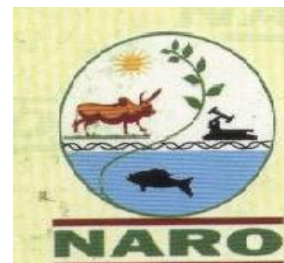


NATIONAL FISHERIES RESOURCES RESEARCH INSTITUTE (NaFIRRI)



**REPORT OF CATCH ASSESSMENT SURVEY OF LAKE ALBERT – ALBERT NILE CONDUCTED
IN JULY 2012**

**ATAAS Project 5: Monitoring changes in stocks of the major commercial fish species in
the five major water bodies of Uganda (Victoria, Albert, Kyoga, Edward and George)**



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Summary

A Catch Assessment Surveys (CAS) with the overall objective of generating information on the fish production and commercial value of the fisheries of Lake Albert and Albert Nile system was implemented by the National Fisheries Resources Research Institute (NAFIRRI) in collaboration with the Department of Fisheries Resources (DFR), Local Government staff (FOs) and BMU members at selected landing sites on Lake Albert (12 landing sites) and Albert Nile (26 landing sites) in July 2012.

A total 622 and 313 boat days on Lake Albert and Albert Nile respectively were sampled for a period of 9 days. Results indicate an annual landing of 151,600 and 5,900 tonnes (t) of fish with an estimated beach value of 122.5 and 14 Billion (US\$) from Lake Albert and Albert Nile respectively. Over 80% of the catch from Lake Albert comprised the small pelagic species; *Neobola bredoi* (Muziri) and *Brycinus nurse* (Ragoogi) followed by Nile perch (6%). However, due to low market value of the small fishes and the high prices attached to Nile perch for industrial processing and export market, the contribution of the latter to beach value rose to 34% of the total. The contribution of the light fishery based on small pelagic species ((*B. nurse* and *N. bredoi*) are insignificant on Albert Nile. Even if the small pelagic species may be present in the river system, a light fishery based on these two is yet to be developed. Proportionally, Albert Nile still remain a multispecies fishery with over 20 fish species harvested commercially. Interestingly, the Albert Nile fishery still remains primitive with simple crafts and gears (mainly dugout canoes, traps, and gillnets). This could suggest that the more developed the system becomes the higher the level of transformation in its fisheries leading to simplification, characterized by reduction in multispecies nature and dominance of few species.

Illegal gears especially undersized gillnet of mesh size less than 4 inches were the most dominant in the Lake Albert and Albert Nile fisheries. They captured large quantities of immature fish particularly when used to target Nile perch, *Bagrus*, Nile tilapia, and large *Barbus* spp. Their impact when used to target the smaller species (Ragoogi, Angara & Ngasia) is yet to be evaluated. A specific study to analyze selectivity and impacts of these nets is recommended. However, the dominance of 1.5" mesh sizes especially on Albert Nile to target Angara, Ngassia and *Barbus*, is definitely destructive to their fisheries and should be checked forthwith. In addition, there is an emerging fishing method locally referred to as "Salsio or Luzira" whereby fishers stay on the lake from 3 days up to 2 weeks without returning to the landing site. They carry with them food and salt for processing the catches on the lake, and in the case of Albert Nile on make shift shelters on islands and in the game park. They normally use gillnets of 3-3½ inch mesh size and caught mainly Nile perch & *Bagrus* (Pethi & Munama). On return they land several tons of fish. Most of these Catches are not captured in the estimates presented in our analyses since we target daily fishing boats. The possible impacts of this fishing method should be studied and appropriate action recommended.

1. INTRODUCTION:

Lake Albert is currently the second most productive lake in Uganda after Lake Victoria. The lake is one of the shared water bodies in the country. It is shared between Uganda (60% by area) and the Democratic Republic of Congo (DRC). In Uganda, the lake is shared by five riparian districts namely: Ntoroko, Kibaale, Hoima, Buliisa and Nebbi. The lake covers a total estimated surface area of 5,270 km² with approximately 60% within Ugandan waters (Walker, 1972). It is located in the western part of the great rift-valley at an altitude of 618 m above Sea level. The central parts of the lake are characterized by steep escarpments whereas the northern and southern parts lie in a plain of the rift valley. The plains are gently sloping, resulting in shallow swampy inshore waters in many places. The major inflowing rivers are the Semliki and Kafu in the south, and the Victoria Nile at the northern tip. The lake has a diverse fish fauna with a gradient of multi-species fisheries in different parts of the lake.

The section of the great River Nile termed Albert Nile starts from the northern tip of Lake Albert and travels about 220 km to Uganda-South Sudan border. The stretch traverses an area characterised by gentle slopes and numerous flood plains surrounded by swamps. This makes some of the landing sites difficult to access. For example some landing sites at the border of Arua and Moyo districts (Para and Imvi) could only be accessed by water as they are cut off from the rest of Arua district by the Zoka river that drains west Nile.

Catch Assessment Surveys (CASs) were carried out by the National Fisheries Resources Research Institute (NAFIRRI) at selected landing sites on Lake Albert (12 landing sites) and Albert Nile (26 landing sites) in July 2012.

