

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

KENYA, TANZANIA AND UGANDA



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LIST OF ACRONYMS

BMUs	Beach Management Units
CAS	Catch Assessment Surveys
CC	Craft – gear Categories
EAC	East African Community
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
FS	Frame Survey
FS-NTT	Frame Survey – National Technical Team
FS – RTF	Frame Survey – Regional Task Force
GEF	Global Environmental Facility
GPS	Geographical Positioning Station
KMFRI	Kenya Marine Fisheries Research Institute
LVEMP	Lake Victoria Environmental Management Project
LVFO	Lake Victoria Fisheries Organization
LVFRP	Lake Victoria Fisheries Research Project
NWGs	National Working Groups
RWGs	Regional Working Groups
SOPs	Standard Operating Procedures
UNDP	United Nations Development Programme

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EXECUTIVE SUMMARY

Lake Victoria is very important to the economies of the East African Community Partner States. The fishery has undergone major transformations since fish catches increased following establishment of Nile perch (*Lates niloticus*) and emerging fish processing plants, which export fish and fish products. Fishing pressure on the lake increased rapidly creating fears that the fishery may not be sustainable. Frame surveys have been carried out on Lake Victoria biannually since 2000 to determine the number of fishers and fish landing sites, facilities at the landing sites, the types, numbers and sizes of fishing crafts and their mode of propulsion, the number, types and sizes of fishing gears and the fish species targeted to provide information to guide development and management of the fishery. The surveys show that: the number of fishers and fish landing sites did not change significantly between 2000 and 2004; there were inadequate facilities at the fish landing sites; the total number of gillnets increased from 650,653 in 2000 to 984,084 in 2002 and 1,233,052 in 2004 suggesting an increase in fishing effort. The number of fishing crafts using outboard engines increased from 4,108 in 2000 to 6,552 in 2002 and 9,609 in 2004, suggesting that fishers went far in search of fish. The Partner states have made deliberate efforts to improve facilities at fish landing sites to meet fish quality requirements and curb illegal fishing gears which is manifested in the reduction in the number of beach seines and illegal gillnets of prohibited mesh sizes. However, there were still a large number of illegal gears especially beach seines and gill nets of mesh sizes less than 5 inches. Facilities and access to fish landing sites should be improved. Efforts to remove illegal fishing gears and methods should be enhanced; and fishing effort should as much as possible be moderated.

1.0. INTRODUCTION

1.1. Background

Lake Victoria is the second largest freshwater body in the World. The lake has a surface area of 68,800 km² of which 35,088 km² (51%) is in Tanzania, 29,584 km² (43%) is in Uganda, and 4,128 km² (6%) is in Kenya. It has a shoreline length of 3,450 km of which 1,150 km (33%) is in Tanzania, 1,750 km (51%) is in Uganda and 550 km (16%) is in Kenya. The lake has a catchment area of 193,000 km² (Uganda 30,880 km², 16%; Kenya 42,460 km², 22%; Tanzania 84,920 km², 44%; Rwanda 21,120 km², 11%; Burundi 13,510 km², 11%) with a rapidly growing population of over 30 million people.

Lake Victoria is very important to the economies of the East African Community (EAC) Partner States. It is the most productive fresh water body in Africa, with an annual fish landing of 500,000 metric tons (National statistical bulletins). The contribution of the fishery was valued at US\$ 600 million locally and US\$ 259 million from Nile perch exports by 2004. It provides high protein food, employment, income, and water for domestic and industrial use. It has high fish species diversity of economic and ecological importance and is used as an avenue for transport, recreation and power generation. The dynamics of the fishery of Lake Victoria has changed dramatically since the emergence of the Nile perch fishery in the late 1970s (Acere, 1985; 1995) and the subsequent evolution of fish processing for export. The incentive created by the ready market in the fish processing plants has fuelled rapid increase in fishing effort. Fish export is a major foreign exchange earner of the Partner States and efforts have been made to ensure sustainability of this resource. Relevant parameters of the fishery are monitored to guide its development and management. Frame survey is one of the avenues through which the Partner States are monitoring the fishery resource.

- Frame Surveys are used to generate important information required both for management planning purposes and for helping to design Catch Assessment Surveys (CAS) by providing the sampling frame for different surveys. Frame Surveys involve direct and complete enumeration of all fish landing sites on a regular or *ad hoc* basis.

The information recorded in the Frame Survey helps to identify primary and secondary sampling sites, and appropriate sampling strata for the CAS. Information relating to the total numbers of sampling units (crafts belonging to each crafts-gear categories, CG) is used to raise sampled catch rates to provide estimates of total catches.

The three East African Community (EAC) Partner States have conducted Frame Surveys on Lake Victoria individually since the 1970s. Frame Surveys were conducted in the Kenyan part of Lake Victoria in 1972, 1990, 1994 and 1998.

The 1972 Frame Survey was an aerial Survey supported by spot checks on the ground by Fisheries Research Institute and Fisheries Department field staff and it lasted three months. In 1990, the Fisheries Department staff at Kisumu undertook another Frame Survey, which lasted approximately three months. Reports are available for the two surveys above. In 1994 and 1998 additional Frame Surveys were conducted in the Kenyan part of the lake by Kenya Marine Fisheries Research Institute (KMFRI) and Fisheries Department staff but implementation was not well coordinated and no reports were produced. In Tanzania, National Frame Surveys were conducted annually in the 1970s using Fisheries staff until 1991. In 1992, Frame Surveys started being conducted biannually. However, funds were not readily available and the Survey planned for 1994 was postponed to 1995. The subsequent Frame Survey planned for 1997 was also postponed to 1998. In Uganda, Frame Surveys were conducted on Lake Victoria in 1970, 1971, 1972 and 1988 (Frielink, 1989; Tumwebaze and Coenen, 1990). These four surveys included aerial counts of fishing crafts supported by on-water coverage checks for purposes of providing the estimate of the entire frame (Graham, 1970; Dhatemwa and Walker, 1972; Wetherall, 1972). In 1988 an on land survey was carried out but had a number of weaknesses and the results had to be applied with caution (Frielink, 1989). In 1990, the Uganda Fisheries Department supported by the FAO/UNDP Project (UGA/87/007) carried out a Frame Survey in the Ugandan waters of the lake using the land and water approach (Tumwebaze & Coenen, 1990). These surveys have had very limited regional application but provide a benchmark against which subsequent regional surveys have been compared.

The first coordinated lake wide Frame Survey was conducted on Lake Victoria from 22nd to 25th March, 2000 with the support of the GEF/World Bank funded Lake Victoria Environmental Management Project (LVEMP) and the EU funded Lake Victoria Fisheries Research Project Phase II (LVFRP II). A second Survey was carried out from 10th to 13th April, 2002 with funds from LVEMP and a third one was conducted from 27th to 30th April, 2004. Both Surveys were coordinated by the Secretariat of the Lake Victoria Fisheries Organization (LVFO).

1.2. Objective of the Frame Surveys

The overall objective of the Frame Surveys was to provide information on the facilities and services at landing sites and the composition, magnitude and distribution of fishing effort to guide development and management of the fisheries resources of Lake Victoria.

The specific objectives were to provide information on:

- a) The number of fish landing sites;
- b) The facilities available at the fish landing sites to service the sector including accessibility;
- c) The service providers, especially fisheries staff and Beach Management Units (BMUs) at the fish landing sites

- d) The number of fishers;
- e) The number and types of fishing crafts and their mode of propulsion;
- f) The number, types and sizes of fishing gears used on the lake and their mode of operation

1.3. Key Questions

The key management questions which the Frame Survey seeks to answer include:

- a) Are the number of landing sites and fishing crafts increasing or decreasing?
- b) Are the numbers of fishers increasing or decreasing?
- c) Are the types of gillnets and their mesh sizes changing?
- d) Is the number of illegal fishing gears increasing or decreasing?
- e) Are the facilities on the landing sites changing (toilets, banda, electricity, potable waters, cold room, fish store, accessibility to all weather road, designated net and boat repair facilities, and pantoons/jetties)?
- f) Are service providers adequate (Fisheries staff and BMUs)?
- g) What is the situation of fishing crafts propulsion?

