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# Species composition and abundance of freshwater fishes from the lower reaches of the White Volta at Yapei, Ghana

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**Key words:** Abundance, White Volta River, identification keys, semi-pelagic omnivorous fish, West Africa.

**Abstract**

A study to assess the fish species composition and abundance was conducted over a six month period covering the post flood and dry seasons in the lower reaches of the White Volta River at Yapei, Ghana. Data was taken from fish landings at three main landing sites. Species were sorted and identified according to standard identification keys for the fresh and brackish water fishes of West Africa. Abundance was calculated as weight of a species/weight of total catch×100. Fifty two (52) species belonging to sixteen (16) families were encountered during this six months period of study. *Alestes baremoze* was the most abundant species. It made up 80.6kg of the total of 462kg of fish caught during the period of study, and thus representing 17.5%. It was followed by *Brycinus leuciscus* (58.3kg, representing 12.6%) and *Brycinus nurse* (27.6 kg, representing 6.0 %). All the three top species were semi pelagic omnivorous fish belonging to the family Alestidae which was also the most abundant family in all the landing sites. Alestidae which is a family of six species made up 42.2% of all catches. *Synodontis eupterus* was the least abundant species. Throughout the period of study, only 0.02kg of *Synodontis eupterus* was encountered and measured. The family Tetraodontidae which has a single genus; Tetraodon, represented in West African fresh and brackish waters was the least abundant.

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## Introduction

The Lake Volta is the most important inland fishery area in Ghana. According to FAO statistics, inland capture fisheries contributed 27 percent of total Ghanaian fish production in 2009 (FAO FishStat Plus). It is estimated that the reservoir provides 90 percent of the national freshwater fish production (Abban, 1999). The Lake Volta in Ghana is an immense reservoir created after a completion of the Akosombo Dam on the Volta River in 1964. It is the largest man-made lake by surface area in the world. It has a length of 520 km and covers about 8,500 km$^2$, or 3.2 percent of Ghana's total land area. The reservoir stores about 149 km$^3$ of water (van Zwieten *et al.*, 2011). The lake Volta extends from the Akosombo Dam in southeastern Ghana to the town of Yapei in the Northern region of Ghana. Yapei is thus the terminal point for the lake Volta and the lower reaches of the White Volta River (WVR) starts from there. According to Braimah (2003) some 300 000 fisherfolk depend on the Volta reservoir for their livelihood. The Volta reservoir is endowed with fisheries resources. Dankwa *et al.* (1999) identified 121 species in the Volta reservoir.

The importance of the Yapei fishery cannot be underestimated. Yapei is 52km from the Northern regional capital Tamale. Tamale is the third largest city in Ghana with a population of 537,986 (Wikipedia, 2012). Yapei is easily accessible as it is on the Accra-Kumasi-Tamale trunk road. Yapei is one of the nine main sources of smoked fish to the Tamale Central Market (Obodai *et al.*, 2009). The Tamale Central Market is the largest market center in the metropolis and majority of the inhabitants buy their food stuffs from this market. It thus makes Yapei an important supplier of fish especially smoked fish. Fishermen at the Yapei stretch of the White Volta River practice unregulated and unselective harvesting of fish with fishermen harvesting all sizes of fish without regard to the sustenance of the fishery. These practices targeted at more catches for more income. Fish can only be harvested at the maximum sustainable yield (MSY) when all the biological parameters are known including the species composition and relative abundance.

## Materials and methods

### *Study area*

The study was conducted at the Yapei stretch of the White Volta River, which is a major landing site in the Northern Region of Ghana. Three non-overlapping landing sites namely Pataplapei, Porturto and Aglassipei were selected (Figure 1).

