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Management of the Nile perch, *Lates niloticus* fishery in Lake Victoria in light of the changes in its life history characteristics

Richard Ogutu-Ohwayo

Lake Victoria Fisheries Organisation, PO Box 1625, Jinja, Uganda

Abstract

Nile perch was introduced into lakes Victoria and Kyoga in the 1950s and 1960s from Lake Albert. The changes in prey eaten and the life history characteristics of Nile perch in lakes Victoria and Kyoga from the 1960s to 1990s were examined and compared with Lake Albert. The dominant prey eaten changed from haplochromines, *Caridina nilotica*, *Rastrineobola argentea*, and Nile perch juveniles. The condition factor deteriorated from 1.4 in 1960s to 1.2 in 1990s, compared with 1.3 in Lake Albert suggesting a reduction in food supply. Therefore, exploitation of Nile perch prey should be controlled. The size at first maturity increased from 30–40 to 40–50 cm and 50–59 to 80–100 cm for males and females, which is similar to Lake Albert.. Sex ratios decreased from 85–100 to 20–65 females for every 100 males suggesting that Nile perch had less capacity to replenish its stocks such that breeding females should be protected. As males mature at 50–55 cm and females at 80–100 cm, immature males of <50 cm and breeding females of >100 cm could be protected through size selective exploitation of fish of 50–100 cm using gillnets of 127–254 mm.

Key words: condition, food, management, Nile perch, reproduction

Résumé

La perche du Nil provenant du Lac Albert fut introduite dans les lacs Victoria et Kyonga dans les années 50 et 60. L'évolution dans la sélection de proie et le cycle de vie caractéristique des perches du Nil dans les lacs Victoria et Kyonga entre les années 60 et les années 90 ont été étudiés et comparés avec celles du Lac Albert. La proie principale a changé des haplochromines, *Caridina nilotica*, *Rastrineobola argentea*, et perches du Nil juveniles. Le coefficient de condition s'est vu détériorer de 1.4 dans les années 60 jusqu'à 1.2 dans les années 90, par rapport à 1.3 dans le Lac Albert – ce qui implique une diminution dans l'abondance de nourriture. En conséquent, l'exploitation de la proie des perches du Nil a besoin d'être contrôlée. La taille, arrivant à première maturité, a augmenté de 30 à 40 cm jusqu'à 40 à 50 cm, et de 50 à 59 jusqu'à 80 à 100 cm pour les mâles et les femelles respectivement - ce qui correspond largement aux données provenant du Lac Albert. Le ratio femelles mâles a diminué de 85–100 à 20–65 femelles pour 100 mâles, suggérant que la capacité de reproduction des perches est en cours de diminution, ce qui suggère que les femelles reproductrices devraient être protégées. Puisque les mâles adultes mesure de 50 à 55 cm et que les femelles atteignent de 80 à 100 cm, les mâles immatures de moins de 50 cm et les femelles reproductrices de plus de 100 cm pourraient être protégés à travers l'exploitation par sélection de taille des poissons de 50 à 100 cm utilisant les filets maillants de 127 à 254 mm.

Correspondence: Tel.: 256 43 120203;
E-mail: ogutu-ohwayo@lvfo.org

Introduction

Nile perch, *Lates niloticus* Linnaeus 1758, is a predatory fish of high commercial and recreational value. It can grow to a length of 2 m and a weight of over 200 kg. In Uganda Nile perch was originally found only in Lake Albert and the Nile below Murchison Falls. The species is, however, widely distributed in Africa occurring in the Nile system below Murchison Falls, the Congo, Niger, Volta, Senegal and in Lake Chad and Turkana (Greenwood, 1966). The distribution of Nile perch was extended through introduction of the species into lakes Kyoga, Nabugabo and

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Victoria from Lake Albert during the 1950's and early 1960's. Eight specimens from Lake Turkana were introduced in the Kenyan part of Lake Victoria at Kisumu in 1963 (Gee, 1964). The purpose of introducing Nile perch into lakes Victoria and Kyoga was for it to feed on the small-sized haplochromine cichlids, which were at that time abundant, but not much exploited, and convert them into a larger fish of greater commercial and recreational value (Graham, 1929; Worthington, 1929; Anderson, 1961). There were, however, fears that Nile perch might deplete stocks of native commercial fish species including itself after which the fisheries would collapse (Fryer, 1960).

Stocks of Nile perch increased rapidly after 1965, in Lake Kyoga, and 1977, in Lake Victoria. This was followed by rapid increases in fishery yield (Stoneman & Rogers, 1970; Hughes, 1983; Okaronon, Acere & Ocenodongo, 1985; Goudswaard & Witte, 1985). Increased abundance of the Nile perch was accompanied by a reduction and, in some cases, total disappearance, of many of the native species (Ogutu-Ohwayo, 1990a,b; 1993; Ogari & Dadzie, 1988; Ligtvoet & Mkumbo, 1990). Haplochromines, which were the most abundant fishes in Lake Victoria and were expected to form the bulk of the food of the Nile perch, were depleted and other species became scarce. About 60% of the haplochromine species are thought to have become extinct (Witte *et al.*, 1992a,b). The food of the Nile perch changed to the extent that it started feeding on its own young. Consequently, the condition factor and other life history characteristics of Nile perch were affected (Ogutu-Ohwayo, 1990b; 1999). This created fears that, although the Nile perch fishery had become very lucrative, it might not be sustainable if appropriate management measures were not put in place. The changes in the fish stocks, the type of prey eaten and the life history characteristics of Nile perch in lakes Victoria, Kyoga and Nabugabo have been monitored since the predator was introduced in these lakes and compared with the situation in its original habitat of Lake Albert.