1.4. Expected Outputs

The outputs expected from the Frame Surveys are as follows:

- a) Information on the number of fish landing sites on the lake;
- b) Information on the facilities available at the fish landing sites to service the fisheries sector including those landing sites that can be accessed by all weather roads;
- c) Information on the number of fishers and how the number changed since the last surveys;
- d) Information on the number and types of fishing crafts and how the number changed since the previous Frame Surveys;
- e) Information on the modes of propulsion of the fishing craft to provide an insight on how far the vessels can fish;
- f) Information on the number, types and sizes of fishing gears especially the number of illegal fishing gears in the fishery;
- g) An indication of the impact of management measures e.g. enforcement of the legal fishing gears and methods;
- h) Recommendations on development and management of the Lake Victoria fisheries.

2.0. METHODOLOGY

2.1. Preparation for the Frame Survey

Frame Surveys have been conducted bi-annually on Lake Victoria since April 2000. The Lake Victoria Fisheries Organisation (LVFO) has coordinated the surveys. The planning and implementation of the survey was done by the Regional Working Group (RWG) and the National Working Groups (NWGs) on Frame Surveys. The RWG harmonizes plans for conducting the surveys. Implementation and conducting of Frame surveys at national level is coordinated and implemented by a NWG on Frame Survey in each of the Partner State. The planning and implementation of Frame Surveys has involved the following steps:

- a) Convening of a NWG planning meeting to plan the actual survey and review national work-plan and budget, questionnaire forms, training manuals, and Standard Operating Procedures (SOPs);
- b) Identification of inputs for the surveys including: questionnaire forms, computers and accessories, Geographical Positioning Station (GPS), tape measures/ropes, life jackets, whistles, rain coats, umbrellas, binoculars and stationery.
- c) Convening a RWG meeting to review previous results, update status report, review SOPs, questionnaire forms, prepare work-plans and set the dates to the subsequent survey.
- d) Plan for awareness programmes among all stakeholders before the surveys start. This involves preparation and distribution of publicity materials such as posters, and conducting radio and TV programmes a week before the survey;

2.2. Conducting the Frame Survey

Before conducting the survey, supervisors and enumerators among the key stakeholders including BMUs were identified during the NWG Planning meeting. A one-day training session was conducted for the field supervisors and a two-days session for enumerators in each country, using the standard field guides developed from the SOPs. This is done during the week preceding the Survey and includes pre-testing of the questionnaire by the enumerators.

The Frame Survey involve a complete enumeration of (count) of all landing sites and the facilities available, fishers, fishing crafts and fishing gears by type and size.

The logistics for the survey were organised by the NWG. There were senior supervisors at the district/county headquarters. Members of the Frame Survey NWG were in charge of areas within a district or portion of the district such as the

Islands. There were supervisors located at the lower administrative units eg. the sub-county or division. Each supervisor is in charge of several enumerators, of which the numbers were proportional to the number of fishing crafts in the administrative unit.

2.3. Data Collection

Enumerators do the collection of the data by filling the Frame Survey Recording Form (Annex 1) that includes a Table on 'Details of Operational Fishing Vessels' and a Table on 'Details of crafts and Gears'. Each type of information has been assigned a code.

The information recorded on the landing site concerning facilities includes availability of banda, cold rooms, pontoon or jetty, fish store, electricity supply, toilets, potable water, facilities for repair of crafts and nets, established BMU, presence of resident fisheries staff and availability of nearby fish market.

The information recorded on crafts (vessels) included both fishing and non fishing crafts. The crafts categories included: operational fishing crafts that are actively fishing; Derelict crafts that were not operational and those damaged; Fish carriers that solely transport fish; and transport crafts used for other purposes. The crafts types are classified in six categories namely: Sesse flat at one end; Sesse pointed at both ends, Parachutes, Dugouts, Rafts and Others which were not covered by the above categories. A description and diagram of each type of boat is given to facilitate identity (Annex 2). The length of individual crafts was recorded in metres. The method of propulsion of the craft was also recorded according to those, which use Inboard engines, outboard engines, Paddles and sails. The horsepower of the engines was recorded. The number of crew in each craft was recorded.

The type and size of fishing gears were recorded. These included gillnets, Small seines mainly used for Dagaa (*Rastrineibola argentea*), hooks, Long lines, Beach seines, Cast nets, Monofilament nets, Traps and others which could not be classified in the above categories.

The fish species targeted by the fishing craft and gear were also recorded for the main commercial species, Nile perch (*Lates niloticus*), Tilapia, Dagaa, and others like *Clarias*, *Protopterus aethiopicus*, Haplochromines etc.

2.4. Data entry, storage and analysis

Soon after the last day of data collection in the field the supervisors collected the filled in questionnaires and survey equipment, compiled returns and submitted them to the national Frame Survey coordinator.

Samaki Database, which has been developed by the LVMP/LVFRP, was used in the analysis of the data. Data entry personnel were identified and trained on the use of Samaki database. This was done in-house by the trainers already trained regionally or by the LVFO Secretariat staff.

The training of data entry personnel was followed by data entry using the Samaki database programme. If during data entry some data was found to be doubtful, the data entry personnel organised and went for a ground truthing exercise to verify the data. This was followed by data analysis by the NWG using queries in the Samaki database software and other analysis tools such as MS-Excel.

2.5. Reports preparation

2.5.1. Preparation of national draft reports

The national report was prepared by the NWG. The national report outlines the observations on the key parameters outlined in Table 1. These parameters are compared at different levels of governance e.g. region, district, sub-county/division. For purpose of submission to the regional LVFO level, the comparisons in the national reports will be up to the district level in the format given in Table 1 of this report (replacing countries e.g. with districts) and including a national summary. Important parameters are presented in graphs to improve the illustration of the results.

2.5.2. Preparation of Regional synthesis report

The National draft reports were presented to National stakeholders' workshops for comments in each country. Immediately after the National stakeholders' workshops the NWGs chairpersons/coordinators incorporated the stakeholders' inputs into the final National reports, which were presented to the Regional Working Group for preparation of a Regional draft report. The National reports were then submitted to the LVFO Secretariat. Once all the three reports were received by the Secretariat, the Secretariat in collaboration with the Chairpersons of the RWG for Frame Surveys prepared a draft Regional synthesis report.

The members of the Frame Survey RWG then convened to review the regional synthesis. The report was distributed to the Partner States for comments. The LVFO Secretariat incorporated the comments from the Partner States.

2.5.3 Adoption of the Regional Frame Survey Report

Finally, the LVFO Secretariat I presented the Regional Frame Survey Report for adoption to the Organs of the LVFO. Once the report had been adopted by the relevant Organs of the LVFO, the Secretariat worked closely with the Information Communication and Outreach RWG and the Frame Survey RWG to prepare relevant modules to disseminate the survey information. The survey results were packaged promptly for dissemination to stakeholders in form of reports, posters, brochures, fact sheets and website material.

3.0 RESULTS AND DISCUSSION

The findings of the Frame Survey 2000, 2002 and 2004 are summarized in Table 1.

3.1. Landing Sites

The total number of landing sites on the lake did not change much between 2000 and 2004 and remained between 1400 and 1500. The number of fish landing sites changed only slightly from 594 to 575 in Tanzania, in Uganda from 552 to 554 and in Kenya from 306 to 304 between 2002 and 2004. On average, there were four landing sites per 10 km of shoreline. The highest number of landing sites per 10 km was in Kenya (6) followed by Tanzania (4) and Uganda (3) in 2004.

3.1.1 Facilities Available at the Fish landing sites on the Lake

The facilities examined included landing sheds (*bandas*), cold rooms, pontoon/jetties, fish stores, potable water, toilet facilities, boat and net repair facilities, access to the fish landing site by all-weather roads and electricity supply. The facilities at the landing sites remained inadequate. For instance, only 9% of the landing sites had *bandas*, less than 1% had working cold rooms, 3% had jetties, 3% had fish stores, 3% had potable water, 20% had toilets, 4% were supplied with electricity and only 27% were accessible by all-weather roads. There is need to improve facilities servicing fisheries at the landing sites. Some of these important facilities like toilets do not need much input yet they are not adequately provided. The leadership at landing sites should be sensitized in development of landing site facilities like toilets within their capability.

