GCP/RAF/271/FIN-TD/48 (En) March 1996

Reports of Travel 61 - 75 of the Project GCP/RAF/271/FIN

by

G. Hanek

(ed.)

FINNISH INTERNATIONAL DEVELOPMENT AGENCY

FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

Bujumbura, March 1996

PREFACE

The Research for the Management of the Fisheries on Lake Tanganyika project (LTR) 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 the United Nations Development Organizations (AGFUND).

LTR's objective is 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 is 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.

Prof. O.V. LINDQVIST
LTR Scientific Coordinator

Dr. George HANEK
LTR Coordinator

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GCP/RAF/271/FIN PUBLICATIONS

Publications of LTR are issued in two series:

* a series of **technical documents (GCP/RAF/271/FIN-TD)** related to meetings, missions and research organized by the project; and

* a series of **working papers (GCP/RAF/271/FIN-WP)** related to more specific field and thematic investigations conducted in the framework of the project.

For both series, reference is further made to the document number **(01)**, and the language in which the document is issued: English **(En)** or French **(Fr)**.

For bibliographic purposes this document should be cited as follows:

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RESEARCH FOR THE MANAGEMENT OF THE FISHERIES ON LAKE TANGANYIKA
GCP/RAF/271/FIN

GCP/RAF/27l/FIN/TRAM/6l

Report of Travel

to

Kigoma (Tanzania)
(07-14.03.1995)

by

Petra Paffen
APO - Fisheries Biologist

GCP/RAF/271/FIN.10

CC: Blessich, TCO4
Kapetsky, FIRI
All LTR stations
E. Aro, Helsinki
SSP, fish biology
Chrono
TRAMS
Diary: Paffen

1. INTRODUCTION

Data on LTR's fish biology scientific subcomponent has been collected since July 1993. In November 1994, after the first year of data collection, the results have been presented at the Third Joint Meeting of LTR's Coordination and International Scientific Committees in Kigoma (Mannini & Aro *In:* Hanek & Coenen, 1994)

1.1 Objectives

The objectives of this travel were: (a) to reassess the collection of data on fish biology in Burundi and Zaïre, (b) to reassess and coordinate the responsibilities of each LTR station concerning the analyses of data on fish biology, (c) to plan LTR's involvement concerning fish biology in the coming Scientific Symposia in Kenya (Nairobi, July 1995) and Finland (Kuopio, September 1995), (d) to specify the research proposals for two Burundian university students, and (e) to backup the LTR's data base on fish biology in Kigoma.

1.2 Itinerary

	Arrival	Departure
Bujumbura		07.03.1995
Kigoma	08.03.1995	13.03.1995
Bujumbura	14.03.1995	

1.3 Persons met

Mr. P. Mannini	Fisheries Biologist, LTR/Kigoma
Mr. Chitamwebwa	Director, TAFIRI/Kigoma
Mr. I.K. Katonda	Researcher, TAFIRI/Kigoma
Mr. Kalangali	Researcher, TAFIRI/Kigoma
Mr. Challe	Skipper, TAFIRI/Kigoma
Mr. N. Brown	DRR UNDP/Dar es Salaam

+ other staff of LTR/Kigoma

2. RESULTS AND CONCLUSIONS

2.1 Reassessment of data collection in Burundi and Zaïre

The collection of data as carried out by all LTR stations is described in GCP/RAF/271/FIN-FM/08 (Mannini, 1993) . In addition, Office Memorandum 07.03.1994 (Mannini) provides some 'changes in fish data collection work'.

In contrast to LTR/Kigoma and Mpulungu, LTR/Bujumbura has not started stomach contents analysis of *L. stappersii.* This is due to the very few samples available which is caused by a very low abundance of this species in liftnet catches in the northern part of the Lake. However, LTR/Bujumbura has recently started to regularly collect clupeid stomachs. All samples will be analyzed as soon as possible.

LTR will start collecting data on egg size distribution in maturing and mature ovaries of clupeids. For this, Gilson's fluid (Bagenal, 1978) will be prepared by LTR/Bujumbura where

mercuric chloride and glacial acetic acid can be obtained.

Despite several attempts to solve this matter, there remain some unclarities concerning the quality of data from LTR/Kalemie and Moba. Contact with these stations is established mostly by post and during occasional visits by members of the sampling team of Kalemie to Bujumbura (twice in 1994) . A member of the fish biology sampling team of LTR/Uvira should travel to LTR/Kalemie and Moba in order to control and adjust the sampling method and data collection while working closely together with both teams. This can be done during cruises of the R/V Tanganyika Explorer.

Gear selectivity is strongly related to total mortality and the predictions of future yields (Sparre & Venema, 1992) . LTR/Kigoma has started to test the selectivity of liftnets. For this, a mosquito net is attached around the cod-end of the net such that all fish which escapes through the cod-end will be trapped. A demonstration was provided. LTR/Bujumbura and Mpulungu will carry out the same experiment in order to test the selectivity of both liftnets and beach seines. In contrast to LTR/Kigoma, which uses the liftnet of TAFIRI (Tanzanian Fisheries Research Institute), there are no available nets in LTR/Bujumbura. Therefore, there will have to be achieved an agreement with a fisher concerning the attachment of an external mosquito net.

Other modifications concerning LTR's Scientific Sampling Program (SSP) will be proposed/discussed during LTR's third SSP Assessment Meeting in Kigoma as scheduled for April.

2.2 Reassessment and coordination of data analyses

The reproductive patterns of the target species in this project are investigated by determination of the percentage of mature individuals per length class, the Gonado Somatic Index (GSI), condition factor (K), and the recruitment patterns. In order to investigate population spawning dynamics, it would be best to multiply the percentage of mature specimens by the absolute number of individuals in the population so that variations in seasonal biomass can be corrected. For this, CPUE data will be used. In order to raise length frequency (LF) samples *(i.e.* percentage of mature individuals per length class) to total catch data *(i.e.* CPUE), the mean weights of the fish in the various classes must be calculated (Beyer, 1987)

Length frequency (LF) distributions of the target species do not show a clear recruitment pattern so far. However, similar to the above, the relative importance of recruitment peaks in relation to the population size should be taken into account, e.g. by indicating the percentage of recruits.

Most data analyses will be carried out by LTR/Kigoma and LTR/Bujumbura. LTR/Mpulungu is investigating the application of Ecopath II for Lake Tanganyika. Furthermore, LTR/Mpulungu's involvement will be reassessed during the Third SSP Assessment Meeting coming April.

2.3 LTR's involvement in Scientific Symposia

LTR's Scientific subcomponent fish biology aims to present some of the following topics during July in Nairobi or September in Kuopio:

a. Feeding regime of *L. stappersii* in Lake Tanganyika.
   By:LTR/Kigoma; data available from Kigoma and Mpulungu, data from Bujumbura can only provide an indication.
b. Feeding regime of clupeids in the northern part of Lake Tanganyika.
   By:LTR/Bujumbura; stomach contents analysis of clupeids caught in liftnets and beach seines.
c. Reproduction of clupeids in Lake Tanganyika.
   By:LTR/Bujumbura; combination of results on weighed mature (see § 2.2), GSI, condition factor, egg size distribution, and possibly the recruitment pattern.
d. Gear selectivity of liftnets and beach seines in Lake Tanganyika.
   By:LTR/Kigoma and Bujumbura; experiments in Bujumbura and Mpulungu will be carried out.
e. Ecopath II modelling for Lake Tanganyika.
   By:LTR/Mpulungu; necessary information must be requested from each station and subcomponent.

2.4 Specification of research proposals for two Burundian students

Two research proposals were provided in Office Memorandum 13.02.1995 (Mannini) . The final versions are specified in Office Memorandum 23.02.1995 (Paffen) which provides details on the methodology. One student has been visiting LTR/Bujumbura regularly. His research topic is: 'Feeding regime of *L. stappersii* and clupeids in the northern part of Lake Tanganyika'. After an initial period during which he has been studying literature in LTR's documentation center, he will presently start to analyze the samples which were collected for him by LTR/Bujumbura's fish biology sampling team.

2.5 Backup of LTR's data base

LTR/Bujumbura has obtained one portable tape-streamer and 3 cassettes (each 120 Mb) . Using the computer program Conner Backup Basics, which was installed at LTR/Kigoma, the data base on fish biology was partly backed up. It is proposed to purchase 3x2 extra cassettes and possibly 2 extra portable tape-streamers for LTR/Kigoma and Mpulungu. That way, each station will be provided with adequate backup facilities.

Furthermore, it was concluded that LTR's achievement of E-mail at all stations would enormously facilitate internal *(i.e.* between LTR's stations) and external (e.g. to Finland) communication which, especially with regard to data analyses and the preparation of scientific documents, would be greatly appreciated.

3. FOLLOW-UP

3.1 Analysis of all available fish sample stomachs in LTR/Bujumbura will start as soon as possible.
(Action: Paffen, LTR/Bujumbura)

3.2 Gear-selectivity of liftnets and beach seines to be tested by LTR/Bujumbura, Mpulungu, and Kigoma (5 2.1).

(Action: Paffen, LTR/Bujumbura; Verburg, LTR/Mpulungu; Mannini, LTR/Kigoma)

3.3 Egg-size distribution of clupeids to be investigated by all LTR stations. LTR/Bujumbura will prepare and distribute Gilson's fluid as soon as possible.
(Action: Paffen, LTR/Bujumbura; each LTR station)

3.4 Data collection by LTR/Kalemie and Moba has to be controlled by a member of LTR/Uvira's fish sampling team.
(Action: Paffen, LTR/Bujumbura)

3.5 To purchase 3x2 extra tape-streamer cassettes.
(Action: Paffen, LTR/Bujumbura)

3.6 Data analyses as proposed in 5 2.2 to be carried out.
(Action: Paffen, LTR/Bujumbura; Mannini, LTR/Kigoma)

3.7 Data analyses as necessary for LTR's involvement in Scientific Symposia to be carried out.
(Action: as in § 2.3)

4. REFERENCES

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Beyer, J.E., On length-weight relationships. Part I: Computing the
1987 mean weight of the fish in a given length class. **Fishbyte 5(1): 11-13.**

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1994 LTR's Coordination and international Scientific Committees. FAO/FINNIDA Research for the Management of the Fisheries on Lake Tanganyika. **GCP/RAF/271/FIN-TD/27 (En): 181p.**

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GCP/RAF/271/FIN/TRAM/62

Report of Travel

to

**Bujumbura (Burundi), Kigoma (Tanzania), Mpulungu (Zambia)
and to Lake Tanganyika
(02.06.1995 – 19.06.1995)**

by

Timo Huttula

Consultant in hydrodynamics

and

**Jyrki Nieminen
Electrician**

GCP/RAF/271/FIN.10

cc: Lindqvist/Mölsä
Gonzalez-Alberdi/Doeff/Blessich, TCO4
Hanek/Kotilainen
Mannini/Kurki
Plisnier
Sarvala
Salonen/Järvinen
Vuorinen
Aro

GCP/RAF/271/FIN **June, 1995**

1. INTRODUCTION

1.1 Objectives

The objectives of the trip were: (A) to install a new ship meteo station on the *R/V Tanganyika Explorer* and (B) to conduct the first hydrodynamic expedition on the lake. The objectives of the mission on the lake were: (B.1) to carry out maintenance on the lake buoy outside Mpulungu, (B.2) to install an extended meteorological station in Mpulungu, (B.3) to give instructions to the data collector in Kipili, (B.4) to conduct CTD and flow measurements lake-wide, (B.5) to change memory units of recording devices and (B.6) to train counterparts and crew in hydrodynamic measurements.