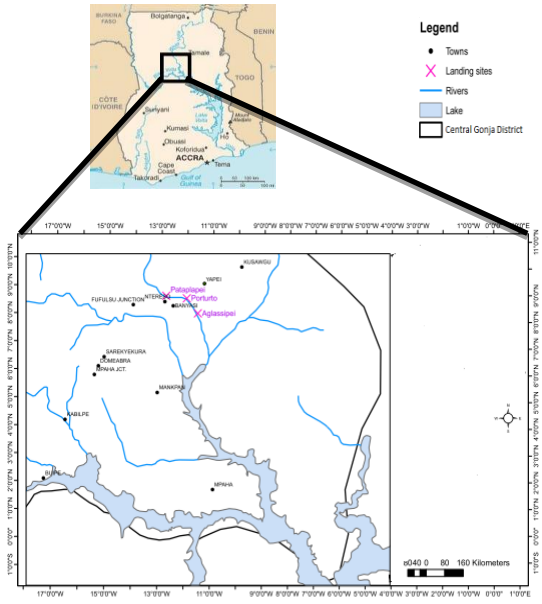


**Fig. 1.** Map of Ghana with an insert of the detailed study area showing Yapei, and the three landing sites; Pataplapei, Porturto, and Aglassipei

### *Fish sampling and total catch*

Fish sampling and landings survey were done once in a month in each of the three landing sites and it spanned over the study period (October 2011-March 2012). The fish sampling and landing surveys were conducted on the days of visit between 6:00 am and 12:00 pm GMT. On the sampling days. The samples were taken from the local fishermen's catches and examined for their species composition using keys provided by Levesque *et al.* (1992) and Dankwa *et al.* (1999). Total catch weight was measured and recorded. The total catch was then sorted into individual species and the species weight measured.

**Data analysis**

Descriptive statistics of the Software STATISICA 8.1 and Microsoft Excel 2010 were used to analyze catches data for means and percentages.

Abundance was calculated as follows:

$$\text{Abundance} = \frac{\text{The weight of a species}}{\text{The weight of the total catch}} \times 100$$

**Result**

*Species composition and relative abundance*

Fifty two (52) species belonging to sixteen (16) families were encountered in the lower reaches of the White Volta River during the period of study (Table 1). *Alestes baremoze* was the most abundant species. It made up 80.6kg of the total of the 462kg of fish caught, representing 17.5%. It is followed by *Brycinus leuciscus* (58.3kg) and *Brycinus nurse* (27.6 kg). All the three top species were semi pelagic omnivorous fish belonging to the family Alestidae which was also the most abundant family in all the landing sites. *Synodontis eupterus* was the least abundant species. Throughout the period of study, only 0.02kg of *Synodontis eupterus* was encountered and measured.

Figure 2 shows the percentage representation of the weight of the fish families in the lower reaches of the White Volta River. The most abundant family was Alestidae (42.2%). It is followed by Schilbedae (12.9%) and then Cyprinidae (12.2%). Cichlidae, Citharinidae, Polypteridae, Centropomidae and Malapteruridae had percentages within 0.9% and 0.5%. Tetraodontidae was the least abundant family (0.1%) and occurred only in Porturto. The Malapteruridae also occurred in Pataplapei and Porturto only.

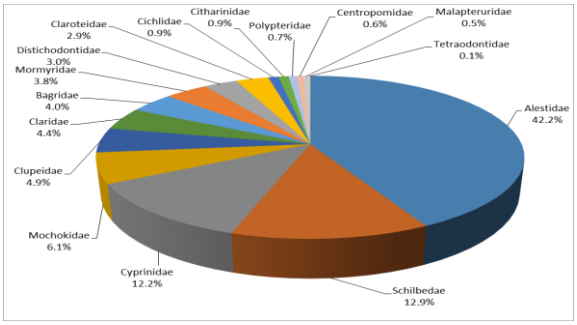


**Fig. 2.** Percentage representation of the weight of fish families in the lower reaches of the White Volta River from October 2011 to March 2012

**Discussion**

The fishery in the lower reaches of the White Volta River is characterized by artisanal activities and mode of operation. No outboard motor canoes were observed during the period of study. Dug-out canoes are the main fishing craft in the lower reaches of the White Volta River. This presents a clear difference between the Yapei fishery and that of Yeji, which is main fishing area in stratum VII where outboard motors are used and purse seine fishing is practiced. Landings are dominated by *Alestes baremoze*. This is in contrast to other areas or strata that have been reported to have tilapia-dominated landings of catches. According to Braimah (2001) fish landing in the Volta reservoir are dominated by tilapia species which formed 38.1% of catches. *Alestes* sp, and *Brycinus* sp, were reported to have less than 1% in the catches. Tilapia-dominated landings in stratum VII is probably as a result of the species preference for still or slowly flowing water which is the lacustrine nature of the stratum. The lower reaches of the White Volta River is within stratum VIII and it is more riverine. The fifty two (52) species identified in this study is far below the one hundred and twenty one (121) Dankwa *et al.* (1999) identified in the entire Volta reservoir. This is because this study was done within a limited time (6 months) and thus does not present a complete species composition as some fishes are seasonal. Moreover, spatially the study was restricted to 15km length of the whole Volta reservoir which has a total length of 520 km (van Zwieten *et al.*, 2011)

