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CONTENTS

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The Editor wishes to invite comments and suggestions from readers with a view to improving the bulletin in the choice and arrangement of the articles, notes, summary, news briefs etc. It is our aim to see that this publication receives wide acceptance from the reading public and those interested in aquatic both within the country and abroad. It is hoped that this issue will stimulate further contributions from the readers.

We appeal to all concerned to send us regularly such Publications, at the following address:-

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Potential Fishery of Nile Perch Lates Niloticus Linne (Pisces: Centropomidae) in Nyanza Gulf of Lake Victoria, East Africa *

Ezekial N. Okemwa

INTRODUCTION

Lates niloticus (Linne) is not a native fish of Lake Victoria, although the fossil record shows the presence of *Lates* spp. during the Miocene period in the area now occupied by this lake (Greenwood, 1951). In the 1950's *Lates* was introduced into Lake Victoria (Uganda waters) to prey on *Haplochromis spp.*, which were in abundance and not consumed by local fishermen (Hamblyn, 1960). Stonman & Rogers (1971) reported that the first large quantities of *Lates* appeared in fishermen's catch in 1964 in Uganda waters. In Nyanza Gulf, *Lates* began appearing in the fishermen catches in the late sixties and early seventies. In 1966, a 34.5 Kg *Lates* was caught off Rusinga Islands (Fig. 1) (Arunga, 1981b). Kodhongania & Cordone (1974 reported for 1969 a catch rate of 2 kg/h in shallow water (0-10m). Later, Muller & Benda (1981) found that *Lates* catch rates in Nyanza Gulf had increased to 23.8 kg/h

Kongere (1979)reported a total of fishermen catch of 203 metric tons in 1977 from Nyanza Gulf. Arunga (1981a), found a total gillnet production in Nyanza Gulf of 36 533 metric tons for 1981, and 60% of that was *Lates*

Lake Victoria fisheries have changed considerably during recent years. *Sarotherodon esculentus*, previously the fish of greates commercial importance, has virtually disappeared from the Lake (Marten, 1979). Numerous other species have declined drastically during the past decade, particularly those that migrate into streams to spawn such as *Barbus*, *Labeo*, *Alestes* and *Momyrus*, because of the use of small mesh-size gill nets and traps at the mouth of the rivers (Marten, op. cit.). Okemwa (1981a) reported that the fish species composition of Nyanza Gulf changed drastically in the last five years.

The Haplochromines which used to dominate all other fish catches in this Gulf have disappeared. Other fishes like *Clarias*, *Bagrus*, *Protopterus* and *Synodontis spp.* are now rare (Okemwa, op. cit.). On the other hand, *Lates* has now colonised the whole of Nyanza Gulf.

This paper discusses the importance of the *Lates* fishery and its potential in Nyanza Gulf using data obtained from recent studies.

Study area

The study area is shown in Fig. 1. A description of the study area is given by Rinne & Wanjala (1982). Nyanza Gulf is a shallow bay with a depth range of 0-30 m, and a mean depth 6m.

Material and Methods

To assess the potential of the *Lates* fishery in Nyanza Gulf, a bottom trawl programme (see Okemwa,

This paper is adopted from Hydrobiologia 108, 121-126 (1984)

1981a) was conducted. Fourteen sampling sites throughout the Gulf (Fig. 1) were determined by the feasibility of trawling. The draught of the research vessel allowed trawling at depths under 3 m.

All hauls were made with an 85 hp diesel powered trawler using an otter trawl with a 13.7 m headrope and 38 mm mesh. The hauls were usually of 30 min duration. Trawling speed was 2.5 knots. Trawl catches were adjusted to one hour hauls. Sampling was carried out monthly from January 1979 to December 1981. Three sets of replicate hauls were taken in each station. The catch was sorted to species and weighed.

Gulland (1970) noted that the rate of exploitation of a virgin stock can increase to quickly that the fish population is endangered before fisheries scientists can assess the situation by classical methods.