Objective of the Survey

The overall objective of the Catch Assessment survey was to provide information which would help assess removals and the value of the fisheries of Lake Albert and Albert Nile system. Specific parameters evaluated included estimation of:

- i. the fish catch rates apportioned to the major fishing attributes that characterise the fisheries of Lake Albert and Albert Nile;
- ii. the total catch by the type of fishery, category of fishing boats, gears in the riparian local administrative units;
- iii. the contribution of different fish species to the total catches; and
- iv. the monetary value of the fish landed;

2. METHODOLOGY

2.1 The Catch Assessment Survey Design and sampling units

The current CAS was conducted in the Ugandan waters of Lake Albert and the 220 km stretch of Albert Nile to the Uganda – South Sudan border (Fig. 1). Sample landing sites

were selected from every Riparian district using a two-stage stratified sampling design according to the Standard Operating Procedures (SOPs) for CAS adopted by the Lake Victoria Fisheries Organization (LVFO, 2005) for implementation on Lake Victoria and other large lakes. Within each district, a sample of primary sampling units (PSUs) i.e. the fish landing sites were first selected, and then, at each PSU, stratified samples of Secondary Sampling Units (SSUs) - the Vessel gear type, were randomly selected for sampling. A total 18 landing sites representing 23% of all the 78 landing sites on the Ugandan part of the lake and 26 (21%) of the 126 fish landing sites on Albert Nile were sampled. In all 622 and 313 boat days on Lake Albert and Albert Nile respectively were covered (Appendix 1). Standard CAS data forms (Appendix II) were used to record field data.

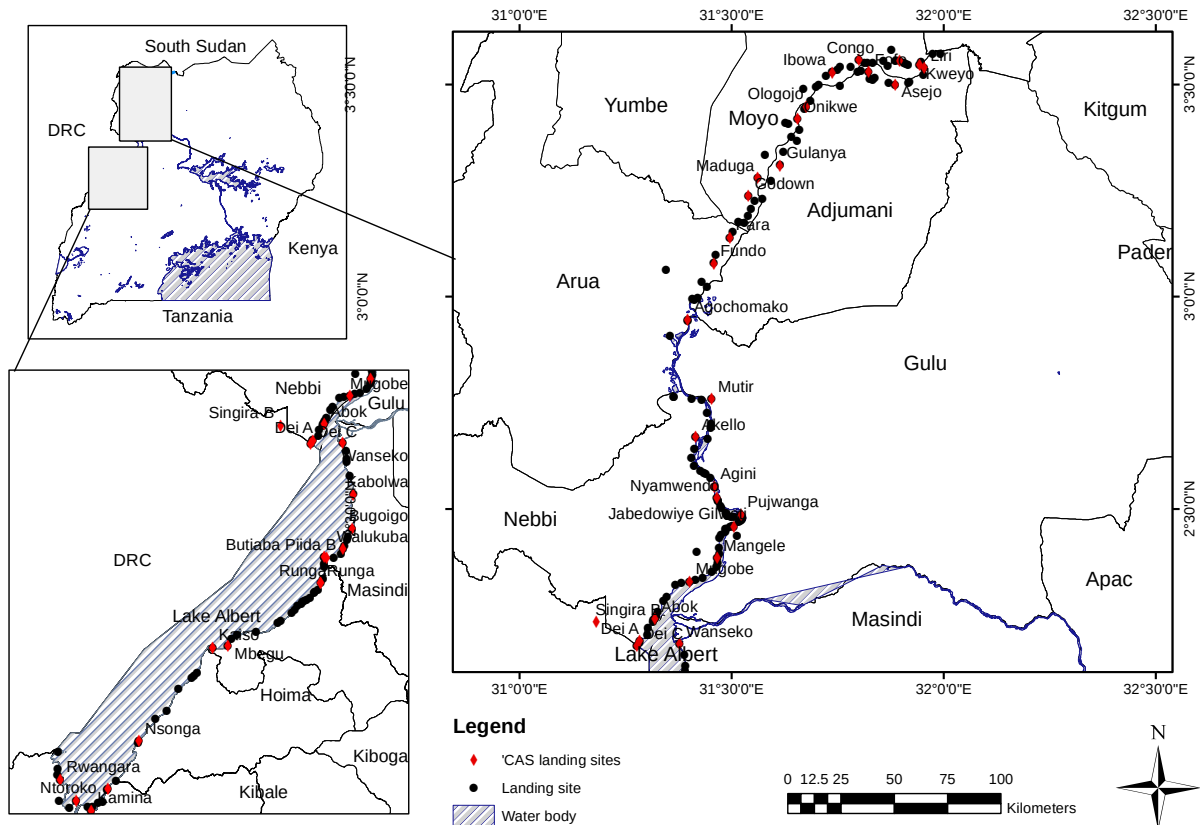


Fig. 1: Map of mid-western and west Nile part of Uganda showing location of Lake Albert and Albert Nile and the landing sites sampled during the July 2012 Catch Assessment Survey

2.2 Estimation of CAS-based Indicators

Data were stored and analyzed using Microsoft Excel. The fishing crafts were segregated into effort groups (Craft-gear combinations) and the CAS indicators estimated for each effort group.

- (i) The mean fish catch rates ($\text{kg boat}^{-1} \text{ day}^{-1}$) were estimated for each effort group by species.
- (ii) The mean price (shs kg^{-1}) of fish was estimated for each effort/species group.
- (iii) The total fish catches were estimated using the mean fish catch rates and the May 2012 Frame survey data as rising factor. For each effort group, the Boat activity coefficient i.e. the probability that a fishing craft of each craft-gear type would be active on any day during the month, was estimated as the mean number of days boats in each effort group fished in the week preceding the sampling day divided by the number of days in a week. A correction was made for the *N. bredoi* light fishery to consider the 21 moon days when fishing takes place. The total catch of each effort group was then estimated.
- (iv) The beach value of the catch was estimated by raising the estimated total catch in each effort group by the mean unit price of each species landed in the given effort group (Note: different effort groups harvest different sizes of a given species and therefore attract different mean prices).