1.2. Itinerary

	Arrival Departure	
Helsinki		18.4.95
Bujumbura	19.4.95	28.4.95
Kigoma	29.4.95	29.4.95
Mpulungu	01.5.95	01.5.95
Kipili	02.5.95	02.5.95
Kigoma	04.5.95	04.5.95
Bujumbura	05.5.95	07.5.95
Helsinki	07.5.95	

1.3. Persons met

In Bujumbura
Dr. G. Hanek, Project Coordinator, LTR
Mr. E. Coenen, Fishery Statistician, LTR
Mr. R. Kanyaru, Directeur, Direction des Pêches, Burundi
Mr. B. Nyakageni Boniface, Conseiller, Direction des Pêches, Burundi
Mr. L. Tumba, Scientist, Direction des Pêches, Bujumbura
Mr. G. Pajot, Naval adviser, FAO
Mr. M. Järvinen, limnologist, LTR/Univ. of Helsinki

In Kigoma
Mr. P. Mannini, Fishery Biologist, LTR
Mr. I. Chitamwebwa, Director, TAFIRI
Mr. N. Challe, Technician, TAFIRI
Mr. M. Kissaga, Scientist, TAFIRI
Mr. A. Kihakwi, Scientist, TAFIRI
Mr. E. Peltonen, Scientist, LTR
Mrs. H. Kurki, APO Fishery Biologist, LTR
Dr. J. Salo, evaluation mission member, FINNIDA
Dr. D. Roest, evaluation mission member, FINNIDA

In Kipili
Mr. D. Muemba, technician, TAFIRI

In Mpulungu
Dr. P. Plisnier, Limnologist, LTR
Mr. P. Verburg, APO Fishery Biologist, LTR
Mr. L. Makasa, Scientist, Fisheries Training Station, Mpulungu
Dr. Mbilindi, Scientist, Fisheries Training Station, Mpulungu

Others
Mr. M. Kakogozo, Scientist, from CRSN, Uvira, Zaïre

2. RESULTS

2.1. Installation of the ship meteo station

The new meteo station on the *R/V Tanganyika Explorer* was installed. The main mast was used for wind sensors and an extra mast was installed 4 m above the top deck. The sensors, data logger and PC were functionally tested. The NISWS software was tested. A new version of the software was requested from NAVARC Ltd. since some options (e.g. selection of the logging interval) were not functional. After the expedition, the second version was tested. In this version all the displays functioned well, but in data logging, the correct setting of parameters was not found for successful data collection.

2.2. Maintenance of the lake buoy outside Mpulungu

The air filled buoy was replaced with a foam filled one. Thus the buoy will be more secure and will not be damaged as easily as the previous one. The malfunctioning thermistor chain was replaced with a new one. The mooring of the buoy was also changed by using a side anchor.

2.3. Extension of the land meteo station in Mpulungu

The station at the top of the water tower on a hill was extended in such a way that the following variables are now recorded automatically: wind speed and direction, air temperature, air humidity, air pressure and solar radiation.

2.4. Visit to the Kipili wind station

The visit took place in the evening. We met with Mr. D. Muemba, who had sent the manual wind anemometer for service in Kigoma. No malfunctioning was found in the anemometer. We discussed the procedure and importance of wind measurements with Mr. Muemba and returned the device to him. He promised to go on with the measurements. The station site was observed in the spot light only from a distance. It seems to be quite suitable, but has to checked in daylight and also, Mr. Muemba needs some further training.

2.5. Checking other automatic instruments

All the water level recorders were checked and batteries replaced. The meteorological station in Bujumbura harbour was functioning well. The Aanderaa wind station in Kigoma was checked, but the data was not unloaded. The lake buoy station outside Kigoma was checked and the memory unit replaced.

2.4. Measurements of the longitudinal and transversal variation of flow and temperature regime in the lake

The temperature profiling was done down to the 300-460 m depth.

Altogether about 18 profiles were collected. Flow was measured during the daytime with flow cylinders at the levels 5,10,20,40 and twice at a depth of 80 m.

2.5. Other results

Mr. G. Pajot was training the crew during the expedition. He will report his observations elsewhere. Mr. M. Järvinen and Mr. V. Langenberg conducted primary production measurements at the same time as hydrodynamic measurements were done. Mr. Järvinen will report his travel elsewhere. Both Mr. Pajot and Mr. M. Järvinen and others working with them contributed to the attainment of the hydrodynamic expedition's goals. This input is very highly appreciated.

The *R/V Tanganyika Explorer* and its activities were introduced to the officials in Kigoma and the Mpulungu port. LTR/Mpulungu organized a special reception for local officials on May 1st. More than 30 people attended and a very active and positive discussion was lead by Dr. Plisnier.

The drafts of scientific papers for the LTR symposium in Kuopio were discussed with Mr. Kakagozo and Messrs Verburg and Makasa.

In discussions with Dr. Hanek, the specific needs of the hydrodynamic subcomponent were expressed. A tentative plan for following expeditions and reduction of flow measurements within SSP was given to project coordinator.

3. RECOMMENDATIONS

3.1. As the expedition was the first one with the R/V Explorer, there were fairly many things on the ship which should be completed or redone. The improvement of the usage of the R/V Tanganyika Explorer for scientific usage has been discussed in the expedition report 1/95. (Action: project coordinator)

3.2. NISWS is not functioning fully. More instructions are needed. (Action: Expert, field coordinator in hydrodynamics)

3.3. The functioning of the new parts of the extended meteo station in Mpulungu and the new installation of the lake buoy must be checked within 3 weeks. (Action: LTR staff from Mpulungu)

Action: The function of the station will be checked by LTR staff within 3 weeks after installation.

3.4. The data flow from Kipili must be ensured. A new visit to Mr. Muemba must be organized as soon as possible and more training provided. Maybe this can be done during the *R/V Explorer's* next expedition. (Action: LTR staff in Kigoma)

3.5. The memory unit in Kigoma must be changed in a few weeks. Also, the ventilation in the box must be improved. This prevents the heating and energy loss of the battery. (Action: LTR staff in

Kigoma)

3.6. Recommendations for a reduction of SSP in hydrodynamics and instructions special flow measurements must be done during the month of June 1995. (Action: Expert and field coordinator of hydrodynamics).

3.7. Preparation for a change over of the responsibilities in field coordination of hydrodynamics. It seems that P. Verburg is a good person to take over as soon as project coordinator feels it is reasonable. The extension of Mr. Verburg's contract is essential. (Action: project coordinator, field coordinator in hydrodynamics).

RESEARCH FOR THE MANAGEMENT OF THE FISHERIES ON LAKE TANGANYIKA
GCP/RAF/271/FIN

GCP/RAF/271/FIN/TRAM/63

Report of Travel

to

Kigoma, Tanzania
(02.06.1995 – 19.06.1995)

by

Els M. Bosma, APO Fishery Biologist

GCP/RAF/271/FIN.10

cc: Gonzalez–Alberdi/Doeff/Blessich, TCO4
Kapetsky, FIRI
FAOR, Tanzania
FAOR, Zambia
Mudenda/Mubamba, DOF Zambia
Lindqvist/Mölsä, Kuopio
All LTR stations
Janus, APR to FAO/WFP, Rome
Chrono
Trains
Diary: Bosma

GCP/RAF/271/FIN **June, 1995**

1. INTRODUCTION

1.1 Objectives

The objectives of this duty travel were to discuss the analysing of zooplankton data, to assist in new methods of limnology analyses and to discuss the use of the ECOPATH II Box Trophic Model Software.

1.2 Itinerary

Departure	Arrival
Mpulungu	02.06.95
Kigoma	04.06.95
Mpulungu	17.06.95
	19.06.95

1.3 Persons met

Mr. P. Mannini,	LTR Fisheries Biologist, Expert
Mrs. H. Kurki,	APO—Fisheries Biologist, LTR
Mr. Chitamwembwa,	Centre Director of Kigoma, TAFIRI
Mr. K.J. Katonda,	Research Officer
Mr. M.B.S. Kissaka,	Research Officer
Mr. L. Tegulirwa	Research Officer
Mr. A.M. Kalangali,	Research Officer
Mr. A.D.B. Kihakwi,	Technician
Mr. S. Muhoza,	Technician
Mr. U. Kisisiwe,	Technician
Mr. Kadula,	
+ other TAFIRI personnel	

2. RESULTS

— Sampling V done to show the radiation measurements method to Messrs Chitamwebwa and Kissaka.

— Samples taken for Chlorophyll *a* measurements and analyzed in the lab with Messrs Chitamwembwa, Kissaka and Kadula.

— Third year of SSP for the zooplankton research Subcomponent discussed with H. Kurki.

— possible subjects discussed with H. Kurki for analysing zooplankton data and writing technical documents.

— Research program for the coming cruise of the Tanganyika Explorer discussed with P. Mannini and H. Kurki.

— The preliminary results of the ECOPATH ii software program discussed with P. Mannini and H. Kurki and involvement of other LTR international staff for data collection and analysing for the ECOPATH II program.

— Training given to H. Kurki in the use of ECOPATH II software program.

— Exchange of fish statistics data and shrimps determination key.

– Exchange of the software programs Excel 5, Statistica and F–Prot.

3. CONCLUSIONS AND FOLLOW-UP

– Radiation and chlorophyll a measurements to be continued and carbon energy measurements to be started in close cooperation with LTR Mpulungu. (Action: LTR Kigoma & LTR Mpulungu)

– Third year SSP for the zooplankton research subcomponent proposal to be send to G. Hanek. (Action: Kurki & Bosma)

– Correlation between zooplankton data and other LTR results to be determined and presented in technical documents. (Action: Kurki & Bosma)

– Zooplankton data to be analyzed and presented in paper for Kuopio Symposium. (Action: Kurki & Bosma)

– Stomach contents of clupeids caught on the coming cruise of the Tanganyika Explorer to be analyzed in Mpulungu. (Action: LTR Mpulungu)

– Data for ECOPATH II to be collected from the three LTR stations. (Action: Bosma)

– Involvement of international LTR staff for analysing data for the ECOPATH II program. (Action: LTR Bujumbura, LTR Kigoma, LTR Mpulungu)

– Request for literature to be send to J. Collins concerning trophic interactions in great lakes in general and zooplankton research in particular. (Action: Kurki & Bosma)

GCP/RAF/271/FIN/TRAM/64

Report of travel

of

the Second Scientific Cruise (15—30.6.1995)

by

**Eero Aro, Piero Mannini, I. Mohamed Kimosa,
E. Robert Makere and N. A. Chale**

GCP/RAF/271/FIN. 10
cc: Blessich, TCO4
Kapetsky, FIRI
Fitzpartick/Turner
All LTR stations
SSP
Chrono
TRAMS

GCP/RAF/271/FIN **July 1995**
FORM TE/3

LAKE TANGANYIKA RESEARCH

1995 RESEARCH VESSEL PROGRAMME

PROGRAMME: R/V TANGANYIKA EXPLORER CRUISE 95/02

NAME	POSITION
1. Aro, E	Fish biologist, cruise leader.
2. Pajot, G	Fishing technologist
3. Mannini, P	Fish biologist
4. Paffen, Petra	Fish biologist
5. Kotilainen, P	Fish biologist
6. Lensu, 5	Student
7. Butoyi, K	Fish biologist
8. Mambona wa Bazolana, C	Fish biologist
9. Tequlirwa, L	Fish biologist
10. Muhoza, 5	Fish biologist
11. Muenda, M	Fish biologist

DURATION 15-30.06.95

LOCALITY
1. Bujumbura 15.06
2. Kigoma 18.06
3. Mpulungu 24.06
4. Kigoma 29.06
5. Bujumbura 30.06

PLAN (all times are Greenwich Mean Time + 2)

LTR Coordinator

Date: 13/6/95

INITIALED .....

