

**UNITED REPUBLIC OF TANZANIA**

**STATUS REPORT ON LAKE VICTORIA FRAME  
SURVEYS FOR 2000, 2002 AND 2004**

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## **LIST OF ACRONYMS**

BMUs	Beach Management Units
EU	European Union
LVEMP	Lake Victoria Environment Management Project
LVFO	Lake Victoria Fisheries Organisation
LVFRP	Lake Victoria Fisheries Research Project

## **ACKNOWLEDGEMENTS**

The 2004 Frame Survey was conducted with financial support from The Fisheries Division. Lake Victoria Environmental Management Project (LVEMP) assisted by providing funds to pay for data entry and for conducting the national workshop. Their vital contribution is hereby acknowledged.

Appreciation is expressed to all fishers who accepted to conduct the survey in spite of the little remunerations. Their spirit of participatory management of the fishery resource is really commendable.

Appreciation is also expressed to the Local Government Authorities who assisted in mobilising fishers and also released their fisheries staff who participated in supervisory activities.

## EXECUTIVE SUMMARY

This is a report of the third simultaneous Frame Survey conducted on Lake Victoria on 27 - 30<sup>th</sup> April 2004. The survey was carried out simultaneously between the three partner states sharing Lake Victoria. It involved a complete census of fishers, fishing crafts and gears. Also some economic features found at the landing sites such as markets, electricity, net and craft repair facilities, and accessibility by road all year round were enumerated.

The 2004 Frame Survey results show that there were 575 landing sites, a drop of 3.3% as compared to 2002 results. Facilities at the landing sites continued to be scarce. Out of the total recorded landing sites only 176 were accessible by road all year round, 31 had bandas (fish sheds), 28 had electricity supply, 25 had pontoon/jetty, 16 had fish stores, 30 potable water, 49 toilet facilities, 218 net repair facilities and 235 boat repair facilities. Landing sites with working Beach Management Units (BMUs) were 466 while those with resident fisheries staff were only 49. There were 77,997 fishers and 22,653 fishing crafts as compared to 80,053 and 21,660 recorded in 2002. There was a general decrease in the use of gill net of mesh sizes below 4.5" and an increase in the mesh sizes 5" and above. The total number of gill nets increased by 37.1% from 425,888 recorded in 2002 to 583,699 in 2004. The number of long line hooks decreased by 33.3% from 4,608,998 recorded in 2002 to 3,081,885 in 2004.

The Number of out board engines increased by 113.6% from 2,610 recorded in 2002 to 5,576 in 2004. The big increase in motorization may indicate that fishers are compelled to move further off shore in search of fish.

Illegal gears such as beach seines and gill nets with mesh sizes below 5" continue to be used. In the 2004 survey there were 1,532 beach seines as compared to 1,454 recorded in 2002. However, there was a decrease in the use of gillnets below 5" mesh sizes which formed only 9.8% of the total number of gill nets as compared to 22.7% in the 2002 survey.

It is highly recommended that partner states should put more efforts in curbing the use of illegal gears and try to control the fishing effort as much as possible. Local Authorities should be sensitised to improve facilities at the landing sites such as potable water, toilets, access roads, electricity, net and craft repair.

## **1.0 INTRODUCTION**

### **1.1 Background**

Lake Victoria is the second largest fresh water body in the world, with a total area of 68,800 sq. km. The lake is shared among the three East African countries of Tanzania 51% (35,088 Km<sup>2</sup>), Kenya 6% (4,128 Km<sup>2</sup>) and Uganda 43% (29,584 sq. km). Lake Victoria is very important to the economies of the three countries in providing food, employment and foreign exchange.

Proper management of the lake's fishery calls for joint efforts between the three countries sharing the lake, therefore the need for organising simultaneous Frame Surveys on the lake. The first simultaneous Frame Survey was conducted in March, 2000 with the support of the World Bank funded Lake Victoria Environmental Management Project (LVEMP) and the European Union (EU) funded Lake Victoria Fisheries Research Project (LVFRP) which was doing fish stock assessment on the lake. The results of the 2000 Frame Survey were used in the estimation of Nile perch stocks in the lake.

Frame Surveys are conducted bi-annually so as to determine the fishing effort. The last Frame Survey was conducted in 2002 and hence the need to repeat it in 2004. In all the three surveys fishers were deployed as enumerators while Fisheries Division staffs were used as supervisors. A harmonized questionnaire used in the past two surveys was improved at a preparatory meeting held in Kisumu, Kenya from 4 – 8 April 2004 and used in 2004 in all three countries. The survey was conducted in four days, starting 27 – 30<sup>th</sup>. April. The cost of conducting the survey was Tshs. 33.0 million financed by The Fisheries Division, while LVEMP provided Tshs.9.4 million for data entry and conducting the national workshop.

### **1.2 Objectives**

The objectives of the Frame Surveys are fourfold:

- To secure data on the current fishing effort i.e. number and nature of fish producing factors such as fish landing sites around the lake, number of fishermen, fishing vessels and number of fishing gears by type and size. Other information included facilities available at landing sites such as cold rooms, pontoon/jetties, portable water, electricity supply, fish stores, all weather roads, boat and net repair facilities and toilet facilities;
- To provide accurate raising factors for estimating the total fish catch for the lake;
- To provide data which can be used to estimate fish stocks in the lake;
- To provide sampling frames for various surveys being conducted on the Lake and others that may be undertaken in the future.



## **2.0 METHODOLOGY**

### **2.1 Coverage**

The survey covered the whole Lake. Each country covered the area falling under its jurisdiction, stretching from border to border together with outlying islands. In Tanzania the survey covered the Regions of Kagera, Mara and Mwanza.

### **2.2 Planning of the survey**

The survey method used was complete enumeration of all landing sites, fishers, fishing vessels and fishing gears by type and size. Before conducting the survey a team of supervisors went around the lake zone to identify staff and fishers who participated as enumerators. At least one fisher was earmarked for each landing site except where the landing sites had few fishing vessels then one enumerator was allocated two or three landing sites. A total of 271 enumerators were deployed where 91 were in Kagera Region, 110 in Mwanza Region and 70 in Mara Region.

Before embarking on the exercise a one-day training was conducted for the field supervisors on the 23<sup>rd</sup> April 2004, and a two days training for the enumerators on 24<sup>th</sup> – 25<sup>th</sup> April 2004.

### **2.3 Data collection**

The survey covered the whole coastline using the most appropriate approach either by land or water transport. The exercise was conducted in four days, stating 27<sup>th</sup> – 30<sup>th</sup> April 2004.

A uniform questionnaire was designed for all the three countries. Types of information collected included listing of number of landing sites, number of fishermen, number of fishing crafts, the type and number of fishing gears and some socio-economic information regarding the landing site.

### **2.4 Data entry and analysis**

Immediately after the field data collection questionnaires were submitted to the fisheries head office for entry, storage and analysis. SAMAKI programme was used for entering and processing the survey data. The programme was updated from version 2.1 used in the 2002 survey to version 2.2. A five days training in the use of the updated programme was held in Dar-es-salaam from 20<sup>th</sup> – 24<sup>th</sup> September 2004.

### 3.0 RESULTS AND DISCUSSION

A summary of the April 2004 frame survey results is presented in Table 1 below, whereby number of fishing effort factors are highlighted. The table also highlights some socio – economic features found in the landing sites. Table 2 gives a comparison of the 2000, 2002 and 2004 Frame Surveys so as to observe the changes.

**Table 1: A Summary of Lake Victoria April, 2004 Frame Survey Results**

ITEM	KAGERA REGION	MWANZA REGION	MARA REGION	TOTAL
Number of Landing sites	138	283	154	575
Landing sites with bandas (sheds)	12	9	10	31
Sites with non working cold rooms	7	24	5	36
Landing sites with working cold rooms	2	2	1	5
Landing sites with Pontoon/Jetty	7	15	3	25
Landing sites with electricity supply	3	7	15	25
Landing sites with Boat repair facilities	63	65	107	235
Landing sites with Net repair facilities	56	61	101	218
Number of fishermen	15,626	39,370	23,001	77,997
Number of fishing vessels	5,321	10,983	6,349	22,653
Number of Outboard engines	1,077	3,025	1,330	5,576
Number of Transport vessels	88	477	202	767
Number of derelict vessels	1,102	3,250	1,474	5,826
Gears by type:				
Gill nets: <2.5"	496	5,621	4,576	10,693
2.5"	162	4,572	3,002	7,736
3"	575	3,485	2,263	6,323
3.5"	676	3,105	1,509	5,290
4"	2,958	4,764	2,462	10,184
4.5"	3,646	10,403	3,101	17,150
5"	55,429	130,752	86,043	272,224
5.5"	33,930	79,370	55,839	169,139
6"	11,297	46,509	6,708	64,514
6.5"	361	6,552	1,658	8,571
7"	927	6,573	1,509	9,009
7.5"	8	248	102	358
8"	8	1,018	102	1,128
9"	0	879	30	909
10"	0	429	0	429
>10"	0	42	0	42
Total gill nets	110,473	304,322	168,904	583,699
Monofilament nets	21	4,188	832	5,041
Beach seines	269	841	422	1,532
Scoop nets	449	55	32	536
Cast nets	26	12	28	66
Lift nets	0	305	2	307
Number of hand line hooks	3,968	9,837	5,381	19,186
Number of Long line hooks	427,742	1,549,593	1,104,550	3,081,885
Number of traps	5	426	167	598
Number of Small Seines <= 5mm.	60	684	391	1,135
Number of Small Seines 6-9mm.	424	1,911	753	3,118
Number of Small Seines 10mm.	96	23	2	121
Others (Unspecified)	0	70	0	70