The Ugandan part of the lake was divided into three zones with generally similar fisheries and the above analyses were carried out separately for each zone. The zones were as follows:

- (i) Northern zone – covering landing sites in Nebbi and Buliisa districts. This area is largely influenced by the Nile River system and lies in a plain of the rift valley with gentle slope of shoreline and predominantly shallow inshore waters.
- (ii) The central zone – covering landing sites in Hoima district. This area is characterized by steep escarpments, and predominantly deep waters right from the shore.
- (iii) The southern zone – covering landing sites in Ntoroko and Kibaale districts.

3.0 RESULTS

Neobola bredoi (Muziri) was the most dominant fishery with an estimated annual catch of 78,000 t on Lake Albert followed by *Brycinus nurse* (Ragoogi/Ndolo/Silvery sardine) (51,000 t) constituting 51% and 34% of all total catch respectively (Table 1a). Both Muziri and Ragoogi are harvested at night using light attraction and haul into canoes using small seines mostly 5 mm mesh size. In addition, Ragoogi is harvested during

daylight using small seines of 5 mm mesh size and bait of Cassava “Ugali” mixed with fish “offals” and sometimes cow dung and humus soil. Other fishers (especially women) used perforated basins to harvest Ragoogi. The annual catch estimates of the two most abundant fish species on the lake (Muziri *and* Ragoogi) were highest in Hoima district with 58,000 t (45%) followed by Buliisa, 40,000 t (31%) and Ntoroko 16,500 t (13%), Kibaale contributed 12,000 t (9%) while Nebbi only produced 2% of small pelagic species (Table 1a).

Table 1a: The total annual fish catches on Lake Albert (t) as estimated by district during the CAS conducted in July 2012.

	Buliisa	Hoima	Kibaale	Nebbi	Ntoroko	Production	Contribution (%)
<i>Neobola bredoi</i>	23,781	46,128	7,854	-	279	78,042	51.5
<i>Brycinus nurse</i>	16,065	11,685	3,870	3,151	16,133	50,905	33.6
<i>Lates spp/Nile perch</i>	333	2,824	4,784	644	35	8,619	5.7
<i>Hydrocinus forskalli</i>	783	3,629	1,166	340	732	6,652	4.4
<i>Oreochromis niloticus</i>	948	315	254	74	1,568	3,159	2.1
<i>Alestes baremose</i>	-	351	311	-	1,047	1,710	1.1
<i>Bagrus bayad</i>	46	450	55	86	264	902	0.6
<i>Clarias gariepinus</i>	4	25	7	-	32	68	0.0
<i>Protopterus eathropicus</i>	-	-	10	1	17	28	0.0
<i>Barbus bynni</i>	5	187	14	-	13	220	0.1
<i>Other species</i>	364	133	58	132	573	1,260	0.8
<i>Overall</i>	42,330	65,727	18,385	4,429	20,694	151,565	100
	27.9	43.4	12.1	2.9	13.7	100	

Amongst the large commercial species, Nile perch/*Mputa/Gur/Pethi/Gem* (*Lates niloticus* and *Lates macrophthalmus*) was most dominant species caught on the lake and third overall with an estimated annual catch of 8,600 t (5.7% of the total production). The main fishing gears used to catch Nile perch were gillnets and long line hooks. Approximately 56% of Nile perch (4,700 t) was landed in Kibaale district followed by Hoima 33%, Nebbi (8%), Buliisa 4% and lastly Ntoroko (< 1%).

In all the 1st 10 most important commercially exploited fish taxa on lake albert include *Neobola bredoi*, *Brycinus nurse*, *Lates spp/Nile perch*, *Hydrocinus forskalli*, *Oreochromis niloticus*, *Alestes baremose*, *Bagrus bayad*, *Clarias gariepinus*, *Protopterus eathropicus*, and *Barbus bynni* in the respective order (Table 1a).

Table 1b: The total annual fish catches on Albert Nile (t) as estimated by district during the CAS conducted in July 2012.

Species/Taxa	Adjumani	Arua	Moyo	Nebbi	production	Contribution (%)
<i>Oreochromis niloticus</i>	334	90	268	175	866	15
<i>Brycinus nurse</i>	-	420	-	411	831	14
<i>Clarias gariepinus</i>	111	73	233	288	705	12
<i>Barbus bynni</i>	-	-	1	636	637	11
<i>Protopterus eathropicus</i>	49	111	28	260	448	8
<i>Bagrus bayad</i>	-	23	2	409	434	7
<i>Lates spp/Nile perch</i>	117	14	2	106	238	4
<i>Alestes baremose</i>	4	26	-	186	216	4
<i>Hydrocinus forskalli</i>	4	1	0	216	221	4
<i>Other species</i>	428	138	231	479	1,276	22
<i>Neobola bredoi</i>	-	-	-	-	-	-
Overall	1,046	896	764	3,166	5,872	100
Contribution (%)	17.8	15.3	13.0	53.9	100.0	

Catch composition on Albert Nile was slightly different from that of the main Lake Albert. The most dominant catch on Albert Nile was Ngege/Nile tilapia (*Oreochromis niloticus*) contributing an annual production of 870 t (15%) closely followed Ragoogi *B. nurse* (14%), *Clarias gariepinus* (Male), kisinja (*Barbus bynni*), *Protopterus aethiopicus*, *Bagrus bayad*, *Lates spp/Nile perch*, *Alestes baremose*, *Hydrocinus forskalli* in the same order (Table 1b). *Neobola bredoi* was not recorded on the river across all the districts. The largest proportion of the annual production on Albert Nile was recorded in Nebbi district 3,200 t (54%) of the 5,900 t estimated annual production.

