A STUDY ON SOME ASPECTS OF THE DISTRIBUTION, BIOLOGY, ECOLOGY AND FISHERY OF CRAYFISH (*Procambarus clarkii* GIRARD) POPULATION IN LAKE NAIVASHA.

BY

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D E C L A R A T I O N

This thesis is my original work and has not been presented for a degree in any other University.

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This thesis has been submitted for examination with my approval as a University supervisor.

Signature .....

DR. M. Litterick. 3rd June 1983

SUMMARY

A study was conducted on the distribution of the introduced Procambarus clarkii (GIRARD) of L. Naivasha and its impact on the Naivasha system and vice versa.

Various field methods were employed to investigate the presence of Procambarus and their burrows in different habitats.

The results obtained showed that the eastern basin of Naivasha had a great abundance with continuous distribution of Procambarus while the main lake showed a patchy distribution with low numbers of Procambarus.

The difference in biological performance (growth rate, maturation rate, fecundity, mortality rate) of Procambarus between the eastern basin and the main lake was the immediate cause of the observed difference in abundance and distribution between the 2 areas in Naivasha.

Behind this difference in biological performance were external factors and among the factors food availability is suggested as the chief cause of the differing perfomance between the eastern basin and the main lake.

Other main external factors affecting the distribution of Procambarus were namely the presence and extent of marsh belt and the ecology of the hinterland eg. human activity, nature of the substrate, and distance off shore.

Due to the change in habitat (from Louisiana to Naivasha) Procambarus had increased its minimum size at maturity from 25 mm CL (50 mm TL) in both sexes in Louisiana to 33 mm CL(66mm TL) and 35 mm CL (70 mm TL) in Naivasha for females and males respectively. The mean size at maturity increased from 31 - 33 mm CL for both sexes in Louisiana to 40 mm CL and 42 mm CL in Naivasha for males and females respectively.

The females in Naivasha were heavier (15 - 20g) at the onset of egg-laying than the females (5 - 10 g) in Louisiana. Similarly, the impact of the Naivasha system was to increase significantly the fecundity from 313 in Louisiana to 433 in Naivasha.

The impact of the Naivasha habitat changed the life cycle of Procambarus to a much extended (9 - 12 months) mating, egg-laying and hatching periods than in Louisiana (2 - 4 months).

The Naivasha habitat maintained a higher (minimum of 60% of the adult males throughout the year) percentage of the sexually active males (M1) than Louisiana (M1 males absent from the adult male population for about 8 months in a year).

The results obtained showed that Procambarus in Naivasha bred throughout the year with possibly several generations unlike in Louisiana where breeding activities are confined within 5 months with typically one generation per year.

Although the Naivasha habitat had a biological impact on Procambarus the system in its turn underwent ecological and economic changes due to the presence of Procambarus.

The crayfish which is polytrophic formed many new links within the food web and interacted with producers, consumers and decomposers in Naivasha. Thus the crayfish assisted in the availability and provision of energy in the food cycle.

The crayfish became a new prey to many predators (20 birds, 3 mammals, 1 fish) and formed the sole food in 55% of the black bass stomachs in some areas of Naivasha. Thus the recent (1977) recovery in tilapia numbers in Naivasha was attributed to the change in prey predator relationship since bass shifted in predation from tilapia to crayfish.

In Naivasha crayfish formed a new source of income and crayfish trappers earned up to Ksh. 50,000 annually. Its contribution to the lake fishery supports its introduction in Naivasha as a worthy venture although crayfish had some few disadvatages eg. destruction of gill nets.