 | **F** |
| **38.** | *Oreochromis aureus* | Cichlidae | Perciformes | 57 | 1.34 | **F** |
| **39.** | *Sarotherodon galilaeus* | Cichlidae | Perciformes | 101 | 2.38 | **C** |
| **40.** | *Protopterus annectens* | Protopteridae | Lepidosireniformes | 163 | 3.84 | **C** |
| **41.** | *Hepsetus odoe* | Hepsetidae | Gonorynchiformes | 129 | 3.04 | **C** |
| **42.** | *Parachanna obscura* | Channidae | Ophiocepaliformes | 145 | 3.41 | **C** |
| **43.** | *Parachanna africanus* | Channidae | Ophiocepaliformes | 75 | 1.76 | **F** |
| | **Total Number of catches** | | | **4,250** | | |

Abundance scores: 1-50 = Rare (R), 51-100 = Few (F), 101-200 = Common (C), 201-400 = Abundant (A) and > 400 = Dominant (D) Allison *et al.* (2003).

**Data Analysis**

**Table 3: Pearson Correlation for Fish Species Across The Stations**

| STATIONS | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **1** | 1 | 0.502 (**) | 0.448 (**) | 0.300 | 0.346 |
| **2** | 0.502 (**) | 1 | 0.594 (**) | 0.422 (**) | 0.333 |
| **3** | 0.448 (**) | 0.594 (**) | 1 | 0.528 (**) | 0.351 |
| **4** | 0.300 | 0.422 (**) | 0.528 (**) | 1 | 0.215 |
| **5** | 0.346 | 0.333 | 0.351 | 0.215 | 1 |

**The correlation is significant at the level 0.01, (2-tailed).

Correlation was analyzed using the Pearson correlation at 0.01 level as shown in (Table 3) amongst locations (stations). There was a very high correlation of fish species in station 2, 3 and 4; there was no correlation of fish species in station 5 with stations 4, 3, 2 and 1.

**Table 4: Mean values within stations of Fish Species and Fish Species Families on the Oguta Lake (P<0.05)**

| STATIONS | FISH SPECIES | FISH SPECIES FAMILIES |
|---|---|---|
| **1** | $122.07 \pm 63.76^{c}$ | $105.31 \pm 47.32^{c}$ |
| **2** | $115.48 \pm 156.94^{b}$ | $138.41 \pm 144.05^{b}$ |
| **3** | $223.70 \pm 212.09^{a}$ | $218.30 \pm 213.41^{a}$ |
| **4** | $67.80 \pm 144.16^{b}$ | $111.84 \pm 48.06^{c}$ |
| **5** | $125.31 \pm 63.38^{c}$ | $106.54 \pm 48.06^{c}$ |

Means within the rows with different superscripts differ significantly @P<0.05.