DISTRIBUTION: Blessich, TCO4
Kapetsky, FIRI
Fitzpatrick/Turner, FIIT
Chrono
Diary: Hanek

SHIP:R/V TANGANYIKA EXPLORER CRUISE NUMBER: 02/95

CRUISE ITINERARY REQUIRED: (start, stop. port call(s) track chart)

1. Departure from Bujumbura 15.06.
2. Arrival in Kigoma 19.06 and departure from Kigoma 19.06.
3. Arrival in Mpulungu 24.06 and departure from Mpulungu 25.06.
4. Arrival in Kigoma 29.06 and departure from Kigoma 29.06.
5. Arrival in Bujumbura 30.06

SENIOR SCIENTIST: Mr. B. Aro — Finnish Game and Fisheries Research Institute (FOFRI)
Mr. P. Mannini — LTR/Kigoma

SCIENTIFIC STAFF LIST: (including affiliation)

Name	Laboratory	Institution	DATES Boarding	Disembarking
Aro, E.	Hydroacoustics	PGFRI Cruise leader	Bujumbura 15.06.95	Mpulungu 24.06.95
Pajot, G.	Fishing technology	Consultant	Bujumbura 15.06.95	Bujumbura 30.06.95
Paffen, P.	Fish biology	LTR/Bujumbura	Bujumbura 15.06.95	Bujumbura 30.06.95
Lensu, S.	Fish biology	University of Kuopio	Bujumbura 15.06.95	Bujurnbura 30.06.95
Kotilainen, P.	Hydroacoustics	LTR/Bujumbura	Bujumbura 15.06.95	Bujumbura 30.06.95
Mannini, P.	Fish biology	LTR/Kigoma	Bujumbura 15.06.95	Kigoma 29.06.95
Butoyi, C.	Fish biology	LTR/Bujumbura	Bujumbura 15.06.95	Kigoma 19.06.95
Mambona wa Bazolana, C.	Fish biology	LTR/Uvira	Bujumbura 15.06.95	Kigoma 19.06.95
Tequliruwa, L.	Fish biology	LTR/Kigoma	Kigoma 19.06.95	Kigoma 29.06.95
Muhoza, S.	Zooplankton	LTR/Kigoma	Kigoma 19.06.95	Kigoma 29.06.95
Muenda, M.	Fish biology	LTR/Mpulungu	Mpulungu 25.06.95	Kigoma 29.06.95

EQUIPMENT TO BE USED:

1. Equipment supplied by LTR/Bujumbura
   Mid-water trawl

Scientific echosounder EYSOO
HP PaintJet printer
CTD probe for temperature/conductivity profiles
GULF V sampler for larvae sampling
Plankton net 50µm
Plankton torpedoes
Equipment for fish biology sampling and preservation
Two electrical balances (Eilersen)
Microscope

2. Equipment supplied by LTR/Kigoma
Limos water sampler 7.4 liters
Plankton net 50µm
Balance (Sartorius)

3. Equipment supplied by LTR/Mpulungu Spring balance (10 kgs)

4. Equipment from other sources:
Meteorological station on board
Spring balance (50 kgs)

5. Winch and wire requirements.
Trawl winch wire used l0O-550m
Trawl sonde cable 700m (maximum length)
Oceanographic winch 300 meters

SCIENTIFIC OR SURVEY OBJECTIVES:

To obtain:

1) data on spatial distribution and abundance estimates of target species, *i. e.* *Stolothrissa tanganyicae* and *Limnothrissa miodon* and four *Lates* species, *L. marie*, *L. angustifrons*, *L. microlepis* and *L. stappersii*.

2) Information on the demographic structure of the target species, their sex ratios and maturity stages.

3) Information about feeding and predator-prey interactions of target species.

CRUISE PROCEDURES AND STATION PATTERN REQUIRED:

FORM TE 5

CRUISE SUMMARY

SHIP:RV/TANGANYIKA EXPLORER CRUISE NUMBER: 95/02
SENIOR SCIENTIST(S) : Aro, E. / Mannini, P.

LIST OF SCIENTIFIC STAFF ACTUALLY PARTICIPATING

			DATES	
Name	Laboratory	Institution, etc	Boarding	Disembarking
Aro, E.	Hydroacoustics	FGFRI cruise leader	Bujumbura 15.06.95	Mpulungu 24.06.95
Pajot, G.	Fishing technology	consult.	Bujumbura 15.06.95	Bujumbura 30.06.95
Paffen, P.	Fish biology	LTR/Bujumbura	Bujumbura 15.06.95	Bujumbura 30.06.95
Lensu, S.	Fish biology	University of Kuopio	Bujumbura 15.06.95	Bujumbura 30.06.95
Kotilainen, P.	Hydroacoustics	LTR/Bujumbura	Bujumbura 15.06.95	Bujumbura 30.06.95
Mannini, P.	Fish biology	LTR/Kigoma	Bujumbura 15.06.95	Kigoma 29.06.95
Butoyi, C.	Fish biology	LTR/Bujumbura	Bujumbura 15.06.95	Kigoma 19.06.95
Mambona wa Bazolana, C.	Fish biology	LTR/Uvira	Bujumbura 15.06.95	Kigoma 19.06.95
Tequlirua, L.	Fish biology	LTR/Kigoma	Kigoma 19.06.95	Kigoma 29.06.95
Muhoza, S.	Zooplankton	LTR/Kigoma	Kigoma 19.06.95	Kigoma 29.06.95
Muenda, M.	Fish biology	LTR/Mpulungu	Mpulungu 25.06.95	Kigoma 29.06.95

ITINERARY ACCOMPLISHED: (including actual track chart)
Bujumbura - Mpulungu (see the track chart):
1) Start of the survey 15.06.95 from Bujumbura.
2) Sampling in the northern part of the lake, 15-19.06.
3) Arriving in Kigoma 19.06.95, 0730 hrs., fuel bunkering, repairing electric balances, boarding of scientists.
4) Departure from Kigoma 19.06.95 at 1800 hrs.
5) Sampling in the central part of the Lake 19-24.06.95.
6) Arrival in Mpulungu 24.06.95 at 0630 hrs., bunkering of fuel and food, one night rest, boarding and disembarking of scientists.

Mpulungu - Bujumbura (see the track chart):
1) Departure from Mpulungu 25.06.95 at 0930 hins.
2) Checking and unloading the lake meteo station off Mpulungu, 25.06.95 at 1200 hins.
3) Sampling in the southern and the central part of the lake 25-29.06.95
4) Arrival in Kigoma 29.06.95 at 0400 hrs., disembarking of scientists and unloading of samples to be analyzed at LTR/Kigoma, electrical balances for maintenance and other equipment.

SCIENTIFIC OR SURVEY ACCOMPLISHMENTS:
(with brief statements exDlainincr failures to achieve obiectives)

1) Hydroacoustics:
Bujumbura - Mpulungu

All the trawl hauls and most of the planned transects were carried out and recordered. Results were stored on computer in some cases. Acoustic equipment didn’t perform as expected. Integrated values and target strength distri -~ butions couldn’t be recorded below 80-90 meters depth A Bef ore Kigoma two unsuccessful attempts to calibrate EY500 echosounder were made. After Kigoma winds were too strong to carry on with the trials.

Mpulungu - Bujumbura

EY-500 failed several times. This might have been caused by the variable voltage on board. Most of the transects planned were carried out and recorded as printouts, but no storage on the computer was done (water damage on the keyboard of the computer unit due to the leaking air conditioner in the dry laboratory)

2) Trawl stations:
Bujumbura - Mpulungu

23 stations trawled (22 stations in the plan) . One extra station sampled because two different scattering layers were observed.

Mpulungu - Bujumbura

10 stations trawled (10 in the plan, but an extra was taken and station no. 32 skipped because of a problem in the fuel pumping system).

3) Fish samples:

Bujumbura - Mpulungu

All 23 stations were sampled. Catch rates were lower than expected but large enough to accomplish the biological sampling programme.

Mpulungu - Bujumbura

9 samples taken out of 10 planned plus an extra two extra stations.

A total of 200 otoliths, 1400 stomachs and 350 tissue samples (tissue samples for genetics especially to cover the areas which has not been properly collected before) of the target species were collected.

4) Plankton torpedoes:

Bujumbura - Mpulungu

Plankton torpedoes were tested on the headrope for two first stations but from station 3 on they were attached to the trawl wing tips, where they worked well. In total, 21 stations were sampled.

Mpulungu - Bujumbura

10 stations sampled as in the plan.

5) Plankton net stations:

Bujumbura - Mpulungu

Plankton sampling started after Kigoma (plankton net was torn at station 1 and replacement was received in Kigoma) at station no. 9. Station no. 22 was not sampled because of strong winds. So, 13 stations out of planned 22 and one extra plankton sample were taken (Limnos sampler)

Mpulungu - Bujumbura

13 plankton samples were taken (10 in the plan) and an extra sample with Limnos sampler.

6) CTD stations:

Bujumbura - Mpulungu

21 stations out of 22 (in the plan) were carried out. One station~was not recorded, because of flat batteries in the instrument. Batteries were replaced for the next station.

Mpulungu - Bujumbura

13 stations were sampled (10 in the plan)

At each station CTD was lowered down to 300 meters if possible, otherwise to the nearest 20 meters from the bottom.

7) GULF V - larvae sampling:

Bujumbura - Mpulungu

20 stations out of 22 planned were sampled. Station no 7 omitted because of shallow water and station 22 because of strong wind.

Mpulungu - Bujumbura

12 stations sampled (10 stations originally planned)

The sampler was attached to the starboard side trawl winch and was standardized as follows using the Koden sonar CSV-822)

at 3 kts speed (=700 rpm, speed kept constant with the clutch) 50 meters of wire = 15 meters of depth
100 meters of wire = 38 meters of depth
150 meters of wire = 62 meters od depth
200 meters of wire = 90 meters of depth
250 meters of wire = 130 meters of depth
300 meters of wire = 168 meters of depth

Each depth was sampled for 3 minutes including pay out time of the wire. Exact start and end times and positions were recorded.

8) Meteorological station Bujumbura - Mpulungu

Using the meteorological station the following parameters were recorded while sailing: time, position, wind speed and direction (in N-S and E-W components), air temperature, relative humidity, air pressure, solar radition, sun minutes and rainfall. Logging interval was set at two minutes.

Mpulungu - Bujumbura

Data logging continued although a few times the logging was blocked for some unknown reason.

