Analysis of the Catch and Effort Data for the Fisheries of Nkhotakota Area - Lake Malawi 1976 - 1989

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CATCH AND EFFORT DATA FOR THE FISHERIES OF THE NKHOTAKOTA AREA: LAKE MALAWI, 1976-1989

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TRADITIONAL FISHERIES ASSESSMENT PROJECT (MG/ODA)
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PREFACE

This Fisheries Bulletin is one of a series of working papers on the fisheries of Lake Malawi and associated waters produced by the ODA-funded Traditional Fisheries Assessment Project in 1991. They have since been edited after external refereeing but no changes have been made to the findings and recommendations made at that time. These papers include all available data on the fisheries up to 1989 tabulated on an annual basis, and also numerous graphs of the data for various fishing gears to allow Fisheries Officers in the different areas to easily visualise the trends which have occurred in the fisheries in their areas.

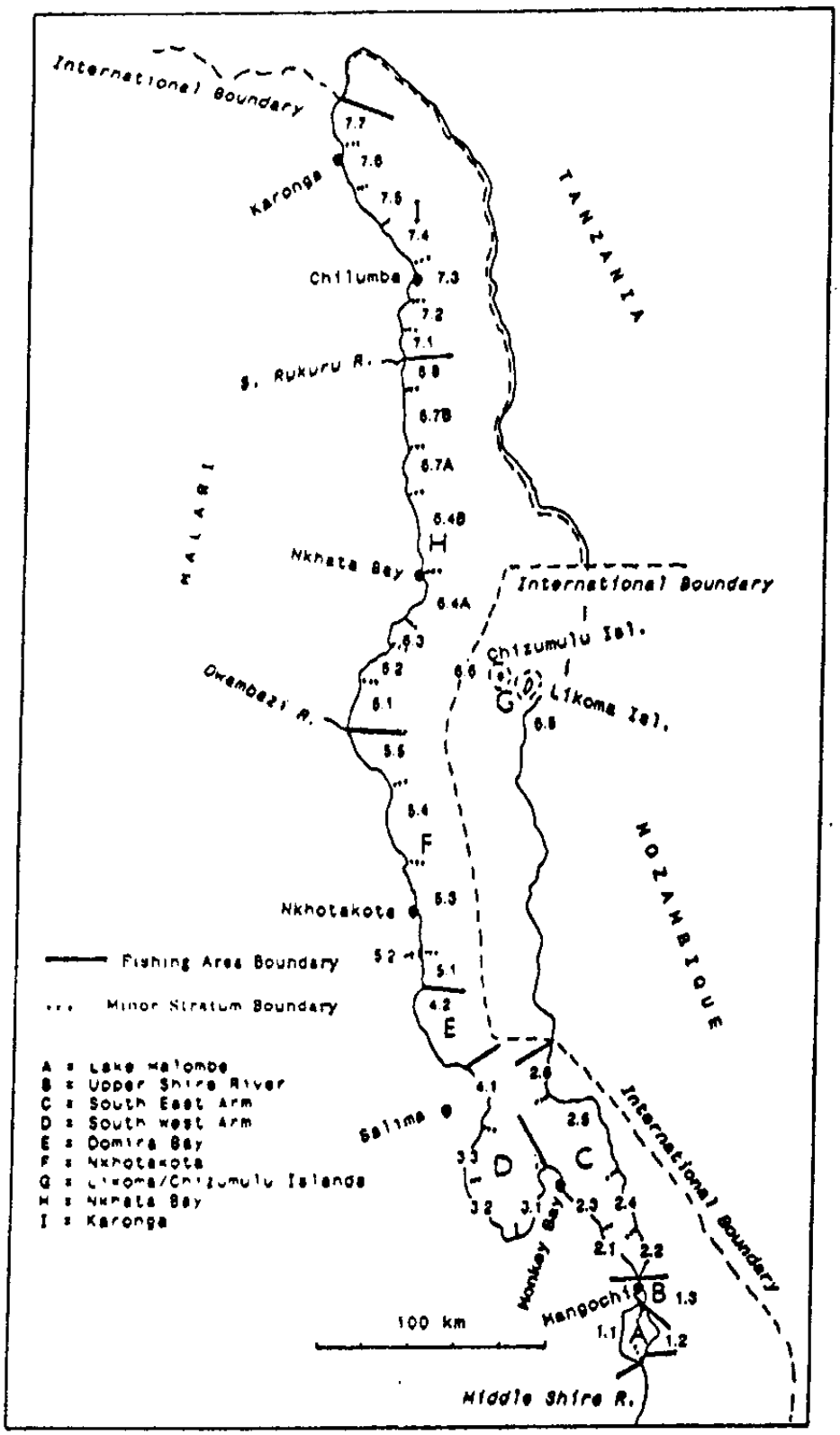


Figure 1. Lakes Malawi, Malombe and the Upper Shire River, showing areas into which the areas have been divided for data analysis

INTRODUCTION

Nkhotakota's 130km shoreline is predominantly sandy, with several distinctive features (Figs. 1 and 2). The Bua and Dwanga are major rivers which enter the lake in the area, and these have created extensive low-lying deltas with extensive swamps, lagoons and reedbeds. Unaka Lagoon is a particularly extensive area of open water and marsh. The coastal shelf is fairly narrow, with the 50m contour on average from 3 to 5km offshore and the 100m contour from 5 to 12km out.

25km south of Nkhotakota town, Chia Lagoon is a shallow, very productive lagoon about 8km long by 2km wide, connected to the lake by a narrow open channel. The east shore of the lagoon is sandy, the west is a very extensive swamp.

By 1989, the Nkhotakota area was fished by almost 5,000 fishermen using 1,400 fishing craft.

METHODS OF DATA COLLECTION

Statistical data on the traditional fisheries are collected and analysed using methods developed by Bazigos (1972) and implemented by Walker (1974; 1976). A description of the methods of collecting data and the associated problems has been presented elsewhere (Alimoso, 1988). Total catch and fishing effort for each area are estimated by combining data obtained in monthly catch assessment surveys (CAS) and in annual frame surveys. The data are presented here by gear and by species group.

RESULTS

4,923 fishermen, including assistants, were recorded fishing in the Nkhotakota area during the 1989 annual frame survey, using 1,123 canoes and 273 boats, of which 104 had outboard engines. Figure 3 shows the trend in ownership of fishing craft in recent years. Data from 1983 onwards only are available, earlier records having been lost. The data show an increase in numbers in both canoes and boats, while the number of engines in use has remained fairly stable. The analysis of data in this report covers the period from 1976 to 1989.

In the first two years of sampling (1976 and 1977), only two of the four minor strata were sampled. The data for those years are shown in the graphs presented here, but it should be noted that these data are not complete. Estimated catches over the remaining 12 year period ranged from 1,716 to 8,878 tonnes (Fig. 4) with a mean of 4,063 tonnes. Catches increased steadily until 1987, but sharply declined in 1988 and 1989. Several species groups contributed significantly to the catches, the main species being Utaka (*Copadichromis* spp.) (mean 54% over the 14 years), Chambo (*Oreochromis* spp.) (13%), Usipa (*Engraulicypris sardella*) (7%), Kampango (*Bagrus meridionalis*) (5%) and Mlamba (clariid catfishes) (5%). In addition, species categorised as "Other Species" were more important in the Nkhotakota area than in other areas covered in this series of reports, comprising 9% of overall catches (Fig. 5).

ANALYSIS BY GEAR

Most of the catch came from chirimila nets (56% overall), gillnets (23%) and Kambuzi seines (9%). Mosquito nets contributed 6% of the catch and longlines 4% (Fig. 6). Other gears reported were Chambo seines, fish traps, handlines and scoop nets.

Gillnets

The number of gillnets owned by fishermen in the Nkhotakota area ranged from 1,958 in 1984 to 2,257 in 1986 according to the results of annual frame surveys (Fig. 7). There are doubts about the accuracy of these numbers, as from 1986 to 1989 the number recorded varied between 2,254 and

2,257. These data are far too consistent to be true and suggest that the recorders were simply repeating data from year to year instead of conducting the frame surveys thoroughly.

Over the twelve year period, Chambo was the main species group caught in gillnets (47% of the total catch). Kampango (18%), Mlamba (10%) and other species (15%) were also important (Fig. 8). Figures 9 to 11 show the trends in the gillnet fishery. For most of the period, effort was very stable with the exception of an unusual and doubtfully high figure in 1978. However, since 1987 there is evidence of increasing effort despite the apparently stable ownership. The catch per unit effort (cpue) was relatively high between 1983 and 1985, due mainly to good catches of Chambo and, in 1984, "other species". Cpue then fell back to the level of the early 1980s, about 3-4 kg/set. The high catch of other species in 1984 (237 tonnes) was almost certainly a result of high Mpasa (*Opsaridium microlepis*) catches in the area around the Bua River mouth, as 1984 was a very good spawning year for Mpasa in that river (Tweddle, 1987).

Chirimila net

Numbers of chirimila nets owned by Nkhotakota area fishermen increased steadily from 188 in 1983 to 352 in 1989 according to annual frame surveys (Fig. 12).

The catch and effort data for this gear are shown in Figs. 13 to 15. Recorded effort increased steadily from 1978, in agreement with the increase in gear ownership. There was also, however, a very high effort in the two areas recorded in 1976 which is difficult to explain and is probably a recording error. Estimated catches increased greatly from 393 tonnes in 1978 to 5,389 tonnes in 1987 but declined in 1988 and 1989. Several species categories were recorded in the catches, but Utaka were the main quarry, comprising 92% of the catch overall (Fig. 16). There was considerable fluctuation in cpue, but with generally higher estimates in the most recent years. The estimated cpue is much higher than that of the other areas of Lake Malawi covered in this series of reports. These data, therefore, should be treated with some caution if used in future to attempt stock assessment. The decline in catches since 1987 may be an indication that the increased effort is now having a major impact on catch rates, but as Utaka stocks show large natural fluctuations in abundance this is still only speculation and more data are needed for confirmation.

Kambuzi seine

Kambuzi seine ownership rose from 20 nets in 1983 to 147 in 1988 according to the annual frame surveys (Fig. 17).

Figures 18 to 20 shew the catch and effort data for Kambuzi seines. The effort data (Fig. 19) show large fluctuations though with a definite trend to higher effort in line with the increased number of nets in the fishery. The selection of recorded beaches on an annual basis can lead to anomalies when gear numbers vary greatly from beach to beach and this is the probable cause of the fluctuations, particularly in the early years when very few nets were present. Catches increased in line with the increased effort, though cpue figures were very erratic.

Kambuzi (small demersal haplochromines) were the main target species group, but Chambo and other species were also regularly caught.

Longline

Reported ownership of this gear ranged from 221 to 313 with no obvious trends (Fig. 21). Catches and effort (Figs. 22 to 24) were fairly stable through the 1980s, but estimated effort doubled in 1989. This is believed to be a statistical aberration, particularly given the relatively stable gear ownership figures.

Most of the catch was Mlamba, with Kampango and other species of lesser importance.

