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GUIDELINES FOR SAMPLING PELAGIC FISH CATCHES ON LAKE TANGANYIKA

by

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PREFACE

The Research for the Management of the Fisheries on Lake Tanganyika project (Lake Tanganyika Research) became fully operational in January 1992. It is executed by the Food and Agriculture Organization of the United Nations (FAO) and funded by the Finnish International Development Agency (FINNIDA) and the Arab Gulf Programme for United Nations Development Organizations
(AGFUND).

This project aims at the determination of the biological basis for fish production on Lake Tanganyika, in order to permit the formulation of a coherent lake–wide fisheries management policy for the four riparian States (Burundi, Tanzania, Zaïre and Zambia).

Particular attention will be also given to the reinforcement of the skills and physical facilities of the fisheries research units in all four beneficiary countries as well as to the build–up of effective coordination mechanisms to ensure full collaboration between the Governments concerned.

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1. INTRODUCTION

Fish population biology is one of the six subcomponents of the LTR research programme. Its aim is to study the pelagic fish catch composition in eight areas of Lake Tanganyika by taking regular samples from various fishing fleets. In order to ensure that the sampling procedures at each LTR research station are the same and thus comparable, a two week long training course has been organized. It took place in LTR-HQ in Bujumbura from 29.03 to 09.04.1993. Participants from all four riparian states took part. This document provides the initial guidelines concerning the LTR fisheries biology subcomponent.

In Lake Tanganyika's pelagic fish community there are six endemic species i.e. *Limnothrissa miodon, Stolothrissa tanganicae* and four members of the genus *Lates,* namely *L. angustifrons, L. mariae, L. microlepis* and *L. stappersii.* Predator–prey interactions play an important role in the life history of all these species.

Studies of the interactions between the plankton community, the pelagic fish community and the predator-prey system should provide information in order to answer the following questions:

1. What is the biological basis for pelagic fish production in Lake Tanganyika?

2. How would pathways of carbon change in the pelagic ecosystem if the present composition and abundance of fish stocks would change?

3. What are the ecological interactions and adaptations that control the pelagic carbon flow and how are they changing in the present situation?

4. What is the total pelagic fish production and do pelagic fish species regulate the distribution pattern, patchiness and vertical migration of the plankton community.

5. Do predators influence the distribution and migration patterns of *Limnothrissa miodon* and *Stolothrissa tanganicae*

6. How does fishing influence the annual and seasonal changes of pelagic fish abundance and production?

2. SAMPLING FISH CATCHES

Catch statistics collected by national authorities are used as historical background information of fishing activities, number and type of gears, number of fishing vessels and total catches. These data, however should be handled with caution as there are always some inconsistencies, gaps and uncertainties. Some indices, however, could be estimated from these data. A statistical survey is planned in order to improve the estimates of total catches in 1993.

The first ever aerial frame survey of Lake Tanganyika fisheries, conducted in September-October 1992 (Hanek et *al.* 1993), forms a good basis for the estimation of the amount of fishing effort in various parts of the lake and for the design of a sampling strategy. In LTR there are possibilities to sample regularly pelagic fish catches in order to get more detailed information on length composition, species composition and mean weights per length group.

For the evaluation of the catch composition of the target species for different seasons and locations, the latest available catch statistics will be used and a special survey in five or more locations around the Lake will be conducted. The aim of this catch composition survey is to estimate the exploitation rate and the changes in the exploitation pattern of *L. miodon* and S. *tanganicae* as well as *Lates* spp., because juvenile *Lates* spp. are represented in artisanal fisheries in large quantities.

2.1 Where, when and why

Weekly samples should be taken from the most important local fisheries and gears in the vicinity of Bujumbura (Burundi), Kigoma and Rukwa (Tanzania), Mpulungu and Nsumbu (Zambia), Moba, Kalemie and Uvira (Zaïre). The sampling sites have to be chosen locally. This sampling strategy divides the lake's pelagic area into three parts: southern, central and northern. According to historical data, the artisanal catch per unit of effort (CPUE) varies between 15 kg/day to 150 kg/day and total annual catches are about 80,000 tons. As a rule of thumb, one sample for around 100 tons of catch should be taken i.e. about 800 samples per year to give estimates of exploitation patterns, mortality rates and their changes. At each sampling location, about 200—250 samples per year (in total 52 weeks of sampling) consisting of 4 weekly subsamples (different vessels and gears) should be taken at each landing site. Each subsample should weigh about 1 kg. This means a total of 4 kg of unsorted randomly sampled fish during the day of sampling. These 4 samples should be processed during the same day (depending on the size of the individual specimens there should be in all about 2 000-5 000 specimens).

The *Lates* species should also be sampled regularly and the sample size should be 2 kg, comprising juvenile as well as adult *Lates* specimens; if only a few big specimens are present in the

sampled catch, all efforts must be made to sample them all.

2.2 How to take subsamples of catches

When taking subsamples from the total catch of a fishing unit (canoes, catamarans, trimarans, Apollo, beach seine used in the pelagic zone and industrial fishing units) (see Appendix 3), one must ensure that the sample is not taken from the catch already sorted out. There will certainly be some difficulties to obtain proper samples for *Lates* spp., because fishermen tend to sort them out immediately after hauling. Nevertheless, the target species are mainly *L. miodon* and S. *tanganicae* as well as the juvenile and adult *Lates* spp. in the pelagic zone (Appendix 1). Gears used only in the littoral zone will not be sampled.