3.2. Number of Fishers

The total number of fishers operating on Lake Victoria decreased from 175,890 in 2002 to 153,066 in 2004 a decrease of 13% (Fig.1). There was a decrease in all the Partner States from 54,163 to 37,348 (31%) in Kenya, 80,053 to 77,997 (2.5%) in Tanzania and 41,674 to 37,721 (9%) in Uganda between 2002 and 2004.

Table 1: Comparison of Lake Victoria Fisheries Frame survey 2000, 2002 and 2004 Frame Survey results

		Kenya			Tanzania			Uganda			Whole lake		
		YEAR			YEAR			YEAR			YEAR		
	Description	2000	2002	2004	2000	2002	2004	2000	2002	2004	2000	2002	2004
1	Landing sites												
1.1	Number of landing sites	297	306	304	598	594	575	597	552	554	1,492	1,452	1,433
2	Landing site facilities												
2.1	Bandas (Fish sheds)	80	72	76	30	28	31	56	33	21	166	133	128
2.2	Cold rooms (working)	1	0	3	2	6	5	7	4	0	10	10	8
2.3	Cold rooms (Non working)	1	2	6	0	27	36	0	1	4	1	30	46
2.4	Pontoon/Jetty	9	5	11	32	31	25	34	5	7	75	41	43
2.5	Fish stores	16	12	13	14	24	16	78	6	11	108	42	40
2.6	Electricity supply	29	15	12	20	35	25	16	10	19	65	60	56
2.7	Toilet facilities	-	150	179	-	20	74	-	95	41	-	265	294
2.8	Portable water	-	29	22	-	1	30	-	21	41	-	51	93
2.9	All weather roads	60	102	68	137	189	176	138	108	127	335	399	371
2.10	Boat repair facilities	51		149	224	323	235	221	40	23	496	363	407
2.11	Net repair facilities	51		107	248	332	218	181	23	4	480	355	329
3	Fisheries staff												
3.1	Fisheries staff resident	-	22	39	65	54	49	-	18	-	65	94	88
4	Fishers												
4.1	No. of fishers	38,431	54,163	37,348	55,985	80,053	77,997	34,889	41,674	37,721	129,305	175,890	153,066
5	BMU presence												
5.1	No. of landing sites with BMUs			-			466			-			466

		Kenya			Tanzania			Uganda			Whole lake		
		YEAR			YEAR			YEAR			YEAR		
	Description	2000	2002	2004	2000	2002	2004	2000	2002	2004	2000	2002	2004
6	Fishing crafts												
6.1	Total No. of fishing crafts	11,515	12,209	12,284	15,434	21,660	22,653	15,544	18,612	16,775	42,493	52,481	51,712
6.2	Mode of Propulsion												
6.2.1	No. using outboard engines	626	692	860	1,451	2,610	5,576	2,031	3,250	3,173	4,108	6,552	9,609
6.2.2	No. using inboard engines	15	0	0	75	0	0	0	0	0	90	0	0
6.2.3	No. using paddles	7,561	6,820	6,560	11,623	14,638	14,339	12,848	14,262	12,506	32,032	35,720	33,405
6.2.4	No. using sails	3,313	4,697	4,858	2,326	3,909	2,718	665	1,074	1,096	6,304	9,680	8,672
6.3	Craft types												
6.3.1	Dugout	3	29	7	694	373	294	269	164	122	966	566	423
6.3.2	Parachute	1,501	1,966	2,394	69	295	294	5,342	5,580	5,450	6,912	7,841	8,138
6.3.3	Sesse flat at one end	951	1,625	1,445	2,068	3,856	5,776	8,107	10,666	9,067	11,126	16,147	16,288
6.3.4	Sesse pointed at both ends	7,903	8,499	8,304	12,659	16,552	14,793	1,797	2,197	1,979	22,359	27,248	25,076
6.3.5	Rafts	-	-	128	-	-	1,201	-	2	149	0	2	1,478
6.3.6	Other/Unspecified	1,127	90	0	0	582	181	29	0	8	1,156	672	189
7	Transport crafts												
7.1	No. Transport crafts	409	508	352	639	1,082	769	910	790	593	1,958	2,380	1,714
8	Derelict crafts												
8.1	No. Derelict crafts	1,876	2,467	1,906	2,812	3,458	5,882	2,777	3,278	3,547	7,465	9,203	11,335
9	Fishing gears												
9.1	Gillnets by size												
9.1.1	Gill net, mesh size < 2½"	4,313	3,123	5,064	7,095	14,563	10,693	675	1,013	359	12,083	18,699	16,116
9.1.2	Gill net, mesh size 2½"	5,266	7,907	7,841	3,123	4,614	7,736	321	345	263	8,710	12,866	15,840

		Kenya			Tanzania			Uganda			Whole lake		
		YEAR			YEAR			YEAR			YEAR		
	Description	2000	2002	2004	2000	2002	2004	2000	2002	2004	2000	2002	2004
9.1.3	Gill net, mesh size 3"	8,412	3,817	3,589	2,936	6,159	6,323	3,014	3,090	4,022	14,362	13,066	13,934
9.1.4	Gill net, mesh size 3½"	6,826	2,262	2,923	2,300	11,305	5,290	9,646	8,168	7,304	18,772	21,735	15,517
9.1.5	Gill net, mesh size 4"	5,825	4,475	4,192	4,074	29,475	10,184	20,366	16,244	15,059	30,265	50,194	29,435
9.1.6	Gill net, mesh size 4½"	2,902	6,943	5,387	5,651	30,716	17,150	20,432	23,986	29,239	28,985	61,645	51,776
	Total No. of gillnets <5"	33,544	28,527	28,996	25,179	96,832	57,376	54,454	52,846	56,246	113,177	178,205	142,618
9.1.7	Gill net, mesh size 5"	8,085	26,194	27,303	82,290	184,943	272,224	51,479	90,298	81,283	141,854	301,435	380,810
9.1.8	Gill net, mesh size 5½"	11,677	20,501	27,407	27,089	71,347	169,139	16,294	23,448	30,189	55,060	115,296	226,735
9.1.9	Gill net, mesh size 6"	32,147	28,096	57,174	59,326	57,274	64,514	95,302	158,128	189,619	186,775	243,498	311,307
9.1.10	Gill net, mesh size 6½"	9,249	8,039	21,974	8,804	7,834	8,571	8,067	14,759	16,308	26,120	30,632	46,853
9.1.11	Gill net, mesh size 7"	24,293	14,779	18,421	15,123	6,343	9,009	54,459	68,069	51,578	93,875	89,191	79,008
9.1.12	Gill net, mesh size 7½"	2,226	981	1,036	0	530	358	1,398	1,285	2,093	3,624	2,796	3,487
9.1.13	Gill net, mesh size 8"	2,501	2,420	1,810	1,139	21	1,128	8,100	11,725	13,898	11,740	14,166	16,836
9.1.14	Gill net, mesh size 9"	2,513	264	470	198	296	909	1,776	1,729	12,763	4,487	2,289	14,142
9.1.15	Gill net, mesh size 10"	3,527	669	497	477	198	429	5,709	4,011	3,600	9,713	4,878	4,526
9.1.16	Gill net, mesh size > 10"	3,603	238	5,668	0	270	42	625	1,190	1,020	4,228	1,698	6,730
	Total No. of gillnets >5"	99,821	102,181	161,760	194,446	329,056	526,323	243,209	374,642	402,351	537,476	805,879	1,090,434
	Total No. of all gillnets	133,365	130,708	190,756	219,625	425,888	583,699	297,663	427,488	458,597	650,653	984,084	1,233,052
9.2	Dagaa fishing gears												
9.2.1	Lift net/Lampara	0	11	0	315	130	307	0	3	2	315	144	309
9.2.2	Small seine, mesh size ≤5 mm	-	-	1,520	-	-	1,135	-	-	867	-	-	3,522
9.2.3	Small seine, mesh size 6-9 mm	-	-	1,502	-	-	3,118	-	-	273	-	-	4,893
9.2.4	Small seine, mesh size 10mm	-	-	26	-	-	121	-	-	39	-	-	186