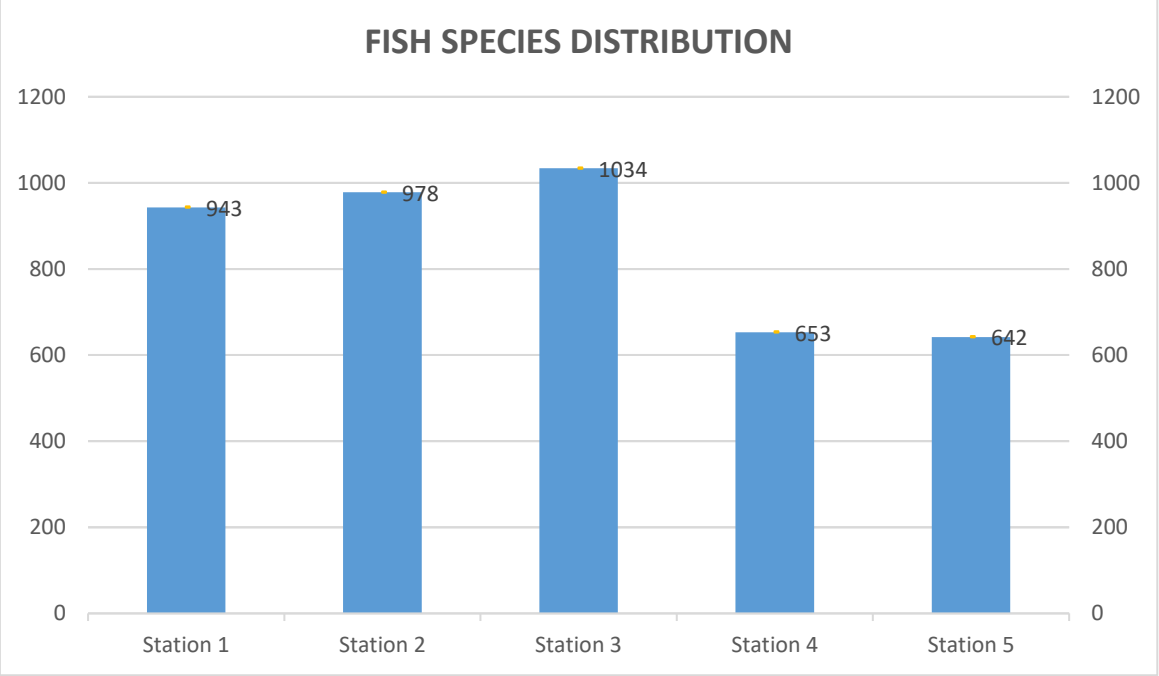


**Figure 2:** Bar chart showing fish distribution in the Oguta Lake amongst sampled stations

Results are expressed as Mean±SD for double measurements. Values on the same row with same superscript do not differ significantly at $P<0.05$. The result of the analysis (table 4) shows the highest mean (223.70) in station 3 and the least mean (63.38) in station 5 of Fish Species; while Fish Species Families the highest mean (218.30) in station 3 and the least mean (47.32) in station 1. An analysis of variance (ANOVA) at a probability, $P<0.05$ as shown in (Appendix II) was carried out within stations for species relative abundance and catches in their significant levels. It shows that there was a significant difference in species abundance/distribution within groups (stations). There was a clear difference of fish species distribution between the stations as shown in the bar chart above (figure 2), the highest catches were observed in station 3 with 1,034 fish species, followed by station 5 with the lowest catches with 642 fish species.

## CONCLUSION

The Oguta Lake could be said to be rich in fish species fauna as there are relative fish species represented in this assessment in spite of its human activities. The diversity amongst families like Cichlidae is high, although, this is not so for others like the Notopteridae, Osteoglossidae, Gymnarchidae, Distichodontidae, Cyprinidae, Protopteridae

and Hepsetidae. All the same, it is clear that there is low diversity of fish species in this lake due to the duration of the research and the fish species are said to be endangered. The abundance of fish species reported was low based on the duration of species sampled along the lake. Nevertheless, this seems to be associated more with fish exploitation in relationship to gear types and mesh size (cast nets , gill nets, gura net traps, seine nets, drag nets, dugout canoe, drift nets, longlines, hooks and lines, baskets; spears), human activities such as fishing, dredging, river dumping, gear mesh size and fish adaptation to their individual natural ecosystem. This study could serve as a baseline data to relevant bodies in the taxonomy, Fedearl Ministry of Fisheries; Ministry of Agriculture and water Resources, conservation and management of the fisheries resources. The fish species identified could be used as a fish taxonomy catalogue or key for zoology, fisheries and aquaculture students and scientists. The fisheries of this river should be monitored from illegal fishing and overexploitation of its biodiversity.

**Recommendations**

The identified fish species could be used as a working document for fish identification key. More elaborate and longer research work should be done on the fisheries in the Oguta Lake, in order to identify more fish species. The human activities along the Oguta Lake should be monitored and checked to avoid undue alteration of the fisheries ecosystem and subsequently the fishing grounds in relationship with fish species habitats and breeding grounds.

## REFERENCES

Abiodun, J. A.and John, P. (2017). Biodiversity and Abundance of Fish and Some Processing Methods in the Lower Niger River Idah, Kogi State, Nigeria. *Nigerian Journal of Fisheries and Aquaculture* 5(2): 20-25. Copy Right © 2013 Printed in Nigeria. Department of Fisheries, Faculty of Agriculture, University of Maiduguri, Nigeria. http://www.unimaid.edu.ng ISSN-2350-1537.

Adaka, G. S., Nlewadim, A. A. and Udoh, J. P. (2016). Diversity and Distribution of Freshwater Fishes in Oguta Lake, Southeast Nigeria. www.iiste.org, ISSN 2224-7181 (Paper), ISSN 2225-062X (Online). *Advances in Life Science and Technology*, Vol.46: 25-32.

