Current status of the fish stocks of Lake Victoria (Uganda)

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Abstract: *A total of 457 hauls were taken during experimental bottom trawl surveys in the Uganda sector of Lake Victoria between November 1997 and June 1999 to estimate composition, distribution and abundance of the major fish species in waters 4-60 m deep. Fifteen fish groups were caught with Nile perch,* Lates niloticus *(L.), constituting 94% by weight. Haplochromines and* L. niloticus *occurred in all areas sampled, while Nile tilapia,* Oreochromis niloticus *(L.) and other tilapiines were restricted to waters <30 m deep. The mean trawl catch rate in the zone where artisanal fishermen operate (i.e. in waters <30 m depth was 165 kg hr^{-1}, of which 93.6% comprised* L. niloticus. *Species diversity and relative abundance decreased with increasing water depth.*

Introduction

Until the 1970s, Lake Victoria had a multi-species fishery dominated by tilapiine and haplochromine cichlids. There were important subsidiary fisheries for more than 20 genera of non-cichlid fishes, including catfish (*Bagrus docmak* (Forskål), *Clarias gariepinus* (Burchell), *Synodontis* spp. and *Schilbe intermedius* Rüppell), the lungfish (*Protopterus aethiopicus* Heckel) and *Labeo victorianus* Boulenger (Kudhongania & Cordone 1974). Stocks of most of these species declined and others disappeared following the introduction of four tilapiines (*Oreochromis niloticus* (L.), *O. leucostictus* (Trewavas), *Tilapia rendalli* Boulenger and *T. zillii* (Gervais)) and Nile perch (*Lates niloticus* (L.)) during the 1950s. Since then the fishery has been dominated by Nile perch, Nile tilapia and the native cyprinid species, mukene, *Rastrineobola argentea* (Pellegrin).

Lake Victoria is an important source of fish not only for local consumption but also for export. A number of fish processing plants have been constructed along the shores of the lake, 11 of which are licensed to operate in the Uganda sector of the lake (Odongkara & Okaronon 1999). The fishing capacity in the Uganda sector increased from about 3200 fishing canoes in 1972 to 8000 by 1990 (Okaronon 1994) and was estimated to be about 10 000 canoes in 1998 (C. Dhatemwa, pers. comm.).

This increase in fishing effort and investment was made without clear knowledge of the magnitude and sustainability of the stocks. There are indications that the fishery yield has declined from 135 000 t in 1993 to 107 000 t in 1997 (Odongkara & Okaronon 1999). The only previous extensive stock assessment exercise undertaken was from 1969 to 1971, before the Nile perch upsurge (Kudhongania & Cordone 1974). The current stock assessment programme, which commenced in 1997, is designed to generate information to underpin management decision making for the fishery. This includes estimating the current composition, distribution, abundance, population structure and biomass of the major fish species. The objective of this paper is to provide an overview of findings to date.

Materials and methods

Experimental bottom trawling surveys were carried out monthly in the Uganda sector of the lake using the RV Ibis. Because of the size of the Ugandan sector of the lake, it was divided into three zones: I- Tanzania/Uganda border to Bukakata; II- Bukakata to Kiyindi; and III- Kiyindi to Uganda/Kenya border (Fig. 1). Each zone was surveyed quarterly between November 1997 and June 1999. A monthly sampling exercise comprised 4-6 hauls per day for a total of 10 days. On some occasions the sampling was curtailed because the boat broke down or for safety reasons because the weather was too rough. No survey was carried out in February 1999 because the RV Ibis was being used for the lake-wide hydroacoustic survey.

A total of 457 hauls of 30 min duration were made using a 25-mm codend stretched mesh trawl in transects from 4-60 m deep. Fish catches were sorted into species, individual weight (g) and length (TL, cm) were recorded. The fish were opened up and the sex, reproductive status, and contents of the stomach assessed. When possible, every fish in the catch was individually measured. For large catches, Nile perch above 35 cm TL were measured individually and the smaller fish were subsampled. To achieve this in an unbiased manner, the catch was mixed thoroughly and a subsample of approximately three shovelfuls (depending on the size of the fish, the aim being to obtain a sample of approximately 200 fish) was taken for measurement of the biological characteristics. The results were raised by the proportion of the subsample against the total catch by weight (after the larger fish were removed).

The total mortality rate Z was estimated using the growth parameters derived by Asila and Ogari (1988) for the Kenyan waters of the lake.

Results

Distribution of hauls by zone and depth

Of the 457 hauls made between November 1997 and June 1999, 53% were taken in Zone II, 37% in Zone III and only 48 hauls (11%) were taken in Zone I (Table 1). The low number of hauls in Zone I was primarily because of breakdown of the research vessel and rough weather. The majority of trawls (71%) were made in waters between 10 and 30 m deep, with 18% in shallower waters (Table 1).

Fish species composition and distribution

During the current survey, 15 fish species groups were recorded (Table 2). These groups included species complexes such as haplochromine cichlids. *Lates niloticus* dominated the catches (94% by weight) followed by *O. niloticus* (4.4%) and haplochromines (1.5%). The other species groups contributing less than 0.6% of catches (Table 3).