This paper compares the data collected from Lake Victoria between 1964 and 2000, Lake Kyoga between 1967 and 2000, and Lake Nabugabo between 1991 and 1993 with that collected from Lake Albert between 1989 and 1992 to help predict the long-term trends in Nile perch fishery. Additional information for lakes Victoria and Kyoga has been obtained from reports of Gee (1964, 1969) and Asila & Ogari (1987) and that for other native habitats from Worthington (1929) for Lake Albert, Kenchington (1939) for the Blue Nile at Sennar and from Hopson (1972, 1982) for lakes Chad and Turkana. It was assumed that the status of Nile perch in Lake Albert and other native habitats represents the equilibrium state and that the biological characteristics of the species in the new habitats would change to a level recorded in Lake Albert and other native habitats. The following data sets have been used in the comparisons.

- A8993: Lake Albert, 1980–1993; the original and native habitat of Nile perch stocks, which were, introduced into lakes Victoria, Kyoga and Nabugabo.
- V6467: Lake Victoria, 1964–1967; soon after introduction of Nile perch and when haplochromines were still abundant and formed the main prey of Nile perch.
- V6877: Lake Victoria, 1968–1977; before Nile perch became well established and haplochromines were still abundant.
- V1982: Lake Victoria, 1982; the year when Nile perch populations increased rapidly in the northern region of Lake Victoria but when haplochromines were still abundant.
- V8892: Lake Victoria, 1988–1992; after haplochromines had been depleted and were no longer important as prey.
- V2000: Lake Victoria 1995–2000; when haplochromine stocks were starting to recover and were again becoming prominent as Nile perch prey.
- N9193: Lake Nabugabo 1991–1993; after Nile perch were well established and haplochromines had been depleted.
- K6768: Lake Kyoga, 1967–1968; after Nile perch were well established and haplochromines had been depleted and were no longer important as prey.
- K7880: Lake Kyoga 1978–1980; about 10 years after K6768.
- K8890: Lake Kyoga 1988–1990; about 10 years after K7880.
- K9193: Lake Kyoga 1991–1993; when haplochromines were starting to recover and were again becoming prominent as prey.

Fishery yield

After establishment of Nile perch, fishery yield in lakes Victoria and Kyoga increased five to eight times. Total fishery yield in the Ugandan portion of Lake Victoria increased from 17,000 tonnes in 1981 to 132,000 tonnes by 1989 because of an increase in contribution of Nile perch from 14,000 tonnes in 1983 to 101,000 tonnes in

1989. Similarly total yield in Lake Kyoga increased from 18,000 tonnes in 1964 to 167,000 tonnes in 1978 because of the rise in the contribution of Nile perch from about 700 to 71,000 tonnes. However, the yield of Nile perch in Lake Kyoga later decreased to 15,000 tonnes by 1989 (Ogutu-Ohwayo, 1994). This decline was attributed to heavy fishing pressure, use of destructive fishing gears and methods especially open water beach seines, which were widely used on the lake.

Food of Nile perch

Nile perch was introduced and became established earlier in Lake Kyoga than in lakes Victoria and Nabugabo. Data collected from Lake Kyoga soon after its introduction showed that haplochromines, mormyrids and tilapiines were the main prey of Nile perch (Hamblyn, 1966; Gee, 1969). The relative importance of the prey eaten by different size groups of Nile perch in lakes Victoria, Kyoga, Nabugabo and Albert during the different periods is illustrated in Fig. 1. The major types of prey eaten by Nile perch in Lake Kyoga by 1968 had changed from what had been reported by Hamblyn (1966) and Gee (1969) to anisopteran nymphs, *Rastrineobola argentea*, tilapiines, *Caridina nilotica* with few haplochromines and Nile perch juveniles. The type of prey eaten remained the same for the 1967–1968, 1978–1980 and 1988–1990 periods. During these periods, Nile perch of <20 cm mainly ate *C. nilotica, R. argentea*, anisopteran nymphs and chironomids. Those of 20–60 cm mainly ingested *R. argentea*, anisopteran nymphs, *C. nilotica*, tilapiines, juvenile Nile perch and to a less extent haplochromines, those of 60–100 cm mainly ate *R. argentea*, Nile perch juveniles, tilapiines and haplochromines while those of >100 cm depended almost solely on tilapiines. Between 1991 and 1993, the importance of haplochromines in the diet of Nile perch in Lake Kyoga, increased and became the most important prey for Nile perch of <100 cm with the larger Nile perch still fed on tilapiines and juvenile Nile perch. The relative importance of prey remained the same up to the 2002.

Between 1968 and 1977 haplochromines were the dominant prey of most sizes of Nile perch in Lake Victoria. By 1988, the major types of prey eaten in Lake Victoria had changed to *C. nilotica*; anisoptera nymphs, Nile perch juveniles, tilapiines with very few haplochromines. These remained the major types of prey eaten by Nile perch in Lake Victoria up to the 1995–2000 period. As for Lake Kyoga, the proportion of haplochromines in the diet had increased by the year 2000 but was still less important than during the 1968–1977 period. *Caridina nilotica*, anisoptera nymphs, *R. argentea* and Nile perch juveniles were the most important prey of Nile perch of <60 cm. Nile perch of 60–100 cm ingested mainly *R. argentea* and Nile perch juveniles while those of >100 cm still ate mainly tilapiines and Nile perch juveniles.

In Lake Albert, the reference habitat for Nile perch, the most important prey were *Alestes* spp., haplochromines, *C. nilotica*, anisopteran nymphs and Nile perch juveniles. *Caridina nilotica* and haplochromines were important in Nile perch of <20 cm. Nile perch of 20–60 cm ate *Alestes* spp., haplochromines, anisopteran nymphs, and *C. nilotica* while those of 60–100 cm fed on *Alestes* spp., haplochromines, *Hydrocynus* spp., Nile perch juveniles and tilapiines.

