

Distribution, Status, and some aspects of the Biology of two Non-Cichlid Native Fishes of Lake Victoria, Kenya.

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Abstract

The status, distribution and some aspects of the breeding biology of mormyrids and *Brycinus* sp. was studied in the years 2000 and 2001 in the Kenyan portion of Lake Victoria. Five mormyrid species, *Mormyrus kanume* FORSK., *Pollimyrus nigricans* BLGR., *Marcusenius victoriae* WORTH, *Hippopotamyrus grahami* NORM., and *Gnathonemus longibarbis* HILG., and two species of *Brycinus*, *Brycinus Jacksonii* BLGR and *B. sadleri* BLGR. were recorded. *M. kannume* and *B. sadleri* occurred both at the river mouths and in the open waters while the rest of the species were restricted to certain river mouths only. The size distribution of these species in the lake consists of mainly larger ripe individuals. Of the mormyrids *P. nigricans* dominated with 62% while *M. kannume* accounted for <5% of the mormyrids caught.

The size range for each species caught, size at first maturity for both males and females and sex ratios are presented. The Possible reasons for the decline of the species numbers and abundance are suggested.

Key words: Distribution, Mormyridae, *Brycinus*, Breeding, Lake Victoria

Introduction

The native non-cichlid fish species of Lake Victoria once formed a basis for major fisheries. A drastic decline in the species like *Labeo victorianus*, *Alestes (Brycinus) sp.*, Mormyridae and, *Barbus altianalis* was observed in the 1970s (Marten, 1979). Majority of these species are potamodromous and their decline has been attributed to intense fishing using small mesh gillnets and traditional traps at the river mouths, where ripe female and males congregate on their way to spawn in the riverine environment, leading to recruitment over fishing (Cadwalladr, 1965; Katunzi, 1985). Apart from over fishing, most of these species are threatened by modification of riverine regimes by human activities such as farming, settlement and pollution from factories, etc.

Although adoption of larger nets targeting *Lates niloticus* was reported to have led to an upward trend in the catches of traditional species (CIFA, 1982), most of these species have not shown any significant recovery (Pers obs.). It is thus imperative to examine the current distribution and abundance of the native non-cilchids and to define the existing and potential threats to their survival. Their life history should also be obtained in order to develop recommendations for enhancing their status.

In this paper, the current status, distribution and some aspects of the breeding biology of the Mormyrids and *Brycinus* of Lake Victoria, Kenya are described.

Materials and methods

Sampling was mainly done in the Nyanza Gulf and the Northern and Southern portions of the Kenyan waters of Lake Victoria (Fig. 1). Fish samples were obtained from small mesh gillnets (25.4 mm, 28.6 mm, 50.8 mm, 68.5 mm, 93.9 mm, 76.2 mm, 101.6 mm, 127.0 mm) set around the river mouths and the rocky areas. Additional samples were obtained through bottom trawls especially in the deep offshore areas. For each sampling site, the bottom and vegetation type were noted.

Fish were identified to species level and for each fish total length (TL, cm) was taken to the nearest cm, while total weight (g) was taken to the nearest gram. The fish were dissected, sexed and maturity status recorded.

Results

I. Mormyridae

(a) Distribution

Five species belonging to the family Mormyridae were recorded. Four small *mormyrid* species namely: *Pollimyrus nigricans*, *Hippopotamyrus grahami*, *Marcusenius victoriae* and *Gnathonemus longibarbis* were found associated with only two river mouths, Awach (Kendu bay) and Sio. The fifth species *Mormyrus kannume*, a large species hitherto of high commercial value, was recorded in the rocky areas around Asembo Bay, Mbita and at Nzoia river mouth. All the river mouths have soft bottom and have shallow waters with adjacent papyrus swamps. The small species were in nets set overnight. Nets set during the day had no mormyrids confirming remarks by Okedi (1969) that migration of the species was always at night, peak periods coinciding with dusk and dawn.

(b) Composition

The composition of the samples examined is summarised in Table 1.

Pollimyrus nigricans

Some biometric characteristics of *P. nigricans* are shown in Table 2. The size range of *P. nigricans* examined was 6-11 cm TL. Male ranged from 6- 10 cm TL while female were in a higher length range (8-11 cm TL). Smallest ripe male was 7.5 cm TL weighing 5.5 g while smallest mature female was 8.0 cm TL weighing 6 g. This species accounted for 61.64 % of all the small mormyrid species.