It is very important to ensure that the data collectors are present at the landing sites well before the return of the fishing vessels. The sampling schemes may differ depending on area, fishing gear and amount of the total catch per fishing unit.

As far as the selection of fishing craft is concerned it should be noted that it does not have to be the same vessel each time the samples are taken. The important thing is to sample different vessels using the same gears and, particularly, the most important gear locally. The objective is to cover the whole range of fishermen and gears. Sampling may vary from one week to another, but in principle combined monthly samples should give us detailed information of catch composition.

The samples should be taken fast because fishermen have their catches in fish boxes ready to transport them to the market as fast as possible. Ideally, one should buy the sample at market price directly from the vessel just after their arrival. Three weekly samples are an absolute minimum. Each LTR station will have its sampling programme.

The size of one subsample is around 1 kg unsorted mixed catch of *L. miodon, S. tanganicae* and juvenile and adult *Lates* spp. specimens. If there are bigger *Lates* specimens already sorted out (usually there are) one should also buy them in order to get the amount of bigger predators in the catches. Big predators may be expensive and to reduce costs one may ask the fishermen the permission to take the basic biological information (species, length, weight, sex) without buying the fish. The whole subsample is placed in a plastic bag in a cooler with ice in order to keep it in good shape for processing. The following information should be placed inside the bag as well as on the forms to be filled in the laboratory:

* sampling location;
* sampling date;
* total catch of the vessel (kg); and
* fishing gear, including mesh size (mm).

2.3 How to process subsamples

In the laboratory the samples are kept in a refrigerator. The procedure is as follows:

1. obtain the total subsample weight (g) and write it down on the measuring forms;

2. write down the catch sample information on the measuring forms;

3. sort the sample by target species and other species (Appendix 1 provides the characteristics of all target fish species)

   - *L. miodon*
   – *S. tanganicae*
   – all *Lates* species separately, and
   - all other by-catch species;

4. obtain the total weight of all specimens (by species) in the subsample (g) and write it down on the measuring form; and

5. start measurements with one species (for example *L. miodon)* and put all others in a cool place.

3. STANDARD MEASUREMENTS AT LABORATORY

The following procedure is used for all six species in the catch samples and length and weight measurements and maturity stage checking by sexes are repeated for all species.

3.1 Length and weight measurements

Length measurements of all specimens in a subsample are measured as total length (see Figure 1: from the tip of the snout to the end of the caudal fin) and in millimetre (mm) scale (to the nearest millimetre) using a measuring board. In practice, one or two persons are measuring and one is filling the information on measuring forms. Ready for use measuring forms are presented as Tables 1–3 and Appendix 2 shows an example of a completed measuring form.

The fish are sorted into 5 mm length groups on small plastic plates; these 5 mm groups are then weighed in order to get mean weights. Appendix 2 shows the grouping of these 5 mm length groups. Length groups start always at full 10 mm and 5 mm; for example, a length group is from 60 mm to 64 mm (five length classes: 60 mm, 61 mm, 62 mm, 63 mm and 64 mm) and the next length

group from 65 mm to 69 mm (five length classes: 65 mm, 66 mm, 67 mm, 68 mm and 69 mm) and so on.

When all specimens of the first species are measured, specimens of each mm group are counted to obtain the total number of specimens belonging to that group (see Appendix 2); the number is recorded on the form. Then, each small plate containing all measured fish in any particular 5 mm length group are weighed to the nearest g; the reading is recorded on the measuring form (Appendix 2). Important: the balance must be reset with an empty plastic plate after each group has been weighed; this step is repeated for all 5 mm length groups and the results recorded on measuring forms. The different 5 mm length groups must not be mixed since they are needed for the following measurement.

3.2 Maturity stages

After the measuring and weighing of *L. miodon* and *S. tanganicae* is completed, 10 specimens from each 5 mm length group are taken by random selection and checked for their sex and maturity stage. Females and males are handled separately and information is recorded on the appropriate form; examples are given in Tables 4 and 5.

There are five different maturity stages, and their characteristics and simplified classification are:

Stage 1:	**Immature** (juvenile) Young individuals, which are not yet able to reproduce. Gonads are very small and thread-like. The sexing is very difficult. They are handled as one separate group.
Stage 2:	**Maturation** Eggs distinguishable to the naked eye. A very rapid increase in weight of the gonad is in progress. Testes change from transparent to a pale rose colour.
Stage 3:	**Maturity** Sexual products are ripe. Gonads have achieved their maximum weight, but & sexual products are not extruded, when light pressure is applied.

Stage 4:	**Reproduction** (spawning) Sexual products are extruded in response to very light pressure on the belly. Weight of the gonads decreases rapidly from the start of spawning to its completion.
Stage 5:	**Spent** Gonads are not fully empty and in the distal part of the ovary there might be some eggs.

The spawning of *L. miodon* and *S. tanganicae* is a continuous process. Although these maturity stage criteria are rather subjective, the results provide an estimation of the number and biomass of immature, maturing, and mature specimens of both species which are removed from the pelagic part of the stock in a particular time frame.

4. PREPARING A DATAFILE

After all samples i.e. 4 samples have been processed following the guidelines provided in 3.1 and 3.2 above, these primary data are recorded in a data—base created by the EXCEL spreadsheet program running under Windows. For *L. miodon, S. tanganicae* and *Lates* spp. the ready to use files have been prepared; examples are shown in Tables 6—8.