**Table 2: Summary of the 2000, 2002 and 2004 Frame surveys**

Item		2000 SURVEY	2002 SURVEY	2004 SURVEY
1	LANDINGS			
1.1	Number of Landing sites	598	594	575
2.	Landing Site Facilities			
2.1	Bandas (sheds)	30	28	31
2.2	Cold Rooms (working)	2	6	5
2.3	Cold Rooms (not working)	0	27	36
2.4	Pontoon/Jetty	32	31	25
2.5	Fish Stores	14	24	16
2.6	Portable water		1	30
2.7	Toilet facilities		20	74
2.8	All weather roads	137	189	176
2.9	Boat repair facilities	224	323	235
2.10	Net repair facilities	248	332	218
2.11	Electricity Supply	20	35	25
3.	Fisheries Staff			
3.1	Fisheries Staff Resident		54	49
4.	Fishers			
4.1	Number of fishermen	55,985	80,053	77,997
5.	BMU presence			
5.1	No. of landing sites with BMUs			466
6.	Fishing crafts			
6.1	Number of fishing crafts	15,434	21,660	22,653
6.2	Mode of propulsion			
6.2.1	No using outboard engines	1,451	2,611	5,576
6.2.2	No. using inboard engines	75	0	0
6.2.3	No. using paddles	11,623	14,638	14,339
6.2.4	No. using sails	2,326	3,909	2,718
6.3	Craft types			
6.3.1	Dug out	694	373	294
6.3.2	Parachute	69	295	294
6.3.3	Sesse flat at one end	2,068	3,856	14,793
6.3.4	Sesse pointed at both ends	12,659	16,552	5,777
6.3.5	Rafts			1,201
6.3.6	Others/unspecified	-	582	181
7.	Transport craft			
7.1	No. of transport crafts	639	1,082	769
8.	Derelict crafts			
8.1	No. of derelict crafts	2,812	3,458	5,882
9.	Gears by type:			
9.1	Gill net by size			
9.1.1	Gill nets: < 2.5"	7,095	14,563	10,693
9.1.2	2.5"	3,123	4,614	7,736
9.1.3	3"	2,936	6,159	6,323
9.1.4	3.5"	2,300	11,305	5,290
9.1.5	4"	4,074	29,475	10,184
9.1.6	4.5"	5,651	30,716	17,150
	<b>Total number of gill nets &lt;5"</b>	<b>25,179</b>	<b>96,832</b>	<b>57,376</b>
9.1.7	5"	82,290	184,943	272,224
9.1.8	5.5"	27,089	71,347	169,139
9.1.9	6"	59,326	57,274	64,514
9.1.10	6.5"	8,804	7,834	8,571
9.1.11	7"	15,123	6,343	9,009
9.1.12	7.5"	0	530	358

Item		2000 SURVEY	2002 SURVEY	2004 SURVEY
9.1.13	8"	1,139	21	1,128
9.1.14	9"	198	296	909
9.1.15	10"	477	198	429
9.1.16	> 10"	0	270	42
	<b>Total number of gill nets &gt; 5"</b>	<b>194,445</b>	<b>329,056</b>	<b>526,323</b>
	<b>Total gill nets</b>	<b>219,625</b>	<b>425,888</b>	<b>583,699</b>
9.2	Dagaa fishing gears			
9.2.1	Lift nets/Lampara	315	130	307
9.2.2	Small seines mesh sizes =< 5mm.	3251	3874	1135
9.2.3	Small seines mesh sizes 6-9 mm.	0	0	3118
9.2.4	Small seines mesh sizes 10mm.	22	969	121
	<b>Total number of Small seines</b>	<b>3,273</b>	<b>4,843</b>	<b>4,374</b>
9.2.5	Scoop nets	809	812	536
9.3.	Hooks			
9.3.1	Handline hooks	14,307	39,404	19,186
9.3.2	Long line hooks	2,201,901	4,608,998	3,081,885
9.4	<b>Other gears</b>			
9.4.1	Beach/Boat seine	999	1,454	1,532
9.4.2	Cast net	63	135	66
9.4.3	Monofilament	0	0	5,041
9.4.4	Traps/Baskets	1,030	1,030	598
9.4.5	Other/Unspecified	0	46	70

### 3.1 Landing sites and facilities

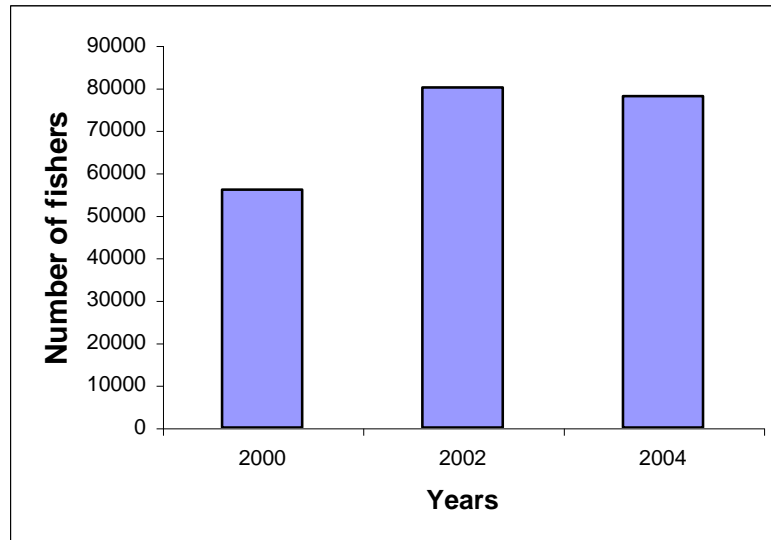
The results of 2004 Frame Survey shore that Lake Victoria coastline (Tanzania side) had a total of 575 fish landing stations spread over 1,150 km. of coastline. This is a concentration of about 1 landing site to every 2 km. Number of landing sites dropped from 598 recorded in 2000 to 594 in 2002 and 575 in 2004.

Availability of facilities at the landing sites are as follows:

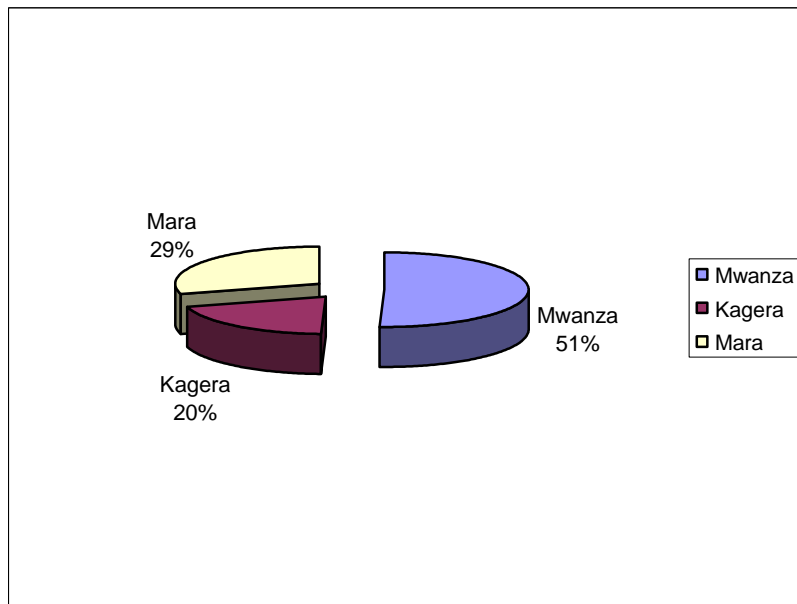
Bandas (fish sheds) were only 31, which is 5.4%. This was an improvement when compared to 2002 frame survey results where landing sites with Bandas were 4.9%. Electricity supply were 25, most of which were found in Mara Region. Cold rooms were 41, and out of these 36 were not working, while 5 were in working order. Those working were found in Mwanza (2), Kagera (2) and Musoma (1). Accessible by road all year round were 176, which is 30.9%, craft repair facilities were 235 which is 41.2%, net repair facilities were 218 which is 38.2%, pontoon/Jetty are 25, which is only 4.4%, Fish Stores were 16, which is 2.8%, potable water were 30, which is only 5.2% and toilet facilities were 74, which is 13.0 %.