PROBLEMS ENCOUNTERED, SUGGESTED IMPROVEMENTS. ETC.

Scientific equipment and sampling facilities

1) The performance of the trawl sonde is poor. It is useless below 60 meters and should be repaired. The priority for doing this is high. The trawl sonde cable is too short for deep fishing (below 100 meters) and should be extended from 700 m to 900 meters.

2) Fish handling facilities are insufficient. An extra table should be installed or at least one removable table should be placed on the stern deck. The wet laboratory is too hot to be used for fish catch handling/analysis. Extra racks for wet lab should be installed.

3) EY-500 echosounder needs servicing. Target strength and integrated values were obtained at maxumurn 80-90 meters depth. Noise was occasionally fairly high.

4) Calibration of the hydroacoustic equipment should be carried out during the next cruise.

5) Racks for the CTD-sonde and plankton torpedoes should be manufactured and installed in the railing on the trawl deck. Some hooks to tie up additional sampling equipment should be welded in the railing frames on the trawl deck.

6) The wire for the hydrographic winch should be marked at 5 meter intervals and, as was requested, should be extended to 600 meters.

7) The software of the meteorological station on board and its wind display on the bridge got stuck during the last few days. They should be properly checked for the next cruise. Standard settings of data logging and instructions for every cruise should be established.

8) A stop-watch or a timer for larvae sampling should be purchased and written sampling instructions should be provided.

9) The computer unit needs service. Water leakage damaged the keyboard and therefore it should be replaced as soon as possible.

10) Autopilot doesn't work and should be made functioning. Reinstallation of the compass is needed.

11) A freezer for fish samples should be provided. It could be placed in the wet lab.

12) A set of spring balances 1, 5, 10 and 50 kgs should be purchased for fish sampling for the next cruise.

General matters

13) High frequency radio ICOM-700 should be checked to allow communication between the vessel and all LTR stations.

14) Survey preparations should be done in advance (materials, sampling equipment, etc.) and a responsible person for each cruise assigned.

15) A complete first aid kit and seasickness pills or stickers should be supplied for the coming cruises.

16) The voltage supply in the wet laboratory should be checked for peak voltages. One brand new Eilersen balance burned (in dry conditions) because of variable voltage.

17) The air conditioner in the dry lab is dangerous for the electrical equipment used there and should be replaced under the table. Hydro-acoustic recording had to be interrupted for several hours due to malfunctioning of the computer unit. In general, all airconditioners on board should be checked.

18) Bunkering of food staff should be carried out at Bujurnbura before the cruise (Already after 4 days of cruising some items were purchased in Kigoma) intead of doing time consuming shopping in Kigoma or Mpulungu.

19) The scuppers should be cut to the deck level to get water coming on the deck to run out as well.

20) The storage facitilies for kitchenware are unsatisfactory. Racks for plates, cups, etc. in the cupboards, stoppers for the freezer and ref rigarator doors, etc. should be made.

21) Some (2 + 2) chairs for the dry and wet laboratories should be provided.

22) To purchase a chair for the wheel house should be considered.

RESEARCH FOR THE MANAGEMENT OF THE FISHERIES ON LAKE TANGANYIKA
GCP/RAF/271/FIN

GCP/RAF/271/FIN/TRAM/65

Report of Travel to Rome, Italy (25–30.6.95)

by

George Hanek
LTR Coordinator

GCP/RAF/271/FIN.10

cc: Gonzalez-Alberdi/Doeff/Blessich, TCO4
Kapetsky, FIRI
Everett, FIPP
Kambona/Ssentongo, FIPL
Fitzpatrick/Turner, FIIT
Padroni, FIDX
All LTR Stations
Chrono
Diary: Hanek

1. INTRODUCTION

1.1 Objectives

The objectives of this duty travel were: (1) to brief FAO—HQ officers on LTR progress to date; (2) to deal with a number of operational aspects; (3) to participate in meeting with NRI representatives; (4) to propose and discuss the timing for 4th Joint Meeting of LTR Committees and 7th Session of CIFA Sub-Committee for Lake Tanganyika; and (5) to deal with number of other matters.

1.2 Itinerary

	Arrival	Departure
Bujumbura		25.6.95
Rome	25.6.95	30.6.95*

* continued on Home Leave

1.3 Persons met

Dr. W. Krone	ADG-FI a.a..
Mr. P. Gonzalez-Alberdi	Chief, TCO4
Mr. M. Doeff	SPOO, TCO4
Ms. D. Blessich	P00, FIDO
Dr. J. Kapetsky	SFRO, FIRI
Mr. J. Fitzpatrick	Director a.i. FIID
Mr. J. Turner	SF10, FIIT
Mr. G. Everett	SFPO, FIPP
Mr. J. Kambona	Chief, FIPL
Mr. S. Venema	PM, GCP/INT/575/DEN
Mr. C. Stomatopoulos	SFDO, FIDI
Ms. J. Collins	Librarian, FIBL
Prof. O.V. Lindqvist	LTR/Finland
Dr. H. Mölsä	LTR/Finland
Mr. T. Bostock	NRI
Mr. G. Patterson	NRI
Mr. G. Padroni	P0, FIDX
Mr. F. Mancini	AC, FIOX

2. RESULTS

2.1 LTR Progress

LTR progress to date was outlined during meetings with numerous officers as well as during general meeting attended by all key Fl officers.

2.2 LTR operational and technical aspects

A number of operational and technical aspects was treated as follows:

* budget – various options were discussed and AA/2 proposed; as of now the funds allow operation up to end June 1996;

* personnel – transfer of Dutch APOs was proposed, change of duty station for Craig discussed, need for another APO for LTR/Bujumbura recorded and likely NTEs for existing LTR experts proposed;

* Evaluation Mission – second draft was received; the final version should be available early August 1995. If the preliminary recommendations stand a plan for the second phase must be ready by end September (George Everett promised to assist on socio–economy while the scope of LTR scientific programme will be proposed by LTR Scientific Coordinators);

* LTR Scientific Sampling Programme – various options were discussed; it was agreed that the report on the 3rd SSP Assessment Meeting will be sent to LTR Scientific Coordinators and to Dr. Kapetsky as soon as possible for comments and approval;

* *R/V* Tanganvika Explorer – details on her operation up to date were presented and cruise programme until end 1995 proposed;

* schedule of remaining Workshops/Seminars – in Acoustics tentatively for February/March 1996 (duration: one week to ten days; it will be devoted to interpretation of acoustics data; Mr. Venema kindly offered the services of Mr. Paul Degnbol; LTR will ensure the services of Mr. Eero Aro; and the Final Seminar on Project Findings to be still determined but likely two months before end of LTR;

* charts for Lake Tanganyika - Mr. Fitzpatrick suggested that Mr. Nhnyete of the Tanzania Harbour Authority be contacted in order to prepare and the initial document;

* TCP on statistics for Burundi – a proposal was given and discussed with LTRs P00 and with Mr. Stomatopoulos; and

* e–mail for LTR stations – it was agreed that all LTR stations should have this facility

2.3 Meeting with NRI

Two full days were spent in meeting with NRI representatives. Numerous options for cooperation were proposed and discussed. It was agreed that final decision will be taken once the 'mobilization phase' of GEF project is completed i.e. end of September 1995.

2.4 Other matters

* 4th Joint Meeting of LTR Committees - it was agreed that this meeting will be held on R/V Tanganyika Explorer and at LTR/Kigoma facilities from 1 to 3.11.1995; and

* 7th Session of CIFA Sub-Committee for Lake Tanganyika – it was agreed that if portable equipment for translators can be found this session will take place at LTR/Kigoma facilities tentatively during February/March 1995.

3. CONCLUSIONS AND FOLLOW-UP

3.1 Prepare report on the 3rd SSP Assessment meeting and forward copies to LTR Scientific Coordinators and to Dr. Kapetsky.
(Action: Craig)

3.2 Obtain decision on transfer of Dutch APO's. (Action: Dutch APO's and LTR Coordinator)

3.3 Due to transfer of Craig's duty station secure the services of at least one APO for LTR/Bujumbura.
(Action: Ms. Blessich and LTR Coordinator)

3.4 Upon receiving the final version of the Evaluation Mission's report initiate the preparation of PRODOC for LTR's second phase. (Action: Everett, Kapetsky, Blessich and all LTR Coordinators)

3.5 Prepare programme for the LTR Workshop on Acoustics.
(Action: Venema, Aro and LTR Coordinator)

3.6 Propose duty travel to Dar and Kunduchi; objectives: (1) secure Gov't invitation for 7th Session of CIFA Sub-Committee for Lake Tanganyika; (2) secure Gov't clearance for Craig and two Dutch APO's; (3) meet with Mr. Nhnyete and discuss possible SSA; brief FAOR, Mr. Maembe, Prof. Bwathondi and Amb. Rantakari.
(Action: LTR Coordinator; authorization by Ms. Blessich)

3.7 Determine the feasibility of obtaining e–mail facility for LTR stations. (Action: Ms. Blessich)

RESEARCH FOR THE MANAGEMENT OF THE FISHERIES ON LAKE TANGANYIKA
GCP/RAF/271/FIN

GCP/RAF/271/FIN/TRAM/66

Report of Travel

to
Dar es Salaam and Kunduchi, Tanzania
(13–17.8.95)

by

George Hanek
LTR Coordinator

GCP/RAF/271/FIN.10

cc: Maembe/Bwathondi, URT
FAOR/ URT
Gonzalez-Alberdi/Doeff/Blessich, TCO4
Kapetsky, FIRI
Everett, FIPP
Kambona/Ssentongo, FIPL
Fitzpatrick/Turner, FIIT
All LTR Stations
Chrono
Diary: Hanek

GCP/RAF/271/FIN **August, 1995**

1. INTRODUCTION

1.1 Objectives

The objectives of this duty travel were: (1) to brief FAOR, Mr. Maembe and Prof. Bwathondi on LTR progress to date; (2) to arrange venues for the 4th Joint Meeting of LTR Committees and the 7th Session of CIFA Sub–Committee for Lake Tanganyika; (3) to obtain Gov't clearance for Craig; and (4) to meet with Mr. I.K. Nhnyete and Prof. Nikundiwe.

1.2 Itinerary

	Arrival	Departure
Bujumbura		11.8.1995
Nairobi	11.8.1995	13.8.1995
Dar es Salaam	13.8.1995	17.8.1995
Nairobi	17.8.1995	20.8.1995
Bujumbura	20.8.1995	

1.3 Persons met

Mr. T. Maembe	Director of Fisheries
Prof. P. Bwathondi	Director General of TAFIRI
Ms. L. Lyimo	Senior Officer
Prof. Nikundiwe	University of Dar es Salaam
Dr. E.P. Alleyne	FAO Representative
Mr. J. Yonazi	FAO Programme Officer
Ms. J. Backhouse	FAO Admin. Officer
Mr. I. K. Nhnyete	AHC Ltd.
Ms. A. Malishewski	Finnish Embassy

2. RESULTS

2.1 LTR Progress

LTR progress to date was outlined during meetings with all persons listed under 1.3 above.