The Fisheries Act of Ghana (PNDC law 256 of 1991) is a regulation by government to ensure sustainability of fisheries resources. However, fishing in the lower reaches of the White Volta River is unregulated. Fishing gears of all sizes are used. There is no adherence to mesh-size regulation, which require minimum mesh size of 25mm, approximately one inch, in stretched diagonal length. Some fishermen fish with gillnets with mesh size of 12mm. This is greatly impacting on the fisheries as non-target species are caught. There is no adherence probably due to lack of enforcement of regulation. Generally, Pataplapei (upstream) had a more established fishery

than the Porturto (Midstream) and Aglassipei (downstream). The fishermen used gillnets with mesh size above 25mm showing adherence to the minimum mesh regulation of the Fisheries Act of Ghana (PNDC law 256 of 1991).

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**Appendix 1.** Species composition and abundance by weight in the lower reaches of the White Volta River from October 2011 to March 2012

| | Family | Species | Weight (Kg) | Abundance (%) | Feeding type |
|---|---|---|---|---|---|
| 1 | Alestidae | *Alestes baremoze* | 80.6 | 17.5 | Semi pelagic omnivores |
| 2 | Alestidae | *Brycinus leuciscus* | 58.3 | 12.6 | Semi pelagic omnivores |
| 3 | Alestidae | *Brycinus nurse* | 27.6 | 6.0 | Semi pelagic omnivores |
| 4 | Cyprinidae | *Labeo coubie* | 25.7 | 5.6 | Aufwuchs-detritus and herbivores |
| 5 | Schilbedae | *Parailia pellucida* | 25.4 | 5.5 | Benthic omnivores |
| 6 | Schilbedae | *Schilbe intermedius* | 24.5 | 5.3 | Semi pelagic omnivores |
| 7 | Clupeidae | *Odaxothrissa mento* | 22.4 | 4.8 | Semi pelagic omnivores |
| 8 | Alestidae | *Hydrocynus forskalii* | 22.3 | 4.8 | Carnivores |
| 9 | Bagridae | *Bagrus bajad* | 17.7 | 3.8 | Carnivores |
| 10 | Cyprinidae | *Labeo senegalensis* | 17.6 | 3.8 | Aufwuchs-detritus and herbivores |
| 11 | Claridae | *Clarias gariepinus* | 14.3 | 3.1 | Carnivores |
| 12 | Cyprinidae | *Labeo parvus* | 11.7 | 2.5 | Aufwuchs-detritus and herbivores |
| 13 | Mochokidae | *Synodontis clarias* | 9.1 | 2.0 | Aufwuchs-detritus and herbivores |
| 14 | Claroteidae | *Auchenoglanis occidentalis* | 9.0 | 1.9 | Benthic omnivores |
| 15 | Schilbedae | *Schilbe mystus* | 8.6 | 1.9 | Semi pelagic omnivores |
| 16 | Mormyridae | *Mormyrus rume* | 7.6 | 1.7 | Semi pelagic omnivores |