		Kenya			Tanzania			Uganda			Whole lake		
		YEAR			YEAR			YEAR			YEAR		
	Description	2000	2002	2004	2000	2002	2004	2000	2002	2004	2000	2002	2004
	Total small seines	12,387	2,097	3,048	3,273	4,843	4,374	2,452	1,296	1,179	18,112	8,236	8,601
9.2.5	Scoop net	0	12	14	809	812	536	0	555	292	809	1,379	842
9.3	Hooks												
9.3.1	No. of Hook and line/Handline hooks	34,313	12,172	13,432	14,307	39,404	19,186	4,585	6,547	8,335	53,205	58,123	40,953
9.3.2	No. Long line hooks	1,039,893	2,562,066	2,045,605	2,201,901	4,608,998	3,081,885	254,453	926,959	968,848	3,496,247	8,098,023	6,096,338
9.4	Other gears												
9.4.1	Beach/Boat seine	5,803	1,157	869	999	1,454	1,532	811	880	954	7,613	3,491	3,355
9.4.2	Cast net	4,548	102	78	63	135	66	1,276	858	659	5,887	1,095	803
9.4.3	Monofilament	-	-	58	-	-	5,041			845	-	-	5,944
9.4.4	Traps/Baskets	3,179	2,311	1,846	2,584	1,030	598	11,349	5,781	5,361	17,112	9,122	7,805
9.4.5	Other/Unspecified	1,649	0	0	0	46	70	71	266	141	1,720	312	211

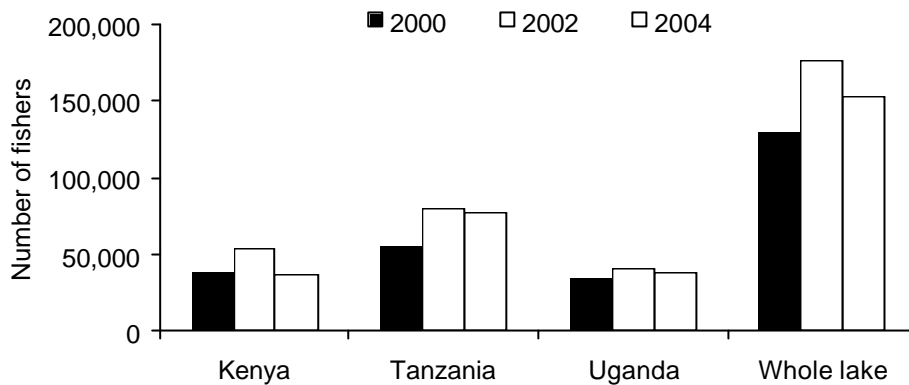


Figure 1: The number of fishers in Lake Victoria in 2000, 2002 and 2004

Of the total number of fishers recorded in the lake in the year 2002, 31% operated in the Kenyan side, 24% in the Ugandan side while 45% operated in the Tanzanian part of the lake. In 2004, 24% operated in Kenyan side, 25% in Ugandan and 51% in Tanzanian waters of Lake Victoria (Fig. 2).

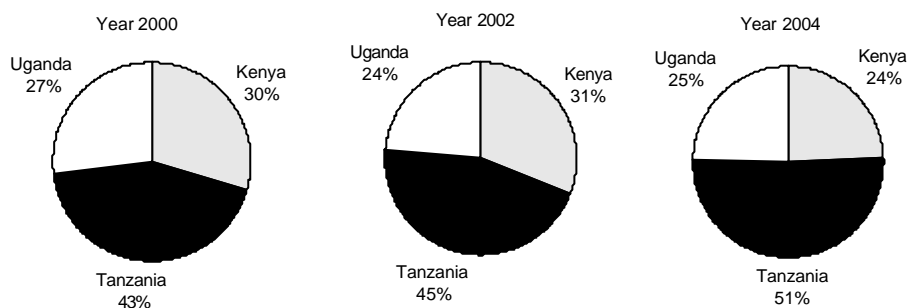


Figure 2: The distribution of fishers in Lake Victoria in 2000, 2002 and 2004

The density of fishers on the lake decreased between 2002 and 2004 from 14 to 9 fishers km^{-2} in Kenya, 3 to 2 fishers km^{-2} in Tanzania and 2 to 1 fisher km^{-2} in Uganda. This could suggest declining benefits from the fishery.

The decrease in number of fishers operating on the lake is a welcome development as it suggests a decrease in fishing pressure.

3.3. Fishing Crafts

The total number of fishing crafts over the entire lake decreased from 52,481 in 2002 to 51,712 in 2004, a decrease of 1.5%. Of these, 24% operated in Kenya, 32% in Uganda and 44% in Tanzanian waters of the lake in 2004 (Fig. 3). The proportion of fishing crafts in the Tanzanian waters has steadily increased from 36% in 2000, to 42% in 2002 and 44% in 2004 while it has consistently decreased in the Kenyan and Ugandan parts of the lake which is an indication of the expansion of the fishery in the Tanzanian waters compared to Kenya and Uganda.

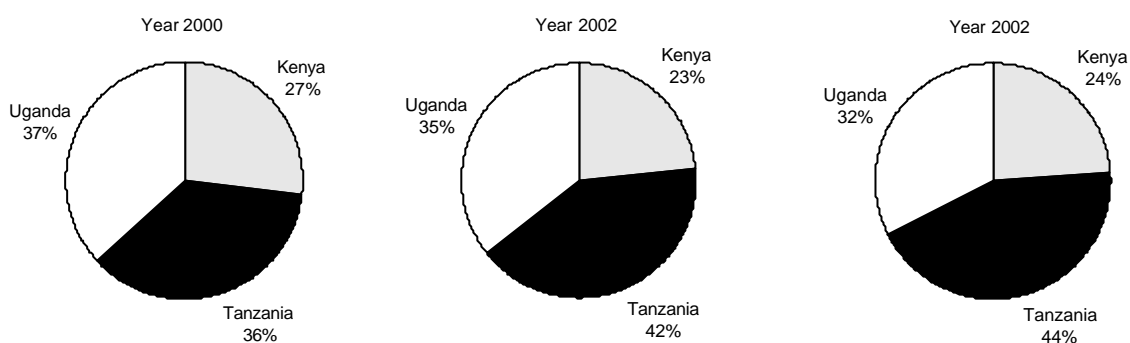


Figure 3: The distribution of fishing crafts in Lake Victoria in 2000, 2002 and 2004

The types of fishing crafts in Lake Victoria continued to be dominated by Sesse boats which are pointed at both ends in the Kenyan and Tanzanian parts of the lake the Sesse that are flat at one end were more common in the Ugandan part of the lake (Fig. 4). Parachute boats were more commonly used in Kenya and Uganda but were rare in the Tanzanian waters. Parachutes are less stable and are operated in near-shore and protected bays, which are common in Uganda and Kenya parts of the lake as opposed to the more open Tanzanian waters.

The decrease in the number of fishing crafts is another positive development as it suggests that there has been no further increase in fishing effort arising from changes in the number of fishing crafts on the lake.