Table 1. Estimated mean numbers and mean of 25 monthly samples in kg/h of *Lates* from 14 stations in Nyanza Gulf for the period January 1979 to December 1981.

	Lates numbers	Catch rates kg h						
Year	1981	1979		1980		1981		
Station	No.	S.D.*	kg h	S.D.	kg h	S.D	kg h	S.D.
1. Kaloka	156	94	51.1	30.5	19.3	9.3	104.3	100.2
2. Usare	165	56	36.0	28.9	41.9	23.6	60.0	48.3
3. Dunga	77	17	23.2	19.0	37.6	17.9	64.2	42.9
4. Open Water (Ndere)		93	55.4	53.2	35.4	12.9	116.4	35.0
5. Kendu Bay	65	42	25.8	17.2	151.9	145.9	57.8	29.3
6. Sango	73	37	10.3	5.6	8.1	2.7	7.8	5.0
7. Homa Bay	207	144	68.6	23.4	70.9	45.3	101.4	79.8
8. Mirunda Bay	230	159	122.0	60.7	438.9	602.8	200.6	109.6
9. Luanda Naya	300	17	141.1	28.4	292.1	157.7	148.5	75.2
10 Mbita	110	49	12.8	9.2	19.5	11.7	52.9	57.8
11. Naya (Open water)		166	141.1	96.0	292.1	127.6	148.5	35.0
12. Homa Point	14 900	536	9.0	6.6	227.2	184.3	689.4	57.0
13. Asembo Bay	838	138	60.6	2.8	57.5	29.8	168.1	97.5
14. Main Lake	19	8		0.0	0.0	0.0	4.3	2.8

*S.D. Standard deviation.

Consequently, he developed a rough but quick estimate of potential yield (Y_{max}), including total mortality coefficient (Z) and exploited standing stock (B). This relationship us used in the present paper. It is given by the equation:

$$Y_{max} = 0.5\ ZB^{1}$$

Results

Lates was present in all stations sampled (Fig. 1). Its abundance varied from station to station and from month to month (Table 1 and Fig 2), but always was the vast majority. More than 90% of the catch by weigh was Lates followed by *Oreochromis niloticus* (formerly Tilapia nilotica) Trewavas, 1981. *O. niloticus*, was more numerous in the shallow water near the edge. *Lates* was not found in the main Lake at 30 m depth (Fig. 1) in 1979 & 1980, and appeared in low numbers in 1981. Homa point (Fig. 1), had a higher concentration of *Lates* than other sampling stations (Table 1). The general pattern of distribution of *Lates* in Nyanza Gulf between 1979 and 1981 is given in Fig 1. Its standing stock was estimated at 9.1 kg/ha in 1979 and rose to 61.8 kg/ha in 1981. Homa point and Mirunda Bay had the highest average catch rate with 689.4 57 and 200.6 109.6 kg/h , respectively (Table 1). The main lake had the lowest catch during the same period (Table 1). About 90% of the *Lates* caught by trawl-net had a wight ranging from 1 to 70 kg. Table 2 lists the mean catch rates (kgh^{-1}) by species in Nyanza Gulf in 1981 by bottom trawl.

The present *Lates* harvest of 21.807 metric tons (Arunga, 1981a) was considered as the exploited standing stock B . Okemwa (1982b) found total mortality to be 1.0. Using Gulland's equation the potential yield estimate of *Lates* in Nyanza Gulf is thus near to 11 000 metric tons. This indicates that exploitation rates are over the maximum and therefore, there is overfishing of Lates in Nyanza Gulf.

Discussion

The results show there is a good stock of *Lates* in Nyanza Gulf. Gee (1969) has indicated that in Lake Victoria *Lates* is piscivorous and feeds mainly on *Haplochromis spp*. Ogari (pers. comm.) finds that, in Nyanza Gulf it feeds on Shrimps of the genus *Caridina* on *Engraulicypris spp.* and on its own progeny.