The highest catches were obtained in Zone II, where an average of 172.9 kg hr^{-1} was recorded; followed by Zone III (141.6 kg hr^{-1}) and Zone I (125 kg hr^{-1}) (Table 4). Fish species diversity was greatest in the depth range 10-20 m, and declined markedly with increasing depth (Tables 2 and 3). A high proportion of the fish (93%) was found in waters <30 m deep (Table 5). *Lates niloticus* and haplochromines occurred in all areas sampled, whilst *O. niloticus* and other tilapines were restricted to waters less than 30 m deep (Table 6). Few fish were caught in depths greater than 40 m, and these were restricted to *L. niloticus*, haplochromines and *Barbus profundus* Greenwood.

The mean catch declined from about 200 ±36 kg hr^{-1} in the 4-10 m depth zone to 32 ±30 kg hr^{-1} in waters 40-50 m deep (Table 2 & 3; Fig. 2). A mean catch rate of 165 ±28 $kghr^{-1}$ was recorded in the 4-30 m depth zone where the artisanal fishermen operate.

The mean catch of bottom trawling in the artisanal fishing zone showed a marked decline since trawl surveys began in 1969 (Fig. 3). This decline was most rapid in the early 1980s when catches dropped from 595 kg hr^{-1} in 1981 to 155 kg hr^{-1} in 1985.

***Population characteristics of* Lates niloticus**

Length frequency analysis was carried out for 29 345 fish caught during the entire survey programme to elucidate the size distribution of stock (Fig. 4). The fish caught ranged between 2 and 137 cm total length. About 50% of the fish fell between 4 and 16 cm total and 73% between 5 and 26 cm total length. The modal length was 10 cm. As yet, no analysis has been carried out on the monthly length frequency data to assess population characteristics.

Although no growth analysis has been carried out on the data to date, there are a number of trends within the series (Fig. 4). In particular there is evidence of recruitment of a new cohort of fish in the April/May period in both 1998 and 1999. Two modes, one of about 5 cm and the other between 25 and 30 cm were apparent in both years. These trends will be examined for the next FIDAWOG meeting.

Considerable differences were also found between the stock size distribution between the three zones (Fig. 5). In Zone 1, which includes the Sesse Islands and many deep water areas, there is a greater proportion of larger individuals (20-50 cm TL) than in Zone 3 which is dominated by smaller fish (< 30 cm TL). This probably reflects the exploitation patterns between the regions, a point supported by the higher total mortality determined for the latter region (Z = 1.73 for Zone 3 compared to 1.47 for Zone 1).

The size distribution of Nile perch in different depth zones also showed some evidence of variation (Fig. 6). In particular, there is a tendency for more smaller individuals in deeper areas of the lake, although this needs further analysis to confirm the trend.

Discussion

During the lakewide bottom trawl survey of 1969/1971 (Kudhongania & Cordone 1974), in addition to the abundant haplochromine cichlids, 24 fish species in 21 genera were encountered. There was a well-defined trend in the number of species by depth with maximum species diversification in the shallows. Catches were dominated by the *Haplochromis* complex (83% by weight) followed by *B. docmak* (4.2%), *C. gariepinus* (4.1%), *O. esculentus* (3.8%), *P. aethiopicus* (2.8%), *O. niloticus* (0.5%), and *Synodontis victoriae* Boulenger (0.4%). *Lates niloticus* catches were insignificant (<0.1%). A mean catch rate of 797 kg hr^{-1} was estimated for waters between 5 m and 29 m deep (Fig. 3). The mean size of some fishes (*Haplochromis* spp., *S. victoriae*, *Xenoclarias eupogon* (Norman)) increased with depth.

Bottom trawling in the Ugandan waters from 1981-1985 (Okaronon *et al.* 1985; Okaronon & Kamanyi 1986) yielded all but two of the non-cichlid species (i.e. *Gnathonemus longibarbis* Hilgendorf and *Brycinus* sp.) found in the 1969-1971 survey. Haplochromines declined from 91.4% of the catch by weight in 1981 to almost zero in 1985, while the contribution of *L. niloticus* increased from 5% to 96% during the same period. The mean catch rates for all fish species combined declined from 595 kg hr^{-1} in 1981 to 355 kg hr^{-1} in 1983 and to 155 kg hr^{-1} in 1985 (Fig. 3).

During the survey from May 1993 to October 1997, *L. niloticus* contributed 96.5% of the catch by weight. Fish diversity and abundance decreased with increasing water depth. The mean annual catch rate in the 4-29 m depth zone was 150 kg hr^{-1}.

Four fish taxa recorded during the 1993/1997 survey (*Barbus altianalis* Boulenger, *Brycinus* sp., *Oreochromis variabilis* (Boulenger) and *X. eupogon*) were not caught in 1997/1998, suggesting a further decline in fish species diversity. More fish were recorded in waters less than 30 m deep during 1997/1998 (about 95% of total catch by weight) than before this period (60%). In the 1999 surveys, two additional fish species, *Aethiomastacembelus frenatus* (Boulenger) and *T. rendalli*, were found compared to the 1997/1998 period.