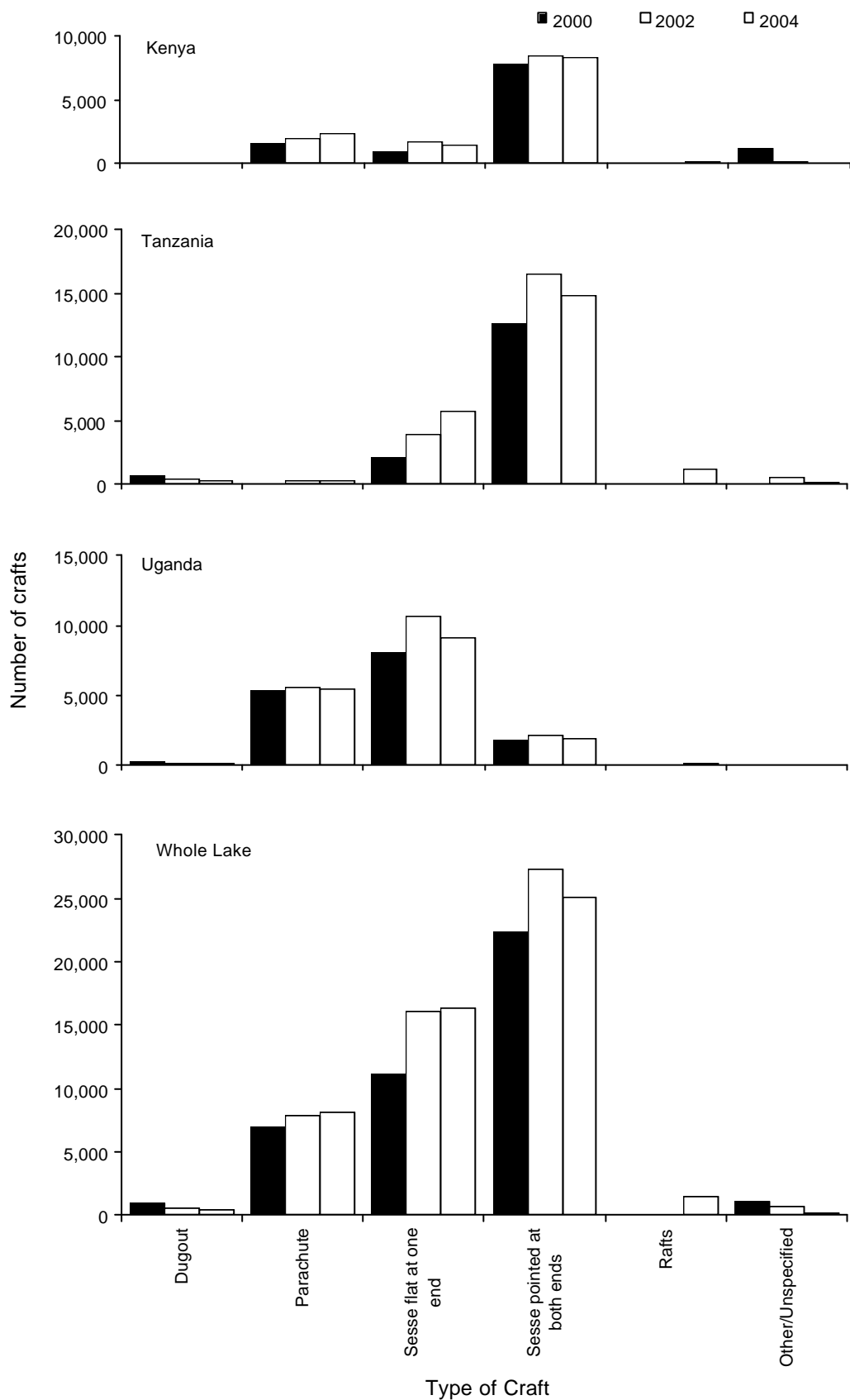


Figure 4: Distribution of fishing crafts by type in Lake Victoria in 2000, 2002 and 2004

3.3.1. Mode of Propulsion of Fishing Crafts

The number of fishing crafts propelled by paddles and sails generally decreased between 2002 and 2004 but those with outboard engines continued to increase from 6,552 in 2002 to 9,609 in 2004 an increase of 47%. The highest increase was in Tanzania (114%), followed by Kenya (24%) with Uganda registering a decrease of 2.4%. This is another manifestation of an expansion of the fishery in Tanzania as compared to Kenya and Uganda.

The increase in number of boats propelled by engines could imply that the fishery was still profitable and attractive to new investments. These crafts target the Nile perch fishery. The increase in the use of outboard engines suggests fishermen had to go further away from the shore probably as a consequence of a decrease in fish stocks in the in-shore waters.

3.3.2. Fishing Crafts (by type and size), Means of Propulsion and Gear Type targeting different Fish species

Overall, most of the crafts targeted Nile perch followed by *R. argentea* and Nile tilapia. Average size of crafts varies with species targeted with Nile perch and *R. argentea* requiring relatively larger crafts under the same craft category than Nile tilapia. The Sesse canoes with flat-end and those with outboard engines mainly target Nile perch and to a less extent *R. argentea*. Crafts targeting Nile tilapia are virtually powered by paddles and are on average smaller than those targeting Nile perch. Most boats using sails target Nile perch. Gillnets target Nile perch and Nile tilapia. Small Seines, Scoop nets and Lift nets target *R. argentea*. Long lines target Nile perch but the hook and line fishery targets Nile tilapia. Boat/beach seines mainly target Nile perch.

3.4. Fishing Gears

The legal fishing gears permitted by the three Partner States on Lake Victoria are gillnets of 5 inches in mesh size and above, hooks and small seines. Beach seines, monofilament gillnets and cast nets are not allowed in the lake.

During the 2000, 2002 and 2004 Frame Surveys, the main fishing gears encountered on the Lake Victoria included gillnets, small seines, scoop nets, lift nets, beach seines, cast nets, hooks and line, long line hooks and traps/baskets.

3.4.1. Gill nets

The total number of gillnets on Lake Victoria increased further from 650,053 in the year 2000 to 984,084 in 2002 and 1,233,052 in 2004, an increase of 25.4% between 2002 and 2004. The number of gillnets increased in all the Partner States. The increases were from 130,078 to 190,756 (46%) in Kenya, 425,888 to 583,699 (37%) in Tanzania and 458,597,597 to 650,653 (7%) in Uganda.

The number of undersized gillnets (< 5 inch mesh size) decreased from 178,205 nets in 2002 to 142,618 in 2004 but was still high being 12% of the total number of gill nets. In Kenya, the number of undersized gillnets increased from 28,527 in 2002 to 28,996 2004, a slight increase of 1.6% (Fig. 8). In the Ugandan waters, the number of undersized gillnets also increased slightly from 52,846 to 56,246, an increase of 6.4%. Conversely, in Tanzania the number of undersized gillnets decreased drastically from 96,832 in 2002 to 57,376 in 2004 a decrease of 40.7%. The little change in the number of undersized nets especially in Uganda and Kenya is cause for concern and call for more action to reduce the illegal sizes of gillnets.