Akari, E. J. (2002) Studies of the upper Orashi River. The distribution and abundance of fish stocks using fleets of a gill nets. Niger Delta. Nigeria. *Journal of Applied Science, Environmental management*, (2) 63-69.

Allison, M. E., Gabriel, U., Inko-Tariah, M. B., Davies, O. A. and Uedeme-naa, B. (2003). The fish assemblage of Elechi Creek, Rivers State, Nigeria. Niger Delta. *Biologia*, 2: 53-61.

Audenaerde (1969). *Sierrathrissa leonensis.* In: *Fishbase. Retrieved 20 October 2016*.

Audenaerde (1971). *Tilapia guineensis.* In: *Myers*, P., R. Espinosa, C. S. Parr, T. Jones, G. S. Hammond, and T. A. Dewey. 2019. The Animal Diversity Web (online). Accessed at https://animaldiversity.org.

Bloch (1794). *Hepsetus odoe.* In: Fishbase. *Retrieved 16 October 2016*.

Boulenger (1897). *Hippopotomyrus psittacus.* Gordon McGregor Reid & Hilary Sydenham. In: Fishes and an Ichthyogeographical review of the Benue River (West Africa). 13: 1, 41-67, DOI: 10.1080/00222937900770051

Boulenger (1901). *Phractolaemus ansorgii.* Froese, Rainer, and Daniel Pauly, eds. (2006). "Phractolaemidae" In: FishBase. May 2006 version.

Boulenger (1907). *Mastacembelus longicuada.* Froese, Rainer and Pauly, Daniel, eds. (2018). Species of *Mastacembelus*. In: FishBase. April 2020 version.

Boulenger (1911). *Synodontis budgetti.* In: Froese, Rainer and Pauly, Daniel, eds. (2016). "*Synodontis budgetti*" in FishBase. June 2020 version.

Burchell (1822). *Clarias gariepinus*. Froese, Rainer and Pauly, Daniel, eds. (2014). "*Clarias gariepinus*" In: FishBase. March 2014 version.

Chindah, A.C. and Osuamkpe, A. M., (1994). The first Assemblage, *the lower BonnyRiver. Afri.j.Ecol.*23: Pp 55 – 65.

Cuvier (1829). *Gymnarchus niloticus.* Froese, Rainer and Pauly, Daniel, eds. (2014). "*Gymnarchus niloticus*" In: FishBase. April 2020 version.

Cuvier (1829). *Heterotis niloticus*. Froese, Rainer, and Daniel Pauly, eds. (2014). "Arapaimidae" In: FishBase. July 2020 version.

Daget (1954). *Marcusenius deboensis.* Froese, Rainer and Pauly, Daniel, eds. (2016). Species of Marcusenius. In: FishBase. January 2016 version.

Duméril (1861). *Aplocheilichthys spilauchen.* Froese, Rainer and Pauly, Daniel, eds. (2017). In: Species of Aplocheilichthys in FishBase. April 2017 version.

Duméril (1861). *Eleotris vittata.* Froese, Rainer and Pauly, Daniel, eds. (2016). Species of Eleotris in In: FishBase. June 2016 version.

Enghoff, H. (2009). What is taxonomy? –An overview with myriapodological examples. *Soil Organism*, 81(**3**), 441–451.

Francis, A., Sikoki, F. D. and Agorua, U. N. (2014). Fish Families of Oguta Lake, South Eastern Nigeria, and Sustainability Issues. www.iiste.org ISSN 2224-3186 (Paper) ISSN 2225-0921 (Online). *Journal of Natural Sciences Research,* 4 (9): 39-43.

Froese, R., Pauly, D. (Eds.) (2013). *FishBase.* World Wide Web electronic publication. http://www.fishbase.org (Version 2020).

Fryer, G. and Iles, T. D. (1972). *The Cichlids of the Great Lakes of Africa.*Oliver & Boyd, Edinburgh, Pp 68 – 75.

Geoffroy Saint-Hilaire (1809). *Citharinus citharus.* Froese, Rainer and Pauly, Daniel, eds. (2011). Species of *Citharinus* In:FishBase. October 2011 version.

Geoffroy Saint-Hilaire (1809). *Heterobranchus bidorsalis*. Froese, Rainer and Pauly, Daniel, eds. (2011). In: Species of *Heterobranchus* in FishBase. December 2011 version.