The experimental trawl CPUE has shown a continuous and marked decline since research trawling began in 1969. CPUE in waters less than 30 m averaged 797 kg.hr^{-1} over the 1969-1971 surveys and declined to 115 kg hr^{-1} in 1997/1998. The average catch in the 1999 surveys increased to 159 kg hr^{-1}, but this slight increase was probably due to change of trawl gear with effect of November 1998. The species composition in 1969-1971 was very different to the present day and different behaviour and possible net avoidance of the species presently targeted by the trawl may be partially responsible for the apparent decline in fish stocks. Nevertheless, an apparent seven-fold decline in stock abundance gives considerable cause for concern.

Analysis of the monthly length frequency data will be carried out in the near future to elucidate the population characteristics of the Nile perch populations in the three zones and at different depths to identify the effects of fishing in these different areas. However, provisional assessment of the catch composition suggests that all size groups are evenly distributed throughout the range of depths encountered, except possibly the deep water areas > 30 m. Here there appears to be a preponderance of smaller fish. These may be occupying the deep water to avoid predation by their larger conspecifics. Alternatively, the smaller fish may exploit the abundant food resources, especially *Caridina nilotica* (Roux), known to exist in this region where oxygen levels are depleted and thus making it inaccessible to larger fish which have lower tolerance to low oxygen levels.

As in other riparian countries (Mkumbo & Ezekiel 1999; Othina and Tweddle 1999), catch rates varied between different zones of the Ugandan sector. No explanation for the higher catch rates in Zone II was available, but this could be linked to lake topography or possible impact of different exploitation patterns of the fishery. This is an issue that will be addressed when the population characteristics of the stock are compared for different sectors of the lake in the next period of the LVFRP project. Irrespective, marked difference in the length frequency distributions of Nile perch were found between the zones. All zones exhibited a predominance of small sized fish with few greater than 50 cm. However, this was particularly prevalent in Zone 3, Kiyindi to Kenyan border and appears to be indicative of heavy exploitation pressure ($Z = 1.73$). By contrast, in Zone 1, (Tanzanian border to Bukakata), which is more remote from large urban centres, a greater proportion of medium-sized (20-60 cm) fish were caught, possibly indicating lower exploitation pressure at present. This issue will again be addressed in future analysis but the total mortality calculated for Ugandan waters ($Z = 1.55$) is considerably less than Kenyan waters ($Z = 3.69$) (Getabu & Nyaundi 1999).

Finally, further work is required to explain the general perception that catch rates decline with increasing depth. This pattern appears to have broken down in Zone II in the 1999 surveys (Table 4), when high catches were recorded in waters deeper than 40 m. This was presumably due to a breakdown of the oxycline allowing Nile perch to exploit the resources in a greater proportion of the water column. It was proposed in the original tender document to investigate the possible relationships between water quality parameters and fish distribution patterns, as it was considered fundamental to the management of the fishery resources. Unfortunately, delays in deployment of the SEABIRD monitoring equipment have prevented this study taking place to date. This problem has now been resolved and the equipment will come on line as of September 1999.

Acknowledgements

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References

Asila A.A. & Ogari J. (1988) Growth parameters and mortality rates of Nile perch (*Lates niloticus*) estimated from length frequency data in the Nyanza Gulf (Lake Victoria). In: S. Venema, J. Möller-Christensen and D. Pauly (eds) Contributions to tropical fisheries biology. FAO Fish. Rep. 389. Rome, 272-278.

Getabu A. & Nyaundi J. (1999) Relative abundance and distribution of fish in Kenyan waters of Lake Victoria. This volume.

Kudhongania A.W. & Cordone A.J. (1974) Batho-spatial distribution patterns and biomass estimate of the major demersal fishes in Lake Victoria. *African Journal of Tropical Hydrobiology and Fisheries* 3, 15-31.

Mkumbo O. & Ezekiel C.N. (1999) Distribution and abundance of fish stocks in Lake Victoria, Tanzania. This volume.

Odongkara O.K. & Okaronon J.O. (1999) Impact of economic reforms on the performance of fish processing firms and the fisheries resource. In: G. Bahiigwa (ed.) *Capacity building for integrating environmental considerations in development planning and decision-making with particular reference to the fishing industry in Uganda.* Economic Policy Research Centre, Makerere University Campus, Kampala, Uganda, pp. 8-26.

Okaronon J.O. (1994) Current composition, distribution and relative abundance of the fish stocks of Lake Victoria, Uganda. *African Journal of Tropical Hydrobiology and Fisheries* 5, 89-100.

Okaronon J.O., Acere T.O. & Ocenodongo D.L. (1985) The current state of the fisheries of Lake Victoria (Uganda). Rome: FAO Fisheries Report 335, 89-98.

Okaronon J.O. & Kamanyi J.R. (1986) Recent trends in the fisheries of the northern portion of Lake Victoria, Uganda. UFFRO Seminar, Jinja, Uganda November 1986, unpublished manuscript.

Othina A. & Tweddle D. (1999) The status of the artisanal fishery of Lake Victoria, Kenya, with notes on improvements to the catch data collection system. This volume.

Table 1. Distribution of hauls during bottom trawling in Lake Victoria, Uganda.