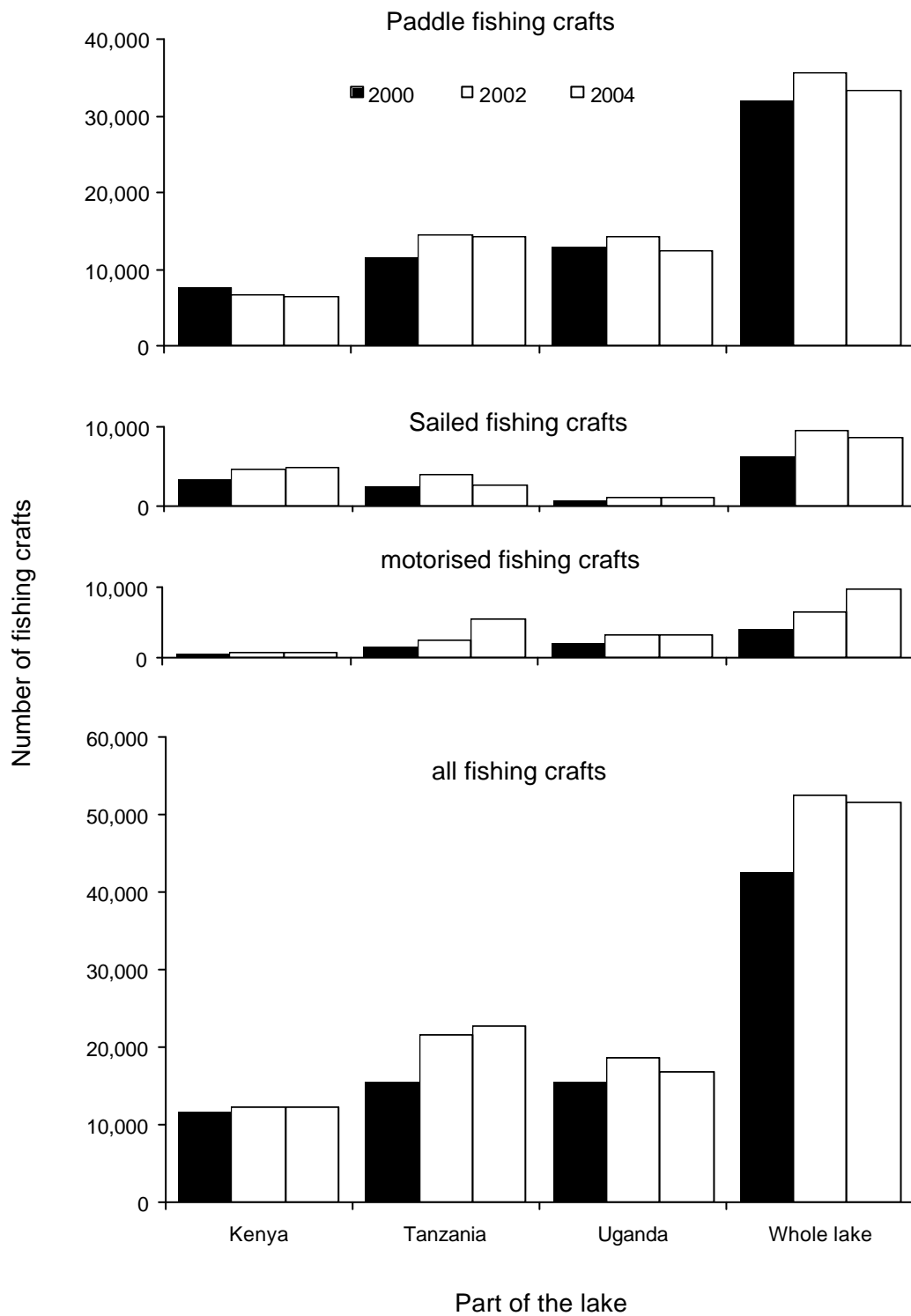


Figure 5: The number of fishing crafts in Lake Victoria in 2000, 2002 and 2004

3.4.2. Beach seines

Beach seines are illegal in all the three Partner States. Although there had been a rapid decrease in number of beach seines from 7613 in 2000 to 3491 in 2002, the decrease between 2002 and 2004 was minimal, only 3.8% as compared to 54.1% between 2000 and 2002. Most of this decrease was, as in 2002 recorded on the Kenyan side of the lake where the numbers decreased from 1,157 in the year 2002 to 868 in 2004, a decrease of 24% - but even here, it is still less than the decrease of 80% recorded between 2000 and 2002. In the Ugandan portion of the lake, the number of beach seines increased from 880 in the year 2002 to 954 in 2004 (8.4%) while in Tanzanian portion of the lake, it increased from 1,454 in 2002 to 1,532 in 2004, an increase of 5.4%. Even though fishers know the negative impacts of these gears to the fishery, and that they are prohibited they still use them because their fishing efficiency. There is still need for concerted effort to remove these illegal gears from the lake.

3.4.3. Monofilament nets

Monofilament nets are illegal in all the three Partner States. Monofilament nets were not recorded on Lake Victoria during the 2000 and 2002 Frame Surveys. However, during the 2004 survey, a total of 5,944 monofilament nets were recorded on the lake (58 in Kenya, 5,041 in Tanzania and 845 in Uganda). The source of these nets needs to be identified and mitigation measures put in place. There is need to continue monitoring the emergence of illegal fishing gears on the lake and to remove them from the fishery.

3.4.4. Long line Hooks

There was a dramatic increase in the number of long line hooks in all the three Partner States from 3,496,247 hooks in 2000 to 8,098,023 hooks in 2002, an increase of 131.6%. The rise in number of hooks in 2002 is attributed to the increased demand for Nile perch by fish processing plants since this is the main target species for long-line fishery given that its investment cost is low. The number of hooks on the lake however decreased from 8,094,023 in 2002 to 6,096,338 in 2004 a decrease of 25%. The reason for this decrease is not clear but could be associated with shortage of bait and its declining catch rate.

3.4.5. Hand line hooks

The number of long line hooks have been rising and then falling between 2000, 2002 and 2004. The decrease between 2002 and 2004 was 29.5%, i.e. from 58,123 to 40,953 lines.

3.4.6. Small seine

This gear which targets *R. argentea* has remained stable between 2002 and 2004 recording respectively 8,236 and 8,601 units respectively. This was an insignificant increase of 4%. The 2000 figure of 18,112 is misleading since during this survey a whole unit was not counted as one, but as several units of 100m nets.

3.4.7. Traps

These gears are used in shallow waters, floodplains and river mouths. They target tilapiines and riverine species. They have shown steady decline with Kenya and Tanzania recording an average of 50% over these years. The number of these gears in the whole lake decreased from 9,122 to 7,805 in 2002 and 2004 respectively, implying a decrease of 14%.

3.4.8. Cast nets

Cast nets usually referred to as 'tupa tupa' and are used in littoral zones and target tilapiines. Though they have shown decrease in the whole lake between 2002 and 2004, the high figure of 4,548 nets for 2000 could be a recording error as the gear has never been popular. Total decrease in the whole lake was about 27% between 2002 and 2004, i.e. from 1,095 to 803 nets.

3.4.9. Scoop nets

There was an increase in the number of scoop nets from 809 (2000) to 1,379 (2002), i.e. 70% and a drop to 842 (2004), i.e. 39%.

3.4.10. Lift nets/Lampara

There was a decline of 54% in the number of lift nets from 315 in 2000 to 144 in 2002, but the number rose again to 309 (53% increase) in the 2004 Frame Surveys.

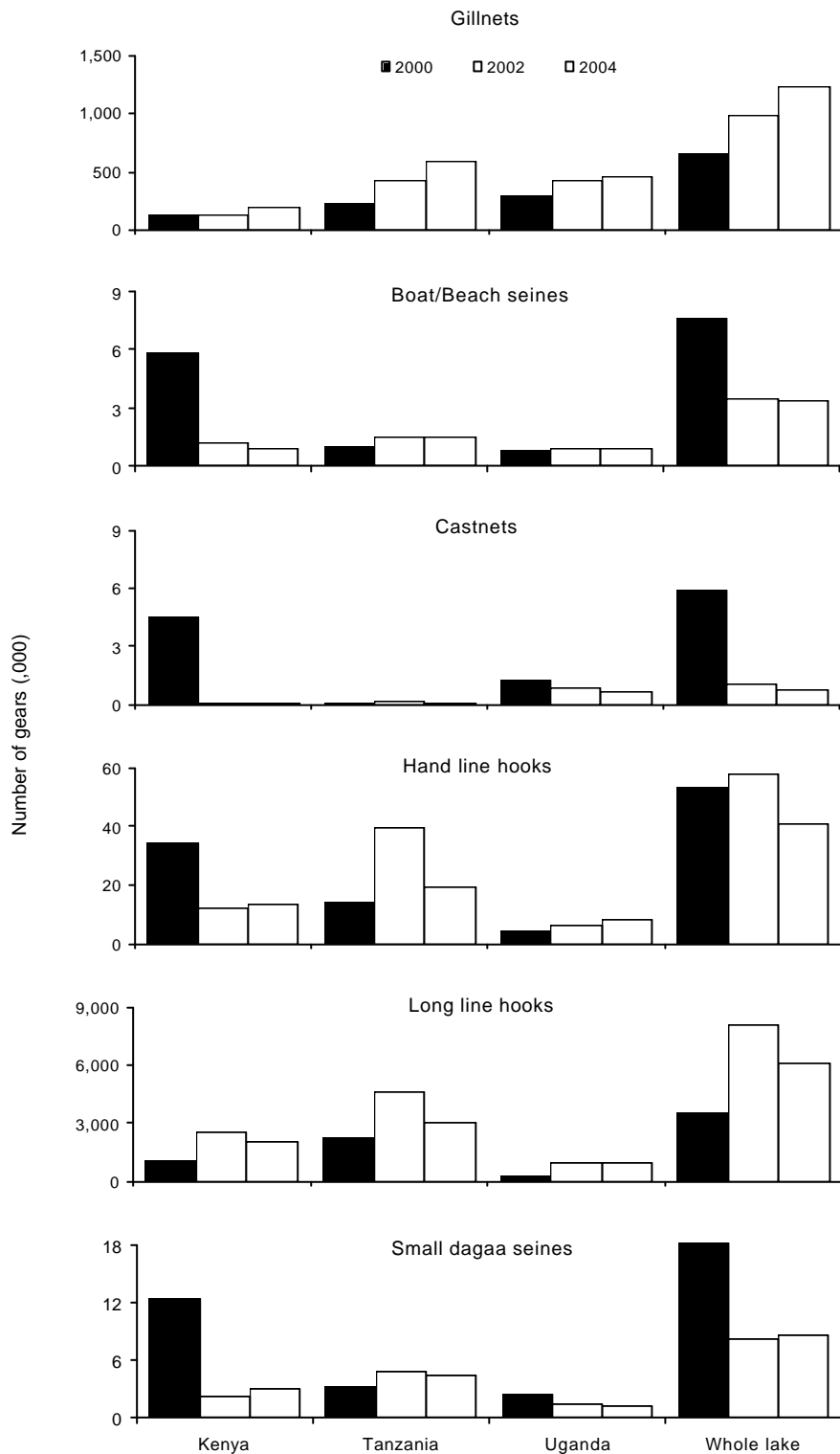


Figure 6: The numbers of the main fishing gears used in Lake Victoria in 2000, 2002 and 2004