2.2 Dates and Venues for 4th Joint Meeting of LTR Committees and the 7th Session of CIFA Sub–Committee for Lake Tanganvika

Due to the previous commitments of Mr. Maembe, it was agreed to hold the 4th Joint Meeting of LTR Committees from 15 to 17 November 1995. Its venue is still Bujumbura; Kigoma is retained as an alternative venue should the security situation in Bujumbura not improve. It was further proposed and subsequently agreed to hold the 7th Session of CIFA Sub-Committee for Lake Tanganyika at TAFIRI/LTR Kigoma facilities

from 12 to 14 March 1996. The official invitation of the Tanzanian authorities will reach the FAO's Director General office shortly after the General Elections *i.e.* after 29.10.1995.

2.3 Craig

Concerns were raised re: Craig's title and his proposed transfer to LTR/Kigoma. After consulting FAOR, his Programme Officer and LTR's Operations Officer it was proposed to revert immediately to the title as given in PRODOC and to propose a temporary transfer of Craig to LTR/Kigoma. These modifications were accepted and agreed to by the Director of Fisheries.

2.4 Charts for Lake Tanganyika

Following on Mr. J. Fitzpatrick's suggestion an initial contact was made with Mr. Nhnyete, an official of the Tanzania Harbour Authority. Several sessions followed. It was agreed that a one week visit to LTR/Bujumbura will be arranged during September in order to inspect the instruments of R/V Tanganyika Explorer, consult LTR Documentation Centre and to prepare a detailed proposal to prepare navigation chart/s for Lake Tanganyika (his c.v. and original proposal are now attached as Appendix 1).

2.5 Other matters

As always the Finnish Embassy was visited (Mr. Rantakari was unfortunately on home leave); two requests for visas for Finland were given to Mrs. Malishewski. Lastly, yet another contact was made with Prof. Nikundiwe of the University of Dar es Salaam. It was agreed that he will consult both Mr. Maembe and Prof. Bwathondi and assign two Tanzanian students to LTR/Kigoma so that they can take part in LTR research activities for one year and, eventually, fulfill the requirements for M.Sc.

3. CONCLUSIONS AND FOLLOW-UP

3.1 Modify initial LTR documentation for the 4th Joint Meeting of LTR Committees and inform all members re: change of dates.
(Action: LTR Coordinator)

3.2 Write to Mr. Maembe requesting to secure the official invitation to host the 7th Session of CIFA Sub-Committee for Lake Tanganyika
(Action: LTR Coordinator)

3.3 Determine if portable equipment for simultaneous translation is available in URT.
(Action: Mr. Yonazi)

3.4 Retain Coenen's title for Craig. (Action: Ms. Blessich)

3.5 Inform URT's authorities re: temporary transfer of Craig to LTR/Kigoma. (Action: LTR Coordinator)

3.6 Propose one week long visit to LTR/Bujumbura for Mr. Nhnyete. Authorize URT's FAO Representation to issue a return air ticket. Authorize LTR/Bujumbura to pay for his hotel and 50% DSA for 6 days.
(Action: LTR Coordinator and Ms. Blessich)

3.7 Maintain contact with Prof. Nikundiwe. (Action: LTR Coordinator)

GCP/RAF/271/FIN/TRAM/67

Report of travel

of

the Third Scientific Cruise
(28.8 – 6.9.1995)

by

**Victor Langenberg
APO - Fisheries Biologist**

GCP/RAF/271/FIN.10
cc: Blessich, TCO4
Kapetsky, FIRI
Turner, FIIT
All LTR stations
SSP
Chrono
TRAMS

FORM TE/3

LAKE TANGANYIKA RESEARCH
1995 RESEARCH VESSEL PROGRAMME
PROGRAMME: *R/V TANGANYIKA EXPLORER* CRUISE 95/03

NAME	POSITION
1. Craig, J	Biostatistician
2. Langenberg, V	Fish biologist
3. Tshibangu, K	Fish biologist
4. Tumba, J-M	Fish biologist
5. Chitamwebwa, D	Director TAFIRI, Kigoma
6. Makassa, L	Fish biologist
7. Plisnier, P-D	Field coordinator Limnology...
8. Kurki, H	Zooplankton biologist
9. Mannini, P	Field coordinator Fish biology
10. Lukwesa, Ch	limnologist

DURATION 28.08.95—06.09.95

LOCALITY

1. Bujumbura 28.08

2. Kigoma 29.08

3. Mpulungu 02.09

4. Kigoma 05.09

5. Bujumbura 06.09

PLAN (all times are Greenwich Mean Time ± 2)

LTR Coordinator
Date : 27 .8. 1995
INITIALED

DISTRIBUTION: Blessich, TCO4
Kapetsky, FIRI
Turner, FIIT
Chrono
Diary: Hanek

CRUISE PLAN **FORM TE/4**

SHIP: *R/V TANGANYIKA EXPLORER* CRUISE NUMBER: 95/03

CRUISE ITINERARY REOUIRED: (start. stop, port call(s) track chart)

1. Departure from Bujumbura 28.08
2. Arrival in Kigoma 29.08 and departure from Kigoma 29.08.
3. Arrival in Mpulungu 02.09 and departure from Mpulungu 02.09.
4. Arrival in Kigoma 05.09 and departure from Kigoma 05.09.
5. Arrival in Bujumbura 06.09

SENIOR SCIENTIST: J.F. Craig (Bujumbura-Kigoma)
V. Th. Langenberg (Kigoma-Mpulungu)
P-D. Plisnier (Mpulungu-Bujumbura)

SCIENTIFIC STAFF LIST: (including affiliation)

			DATES	
Name	Laboratory	Institution	Boarding	Disembarking
Craig, J.F	Fish biology	LTR/Bujumbura	Bujumbura 28.08.95	Kigoma 29.08.95
Langenberg, V.	Limnologist	LTR/Bujumbura	Bujumbura 28.08.95	Bujumbura 06.09.95
Tshibangu, K.	Limnologist	LTR/Bujumbura	Bujumbura 28.08.95	Bujumbura 06.09.95
Tumba, J.M.	Limnologist	LTR/Bujumbura	Bujumbura 28.08.95	Bujumbura 06.09.95
Chitamwebwa, D.	Limnologist	LTR/Bujumbura	Bujumbura 29.08.95	Bujumbura 06.09.95
Mannini, P.	Fish biology	LTR/Kigoma	Kigoma 05.09.95	Kigoma 06.09.95
Kurki, H.	Zooplankton	LTR/Kigoma	Kigoma 05.09.95	Bujumbura 06.09.95
Plisnier, P-D	Limnologist	LTR/Mpulungu	Mpulungu 02.09.95	Bujumbura 06.09.95
Makassa, L.	Fish biology	LTR/Mpulungu	Mpulungu 02.09.95	Bujumbura 06.09.95
Lukwesa, Ch.	Limnologist	LTR/Mpulungu	Mpulungu 02.09.95	Kigoma 05.09.95

EQUIPMENT TO BE USED:

1. Equipment supplied by LTR/Bujumbura

TURNER designs fluorometer with connecting tubes.
CTD probe for temperature/conductivity profiles.
Plankton net 100µm and formaldehyde.
Equipment for limnological sampling.
LICOR loggers and sensors.
Compaq labtop, color.
YSI oxygen sensor with cable.
2 lOOp Portable turbidity meter.
Limno water sampler (2pcs.).
DREL 2000 box (containing: COD reactor, Digital titrator, Conductivity meter, pH meter, FINpipets, Spectrophotometer with charger.
Manuals of all equipment mentioned above.
Chemicals and accessories for Limnological and Primary Production sampling.
Spare parts for most of the equipment mentioned above.
Spare GPS

2. Equipment supplied by LTR/Kigoma

Distilled water (30 liters)
Plankton net 100µm
Formaldehyde (5 liters)

3. Equipment supplied by LTR/Mpulungu

Distilled water (30 liters)

4. Equipment from other sources:

Meteorological station on board

5. Winch and wire requirements.

Oceanographic winch 550 meters

SCIENTIFIC OR SURVEY OBJECTIVES:

1) To study primary production in the three basins of the lake during the dry season. Most emphasis will be put on the training of the nationals to insure their full understanding and capability of carrying out these new incubation techniques

2) To study the horizontal and vertical abiotic composition of the epilimnic waters in the three basins of the lake. Intensive sampling will take place during the *in situ* incubation stops (incl. measurements of PAR, fluorescence, the standard limnological parameters along with CTD profiling.

3) With help of a tapestreamer, copies will be made from all the updated SSP date available at the stations which shall be taken back to Bujumbura.

4) To study the vertical zooplankton distribution and composition in the three basins of the lake. Hauls from 100 meters will take place.

FORM TE/5

CRUISE SUMMARY

SHIP: *R/V TANGANYIKA EXPLORER* CRUISE NUMBER: 95/03

SENIOR SCIENTIST(S): Craig, J. / Langenberg, V/ Plisnier, P-D.

LIST OF SCIENTIFIC STAFF ACTUALLY PARTICIPATING

Name	Laboratory	Institution,etc	DATES Boarding	Disembarking
Craig, J.F	Fish biology Cruise leader	LTR/Bujumbura,	Bujumbura 28.08.95	Kigoma 29.08.95
Langenberg, V.	Limnologist Cruise leader	LTR/Bujumbura,	Bujumbura 28.08.95	Bujumbura 06.09.95
Tshibangu, K.	Limnologist	LTR/Bujumbura	Bujumbura 28.08.95	Bujumbura 06.09.95
Tumba, J.M.	Limnologist	LTR/Bujumbura	Bujumbura 28.08.95	Bujumbura 06.09.95
Chitamwebwa,D	Limnologist	LTR/Bujumbura	Bujumbura 29.08.95	Bujumbura 06.09.95
Kurki, H.	Zooplankton	LTR/Kigoma	Kigoma 05.09.95	Bujumbura 06.09.95
Makassa, L.	Fish biology	LTR/Mpulungu	Mpulungu 02.09.95	Bujumbura 06.09.95
Plisnier, P-D	Limnologist	LTR/Mpulungu	Mpulungu 02.09.95	Bujumbura 06.09.95
Lukwessa, Ch.	Limnologist	LTR/Mpulungu	Mpulungu 02.09.95	Kigoma 05.09.95

ITINERARY ACCOMPLISHED: (including actual track chart)
Bujumbura – Kigoma (see the track chart):
1) Start of the survey 28.08.95 from Bujumbura.
2) Arrival in Kigoma 29.08.95, early morning, boarding of scientist.

4) Departure from Kigoma 29.08.95 around noon.
5) Sampling in the central part of the Lake 29-31.08.95.
6) Sampling in the southern part of the Lake 31.08-03.09.95, with scientists boarding on the 02.09.95 in Mpulungu.
7) Sampling in the central part of the Lake 03-05.09.95.
8) Arrival in Kigoma 05.09.95. early morning, disembarking of a scientist and boarding of scientists.
9) Departure from Kigoma 05.09.95 early afternoon.
10) Arrival in Bujumbura around 14.00 hrs., disembarking of scientists and unloading of samples to be analysed in Bujumbura station and in Finland (Lammi).