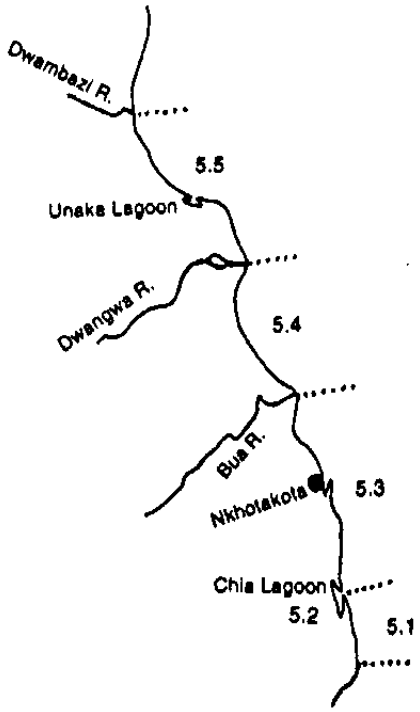
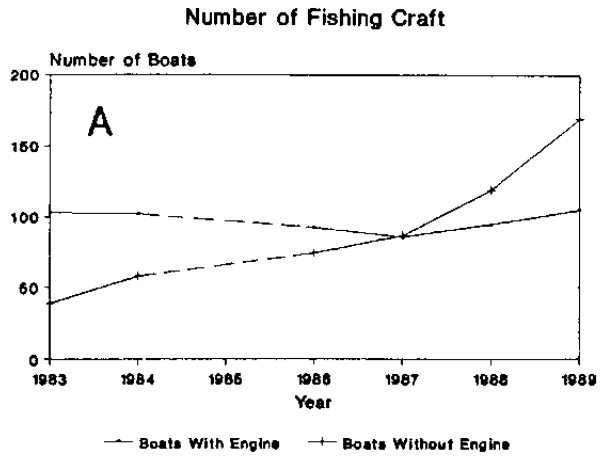


Figure 2



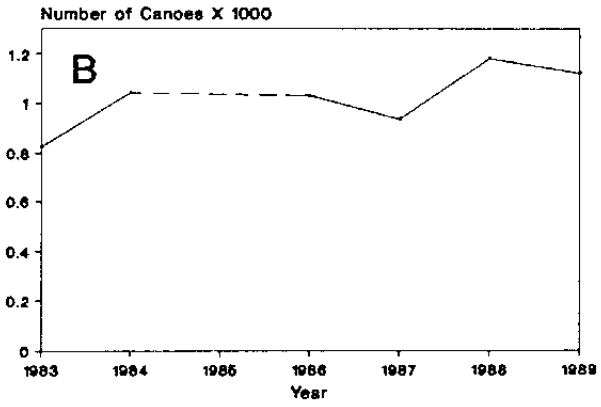


Figure 3

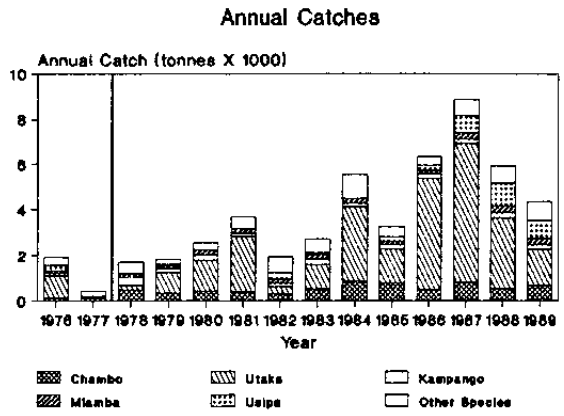


Figure 4

Figure 2. Map of the Nkhotakota shoreline, showing the boundaries of the minor strata.

Figure 3. Changes in the number of fishing craft owned by Nkhotakota fishermen, based on annual frame surveys. (A) Boats with and without engines, and (B) Dugout canoes.

Figure 4. Annual catches in the Nkhotakota area. Note that in this figure and in all subsequent figures the 1976 and 1977 data are treated separately, divided by a vertical line on the figure, as data for two beach recording areas only were available.

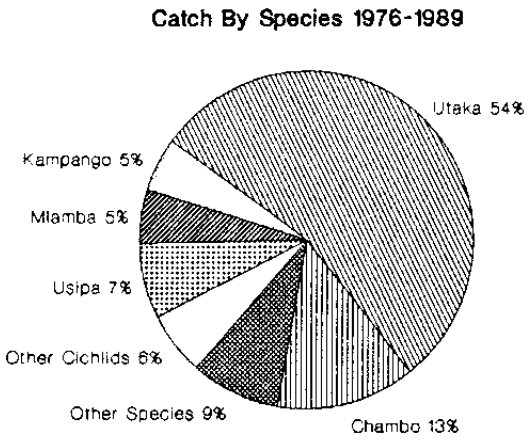


Figure 5

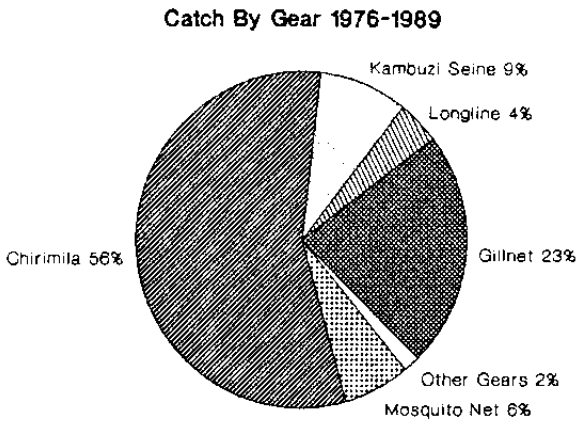


Figure 6

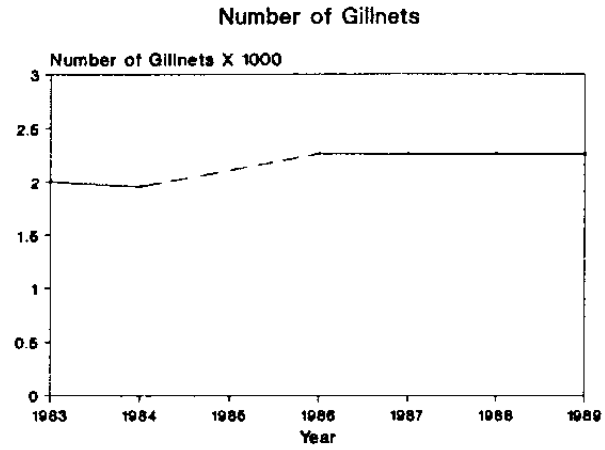


Figure 7

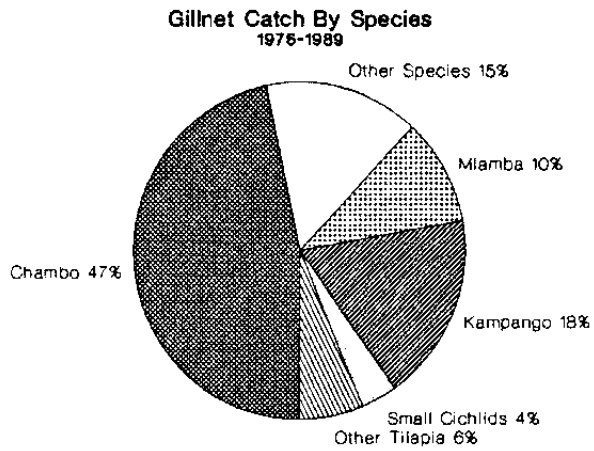


Figure 8

Figure 5. Contribution of the different species groups to the total catch over the 14 year period 1976-1989.

Figure 6. Contribution of the different fishing gears to the total catch over the 14 year period 1976-1989.

Figure 7. Changes in the number of gillnets owned by Nkhotakota area fishermen, based on annual frame surveys. The dotted line in this figure and all subsequent figures indicates missing data for 1985.

Figure 8. Contribution of the different species groups to the Nkhotakota gillnet catches over the 14 year period 1976-1989.

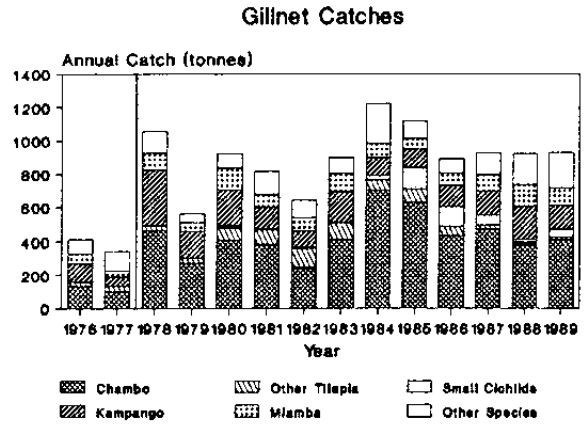


Figure 9

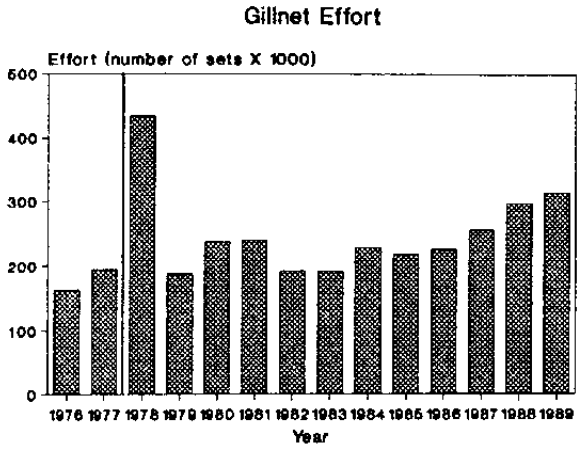


Figure 10

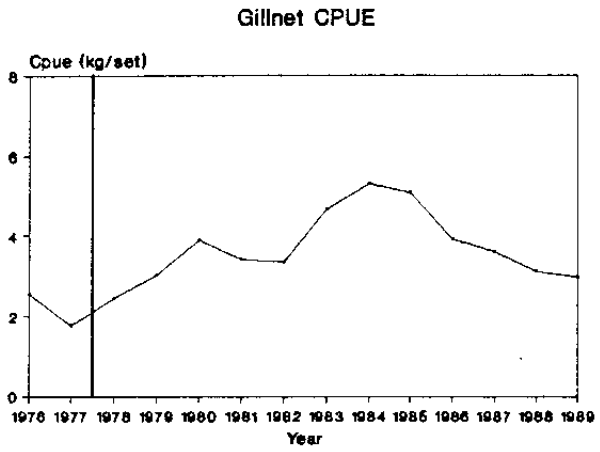
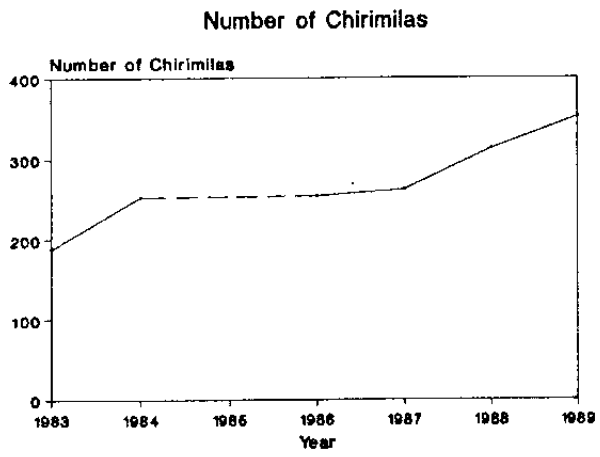


Figure 11

Figure 9. Annual catches made by gillnets by species groups.

Figure 10. Annual effort for gillnets (1 gillnet night = 1 x 100yd (91m) stretched length gillnet set for 1 night).

Figure 11. Changes in cpue in gillnets from year to year.



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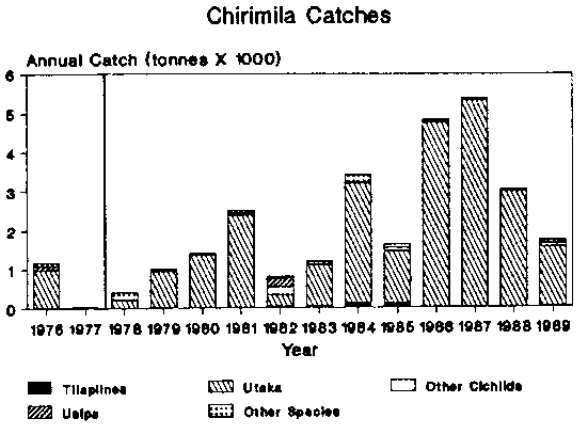

Figure 13

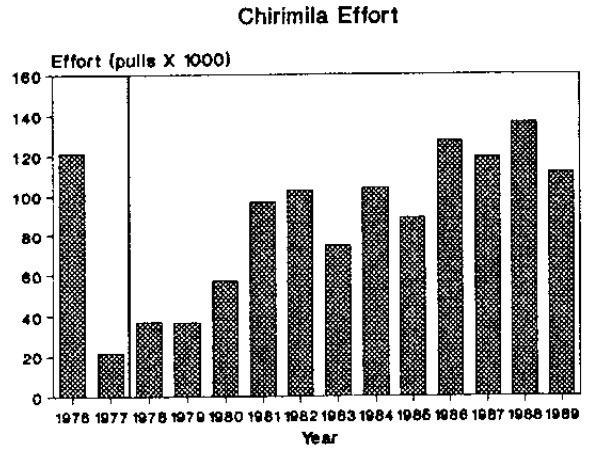

Figure 14

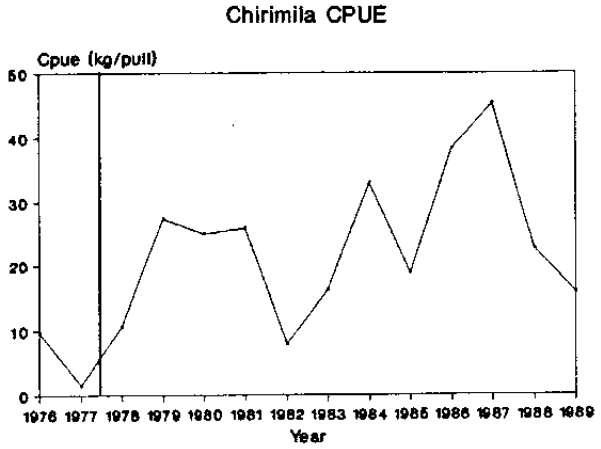

Figure 15

Figure 12. Changes in the number of chirimila nets owned by Nkhotakota area fishermen, based on annual frame surveys.