### 3.2 Number of Fishers

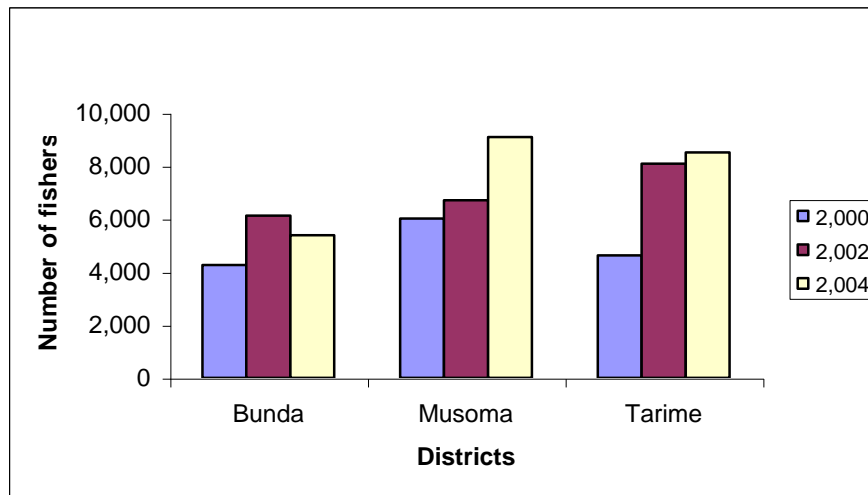
In 2004 the number of fishers dropped by 2,056 from 80,053 recorded in 2002 to 77,997. This was a decrease of 2.6%. The drop in number of fishers was recorded in Mwanza Region only while Kagera and Mara Regions recorded an increase. Overall concentration of fishers was 2.1 per sq. km.



**Figure 1: The trend of number of fishers in Lake Victoria 2000, 2002 and 2004 Frame Surveys.**



**Figure 2: Percentage Distribution of Fishers between Regions in 2004 Frame Survey**



**Figure 3: Comparison of number of Fishers by Region for 2000, 2002 and 2004 Frame surveys**

### 3.3 Crafts

#### 3.3.1 Fishing Crafts

According to 2004 Frame Survey the number of fishing crafts was 22,653. The number increased by 993 from 21,660 recorded in 2002, which is an increase of 4.6%. Mwanza Region, which has the highest concentration of fishing vessels as compared to Kagera and Mara Regions, recorded a drop of 272 crafts while Kagera and Mara Regions recorded an increase of 118 and 1,147 crafts respectively.

Craft types included Sesse pointed at both ends (65.3%), Sesse flat at one end (25.5%), Rafts (5.3%), Dugout (1.3%) and Parachutes (1.3).

#### 3.3.2 Transport crafts

Number of transport crafts decreased from 1,082 recorded in 2002 to 769 in 2004. This was a drop of 29.8%. Most of these are used to transport fish, people and other goods.

#### 3.3.3 Derelict crafts

Number of derelict crafts increased by 2,424 from 3,458 recorded in 2002 to 5,882 in 2004. Derelict crafts formed about 26% of the fishing crafts on the Tanzanian part of the Lake.

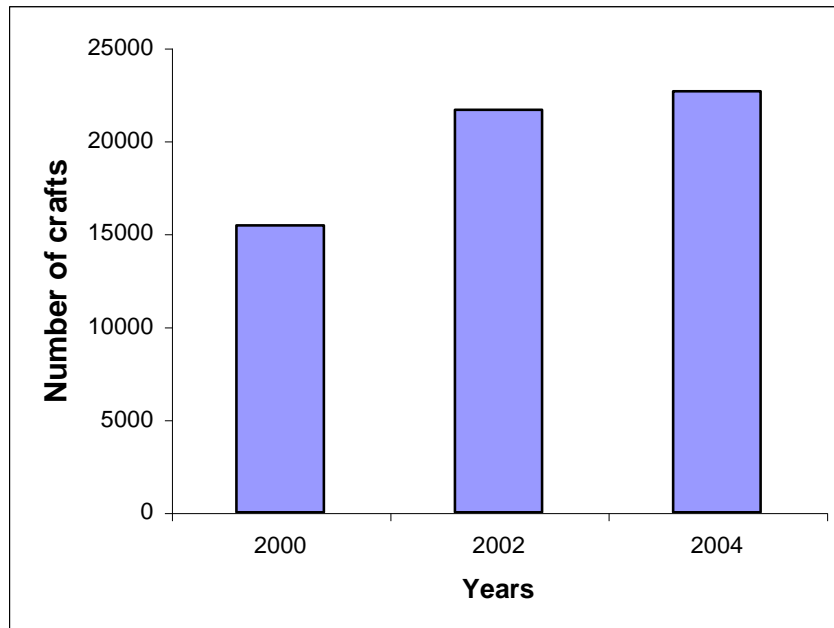
#### 3.3.4 Fish Carriers

In 2004 the number of crafts used to transport fish only was 580.

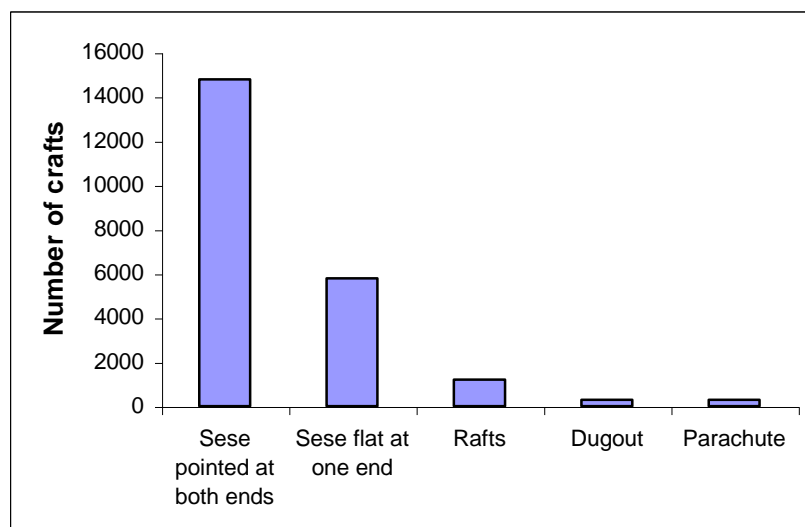
### 3.4 Fishing Crafts Propulsion

Mode of propulsion of fishing crafts was mostly paddles 63.3%, Sails 12%, and motorized crafts 24.6%. There was a big increase in the number of outboard engines from 2,610 recorded in 2002 to 5,576 in 2004. This was an increase of about 113.6%.

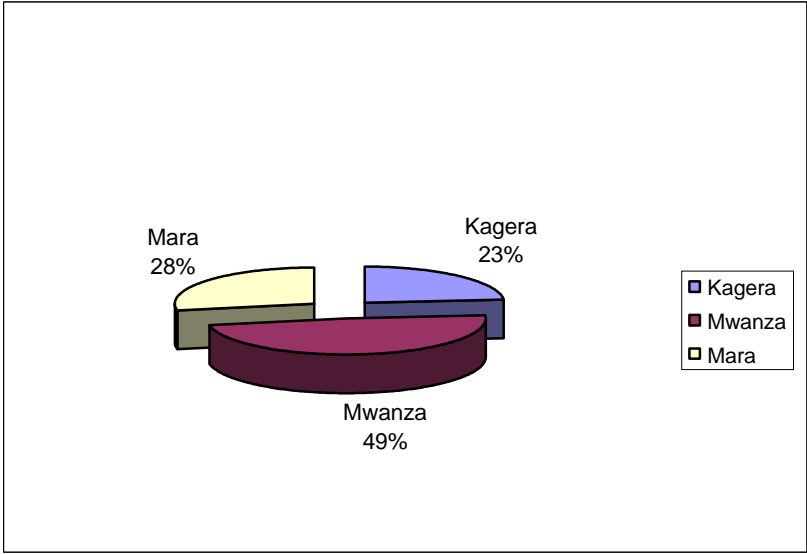
The increase in the use of motorized fishing crafts may indicate that the fishers are now forced to move further off shore in search of fish than it was the case in the past two years.



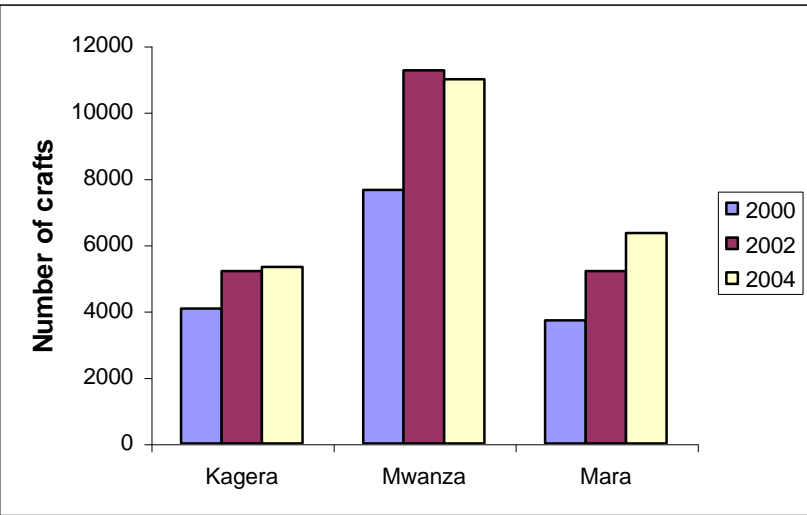
**Figure 4:** The trend of number of fishing crafts on Lake Victoria 2000,2002 and 2004 Frame Surveys



**Figure 5: Fishing Craft types in 2004 Frame Survey**



**Figure 6: Percentage Distribution of fishing crafts between Regions in the 2004 Frame Survey**



**Figure 7: Comparison of number of fishing crafts by Region for 2000, 2002 and 2004 Frame Surveys.**



### 3.5 Fishing gears

Fishing gears mostly in use include gill nets of varying mesh sizes, long line hooks, scoop nets, lift nets, small seines, beach seines and traps.

