

Stock assessment of *Lates niloticus* (L.), *Oreochromis niloticus* (L.) and *Rastrineobola argentea* (Pellegrin) using fishery dependent data from the Tanzanian waters of Lake Victoria

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Abstract: Catch data were collected from three beaches in the Mwanza area for *Oreochromis niloticus* (L.), *Rastrineobola argentea* (Pellegrin) and *Lates niloticus* (L.). Sampling took place in October 1997 and February, June and September 1998. The CPUE for *O. niloticus* was 3.9 to 6 kg boat⁻¹ and for *R. argentea* from 98 to 282 kg boat⁻¹. There was no obvious trend in catch rates for *L. niloticus*. The modal length for *O. niloticus* recorded at Chole beach was 34 cm TL. In February, fish were larger (41–45 cm) than in the other surveys. *Rastrineobola argentea* caught in October 1997 had modal length at 65 mm TL with some smaller fish. In February and June prominent length modes occurred at 45 and 58 mm respectively, which may represent the same cohort as the small fish caught in October 1997. In September 1998, there were two length modes at 46 and 60 mm. The 60 mm fish may represent the same cohort seen in previous surveys, suggesting growth from approximately 30 mm to 60 mm in an eleven month period. *Lates niloticus* landed at Kayenze beach over the four surveys had a modal length of 46 cm TL. Fish species encountered on the three beaches during the surveys were *O. niloticus*, *L. niloticus*, *R. argentea*, *Bagrus docmak* Forsskäll, *Clarias gariepinus* (Burchell), *Protopterus aethiopicus* Heckel, *Labeo victorianus* Boulenger, *Synodontis afrofisheri* Hilgendorf, *Synodontis victoriae* Boulenger, *Schilbe intermedius* (L.), *Brycinus jacksonii* (Boulenger), *Mormyrus kannume* Forsskäll and haplochromine cichlids.

Introduction

The management of fisheries requires assessment of stock abundance and population parameters to use in the decision-making process or to evaluate the impact of management measures. Stock assessment is needed to gauge the effects of activities such as overfishing, pollution, land drainage, river regulation, habitat restoration, stocking, introduction of new species, or to respond to requests for advice on the management of waters.

In Lake Victoria, there are now only three fish species of commercial importance, *Lates niloticus* (L.), *Oreochromis niloticus* (L.) and *R. argentea* (Pellegrin). Catch assessment surveys are now being conducted to investigate the exploitation status of the three species.

Materials and methods

Three beaches Kayenze, Chole, and Igombe were selected for sampling on the basis of accessibility and their importance for *L. niloticus*, *O. niloticus* and *R. argentea* fisheries respectively.

Each of these beaches was surveyed in October 1997, February, June and September 1998. The number of boats on beach on the day of sampling, the number that did not go out fishing and the number that went out fishing were recorded. The catches from as many boats as possible were sampled. The types of gear, number and mesh size were recorded. The landed catches of each boat were sorted into species. Length frequency measurements (TL, cm below) and weight (g) of the entire sample or sub sample of *L. niloticus* and *O. niloticus* from each sampled boat were taken. For *R. argentea*, a sample of 0.125 kg was taken and preserved in 5% formalin for measuring in the laboratory.

Results

There were no obvious trends in catch rates over the four surveys. The *O. niloticus* catch ranged from 2.7 to 5.9 kg boat⁻¹ and for *R. argentea* from 40 to 282 kg boat⁻¹. (Fig. 1 and Table 1).

Table 1. Catches of the three species recorded in the four surveys.

Beach	Survey no.	Species	CPUE (kg boat ⁻¹)	Estimated catch (kg)	Effort (no of boats)
Chole	I	<i>Oreochromis niloticus</i>	5.7	143	24
	II		2.5	16	9
	III		3.1	40	22
	IV		2.7	70	18
Igombe	I	<i>Rastrineobola argentea</i>	125.0	10500	107
	II		160.8	12585	76
	III		20.3	1458	36
	IV		141.1	9593	34
Kayenze	I	<i>Lates niloticus</i>	41.5	6825	96
	II		101.2	3334	42
	III		55.6	2559	46
	IV		64.5	5671	83

The size range of *Oreochromis niloticus* caught by gillnet, longline, handline and beach seine was very variable from visit to visit with no obvious trends (Fig. 2).

The different fishing methods yielded similar size distributions of *R. argentea* and thus the data for the different gears have been combined in Figure 3. In October 1997, there was a prominent cohort with 65 mm modal TL. In addition there were some smaller fish between 20 and 45 mm. In February 1998, the catch was dominated by a cohort with a modal TL of 43 mm. By June, the modal length shifted to 58 mm TL. In September, there were two peaks in the length frequency distribution at 45 mm and 60 mm TL.

There were no clear trends in the length distributions of *L. niloticus* (Fig. 4) although the modal length of the fish in each sample was around 50 cm.