It was however, noted that on albert Nile a large proportion of the catch still remained in the group termed other species after removal on the 10 dominant species on the

main lake. It prompted further disintegration of the catch to generate up to 20 species commercially exploited on the river (Appendix 1).

Table 2a: The annual beach value of fish catches on Lake Albert (million shs) as estimated during the July 2012 CAS

Species	Buliisa	Hoima	Kibaale	Nebbi	Ntoroko	Overall	Contribution (%)
Nile perch	1,144	5,877	32,370	2,171	86	41,648	34.0
<i>N. bredoi</i>	,679	17,173	5,524	-	119	29,495	24.1
<i>B. nurse</i>	,527	4,223	3,084	731	5,803	18,367	15.0
<i>H. forskalli</i>	,575	8,608	2,226	1,603	1,946	15,957	13.0
<i>O. niloticus</i>	2,926	795	630	149	5,563	10,062	8.2
<i>A. baremose</i>	-	792	611	-	2,833	4,236	3.5
<i>B. bayad</i>	16	887	120	287	616	2,026	1.7
<i>B. bynni</i>	10	396	31	-	36	473	0.4
<i>C. gariepinus</i>	4	100	16	-	57	177	0.1
<i>P. aethiopicus</i>	-	-	18	1	32	51	0.0
Others	-	-	0	-	-	0	0.0
Overall	16,981	38,851	44,629	4,942	17,089	122,492	100
Contribution (%)	13.9	31.7	36.4	4.0	14.0	100.0	

The estimated annual gross beach value (million shs) of fish on Lake Albert is provided in Table 2a. The annual gross beach value of the fish catches was estimated at shs 122.5 billion contributed by Nile perch (34%), *N. bredoi* (24%), *B. nurse* (15%), *H. forskkahlii* (13%), *O. niloticus* (8.2%), *A. baremose* (3.5%), and *B. bayad* (1.7%). Kibaale district had the highest estimated gross revenue of fishers at the beach level amounting to shs 44.6 billion (36%), followed by Hoima shs 38.9 billion (32%), and Ntoroko shs 17.1 billion (14%) and Buliisa 17 billion (14%). The gross beach level earnings from the main lake were lowest in Nebbi, shs 4.9 billion (4).

Table 2b: The annual beach value of fish catches on Albert Nile (million shs) as estimated during the July 2012 CAS

District	Adjumani	Arua	Moyo	Nebbi	Overall	(%)
<i>C. gariepinus</i>	328.4	262.3	791.7	1,033.7	2,416	17.4
<i>O. niloticus</i>	645.2	182.1	585.8	425.6	1,839	13.2
<i>P. athiopicus</i>	133.3	1,071.2	75.0	534.0	1,813	13.0
<i>B. bynni</i>	-	-	1.4	1,141.0	1,142	8.2
<i>B. bayad</i>	-	58.6	4.7	927.6	991	7.1
<i>B. nurse</i>	-	524.7	-	457.1	982	7.1
Nile perch	440.1	68.3	3.9	281.0	793	5.7
<i>A. baremose</i>	8.1	55.4	-	580.0	643	4.6
<i>H. forskali</i>	7.2	2.4	0.5	480.5	491	3.5
Others	940.6	303.7	508.7	1,053.5	2,807	20.2
Overall	2,502.8	2,528.7	1,971.6	6,913.9	13,917	100
Contribution	18.0	18.2	14.2	49.7	100.0	

An estimated beach value of 14 billion shillings is earned annually by fishers on Albert Nile alone (Table 2b). The largest portion of the income is received by fishers targeting Male *C. gariepinus* 2.4 billion (17.4% of the total), followed by Tilapia and Mamba fishers. Significant earnings are received from Barbus, *B. nurse*, Nile perch, *A. baremose* (Angara) and *H. forskali* (Ngasia). Up to 20% of the earnings come from species other than the main 10 considered for the lake-river comparison. These other species and their contributions are given in Appendix III.