The names of the length distribution and mean weight at length group files for different species are:

1.	Limnoall.xls	(for *Limnothrissa* length distribution)
2.	Stoloall. xls	(for *Stolothrissa* length distribution)
3.	Lstapall.xls	(for *Lates stappersii* length distribution)
4.	Languall.xls	(for *Lates angustifrons* length distribution)
5.	Lmariall.xls	(for *Lates mariae* length distribution)
6.	Lmicrall.xls	(for *Lates microlepis* length distribution)

5. PRESERVING THE PRIMARY DATA AND MONTHLY OPERATIONS

Those field stations with PC capacity (Bujumbura, Kigoma, Mpulungu and Uvira) should compile each month’s primary data in a database by species and send monthly a printout as well as a file copy to the fisheries biology field coordinator (Piero Mannini in Kigoma).

Those sampling sites and field stations without PC capacity must send their results (copies of original forms; photocopies or handwritten copies) regularly to the nearest station having computer capacity. This station then compiles the information as mentioned above and forwards it to the fisheries biology field coordinator.

As each station's database is using the same filename, diskettes and its copies must be very clearly marked.

Each station must keep a backup copy of all files and the original data forms. Information on each sample examined should be preserved separately. All information of one sample should be put together so that no mixing of data occurs.

Since the original forms are filled by hand, the quality of the handwritten information should be so clear that they can be read without mistake by anyone.

Table 1.

Research for the Management of the Fisheries on Lake Tanganyika

Sample number: Date: Station:

Species: Limnothrissa miodon Area:

Fishing vessel category: Total catch (kg):

Gear and mesh size: Subsample (kg):

Length (mm)	Total	Length (mm)	Total
30		95	
1		6	
2		7	
3		8	
4		9	
35		100	
6		1	
7		2	
8		3	
9		4	
40		105	
1		6	
2		7	
3		8	
4		9	
45		110	
6		1	
7		2	
8		3	
9		4	
50		115	
1		6	
2		7	
3		8	
4		9	
55		120	
6		1	
7		2	
8		3	
9		4	
60		125	
1		6	
2		7	
3		8	
4		9	
65		130	
6		1	
7		2	
8		3	
9		4	
70		135	
1		6	
2		7	
3		8	
4		9	
75		140	
6		1	
7		2	
8		3	
9		4	
80		145	
1		6	
2		7	
3		8	
4		9	
85		150	
6		1	
7		2	
8		3	
9		4	
90		155	
1		6	
2		7	
3		8	
4		9	

Table 2.

Research for the Management of the Fisheries on Lake Tanganyika

Sample number: Date: Station:

Species: Stolothrissa tanganicae Area:

Fishing vessel category: Total catch (kg):

Gear and mesh size: Subsample (kg):

Length (mm)	Total
30	
1	
2	
3	
4	
35	
6	
7	
8	
9	
40	
1	
2	
3	
4	
45	
6	
7	
8	
9	
50	
1	
2	
3	
4	
55	
6	
7	
8	
9	
60	
1	
2	
3	
4	
65	
6	
7	
8	
9	
70	
1	
2	
3	
4	
75	
6	
7	
8	
9	
80	
1	
2	
3	
4	
85	
6	
7	
8	
9	
90	
1	
2	
3	
4	

Table 3.

Research for the Management of the Fisheries on Lake Tanganyika

Sample number: Date: Station:

Species: Lates Area:

Fishing vessel category: Total catch (kg):

Gear and mesh size: Subsample (kg):

Length (mm)

30		95		160		225		290		355	
1		6		1		6		1		6	
2		7		2		7		2		7	
3		8		3		8		3		8	
4		9		4		9		4		9	
35		100		165		230		295		360	
6		1		6		1		6		1	
7		2		7		2		7		2	
8		3		8		3		8		3	
9		4		9		4		9		4	
40		105		170		235		300		365	
1		6		1		6		1		6	
2		7		2		7		2		7	
3		8		3		8		3		8	
4		9		4		9		4		9	
45		110		175		240		305		370	
6		1		6		1		6		1	
7		2		7		2		7		2	
8		3		8		3		8		3	
9		4		9		4		9		4	
50		115		180		245		310		375	
1		6		1		6		1		6	
2		7		2		7		2		7	
3		8		3		8		3		8	
4		9		4		9		4		9	
55		120		185		250		315		380	
6		1		6		1		6		1	
7		2		7		2		7		2	
8		3		8		3		8		3	
9		4		9		4		9		4	
60		125		190		255		320		385	
1		6		1		6		1		6	
2		7		2		7		2		7	
3		8		3		8		3		8	
4		9		4		9		4		9	
65		130		195		260		325		390	
6		1		6		1		6		1	
7		2		7		2		7		2	
8		3		8		3		8		3	
9		4		9		4		9		4	
70		135		200		265		330		395	
1		6		1		6		1		6	
2		7		2		7		2		7	
3		8		3		8		3		8	
4		9		4		9		4		9	
75		140		205		270		335		400	
6		1		6		6		6		1	
7		2		7		7		7		2	
8		3		8		8		8		3	
9		4		9		9		9		4	
80		145		210		275		340		405	
1		6		1		6		1		6	
2		7		2		7		2		7	
3		8		3		8		3		8	
4		9		4		9		4		9	
85		150		215		280		345		410	
6		1		6		1		6		1	
7		2		7		2		7		2	
8		3		8		3		8		3	
9		4		9		4		9		4	
90		155		220		285		350		415	
1		6		1		6		1		6	
2		7		2		7		2		7	
3		8		3		8		3		8	
4		9		4		9		4		9	