Year	Month	Depth interval (m)															
		Zone I					Zone II					Zone III					
		4-10	10-20	20-30	30-40	40-50	4-10	10-20	20-30	30-40	40-50	4-10	10-20	20-30	30-40	40-50	50-60
	Nov						7	12	9	3	5						
1997	Dec											4	11	10	5	1	1
	Jan																
	Feb	1	15	6	4		1	1									
	Mar						6	9	10	3		1	1				
	April											2	14	6	1		
	May																
1998	June						13	15	14								
	July																
	Aug											3	12	11	3	1	
	Sept											1	24	1			
	Oct						3						5				
	Nov						1	2	8		2						
	Dec		12	4	2		8	9	1								
	Jan											3	10	18		1	
	Feb																
	Mar						6	13	5	3							
1999	April		4				9	9	10	4	1						
	May											3	6	7	3		
	June						12	10	12	3	1						
Total	Hauls	1	31	10	6		66	80	69	16	9	17	83	53	12	3	1
				48					240					169			

Table 2. Distribution of fish caught during bottom trawling in the various depth ranges, divided into 10-m intervals.

	1969-1971 survey								1993-1997 survey					1997-1998 survey					
	Water depth (10 m intervals, i.e. 4 = 4-10 m, 10 = 10-20 m, etc.)																		
Species	4	10	20	30	40	50	60	70	4	10	20	30	40	4	10	20	30	40	50
Aethiomastacembelus frenatus	✱	✱	✱																
Bagrus docmak	✱	✱	✱	✱	✱	✱	✱	✱	◆	◆				●					
Barbus altianalis	✱	✱	✱	✱	✱					◆	◆								
Barbus spp.									◆	◆					●		●		●
Brycinus spp.	✱								◆										
Clarias gariepinus	✱	✱	✱	✱	✱	✱	✱	✱	◆	◆					●				
Haplochromines	✱	✱	✱	✱	✱	✱	✱	✱	◆	◆	◆	◆	◆	●	●	●	●	●	●
Gnathonemus longibarbis	✱	✱	✱																
Labeo victorianus	✱	✱	✱							◆					●				
Lates niloticus	✱	✱	✱						◆	◆	◆	◆	◆	●	●	●	●	●	●
Mormyrus kannume	✱	✱	✱	✱	✱	✱	✱	✱		◆					●				
Oreochromis esculentus	✱	✱	✱	✱															
O. leucostictus	✱	✱							◆	◆					●				
O. niloticus	✱	✱							◆	◆				●	●	●			
O. variabilis	✱	✱	✱						◆										
Protopterus aethiopicus	✱	✱	✱	✱	✱	✱			◆	◆					●				
Schilbe intermedius	✱	✱	✱	✱	✱	✱	✱	✱											
Synodontis afrofischeri	✱	✱	✱	✱	✱	✱	✱	✱	◆	◆				●	●				
S. victoriae	✱	✱	✱	✱	✱	✱	✱	✱		◆					●	●	●		
Tilapia zillii	✱	✱								◆				●	●				
Xenoclarias eupogon	✱	✱	✱	✱	✱	✱	✱	✱	◆										

Table 3. Mean catch rates (kg hr^{-1}) during bottom trawling in Lake Victoria (Uganda), November 1997 to June 1999

Fish species	Depth interval (m)						Total	Percentage
	4 - 9	10 - 19	20 – 29	30 – 39	40 – 49	50 – 59	(kg hr^{-1})	
Aethiomastacembelus frenatus	0.02						0.00	0.01
Bagrus docmak	0.01						0.00	0.00
Barbus spp.		0.01	0.02	0.01		0.01	0.01	0.00
Clarias gariepinus		0.05					0.02	0.01
Haplochromines	3.74	2.86	1.53	1.47	1.09	0.15	2.44	1.53
Labeo victorianus		0.01					0.01	0.00
Lates niloticus	173.45	136.30	168.26	137.87	30.92	9.90	149.42	93.92
Mormyrus kannume		0.01					0.00	0.00
Oreochromis niloticus	22.41	6.81	0.01				7.01	4.41
Oreochromis leucostictus		0.01					0.00	0.00
Protopterus aethiopicus		0.24					0.10	0.06
Synodontis victoriae		0.02	0.01	0.00			0.01	0.00
Synodontis afrofischeri	0.05	0.01					0.03	0.02
Tilapia zillii	0.02	0.00					0.01	0.00
Tilapia rendalli		0.01					0.00	0.00
Number of species caught	7	13	5	4	2	2		
Mean catch (kg hr^{-1})	199.65	146.34	169.83	139.35	32.01	10.06	159.11	
Confidence limits (95%)	36.45	21.67	31.32	77.15	30.46	-		
Number of hauls	84	194	132	34	12	1	457	

Table 4. Mean catch rates (kg hr^{-1}) during bottom trawling in Lake Victoria, Uganda