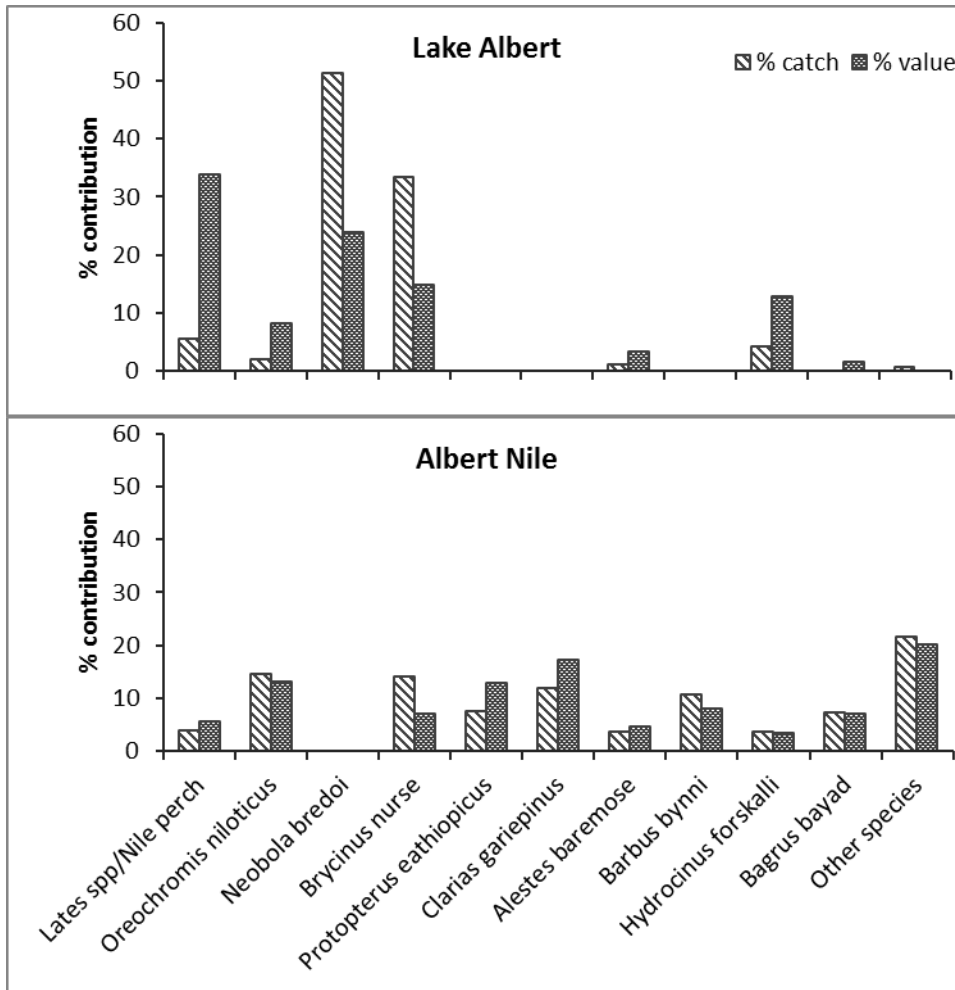


Fig. 2: Comparison of contribution of the various fish species to catch composition and beach value from Lake Albert and Albert Nile as estimated from the July 2012 CAS

Comparison of the contribution of the diverse commercial fish species of Lake Albert and Albert Nile to annual catch and beach value is given in Figure 2. *B. nurse* and *N. bredoi* dominate Albert catch composition but Nile perch dominate by beach value (Fig 2). On Albert Nile the contribution of the major commercial species in both catch and beach value is comparable. In addition, the contribution of other relatively rare species is still significantly visible.

Length frequencies

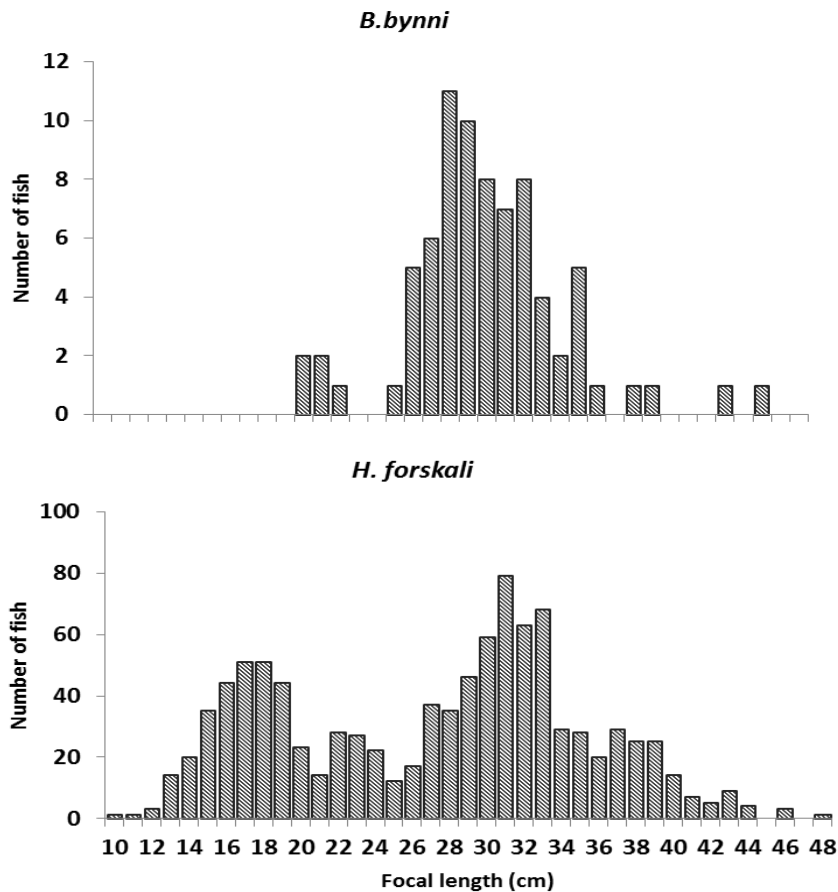


Fig. 3: Length frequency distribution of *B. bynni* and *H. forskali* retained by the commercial gill net fishery on Lake Albert and Albert Nile as measured during the July 2012 CAS

Length frequency distribution of *H. forskali* retained by commercial gill net fishers on Lake Albert and Albert Nile exhibit a bimodal distribution Fig 3. The second modal class roughly coincides with that of *B. bynni* which could relate to selectivity of the gear used. In addition, there is need for further analysis to isolate the factors behind the bimodal distribution. It could be year classes (cohorts) being harvested by same gear, different proportions of gill net sizes harvesting a common population, or different sub-populations being harvested in the lake and river.