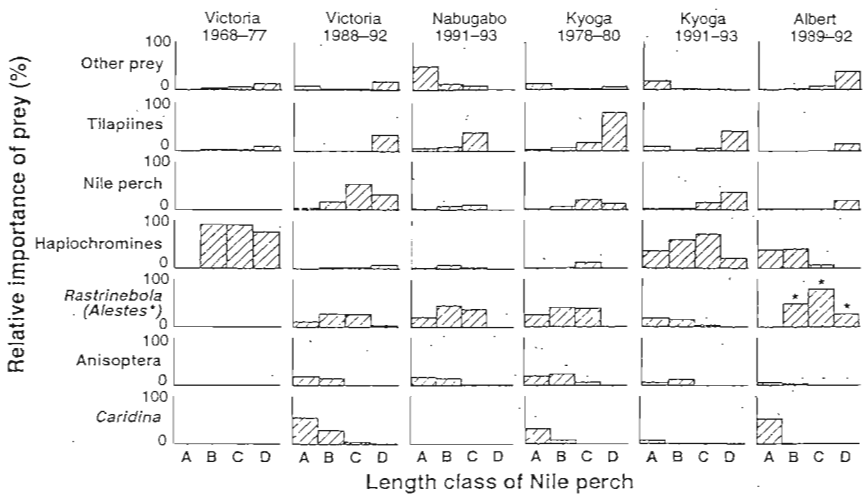

Fig 1 The relative importance of prey eaten by Nile perch in of: A, <20; B, 20–59; C, 60–100 and D >100 cm – Lakes Victoria, Kyoga, Nabugabo and Albert

Nile perch of >100 cm ate a variety of fish prey, which included *Alestes* spp., juvenile Nile perch, *Polypterus senegalensis*, mormyrids and *Bagrus* spp.

From the above observations, it can be concluded that the main prey of Nile perch in lakes Victoria, Kyoga, Nabugabo and Albert are *C. nilotica*, anisopteran nymphs, *R. argentea* or *Alestes* spp., haplochromine species, tilapiine species and Nile perch juveniles. *Caridina nilotica* are, however, more important and are eaten by Nile perch of a wider size range (up to 100 cm) in Lake Victoria than in the other lakes. Anisopteran nymphs were more important in lakes Kyoga and Nabugabo than in Victoria and Albert.

Rastrineobola argentea, for lakes Victoria, Kyoga and Nabugabo, and *Alestes* spp., for Lake Albert, were, in the absence of haplochromines, the most important fish prey species of Nile perch in the four lakes. *Rastrineobola argentea* was very important for Nile perch of 20–100 cm in lakes Victoria, Kyoga and Nabugabo, while in Lake Albert, *Alestes* spp. were important in Nile perch >20 cm. A decline in the importance of haplochromines was accompanied by an increase in that of *R. argentea*. However, as haplochromine stocks improved, Nile perch reverted to feeding more on haplochromines suggesting that Nile perch shifts to *R. argentea* in the absence of haplochromines. It also suggests that *R. argentea* may be a less preferred prey than haplochromines.

The length and numbers of prey ingested

The length and number of prey eaten changed with the size of the predator for all the periods examined (Fig. 2). The most abrupt change in both number and the size of prey eaten occurred when Nile perch was about 100 cm total length. This was most abrupt following a decline in haplochromine prey.

The changes in the average sizes and numbers of prey eaten by Nile perch of >100 cm in the new habitats from the time when haplochromines were still abundant through the period when haplochromine stocks had virtually disappeared to that when they had started to recover are compared with data from Lake Albert for the period 1989–1992 in Fig. 3. From 1968 to 1977, the average length of prey taken by Nile perch of >100 cm in Lake Victoria was lower than that for Lake Albert while the average number of prey was higher. After this period, the average number of prey decreased while the average length increased. Eventually, the average number became lower than in Lake Albert while the length increased beyond that found in that

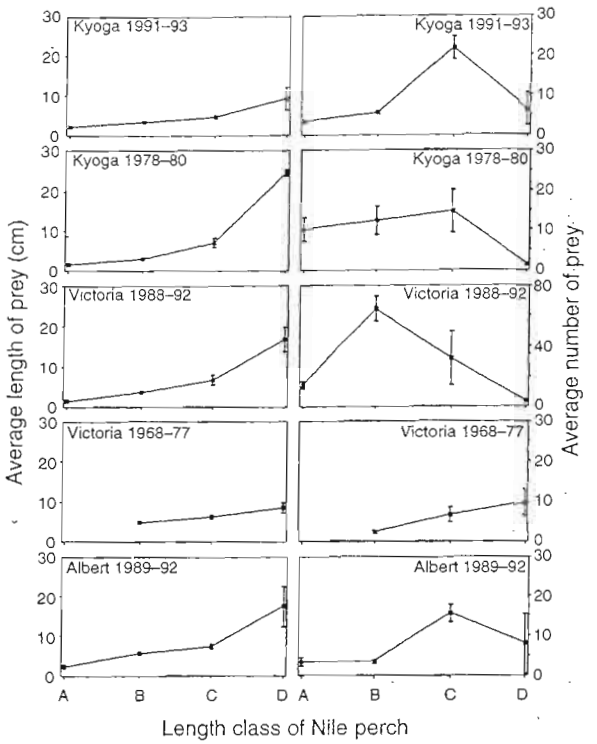

Fig 2 The average length and numbers of prey eaten by Nile perch of: A, <20 cm; B, 20–59; C, 60–100 and D, >100

lake. By the 1978–1998 period, the average length of prey had increased beyond the values recorded in Lake Albert while the average numbers had declined to lower values. With the improvement in haplochromine stocks as demonstrated by the 1991–1993 data from Lake Kyoga, the average length of prey eaten declined while average numbers increased towards values recorded in Lake Albert. This shows that Nile perch meets its food requirements by increasing either the number or size of prey.