#### 3.5.1 Gill nets

The total number of gill nets increased by 37.1% from 425,888 recorded in year 2002 to 583,699 in 2004. Mesh sizes mostly used are 5 inches and above for the Nile perch and Tilapia species fishery. This category composed 90.2% of the total gill nets. Although the law prohibits the use of gill nets of small mesh sizes below 5 inches, their use still continues. In 2004 this category formed 9.8% of the total gill nets. This was a big improvement because in 2002 under mesh sized gill nets formed about 22.7% of the total gill nets in use. Use of nets with mesh sizes larger than 7 inches improved slightly, forming 0.5% of the total gill nets as compared to 0.3% in 2002.

Small mesh sizes of 2.5" and below are used in the Haplochromine fishery whose stocks have started to build up after the recent decline that followed the outburst of the Nile perch on the lake.

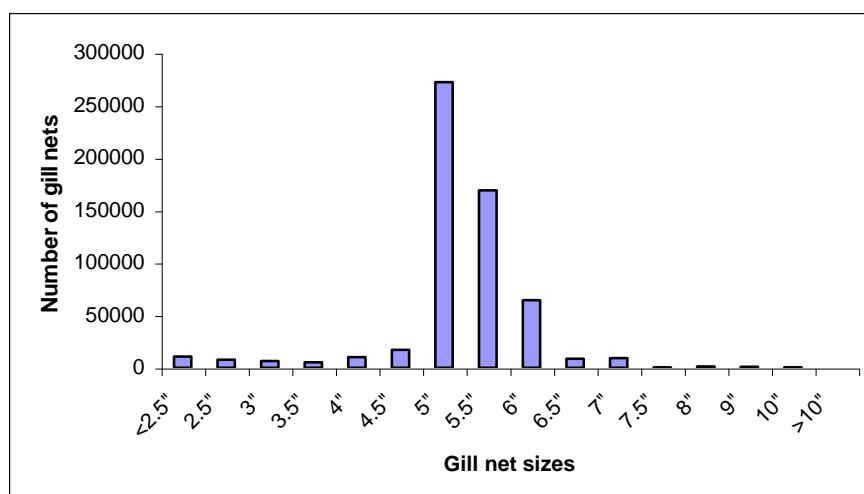


Figure 8: Gill net distribution by size in 2004 Frame Survey

#### 3.5.2 Long line hooks

In 2004 the number of long line hooks dropped by 33.3% from 4,608,998 recorded in the 2002 survey, to 3,081,885 in 2004. These are mostly used for Nile perch fishery. Although all Regions recorded a drop the greatest drop was in Mwanza Region where all Districts recorded a drop.

#### 3.5.3 Hand line hooks

In 2004 the number of hand line hooks decreased by 51.3% from 39,404 recorded in 2002 to 19,186 in 2004. Hand line hooks are used mostly for Tilapia species and Nile perch fishery.

### 3.5.4 Beach seines

The number of beach seines increased from 1,454 recorded in year 2002 to 1,532 in 2004. This is an increase of 5.4%. This increase may have been caused by the fact that at some landing sites small seines were misreported as beach seines or they were being used as beach seines.

### 3.5.5 Small seines

Small seines are used in the Dagaa fishery. In the 2004 Frame Survey small seines were divided into size categories of less or equal to 5mm (initially known as mosquito nets), 6-9mm, and 10mm. The number of small seines of less or equal to 5mm. dropped by 70.7% from 3,874 recorded in 2002 to 1,135 in 2004. The use of small seines of sizes 10mm (initially Dagaa seines) also dropped by 87.6% from 969 of 2002 to 120 in 2004. The 6-9mm category rose from 0 of 2002 to 3,068 in 2004.

### 3.5.6 Traps

The number of traps dropped by 42% from 1,030 recorded in 2002 to 598 in 2004.

### 3.5.7 Other gears

Other gears used for dagaa fishery included lift net, and scoop nets. The number of lift nets increased from 130 recorded in 2002 to 307 in 2004. Scoop nets decreased by 34.1% from 812 of 2002 to 536 in 2004.

## 3.6 Target species

The targeted species differed between landing sites, craft type and gear combinations. Some landing sites were specific to either *Lates niloticus* or Dagaa/Haprochlomines fishery, while others were multi-species. Also the targeted species depended on the size of craft and gear combination. Most of the larger sized Sesse (paddled, motorized or sail) using gill nets and long lines targeted *Lates niloticus*, while those using small seines targeted Dagaa and Haplochromines. Small sized sesse, rafts and other crafts using hand lines and gill nets of below 5" mesh sizes targeted Tilapines and other small size fishes like *Labeo* and *Schilbe*. About 60% of all crafts target *Lates niloticus*. The Table below shows the number of crafts targeting different species.

**Table 3: Number of fishing crafts and species targeted.**

Targeted species	Number of crafts	% of crafts
<i>Lates niloticus</i>	13,468	59.5
<i>Rastrineobola argentea</i>	4,297	18.9
Tilapia species	4,046	17.9
Haplochromines	77	0.3
<i>Clarias spp.</i>	55	0.2
<i>Protopterus</i>	70	0.3
Other species	640	2.8

#### **4.0 DISTRICT RESULTS OF THE 2000, 2002 AND 2004 FRAME SURVEYS**

The following tables give summaries of the 2000, 2002 and 2004 results based on Regions and Districts.

##### **4.1 Kagera Region**

In Kagera Region the number of landing sites increased by four (4) from 134 in 2002 to 138 in 2004. There was an increase of 4 in Bukoba, 1 in Biharamulo and a decrease of 1 in Muleba.

The number of fishers increased slightly from 15,354 recorded in 2002 to 15,626 in 2004. The increase was recorded in Biharamulo and Bukoba Districts while Muleba recorded a drop. Muleba District hosts 63% of the total fishing crafts while Biharamulo and Bukoba hosts 19% and 18% respectively.

Like wise, there was a small increase in the number of fishing crafts from 5,203 recorded in 2002 to 5,321 in 2004. The increase was recorded in Bukoba and Biharamulo districts while Muleba District recorded a drop.

The total number of gill nets dropped from 114,717 in 2002 to 110,514 in 2004. A decrease was recorded in Muleba District while Biharamulo and Bukoba Districts recorded an increase. The use of undersized mesh sizes of below 5" is still evident. This category formed about 7.7% of the total gill nets. The category of 5 – 6" formed the bulk of the gill nets, which was about 91%.

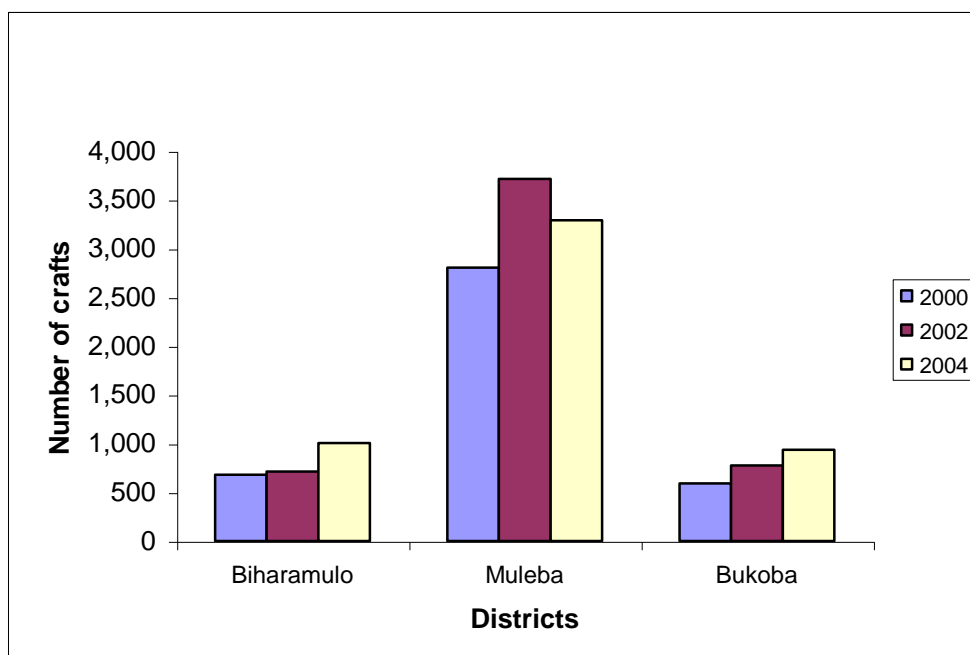
The number of long line hooks dropped from 543,051 of 2002 to 427,742 in 2004. All three districts recorded a drop.

The number of beach seines increased from 210 in 2002 to 269 in 2004. Although all Districts recorded an increase, the highest increase was in Bukoba District. Number of Scoop dropped from 803 of 2002 to 449 in 2004. Other gears like small seines, cast nets and hand line hooks increased slightly.