Year	Month	*Zone I*					*Zone II*					*Zone III*					
		4-10	10-20	20-30	30-40	40-50	4-10	10-20	20-30	30-40	40-50	4-10	10-20	20-30	30-40	40-50	50-60
	Nov						118.4	175.0	85.7	140.9	0.3						
1997	Dec											95.4	81.0	52.8	55.9	1.4	10.1
	Jan																
	Feb	125.4	213.5	6.4	2.1		114.6	114.7									
	Mar						189.3	125.8	93.9	114.3		382.1	107.1				
	April											272.6	203.1	140.7	6.0		
	May																
	June						122.0	125.8	93.9								
1998	July																
	Aug											7.3	33.6	30.2	1.2	0.8	
	Sept											142.0	92.7	14.1			
	Oct						184.2						44.5				
	Nov						101.6	180.2	46.3		3.6						
	Dec		159.6	35.2	17.0		220.2	203.5	206.4								
	Jan											557.6	111.1	337.0		4.4	
	Feb																
	Mar						254.1	235.2	87.4	230.9							
1999	April		142.7				262.1	91.6	275.3	302.7	0.2						
	May											500.3	171.2	270.6	30.6		
	June						209.9	217.7	478.5	407.6	349.9						
Mean (kg hr^{-1})		125.4	182.4	17.9	7.1		183.2	162.1	181.6	243.2	1.2	273.3	105.9	182.6	67.0	0.7	10.1
95% CL		-	52.8	17.6	10.4		30.2	28.9	56.6	93.7	1.3	144.8	30.1	75.3	30.0	3.3	-
Average (kg hr^{-1})				125.0					172.9					141.6			
Total hauls		1	31	10	6		66	80	69	16	9	17	83	53	12	3	1

Table 5. Mean catch rates (kg hr^{-1}) for *Lates niloticus* during bottom trawling in Lake Victoria, Uganda

Year	Month	*Zone I* 4-10	*Zone I* 10-20	*Zone I* 20-30	*Zone I* 30-40	*Zone I* 40-50	*Zone II* 4-10	*Zone II* 10-20	*Zone II* 20-30	*Zone II* 30-40	*Zone II* 40-50	*Zone III* 4-10	*Zone III* 10-20	*Zone III* 20-30	*Zone III* 30-40	*Zone III* 40-50	*Zone III* 50-60
	Nov						110.2	173.5	85.3	139.0	0.2						
1997	Dec											84.3	67.3	49.5	55.8	0	9.9
	Jan																
	Feb	105.5	209.9	6.4	2.1		114.7	97.6									
	Mar						103.3	115.5	23.2	114.0		381.4	105.9				
	April											205.2	169.6	140.6	4.1		
	May																
	June						114.8	120.1	93.9								
1998	July																
	Aug											6.4	33.3	30.1	1.2	*	
	Sept											141.2	92.1	14.1			
	Oct						174.4						42.8				
	Nov						69.2	169.4	40.7		2.2						
	Dec		119.2	27.8	8.2		208.3	194.9	206.4								
	Jan											528.9	97.5	333.7		4.4	
	Feb																
	Mar						182.4	218.1	81.7	225.8							
1999	April		133.6				204.4	83.7	271.5	149.0	0.1						
	May											454.1	139.1	268.0	29.2		
	June						169.6	161.1	472.2	406.8	347.6						

Depth interval (m)

Table 6. Mean catch rates (kg hr^{-1}) for *Oreochromis niloticus* during bottom trawling in Lake Victoria, Uganda

		Depth interval (m)															
Year	Month	*Zone I*					*Zone II*					*Zone III*					
		4-10	10-20	20-30	30-40	40-50	4-10	10-20	20-30	30-40	40-50	4-10	10-20	20-30	30-40	40-50	50-60
	Nov						8.7	0.5	*								
1997	Dec											8.3	10.4	2.7			
	Jan																
	Feb	19.4	0.8					16.9									
	Mar						51.8					0.5	1.2				
	April											67.4	28.5				
	May																
	June						9.3	1.6									
1998	July																
	Aug											0.9	0				
	Sept											0.7	0.5				
	Oct						9.4						1.6				
	Nov						32.4	10.0									
	Dec		1.4				3.2	1.8									
	Jan											22.3	8.9				
	Feb																
	Mar						63.3	8.5									
1999	April		6.9				53.0	2.3	0.2								
	May											6.5	7.2				
	June						34.3	36.5									