Geoffroy Saint-Hilaire (1809). *Synodontis membranaceus*. In: Froese, Rainer and Pauly, Daniel, eds. (2016). "*Synodontis membranaceus*" in FishBase. June 2016 version.

Gervais (1848). *Tilapia zillii*. Froese, Rainer and Pauly, Daniel, eds. (2016). "Coptodon zillii" in FishBase. September 2016 version.

Gill (1863). *Gnathonemus petesii*. Froese, Rainer and Pauly, Daniel, eds. (2011). Species of *Gnathonemus*. In: FishBase. June 2011 version.

Gmelin (1789). *Malapterurus electricus*. Froese, Rainer and Pauly, Daniel, eds. (2011). "*Malapterurus electricus*" In:FishBase. December 2020 version.

Günther (1861). *Parachanna obscura*. Bolaji, B. B.; Mfon, T. U.; Utibe, D. I. (2011). *In:* "Preliminary study on the aspects of the biology of snakehead fish *Parachanna Obscura* (Günther) IN A NIGERIAN WETLAND". African Journal of Food, Agriculture, Nutrition & Development. **11** (2): 4709–4717. *doi*:*10.4314/ajfand.v11i2.65923*

Günther (1862). *Campylomormyrus tamandua*. Froese, Rainer and Pauly, Daniel, eds. (2018). "*Campylomormyrus tamandua*" In: FishBase. May 2018 version.

Günther (1864). *Ctenopoma petherici*. Froese, Rainer and Pauly, Daniel, eds. (2012). Species of Ctenopoma. In: FishBase. December 2012 version.

Günther (1864). *Distichodus rostratus*. Froese, Rainer and Pauly, Daniel, eds. (2015). Species of *Distichodus* In: FishBase. October 2015 version.

Günther (1864). *Synodontis gambiensis*. In: Global Biodivervisity Information Facility (GBIF) Secretariat (2019). GBIF Backbone Taxonomy. Checklist dataset https://doi.org/10.15468/39omei accessed via GBIF.org on 2017-10-10.

Günther (1866). *Mormyrus macrophthalmus*. Froese, Rainer and Pauly, Daniel, eds. (2017). Species of Mormyrus In: FishBase. June 2017 version.

Günther (1867). *Gymnallabes typus*. Froese, Rainer and Pauly, Daniel, eds. (2011). "*Gymnallabes typus*" In: FishBase. December 2011 version.

Günther (1868). *Xenomystus nigri*. In: Froese, Rainer and Pauly, Daniel, eds. (2007). "*Xenomystus nigri*" in FishBase. Apr 2007 version.

Igbani, F and Uka A. (2019). Fish diversity, abundance and fishing activities in the Upper Ekole River, Bayelsa State, Niger Delta, Nigeria. *International Journal of Fisheries and Aquatic Studies*, 7(5):122-129.

Ita, E.O**.** (1993). Inland fishery resources of Nigeria. CIFA occasional Paper No. 20, Rome, FAO. Pp 120.

Joannis, (1835). *Alestes baremoze* In: Fishbase.org. Retrieved 23 December 2016.

Lacépède (1803). *Chrysichthys nigrodigitatus*. Global Biodivervisity Information Facility (GBIF) Secretariat (2019). In: GBIF Backbone Taxonomy. Checklist dataset https://doi.org/10.15468/39omei accessed via GBIF.org on 2017-10-10.

Lacépède (1803). *Hyperopisus bebe*. Froese, Rainer and Pauly, Daniel, eds. (2011). In: Species of *Hyperopisus* in FishBase. June 2011 version.

Lacépède (1803). *Polypterus bichir*. Evans, David H.; Claiborne, James B. (15 December 2005). *In*: *The Physiology of Fishes, Third Edition. CRC Press. p. 107. ISBN 978-0-8493-2022-4. Retrieved 28 July 2015.*

Lamarck (1818). *Iphigenia brasiliensis*. Geraadpleegd via: In: WoRMS (World Register of Marine Species op., 2012). http://www.marinespecies.org/aphia.php?p=taxdetails&id=420905 11.10.2019.

Lamarck (1822). Brown, D. S. (1994). *Bellamya bengalensis*. In: Freshwater Snails of Africa and their Medical Importance. Taylor & Francis. ISBN 0-7484-0026-5.

Leach, (1818). *Mormyrops deliciosus:* In GBIF Secretariat (2021). GBIF Backbone Taxonomy.Checklist dataset https://doi.org/10.15468/39omei accessed via GBIF.org on 2022-11-11.