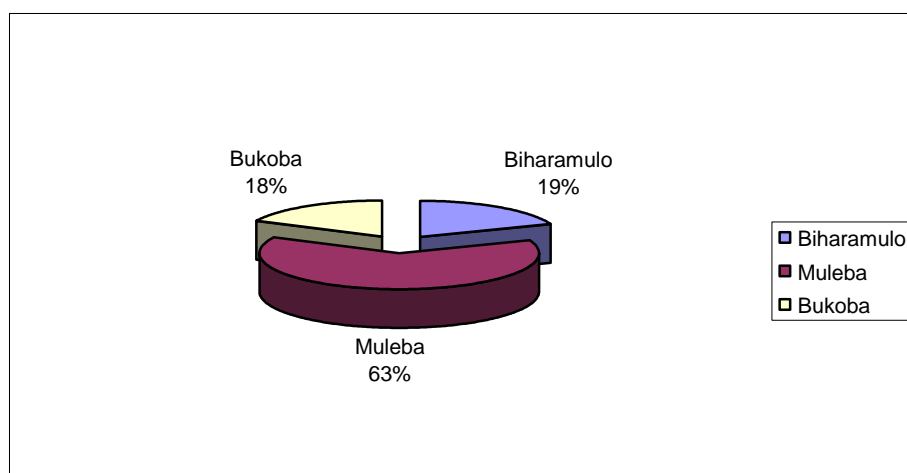
**Table 4: Comparison of Results of 2000,2002 and 2004 Frame Surveys by District in Kagera Region.**

Item	Year	Biharamulo	Muleba	Bukoba	Total	
Number of L/sites	2000	30	96	41	167	
	2002	26	80	28	134	
	2004	27	79	32	138	
Number of fishers	2000	2,416	7,894	1,722	12,032	
	2002	2,298	10,737	2,319	15,354	
	2004	3,018	9,872	2,736	15,626	
No. of fishing crafts	2000	680	2,805	590	4,075	
	2002	713	3,714	776	5,203	
	2004	1,006	3,290	936	5,232	
Propulsion	In board Engines	2000	0	16	0	16
		2002	0	0	0	0
		2004	0	0	0	0
	Out board engines	2000	0	162	93	255
		2002	9	153	141	303
		2004	38	856	183	1,077
Gill nets	<2.5"	2000				0
		2002	6	1,978	95	2,079
		2004	211	195	90	496
	2.5"	2000				0
		2002	22	286	30	338
		2004	122	20	20	162
	3"	2000	119	508	225	852
		2002	215	829	78	1,122
		2004	457	69	49	575
	3.5"	2000	219	106	273	598
		2002	102	408	417	927
		2004	339	271	66	676
	4"	2000	126	721	490	1,337
		2002	311	6,531	544	7,386
		2004	489	1,987	482	2,958
	4.5"	2000	384	751	315	1,450
		2002	284	10,753	1,631	12,668
		2004	853	1,602	1,191	3,646
	5"	2000	2,407	14,029	9,045	25,481
		2002	3,084	36,833	15,834	55,751
		2004	4,590	35,167	15,672	55,429
	5.5"	2000	255	9,589	794	10,638
		2002	857	18,466	549	19,872
		2004	550	24,551	8,829	33,930
6"	2000	671	12,128	3,337	16,136	
	2002	297	12,082	885	13,264	
	2004	504	8,818	1,975	11,297	
6.5"	2000	73	2,089	60	2,222	
	2002	75	359	30	464	
	2004	9	333	19	361	

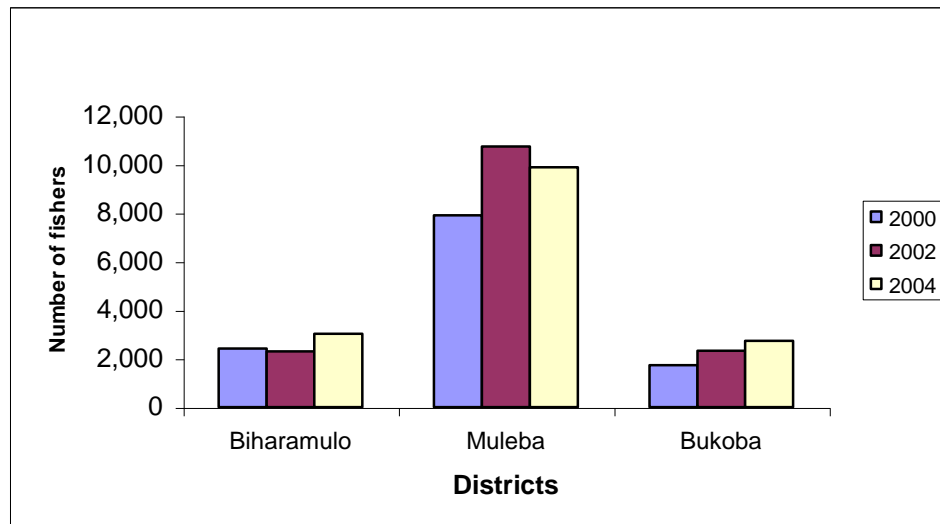
Item	Year	Biharamulo	Muleba	Bukoba	Total
7"	2000	212	2,238	341	2,791
	2002	53	465	204	722
	2004	0	907	20	927
7.5"	2000	0	0	0	0
	2002	0	0	4	4
	2004	0	8	0	8
8"	2000	30	27	2	59
	2002	0	0	0	0
	2004	0	8	0	8
9"	2000	0	0	0	0
	2002	0	120	0	120
	2004	0	0	0	0
10"	2000	3	0	0	3
	2002	0	0	0	0
	2004	0	0	0	0
>10"	2000	0	0	0	0
	2002	0	0	0	0
	2004	0	0	0	0
Total Gill nets	2000	4,579	42,186	14,882	61,647
	2002	5,306	89,110	20,301	114,717
	2004	8,124	73,936	28,425	110,485
Long line hooks	2000	49,920	199,210	96,570	345,700
	2002	113,389	284,656	145,006	543,051
	2004	72,503	262,982	92,257	427,742
Beach Seines	2000	31	108	45	184
	2002	57	89	64	210
	2004	76	91	102	269
Cast nets	2000	1	0	9	10
	2002	1	7	7	15
	2004	19	0	7	26
Hand lines	2000	3,089	273	449	3,811
	2002	997	224	1,188	2,409
	2004	2,268	0	1,700	3,968
Traps	2000	244	77	2	323
	2002	0	1	0	1
	2004	5	0	0	5
Small Seines	2000	69	402	96	567
	2002	70	307	32	409
	2004	35	520	25	580
Lift nets	2000	0	77	2	79
	2002	0	28	6	34
	2004	0	0	0	0
Scoop nets	2000	0	782	0	782
	2002	0	754	49	803
	2004	0	375	74	449
Monofilament nets	2000	0	0	0	0
	2002	0	0	0	0
	2004	29	0	0	29
Other	2000	0	0	0	0
	2002	44	0	0	44
	2004	0	0	0	0



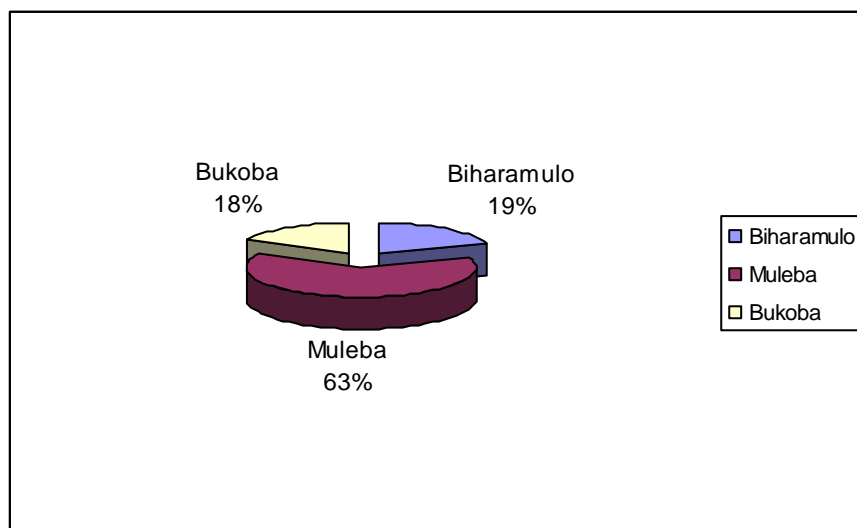
**Figure 9: Comparison of number of fishing crafts by District – Kagera Region for 2000, 2002 and 2004 Frame Surveys**



**Figure 10: Distribution of fishing crafts by District – Kagera Region. for 2004 Frame Survey**



**Figure 11: Comparison of number of fishers by District - Kagera Region for 2000, 2002 and 2004 Frame Surveys for**



**Figure 12: Percentage Distribution of fishers by District – Kagera Region for 2004 Frame Survey**

## 4.2 Mwanza Region

In the 2004 Frame Survey the number of landing sites in Mwanza Region dropped by 44 from 328 of 2002 to 283 in 2004. Decreases were recorded in Geita (17), Sengerema (13), Ukerewe (9), Mwanza (6) and Magu (2). In Misungwi District the number of landing sites increased by 3 from 15 recorded in 2002 to 18 in 2004.

Number of fishing crafts dropped by 272 from 11,255 recorded in 2002 to 10,983 in 2004. Decreases were recorded in Geita (252), Sengerema (836,) and Magu (377). Increases of 42, 50, and 725 were recorded in Ukerewe, Misungwi and Mwanza Districts respectively.

Number of fishers dropped by 4,414 from 43,784 recorded in 2002 to 39,370 in 2004. Decreases were recorded in Sengerema (2,827), Magu (2,100) and Geita (1,318). Mwanza, Misungwi and Ukerewe Districts recorded an increase of 756, 73 and 2 respectively.