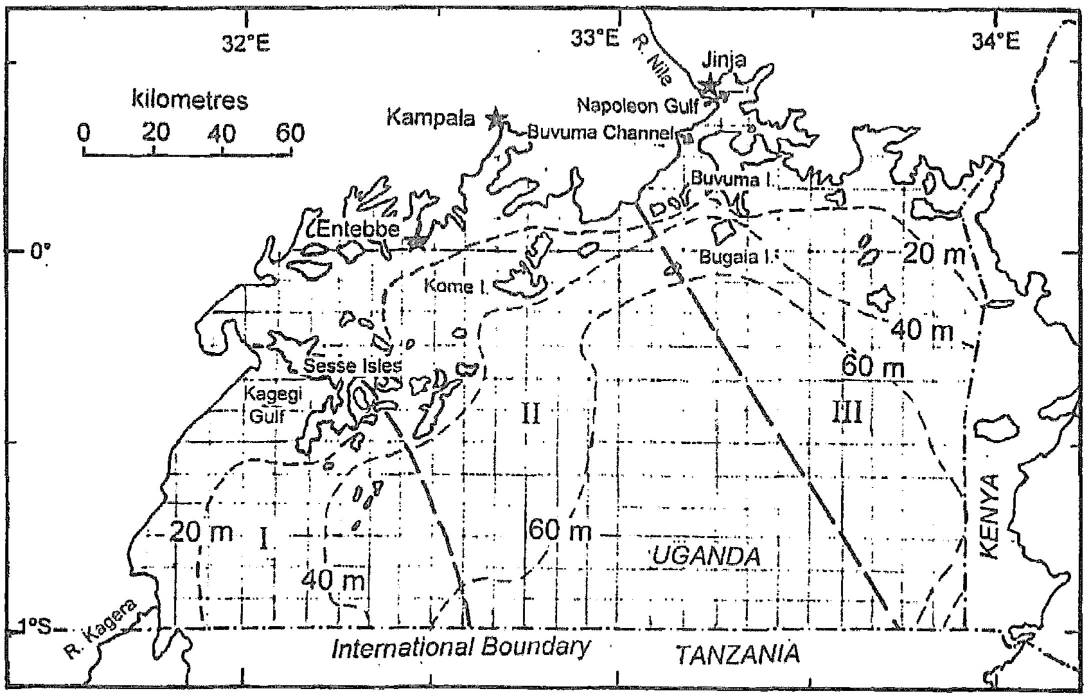

Figure 1. Map of Ugandan waters of Lake Victoria, showing the three areas into which the lake is divided for the trawl surveys The 5 x 5 n.m. sampling grid squares are shown and also the approximate positions of the 20, 40 and 60 m depth contours

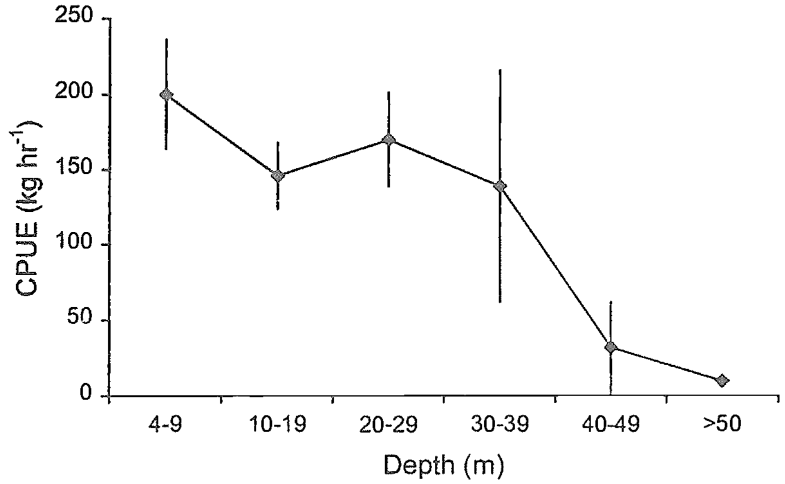

Fig. 2. Mean catch rate from bottom trawling in Lake Victoria (Uganda), November 1997 to June 1999

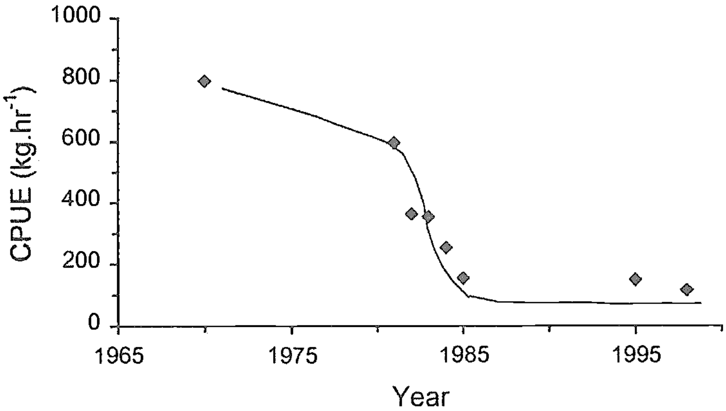

Fig. 3. Change in mean catch per unit effort from experimental trawling since 1969 (line fitted by eye)