Table 4

Research for the Management of the Fisheries on Lake Tanganyika

Sample number: Date: Station:

Species: Limnothrissa miodon

Fishing vessel category: Total catch (kg):

Gear and mesh size: Subsample (kg):

Maturity samples Area:

Length classes (mm)	Immatures (unidentified)		Females					Males				
	1	Total	2	3	4	5	Total	2	3	4	5	Total
20-24												
25-29												
30-34												
35-39												
40-44												
45-49												
50-54												
55-59												
60-64												
65-69												
70-74												
75-79												
80-84												
85-89												
90-94												
95-99												
100-104												
105-109												
110-114												
115-119												
120-124												
125-129												
130-134												
135-139												
140-144												
145-149												
150-154												
155-159												
Total												

Observations: _____

Table 5.

Research for the Management of the Fisheries on Lake Tanganyika

Sample number: Date: Station:

Species: Stolothrissa tanganicae

Fishing vessel category: Total catch (kg):

Gear and mesh size: Subsample (kg):

Maturity samples Area:

Length classes (mm)	Immatures (unidentified)		Females					Males				
	1	Total	2	3	4	5	Total	2	3	4	5	Total
20-24												
25-29												
30-34												
35-39												
40-44												
45-49												
50-54												
55-59												
60-64												
65-69												
70-74												
75-79												
80-84												
85-89												
90-94												
95-99												
100-104												
105-109												
110-114												
115-119												
120-124												
125-129												
130-134												
135-139												
140-144												
145-149												
150-154												
155-159												
Total												

Observations:

Table 6.						
Research for the Management of the Fisheries on Lake Tanganyika						
Limnothrissa miodon		Length distribution and mean weights in the catches				
Date:			01.04.1993			
Station:			Bujumbura			
Area:			Kadjaga			
Fishing vessel category			Catamaran			
Gear			Lift net			
Mesh (mm)			6			
Total catch (kg; estimated)			32			
Subsample (kg)			2,141		#DIV/0!	
Raising factor			14,95		#DIV/0!	
Sample number:			1	1	2	2
			Numbers	Weight	Numbers	Weight
				(g)/0.5 cm		(g)/0.5 cm
		Length (mm)				
		30		Total w		Total w
		31				
		32		Mean w		Mean w
		33		#DIV/0!		#DIV/0!
		34				
		35		Total w		Total w
		36				
		37		Mean w		Mean w
		38		#DIV/0!		#DIV/0!
		39				
		40		Total w		Total w
		41				
		42		Mean w		Mean w
		43		#DIV/0!		#DIV/0!
		44				
		45		Total w		Total w
		46				
		47		Mean w		Mean w
		48		#DIV/0!		#DIV/0!
		49				
		50		Total w		Total w
		51		3,0		3,0
		52	1	Mean w		Mean w
		53		1,0		#DIV/0!
		54	2			
		55	1	Total w		Total w
		56	2	17,0		17,0
		57	4	Mean w		Mean w
		58	2	1,5		#DIV/0!
		59	2			
		60	6	Total w		Total w
		61	8	74,7		74,7
		62	11	Mean w		Mean w
		63	12	1,7		#DIV/0!

Table 7.						
Research for the Management of the Fisheries on Lake Tanganyika						
Stolothrissa tanganicae		Length distribution and mean weights in the catches				
Date:			01.04.1993			
Station:			Bujumbura			
Area:			Kadjaga			
Fishing vessel category			Catamaran			
Gear			Lift net			
Mesh (mm)			6			
Total catch (kg; estimated)			32			
Subsample (kg)			2,141		#DIV/0!	
Raising factor			14,95		#DIV/0!	
Sample number:			1	1	2	2
			Numbers	Weight	Numbers	Weight
				(g)/0.5 cm		(g)/0.5 cm
		Length (mm)				
		30		Total w		Total w
		31				
		32		Mean w		Mean w
		33		#DIV/0!		#DIV/0!
		34				
		35		Total w		Total w
		36				
		37		Mean w		Mean w
		38		#DIV/0!		#DIV/0!
		39				
		40		Total w		Total w
		41	1	2,0		
		42	1	Mean w		Mean w
		43	1	0,5		#DIV/0!
		44	1			
		45	9	Total w		Total w
		46	29	428,9		
		47	60	Mean w		Mean w
		48	132	1,1		#DIV/0!
		49	154			
		50	301	Total w		Total w
		51	348	1106,1		
		52	239	Mean w		Mean w
		53	179	0,9		#DIV/0!
		54	124			
		55	118	Total w		Total w
		56	80	192,4		
		57	37	Mean w		Mean w
		58	17	0,7		#DIV/0!
		59	12			
		60	14	Total w		Total w
		61	10	27,8		
		62	4	Mean w		Mean w
		63	5	0,8		#DIV/0!