Twelve fish species were recorded in the catches. The greatest fish diversity was recorded at Chole beach including *O. niloticus*, *L. niloticus*, *Protopterus aethiopicus* Heckel, *Clarias gariepinus* (Burchell), *Bagrus docmak* Forsskäll, haplochromines, *Labeo victorianus* Boulenger, *Synodontis afrofisheri* Hilgendorf, *S. victoriae* Boulenger, *Schilbe intermedius* (L.) and *Mormyrus kannume* Forsskäll. Four fish species were recorded at Igombe, *R. argentea*, *L. niloticus*, haplochromines and *L. victorianus*. Only three fish species, *L. niloticus*, *O. niloticus* and *B. docmak* were recorded at Kayenze beach.

Discussion

The catch rates of *O. niloticus* at Chole beach (6.0 kg boat⁻¹) were low, perhaps because most fishermen on this beach were part time, fishing mainly for home consumption. *Oreochromis niloticus* caught by gillnets and longlines in October at Chole beach were small fish (modal length 20 cm TL), while those in February, June and September (41 – 45 cm, 26 cm and 34 cm TL respectively) were bigger. The nets recorded in October ranged from 3" to 9" stretched mesh, but in later surveys were from 5" to 9" mesh. Hook sizes number 7, 10, 11, 12 and 13 were commonly in use. Very few fish were recorded from beach seines, suggesting that catches were already sorted and disposed of before the boats landed.

In addition to a prominent mode at 65 mm TL, *R. argentea* catches in October included a number of smaller fish grouped around 30 mm TL. The peak in February at 45 mm TL may be from the same cohort of small fish recorded in October. The peak shifted further to 58 mm TL in June and 60 mm TL in September. A second cohort was also present in September catches with a modal TL of 46 mm.

The length frequency distribution for *L. niloticus* reflects the gillnet mesh sizes used to catch the species at the size required by the commercial market.

The diversity of species encountered at Chole beach is because fishing activities was conducted within the Mwanza Gulf, which has lots of vegetation and small bays which species use as refugia and nursery grounds. The other two beaches had fewer fish species due to the open water fishing grounds.

This study covered a small part of the lake on a quarterly basis. It is being expanded into a monthly programme to obtain more representative data for the whole Tanzanian shoreline. The data collected will supplement Fisheries Department statistics and fisheries independent data to assist in assessing the state of the stocks.

Acknowledgements

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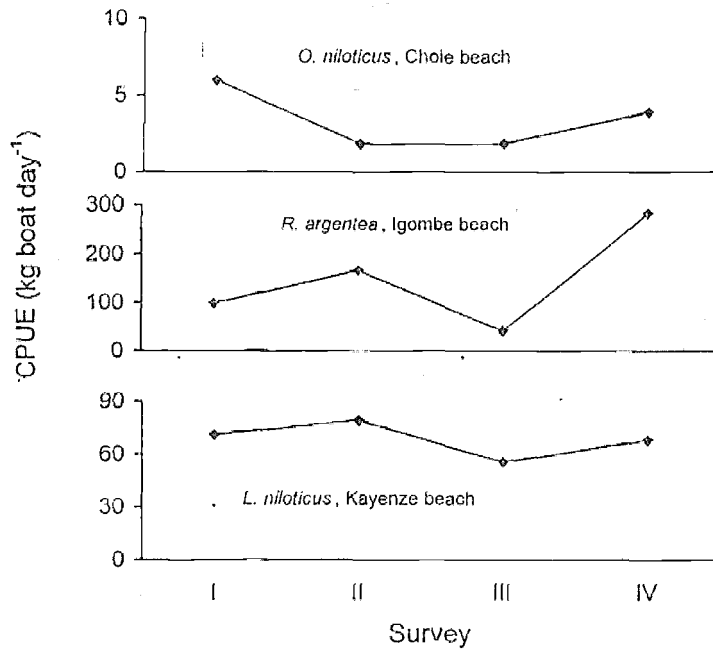


Figure 1. CPUE in kg boat days-1 for the three main commercial species at the sampled beaches in the quarterly surveys.