Figure 13. Annual catches by species group of chirimila nets.

Figure 14. Annual effort for chirimila nets, expressed in numbers of pulls.

Figure 15. Changes in cpue from year to year in chirimila nets.

Figure 16. Contribution of the different species groups to the Nkhotakota chirimila catches over the 14 year period 1976-1989.

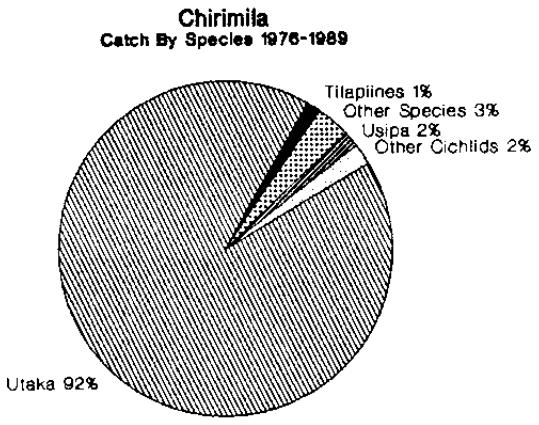

Figure 16

Number of Kambuzi Seines

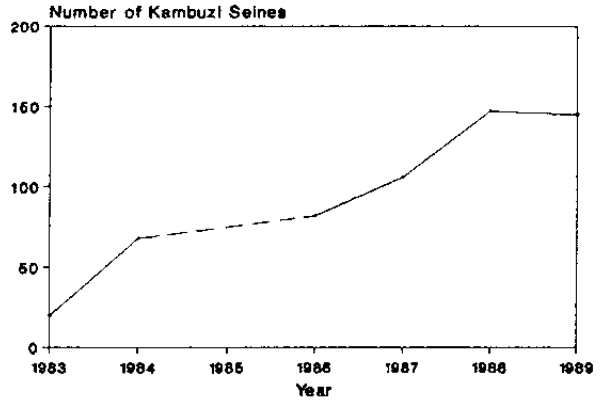

Figure 17

Kambuzi Seine Catches

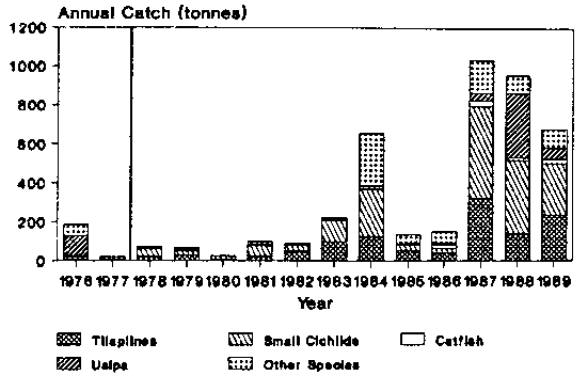

Figure 18

Kambuzi Seine Effort

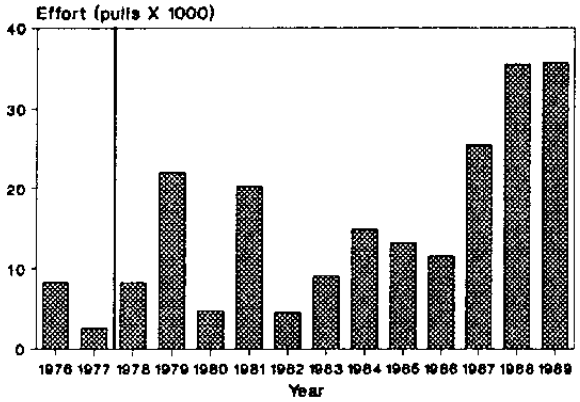

Figure 19

Kambuzi Seine CPUE

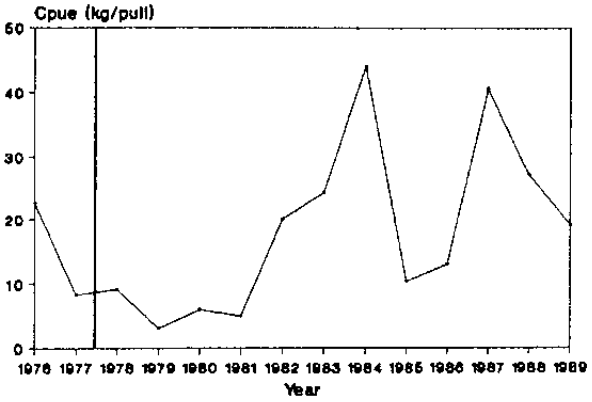

Figure 20

Figure 17. Changes in the number of Kambuzi seines owned by Nkhotakota area fishermen, based on annual frame surveys.

Figure 18. Annual catches for Kambuzi seines, showing the contributions of the different species groups.

Figure 19. Annual effort for Kambuzi seines, expressed in number of pulls.

Figure 20. Changes in cpue in Kambuzi seines from year to year.

Number of Longlines

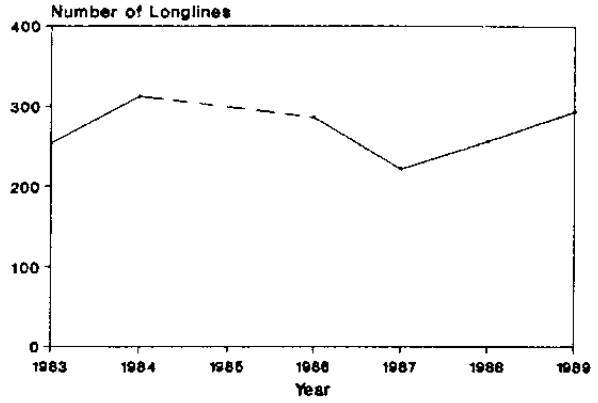

Figure 21

Longline Catches

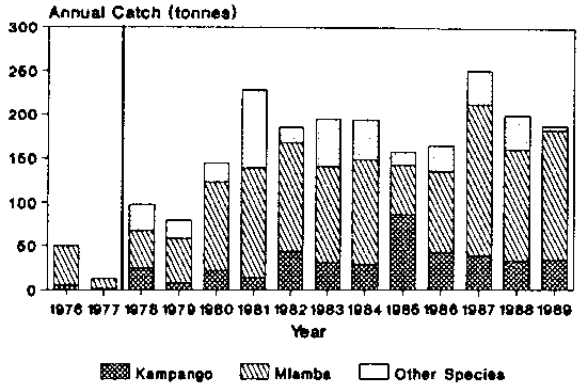

Figure 22

Longline Effort

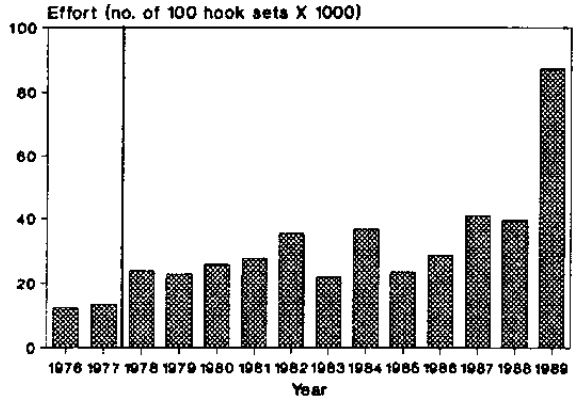

Figure 23

Longline CPUE

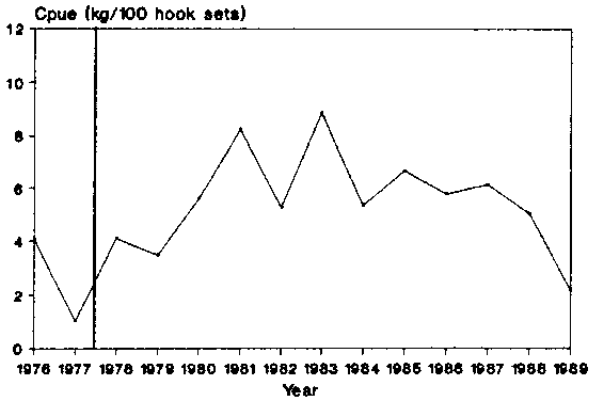

Figure 24

Figure 21. Changes in the number of longlines owned by Nhotakota area fishermen, based on annual frame surveys.

Figure 22. Annual catches for longlines, showing the contributions of the different species groups.

Figure 23. Annual effort for longlines, expressed in number of 100 hook sets.

Figure 24. Changes in cpue in longlines from year to year.

Mosquito net

Reported ownership for this gear ranged from 0 to 37. The catch and effort data for the gear show large fluctuations but with a considerable increase in the late 1980s (Figs. 25 to 27). Cpue was relatively stable from 1976 to 1982 at 1-3 kg/pull but has since swung between 1 and 12 kg/pull. The most likely explanation for the remarkable jump in effort and catches in 1987 is a change in what the beach recorders define as a mosquito net. The sudden appearance of Utaka in high catches in 1987 suggests that the recorders are now using the name mosquito net for chirimila nets lined with mosquito netting and other mosquito net lined seines, whereas before 1982 the term was restricted to the small nets used when diving from canoes into Usipa shoals. Under these circumstances no conclusions can be drawn from the data. The apparent abundance of Usipa from 1987 will be discussed later.

Other Gears

Chambo seines: This gear was recorded only rarely, catching an average of 14 tonnes per year.

Fish traps: Fish traps were recorded regularly but in low numbers. The mean annual catch of 7 tonnes per year was taken at a mean cpue of 1.53 kg/trap. As stated in other reports in this series, effort is almost certainly greatly under-estimated in this gear, because traps are often used without fishing craft and well away from regular landing beaches.

Handline: Handlines are also greatly under-estimated by the present recording system. The estimated annual catch averaged 16 tonnes. Effort and cpue figures were nonsense. 5% of the catch was catfish and 86% in the other species category. In this area, all cyprinids were included under Nchila when recording first started, hence the 9 tonnes of Nchila recorded on handlines in 1976 was almost certainly Mpasa and/or Sanjika. Most of the other species category caught on handlines would have been Mcheni.

Scoopnets: Scoopnets are used particularly in the entrance to Chia Lagoon, where very large catches are often made. Most of these go unrecorded as a result of the way the fish are landed in small quantities continually through the day. Occasional observations of their catches over many years suggest that Mcheni are the main quarry. However, a surprising variety of species are recorded in this gear by the beach recorders, with "Other Tilapia" being particularly prominent. Usipa were also regularly recorded. The presence of Usipa suggests that beach recorders may have occasionally recorded the small mosquito nets used for diving from canoes as scoop nets, though true scoopnets used in conjunction with light attraction from canoes at night may have been recorded. The prominence of "Other Tilapia" in the catches is difficult to explain as we are unaware of any use of scoopnets or related gears which could lead to the regular capture of tilapias. An average of 22 tonnes of fish per year was recorded in scoopnets, at a cpue of 0.71 kg/set. This cpue is unrealistically high.