The condition factor

Soon after its introduction, the condition factor (K) of Nile perch in lakes Victoria and Kyoga was higher than in most natural habitats. This was attributed to the high abundance of suitably sized and vulnerable haplochromine prey (Gee, 1964,1969). The mean condition factor of Nile perch of 20–100 cm in different lakes during different periods is illustrated Fig. 4. The highest values were recorded in Lake Victoria during the 1964–1967 and 1968–1977 periods and were higher than for Lake Albert up to the 1982 period, but subsequently declined to values, which were lower than for Lake Albert. The mean K of Nile perch in

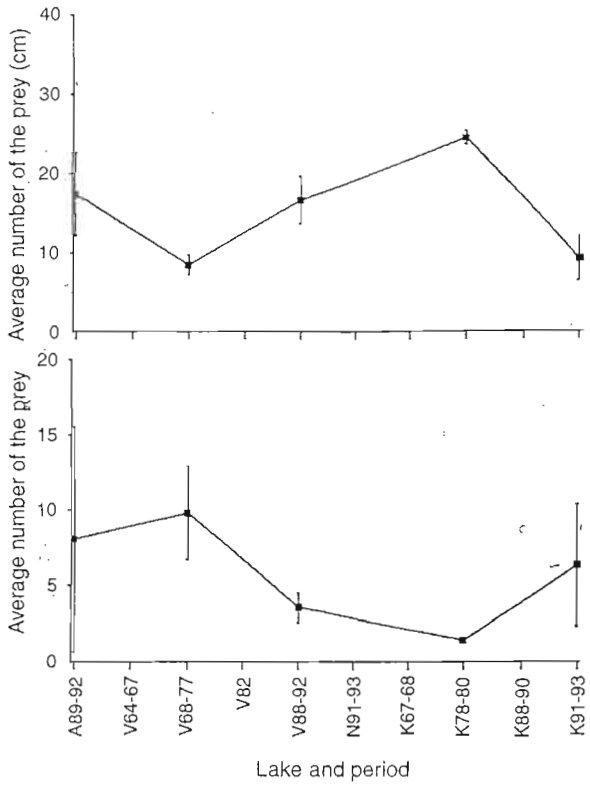

Fig 3 The average number of prey eaten by Nile perch of >100 cm

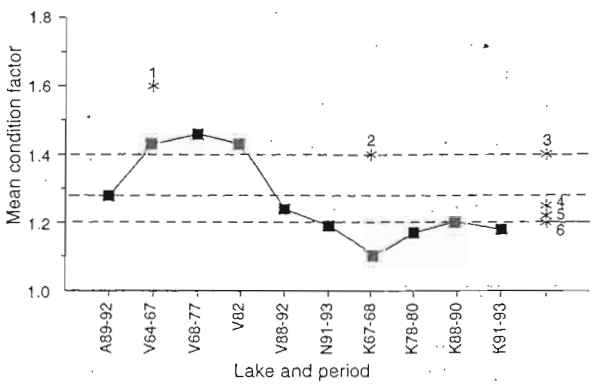

Fig 4 The condition factor of Nile perch. Data from other native habitats (1, Victoria; 2, Kyoga (Gee, 1969); 3, Nile at Sennar (Kenchington, 1939); 4, Albert (Worthington, 1929; 5, Turkana; 6, Chad (Hopson, 1972, 1982)

most native lacustrine habitats is around 1.25 (Worthington, 1929; Kenchington, 1939; Hopson, 1972,1982). The *K* values for lakes Victoria and Kyoga were originally 1.4–1.6 (Gee, 1964,1969). The *K* value of Nile perch in lakes Victoria, Nabugabo and Kyoga decreased to values lower than those originally recorded from the same lakes and are even lower than those recorded for the species on the Blue Nile at Sennar and on lakes Albert, Turkana and Chad. The values of *K* recorded in Lake Kyoga between 1967 and 1993 are cause for concern because they are lower than those recorded from its original habitat. This seems to be related to the types of prey eaten. There is a clear relationship between prey availability and *K* of Nile perch in its new habitats. Some of the prey especially *R. argentea* is currently heavily exploited in lakes Victoria and Kyoga and this is likely to spread to Lake Nabugabo. There are reports of exploitation of *C. nilotica* in some parts of Lake Victoria (Ogari & Asila, 1992). As, the *K* values recorded in lakes Victoria, Kyoga and Nabugabo are lower than those from Lake Albert, further reduction in prey of Nile perch such as may arise through heavy human exploitation of the prey could depress the condition of the Nile perch to a level which may affect its fishery. Therefore, over-exploitation of Nile perch prey should be avoided.

Reproduction

Dietary changes such as those that have occurred in Nile perch in its new habitats can affect aspects of reproduction (Nikolsky, 1963; Stearns & Crandall, 1989). A reduction in the abundance of prey may affect the size at first maturity and can cause sex ratios to be biased towards one sex. The quantity and quality of food affects size at first maturity through its effects on the onset of maturity (Wootton, 1989). Fish fed intensively mature earlier than those fed insufficiently. Improvement in food supply has been observed to accelerate maturity of fish while reduction in food supply can delay maturity (Nikolsky, 1963). Maturity is delayed in order to gain fecundity (Stearns & Crandall, 1989). Population fecundity is determined by individual fecundity, the onset of maturity, breeding periodicity and sex ratios. A population with better food supply usually has higher fecundity (Nikolsky, 1963). Therefore, changes in the quantity and quality of food available affects individual and population fecundity and the ability of the species to replenish its stock.