Fishing gears mostly used included gill nets of varying mesh sizes, long line hooks, small seines and beach seines. The total number of gill nets increased by 34.5% from 222,541 recorded in 2002 to 304,322 in 2004. Increases were recorded in Ukerewe (159.4%), Mwanza (98.5%), Sengerema (33.4%) and Misungwi (51.1%). Decreases of 25.2% and 43.3% were recorded in Geita and Magu Districts respectively. Most commonly used mesh sizes were between 5" – 7", which composed 87.7% of the total gill nets. Under size gill nets of below 5" formed 11.3% of the total while sizes above 7" composed only 1%.

Monofilament nets appeared for the first time in 2004 survey. A total of 4,188 nets were recorded, the bulk of which were recorded in Sengema District followed by Geita District.

Number of long line hooks dropped from 2,457,528 recorded in 2002 to 1,549,593 in 2004. All Districts recorded big decreases except Mwanza, which recorded a small increase.

Number of beach seines decreased by 13 from 854 of 2002 to 841 in 2004. All Districts recorded a drop in the use of beach/boat seines except Ukerewe where there was an increase of 35 beach seines.

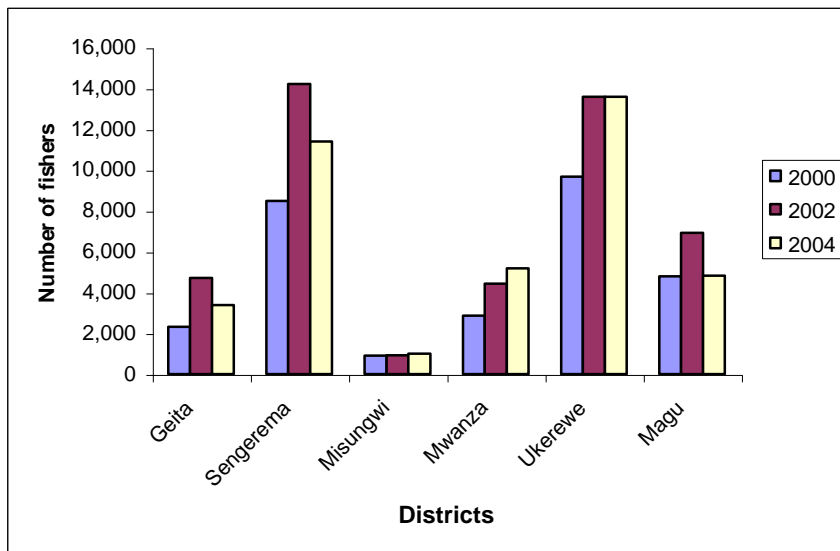
Other gears included Lift nets, scoop nets and small seines for the Dagua fishery. The number of small seines decreased from 3,988 recorded in 2002 to 2,648 in 2004 surveys.



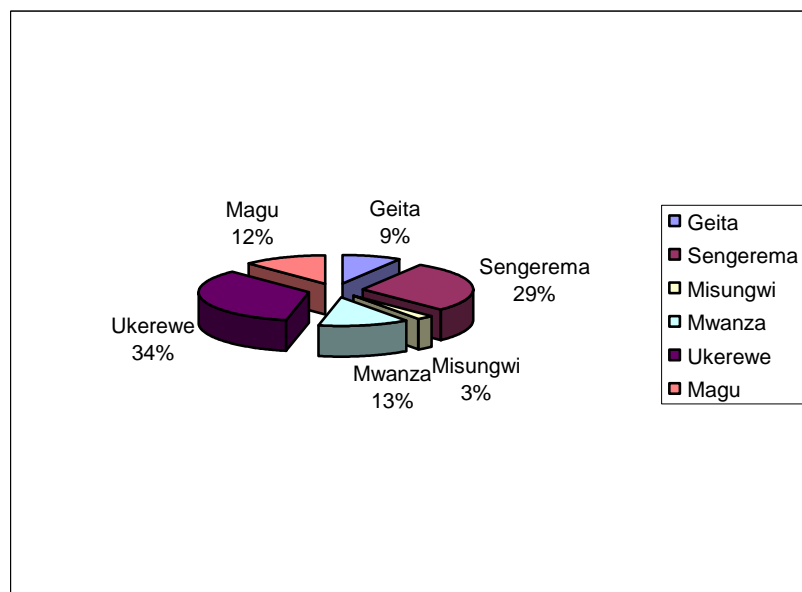
**Table 5: Comparison of Results of 2000, 2002 and 2004 Frame Surveys by District – Mwanza Region**

Item	Year	Geita	Sengerema	Misungwi	Mwanza	Ukerewe	Magu	Total	
Number of L/sites	2000	41	84	15	27	78	39	284	
	2002	53	103	15	38	82	37	328	
	2004	36	90	18	31	73	35	283	
Number of fishers	2000	2,321	8,482	906	2,871	9,681	4,793	29,054	
	2002	4,705	14,219	927	4,430	13,584	6,919	44,784	
	2004	3,387	11,392	1,000	5,186	13,586	4,819	39,370	
No. of fishing crafts	2000	697	2,544	293	717	2,275	1,121	7,647	
	2002	1,378	3,811	287	909	3,320	1,550	11,255	
	2004	1,126	3,351	337	1,634	3,362	1,173	10,983	
Propulsion	In board Engines	2000	11	8	0	6	15	4	44
		2002	0	0	0	0	0	0	0
		2004	0	0	0	0	0	0	0
	Out board engines	2000	247	147	2	127	274	84	881
		2002	52	396	7	213	736	441	1,845
		2004	60	794	5	437	1,521	208	3,025
Gill nets	<2.5"	2000							0
		2002							0
		2004	79	199	225	42	728	4,348	5,621
	2.5"	2000							0
		2002							0
		2004	623	483	771	183	704	1,808	4,572
	3"	2000	260	499	929	356	854	5,137	8,035
		2002	1,038	1,713	1,381	592	1,848	7,321	13,893
		2004	694	1,191	415	214	548	423	3,485
	3.5"	2000	123	221	254	113	241	135	1,087
		2002	3,453	1,167	245	123	514	3,691	9,193
		2004	315	761	571	106	501	851	3,105
	4"	2000	297	496	237	108	184	530	1,852
		2002	642	2,603	136	315	873	14,332	18,901
		2004	742	1,146	401	730	862	883	4,764
	4.5"	2000	626	594	321	11	204	1,538	3,294
		2002	2,350	1,736	91	1,244	1,006	8,612	15,039
		2004	801	1,396	440	207	3,643	3,916	10,403
	5"	2000	4,649	20,127	2,036	1,739	7,944	14,348	50,843
		2002	7,251	21,478	1,323	5,186	24,055	31,456	90,749
		2004	7,386	23,757	1,472	9,119	65,941	23,077	130,752
	5.5"	2000	544	5,043	80	968	4,595	1,443	12,673
		2002	980	12,787	0	1,626	16,370	7,045	38,808
		2004	1,637	26,272	326	3,279	44,269	3,587	79,370
6"	2000	1,348	11,433	214	1,981	9,208	7,742	31,926	
	2002	848	5,134	125	2,611	11,693	6,581	26,992	
	2004	591	5,590	262	5,528	32,320	2,218	46,509	
6.5"	2000	114	729	61	206	2,170	687	3,967	
	2002	726	201	9	550	2,575	695	4,756	
	2004	85	551	8	1,528	2,801	1,579	6,552	
7"	2000	506	2,926	24	447	2,890	1,534	8,327	
	2002	312	449	0	770	821	814	3,166	