Table 8.						
Research for the Management of the Fisheries on Lake Tanganyika						
Lates		Length distribution and mean weights in the catches				
Date:						
Station:						
Area:						
Fishing vessel category						
Gear						
Mesh (mm)						
Total catch (kg; estimated)						
Subsample (kg)			#DIV/0!		#DIV/0!	
Raising factor			#DIV/0!		#DIV/0!	
Sample number:			1	1	2	2
			Numbers	Weight	Numbers	Weight
				(g)/0.5 cm		(g)/0.5 cm
		Length (mm)				
		30		Total w		Total w
		31				
		32		Mean w		Mean w
		33		#DIV/0!		#DIV/0!
		34				
		35		Total w		Total w
		36				
		37		Mean w		Mean w
		38		#DIV/0!		#DIV/0!
		39				
		40		Total w		Total w
		41				
		42		Mean w		Mean w
		43		#DIV/0!		#DIV/0!
		44				
		45		Total w		Total w
		46				
		47		Mean w		Mean w
		48		#DIV/0!		#DIV/0!
		49				
		50		Total w		Total w
		51				
		52		Mean w		Mean w
		53		#DIV/0!		#DIV/0!
		54				
		55		Total w		Total w
		56				
		57		Mean w		Mean w
		58		#DIV/0!		#DIV/0!
		59				
		60		Total w		Total w
		61				
		62		Mean w		Mean w
		63		#DIV/0!		#DIV/0!

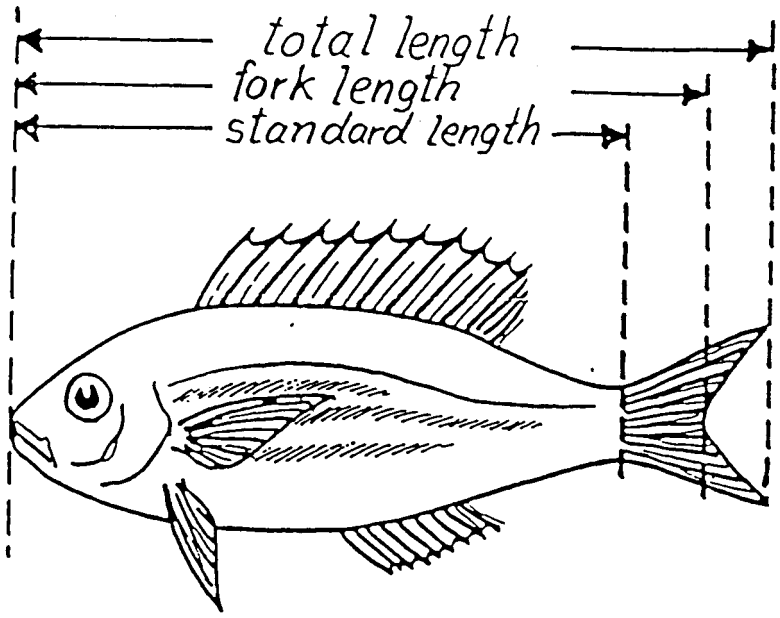


Fig. 1 : Measuring total length of a fish

Target species and their characteristics

CENTROPOMIDAE

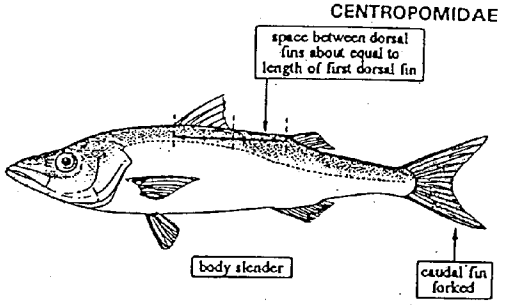
Lates stappersii (Boulenger, 1914)

Local names:
adults: Mukeke (B); Mikebuka (T); Mvolo (Zai), Nvolo and Bukabuka (Zam).
juveniles: Nyamunyamu (B).

Maximum size: 45 cm.

Fishing gear: Lift nets, purse seines.

Habitat and remarks: Pelagic. Closely associated with sardines, on which it depends.



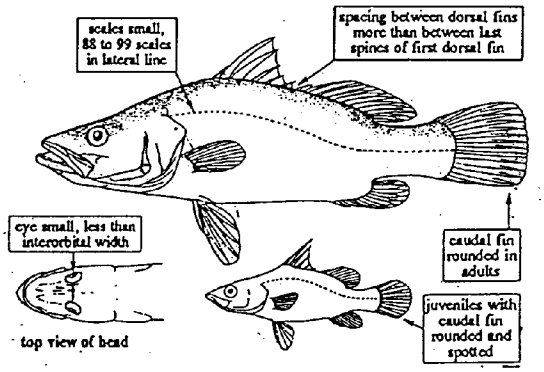
Lates angustifrons Boulenger, 1906

Local names: Sangala (B); Sangara (T); Capitaine (Zai); Gomba, Pamba, Sikiti (Zam).

Maximum size: 200 cm.

Fishing gear: Gill nets, hook and line, seine.

Habitat and remarks: Young inshore and in streams, older fish on bottom over wide depth range. Feed largely on benthic cichlids but also take sardines.

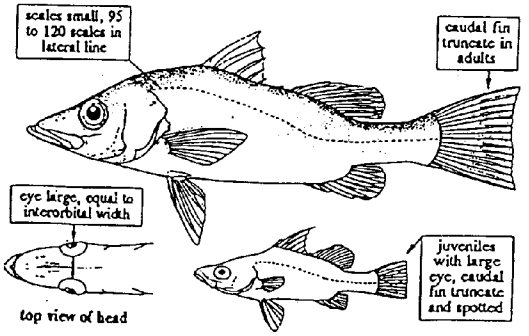


Lates mariae Steindachner, 1909

Local names: Sangala (B); Sangara (T); Pamba, Ngonzi (Zam).

Maximum size: 72 cm.