Linnaeus (1758). *Clarias anguillaris*. Froese, Rainer and Pauly, Daniel, eds. (2011). "*Clarias anguillaris*" In: FishBase. December 2011 version.

Linnaeus (1758). *Cyprinus barbus*. Banister, K.E. (1973): In: A revision of the large *Barbus* (Pisces, Cyprinidae) of East and Central Africa. Studies on African Cyprinidae. Part II. *Bulletin of the British Museum, 26 (1): 3-148*.

Linnaeus (1758). *Lates niloticus*. FishBase Teugels, G.G., C. Lévêque, D. Paugy and K. Traoré, 1988. In: État des connaissances sur la faune ichtyologique des bassins côtiers de Côte d'Ivoire et de l'ouest du Ghana. Rev. *Hydrobiol*ogy Tropical. 21(3):221-237. (Ref. 272)

Linnaeus (1758). *Marcusenius cyprinoides*. Froese, Rainer and Pauly, Daniel, eds. (2016). Species of Marcusenius In: FishBase. January 2016 version.

Linnaeus (1758). *Mormyrus anguilloides*. Froese, Rainer and Pauly, Daniel, eds. (2016). Species of Marcusenius In: FishBase. January 2016 version.

Linnaeus (1758). *Oreochromis niloticus*. Froese, Rainer and Pauly, Daniel, eds. (2015). "Oreochromis niloticus" In: FishBase. November 2015 version.

Linnaeus (1758). *Schilbe mystus*. Froese, R. and D. Pauly. Editors. (June 2016). "Schilbe mystus (Linnaeus, 1758)". In: *Fishbase. Retrieved 15 October 2016*.

Linnaeus (1766). *Caranx hippos*. Smith-Vaniz, W.F., J.-C. Quéro and M. Desoutter, 1990. `Carangidae. In: J.C. Quero, J.C. Hureau, C. Karrer, A. Post and L. Saldanha (eds.) Check-list of the fishes of the eastern tropical Atlantic (CLOFETA). p. 729-755.

Marcusen (1864). *Hippopotamyrus pictus*. Sullivan, J.P. and Lavoué, S. (*2015*). In: Mormyridae - African Weakly Electric Fishes Scratchpad. Accessed at http://mormyrids.myspecies.info on 2019.

Meyer, J. A., Omoruwou, P. E and Mayor, E. D. (2008). Food and feeding habits of *Synodontis ocellifer (boulenger, 1900)* from River Adofi, Southern-Nigeria.*Tropical Freshwater Biology* 17(1):1-12.

Nelson, J. (1996). *Fishes of the World – third edition*. New York, NY: John Wiley and Sons. Pp 208 – 212.

Nwadiaro, C. S. (1989). Icthyofauna of L. Oguta a shallow lake in Southeastern Nigeria. *Archieve Hydrobiology*. 115 (3) 463-475.

Nwadiaro, C. S. and Ayodele, R. O. O. (1992). Contributionto the biology of Sarotherodon melanotheron in the New Calabar River (Nigeria). *Acta hydrobiology*. 34(3): 287-300.

Nwadukwe, J. B. (2000). Survey of the freshwater Fisheries in the Niger Delta, Nigeria.

Ogunkoya, O. O. (2007). Oguta Lake. Information Sheet on Ramsar Wetlands (RIS) (2006 – 2008): 4.

Ohaturuonye, S. O., Osuagwu, I. E., Ibe, C. C. and Ukagwu, J. I. (2017). Length-weight relationship and condition factor of Cichlid species of Oguta Lake, Imo State, Nigeria. Proceedings of the 32nd Annual Conference of Fisheries Society of Nigeria (FISON), 297-300.

Olori, O. O. (1995). The Nature and Relative Abundance of Fish in the New Calabar River Choba, Rivers State. Pp 26.

Omin, V. R. (1983). The diversity and abundance of phytoplankton of Oguta Lake. BSc Thesis. University of Port Harcourt, Port Harcourt, Nigeria. Pp 127 – 138.

Owen (1839). *Protopterus annectens*. Froese, R.; Pauly, D. (2017). *"Protopteridae"*. In: *FishBase version (02/2017). Retrieved 18 May 2017.*

Pellegrin (1924). *Bagrus filamentosus*. Froese, Rainer and Pauly, Daniel, eds. (2017). Species of *Bagrus* In: FishBase. April 2017 version.