SCIENTIFIC OR SURVEY ACCOMPLISHMENTS:
(with brief statements explaining failures to achieve objectives)

1) In total 11 El samplings (i.e., with 10 meter interval up to 100 meters of depth measurements of turbidity, rel. fluorescence, temperature, Dissolved oxygen, conductivity, pH, and analyses of soluble reactive phosphate, ammonium, nitrate, nitrite and silica were determined on mixed water samples of the upper 60 meters of depth), 5 E2 samplings (like El, including PAR measurements and *in situ* primary production incubations) and 37 surface samplings (measurements on temperature, conductivity, pH, turbidity, rel. fluorescence and secchi disk depth when possible) were carried out during this cruise.

2) Most of the samplings were carried out as planned and the results were stored on the board computer after every sampling.

3) Training on the primary production *in situ* incubation techniques (handling of isotopes and other related safety aspects) along with in depth PAR measurements, CTD profiling and computer handling was carried out succesfully.

3) In total 20 CTD stations were visited. At each station the CTD was lowered down to a minimum of 300 meters if possible, otherwise to the nearest 20 meters from the bottom

4) The scintillation vials imploded several times when *in situ* incubating at depths greater than 50 meter.

5) The on board meteorological station's radiation sensor was calibrated with the LI-COR PAR sensor (type: cosine collector). So, the radiation sensor of the meteorological station was used every time a E2 sampling was carried out to obtain integrated PAR during the complete incubation time. However the logging on the computer was sometimes blocked for some unknown reason.

6) A total of 48 vertical hauls from 100 meters of depth with the 100 µm net were succesfully carried out at 16 stations, i.e., during every E sampling. The samples will be analysed at Bujumbura station.

PROBLEMS ENCOUNTERED. SUGGESTED IMPROVEMENTS, ETC.

Scientific ecruipment and sampling facilities

1) Another fan must be placed into the window closest next to the exhaustion pipe of the engine.

2) The wind sensor and radiation sensor were dirty with either rust or sand. Clear instructions on how to avoid or repair these problems must be available on board.

3) A freezer for samples should be provided. It should be placed in the wet lab.

4) The scintillation vials can not withstand pressures more than 5 atmosphere. It is suggested to use stronger ones with glass stoppers (allowing all the air to go out) or limit our *in situ* primary production measurements to the upper 40 meters of depth.

General matters

5) The Eilersen balances should not be used when the winches are in use, because usage of the winches causes fluctuating voltages.

GCP/RAF/271/FIN/TRAM/68

Report of Travel

to

Mpulungu, Zambia

21–31 October 1995

by

J. F. CRAIG
Biostatistician

GCP/RAF/271/FIN.10

cc: Blessich TCO4
Kapetsky, FIRI
Turner, FIIT
All LTR Stations
SSP
Trams
Chrono
Diary: Craig

1. INTRODUCTION

1.1 Objectives

The objectives of the duty travel were to: (1) finalise Dr Plisnier's move to Kigoma; (2) verify station equipment by checking against inventory list and attaching inventory numbers; (3) store all station data (Plisnier's, Bosma's and Verburg's) on backup tapes (IBM and Apple Macintosh) for data bank storage with J F Craig at Kigoma and at the Documentation Centre, Bujumbura; and (4) meet and discuss sampling, progress, future plans and methods to improve communications with staff from the Mpulungu Station.

1.2 Itinerary

	Arrival	Departure
Kigoma		21/10/95
Mpulungu	23/10/95	29/10/95
Kigoma	31/10/95	

1.3 Persons met

Dr P—D Plisnier	LTR
Ms E Bosma	LTR
Mr P Verburg	LTR
Mr Milindi	DOF, Mpulungu Station
Mr Makassa	DOF, Mpulungu Station
Other personnel of	DOF, Mpulungu Station
Mr Kabakwe	DOF, Provincial Fisheries Officer
Participants of	R/V Tanganyika Explorer Hydrodynamics/Limnology Cruise

2. RESULTS

2.1 Dr Plisnier

Dr Plisnier will travel to Kigoma on about 11 November 1995 and work with Dr Craig on his reports and manuscripts until the end of his contract in mid—December 1995. Dr Craig has been editing Dr Plisnier's LTR report on limnology for SSP1.

2.2 Inventory list

Equipment at the Mpulungu station was checked against an inventory list, inventory numbers were assigned, missing equipment was accounted for and responsibility for the equipment was passed from Dr Plisnier to Mr Verburg.

2.3 Data

All LTR data stored at Mpulungu by Plisnier, Bosma and Verburg were recorded on tape streamers.

2.4 Other matters

Comments were solicited from Plisnier, Bosma, Verburg and Huttula and Langenberg (on board R/V Tanganyika Explorer) on the LTR Scientific Coordinators' Report and Proposal for the 1995/96 SSP prepared for the Fourth Joint Meeting.

Plans and responsibilities for data collection in 1996 were discussed.

Dr Craig put forward his views on improving communications including every LTR international staff member submitting a workplan every three months and a summary of achievements in the preceding three months.

Dr Craig outlined his plans for distributing data throughout the project. The last three items will be formulated into a memorandum to be distributed to all stations.

Discussions were held on manuscript preparation and on other specific subjects.

Discussions were held with Mr Kabakwe concerning relationships between LTR Mpulungu and DFO, DFO housing for the two APOs transferring from Bujumbura, electricity payments for the station and the recruitment of DFO staff (fishery assistants) to the station.

GCP/RAF/27l/FIN/TRAM/69

Report of Travel

of

**the 4th Scientific Cruise
(23.10 – 3.11.1995)**

by

Timo Huttula, I. M. Kimosa and R.E. Makere

GCP/RAF/271/FIN.10

cc: Blessich, TCO4
Kapetsky, FIRI
Turner, FIIT
All LTR stations
SSP
Chrono
TRAMS

FORM TE/5

CRUISE SUMMARY

SHIP: RV/TANGANYIKA EXPLORER CRUISE NUMBER: 4

SENIOR SCIENTIST: Dr. Timo Huttula/Regional En.
Agency of Hame, Finland

LIST OF SCIENTIFIC STAFF ACTUALLY PARTICIPATING

Name	Laboratory Institute, etc.	DATES Boarding	Disembarking
Salonen	Univ. of Helsinki	23.10.	2.11.
Langenberg	FAO/FINNIDA/BUJA	23.10.	2.11.
Kihakwi	FAO/FINNIDA/KIGOMA	24.10.	2.11.
Makassa	FAO/FINNIDA/MPULUNGU	28.10.	2.11.
Nikomeze	FAO/FINNIDA/BUJA	23.10.	2.11.
Kagokozo	FAO/FINNIDA/UVIRA	23.10.	2.11.

ITINERARY ACCOMPLISHED: (including actual track chart)

Place	Arrival	Departure
Bujumbura		23.10.
Kigoma	24.10.	24.10.
Kalemie	25.10.	25.10.
Mpulungu	28.10.	29.10.
Kigoma	31.10.	1.11.
Bujumbura	2.11.	

SCIENTIFIC OR SURVEY ACCOMPLISHMENTS:
(with brief statements explaining failures to achieve objectives)

Hydrodynamics:
1. Study of time variations of flow field was done at six sites, longest measurement extending over 14 hours
2. The surface winds were compared to the predicted ones by wind model. It was found that the differences in the onshore off shore winds are calculated quite well but the calculated wind directions were still quite different from the observed ones
3. The LTR flow model results were compared to the observed flows. Generally the agreement was very good. Still more measurements are needed.
4. The boat was introduced for local officials in Kalemie
5. Wind station was evaluated and a new place chosen in Kalemie
6. Water discharge was measured in Lukuga river
7. Changing DSUs: In buoy stations (Mpulungu and Kigoma)
8. Changing DSUs: In land stations (Kalemie, Mpulungu and Kigoma)
9. CTD measurements: 38
10. Flow measurements: 36

Carbon cycling:
1. The numbers of picoplankton were determined on board in 18 vertical series covering the whole productive layer and metalimnion.
2. Having found the significant importance of picoplankton in Lake Tanganyika, its role in the nutrition of zooplankton was preliminarily assessed.
3. Bacterial production in epi- and metalimnion was measured with the leucine uptake method at 4 stations.
4. Photosynthesis-irradiance relationship was determined under productive and nonproductive conditions using the radiocarbon method and an incubator.
5. The horizontal distribution of *in vivo* fluorescence of chlorophyll a at the surface was periodically determined. Similarly we measured the vertical distributions of fluorescence at most CTD measurement sites down to 60-100 m depth.
6. Phytoplankton, zooplankton, bacterioplankton and water samples were collected for later determinations in Finland. DOC samples from deep water could not be taken, because the messenger for the closing of the Limnos water sampler could not be connected to the wire used for the CTD.

PROBLEMS ENCOUNTERED, SUGGESTED improvements, ETC.

Following things must be done in order to improve the scientific work on the vessel:

1. Walkie—talkies
-A pair of walkie talkies are needed for extended flow measurements. The cylinders departed during longest flow measurements more than 3 km. They are followed with rubber boat and TE. For the communication and also safety of persons in rubber boat the walkie talkies are needed.

2. Wet laboratory

-The ventilation of wet lab is still inadequate. Temperature can increase up to 40°C. The exhaust pipe is mounted in the corner of the room and it gives heat to the room. The walls must be better insulated (e.g. by using mineral wool with aluminum foil on both sides to reflect heat) . Because the floor is also very warm, the ventilation must be realized by a mechanical device. Keeping the door and window open are inadequate and sometimes they must be closed to be able to handle some samples (like filters)

-The water from the floor does not go out as vessel is moving. The floor must be redone so that always the leakage water is lead out.

3. Research winch

-The counter was not working. It has to fixed.

-extra wire should be added so that deep water samples and CTD can be taken. There is space on the drum and by having more wire the wire speed in short distances (0-200 m) would also be higher than presently

4. Air condition

-Still leaking condensed water from the system (worst in dry laboratory and in the cabins downstairs) . The complete .system has to be checked and fixed.

5. The function of ship board meteo station

-The measurements were conducted during the whole expedition. The system had to be restarted 41 times. Of these 20 were due to operator while the radio contact or arrival to harbour, 7 due to the practice, training and wind speed sensor maintenance. 4 cut offs were due to the operation of microscope power unit, which was connected closely to the meteo station PC. The remaining 11 cut offs were due to the meteostation system itself. 2 times of these 11 it was observed to be due to the loose serial port in PC and for 9 cut offs no explanation was found. They seem to be due to the interference in the electronic system in the dry laboratory. It has to be noted that also radio of the ship does not function properly due to the similar problems. The meteo station system was left logging also during CTD profiling and operation of the research winch did not normally effect to the system functioning.

-In the beginning of expedition 8 viruses were detected from three computers and diskettes. The viruses were cleaned and a software (McAfee) was left onboard for virus protection.

-The screen of meteostation PC started to go unclear, when one returns from MS-DOS prompt back to Windows during the datalogging. This may be due to the viruses or due to the electric shocks in the ships electric system.

-Humidity sensor gives sometimes unrealistic values. It seems that the life time of this sensor in ship environment is considerably shorter than in other stations. It is suggested that the sensor is periodically calibrated with other humidity meter such as a psychrometer. Also LTR should have few humidity and wind speed sensors as spare parts for the ship and other Aanderaa stations.

6. Onboard there should be an opening messenger which could easily changed from one wire to another without removing wire from the sampler.