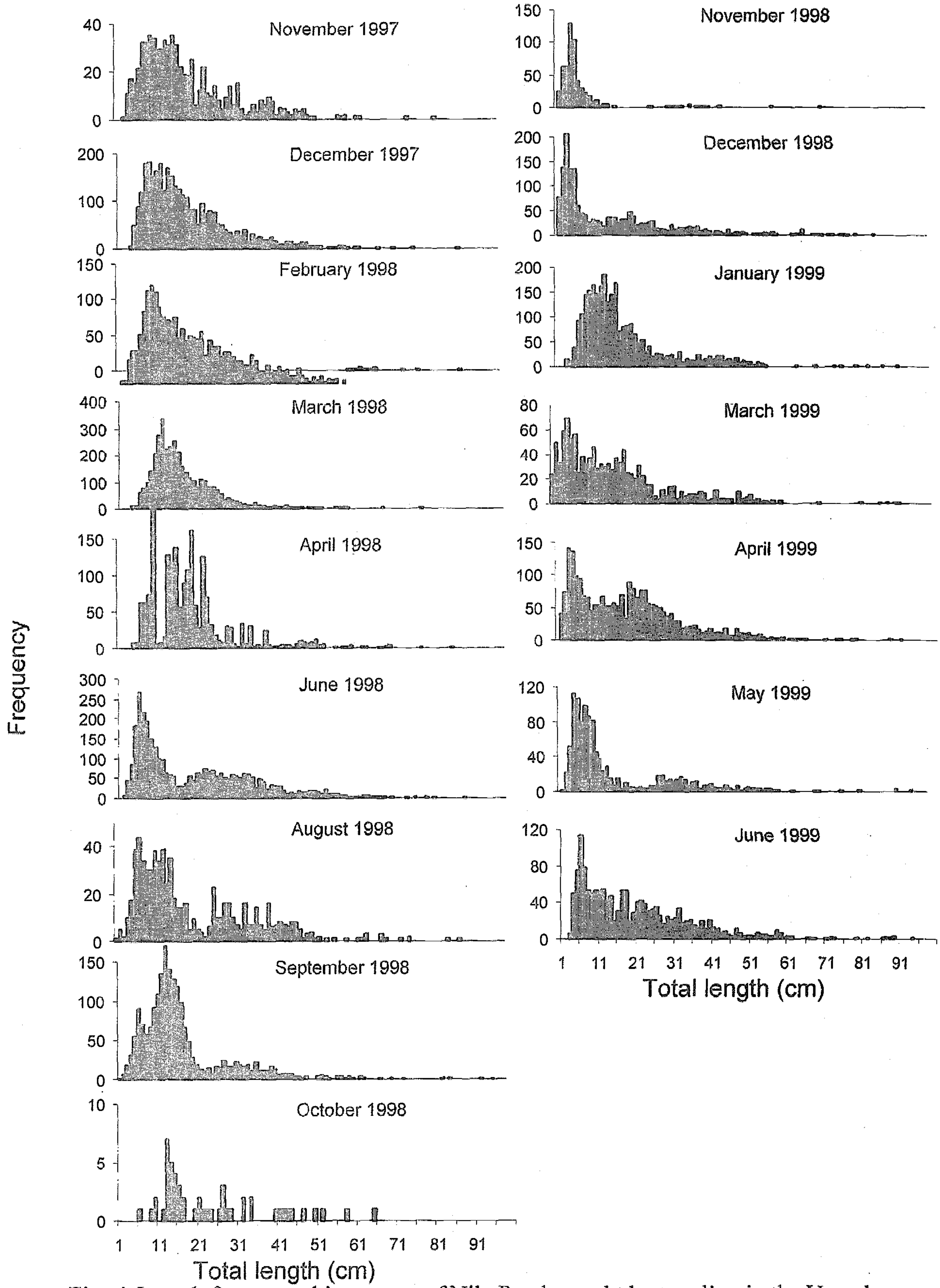

Fig. 4 Length frequency histograms of Nile Perch caught by trawling in the Ugandan waters of Lake Victoria between November 1997 and June 1999