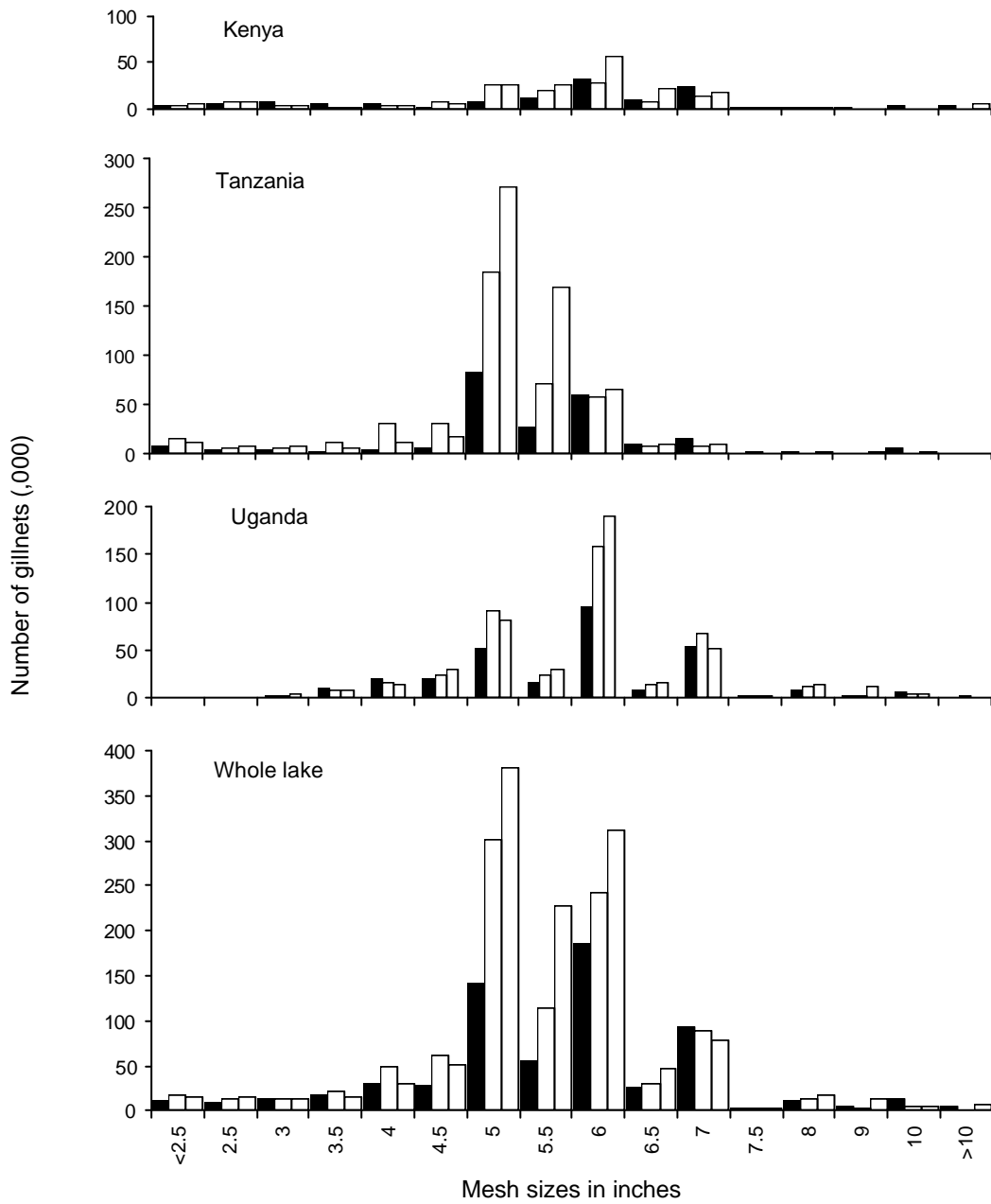


Figure 7: The gillnet mesh size composition by country in 2000, 2002, & 2004 Frame Surveys of Lake Victoria

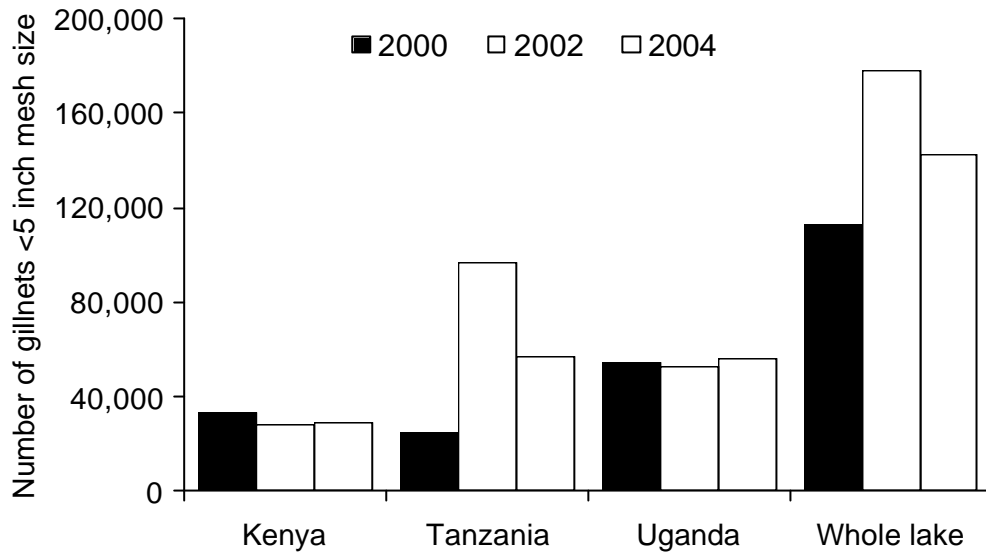


Figure 8: The distribution of undersize gillnet mesh sizes (<5 inch) in Lake Victoria in 2000, 2002 and 2004

Table 2: Preliminary Observation on the fishing crafts (type& size), means of propulsion and gear types targeting different fish species based on 2004 Frame Survey

Craft Type/ Species	Number of crafts/gears targeting				
	Nile perch	Tilapia	Dagaa	Others	Total/Mean
Sesse flat	12,158	1,673	2,009	141	15,981
<i>Mean Length (m)</i>	8.9	6.5	8.1	7.7	8.6
Sesse point	14,952	4,126	5,207	516	24,801
<i>Mean Length (m)</i>	7.3	6.5	7.6	7	7.2
Parachute	1,948	5,520	282	291	8,041
<i>Mean Length (m)</i>	6	5.3	7.8	5.2	5.6
Dugout	43	183	2	192	420
<i>Mean Length (m)</i>	6.2	3.8	7.3	3	3.7
Raft	134	1,269	44	12	1,459
<i>Mean Length (m)</i>	6.6	2.9	8.5	4.6	3.4
Other	4	180	0	3	187
<i>Mean Length (m)</i>	2.5	0.9	0	0.3	0.9
Total	29,239	12,951	7,544	1,155	50,889*
Outboard	7,808	114	1,301	53	9,276
Paddles	13,893	12,107	5,869	1,008	32,877
Sail	7,532	617	371	92	8,612
Total	29,233	12,838	7,541	1,153	50,765*
Gill net	15,550	7,408	92	713	23,763
Long line	9,290	237	52	273	9,852
Hook and line	860	3,191	28	58	4,137
Small seines	99	23	5,486	38	5,646
Lift nets	47	2	242	1	292
Scoop net	8	8	729	3	748
Boat/Beach seine	2,974	187	63	18	3,242
Traps	9	307		24	340
Cast net	102	673	4	3	782
Other	265	892	840	24	2,021

* The figure 50,889 and 50,765 does not equal the total number of fishing crafts (51,712) because targeted species for some crafts were not recorded.