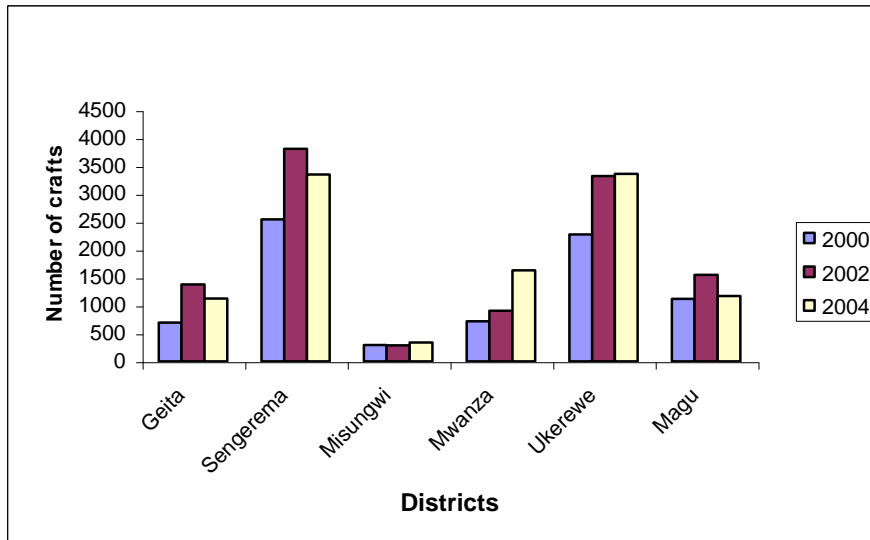
Item	Year	Geita	Sengerema	Misungwi	Mwanza	Ukerewe	Magu	Total
	2004	120	116	57	1,972	2,248	2,060	6,573
7.5"	2000	0	0	0	0	0	0	0
	2002	21	16	0	141	86	8	272
	2004	0	0	0	61	0	187	248
8"	2000	22	374	20	2	221	34	673
	2002	0	0	0	0	0	0	0
	2004	6	492	31	77	56	356	1,018
9"	2000	0	135	0	0	0	10	145
	2002	0	51	0	0	35	65	151
	2004	0	682	19	48	0	130	879
10"	2000	160	0	0	0	1	288	449
	2002	0	0	0	16	0	171	187
	2004	0	0	4	55	0	370	429
>10"	2000	0	0	0	0	0	0	0
	2002	0	0	0	0	0	245	245
	2004	13	20	0	8	0	1	42
Total Gill nets	2000	8,649	42,577	4,176	5,931	28,512	33,426	123,271
	2002	17,502	46,966	3,310	11,666	59,602	80,792	219,838
	2004	13,092	62,656	5,002	23,157	154,621	45,794	304,322
Long line hooks	2000	39,889	425,207	73,219	72,218	247,217	228,270	1,086,020
	2002	187,058	1,056,456	45,950	159,934	704,578	303,552	2,457,528
	2004	117,612	536,549	38,569	162,090	556,148	138,625	1,549,593
Beach Seines	2000	30	66	11	89	1,231	125	1,552
	2002	91	125	89	178	278	167	928
	2004	89	117	17	170	313	135	841
Cast nets	2000	0	0	0	3	11	0	14
	2002	0	68	0	4	0	0	72
	2004	0	3	0	6	2	1	12
Hand lines	2000	892	2,891	450	309	1,128	975	6,645
	2002	1,198	4,251	323	1,263	24,202	231	31,468
	2004	2,143	2,903	505	2,592	837	857	9,837
Traps	2000	24	29	1,773	4	100	83	2,013
	2002	214	216	48	2	24	1	505
	2004	30	66	71	216	43	0	426
Small Seines	2000	50	505	11	123	1,046	91	1,826
	2002	348	1,553	4	303	1,170	233	3,611
	2004	101	720	15	169	507	1,166	2,678
Lift nets	2000	0	133	0	98	5	0	236
	2002	1	38	0	49	6	0	94
	2004	0	54	0	185	66	0	305
Scoop nets	2000	0	0	0	0	0	0	0
	2002	0	0	0	5	4	0	9
	2004	6	32	0	3	14	0	55
Monofilament nets	2000	0	0	0	0	0	0	0
	2002	0	0	0	0	0	0	0
	2004	311	3,868	0	0	9	0	4,188
Other	2000	0	0	0	0	0	0	0
	2002	0	0	0	0	0	0	0
	2004	0	60	0	1	9	0	70



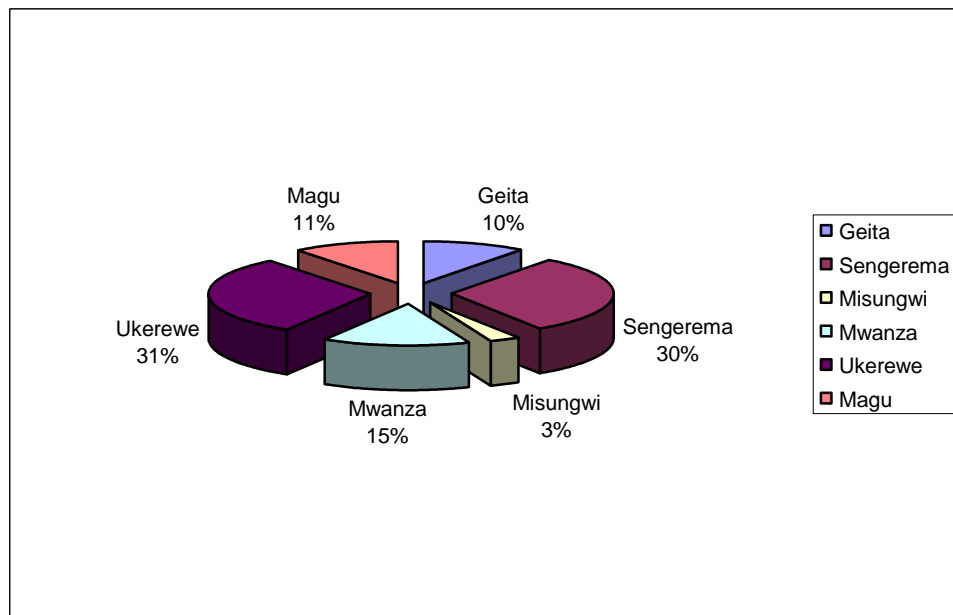
**Figure 13: Comparison of number of fishers by District – Mwanza Region for 2000, 2002 and 2004 Frame Surveys.**



**Figure 14: Percentage Distribution of fishers by District – Mwanza Region 2004 Frame Survey**



**Figure 15: Comparison of number of fishing crafts by District – Mwanza Region for 2000, 2002 and 2004 Frame Surveys.**



**Figure 16: Percentage Distribution of fishing crafts by District – Mwanza Region 2004 Frame Survey**

### 4.3 Mara Region

Generally, in Mara Region there was an increase in the fishing effort in terms of number of fishers, fishing crafts and gear.

The number of fishers increased by 10% from 20,915 recorded in 2002 to 23,001 in 2004 surveys. Increases were recorded in Musoma District (2,388) and Tarime District (429) while Bunda District recorded a drop of 731 fishers.

The number of fishing crafts increased by 22% from 5,202 recorded in 2002 to 6,349 in 2004 surveys. Increases were recorded in Musoma (769) and Tarime (549) while Bunda District recorded a decrease of 171 crafts. Number of outboard engines increased by 182% from 461 recorded in 2002 to 1,302 in 2004 surveys.

The number of outboard engines increased by 188.5% from 461 recorded in 2002 to 1,330 in 2004 surveys. This may indicate that fishers are forced to go further off shore in search of fish than was the case a few years back.

The number of gill nets increased by 90.5% from 88,630 in 2002 to 168,904 in 2004 surveys. The most common sizes were 5" and 5.5" which formed 84% of the total gill nets. Gill nets with mesh sizes below 4.5" formed 10% of the total gill nets while 6" and above formed only 6%. Tarime and Musoma Districts recorded increases while Bunda District recorded a decrease. A total of 832 monofilament nets were recorded in Musoma and Tarime Districts.

The number of long line hooks dropped from 1,582,039 recorded in 2002 to 1,104,550 in 2004 surveys. Decreases were recorded in all the three districts.

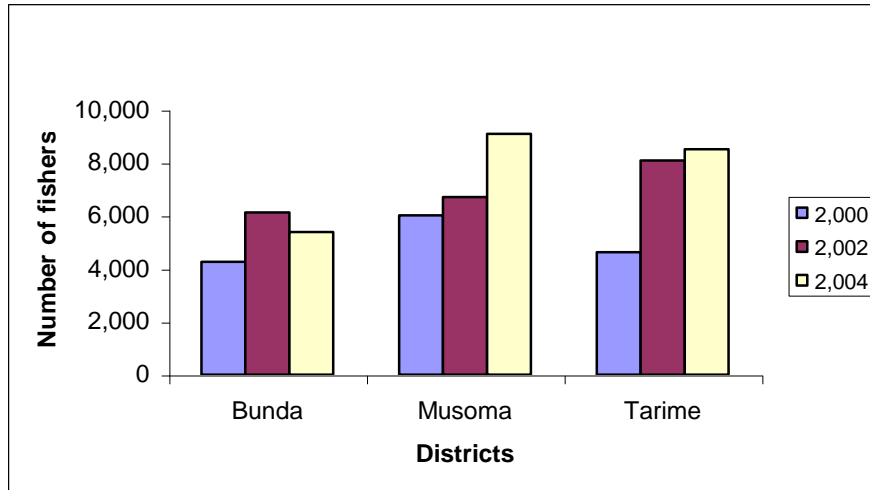
Number of beach seines increased from 384 in 2002 to 422 in 2004 surveys. Bunda and Tarime Districts recorded a decrease while Musoma District recorded an increase.

Number of small seines increased from 1,024 in 2002 to 1,146 in 2004 surveys. Sizes most common are 6-9 mm. and less or equal to 5 mm. Other gears used to catch dagaa include scoop nets and lift nets.