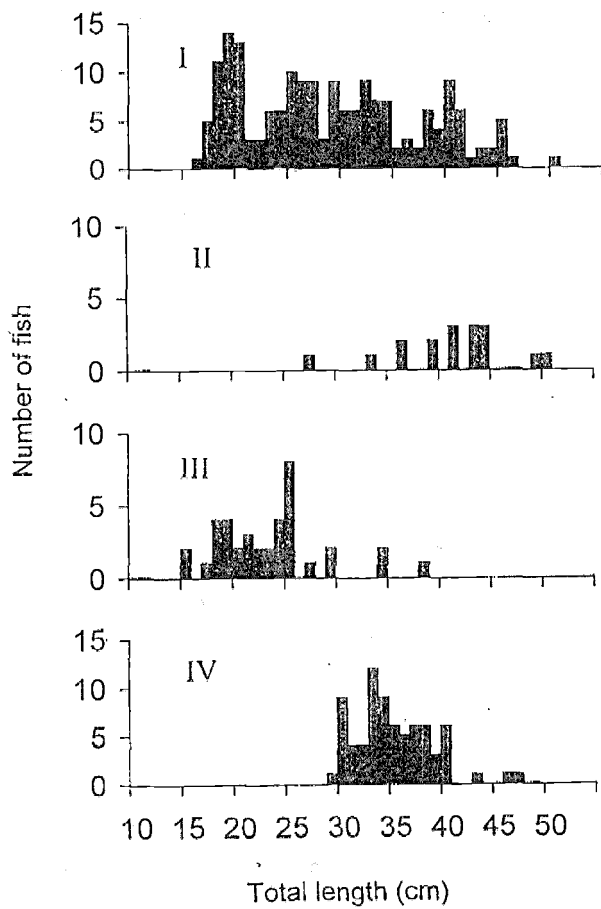


Figure 2. Length frequency distribution for *O. niloticus* landed by fishermen at Chole beach in the quarterly surveys.

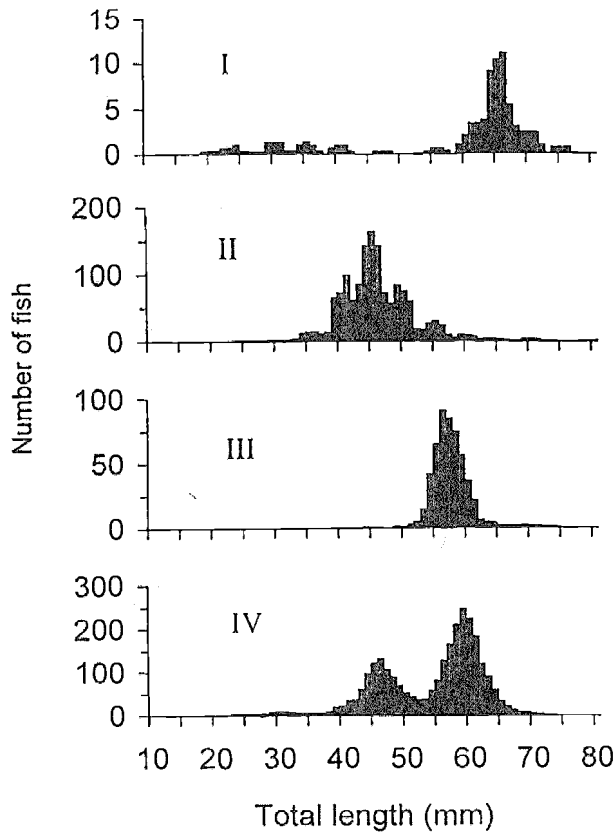


Figure 3. Length frequency distribution for *R. argentea* landed by fishermen at Igombe beach in the quarterly surveys.

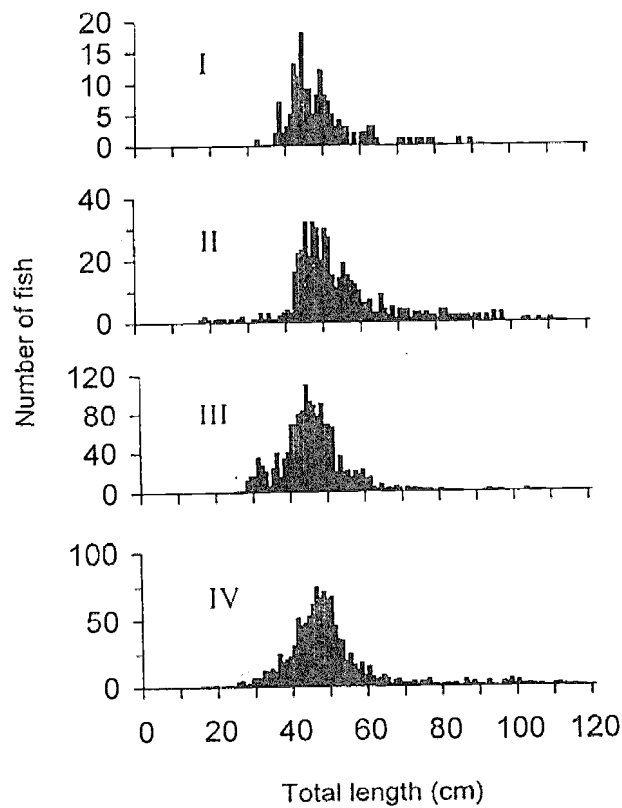


Figure 4. Length frequency distribution for *L. niloticus* landed by fishermen at Kayenze beach in the quarterly surveys.