ANALYSIS BY SPECIES

Utaka

Utaka were by far the most important species in the Nkhotakota area catches, comprising 54% of the overall catch (Fig. 5). Chirimila nets were the main gear used to catch these species, with 92% of the catch in this gear being Utaka (Fig. 16) and 95% of the total Utaka catch coming from chirimilas. From 1984, gillnets also began to catch quantities of Utaka, indicating a trend towards the use of smaller mesh sizes in the gillnet fishery. This trend is also apparent in several other areas at the north of the lake, including Likoma and Chizumulu Islands (Tweddle *et al.*, 1991f) and the Karonga area (Tweddle *et al.*, 1991g), while Utaka have been important in gillnets for many years in the Nkhata Bay area (Tweddle *et al.*, 1991a). Utaka were also occasionally taken in Kambuzi seines. Catches of Utaka increased steadily until 1987 but have since declined sharply (Fig. 28).

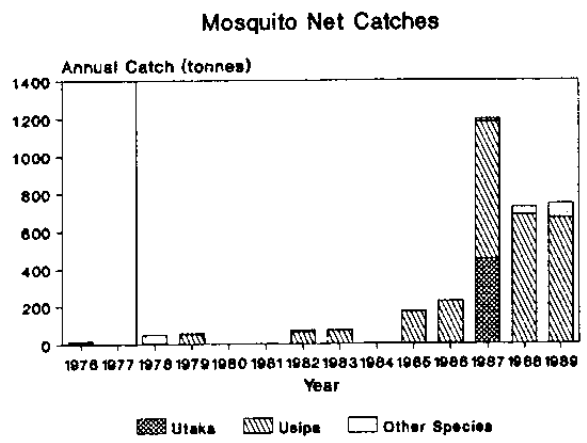

Figure 25

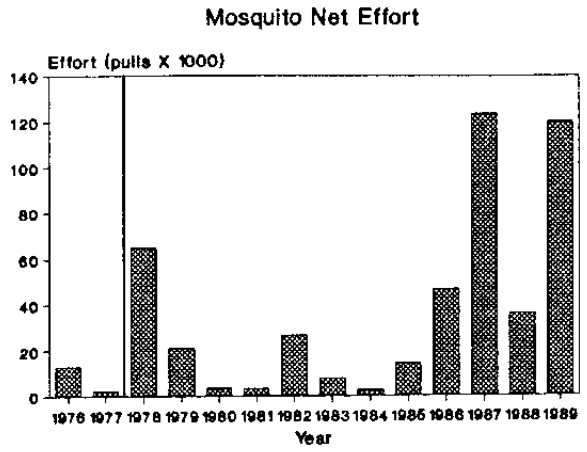

Figure 26

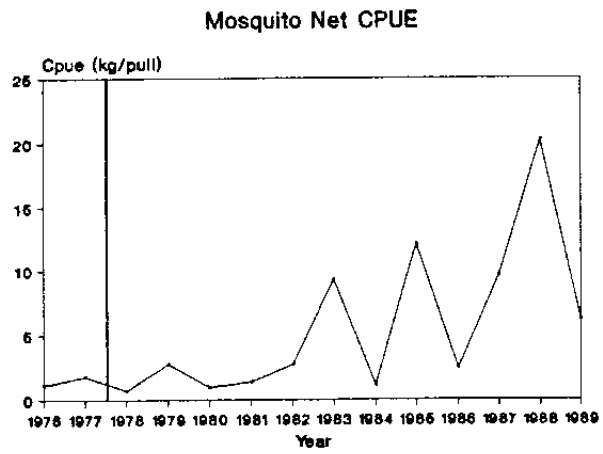

Figure 27

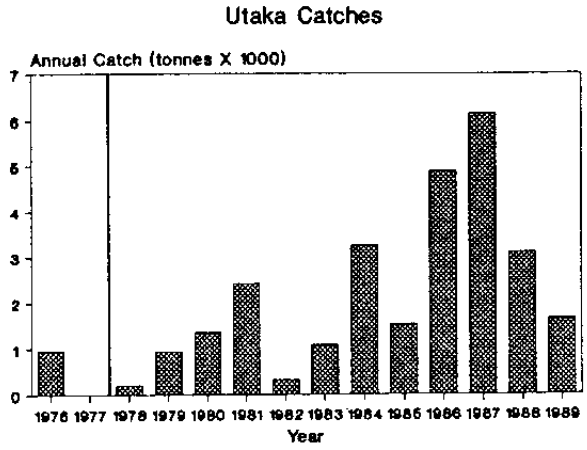

Figure 28

Figure 25. Annual catches for mosquito nets, showing the contributions of the different species groups.

Figure 26. Annual effort for mosquito nets, expressed in number of pulls.

Figure 27. Changes in cpue in mosquito nets from year to year.

Figure 28. Annual catches of Utaka in all gears in the Nkhotakota area.

Chambo

Chambo were second in importance to Utaka in overall catches in the Nkhotakota area, comprising 13% of the total catch (Fig. 5). Gillnets were the main gear used in the fishery for Chambo in all years, though since 1987 good catches have also been recorded from Kambuzi seines. The estimated annual catch ranged from 318 to 870 tonnes (Fig. 29). Total effort expended in catching Chambo was calculated in gillnet equivalents using the formula:-

$$\text{Total Effort} = \frac{\text{Total Chambo Catch}}{\text{Gillnet Chambo Catch}} \times \text{Gillnet Effort}$$

The effort appeared to be fairly stable until 1986 but subsequently rose as a result of (A) increased gillnet effort, and (B) the use of Kambuzi seines to catch Chambo (Fig. 30). Improved gillnet cpue from 1983 to 1985 (Fig. 31) resulted in high catches. In other areas of Lakes Malawi and Malombe, high cpue was also recorded in the mid-1980s, particularly 1982-1983 (Tweddle *et al.*, 1991b; 1991c, 1991d; 1991e) and it is believed that these good catches were a result of favourable environmental conditions (Tweddle and Magasa, 1989).

Catfish

Figure 32 shows the annual catches of the two catfish groups, Kampango and Mlamba, in all gears. Catches were fairly stable throughout the period. Until 1980, Kampango were slightly more important than Mlamba, but since then Mlamba catches have been consistently greater than those of Kampango. Catfish were caught mainly in gillnets and on longlines. Kampango were more important in gillnets and Mlamba on longlines. This interesting phenomenon agrees with findings elsewhere in the lake (Tweddle *et al.*, 1991a; 1991b; 1991f; 1991g) and it is probable that the difference is due to the different shapes of the fishes. Mlamba are more eel-like and, if the head can pass through the meshes of a gillnet, the body can easily follow, whereas the deeper-bodied Kampango are much more likely to become gilled or wedged in the meshes. If this is the case, gillnet catches are likely to under-estimate the abundance of clariid catfishes in the lake. An alternative explanation for the difference in catches may be that Kampango are more active hunters than Mlamba and prefer live prey while Mlamba are scavengers and thus more likely to take deadbait on a longline hook. There is, however, no evidence for this hypothesis and the former explanation is considered much more likely to be true.

Usipa

Usipa comprised 7% of the overall catches by weight (Fig. 5). Annual catches are shown in Fig. 33. Most recorded catches came from mosquito nets, though in 1976 and 1982 substantial catches were also made in chirimila nets. Recorded catches were very erratic, but 1976, 1982, and 1985 to 1989 appear to have been good years. The high catches in 1982 and 1985 to 1987 are in close agreement with Usipa catch data for other central and northern areas of the lake (Tweddle *et al.*, 1991a; 1991f; 1991g). It is possible that improved recording exaggerated the apparent big increase in Usipa catches since 1987 (M. Hara, Fisheries Officer, Nkhotakota, pers. comm.). The report by Lewis and Tweddle (1990) on the high Usipa catches of 1985 to 1986 and the gross underestimates made by the beach recording system was noted by Mr. Hara and an effort was made to improve surveillance of the Usipa fishery in his area. The apparent higher catches since 1987 are likely to be a truer reflection of the Usipa fishery than the figures for previous years.

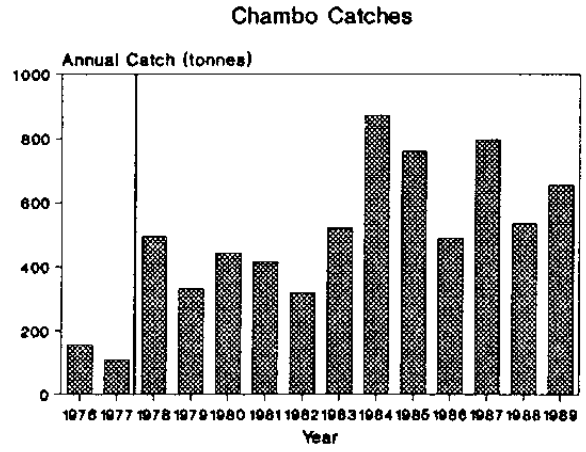

Figure 29

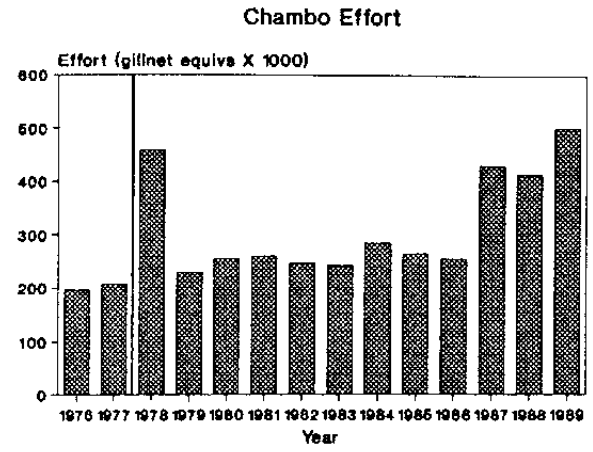

Figure 30

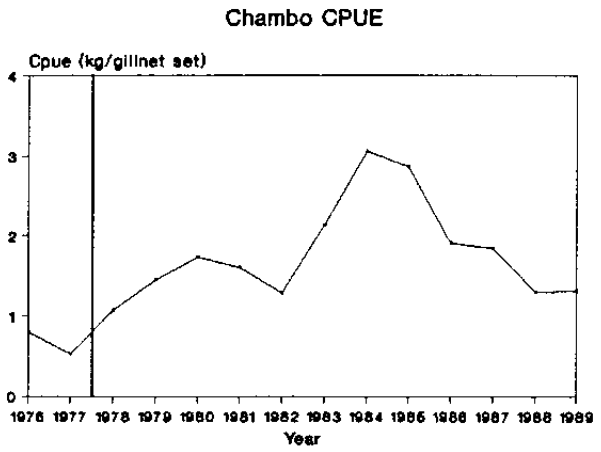

Figure 31

Figure 29. Annual catches of Chambo in all gears in the Nkhotakota area.

Figure 30. Total effort in all gears for Chambo, expressed in gillnet night equivalents,

Figure 31. Changes in cpue for Chambo only in gillnets from year to year.