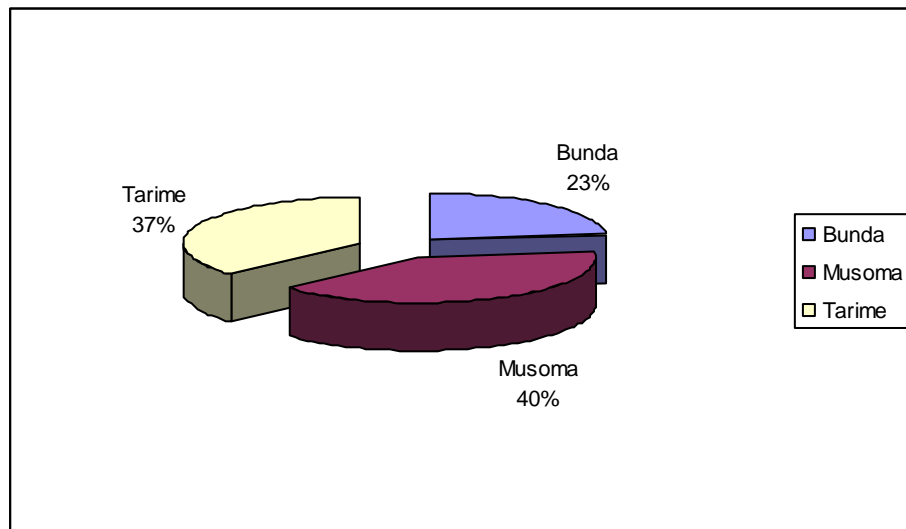
**Table 6: Comparison of Results of 2000, 2002 and 2004 Frame Surveys by District – Mara Region**

Item	Year	Bunda	Musoma	Tarime	Total	
Number of L/sites	2000	44	65	38	147	
	2002	44	54	32	130	
	2004	47	70	37	154	
Number of fishers	2000	4,257	6,014	4,628	14,899	
	2002	6,124	6,704	8,087	20,915	
	2004	5,393	9,092	8,516	23,001	
No. of fishing crafts	2000	1,054	1,610	1,048	3,712	
	2002	1,425	1,743	2,034	5,202	
	2004	1,254	2,512	2,584	6,350	
Propulsion	In board Engines	2000	3	6	6	15
		2002	0	0	0	0
		2004	0	0	0	0
	Out board engines	2000	82	123	110	315
		2002	109	136	216	461
		2004	136	554	640	1,330
Gill nets	<2.5"	2000				0
		2002	4,594	329	468	5,391
		2004	3,221	30	1,325	4,576
	2.5"	2000				0
		2002	483	22	82	587
		2004	1,758	75	1,169	3,002
	3"	2000	3,118	465	670	4,253
		2002	251	83	1,392	1,726
		2004	337	410	1,516	2,263
	3.5"	2000	150	189	279	618
		2002	189	285	711	1,185
		2004	220	521	768	1,509
	4"	2000	335	453	105	893
		2002	1,870	550	768	3,188
		2004	868	1,049	545	2,462
	4.5"	2000	364	456	115	935
		2002	1,139	1,296	574	3,009
		2004	958	1,657	486	3,101
	5"	2000	4,430	4,356	3,367	12,153
		2002	9,610	6,763	22,070	38,443
		2004	13,706	35,991	36,346	86,043
	5.5"	2000	830	1,388	1,589	3,807
		2002	3,400	4,976	4,282	12,658
		2004	1,988	11,761	42,090	55,839
6"	2000	2,451	5,461	3,405	11,317	
	2002	3,098	4,420	9,520	17,038	
	2004	1,212	3,250	2,246	6,708	
6.5"	2000	319	1,428	993	2,740	
	2002	143	1,599	872	2,614	
	2004	60	1,367	231	1,658	

Item	Year	Bunda	Musoma	Tarime	Total	
	7"	2000	723	1,894	1,430	4,047
		2002	223	912	1,320	2,455
		2004	407	983	119	1,509
	7.5"	2000	0	0	0	0
		2002	0	228	26	254
		2004	0	102	0	102
	8"	2000	10	340	57	407
		2002	0	0	21	21
		2004	50	52	0	102
9"	2000	0	49	4	53	
	2002	10	15	0	25	
	2004	0	30	0	30	
10"	2000	10	18	0	28	
	2002	11	0	0	11	
	2004	0	0	0	0	
>10"	2000	0	0	0	0	
	2002	25	0	0	25	
	2004	0	0	0	0	
Total Gill nets	2000	12,740	16,497	12,014	41,251	
	2002	25,046	21,478	42,106	88,630	
	2004	24,765	57,278	86,841	168,884	
Long line hooks	2000	363,836	200,196	205,149	769,181	
	2002	440,446	541,958	599,635	1,582,039	
	2004	340,140	349,019	415,391	1,104,550	
Beach Seines	2000	76	152	32	260	
	2002	165	118	101	384	
	2004	149	198	75	422	
Cast nets	2000	7	15	17	39	
	2002	0	14	34	48	
	2004	1	1	26	28	
Hand lines	2000	247	1,202	2,402	3,851	
	2002	320	1,353	3,854	5,527	
	2004	511	1,128	3,742	5,381	
Traps	2000	30	176	42	248	
	2002	273	202	49	524	
	2004	10	74	83	167	
Small Seines	2000	136	427	317	880	
	2002	166	338	520	1,024	
	2004	122	110	464	696	
Lift nets	2000	0	0	0	0	
	2002	0	0	2	2	
	2004	0	0	2	2	
Scoop nets	2000	0	0	1	1	
	2002	0	0	0	0	
	2004	7	0	25	32	
Monofilament nets	2000	0	0	0	0	
	2002	0	0	0	0	
	2004	0	473	359	832	
Other	2000	0	0	0	0	
	2002	2	0	0	2	
	2004	0	0	0	0	

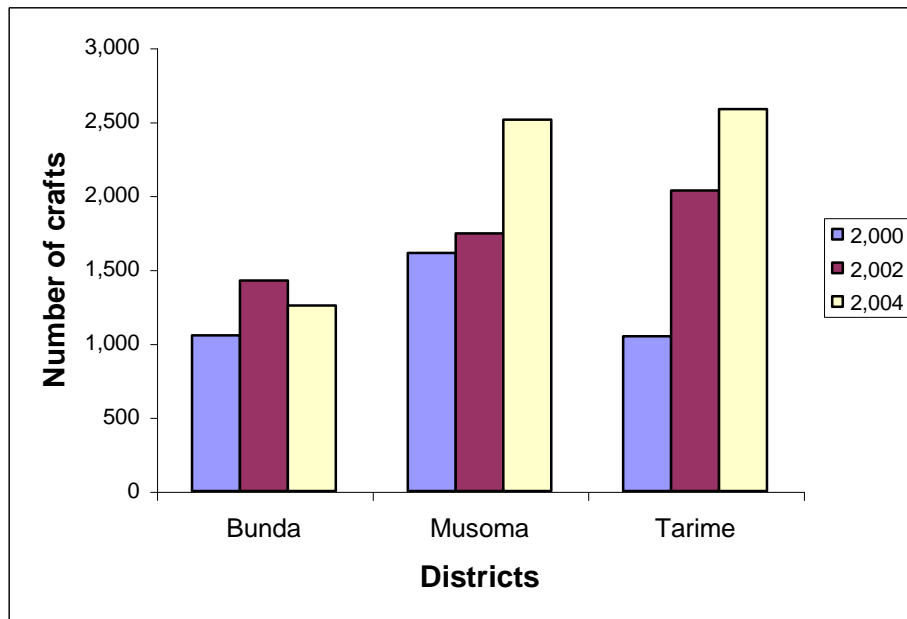


**Figure 17: Comparison of number of fishers by District - Mara Region for 2000, 2002 and 2004 Frame Surveys**

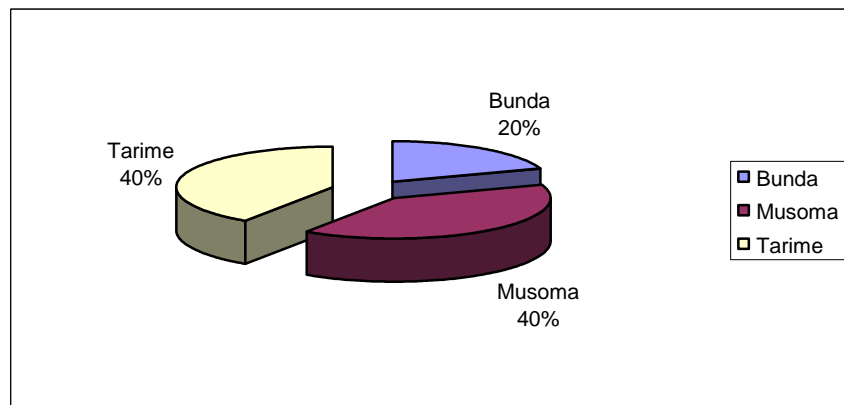


**Figure 18: Percentage Distribution of fishers by District – Mara Region 2004 Frame Survey**





**Figure 19: Comparison of number of fishing crafts by District – Mara Region for 2000, 2002 and 2004 Frame Surveys**



**Figure 20: Percentage Distribution of fishing crafts by Districts – Mara Region 2004 Frame**

## 5.0 CONCLUSIONS AND RECOMMENDATIONS

- The trend shown by the three surveys is increasing of the fishing effort in terms of number of fishers, fishing crafts and the important gears such as gill nets and small seines. It is recommended that Partner States take measures to control the fishing effort as much as possible so as to ensure sustainability of the resource.
- There is still rampant use of illegal fishing gears such as beach seines and under size mesh gill nets on the lake. It is evident that law enforcement activities are not effective. It is recommended that Partner States should strengthen monitoring, control and surveillance activities. Joint patrols should be introduced by the Partner States in the Lake.
- The Frame Survey results show that facilities at the landing sites are still inadequate. Local Authorities should be sensitised to improve facilities at the landing sites such as potable water, toilets, access roads, electricity, net and craft repair.
- Funds allocated for the 2004 Frame Survey exercise were inadequate. It is recommended that in future adequate budget should be provided to cover all costs of conducting the Frame Survey efficiently up to report writing.
- The use of fishers as enumerators has proved to be convenient and economical considering the shortage of fisheries staff in the field. It is recommended that fishers continue to be deployed as enumerators in future Frame Surveys so as to have enough manpower and better coverage. This is also a way of involving stakeholders in participatory management.