Size at first maturity

Soon after its introduction, Nile perch in lakes Victoria and Kyoga matured at a smaller size than in the native habitats (Okedi, 1971; Hopson, 1972). The size at first maturity of

male Nile perch in Lake Victoria during the 1964–1967 period was between 30 and 34 cm total length (Fig. 5a) and was 50–54 cm between 1988 and 1992 period. The size at first maturity of males in Lake Kyoga between 1967 and 1993, Lake Nabugabo between 1991 and 1993 and Lake Albert between 1989 and 1993 was between 50 and 59 cm total length. The values in Lake Victoria for 1988–1992 period approximate to those of different periods of Lake Kyoga between 1967 and 1993 and Lake Albert from 1989 to 1992. They are also similar to those recorded previously from lakes Albert (Worthington, 1929) and Turkana (Hopson, 1982). The size at first maturity of female Nile perch in Lake Victoria was 40–59 cm total length between 1964 and 1977 (Fig. 5b) and was 90–99 cm between 1988 and 1992. The sizes at first maturity of female Nile perch in Lake Kyoga between 1967 and 1993, Lake Nabugabo between 1991 and 1993 and Lake Albert between 1989 and 1993 were 80–99 cm total length. It should be noted that the size at first maturity among females is close to the size at which *L. niloticus* shifts to larger prey (Hopson, 1972; Ogutu-Ohwayo, 1985,1994; Fig. 2). Consumption of larger prey could be related to a need to increase the energy input required for reproduction.

Initially Nile perch in the new habitats matured at a smaller size than in its original habitat of Lake Albert. The size at first maturity in the new habitats adjusted over time to values recorded in lakes Albert and Turkana (Holden, 1963, Hopson, 1982) but higher than those recorded in Lake Chad and the Blue Nile (Hopson, 1972; Kenchington, 1939). The differences in size at first maturity could be because of differences in environmental conditions and fishing pressure. Maturity at a smaller size seems to occur in fish, which are in good condition, and has also been reported when there is over-exploitation. Nile perch in lakes where the condition factor was higher matured at a smaller size than where it was lower (Kenchington, 1939; Gee, 1969).

Sex ratios

Differences in sex ratios of Nile perch have been observed between native and new habitats (Okedi, 1971; Kenchington, 1939). The sex ratios of mature Nile perch over different periods are shown in Fig. 6. The proportion of mature females in Lake Victoria was higher than in Lake Albert between 1964 and 1977. The proportion of mature females

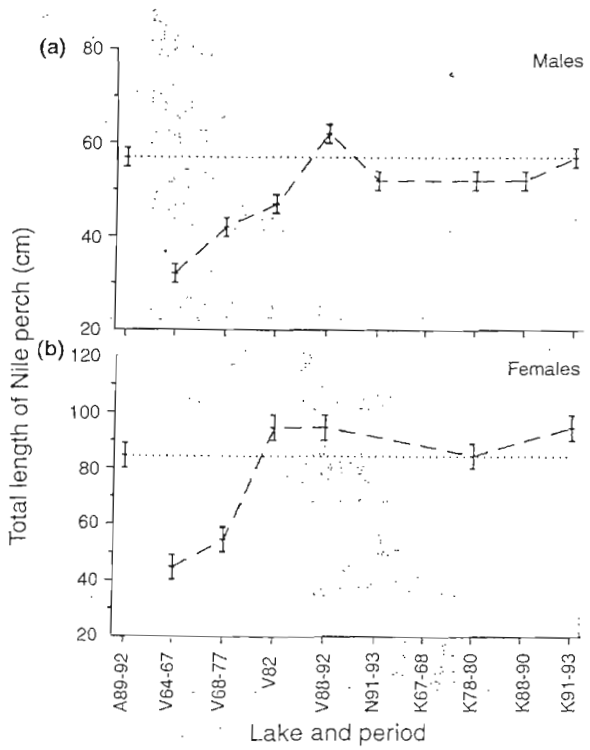

Fig 5 Size at first maturity of (a) males and (b) females in different lakes

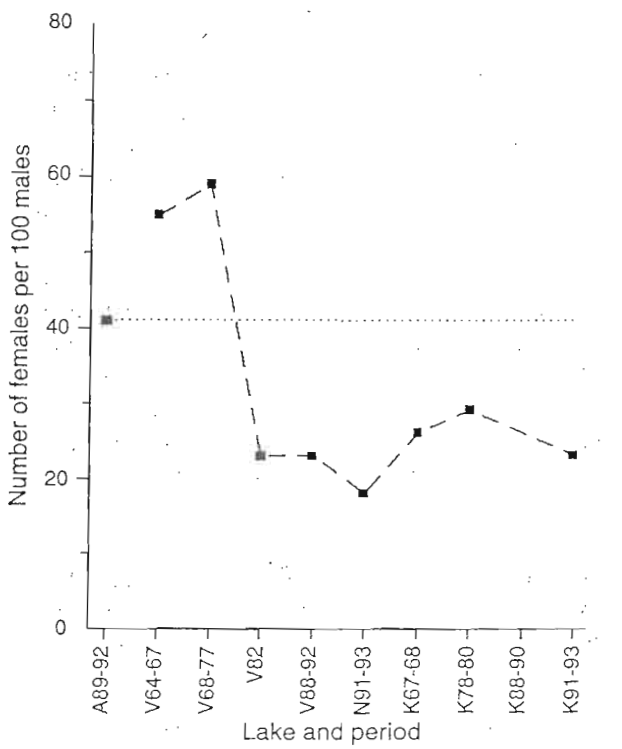

Fig 6 Sex ratios of mature females to mature males in the lakes examined during the different periods

in Lake Victoria by 1982 and in lakes Kyoga and Nabugabo was lower than that for Lake Albert. This indicates that Nile perch now has less capacity to replace its stocks.