Peters (1857). *Hemichromis fasciatus*. Froese, Rainer and Pauly, Daniel, eds. (2019). "Hemichromis fasciatus" In: FishBase. September 2019 version.

Peters (1877). *Pantodon buchholzi*. Froese, Rainer and Pauly, Daniel, eds. (2005). "Pantodon buchholzi" In: FishBase. November 2005 version.

Pilsbry and Olsson (1941). *Tagelus peruvianus*. In: *"WoRMS - World Register of Marine Species - Tagelus Gray, 1847". www.marinespecies.org. Retrieved 2016-11-08.*

RPI. (1985). Environmental Baseline Studies for Establishment of Control Criteria and Standards Against Petroleum Related Pollution in Nigeria RPI/R/84/4/15 – 17.

Rüppell (1829). Eutropius niloticus. Abban EK, 1988. In: Taxonomy and biochemical genetics of some African freshwater fish species. Cardiff, UK: University of Wales. Ph.D. Thesis.

Rüppell (1832). *Synodontis batensoda*. In: Froese, Rainer and Pauly, Daniel, eds. (2022). "*Synodontis batensoda*" in FishBase. June 2022 version.

Rüppell (1852). *Sarotherodon melanotheron*. Froese, Rainer and Pauly, Daniel, eds. (2022). Species of Sarotherodon in FishBase. April 2022 version.

Salcon (1997). Salinity Management Handbook. Department of Natural Resources, Indooroopilly.

Sikoki, F.D. and Otobotekere, A.J.T. (1999) Fisheries. In: Alagoa, E.C., Ed., The Land People of Bayelsa State Central Niger Delta, Onyoma Research Publications, Port Harcourt, 301-319.

Steindachner (1870). *Marcusenius senegalensis*. Froese, Rainer and Pauly, Daniel, eds. (2016). Species of Marcusenius In: FishBase. January 2016 version.

Steindachner (1864). *Oreochromis aureus*. In: "Fact Sheet for Oreochromis aureus (Steindachner, 1864)". Gulf States Marine Fisheries Commission. Retrieved 2008-06-28.

Steindachner (1870). *Eleotris senegalensis*. Froese, Rainer and Pauly, Daniel, eds. (2022). In: Species of Eleotris in FishBase. June 2022 version.

Steindachner (1879). *Bostrychus africanus*. Froese, Rainer and Pauly, Daniel, eds. (2022). Species of Bostrychus. In: FishBase. April 2022 version.

Steindachner (1879). *Parachanna africana*. Froese, Rainer and Pauly, Daniel, eds. (2022). Species of *Parachanna*. In:FishBase. February 2022 version.

Swainson (1822). *Pila globosa*. Bouchet, P. (2015). In: MolluscaBase (2017). Accessed through: World Register of Marine Species at http://www.marinespecies.org/aphia.php?p=taxdetails&id=842943 on 2017-06-07

Valenciennes (1840). *Kryptopterus bicirrhis. Allen, D. (2013). "Kryptopterus bicirrhis"*. In: *IUCN Red List of Threatened Species. Version 2014.1. International Union for Conservation of Nature. Retrieved* 12 July 2014.

Valenciennes (1840). *Synodontis nigrita*. In: Froese, Rainer and Pauly, Daniel, eds. (2022). "*Synodontis nigrita*" in FishBase. June 2022 version.

Valenciennes (1842). *Labeo senegalensis*. FishBase. Reid, G.M., 1985. In: A revision of African species of *Labeo* (Pisces: Cyprinidae) and a re-definition of the genus. Verlag von J. Cramer, Braunschweig. 322 p.

Valenciennes (1847). *Mormyrus rume*. Froese, Rainer and Pauly, Daniel, eds. (2022). Species of *Mormyrus* In: FishBase. June 2022 version.

Valenciennes (1850). *Brycinus macrolepidotus* (True big-scale tetra): Froese, Rainer and Pauly, Daniel, eds. (2022). In: Species of Brycinus in FishBase. January 2022 version.

Wright, J. M. (1986). The Ecology of fish occurring in Shallow Water Creeks of Nigerian Mangrove Swamp. J. Fish Biol. 29: Pp 431 – 441.

Young, S. K. (1990). *The riverine Fish fauna of Abua, Rivers State. B. Sc. Thesis*. University of Port Harcourt, Nigeria.