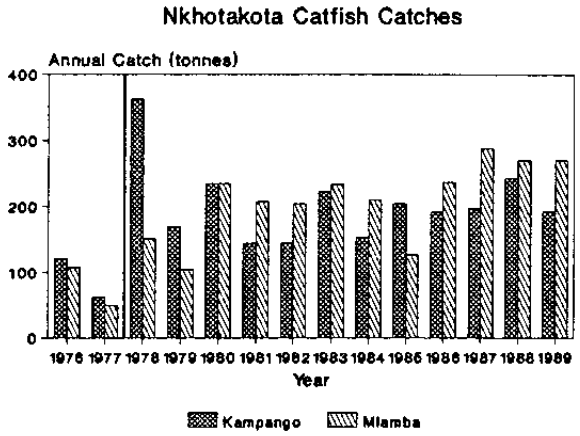

Figure 32

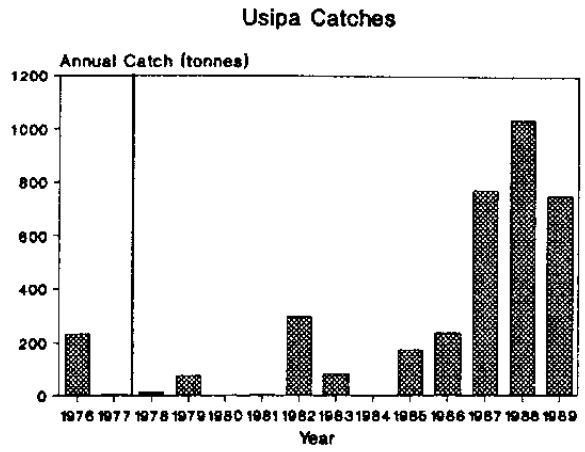

Figure 33

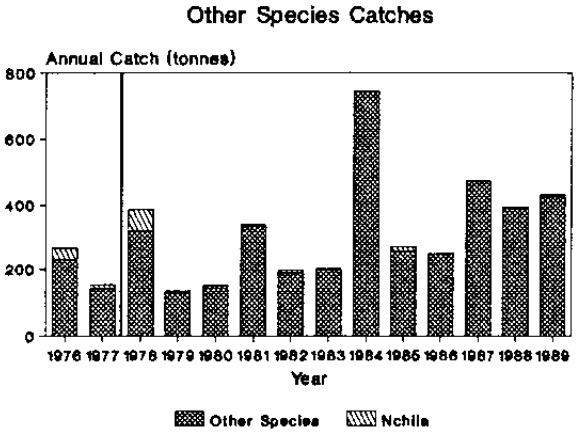

Figure 34

Figure 32. Annual catches of the two catfish groups in all gears in the Nkhotakota area.

Figure 33. Annual catches of Usipa in all gears in the Nkhotakota area.

Figure 34. Annual catches of "Other Species" in all gears in the Nkhotakota area.

Other species

The category "Other species" is of much greater importance in Nkhotakota area than in any other area of Lake Malawi. Catches ranged from 132 to 744 tonnes (Fig. 34 and Appendix). In the Nkhotakota area, the "Other Species" include Mpasa (*Opsaridium microlepis*) and Sanjika (*Opsaridium microcephalum*), which are caught when gathering inshore to run up the Bua River to spawn during the rainy season. These fish are extremely valuable, with present beach prices (1990) in the range of MK5/kg.

Mcheni (*Rhamphochromis* spp.) also of some importance in certain areas, particularly in handline and scoopnet catches.

DISCUSSION

There has been an increase in the number of fishing craft in use in the area in recent years, from a total of 996 in 1983 to 1,396 in 1989. The increase in ownership of chirimila nets and Kambuzi seines parallels the increase in craft.

If Figures 11, 15, 20 and 27 are examined together (i.e. cpue data for gillnets, chirimila, Kambuzi seines and mosquito nets), they give the impression that cpue has been rising in recent years in all gears and that the fishery is therefore very healthy and getting better. Caution is needed, however, in interpreting these results as these apparent rises almost certainly have different causes. Thus, gillnet cpue is only high from 1983 to 1986, caused by good chambo catches as in other parts of the lake, and is fairly stable in other years at 3 to 4kg per set. Chirimila cpue is very erratic and only 1986 and 1987 data create the impression of improving cpue. Also, for this gear, the recorded cpue is very much higher than in any other part of the lake, creating doubts about the accuracy. The number of "hauls" of small active gears is very difficult to record accurately, a point stressed in many of the present series of "Working Papers". The Kambuzi seine data are very erratic and difficult to interpret. The mosquito net data reflect an increasing tendency to use mosquito net lined seines and chirimilas for Usipa fishing, and thus a change in gear being recorded under this heading.

The Nkhotakota area fishery is dominated by the use of chirimila nets for Utaka. The data on chirimila ownership and the catch/effort data show that this fishery is still expanding and may have reached the limit which the stocks can withstand. The situation will need to be very closely monitored and action may have to be taken to reduce the number of nets if catches do not recover in the next 2-3 years.

The Kambuzi seine catch/effort data are too erratic to assess the impact of the increase in number of nets in use.

Effort has been increasing throughout the period in almost all gears (Figs. 10, 14, 19, 23 and 26). This did not appear to have much impact on cpue as the fishery expanded, and catches continued to rise for much of the period reviewed. However, since 1987 there is a suggestion of a downward trend which, together with the increased use of small-meshed nets discussed below, may indicate that the fishery has reached its limit of expansion. As cpue starts to fall in an unregulated fishery, fishermen inevitably change their methods to maintain their catch rates, usually by going for smaller species with smaller meshed nets. The indications are that this happening in the Nkhotakota area and that attention needs to be turned to curbing the excessive use of small-meshed gears.

The increasing proportion of Utaka in gillnet catches shows that smaller mesh sizes are now being used in this fishery. The increased use of small meshed nets such as chirimilas, Kambuzi seines, mosquito nets and gillnets is a trend that it is occurring in all areas of the lake, and in the case of Lake Malombe has led to a collapse of the Chambo fishery (Tweddle *et al.*, 1991c). Close monitoring by field staff in the area is therefore necessary to ensure that the small-meshed nets are not catching too many immature specimens of the larger, commercially-important species such as Chambo and

the catfishes.

The "Other Species" catch data illustrate the importance of the River Bua as a protected spawning ground for the potamodromous cyprinids, particularly Mpasa and Sanjika, a point stressed by Tweddle (1983; 1985).

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APPENDIX I

NKHOTAKOTA

ANNUAL CATCH AND EFFORT DATA SUMMARIES

1976-1989

NOTES ON MONTHLY DATA SUMMARIES

The data in this report are presented by species group and by gear. The species groups listed by column are as follows:-

chambo	=	*Oreochromis* spp., excluding *O. shiranus.*
other tilapia	=	*O. shiranus* and *Tilapia rendalli.*
kambuzi	=	inshore cichlid (haplochromine) species.
utaka	=	*Copadichromis* spp.
chisawasawa	=	offshore, demersal haplochromines.
kampango	=	*Bagrus meridionalis* Günther.
mlamba	=	clariid catfishes.
usipa	=	*Engraulicypris sardella* Günther.
nchila	=	*Labeo mesops* Günther.
others	=	species not included in above categories, including mormyrids and some cyprinid species.

The gears are listed by row, with catch, effort and catch per unit effort (cpue) shown for each gear.

Catch is expressed in metric tonnes in all cases.

Effort is expressed as follows:-

gillnets	:	number of sets of 91 m (stretched length) net.
longlines	:	number of sets of 100 hooks.
chambo seines	:	number of hauls.
kambuzi seines	:	number of hauls.
chirimila nets	:	number of hauls.
mosquito nets	:	number of hauls.
fish traps	:	number of traps set.
handlines	:	number of hauls.
cast nets	:	number of hauls.
scoop nets	:	number of hauls.
nkacha nets	:	number of hauls.

Cpue is expressed in catch (in kg) per unit of effort as defined above.

ADJUSTMENTS FOR MISSING DATA

Where data are unavailable because of no recording in a month, estimates have been made based on catch rates in the area before and after the month for which the data are missing. Estimates are based on the mean effort and cpue for each species group and gear category for the month preceding and the month following the data gap. Total catches in the month are then estimated by multiplying mean cpue by mean effort.

In the Nkhotakota area, catches have been estimated as above for the following months in the indicated minor strata:

1977	All strata August
1978	All strata August
	5.4 October and November
1980	All strata January
	5.2 March
	All strata August
1981	All strata August
1982	5.1 October
1983	All strata August
1984	5.1, 5.2 and 5.3 September
1985	5.4 June and November
	5.5 May and July

In 1976 and 1977 only two areas were recorded. The boundaries of these are not absolutely certain, hence no effort has been made to estimate for the remaining unrecorded areas in the summaries here.

ANNUAL SUMMARY FOR THE YEAR 1976

Gear		chambo	other tilapia	kambuzi	utaka	ch'sawa	k'pango	mlamba	usipa	nchila	others	TOTAL
gill net	catch	130.79	27.80	0.35	0.00	0.00	110.85	60.38	0.00	25.68	59.09	414.94
	effort	163138	163138	163138	163138	163138	163138	163138	163138	163138	163138	163138
	cpue	0.80	0.17	0.00	0.00	0.00	0.68	0.37	0.00	0.16	0.36	2.54
long line	catch	0.00	0.00	0.00	0.00	0.00	6.29	43.86	0.00	0.00	0.05	50.20
	effort	12313	12313	12313	12313	12313	12313	12313	12313	12313	12313	12313
	cpue	0.00	0.00	0.00	0.00	0.00	0.51	3.56	0.00	0.00	0.00	4.08
chambo seine	catch	0.50	6.30	6.09	0.00	0.00	0.00	1.37	0.00	0.00	27.45	41.71
	effort	15191	15191	15191	15191	15191	15191	15191	15191	15191	15191	15191
	cpue	0.03	0.41	0.40	0.00	0.00	0.00	0.09	0.00	0.00	1.81	2.75
kambuzi seine	catch	6.11	0.71	10.23	2.05	0.00	3.75	1.14	107.39	0.10	55.26	186.74
	effort	8248	8248	8248	8248	8248	8248	8248	8248	8248	8248	8248
	cpue	0.74	0.09	1.24	0.25	0.00	0.45	0.14	13.02	0.01	6.70	22.64
chiri' mila	catch	20.02	0.36	1.92	958.43	0.00	0.00	0.00	116.03	0.06	81.33	1178.15
	effort	121158	121158	121158	121158	121158	121158	121158	121158	121158	121158	121158
	cpue	0.17	0.00	0.02	7.91	0.00	0.00	0.00	0.96	0.00	0.67	9.72
m'quito net	catch	0.00	0.00	5.16	1.50	0.00	0.00	0.00	7.94	0.00	0.24	14.84
	effort	13012	13012	13012	13012	13012	13012	13012	13012	13012	13012	13012
	cpue	0.00	0.00	0.40	0.12	0.00	0.00	0.00	0.61	0.00	0.02	1.14
fish trap	catch	0.00	0.00	0.00	0.93	0.00	0.00	0.00	0.00	0.00	3.14	4.07
	effort	738	738	738	738	738	738	738	738	738	738	738
	cpue	0.00	0.00	0.00	1.26	0.00	0.00	0.00	0.00	0.00	4.25	5.51
hand line	catch	0.18	0.50	0.32	0.00	0.00	0.00	0.82	0.00	9.32	3.21	14.35
	effort	5767	5767	5767	5767	5767	5767	5767	5767	5767	5767	5767
	cpue	0.03	0.09	0.06	0.00	0.00	0.00	0.14	0.00	1.62	0.56	2.49
scoop net	catch	0.00	0.08	0.54	0.00	0.00	0.00	0.08	0.00	0.00	1.11	1.81
	effort	223	223	223	223	223	223	223	223	223	223	223
	cpue	0.00	0.36	2.42	0.00	0.00	0.00	0.36	0.00	0.00	4.98	8.12
	TOTAL CATCH	157.60	35.75	24.61	962.91	0.00	120.89	107.65	231.36	35.16	230.88	1906.81