Habitat and remarks: Young inshore. Adults on bottom in deep water almost to limit of oxygen. Less commonly caught than *L. angustifrons* due to the depth at which it lives.



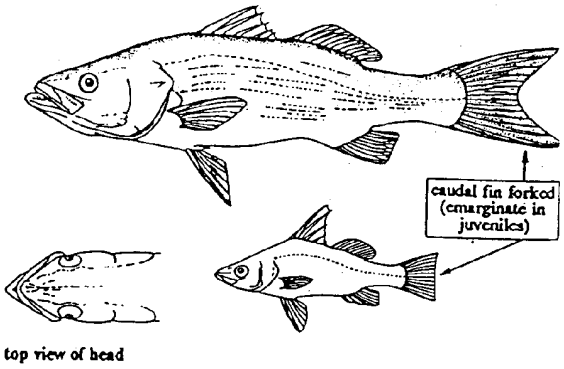
Lates microlepis Boulenger, 1898

Local names: Nonzi (B,T,Zam,Zai); Nyunvi (Zam).

Maximum size: 86 cm.

Fishing gear: Gill nets, purse seines, lift nets, hand lines or angling.

Habitat and remarks: Young inshore, adults pelagic. Adults feed on *L. miodon* and are often caught with them.



CLUPEIDAE

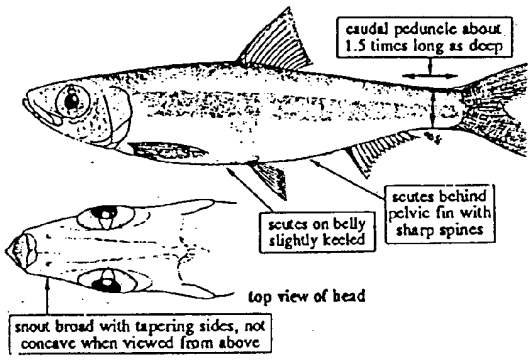
Limnothrissa miodon (Boulenger, 1906)

Local names:Lumpu (B);Dagaa,Lumbu(T,Zai); Lumbo, Nsembe, Chisamba (Zam).

Maximum size: 17 cm, but in catches it seldom exceeds 10 cm.

Fishing gear: Lamp and purse seine or dip net.

Habitat and remarks: Nearshore and in bays.



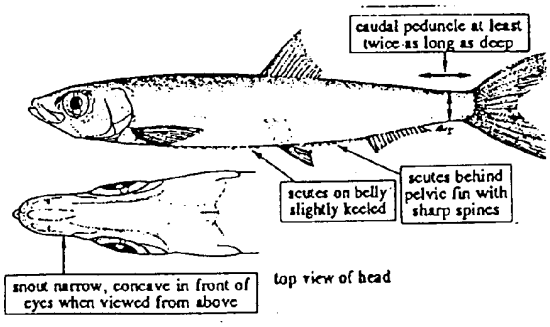
Stolothrissa tanganicae Regan, 1917

Local names: Ndagala (B,T,Zai); Kapenta, Nsembe, Chilwe (Zam).

Maximum size: 10 cm.

Fishing gear: Lamp and purse seine or dip net.

Habitat and remarks: Truly pelagic, all over lake. The most important fish in the lake commercially.



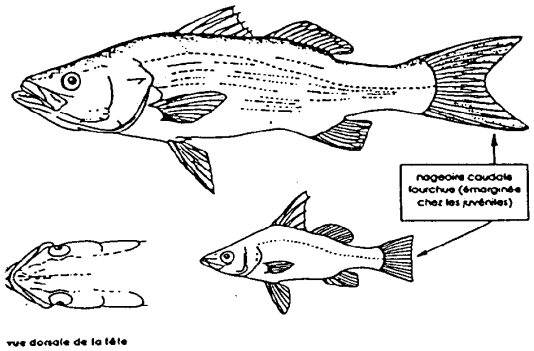
Lates microlepis Boulenger, 1898

Noms vernaculaires: Nonzi (B,T,Zam,Zai); Nyunvi (Zam).

Taille maximale: 86 cm.

Méthodes de capture: Filet maillant,senne coulissantes, carrelet, ligne à main, pêche sportive.

Habitat et remarques: Juvéniles dans la zone littorale, adultes dans la zone pélagique. Adultes se nourrissent de *L. miodon*, espèce avec laquelle ce poisson est souvent capturé.



CLUPEIDAE

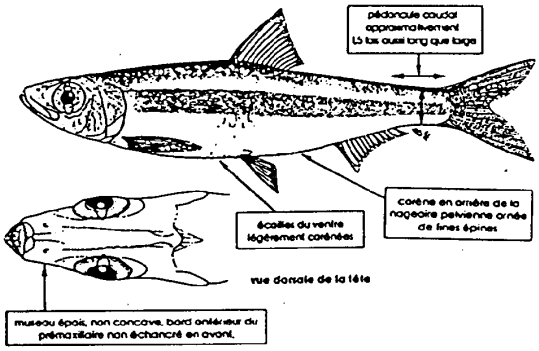
Limnothrissa miodon (Boulenger, 1906)

Noms vernaculaires: Lumpu (B);Dagaa,Lumbu(T,Zai); Lumbo, Nsembe, Chisamba (Zam).

Taille maximale: 17 cm, mais dans les captures, l'espèce dépasse rarement une longueur de 10 cm.

Méthodes de capture: Filet lamparo et senne coulissante ou filet soulevé.