Hippopotamyrus grahami

The size range recorded was 9-17 cm TL The smallest ripe male was 9.4 cm while the smallest ripe female was 10 cm (Table 2). It accounted for 23.3% of the small mormyrid species.

Figure 1. Map of Lake Victoria showing study area

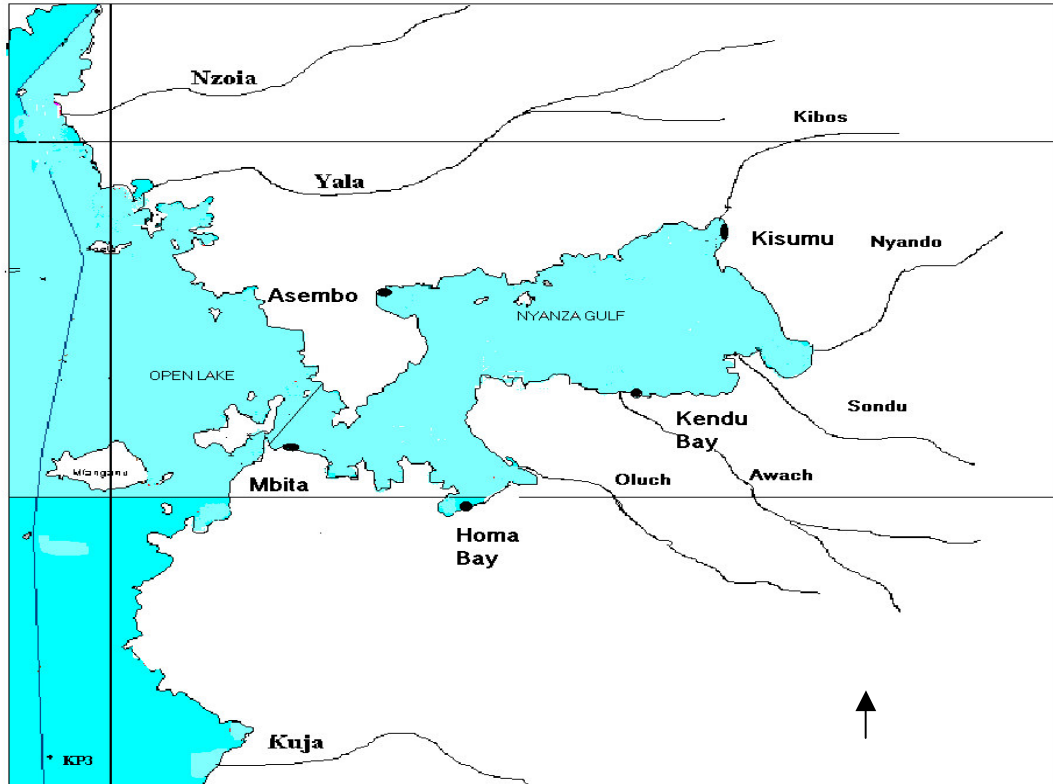


Figure 1: Map of Nyanza Gulf, Lake Victoria showing area of study.

Gnathonemus longibarbis

Size range of this species examined was 12-29 cm TL. The largest fish caught was a male while no female fish larger than 25 cm was caught. All the fish between 17-29 cm TL were ripe (Table 2). These results were consistent with observations made in Sio river (Okedi, 1969) However the lower length ranges appear to occur in the rivers which were not sampled in this study. *G. longibarbis* accounted for 8.22% of all the small mormyrids.

Marcusenius victoriae

The size range examine was 14-23 cm. At 15 cm both males and female were ripe (Table 2). This is in agreement with Observations of Greenwood (1966) that adult *Marcusenius* were usually between 15 and 20 cm long. However, it is strikingly different from Okedi (1969) who recorded a size range of 3.2-15.4 cm. This could be due to differences in the sampling sites. The percentage composition of this species was 6.9%.