N.B. THE DATA PRESENTED HERE ARE FOR TWO MINOR STRATA ONLY AND DO NOT REPRESENT CATCHES FOR THE ENTIRE NKHOTAKOTA AREA

ANNUAL SUMMARY FOR THE YEAR 1977

Gear		chambo	other tilapia	kambuzi	utaka	ch'sawa	k'pango	mlamba	usipa	nchila	others	TOTAL
gill net	catch	102.61	28.54	0.00	0.00	0.00	58.58	34.90	0.00	13.42	107.33	345.38
	effort	194680	194680	194680	194680	194680	194680	194680	194680	194680	194680	194680
	cpue	0.53	0.15	0.00	0.00	0.00	0.30	0.18	0.00	0.07	0.55	1.77
long line	catch	0.03	0.00	0.00	0.00	0.00	1.07	12.49	0.00	0.00	0.03	13.61
	effort	13320	13320	13320	13320	13320	13320	13320	13320	13320	13320	13320
	cpue	0.00	0.00	0.00	0.00	0.00	0.08	0.94	0.00	0.00	0.00	1.02
chambo seine	catch	2.71	6.10	0.28	0.35	0.00	0.08	0.76	0.43	0.00	2.25	12.95
	effort	3196	3196	3196	3196	3196	3196	3196	3196	3196	3196	3196
	cpue	0.85	1.91	0.09	0.11	0.00	0.02	0.24	0.13	0.00	0.70	4.05
kambuzi seine	catch	0.16	0.00	0.21	0.00	0.00	0.75	0.30	3.27	0.00	16.90	21.59
	effort	2598	2598	2598	2598	2598	2598	2598	2598	2598	2598	2598
	cpue	0.06	0.00	0.08	0.00	0.00	0.29	0.12	1.26	0.00	6.51	8.31
chiri' mila	catch	4.27	0.00	9.16	8.96	0.00	0.42	0.33	0.09	0.04	9.45	32.72
	effort	21799	21799	21799	21799	21799	21799	21799	21799	21799	21799	21799
	cpue	0.20	0.00	0.42	0.41	0.00	0.02	0.02	0.00	0.00	0.43	1.50
m'quito net	catch	0.05	0.00	0.00	0.00	0.00	0.00	0.00	4.01	0.00	0.13	4.18
	effort	2346	2346	2346	2346	2346	2346	2346	2346	2346	2346	2346
	cpue	0.02	0.00	0.00	0.00	0.00	0.00	0.00	1.71	0.00	0.06	1.78
fish trap	catch	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.47
	effort	495	495	495	495	495	495	495	495	495	495	495
	cpue	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.75	0.95
hand line	catch	0.00	0.00	0.00	0.00	0.00	0.65	0.44	0.00	0.00	4.32	5.41
	effort	4051	4051	4051	4051	4051	4051	4051	4051	4051	4051	4051
	cpue	0.00	0.00	0.00	0.00	0.00	0.16	0.11	0.00	0.00	1.07	1.33
	TOTAL CATCH	109.92	34.64	9.65	9.31	0.00	61.55	49.22	7.79	13.46	140.77	436.31

N.B. THE DATA PRESENTED HERE ARE FOR TWO MINOR STRATA ONLY AND DO NOT REPRESENT CATCHES FOR THE ENTIRE NKHOTAKOTA AREA

ANNUAL SUMMARY FOR THE YEAR 1978

Gear		chambo	other tilapia	kambuzi	utaka	ch'sawa	k'pango	mlamba	usipa	nchila	others	TOTAL
gill net	catch	465.39	26.67	0.00	0.50	0.00	332.80	101.39	0.00	40.09	92.94	1059.78
	effort	434029	434029	434029	434029	434029	434029	434029	434029	434029	434029	434029
	cpue	1.07	0.06	0.00	0.00	0.00	0.77	0.23	0.00	0.09	0.21	2.44
long line	catch	0.00	0.00	0.00	0.00	0.00	24.02	43.87	0.00	0.06	29.77	97.73
	effort	23786	23786	23786	23786	23786	23786	23786	23786	23786	23786	23786
	cpue	0.00	0.00	0.00	0.00	0.00	1.01	1.84	0.00	0.00	1.25	4.11
kambuzi seine	catch	19.33	0.07	42.28	0.47	0.00	0.36	4.64	3.38	0.12	5.15	75.79
	effort	8258	8258	8258	8258	8258	8258	8258	8258	8258	8258	8258
	cpue	2.34	0.01	5.12	0.06	0.00	0.04	0.56	0.41	0.01	0.62	9.18
chiri' mila	catch	3.36	0.14	16.63	199.48	0.00	4.65	0.46	0.58	0.91	166.62	392.83
	effort	37164	37164	37164	37164	37164	37164	37164	37164	37164	37164	37164
	cpue	0.09	0.00	0.45	5.37	0.00	0.13	0.01	0.02	0.02	4.48	10.57
m'quito net	catch	0.00	0.00	13.05	0.00	0.00	0.00	0.00	5.66	26.51	1.12	46.34
	effort	64995	64995	64995	64995	64995	64995	64995	64995	64995	64995	64995
	cpue	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.09	0.41	0.02	0.71
fish trap	catch	0.14	0.79	0.45	0.00	0.00	0.12	0.48	0.00	0.00	5.70	7.68
	effort	12166	12166	12166	12166	12166	12166	12166	12166	12166	12166	12166
	cpue	0.01	0.06	0.04	0.00	0.00	0.01	0.04	0.00	0.00	0.47	0.63
hand line	catch	0.04	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.05	7.08	7.20
	effort	24962	24962	24962	24962	24962	24962	24962	24962	24962	24962	24962
	cpue	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.29
scoop net	catch	3.68	10.66	0.81	0.00	0.00	0.00	0.00	3.39	0.00	9.76	28.30
	effort	34659	34659	34659	34659	34659	34659	34659	34659	34659	34659	34659
	cpue	0.11	0.31	0.02	0.00	0.00	0.00	0.00	0.10	0.00	0.28	0.82
	TOTAL CATCH	491.94	38.33	73.21	200.45	0.00	361.96	150.87	13.01	67.74	318.15	1715.66

ANNUAL SUMMARY FOR THE YEAR 1979

Gear		chambo	other tilapia	kambuzi	utaka	ch'sawa	k'pango	mlamba	usipa	nchila	others	TOTAL
gill net	catch	270.05	31.83	1.29	1.47	0.00	157.86	48.50	0.00	3.23	48.05	562.28
	effort	187709	187709	187709	187709	187709	187709	187709	187709	187709	187709	187709
	cpue	1.44	0.17	0.01	0.01	0.00	0.84	0.26	0.00	0.02	0.26	3.00
long line	catch	0.00	0.00	0.00	0.00	0.00	8.14	50.66	0.00	0.02	20.78	79.60
	effort	22881	22881	22881	22881	22881	22881	22881	22881	22881	22881	22881
	cpue	0.00	0.00	0.00	0.00	0.00	0.36	2.21	0.00	0.00	0.91	3.48
kambuzi seine	catch	24.90	2.14	21.31	2.69	0.00	3.02	1.70	0.00	0.16	12.09	68.01
	effort	22038	22038	22038	22038	22038	22038	22038	22038	22038	22038	22038
	cpue	1.13	0.10	0.97	0.12	0.00	0.14	0.08	0.00	0.01	0.55	3.09
chiri' mila	catch	16.34	1.64	20.73	933.89	0.00	0.00	0.00	16.71	0.00	21.12	1010.43
	effort	36851	36851	36851	36851	36851	36851	36851	36851	36851	36851	36851
	cpue	0.44	0.04	0.56	25.34	0.00	0.00	0.00	0.45	0.00	0.57	27.42
m'quito net	catch	0.49	0.21	1.20	0.00	0.00	0.00	0.00	50.48	0.42	4.96	57.76
	effort	21188	21188	21188	21188	21188	21188	21188	21188	21188	21188	21188
	cpue	0.02	0.01	0.06	0.00	0.00	0.00	0.00	2.38	0.02	0.23	2.73
fish trap	catch	2.19	0.00	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.51	9.92
	effort	7095	7095	7095	7095	7095	7095	7095	7095	7095	7095	7095
	cpue	0.31	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	1.06	1.40
hand line	catch	0.00	0.00	0.00	0.00	0.00	0.24	2.55	0.00	0.00	11.18	13.97
	effort	8240	8240	8240	8240	8240	8240	8240	8240	8240	8240	8240
	cpue	0.00	0.00	0.00	0.00	0.00	0.03	0.31	0.00	0.00	1.36	1.70
scoop net	catch	17.76	7.02	0.03	0.00	0.00	0.00	0.55	7.49	0.00	6.16	39.01
	effort	67831	67831	67831	67831	67831	67831	67831	67831	67831	67831	67831
	cpue	0.26	0.10	0.00	0.00	0.00	0.00	0.01	0.11	0.00	0.09	0.58
	TOTAL CATCH	331.73	42.84	44.56	938.05	0.00	169.26	104.18	74.68	3.83	131.85	1840.98

ANNUAL SUMMARY FOR THE YEAR 1980

Gear		chambo	other tilapia	kambuzi	utaka	ch'sawa	k'pango	mlamba	usipa	nchila	others	TOTAL
gill net	catch	409.36	73.25	3.11	8.08	0.39	211.99	131.14	0.00	7.98	76.62	921.92
	effort	236864	236864	236864	236864	236864	236864	236864	236864	236864	236864	236864
	cpue	1.73	0.31	0.01	0.03	0.00	0.89	0.55	0.00	0.03	0.32	3.89
long line	catch	0.00	0.00	0.00	0.00	0.00	21.67	101.37	0.00	0.01	21.69	144.74
	effort	25869	25869	25869	25869	25869	25869	25869	25869	25869	25869	25869
	cpue	0.00	0.00	0.00	0.00	0.00	0.84	3.92	0.00	0.00	0.84	5.60
kambuzi seine	catch	6.14	1.39	13.62	1.36	0.00	0.16	0.22	0.44	0.41	4.48	28.23
	effort	4762	4762	4762	4762	4762	4762	4762	4762	4762	4762	4762
	cpue	1.29	0.29	2.86	0.28	0.00	0.03	0.05	0.09	0.09	0.94	5.93
chiri' mila	catch	21.41	0.17	25.35	1348.74	5.45	0.11	0.16	0.27	0.00	24.52	1426.19
	effort	57096	57096	57096	57096	57096	57096	57096	57096	57096	57096	57096
	cpue	0.38	0.00	0.44	23.62	0.10	0.00	0.00	0.00	0.00	0.43	24.98
m'quito net	catch	0.15	1.11	0.65	0.00	0.00	0.00	0.00	0.82	0.00	1.08	3.81
	effort	3830	3830	3830	3830	3830	3830	3830	3830	3830	3830	3830
	cpue	0.04	0.29	0.17	0.00	0.00	0.00	0.00	0.21	0.00	0.28	0.99
fish trap	catch	0.00	0.22	1.28	0.00	0.00	0.00	0.22	0.00	0.02	0.83	2.58
	effort	1616	1616	1616	1616	1616	1616	1616	1616	1616	1616	1616
	cpue	0.00	0.14	0.80	0.00	0.00	0.00	0.14	0.00	0.01	0.52	1.60
hand line	catch	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.28	6.30
	effort	3944	3944	3944	3944	3944	3944	3944	3944	3944	3944	3944
	cpue	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.59	1.60
scoop net	catch	4.72	21.50	0.00	0.00	0.00	0.21	0.84	0.00	0.00	8.01	35.28
	effort	60653	60653	60653	60653	60653	60653	60653	60653	60653	60653	60653
	cpue	0.08	0.35	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.13	0.58
	TOTAL CATCH	441.79	97.66	44.02	1358.18	5.84	234.14	233.95	1.53	8.42	143.51	2569.04

ANNUAL SUMMARY FOR THE YEAR 1981

Gear		chambo	other tilapia	kambuzi	utaka	ch'sawa	k'pango	mlamba	usipa	nchila	others	TOTAL
gill net	catch	384.31	85.58	1.75	1.57	0.00	128.09	77.76	0.00	7.32	131.75	818.12
	effort	240181	240181	240181	240181	240181	240181	240181	240181	240181	240181	240181
	cpue	1.60	0.36	0.01	0.01	0.00	0.53	0.32	0.00	0.03	0.55	3.41
long line	catch	0.00	0.00	0.00	0.00	0.00	13.76	124.76	0.00	0.00	90.42	228.94
	effort	27737	27737	27737	27737	27737	27737	27737	27737	27737	27737	27737
	cpue	0.00	0.00	0.00	0.00	0.00	0.50	4.50	0.00	0.00	3.26	8.25
kambuzi seine	catch	11.84	10.40	33.17	22.94	0.00	1.38	3.34	0.00	0.00	16.57	99.64
	effort	20263	20263	20263	20263	20263	20263	20263	20263	20263	20263	20263
	cpue	0.58	0.51	1.64	1.13	0.00	0.07	0.16	0.00	0.00	0.82	4.92
chiri' mila	catch	10.62	1.35	46.26	2376.77	0.88	0.24	0.30	0.99	0.02	64.36	2501.78
	effort	96835	96835	96835	96835	96835	96835	96835	96835	96835	96835	96835
	cpue	0.11	0.01	0.48	24.54	0.01	0.00	0.00	0.01	0.00	0.66	25.84
m'quito net	catch	0.00	0.00	0.47	0.00	0.00	0.04	0.00	3.89	0.00	0.19	4.58
	effort	3391	3391	3391	3391	3391	3391	3391	3391	3391	3391	3391
	cpue	0.00	0.00	0.14	0.00	0.00	0.01	0.00	1.15	0.00	0.05	1.35
fish trap	catch	4.68	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.00	2.20	7.24
	effort	14272	14272	14272	14272	14272	14272	14272	14272	14272	14272	14272
	cpue	0.33	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.15	0.51
hand line	catch	0.08	0.00	0.00	0.00	0.00	0.11	0.59	0.00	0.00	19.83	20.61
	effort	8162	8162	8162	8162	8162	8162	8162	8162	8162	8162	8162
	cpue	0.01	0.00	0.00	0.00	0.00	0.01	0.07	0.00	0.00	2.43	2.52
scoop net	catch	5.86	0.00	0.00	0.00	0.00	0.13	0.00	0.29	0.00	6.39	12.67
	effort	51375	51375	51375	51375	51375	51375	51375	51375	51375	51375	51375
	cpue	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.12	0.25
	TOTAL CATCH	417.39	97.33	81.64	2401.28	0.88	143.75	207.11	5.17	7.34	331.70	3693.58