Habitat et remarques: Zone littorale et dans les baies.



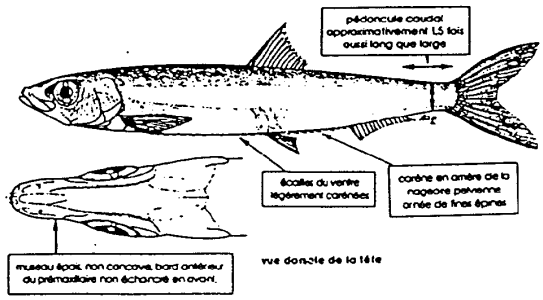
Stolothrissa tanganicae Regan, 1917

Noms vernaculaires: Ndagala (B,T,Zai); Kapenta, Nsembe, Chilwe (Zam).

Taille maximale: 10 cm.

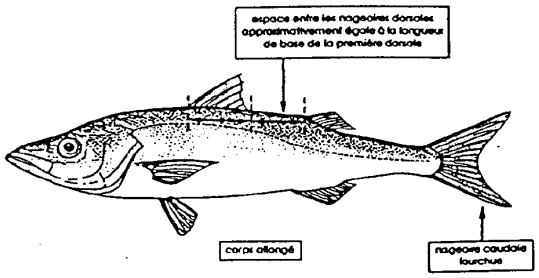
Méthodes de capture: Filet lamparo et senne coulissante ou filet soulevé.

Habitat et remarques: Espèce entièrement pélagique sur la totalité du lac. L'espèce la plus importante du lac pour la pêche commerciale.



CENTROPOMIDAE

Lates stappersii (Boulenger, 1914)



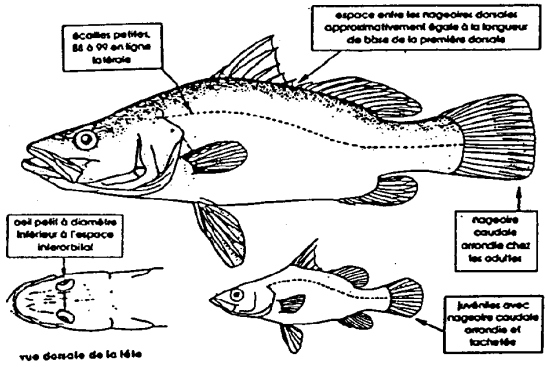
Noms vernaculaires:
adultes: Mukeke (B); Mikebuka (T); Mvolo (Zai), Nvolo et Bukabuka (Zam).
juvéniles: Nyamunyamu (B).

Taille maximale: 45 cm.

Méthodes de capture: Carrelet, senne coulissante.

Habitat et remarques: Pélagique. Etroitement associé aux sardines, dont il se nourrit principalement.

Lates angustifrons Boulenger, 1906



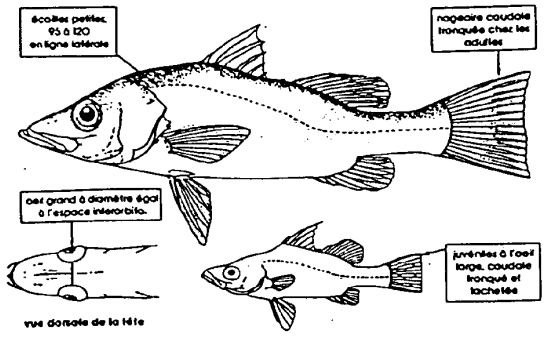
Noms vernaculaires: Sangala (B); Sangara (T); Capitaine (Zai); Gomba, Pamba, Sikiti (Zam).

Taille maximale: 200 cm.

Méthodes de capture: Filet maillant, ligne et hameçon, senne.

Habitat et remarques: Juvéniles dans la zone littorale et dans les rivières, adultes sur le fond à des profondeurs très variées. Se nourrit principalement des cichlides benthiques, mais mange aussi les sardines.