Inter-habitat comparisons of sex ratio suggest a preponderance of males over females when all sizes of fish are considered. However, there have been significant changes in sex ratios in the new habitats since the Nile perch was introduced. In all the cases, the proportion of females in the population has decreased over time and is lower than that in native habitats including Lake Albert. These changes could be related to ecosystem pressures especially the reduction in the abundance of prey. Ricklefs (1990) has noted that a reduction in food supply can cause sex ratios to be biased towards one sex. The sex, which requires less energy, is produced in greater proportion under a situation of food scarcity. More energy may be required to produce females than males because of the higher energy required to produce ova. Also overexploitation of the larger individuals would affect the proportion of mature females in the population as the females mature at a larger size than males.

Fecundity

Lates niloticus is very fecund (Ogutu-Ohwayo, 1988). Fecundity increases with length and weight of the fish and is proportional to the cube of the length. As fecundity increases with size, maturity at a larger size is advantageous as it increases the number of eggs produced. This is probably one of the reasons why females grow to a much larger size than the males (Worthington, 1929; Kenchington, 1939; Hopson, 1972, 1982). Delay in maturity to a larger size could be an adaptation to gain fecundity under a situation of food shortage (Stearns & Crandall, 1989). High fecundity is also beneficial in cannibalistic species like Nile perch because if the stocks of a cannibal have to be sustained, enough young have to be produced to sustain the stocks. The extreme bias of sex ratio towards males like that recorded in Lake Victoria between 1988 and 1992 and that in all other native habitats will lower population fecundity (the total number of eggs produced by all mature females in the population). This will affect the capacity of the species to replenish its stocks.

Conclusions and recommendations

The reduction in the prey supply in the new habitats, the decrease in average weight of the Nile perch and the male biased population, suggest that Nile perch may not sustain the very high yields realized soon after its establishment in lakes Victoria and Kyoga. This situation is compounded by the very high fishing pressure on the species because of the very high demand for fish by the increasing human population and the export oriented fish processing plants. The increase in fish catches following establishment of Nile perch resulted in establishment of fish processing plants which fillet Nile perch mainly for export and this has stimulated increases in fishing effort. In the Ugandan part of the lake, fishing effort increased from 3200 canoes in 1972 before the establishment of Nile perch in Lake Victoria to 8674 canoes in 1990 and to 15,462 canoes by 2000. The total number of boats on the lake is now 41,000. This rapid increase in fishing effort is a major threat to the fishery. In addition, over-fishing of *R. argentea* without a compensatory recovery in haplochromine stocks would further endanger the Nile perch stocks. For the Nile perch fishery to remain sustainable, it will be necessary to:

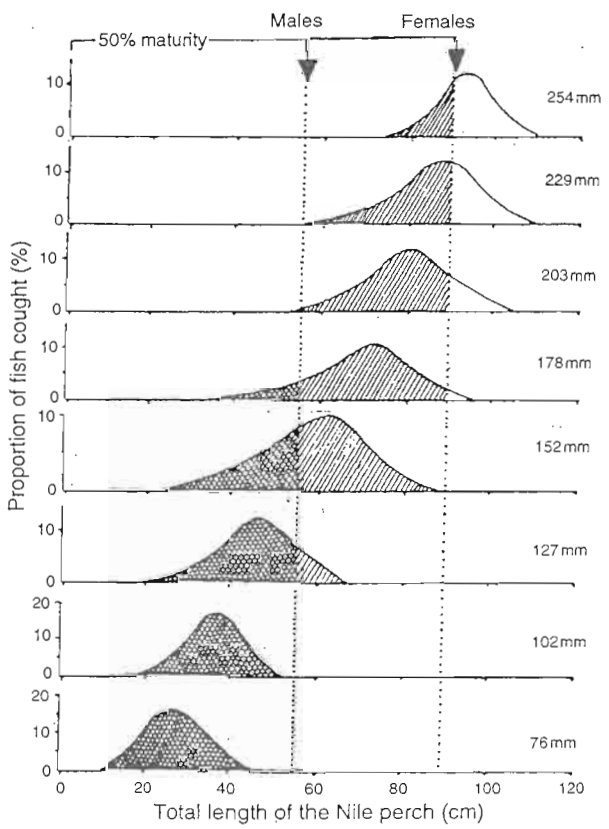

Fig 7 Smoothed curves of length frequency distribution of Nile perch caught in gillnets of 76–254 mm

- Avoid exploitation of Nile perch prey especially the prawns (*C. nilotica*), and control fishing pressure on *R. argentea*;
- Avoid catching immature Nile perch of <50 cm;
- Protect mature breeding females of Nile perch especially those of >100 cm; and
- Reduce fishing pressure on the species.

It has been noted that females mature at and grow to larger sizes than males. Analysis of the population structure of mature Nile perch shows that virtually all fish above 120 cm total length are females. Female Nile perch mature at 80–100 cm total lengths. The management option for Nile perch should aim at protecting immature males and females so that they can reach breeding size and protecting mature females so that they can produce eggs to replenish the stocks. Males mature at a smaller size 50–55 cm and this should determine the lower size limit of Nile perch that should be harvested. Hence Nile perch of <50 cm should not be harvested and mature females of >100 cm should be protected. This means that the slot size of Nile perch that should be harvested is 50–100 cm total length.