GCP/RAF/271/FIN/TRAM/70

Report of Travel

of

the 5th Scientific Cruise

(16.11 – 4.12.1995)

by

Eero ARO

GCP/RAF/271/FM10
cc: Mann, T004
Kapetsky, FIRI
Turner, FlIT
Everett, FIPP
All LTR stations
ssp
Chrono
TRAMS

Version 1. 05.12.19951EA (will be revised and checked by EA)

Cruise 95/05

R/V Tanganyika Explorer Cruise Diary
16. November-4. December 1995

(Combined hydroacoustic-trawi and fish biology cruise)

by

E. Aro

Survey crew:		
Vessel crew:	Mr. I. M. Kimosa	(Captain)
	Mr. E. Makere	(Chief Engineer)
	Mr. A. Suleiman	(Second Engineer)
	Mr. N. Chale	(Fishing Master)
	Mr. N. Amuri	(Quartermaster)
	Mr P Bamporumukeko	(Quartermaster)
	Mr P Bigirimana	(AB)
	Mr L. Mpawenimana	(Cook)
Scientific crew:	Mr. E. Aro	(Senior Scientist, Cruise leader)
	Mr. P. Mannini	(Senior Scientist. Assisting Cruise Leader)
	Mrs. P. Paffen	(Fisheries Biologist)
	Mr. M. Kissaka	(Fisheries Biologist)
	Mr. M. Mambona	(Fisheries Biologist)
	Mr. B. Ndimunzigo	(Fisheries Biologist)
	Mr. R. Vääitäinen	(Student)
	Mr. P. Zomba	(Fisheries Biologist)

Hydroacoustics:

EY-500 standard settings throughout the survey were:

Operation menu:

Ping mode: Normal
Ping auto start: Off
Ping interval: 1.0 sec

Display menu:

Colour set: Light
Event marker: On
Echogram speed: 1:1
Echogram:On

Echogram menu:

Transd. number: I
Range: 100 m (or as necessary)
Range start: 0 m
Auto range: Off
Bottom range: 10 m
Bot. range start: 5 m
Bot. range pres: Off
Sub. bottom Gain 0.0 dB/m
Presentation: Contour
TVG: 2OlogR
Scale lines: 10
Bot. det. line: On
Layer lines: On
Integration line: Off
TS Colour mm : -75 dB
Sv colour mm: -65 dB

Printer menu:

Model type: Paint Jet
Navigation interval: 210 sec (corresponding 0.5 nm)
Event marker: On
Annotation: On
Naut. mile marker; On
TS distribution: On
lntegr. tables: On
Echogram speed: 1:1
Echogram:On

Echogram menu:

Transd. number: 1
Range: 150 m
Range stan: 0 m
Auto range: Off
Bottom range: 10 m
Bot. range start: 5m
Bot. range pres: Off
Sub. bottom Gain 0.0 dB/m
Presentation: Contour
TVG: 2OlogR
Scale lines: 10
Bot. det. line: On
Layer lines: On
Integration line: Off
TS Colour mm : -75 dB
Sv colour min: -65 d

Transceiver menu:

Mode:Active
Transducer type: ES 120-7
Transd. Sequence: Off
Transducer depth: 2.20 m
Absorption coef.: 4 db/km
Pulse length: Medium
Bandwidth: Auto
Max power: 300 W
2-way-beam angle: -20.8 dB
Sv transducer gain: 26.1 dB
TS transducer gain: 26.1 dB
Angle Sens. Along: 21.0
Angle Seas. Athw.: 21.0
3 dB Beamw. Along: 7.1 dg
3 dB Beamw. Athw.: 7.1 dg
Alongship Offset: 0.00 dg
Athw.ship Offset 0.00 dg

Bottom detection menu:

Minimum depth: 0.0 m
Maximum depth: 850 m
Mm depth alarm: 5.0 m
Max. depth alarm. 850 m
Bottom lost alarm: On
Minimum level -50dB

Log menu: Mode: Speed

Ping interval: 210
Time interval: 210 sec.
Distance interval: 0.5 nm
Distance: °In use°.

Layer menu:

Super layer: 10

Layer-1 Menu:

Type: Surface or Pelagic (swapping)
Range:5-10 m.
Range start: 10-15 m.
Margin: 3.0 m
Sv Threshold: -75 dB

Layer-2 Menu:

Type: Surface or Pelagic (swapping)
Range:20 m
Range start: 20 m.
Margin: 3.0 m
Sv Threshold: -75 dB

Laver-3 Menu:

Type: Surface or Pelagic (swapping)
Range: 20 m.
Range start: 40 m.
Margin: 3.0 m
Sv Threshold -75 dB

Laver-4 Menu:

Type: Surface or Pelagic (swapping)
Range: 20 m
Range start: 60 m.
M~irgin: 3.0 in

Sv Threshold: -75 dB

Layer-S Menu:

Type: Surface or Pelagic (swapping)
Range: 20 m
Range start: 80 m
Margin: 3.0 m
Sv Threshold -75 dB

Laver-6 Menu:

Type: Surface or Pelagic (swapping)
Range: 25 m
Range start: 100 m.
Margin: 3.0 m
Sv Threshold: -75 dB

Layer-7 Menu:

Type:Surface or Pelagic (swapping)
Range: 25 m
Range start: 125 m
Margin: 3.0 m
Sv Threshold: -75 dB

Layer-8 Menu:

Type:Surface or Pelagic (swapping)
Range: 50 m
Range start: 150 m
Margin: 3.0 m
Sv Threshold: -75 dB

Layer-9 Menu:

Type: Surface or Pelagic (swapping)
Range: 190 m
Range start: 10 m
Margin: 3.0 m
Sv Threshold: -75 dB

Layer-lO Menu: (during transects)

Type: Surface or Pelagic (swapping)
Range: 90
Range start: 10 m
Margin: 3.0 m
Sv Threshold: -75 dB

Layer-lO Menu: (during trawl hauls)

Type: Surface or Pelagic (swapping)
Range: 12
Range start: Depends on headrope depth
Margin: 3.0 m
Sv Threshold: -75 dB

TS-detection menu:

Mm value: -75dB
Mm Echo Length: 0.8
Max. Echo Length: 1.5
Max. Gain Comp. 4.0 dB
Max. Phase Dev.: 4.0

Disk menu: Used on when needed and necessary. Some of the echograins downloaded to disk and backup copies made on streamer tapes.

Serial Com. Menu: Used when necessary.

Annotation menu: Event counter: 1
Time interval: 3 min
Text: °used frequently°.

Navigation menu: Speed input: Manual
Manual speed: 90 knt (transects). 3.9 km (trawl hauls)

Utility menu: Sound velocity: 1498 m/s for Lake Tanganyika
COM1/COM2 Switch: Off

These settings has been used throughout the survey. Layer settings has been modified according to bottom detection from Pelagic to Surface.

Gulf–V openings:

Larvae net opening (inside diameter): 194 mm
Plankton net opening(inside diameter): 19 cm

15.11.1995 Visit onboard R/V Tanganyika Explorer. Met the crew. Familiar faces onboard. New software available to EY-500. Going through checking list of scientific equipments needed during the survey. Obviously we will be short of printer cartridge for HP Paint Jet Printer used for echograins.

16.11.1995 Starting the survey at 16.10 pm from Bujumbura harbour to sampling station 1. Checking EY500 new software. All times are given as local Burundi time (Greenwich +2 hours) throughout the survey.

Near trawl station 1: at 17.38 p.m. pos: 3027,51~ 29° **08,37.** Waiting darkness. No samples taken yet.

Zairean military gunboat was approaching us 18. 15 p.m. Sailed twice round us all guns on deck loaded, soldiers on positions and guns pointing at us. Gunboat forced us to follow them to Uvira harbour. In the Uvira harbour 18.30 p.m. Captain Kimosa and Mr. Mambona were discussing with the captain of the gunboat about our survey explaining the nature of this international cooperation survey at their office in harbour. All documents were shown to the military officers. All other crew members and scientific crew were kept onboard. There was a little bit tension observed among the crew members and scientific crew. After an hour discussion no results, because local military personnel in the harbour were not authorized to make any decision (so typical and normal). Mambona left to town 19.30 p.m. to search for the military boss, whom he knows well, screening all local bars, to take actions and make decision. Mambona came back to harbour with the big boss 20.55 p.m. and discussion continued in the harbour's military office. A copy of the crew list was given to the military officers. All crew and scientific crew members were ask to come on deck to show their faces. After half an hour discussion it was agreed that we leave for survey. Military officers were requesting compensation of 1 m^3 petrol (what a engine they have, if it consumes 1000 1/15

minutes),because they had used that amount during arresting R/V Tanganyika Explorer. This request is totally unbelievable.

It was my first visit in Zaire and I was not even invited. Leaving Uvira harbour at 21.30 p.m. to time trawl station I Arrival to Station I at 21.45.

At last sampling started.

16.11.1995 (Thursday)

CTD-STATION 1:
CTD-1: Bottom depth 75 in, CTD-depth, 21.55 p.m.
Pos: 30 27,32' 29° 08,25

PLANKTON STATION 1: Plankton-net samples: 1-3, Depth 69 m, Hauls 65 m
Pos: 30 27,4 1' 29° 08,32 at 22.05 Haul no. I at 21.55-22.05
Drifting. Moving back to more deeper area and away from the coast.
New position: 3027,11~ 29° 08,23 at 22.05 Haul no. 2-3. Depth 80 m, hauls 65 in at 22.20-22.35 pm

TRAWL HAUL 1:
Starting trawl haul: 22.40 p.m.
Course: 90
Pos: 3° 27,05' 29°08,15
Start hauling out: 22.45
Warps: 22.55
Hauls start: 23.02
Speed 3.9 knots.
Haul depth 62-75 m 23.02 (30 min), wire out 200 m
Haul depth 35-47 m 23.37 (30 min), wire out 150 m at winch)

17.11.1995 (Friday)

Start hauling in: 00.02 Pos: 3° 59,56' 29° 18,65
Doors up: 00.05 am
Trawl up: 00.20 am.
Pos: 30 29.00' 29° 13.63

TRANSECT NO.1
Start Pos: 3° 29,00' 29° 13,63 time 00.27 am.
Lot of noise in the echogramn *(??).* What to do about it.
Signal/noise ratio.
Depth 182 m at start.