Table 1. Species composition of four small mormyrid and *Brycinus species* in Lake Victoria, Kenya

Taxa	Occurrence
<i>Mormyridae</i>	
<i>Pollimyrus nigricans</i>	Awach (K/bay) & Sio river mouths
<i>Hippopotamyrus grahami</i>	„
Marcusenius victoriae	„
<i>Gnathoonemus longibarbis</i>	„
<i>Mormyrus kannume</i>	Nzoia & Rocky areas (open Lake)
Characidae	
<i>Brycinus sadleri</i>	Awach, Oluch, Nyando, Sio & Mid Gulf
<i>Brycinus jacksonii</i>	Awach (Asembo)

Mormyrus kannume

Only a few samples were obtained and had a size range of 20-38 cm. Fish in the size range 31-38 cm were all mature.

(c) Sex ratio

The sex ratio of the smaller mormyrid species is shown in Table 3. Apart from *P. nigricans*, the rest of the small mormyrids did not differ significantly ($P < 0.05$) from the expected 1:1 ratio. In *P. nigricans* and *G. longibarbis* females dominated over males while in *H. grahami* males dominated.

Table 2. Some biometric characteristics of four small *mormyrid* and *Brycinus* species in Lake Victoria, Kenya

Species	No. Males	No. Females	No. Mature or ripe	Size range	Smallest ripe female (cm)	Smallest ripe male (cm)
P. nigricans	19	55	66	6.0-11.0	8.0	7.5
<i>H. grahami</i>	7	3	10	9.0-17.0	10.0	9.4
<i>G. longibarbis</i>	7	5	12	12.0-29.0	17.0	17.0
<i>M. victoriae</i>	4	7	11	14.0-23.0	15.0	15.0
<i>B. sadleri</i>	64	83	130	4.0-12.0	7.0	5.0
<i>B. jacksonii</i>	129	55	176	12.0-22.0	16.0	12.5

(d) Length Frequency distribution

The length frequency distribution of four mormyrid species is shown in Figures 2-5. The histograms indicate that the component in the population to which majority of fish in the lake belongs consists of large individuals that are mainly ripe.

II *Brycinus* sp. (Pisces: Characidae)

Two species, *Brycinus jacksonii* and *B. sadleri* were recorded.

(a) Distribution

B. jacksonii

This species occurred in very few numbers in the main lake and the river mouths within the Gulf. However it was found unique to Awach river mouth near Asembo Bay where it occurred in very high numbers (> 90 % of all the samples obtained).

Table 3. Sex ratio of the mormyrid & *Brycinus* species examined in L. Victoria, Kenya

Species	No. Males	No. Females	M : F	χ^2
P. nigricans	19	55	1: 2.89	68.21*
<i>H. grahami</i>	7	3	1: 0.43	2.28
<i>M. victoriae</i>	7	5	1: 0.71	0.57
<i>G. longibarbis</i>	4	7	1: 1.75	2.25
<i>B. sadleri</i>	64	83	1: 1.30	5.64
<i>B. jacksonii</i>	129	55	1: 0.43	42.45*

* Significant at $P > 0.05$

B. sadleri

This occurred in abundance at the river mouths and in the pelagic zone associated with *Rastrineobola argentea*. Highest occurrence was associated with Awach river mouth in Kendu Bay, Awach (Asembo Bay), Nyando, Oluch and Sio river mouths. Few samples were found in the mid-Gulf, far away from the river mouths.

(b) Composition

The composition of the characids examined is summarised in Table 1.

B. sadleri

The size range recorded was 4-12 cm TL. This is in agreement with what was reported by Getabu (1988). The smallest ripe female was 7.0 cm while the smallest ripe male was 5 cm (Table 2).

B. jacksonii

The size range recorded was 12-22 cm TL. The smallest ripe female was 15.5 cm and the smallest ripe male was 12.5 cm (Table 2).

(c) Sex ratio

The sex ratio for the two *Brycinus* species is shown in Table 3. In *B. sadleri* there were more females than males while in *B. jacksonii* males were more than females and the ratio was significantly different from the expected 1:1 ratio ($\chi^2 = 68.21$; $P > 0.05$).

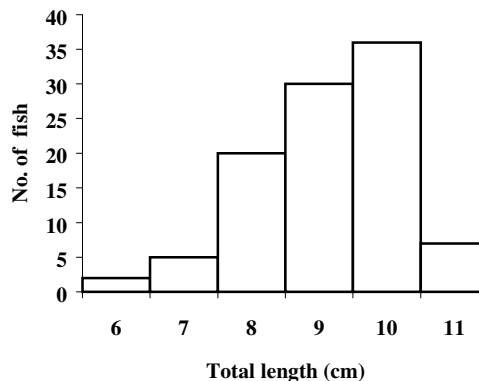


Fig. 2: Length frequency distribution of *P. nigricans* in Lake Victoria, Kenya

(d) Length- frequency distribution

Analysis of the length frequency histograms for *B. sadleri* (Fig. 6) and *B. jacksonii* (Fig. 7) show two components in the population. The component to which majority of fish belong consists of larger individuals. The smaller individuals/ juveniles are very few and probably occur in the riverine environments.