4.0. CONCLUSIONS AND RECOMMENDATIONS

The Frame Surveys carried out on Lake Victoria in 2000, 2002 and 2002 show that:

- a) There are still inadequate facilities servicing the fisheries sector at the fish landing sites and deliberate efforts should be made to improve them.
- b) The gill nets on the lake have continued to increase which is a manifestation of an increase in fishing effort. The implication of the increase in fishing effort on the fish stocks should be assessed and appropriate measures taken.
- c) There were still a large number of illegal mesh size gill nets ranging from <2.5 inches to 4.5 inches, and illegal beach seines on the lake. Specific efforts should be made to remove illegal mesh size gill nets and beach seines from the lake. The same should be done for monofilament nets.
- d) The leadership at landing sites should be sensitized in development of landing site facilities like toilets within their capability.

Other issues to be considered for future Frame Surveys should include clarifications of the definition of terms on the questionnaire, capture of the number and sizes of long line hooks in the survey, types of baits used in the long line fishery and record of the total number of foot fishers.

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6.0. ANNEX

PART A: DOCUMENT IDENTIFICATION AND LOCATION DETAILS

NAME OF ENUMERATOR	
STATUS/ RANK OF RESPONDENT	
DATE	
COUNTRY	
DISTRICT	
SUB-COUNTY/ DIVISION	
LOCATION/ PARISH/WARD	
NAME OF LANDING SITE	
POSITION (Latitude and Longitude)	

PART B SUMMARY OF NUMBER OF VESSELS AT LANDING SITE

VESSEL CATEGORY	NUMBER
OPERATIONAL FISHING CRAFTS	
DERELICT CRAFTS (NON-OPERATIONAL)	
TRANSPORT CRAFTS (FOR FISH)	
TRANSPORT CRAFTS (OTHER PURPOSE)	

PART C LANDING SITE FACILITIES

- 1. BANDA [1] YES [2] NO
- 2. COLD ROOM [1] WORKING [2] NOT-WORKING
[3] NONE
- 17. PONTOON/JETTY [1] YES [2] NO
- 18. FISH STORE [1] YES [2] NO
- 19. ELECTRICITY SUPPLY [1] YES [2] NO
- 20. IF "NO" HOW FAR TO NEAREST SUPPLY (KM)?
[1] <1 [2] 1-5 [3] 6- 10 [4] > 10
- 21. TOILET FACILITY [1] YES [2] NO
- 22. POTABLE WATER [1] YES [2] NO
- 23. IS LANDING SITE ACCESSIBLE BY ALL WEATHER ROAD? [1] YES [2] NO
- 24. IF "NO" HOW FAR TO NEAREST ALL WEATHER ROAD (KM)
[1] <1 [2] 1-5 [3] 6- 10 [4] > 10
- 25. DESIGNATED NET REPAIR FACILITY [1] YES [2] NO
- 26. DESIGNATED CRAFT REPAIR FACILITY [1] YES [2] NO
- 27. IS FISHERIES STAFF RESIDENT? [1] YES [2] NO
- 28. IS THE BMU BASED AT LANDING BEACH? [1] YES [2] NO
- 29 NAME THE NEAREST MARKET (WHERE MOST OF THE FISH IS FIRST SOLD)

- 30 DO FISHERS LAND AT THIS LANDING SITE FOR
[1] > 5 MONTHS OF THE YEAR
[2] < 5 MONTHS OF THE YEAR

PART E: CODES

NOTES ON CRAFTS

Operational Fishing crafts- crafts that are fishing
 Derelict Vessels (non-operational)- damaged crafts not repaired for one year or more
 Fish Carrier crafts solely for transporting fish
 Transport crafts (other purpose) - crafts used for transport only (and never for fishing)

EXPLANATION OF CODES

CRAFT TYPE (and CODES)

1. Sesse flat at one end (SF)
2. Sesse pointed at both ends (SP)
3. Parachute (PA)
4. Dugout (DO)
5. Rafts (RA)
6. Other (Specified)

Length: Measured in metres using a tape measure or a knotted rope

PROP: Method of propulsion: - State main method

1. Inboard motor (I)
2. Outboard motor (O)
3. Paddles (P)
4. Sail (S)

HP: If PROP is inboard or outboard engine state the Horse power, e.g. 15

CREW: Number of fishers in the craft

GEAR TYPES:

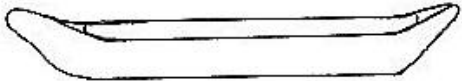

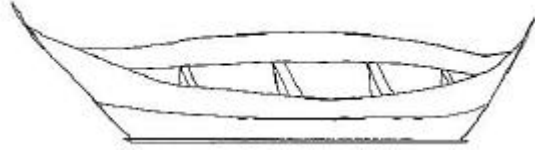

GN	Gill Net: State number per mesh size in inches	MO	Mode of Operation
LL	Long Lines: State number of hooks by sizes	D	Drift
BS	Beach seine: state a complete set	P	Passive
CN	Cast net: State number	A	Active
HL	Hook and Line: State number of lines		
TR	Traps: State number		
LN	Lift net: State number		
SN	Scoop net: State number		
SS	Small seine: Targeting Dagaa/Omena/ Mukene: State number per mesh size in mm		
Others	Other gear not specified above: State type and Number		
MF	Monofilament: state number		

SPECIES TARGETED

LONGLINE BAITS

1. <i>Lates niloticus</i> (Mbuta/Sangara)	LN	1. <i>Clarias</i>
2. <i>Rastrineobola</i> (Omena/Dagaa/)	RA	2. Haplochromines
3. Tilapiines (Ngege/sato)	ON	3. <i>Synodontis</i>
4. <i>Clarias</i> (Mumi/Male)	CL	4. <i>Mormyrus</i>
5. <i>Protopterus</i> (Kambale M.)	PT	5. <i>Rastrineobola</i>
6. <i>Synodontis</i> (Okoko/Ngogogo)	SD	6. Others (specify)

Annex 2. Vessel Categories

Craft type	Description
<p>1. Dugout canoe</p> 	<ul style="list-style-type: none"> ▪ Curved out of a whole log of a tree. ▪ Common size, 4 to 5 m long ▪ Entirely propelled by paddle ▪ Operated exclusively in the littoral areas targeting Nile tilapia, Lung fish ▪ The main fishing gears used are gillnets, basket traps and hooks
<p>2. Parachute</p> 	<ul style="list-style-type: none"> ▪ Constructed from planks of timber ▪ Flat bottomed ▪ Common size, 4 to 6 m long ▪ Commonly propelled by paddles ▪ Operated in the littoral areas targeting Nile tilapia and other species ▪ The main gears used are gillnets, cast nets, basket traps and hooks
<p>3. Sesse pointed at both ends</p> 	<ul style="list-style-type: none"> ▪ Constructed from planks of timber ▪ V-shaped bottom with a keel ▪ Common size, 6 to 10 m long ▪ Propelled by paddle or sails ▪ Operated in the littoral and sub-littoral areas, up to about 3 km from the shore ▪ Largely versatile, i.e. used in the Mukene/Dagaa /Omena fishery with small seines; in the Nile tilapia fishery with gillnets, cast nets and basket traps; and in the Nile perch fishery with gillnets, beach seines, long lines and hand lines
<p>4. Sesse flat at one end</p> 	<ul style="list-style-type: none"> ▪ Constructed from planks of timber ▪ V-shaped bottom with a keel ▪ Common size, 5 to 12 m long ▪ Propelled by paddle, sail or out board motor ▪ Largely versatile, i.e. used in the Mukene/Dagaa /Omena fishery with small seines; in the Nile tilapia fishery with gillnets, cast nets and basket traps; and in the Nile perch fishery with gillnets, beach seines, long lines and hand lines
<p>5.</p>	<ul style="list-style-type: none"> ▪
<p>6.</p>	<ul style="list-style-type: none"> ▪