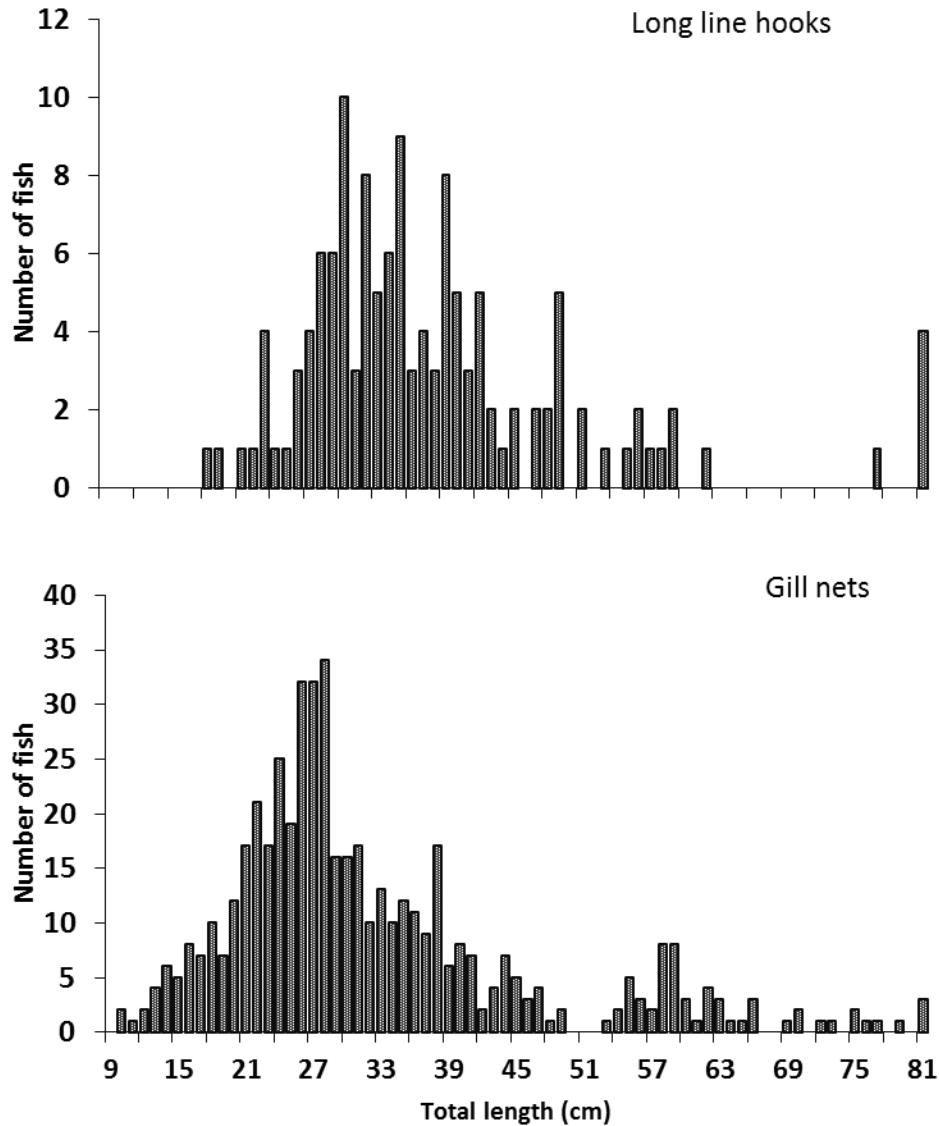


Fig. 4: Length frequency distribution of *L. niloticus* retained by the commercial Long line and gill net fisheries on Lake Albert and Albert Nile as measured during the July 2012 CAS

Although there are chances that the size structure presented may include both *L. niloticus* and *L. macrophthalmus* harvested by both long line and gill net fisheries, the length frequency distribution presented in Figure 4 indicate gill nets harvest smaller Nile perch compared to long line.

4.0 DISCUSSION AND RECOMMENDATIONS

Lake Albert and Albert Nile contribute significantly to the annual fisheries production (close to 400,000 t) of Uganda. The small pelagic fishes (*B. nurse* and *N. bredoi*) contribute over 80% of the fish catches of Lake Albert and similar high abundance of these species is anticipated in the fish biomass in the lake compared with other fishes. They also contribute the highest gross revenue from the fisheries and provide the highest employment opportunities to the fishers and the women who are the main players in post-harvest processing of the catches. This current status contrasts with the historical catch data which ranked *Hydrocynus* spp, *Lates* spp, *Alestes* spp and the tilapiines as the overall dominant commercial fishes between 1969 and 1990. Thus, the current information indicates a drastic change in the fisheries of the lake over the years to dominance by the pelagic species. The future potential of these fisheries cannot be under looked and there is need to identify the best means for sustainable exploitation of these emerging fisheries. There is also need for value addition through improved handling and processing to improve earnings of fisher communities from the pelagic fisheries.