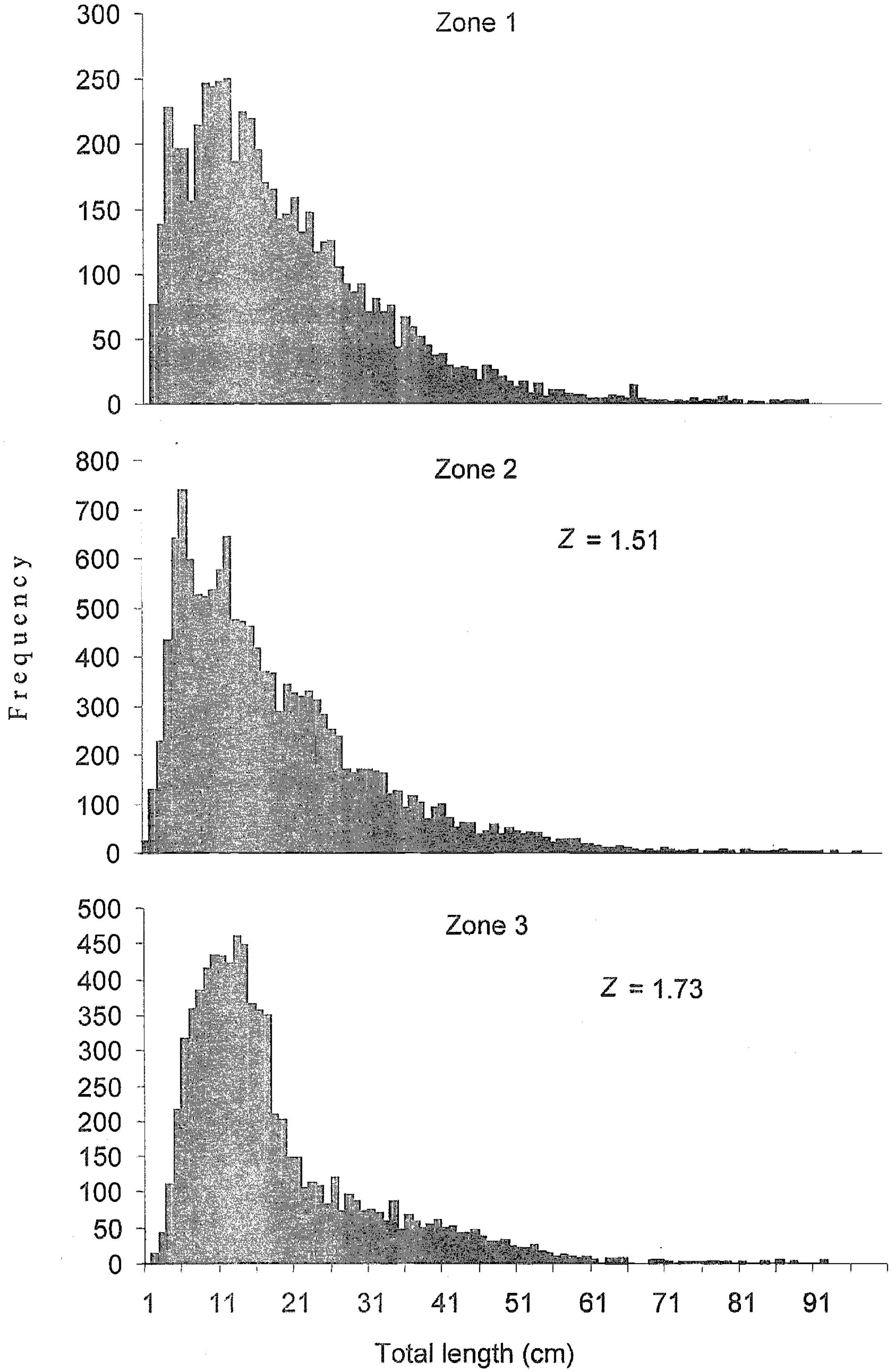

Fig. 5 Length frequency distributions for ***Lates niloticus*** from bottom trawling in three zones of Lake Victoria, Uganda, November 1997 to June 1999

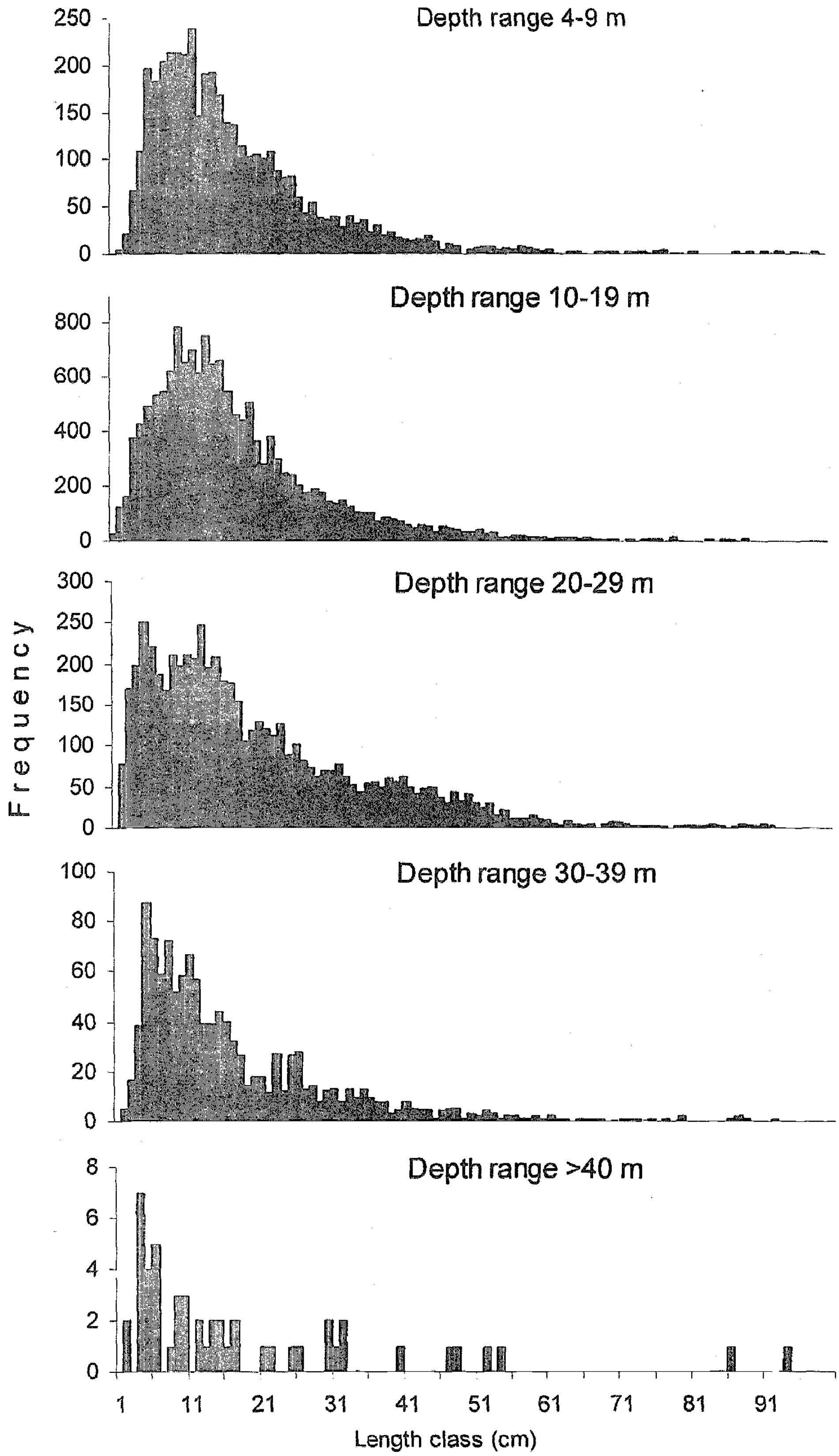

Fig. 6 Length frequency distributions for *Lates niloticus* from bottom trawling in different depth zones of Lake Victoria, Uganda, November 1997 to June 1999