| | Family | Species | Weight (Kg) | Abundance (%) | Feeding type |
|---|---|---|---|---|---|
| 17 | Distichodontidae | *Distichodus rostratus* | 6.9 | 1.5 | Aufwuchs-detritus and herbivores |
| 18 | Distichodontidae | *Distichodus engycephalus* | 6.6 | 1.4 | Aufwuchs-detritus and herbivores |
| 19 | Mochokidae | *Hemisyndontis membranaceus* | 5.9 | 1.3 | Aufwuchs-detritus and herbivores |
| 20 | Claridae | *Clarias anguillaris* | 5.5 | 1.2 | Carnivores |
| 21 | Mochokidae | *Synodontis schall* | 4.9 | 1.1 | Aufwuchs-detritus and herbivores |
| 22 | Mormyridae | *Petrocephalus bovei* | 4.0 | 0.9 | Semi pelagic omnivores |
| 23 | Citharinidae | *Citharinus citharus* | 3.9 | 0.8 | Aufwuchs-detritus and herbivores |
| 24 | Polypteridae | *Polypterus endlIcheri* | 3.0 | 0.7 | Carnivores |
| 25 | Centropomidae | *Lates niloticus* | 2.9 | 0.6 | Carnivores |
| 26 | Cichlidae | *Sarotherodon galilaeus* | 2.8 | 0.6 | Aufwuchs-detritus and herbivores |
| 27 | Mochokidae | *Synodontis ocellifer* | 2.6 | 0.6 | Aufwuchs-detritus and herbivores |
| 28 | Mochokidae | *Synodontis nigrita* | 2.6 | 0.6 | Aufwuchs-detritus and herbivores |
| 29 | Claroteidae | *Chrysichthys auratus* | 2.4 | 0.5 | Carnivores |
| 30 | Malapteruridae | *Malapterurus electricus* | 2.4 | 0.5 | Carnivores |
| 31 | Alestidae | *Brycinus macrolepidotus* | 2.4 | 0.5 | Semi pelagic omnivores |
| 32 | Mormyridae | *Mormyrus macrophthalmus* | 2.1 | 0.5 | Semi pelagic omnivores |
| 33 | Claroteidae | *Chrysichthys nigrodigitatus* | 1.6 | 0.4 | Carnivores |
| 34 | Alestidae | *Hydrocynus brevis* | 1.4 | 0.3 | Carnivores |
| 35 | Mormyridae | *Marcusenius senegalensis* | 1.2 | 0.3 | Benthic omnivores |
| 36 | Mochokidae | *Synodontis filamentosus* | 1.1 | 0.2 | Aufwuchs-detritus and herbivores |
| 37 | Mochokidae | *Synodontis sorex* | 1.1 | 0.2 | Aufwuchs-detritus and herbivores |
| 38 | Cichlidae | *Oreochromis niloticus* | 1.0 | 0.2 | Aufwuchs-detritus and herbivores |
| 39 | Mormyridae | *Mormyrops anguilloides* | 0.9 | 0.2 | Benthic omnivores |
| 40 | Mormyridae | *Hyperopisus bebe* | 0.6 | 0.1 | Semi pelagic omnivores |
| 41 | Tetraodontidae | Tetraodon lineatus | 0.6 | 0.1 | Carnivores |
| 42 | Mochokidae | *Synodontis vellifer* | 0.6 | 0.1 | Aufwuchs-detritus and herbivores |
| 43 | Cyprinidae | *Barbus macrops* | 0.4 | 0.1 | Semi pelagic omnivores |
| 44 | Bagridae | Bagrus docmak | 0.4 | 0.1 | Carnivores |
| 45 | Mormyridae | *Marcusenius abadii* | 0.4 | 0.1 | Benthic omnivores |
| 46 | Mormyridae | *Petrocephalus bane* | 0.2 | 0.0 | Semi pelagic omnivores |
| 47 | Mormyridae | *Hippopotamyrus pictus* | 0.1 | 0.0 | Benthic omnivores |
| 48 | Schilbedae | *Siluranodon auratus* | 0.1 | 0.0 | Benthic omnivores |
| 49 | Distichodontidae | *Distichodus brevipinnis* | 0.1 | 0.0 | Aufwuchs-detritus and herbivores |
| 50 | Cichlidae | *Steatocranus irvinei* | 0.1 | 0.0 | Aufwuchs-detritus and herbivores |
| 51 | Cichlidae | *Tilapia zilli* | 0.04 | 0.0 | Aufwuchs-detritus and herbivores |
| 52 | Mochokidae | *Synodontis eupterus* | 0.02 | 0.0 | Aufwuchs-detritus and herbivores |
| | | **Others (unidentified)* | 6.4 | 1.4 | |

Note: * fish were badly fermented and near decomposition; identification was not possible