Gill nets and hooks are the main legal fishing gear used to harvest Nile perch. Gill net selectivity for Nile perch (Fig. 7) shows that the mesh size of gill net which catch Nile perch of 50 cm is 5 inches (127 mm) stretched mesh while that required to catch Nile perch of 100 cm is 10 inches (254 mm) mesh. The mesh size of gill nets on Lake Victoria should not be <5 inches and not >10 inches.

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(*Manuscript accepted 18 May 2004*)

FIRRI

From: "Fisheries Resources Research Institute" <firi@infocom.co.ug>
To: <director@firi.go.ug>
Cc: <firi@firi.go.ug>
Sent: Wednesday, April 27, 2005 3:27 PM
Attach: Agenda for 10th Regular Session of EC.doc; PROGRAMME OF 8TH SC 05 05.doc
Subject: Fw: Invitation to the Sixth Regular Session of the Scientific Committee 9 to 10 May 2005

----- Original Message -----
From: maembe
To: bwathondi@yahoo.co.uk ; firi@infocom.co.ug ; firi@firi.go.ug ; jkazungu@recoscix.org
Sent: Wednesday, April 27, 2005 1:45 PM
Subject: Invitation to the Sixth Regular Session of the Scientific Committee 9 to 10 May 2005

Please find the invitation letter for the SC meeting and the draft agenda plus the draft aganda for the Tenth Regular Session of the Executive Committee for your action.

T.W. Maembe
Executive Secretary

+ [illegible]
– Schirmeta

DRAFT AGENDA FOR THE EIGHT SESSION OF THE SCIENTIFIC COMMITTEE
9-10 MAY 2005, ENTEBBE, UGANDA.

1. **Opening Session**
   (a) Opening Remarks by the Chairperson
   (b) Adoption of Agenda and Program
   (c) Election of New Chairperson
   (d) Statement of the Executive Secretary of the LVFO
   (e) Welcoming Remarks by the Host State
   (f) Remarks by the Outgoing Chairperson
1. **Status of Implementation of the Decisions of the Council of Ministers**
3. **Issues from the Previous Scientific Committee Meeting**
4. **Progress in Implementation of the Activities Resource Environmental and Socio-economic Research and Monitoring**
   2.1. Frame Surveys
   2.2. Catch assessment surveys
   2.3. Trawl Surveys
   2.4. Hydro-acoustic Surveys
   2.5. Gillnet Surveys
   2.6. Mosquito seine *Rastrineobola argentea* (Dagaa/Omena/Mekene) studies
   2.7. Biological Surveys
   2.8. Environmental Monitoring
   2.9. Socio-Economic Research and Monitoring
   2.10. Fish Quality Assurance, safety, Product Development and Marketing (Registering the Lake Victoria Nile perch)
5. **Aquaculture Research and Development Programme**
6. **Information and Database Programme**
   a. Database Development, Management and Policy
   b. Information, Communication and Outreach
      i. Draft Information Communication and Outreach Strategy and Action Plan
      ii. Publications made (The Institutional Structure and Programs of the LVFO; LVFO Brochure, Posters; Calendars; Book of Abstract)
      iii. Regional Stakeholders' Conference (Conference Declaration & Publication of Conference Proceedings)
      iv. Status of publication of *The African Journal of Tropical hydrobiology and Fisheries*; (Publication of LVEMP Scientific papers; Status of the Editorial Board)
      v. Status of Publication of the *Mputa* Newsletter
      vi. Publication of the Proceedings of the LV 2000: A New Beginning Conference;
      vii. Monitoring and Outreach Mission 2005 (Mission Report)
      viii. Meetings and Conferences (Cage Culture, CIFA, COFI etc)
7. **Infrastructure and Capacity Building Programme**
   5.1. Specifications for the New Research Vessels including equipment for the new vessels and upgrading those on MV Explorer
8. **Status and Progress in the Implementation of LVFO Projects**
9. **AOB**
10. **Date and Venue of the Ninth Regular Session**
11. **Preparation of the Report**
12. **Adoption of the Report**
13. **Closing**

DRAFT AGENDA FOR THE TENTH REGULAR SESSION OF THE EXECUTIVE COMMITEE 24-25 MAY 2005, MOMBASA, KENYA.

1. Opening Session
    1.1. Opening Remarks by the Chairperson
    1.2. Adoption of the Agenda and Programme
    1.3. Election of Chairperson
    1.4. Remarks by the Executive Secretary, LVFO
    1.5. Welcoming Remarks by the Host
    1.6. Remarks by the Outgoing chairperson
2. Consideration of the Report of the LVFO Secretariat
    2.1. Status of Implementation of the Decisions of the Council of Ministers
    2.2. Issues from the Previous Executive Committee Meeting
    2.3. Progress in Implementation of the Programs of the Organisation
        2.3.1. Fisheries Management
        2.3.2. Resource Environmental and Socio-economic Research and Monitoring
        2.3.3. Aquaculture Research and Development
        2.3.4. Information and Database
        2.3.5. Infrastructure and Capacity Building
    2.4. Status and Progress in Implementation of LVFO Projects
    2.5. Staff and Administrative Matters
    2.6. Financial Matters
3. AOB
4. Date and Venue of the Tenth Regular Session
5. Preparation of the Report
6. Adoption of the Report
7. Closing Session

THE SEVENTH SESSION OF THE LVFO SCIENTIFIC COMMITTEE 9-10 MAY 2005, ENTEBBE, UGANDA.