Nile however, is still ranked the most developed and lucrative fishery on the main Lake Albert. This is particularly in the form of fisheries involved in the harvest and processing of Nile perch. It is mainly harvested by long lines and gillnets although some beach seines still target the taxa. Nile perch is mainly transported to fish processing plants spread around the lake and the major towns of the country; Kampala, Jinja and Entebbe. The processed Nile perch targets export market and earns colossal sums of money making the fishery the most profitable and attracts more affluent fishers and traders from all over the country. The introduction of Sese flat type of boats and outboard engines in the Lake Albert could be closely associated with the evolution of Nile perch fishery.

The light fishery based on small pelagic species (*B. nurse* and *N. bredoi*) are insignificant on Albert Nile. Apart from *B. nurse* harvested by small nets (1.5" mesh sized nets) that dominate the gillnet fishery on the river, *N. bredoi* is absent. Even if the small pelagic species may be present in the river system, a light fishery based on these two is yet to be developed although our Frame survey conducted in May 2012 recorded 2 scoop nets that could suggest a possible invasion of the light fishery. Proportionally, Albert Nile still remain a multispecies fishery as illustrated in Fig. 2 with over 20 fish species harvested commercially and over 10 other species reduced on the main lake and other lakes in country but still exploited on the Albert Nile. Interestingly, the Albert Nile fishery still remains primitive with simple crafts and gears (mainly dugout canoes, traps, and gillnets; May 2012 Frame survey report). The implication is that the more developed the system becomes the higher the level of transformation in its fisheries leading to simplification, characterized by reduction in multispecies nature and dominance of few species.

Illegal gears especially undersized gillnet of mesh size less than 4 inches were the most dominant in the fishery. They captured large quantities of immature fish particularly when used to target Nile perch, *Bagrus*, Nile tilapia, and large *Barbus* spp. Their impact when used to target the smaller species (Ragoogi, Angara & Ngasia) is yet to be evaluated. A specific study to analyze selectivity and impacts of these nets is recommended. However, the dominance of 1.5" mesh sizes especially on the Nile to target Angara, Ngassia and *Barbus*, is definitely destructive to their fisheries and should be checked forthwith. The common sizes of long line hooks, which are a major gear used to target Nile perch and *Bagrus* (Munama) are 14 and 16 which catch immature fish. Evaluation of appropriate hook sizes to target Nile perch and Munama should be taken as priority. Small seines of 5 mm mesh size were used for harvesting live bait for the hook fishery by beach seining in near shore areas. This method of bait collection is destructive to food for fish; breeding and nursery grounds; and juveniles of large species. Alternative sources of bait should be sought and encouraged.

There was an emerging fishing method locally referred to as "Salsio or Luzira" whereby fishers stay on the lake from 3 days up to 2 weeks without returning to the landing site. They carry with them food and salt for processing the catches on the lake, and in the case of Albert Nile on make shift shelters on islands and in the game park. They normally use gillnets of 3-3½ inch mesh size and caught mainly Nile perch & *Bagrus* (Pethi & Munama). On return they land several tons of fish. Most of these Catches are not captured in the estimates presented in our analyses since we target daily fishing boats. The possible impacts of this fishing method should be studied and appropriate action recommended.

5.0 Acknowledgment

Funding for this survey was provided through the Agricultural Technologies and Agribusiness Advisory Services (ATAAS) NaFIRRI Project No. 5 Monitoring changes in stocks of the major commercial fish species in the five major water bodies of Uganda (Victoria, Albert, Kyoga, Edward and George). The survey was implemented by NaFIRRI staff with collaboration of DFR, Local Government staff (FOs) and BMU members.

6.0 References

May 2012 Frame survey report
NaFIRRI 2007, CAS report
NaFIRRI 2008, CAS report

Appendix 1: List of sampled landing sites and the numbers of boats at the landing

DISTRICT	SUB-COUNTY/DIVISION	PARISH/WARD	NAME OF LANDING	No.Boats	Lat	Lon
Nebbi	Panyamur	Dei	Dei C	30	2.1776000	31.2767667
Nebbi	Panyamur	Dei	Dei A	92	2.1893167	31.2834167
Nebbi	Panyamur	Ganda	Abok	76	2.2410900	31.3194600
Nebbi	Panyamur	Ganda	Singira B	20	2.2346000	31.1812833
Buliisa	Butiaba	Piida	Butiaba Piida A	163	1.8217600	31.3196900
Buliisa	Butiaba	Piida	Butiaba Piida B	325	1.8198667	31.3267167
Buliisa	Butiaba	Bugoigo	Bugoigo	280	1.9102000	31.4072600
Buliisa	Butiaba	Walukuba	Walukuba	340	1.8465300	31.3781500
Buliisa	Kigwera	Wanseko	Wanseko	138	2.1818600	31.3771800
Buliisa	Buliisa Town Council	Kisiabi	Kabolwa	180	2.0194300	31.4110200
Hoima	Kigorobya	Kibiro	Runga	165	1.7392500	31.3075900
HOIMA	BUSERUKA	TONYA	Mbegu	160	1.5414700	31.0159000
HOIMA	BUSERUKA	TONYA	Kaiso	281	1.5356600	30.9675700
Hoima	Kyangware	Buhuka	Nsonga	172	1.2408600	30.7344500
Hoima	Kigorobya	Kibiro	Runga	165	1.7392500	31.3075900
Hoima	BUSERUKA	TONYA	Kyehoro		1.5093000	31.9362500
Kibaale	Ndaiga	Ndaiga	Kamina	97	1.0230833	30.5850000
Kibaale	Ndaiga	Kitebere	Kitebere	134	1.0907167	30.6372333
Ntoroko	Kanara T/C	Ntoroko	Ntoroko	317	1.0541400	30.5375300
Ntoroko	Kanara	Rwangara	Rwangara	131	1.1203900	30.4877800