Table 2. Mean catch rates (kg/h) by species in Nyanza Gulf in 1981 by bottom trawl.

Depth (m)	(0-10)	
Number of hauls	273	
Average kg/h		S.D.
Species		
Bagrus docmac	0.3	0.2
Clarias mossambicus	0.1	0.1
Haplochromis spp.	0.0	0.0
Labeo victorianus	0.02	0.01
Lates niloticus	169.0	70.9
Protopterus aethiopicus	0.1	0.04
Synodontis	0.2	0.1
Oreochromis niloticus	15.6	8.4
Sarotherodon variabilis	0.2	0.03
Tilapia zillii	0.0	0.0
Mean weight/haul in kg/h	185.52	
	80.0	

Caridina forms about 40% by number of the food of *Lates* It is, however, interesting to note that *Lates* is a shallow water species, limited to

inshore waters. These habitats are similar to those favoured by *Engraulicypris*, (Shallow, well oxygenated waters).

In 1978, Okedi (1982) using Anchor Chinese pressure lamps of 350 candle power (14.10^5 Jcm^2 sec), estimated the biomass of *Engraulicypris* in Tanzania waters of Lake Victoria to be 73 151 tons which, extrapolated for the whole lake, is about 150 000 tons.

There is therefore likely a direct predator-prey interaction between the two species (Okedi, 1982). As other species are on the decline (Payne, 1976; Marten, 1979; Muller & Benda, 1981; Arunga,1981b; Okemwa, 1981a) and become increasingly unavailable, the success of *Lates* in Lake Victora is dependent on three species viz, *Engraulicypris*,, *Caridina* and *Haplochromis spp*.The abundance and growth of *Lates* in Nyanza Gulf will be determined in time by the availability of these preys. When this food resource is exhausted, *Lates* will prey on its own progeny, and finally finish itself. But since *Lates* is now being overfished the preys are not likely overconsumed.

The largest recorded specimen (2.0 m in length) was a female weighing nearly 200 kg. It was caught in a beach Seine at Luanda Naya beach in 1978. The second largest *Lates*,also a female was caught at Homa Point (Fig 1.) at 7 m depth on 15.10. 1981. It weighed 165 kg and measured 1.9 m in total lenth. Female *Lates* are usually larger than males. *Lates* offers a larger amount of flesh per unit weight than the preffered *Tilapia* group (Kongere, 1979).

The consumption of *Lates* around the lake poses a problem. Nile Perch is not popular and considered unpalatable compared to indigenous Sarotherodon esculentus (Ngege) which has now disappeared from Nyanza Gulf. But *Lates* is considered a delicacy elsewhere. It should, therefore, be possible to encourage the fishing of Nile Perch by developing markets to areas where they are worth many times what they are locally, while people should be educated on better methods of preserving and cooking Nile Perch. Marketing data around Nyanza Gulf show that the price of Nile Perch fluctuates between 1.00-2.00 shillings per kilogram, whereas at the Kisumu Fish Market a kilogram of Fillet Sells for 15.00-20.00 shillings, and still more in other towns. The remains of carcass of Nile Perch at Kisumu Market sells for 1.00-2.00 shilling a kilogram. If the carcass could be processed into fish meal and poultry feeds, the returns could be more profitable than the present wholesale prices.

Using the data obtained from Nyanza Gulf, the annual production of *Lates* amount to about 11 000 metric tons in 1981 (Arunga, 1981a). At 2 000 Kenya shillings per ton (rate of exchange in 1982, US$ 1=11 Kenya shillings) this gives a total annual earning of 22 000 000 Kenya shillings (US$ 2 000 000). This is a remarkably productive fishery. A *Lates* fishery also exists in Lake Kioga (Ogutu and Twongo, pers. comm.). In early 1950's, *Lates* niloticus and three prey tilapias - *Sarotherodon leucostictus* *Oreochromis niloticus and Tilapia*.

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