Lates mariae Steindachner, 1909

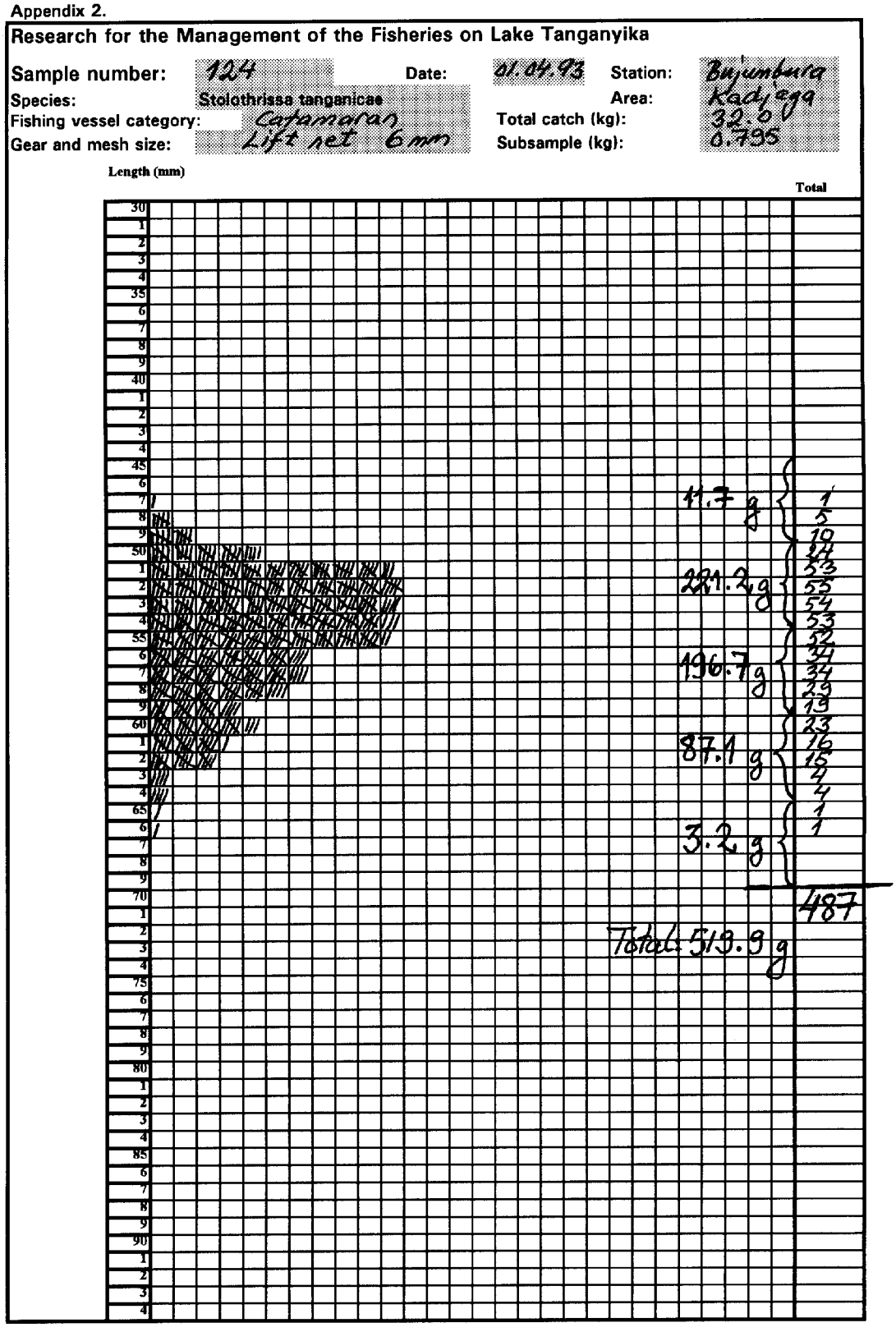


Noms vernaculaires: Sangala (B); Sangara (T); Pamba, Ngonzi (Zam).

Taille maximale: 72 cm.

Habitat et remarques: Juvéniles dans la zone littorale, adultes sur le fond profond, presqu'à la limite de la zone oxygénée du lac. Moins commun dans les captures que *L. angustifrons*, dû au fait qu'il habite les eaux profondes.

Appendix 2.


Research for the Management of the Fisheries on Lake Tanganyika
Sample number: 124
Date: 01.04.93
Station: Bujumbura
Species: Stolothrissa tanganicae
Area: Kadjaga
Fishing vessel category: Catamaran
Total catch (kg): 32.0
Gear and mesh size: Lift net 6mm
Subsample (kg): 0.795
Length (mm)
Total
11.7 g
221.2 g
196.7 g
87.1 g
3.2 g
487
Total: 519.9 g

Appendix 3.

Research for the Management of the Fisheries on Lake Tanganyika

Sample number: 124 Date: 01.04.93 Station: Bujumbura

Species: Limnothrissa miodon

Fishing vessel category: Catamaran Total catch (kg): 32.0

Gear and mesh size: Lift net 6 mm Subsample (kg): 0.795

Maturity samples Area: Kabezya

Length classes (mm)	Immatures (unidentified)		Females					Males				
	1	Total	2	3	4	5	Total	2	3	4	5	Total
20-24												
25-29												
30-34												
35-39												
40-44												
45-49												
50-54	////	10										
55-59	////	10										
60-64	////	10										
65-69			1				1	//// ///				9
70-74			//				2	//// /	//			8
75-79			//	/			3	//// /	/			7
80-84			//	///			5		//			2
85-89			//	/			3					
90-94				//			2					
95-99				/			1					
100-104				/			1					
105-109												
110-114												
115-119												
120-124												
125-129												
130-134												
135-139												
140-144												
145-149												
150-154												
155-159												
Total		30	9	9			18	21	5			26

Observations: No spawning specimens

Appendix 4. The main fishing gears in different sampling areas

		Species		
Area	*Stolothrissa*	*Limnothrissa*	*Lates spp.*	*L. stappersii*
Bujumbura 1)	A(cta)	A(cta)	A(cta)	A(cta)
Kigoma 2)	A(ct) and I	A(ct) and I	A(ct) and I	A(ct) and I
Rukwa (Kipili) 3)	A(ct)	A(ct)	A(ct)	A(ct)
Mpulungu	I B A	I B A	I B A	I B A
Nsumbu	B	B	B	B
Moba			Gillnets; Hooks	Gillnets; Hooks
Kalemie 4)	I A	I A	I A	I A
Uvira	A(ct)	A(ct)	A(ct)	A(ct)

Fisheries	Vessels
A = artisanal fisheries I = industrial fisheries B = beach seine used in pelagic	c = catamaran t = trimaran a = apollo

Comments

1 = once a month (apollo)
2 = once a month (industrial vessels)
3 = check the contribution of pelagic seine
4 = once a month (industrial vessels)