ANNUAL SUMMARY FOR THE YEAR 1982

Gear		chambo	other tilapia	kambuzi	utaka	ch'sawa	k'pango	mlamba	usipa	nchila	others	TOTAL
gill net	catch	244.85	116.04	0.86	0.76	0.00	97.79	76.66	0.00	5.44	99.96	642.36
	effort	191850	191850	191850	191850	191850	191850	191850	191850	191850	191850	191850
	cpue	1.28	0.60	0.00	0.00	0.00	0.51	0.40	0.00	0.03	0.52	3.35
long line	catch	0.00	0.00	0.00	0.00	0.00	43.90	124.34	0.00	0.00	17.67	185.91
	effort	35425	35425	35425	35425	35425	35425	35425	35425	35425	35425	35425
	cpue	0.00	0.00	0.00	0.00	0.00	1.24	3.51	0.00	0.00	0.50	5.25
chambo seine	catch	2.67	99.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	102.58
	effort	231	231	231	231	231	231	231	231	231	231	231
	cpue	11.56	432.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	444.07
kambuzi seine	catch	31.20	18.48	27.10	0.00	2.98	1.67	0.00	0.25	0.00	8.96	90.64
	effort	4516	4516	4516	4516	4516	4516	4516	4516	4516	4516	4516
	cpue	6.91	4.09	6.00	0.00	0.66	0.37	0.00	0.06	0.00	1.98	20.07
chiri' mila	catch	30.96	3.22	188.33	305.94	1.08	1.69	2.19	232.96	0.04	46.84	813.25
	effort	102853	102853	102853	102853	102853	102853	102853	102853	102853	102853	102853
	cpue	0.30	0.03	1.83	2.97	0.01	0.02	0.02	2.26	0.00	0.46	7.91
m'quito net	catch	0.00	0.00	2.01	0.25	0.00	0.00	0.03	61.43	4.45	3.91	72.08
	effort	26708	26708	26708	26708	26708	26708	26708	26708	26708	26708	26708
	cpue	0.00	0.00	0.08	0.01	0.00	0.00	0.00	2.30	0.17	0.15	2.70
fish trap	catch	8.66	0.00	1.59	0.00	0.00	0.00	0.00	0.00	0.00	0.62	10.87
	effort	4452	4452	4452	4452	4452	4452	4452	4452	4452	4452	4452
	cpue	1.95	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.14	2.44
hand line	catch	0.00	0.00	0.00	0.00	0.00	0.29	0.24	0.00	0.00	9.54	10.07
	effort	2939	2939	2939	2939	2939	2939	2939	2939	2939	2939	2939
	cpue	0.00	0.00	0.00	0.00	0.00	0.10	0.08	0.00	0.00	3.25	3.43
scoop net	catch	0.04	17.44	0.00	0.00	0.00	0.00	0.11	0.00	0.00	1.10	18.69
	effort	31584	31584	31584	31584	31584	31584	31584	31584	31584	31584	31584
	cpue	0.00	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.59
	TOTAL CATCH	318.38	255.09	219.89	306.95	4.06	145.34	203.57	294.64	9.93	188.60	1946.45

ANNUAL SUMMARY FOR THE YEAR 1983

Gear		chambo	other tilapia	kambuzi	utaka	ch'sawa	k'pango	mlamba	usipa	nchila	others	TOTAL
gill net	catch	411.08	95.55	0.00	4.15	0.46	182.24	109.64	0.00	2.14	95.99	901.24
	effort	192372	192372	192372	192372	192372	192372	192372	192372	192372	192372	192372
	cpue	2.14	0.50	0.00	0.02	0.00	0.95	0.57	0.00	0.01	0.50	4.68
long line	catch	0.00	0.00	0.00	0.00	0.00	30.59	110.15	0.00	0.00	55.00	195.74
	effort	22062	22062	22062	22062	22062	22062	22062	22062	22062	22062	22062
	cpue	0.00	0.00	0.00	0.00	0.00	1.39	4.99	0.00	0.00	2.49	8.87
chambo seine	catch	6.19	0.00	1.88	0.00	0.00	5.29	0.20	0.00	0.00	16.85	30.41
	effort	635	635	635	635	635	635	635	635	635	635	635
	cpue	9.75	0.00	2.96	0.00	0.00	8.33	0.31	0.00	0.00	26.54	47.89
kambuzi seine	catch	65.16	32.22	110.35	0.37	1.24	0.76	0.51	2.83	0.00	9.74	223.19
	effort	9154	9154	9154	9154	9154	9154	9154	9154	9154	9154	9154
	cpue	7.12	3.52	12.06	0.04	0.14	0.08	0.06	0.31	0.00	1.06	24.38
chiri' mila	catch	23.07	29.08	54.74	1069.98	3.53	0.03	0.27	11.82	0.00	14.30	1206.81
	effort	74536	74536	74536	74536	74536	74536	74536	74536	74536	74536	74536
	cpue	0.31	0.39	0.73	14.36	0.05	0.00	0.00	0.16	0.00	0.19	16.19
m'quito net	catch	0.00	0.00	1.14	0.32	0.00	0.00	0.00	68.40	0.00	2.17	72.03
	effort	7755	7755	7755	7755	7755	7755	7755	7755	7755	7755	7755
	cpue	0.00	0.00	0.15	0.04	0.00	0.00	0.00	8.82	0.00	0.28	9.29
fish trap	catch	0.39	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.00	2.04	2.94
	effort	1028	1028	1028	1028	1028	1028	1028	1028	1028	1028	1028
	cpue	0.38	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	1.98	2.86
hand line	catch	0.00	0.00	0.00	0.00	0.00	0.03	0.22	0.00	0.00	1.39	1.64
	effort	471	471	471	471	471	471	471	471	471	471	471
	cpue	0.00	0.00	0.00	0.00	0.00	0.06	0.47	0.00	0.00	2.94	3.47
scoop net	catch	14.34	39.69	0.00	0.00	0.00	1.74	10.82	0.00	0.00	2.92	69.51
	effort	29081	29081	29081	29081	29081	29081	29081	29081	29081	29081	29081
	cpue	0.49	1.36	0.00	0.00	0.00	0.06	0.37	0.00	0.00	0.10	2.39
	TOTAL CATCH	520.24	196.53	168.62	1074.83	5.23	220.68	231.81	83.05	2.14	200.39	2703.52

ANNUAL SUMMARY FOR THE YEAR 1984

Gear		chambo	other tilapia	kambuzi	utaka	ch'sawa	k'pango	mlamba	usipa	nchila	others	TOTAL
gill net	catch	700.04	64.28	4.53	22.42	0.88	106.34	85.90	0.00	0.67	236.64	1221.70
	effort	228911	228911	228911	228911	228911	228911	228911	228911	228911	228911	228911
	cpue	3.06	0.28	0.02	0.10	0.00	0.46	0.38	0.00	0.00	1.03	5.34
long line	catch	0.00	0.16	0.00	0.00	0.00	29.48	120.43	0.00	0.00	45.58	195.65
	effort	36671	36671	36671	36671	36671	36671	36671	36671	36671	36671	36671
	cpue	0.00	0.00	0.00	0.00	0.00	0.80	3.28	0.00	0.00	1.24	5.34
kambuzi seine	catch	100.87	23.50	113.62	133.34	0.92	13.05	3.78	0.13	0.72	267.24	657.17
	effort	14889	14889	14889	14889	14889	14889	14889	14889	14889	14889	14889
	cpue	6.77	1.58	7.63	8.96	0.06	0.88	0.25	0.01	0.05	17.95	44.14
chiri' mila	catch	65.78	49.22	0.60	3087.26	37.12	2.83	0.26	0.00	0.00	182.11	3425.18
	effort	104035	104035	104035	104035	104035	104035	104035	104035	104035	104035	104035
	cpue	0.63	0.47	0.01	29.68	0.36	0.03	0.00	0.00	0.00	1.75	32.92
m'quito net	catch	0.00	0.00	0.38	0.00	0.00	0.00	0.00	0.57	0.00	2.05	3.00
	effort	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673
	cpue	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.21	0.00	0.77	1.12
fish trap	catch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.16	2.16
	effort	241	241	241	241	241	241	241	241	241	241	241
	cpue	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.96	8.96
hand line	catch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.57	5.57
	effort	925	925	925	925	925	925	925	925	925	925	925
	cpue	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.02	6.02
scoop net	catch	3.30	9.38	0.00	0.00	0.00	0.00	0.04	0.00	0.00	2.26	14.98
	effort	17920	17920	17920	17920	17920	17920	17920	17920	17920	17920	17920
	cpue	0.18	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.84
	TOTAL CATCH	869.99	146.54	119.13	3243.02	38.92	151.70	210.41	0.70	1.39	743.61	5525.41

ANNUAL SUMMARY FOR THE YEAR 1985

Gear		chambo	other tilapia	kambuzi	utaka	ch'sawa	k'pango	mlamba	usipa	nchila	others	TOTAL
gill net	catch	630.47	80.83	9.39	114.73	2.76	112.68	63.91	0.00	10.95	96.07	1121.79
	effort	219586	219586	219586	219586	219586	219586	219586	219586	219586	219586	219586
	cpue	2.87	0.37	0.04	0.52	0.01	0.51	0.29	0.00	0.05	0.44	5.11
long line	catch	0.13	0.00	0.00	0.00	0.00	86.54	55.73	0.00	0.89	14.29	157.58
	effort	23636	23636	23636	23636	23636	23636	23636	23636	23636	23636	23636
	cpue	0.01	0.00	0.00	0.00	0.00	3.66	2.36	0.00	0.04	0.60	6.67
chambo seine	catch	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13
	effort	10	10	10	10	10	10	10	10	10	10	10
	cpue	0.00	13.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.00
kambuzi seine	catch	41.21	13.95	7.47	18.80	0.61	0.75	1.92	0.14	1.40	48.76	135.01
	effort	13141	13141	13141	13141	13141	13141	13141	13141	13141	13141	13141
	cpue	3.14	1.06	0.57	1.43	0.05	0.06	0.15	0.01	0.11	3.71	10.27
chiri' mila	catch	85.73	15.30	70.12	1385.88	2.99	3.60	3.83	6.36	2.58	76.59	1652.98
	effort	88531	88531	88531	88531	88531	88531	88531	88531	88531	88531	88531
	cpue	0.97	0.17	0.79	15.65	0.03	0.04	0.04	0.07	0.03	0.87	18.67
m'quito net	catch	0.03	0.00	3.04	0.00	0.00	0.00	0.51	165.88	0.00	0.58	170.04
	effort	14091	14091	14091	14091	14091	14091	14091	14091	14091	14091	14091
	cpue	0.00	0.00	0.22	0.00	0.00	0.00	0.04	11.77	0.00	0.04	12.07
fish trap	catch	1.50	1.10	1.06	0.00	0.00	0.00	0.97	0.00	0.00	0.48	5.11
	effort	1520	1520	1520	1520	1520	1520	1520	1520	1520	1520	1520
	cpue	0.99	0.72	0.70	0.00	0.00	0.00	0.64	0.00	0.00	0.32	3.36
hand line	catch	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	18.04	18.18
	effort	7638	7638	7638	7638	7638	7638	7638	7638	7638	7638	7638
	cpue	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	2.36	2.38
scoop net	catch	1.26	1.32	0.00	4.34	0.00	0.00	0.34	0.00	0.00	1.60	8.86
	effort	7206	7206	7206	7206	7206	7206	7206	7206	7206	7206	7206
	cpue	0.17	0.18	0.00	0.60	0.00	0.00	0.05	0.00	0.00	0.22	1.23
	TOTAL CATCH	760.33	112.63	91.08	1523.75	6.36	203.71	127.21	172.38	15.82	256.41	3269.68