Discussion

Seven mormyrid species have been reported in Lake Victoria (Greenwood, 1966; Okedi, 1969). Okedi (1969) reported five small mormyrids, *Gnathonemus longibarbis*, *Marcusenius victoriae*, *Pollimyrus nigricans*, *Hippopotamyrus grahami* and *Petrocephalus catostoma* in the Lake Victoria basin especially, in the Sio river in western Kenya. In this study, only four of the smaller mormyrids and one larger species,

Mormyrus kannume, were recorded. *Petrocephalus catostoma* was not recorded at all in the four months of sampling. This species could be confined to the rivers and these were not sampled in this study. Although there is no directed fishery for mormyridae, the number caught in this study was quite low despite intensive gillnetting, with *Pollimyrus nigricans* forming the bulk of the catch (62%).

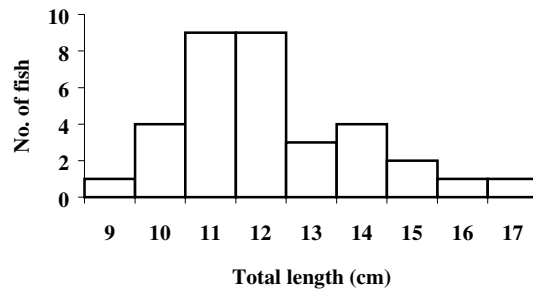


Fig. 3: Length frequency distribution of *Hippopotamyrus grahami* in Lake Victoria, Kenya

The absence of the juveniles of the small mormyrid species in lake may indicate that these species feed in lakes and rivers and spawn in rivers only. Indeed, the high occurrence of the ripe fish caught at the river mouths was a pointer of fish moving into the rivers to spawn. However, for *M. kannume* the occurrence of ripe fish both at the river mouths and in areas very far away from the influence of these rivers such as the rocky and sandy areas around Mbita could mean that spawning takes place both in the lake and rivers. It could also be possible that the currents and turbulence in the rocky areas around Mbita channel offer conditions resembling those in the rivers thus triggering spawning.

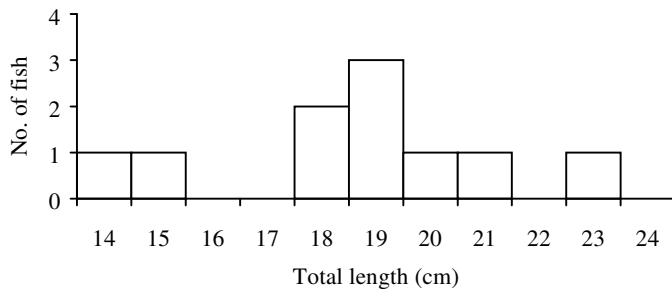


Fig. 4: Length frequency distribution for *Marcusenius victoriae* in Lake Victoria, Kenya

The sex ratios calculated for *P. nigricans*, departed significantly from the expected 1:1 and this could have been due to the differential migration of the sexes during their breeding cycle.

Brycinus jacksonii was uniquely associated with particular river mouths and it would be important to know the factors controlling such distribution pattern. Males matured at smaller size in the two *Brycinus* species. Over 90% all the fish caught both in dry and wet months were ripe, implying that breeding could be continuous and not necessarily synchronised to the rainy seasons. Whereas *B. sadleri* occurred in the pelagic areas far from the river mouths, *B. jacksonii* were confined to the river mouths only.

Conclusion

Although the two families investigated are not targeted for fishery, their abundance seems to have considerably declined. Some possible reasons for this decline could be the interference with the breeding grounds through human encroachment of the wetlands, industrial and domestic pollution of certain river systems. These could be supported by the fact that most of the species were associated with certain rivers only. Investigations into the water quality of the inflowing rivers may be very vital to the understanding of the distribution and abundance of these species.

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