PROGRAMME

Draft Programme

DAY ONE

No.	Activity	Leading Person	Time
	Opening prayer		
1.	**Opening Session**	The ES- LVFO	09:00-10:10
	1.1.Opening Remarks by the Chairperson 1.2.Adoption of Agenda and Program 1.3.Election of New Chairperson 1.4.Statement of the Executive Secretary - LVFO 1.5 Welcoming Remarks by the Host State 1.6 Remarks by the Outgoing Chairperson		
	Coffee/Tea break		10:10-10:30
2.	Status of Implementation of the Decisions of the Council of Ministers	SS -LVFO	10:30-10:45
3.	Issues from the Previous Scientific Committee Meeting	SS -LVFO	10:45-11.00
4.	Progress in Implementation of the Research Activities under Resource Environmental and Socio-economic Research and Monitoring Programm	Presentations of SOPs by RWGs Chairpersons	11:00-13:00
4.1	Frame Surveys	Dr L. Muhoozi	
4.2	Catch Assessment Surveys	Dr. L. Muhoozi	
4.3	Trawl Surveys	Dr. O. Mkumbo	
4.4	Hydro-acoustic Surveys	A. Getabu	
	Lunch		13.00-14.00
	Presentation of SOPs Conts		14:00-15:30
4.5	Gillnet Surveys	Dr. M. Njiru	
4.6	Biological Surveys	Dr. Y. Budeba	
	Progress on other SOps	The SS -LVFO	
	4.7. *Rastrineobola argentea* Studies 4.8. Pollution and Environmental Monitoring 4.9. Socio-Economic Research and Monitoring 4.10. Fish Quality Assurance, Safety, Product Development and Marketing (Registering the Lake Victoria Nile perch)		
5.	Aquaculture Research and Development Programme	SS -LVFO	15:30–15:45
6.	Information and Database Programme	PM – IFMP	15:45-16:15
	Coffee/Tea Break		16.15-16.45
7.	Infrastructure and Capacity Building Programme	PM - IFMP	16:45-17:30

DAY TWO

8.	Status and Progress in the Implementation of LVFO Projects	SS -LVFO	9:00-9:30
9.	AOB	DES- LVFO	9:30-10:10
10.	Date and Venue of the eighth Regular Session	DES- LVFO	10:10-10:30
	Coffee/Tea Break		10:30-10:45
11.	Preparation of the Report	SS - LVFO	10:45-16:30
	Lunch		13:00-13:30
12.	Adoption of the Report	DES	16:30-17:00
13.	Closing	ES -LVFO	17:00

Progress in implementation of the activities of Resource Environment and Socio-economic monitoring in Lake Victoria.

1. Frame surveys

The last Frame survey in Lake Victoria was conducted in April 2004. The activity with funds in the first year of the APE is a meeting of the RWG to analyse the 2004 data and produce a regional report. This activity has not been undertaken and one major constraint is that Uganda has not finished data entry. Frame surveys are bi-annual and the next Frame survey is planned for 2006.

2. Catch Assessment surveys

The CAS SOPs are in the finalisation stages following:

(i) Review by the ISTTA
(ii) A RWG meeting to with the ISTTA 17-18 March 2005 at Colline Hotel Uganda to finalise the SOPs
(iii) A Pilot CAS conducted by the RWG at three landing sites in Magu district Tanzania 25 April – 1 May 2005.

The activities to be undertaken soon include formation of A National Working group in the third week of May during which plans to train enumerators and conduct CAS in early June shall be finalized.

3. Trawl surveys

The trawl survey planned for the last quarter was successfully conducted despite two major breakdowns of the vessel RV IBIS during the Cruise. An internal seminar was held on 31st March to discuss the results of the survey and plan for presentations of the results in a seminar with key stakeholders on 8th April. Results of the Trawl survey were presented in the Seminar of Key stakeholders on 8th April 2005, which was attended by the Hon. Minister MAAIF, The EU Delegation in Uganda, The DG NARO, The Commissioner and staff of DFR, The Technical Staff of LVFO, Staff of the IFMP PIU, The Mayor and RDC Jinja district and FIRRI Scientists. Final reporting is in progress.

The RV IBIS has been taken to Kisumu for dry docking to prepare for the next Cruises.

4. Hydro-acoustic Surveys

FIRRI has participated in the RWG meeting to finalise the SOPs. The two staff who represented FIRRI in the RWG meeting had no prior experience in Hydro-acoustic work. To strengthen the Hydro-acoustic capacity training is needed.

5. Gillnet surveys

FIRRI coordinated the central purchase of gillnets from Uganda Fish net Manufacturers in Kampala. One set has been mounted ready for RWG Pilot testing 13-20 May 2005 in Mackdonald Bay Uganda. All arrangements for the gillnet Pilot survey have been finalized.

6. Dagaa surveys – selectivity experiments

FIRRI participated in the Regional field survey in Kenya and currently in Tanzania (Ongoing)

7. Biological surveys

These activities have been undertaken and reported together with trawl surveys.

8. Environmental Monitoring

These activities have been undertaken and reported together with trawl surveys. One follow up survey was conducted in the Entebbe waters of Lake Victoria to cross check abnormal pollution levels that were recorded during the trawl survey.

9. Socio-economic monitoring
No funds for field activities yet

10. Fish quality assurance
?????

ISSUES FOR CONSIDERATION

1. **Activities which do not have clear regional work programs e.g. Plankton and larval surveys should be discussed. For Larval surveys in particular, given the importance of identifying nursery and breeding grounds should be thoroughly harmonized possibly with a RWG on its own.**
2. **Hydro-acoustics may require specific Environmental SOPs**
3. **Annually all working groups should present papers to management**