ANNUAL SUMMARY FOR THE YEAR 1986

Gear		chambo	other tilapia	kambuzi	utaka	ch'sawa	k'pango	mlamba	usipa	nchila	others	TOTAL
gill net	catch	434.05	56.32	0.00	112.80	0.31	129.02	76.01	0.00	0.51	84.00	893.02
	effort	227250	227250	227250	227250	227250	227250	227250	227250	227250	227250	227250
	cpue	1.91	0.25	0.00	0.50	0.00	0.57	0.33	0.00	0.00	0.37	3.93
long line	catch	0.64	0.00	0.00	0.00	0.07	42.99	92.99	0.00	0.00	28.58	165.27
	effort	28622	28622	28622	28622	28622	28622	28622	28622	28622	28622	28622
	cpue	0.02	0.00	0.00	0.00	0.00	1.50	3.25	0.00	0.00	1.00	5.77
kambuzi seine	catch	36.95	3.84	11.51	6.54	4.18	15.27	2.68	12.42	0.14	58.23	151.76
	effort	11595	11595	11595	11595	11595	11595	11595	11595	11595	11595	11595
	cpue	3.19	0.33	0.99	0.56	0.36	1.32	0.23	1.07	0.01	5.02	13.09
chiri' mila	catch	7.71	0.00	35.45	4756.70	2.80	3.29	0.17	1.74	0.00	49.26	4857.12
	effort	126867	126867	126867	126867	126867	126867	126867	126867	126867	126867	126867
	cpue	0.06	0.00	0.28	37.49	0.02	0.03	0.00	0.01	0.00	0.39	38.29
m'quito net	catch	0.00	0.00	0.00	1.96	0.00	0.00	0.00	221.57	0.35	0.85	224.73
	effort	46565	46565	46565	46565	46565	46565	46565	46565	46565	46565	46565
	cpue	0.00	0.00	0.00	0.04	0.00	0.00	0.00	4.76	0.01	0.02	4.83
fish trap	catch	3.40	4.40	0.37	0.00	0.00	0.15	1.32	0.00	0.39	8.96	18.99
	effort	7869	7869	7869	7869	7869	7869	7869	7869	7869	7869	7869
	cpue	0.43	0.56	0.05	0.00	0.00	0.02	0.17	0.00	0.05	1.14	2.41
hand line	catch	0.00	0.05	0.00	0.00	0.00	0.06	0.19	0.00	0.00	14.88	15.18
	effort	6761	6761	6761	6761	6761	6761	6761	6761	6761	6761	6761
	cpue	0.00	0.01	0.00	0.00	0.00	0.01	0.03	0.00	0.00	2.20	2.25
scoop net	catch	6.61	0.98	0.00	0.00	0.00	0.00	0.16	0.00	0.00	3.60	11.35
	effort	11972	11972	11972	11972	11972	11972	11972	11972	11972	11972	11972
	cpue	0.55	0.08	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.30	0.95
	TOTAL CATCH	489.36	65.59	47.33	4878.00	7.36	190.78	173.52	235.73	1.39	248.36	6337.42

ANNUAL SUMMARY FOR THE YEAR 1987

Gear		chambo	other tilapia	kambuzi	utaka	ch'sawa	k'pango	mlamba	usipa	nchila	others	TOTAL
gill net	catch	473.37	22.51	0.54	56.43	0.00	142.56	98.78	0.00	1.17	131.55	926.91
	effort	256737	256737	256737	256737	256737	256737	256737	256737	256737	256737	256737
	cpue	1.84	0.09	0.00	0.22	0.00	0.56	0.38	0.00	0.00	0.51	3.61
long line	catch	0.00	0.00	0.00	0.00	0.00	39.13	174.00	0.00	0.00	39.29	252.42
	effort	41105	41105	41105	41105	41105	41105	41105	41105	41105	41105	41105
	cpue	0.00	0.00	0.00	0.00	0.00	0.95	4.23	0.00	0.00	0.96	6.14
chambo seine	catch	1.25	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.25	2.00
	effort	125	125	125	125	125	125	125	125	125	125	125
	cpue	10.00	0.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00	2.00	16.00
kambuzi seine	catch	311.98	11.29	164.92	313.95	0.00	14.30	13.88	40.98	0.24	164.90	1036.44
	effort	25516	25516	25516	25516	25516	25516	25516	25516	25516	25516	25516
	cpue	12.23	0.44	6.46	12.30	0.00	0.56	0.54	1.61	0.01	6.46	40.62
chiri' mila	catch	0.00	0.00	0.00	5326.25	0.00	0.29	0.00	0.00	0.00	62.21	5388.75
	effort	118914	118914	118914	118914	118914	118914	118914	118914	118914	118914	118914
	cpue	0.00	0.00	0.00	44.79	0.00	0.00	0.00	0.00	0.00	0.52	45.32
m'quito net	catch	0.81	0.00	3.30	447.90	0.00	0.00	0.00	731.64	0.00	8.69	1192.34
	effort	123643	123643	123643	123643	123643	123643	123643	123643	123643	123643	123643
	cpue	0.01	0.00	0.03	3.62	0.00	0.00	0.00	5.92	0.00	0.07	9.64
fish trap	catch	7.08	2.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.12	10.46
	effort	4567	4567	4567	4567	4567	4567	4567	4567	4567	4567	4567
	cpue	1.55	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	2.29
hand line	catch	0.00	0.00	0.00	0.00	0.00	0.32	0.31	0.00	0.00	59.39	60.02
	effort	26973	26973	26973	26973	26973	26973	26973	26973	26973	26973	26973
	cpue	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	2.20	2.23
scoop net	catch	0.09	3.59	0.00	0.00	0.00	0.00	0.26	0.00	0.00	4.44	8.38
	effort	15279	15279	15279	15279	15279	15279	15279	15279	15279	15279	15279
	cpue	0.01	0.23	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.29	0.55
	TOTAL CATCH	794.58	39.65	168.76	6144.53	0.00	197.10	287.23	772.62	1.41	471.84	8877.72

ANNUAL SUMMARY FOR THE YEAR 1988

Gear		chambo	other tilapia	kambuzi	utaka	ch'sawa	k'pango	mlamba	usipa	nchila	others	TOTAL
gill net	catch	383.30	13.01	0.00	16.53	0.30	193.32	131.19	0.00	2.68	184.20	924.53
	effort	297614	297614	297614	297614	297614	297614	297614	297614	297614	297614	297614
	cpue	1.29	0.04	0.00	0.06	0.00	0.65	0.44	0.00	0.01	0.62	3.11
long line	catch	0.00	0.00	0.00	0.00	0.00	33.19	128.65	0.00	0.00	36.89	198.73
	effort	39681	39681	39681	39681	39681	39681	39681	39681	39681	39681	39681
	cpue	0.00	0.00	0.00	0.00	0.00	0.84	3.24	0.00	0.00	0.93	5.01
kambuzi seine	catch	131.80	9.82	307.46	72.51	0.00	6.34	6.58	335.36	0.00	91.32	961.19
	effort	35537	35537	35537	35537	35537	35537	35537	35537	35537	35537	35537
	cpue	3.71	0.28	8.65	2.04	0.00	0.18	0.19	9.44	0.00	2.57	27.05
chiri' mila	catch	5.40	1.69	1.92	2996.51	0.00	8.41	0.03	17.73	0.00	29.45	3061.14
	effort	135970	135970	135970	135970	135970	135970	135970	135970	135970	135970	135970
	cpue	0.04	0.01	0.01	22.04	0.00	0.06	0.00	0.13	0.00	0.22	22.51
m'quito net	catch	0.20	0.21	26.99	0.00	0.00	0.05	0.00	683.37	0.00	13.32	724.14
	effort	35819	35819	35819	35819	35819	35819	35819	35819	35819	35819	35819
	cpue	0.01	0.01	0.75	0.00	0.00	0.00	0.00	19.08	0.00	0.37	20.22
fish trap	catch	8.84	2.35	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.39	11.88
	effort	5774	5774	5774	5774	5774	5774	5774	5774	5774	5774	5774
	cpue	1.53	0.41	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.07	2.06
hand line	catch	0.00	0.00	0.00	0.00	0.00	0.32	2.79	0.00	0.00	15.22	18.33
	effort	27842	27842	27842	27842	27842	27842	27842	27842	27842	27842	27842
	cpue	0.00	0.00	0.00	0.00	0.00	0.01	0.10	0.00	0.00	0.55	0.66
scoop net	catch	3.75	7.93	0.33	0.00	0.00	0.00	0.14	0.00	0.00	19.39	31.54
	effort	41205	41205	41205	41205	41205	41205	41205	41205	41205	41205	41205
	cpue	0.09	0.19	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.77
	TOTAL CATCH	533.29	35.01	336.70	3085.55	0.30	241.63	269.68	1036.46	2.68	390.18	5931.48

ANNUAL SUMMARY FOR THE YEAR 1989

Gear		chambo	other tilapia	kambuzi	utaka	ch'sawa	k'pango	mlamba	usipa	nchila	others	TOTAL
gill net	catch	410.92	14.83	0.05	44.61	0.83	138.51	106.20	0.00	4.80	210.10	930.85
	effort	314981	314981	314981	314981	314981	314981	314981	314981	314981	314981	314981
	cpue	1.30	0.05	0.00	0.14	0.00	0.44	0.34	0.00	0.02	0.67	2.96
long line	catch	0.00	0.00	0.00	0.00	0.00	34.12	150.10	0.00	0.00	5.28	189.50
	effort	87365	87365	87365	87365	87365	87365	87365	87365	87365	87365	87365
	cpue	0.00	0.00	0.00	0.00	0.00	0.39	1.72	0.00	0.00	0.06	2.17
kambuzi seine	catch	232.54	6.31	242.49	22.75	0.00	18.02	6.30	59.55	0.00	96.28	684.24
	effort	35766	35766	35766	35766	35766	35766	35766	35766	35766	35766	35766
	cpue	6.50	0.18	6.78	0.64	0.00	0.50	0.18	1.66	0.00	2.69	19.13
chiri' mila ,	catch	8.68	3.75	74.39	1564.91	0.00	0.72	1.58	25.14	0.00	66.99	1746.16
	effort	111517	111517	111517	111517	111517	111517	111517	111517	111517	111517	111517
	cpue	0.08	0.03	0.67	14.03	0.00	0.01	0.01	0.23	0.00	0.60	15.66
m'quito net	catch	0.03	0.14	55.17	0.07	0.00	0.05	5.65	666.07	0.00	13.07	740.25
	effort	120027	120027	120027	120027	120027	120027	120027	120027	120027	120027	120027
	cpue	0.00	0.00	0.46	0.00	0.00	0.00	0.05	5.55	0.00	0.11	6.17
fish trap	catch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.73	4.73
	effort	2917	2917	2917	2917	2917	2917	2917	2917	2917	2917	2917
	cpue	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.62	1.62
hand line	catch	0.00	0.00	0.00	5.72	0.00	0.10	0.07	0.00	0.00	16.97	22.86
	effort	37277	37277	37277	37277	37277	37277	37277	37277	37277	37277	37277
	cpue	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.46	0.61
scoop net	catch	3.24	5.44	3.91	0.00	0.00	0.00	0.36	1.28	0.00	12.35	26.58
	effort	62220	62220	62220	62220	62220	62220	62220	62220	62220	62220	62220
	cpue	0.05	0.09	0.06	0.00	0.00	0.00	0.01	0.02	0.00	0.20	0.43
	TOTAL CATCH	655.41	30.47	376.01	1638.06	0.83	191.52	270.26	752.04	4.80	425.77	4345.17