ADJUMANI	PACHARA	OMI	Fofa	54	3.5308200	31.8219400
ADJUMANI	ARINYAPI	LIRI	Liri	11	3.5396300	31.9532200
ADJUMANI	JAIFI	IMINIKE	Asejo	18	3.5004600	31.8850500
ADJUMANI	UKUSIJONI	GULUNYA	Gulanya	30	3.3105500	31.6141400
ADJUMANI	CIFORO	ODEJO	Ologojo	11	3.4487800	31.6759800
ADJUMANI	CIFORO	OPEJO	Onikwe	29	3.4191190	31.6551300
MOYO	ITULA	UPI	Ibowa	45	3.5294500	31.7369800
MOYO	DUFULE	KYINGI	Kweyo	12	3.5482400	31.9426400
MOYO	GIMARA	MADUGA	Maduga	22	3.2801100	31.5609700
MOYO	GIMARA	GOPELE	Godown		3.2382000	31.5390800
MOYO	LAROPI	BALAL	Congo	27	3.5588000	31.7991400
MOYO	LAROPI	PANYANGA	Dwegele/Panyanga	9	3.5572500	31.8956500
Arua	Rigbo	Ewanga	Para	26	3.1399900	31.4952900
Arua	Rigbo	Aliba	Fundo	69	3.0794500	31.4584000
Arua	Rhino Camp	Awuvu	Agochomako	48	2.9468200	31.3957100
Nebbi	Pakwach	Oliejo	Mangele	26	2.3840800	31.4654000
Nebbi	Pakwach	Mukale	Mugobe	37	2.3293400	31.4003300
Nebbi	Pakwach Town Council	Amor East	Pujwanga	29	2.4873700	31.5224300
Nebbi	Wadelai	Mutir	Mutir	12	2.7594800	31.4524000
Nebbi	Wadelai	Ragem lower	Akello	20	2.6695600	31.4143400
Nebbi	Panyango	Pakia	Nyamwendo	21	2.5256400	31.4647900
Nebbi	Panyango	Pamitu	Agini	10	2.5536900	31.4587800
Nebbi	Pakwach TC	Punvungu West	Jabedowiye Gilweti	14	2.4593200	31.5047900

Appendix II: Standard CAS Forms

Appendix III: Contribution of the various fish species annual fish catches (t) on Albert Nile and lake Albert as estimated during the CAS conducted in July 2012.

Species/Taxa	Albert Nile (wt/t)	%	Lake Albert (wt/t)	%
<i>Neobola bredoi</i>	-	-	78,042	51.5
<i>Brycinus nurse</i>	831	14.1	50,905	33.6
<i>Lates spp</i> /Nile perch	238	4.1	8,619	5.7
<i>Hydrocinus forskali</i>	221	3.8	6,652	4.4
<i>Oreochromis niloticus</i>	866	14.8	3,159	2.1
<i>Alestes baremose</i>	216	3.7	1,710	1.1
<i>Bagras bayad</i>	434	7.4	902	0.6
<i>Synodontis schall</i>	25	0.4	547	0.4
<i>Bagrus docmac</i>	96	1.6	260	0.2
<i>Barbus bynni</i>	637	10.8	220	0.1
<i>Auchenoglanis occidentalis</i>	24	0.4	164	0.1
<i>Clarias gariepinus</i>	705	12.0	68	0.0
<i>Tilapia zilli</i>	76	1.3	58	0.0
<i>Labeo forskali</i>	-	-	55	0.0
<i>Citharanus latus</i>	0	0.0	35	0.0
<i>Barbus perince</i>	7	0.1	30	0.0
<i>Protopterus arthiopicus</i>	448	7.6	28	0.0
<i>Momyrus kanume</i>	90	1.5	23	0.0
<i>Oreochromis leucostictus</i>	472	8.0	21	0.0
<i>Tilapia galilaea</i>	-	-	18	0.0
<i>Malapterururs electricus</i>	47	0.8	18	0.0
<i>Disticodus niloticus</i>	121	2.1	16	0.0
Haplochromines	1	0.0	15	0.0
<i>Hyperopisus bebe</i>	4	0.1	9	0.0
<i>Momyrus macrocephalus</i>	45	0.8	8	0.0
<i>Labeo horie</i>	38	0.7	7	0.0
<i>Synodontis victoriae</i>	68	1.2	4	0.0
<i>Synodontis afrofischeri</i>	7	0.1	2	0.0
<i>Mormyrus niloticus</i>	1	0.0	2	0.0
<i>Gnathonemus victoriae</i>	16	0.3	0	0.0
<i>Labeo coubie</i>	94	1.6	-	-
<i>Marcusenius grahami</i>	7	0.1	-	-
<i>Synodontis frontosis</i>	6	0.1	-	-
<i>Alestes macrolipidotus</i>	5	0.1	-	-
<i>Gnathonenus longibarbis</i>	4	0.1	-	-
<i>Mormyrops anguilloides</i>	0	0.0	-	-
<i>Others</i>	23	0.4	3	0.0
Overall	5,873	100	151,600	100