Transect end 00.31 am.. pos. Pos: 3° 27.47' 29° 14,98

CTD-STATION 2:
CTD-2: Bottom depth 154 m, CTD-depth 140 m at 00.45 am.
Pos: 3° 27,47' 29° 14,98'
CTD up: Pos. 3° 27.47' 29° 14,98'

PLANKTON STATION 2: Plankton-net samples: 4-6, Depth 160 m, Hauls 100 m
Pos. 3° 27.47’ 29° 14,98’ at 01.00 am. Haul no. 3-6 at 01.00-01.40 am.
Stop sampling at 3° 27,92’ 29° 14.67

TRAWL HAUL 2:
Starting trawl haul: 01.43 am.
Course: 90
Pos: 3° 27.92’ 29° 14,67’
Start hauling out: 01.45 am.
Warps: 01.53 am, at 3° 28,10’ 29° 15.37’
Hauls start: 0l.59
Speed 3.9 knots.
Haul depth 50-62 m wire out 200 m at winch
Hauling in: 02.59 am. Pos: 3° 59.56 29° 18 65
Doors up: 03.07
Trawl up: 03.15

TRANSECT NO.2 (New transect)
Start Pos: 3° 29,98’ 29° 19,28 time 03.21
Course: 184
Transect end 00.31 pos. Pos: 3° 32,40 29° 19,26’

CTD-STATION 3: (New position)
CTD-3: Bottom depth 50 m CTD-depth 40 m at 03.40 am.
Pos: 30 32,60’ 29° 19,26’
CTD-up: Pos. 3°32,66’ 29° 19,21’

PLANKTON STATION 3: (New position) Plankton-net samples: 7-9, Depth 50 m, Hauls 40 m Pos. 3° 32,72’ 29° 19,19’ at 03.52 am. Haul no. 7-9 at 03.50-04.15 am. Stop sampling at 3° 32,91’ 29° 19,08’

TRAWL HAUL 3: (New position)
Starting trawl haul: 04.15 am.
Course: 180
Pos: 3° 32,95’ 29° 19,08’
Start hauling out: 04.19 am.
Warps: 04.30 am. at 3° 33,64’ 29° 18,84’
Hauls start: 04.32 pos: 3° 33,87’ 29° 18,77’
Speed 3.9 knots.
Haul depth 20-32 m, wire out 100 m

OBSERVE!
76 lift net boats in the area. Shoals very scattered, but when moon goes down and sun starts to rise, shoals are concentrating for half an hour (Chale says this). CPUE expected to be rather low. Whole night shoals have been very scattered except one shoal observed during transect 1 (Limnothrissa??). Fish still very scattered.

Hauling in: 05.37 am. Pos: 3° 37,21’ 29° 18,22’
Doors up: 05.40
Trawl up: 05.55
Sailing to the Burundi coast for anchoring.
Anchored at position 3° 39,08’ 29° 20,22 at 06.15 am.

Anchor up at 15.00 p.m..
Sailing to Gulf-V station I.

EXTRA TRANSECT ETS 1:
Anchoring place to Gulf I.
Start at pos 3° 39,08’ 29° 20,22’ at 15.03 pm
Course: 259 to Gulf-station I
Transect end 15.36 pos. Pos: 3° 37,48’ 29°15,89’

GULF-V STATION I:
Start: 2408981 Pos: 3° 37,30’ 29° 15,67’
Up: 2492468 Pos: 3° 37,79’ 29° 14,79’
Time:15.44—16.18 (34 min)
Depth: 468 m
Gear depth: 90 m

TRANSECT TS 3:
Gt-G2:
Start at pos 3° 38,73’ 29° 19,35’ at 16.27 pm
Course: 198 to Gulf—station 2.
Transect end 17.26 pos. Pos: 3° 47,48’ 29° 12,05’
Very little fish in the open pelagic zone.

GULF-V STATION 2:
Start: Pos: 3° 47,50’ 29° 12,02’
Up: Pos: 3° 49,77’ 29° 11,07’
Time: 17.30-18.05 (34 min)
Depth: 874 m
Gear depth: 90 m

TRANSECT TS 3 continues:
G2-TR4:
Start at pos 3° 49,95’ 29° 10,99’ at 18.09 p.m.
Course: 198 to TR station 4.
Transect end 18.59 pos. Pos: 3° 56,73’ 29° 07,67’
Still very little fish in the open pelagic zone.

PLANKTON STATION 4: Plankton-net samples: 10-12, Depth 871 m, Hauls 100 m Pos. 3° 56,95’ 29° 07,52’ at 19.13 am. Start sampling. Stop sampling at 19.40 pos 3° 56,57’ 29° 07,33’

CTD-STATION 4:
CTD-4: Bottom depth 850 m, CTD-depth 200 m at 19.50 am.
Pos: 3° 56,57’ 29° 07,33’
CTD-up: Pos. 3° 56,52’ 29° 07,32’ at 19.57 p.m.

TRAWL HAUL 4:
Starting trawl haul: 20.03 pm
Course: 90
Pos: 3° 56,54’ 29° 07,35’
Start hauling out: 20.03 am. at 3° 56,46’ 29° 17,54’
Warps: 200 m 20.21 pm 3° 56,47’ 29° 18,17’
Hauls start: 20.21 pos: 3° 56,50’ 29° 18,47’
Speed 3.9 knots.
Haul depth 45-57 m, wire out 200 m
Fish very scattered. No thermocline observed down to 200 m
Everything homogenious. No even a sign of fish shoals
in the neighbourhood. TS-distribution minly -75- -65dB.

Haulim1g in: 21.21 pm Pos: 3° 55,53’ 29° 11,91’
Doors up: 21.29 pm
Trawl up: 21.42 pm

TRANSECT TS 4:
TR4-TRS:
Start at pos 3° 55,57’ 29° 12,78’ at 21.42 pm
Course: 90 to TR station 5.
Transect end 22.04 pos. Pos: 3° 57,47’ 29° 15,05’
Still very little fish in the open pelagic zone. Scattered.

CTD-STATION 5:
CTD-5: Bottom depth 300 m CTD-dcpth 200 in at 22.10 am.
Pos: 3° 57,37’ 29° 14,96’
CTD-up: Pos. 3° 32,66’ 29° 19,21’

PLANKTON STATION 5: Plankton-net samples: 13-15. Depth 292 m, Hauls 100 m. Pos. 3° 57,34’ 29° 14.89’ at 22.30 p.m.-23.05 p.m.
Stop sampling at 3° 57,35’ 29° 14,78’

TRAWL HAUL 5:
Starting trawl haul: 23.03 p.m.
Course: 90
Pos: 3° 57,37’ 29° 14,76’
Start hauling out: 23.10 pm. at 3° 57,37’ 29° 14.76’
Otter boards out 23.28 pos. 3° 57,47’ 29° 15,46’
Speed 3.9 knots.

Screening five depth layers:
Warps: 400 m 23.35 p.m. 3° 57,86’ 29° 16,54’ headrope 90 m (haul 15 minutes)
300 m 23.52 p.m 3° 57,99’ 29° 16,86’ headrope 68 m (haul 15 minutes)

18.11.1995 (Saturday)

250 m 00.08 am. 3° 58,29’ 29° 17,70 headrope 57 m (haul 15 minutes)
150 m 00. 23 am. 3° 58,69’ 29° 18,53’ headrope 37 m (haul 15 minutes)
50 m 00.42 am. 3° 59,16’ 29° 19,33’ headrope 10 m (haul 15 minutes)

Hauling home 00.57 am. 3° 59,62’ 29° 20,30’
Observe: Total Hauling time 1 hour 15 minutes.
Otter boards up: 00.59 am.
Trawl up: 01.12 am.

TRANSECT TS 5:
TR5-TR6:
Start at pos 3° 59,86’ 29° 20,81’ at 01.14 am.
Course: 90 to TR station 6.
Transect end 01.39 pos. Pos: 3° 57,4l’ 29° 23,90’
Approaching coast, more fish nearer to the coast in depth layers 40-60 m

CTD-STATION 6:
CTD—6: Bottom depth 137 m CTD—depth 100 m at 01.45 a.m.
Pos: 3° 57,25’ 29° 24,00’
CTD-up: 01.55 a.m.

Small fish shoals in the area. Fishing vessels near to the coast. Our distance from the coast 0.85 nm. 26 fishing vessels operative in the area. Obviously fishing near the surface.

PLANKTON STATION 6: Plankton-net samples: 16-18, Depth 139 m, Hauls 100 m. Pos. 3° 57,14’ 29° 24,02’ at 02.O0 a.m. -02.26 a.m.

TRAWL HAUL 6:
Starting trawl haul: 02.30 a.m.
Course: 162
Pos: 3° 57,26’ 29° 24,05’
Start hauling out: 02.35 a.m. at 3° 53,27’ 29° 14,74’
Otter boards out 02.45 a.m.
Start haul 02.47 am. pos 3° 56,47’ 29° 18,17’
Warps: 150 m 02.21 a.m. 3° 56,47’ 29° 18,17’ headrope 37 m
50 m 03.17 a.m. 3° 59,58’ 29° 23,24’ headrope 12 m
Speed 3.9 knots.
Dense fish schools near the surface between 10-40 m.
Dense school just at bottom (batybates?) 1 nm long and 20 thick.
Amamnonia experiments after the haul. Position of the school: 3° 58,00’ 29° 24,07’
Hauling in: 03.47 am. Pos: 4° 00,91’ 29° 24,25’
Doors up. 03.50 a.m.
Trawl up: 04.01 a.m. pos 4° 08,11’ 29° 24,77’

Ammonium—nitrogen experiments: First shy try:
Sailing back to the position 3° 58,00’ 29° 24,07’ for searching the dense school of batybates.
Extra transect no.2: Start 04.15 pos 3° 58,59’ 29° 04,28’
End of transect: pos 3° 58,00’ 29° 24,07’ at 04.21 a.m.
Limnos sampling at 60 m depth. Three replicates. 62 m, 59m, and 57 m. Batybates school found same spot, but more dispersed than expected.
Sampling completed at 04.50 a.m. Pages 70 and 71 on echograms.
Sailing on the shore to anchor. Anchoring at pos. 3° 58,38’ 29° 25,27’ at 05.07 am. outside town Rumonge. At anchor 05.15 a.m.—l5.O0 p.m.

Anchor up 15.05 p.m.

TRANSECT TS 6:
TR6-G3:
Start at pos 3° 58,42’ 29° 25.24 at 15.09 p.m.
Course: 202 to Gulf station 3.
Transect end 16.10 p.m. pos. Pos. 4° 07,52’ 29° 21,54’

GULF-V STATION 3:
Start: Pos: 4° 07,73’ 29° 21,53’
Up: Pos: 4° 09,64’ 29° 20,89’
Time:16.16—16.50 (34 min)
Depth: 365 -4l2 m
Gear depth: 90 m.

TRANSECT TS 6 continues:
G3-G4:
Start at pos 4° 09,84′ 29° 20,87′ at 16.52 p.m.
Course: 195 to Gulf station 4.
Layers pelagic, depth more than 500 m.
Transect end 17.45 p.m. pos. Pos: 4° 17,43′ 29° 17,57′

GULF-V STATION 4:
Start: Pos: 4° 17,75′ 29° 17,34′
Up: Pos: 4° 19,67′ 29° 16,84′
Time: 17.51-18.25 (34 min)
Depth: 674-800 m
Gear depth: 90 m
Good example of dense school of fish in page 84 in echograms!!
Copy for demonstration! Sailing speed 3 knots!!

TRANSECT TS 6 continues:
G4-TR7:
Start at pos 4° 20,05′ 29° 16,76′ at 18.30 p.m.
Course: 200 to trawl station 7.
Layers pelagic, depth more than 800 m.
Transect end 19.23 p.m. pos. Pos: 4° 27,46′ 29° 13,03′

CTD-STATION 7:
CTD-7: Bottom depth 329 m, CTD-depth 200 m at 19.25 p.m.
Pos: 4° 27,46′ 29° 13,03′
CTD-up: 19.38 p.m. pos 4° 27,60′ 29° 12,90′

Continuous small fish shoals in 50—60 m depth. Fishing vessels near to the coast. Our distance from the coast 1.1 nm. 29 fishing vessels operative in the area.

PLANKTON STATION 7: Plankton-net samples: 19-21, Depth 261 m, Hauls 100 m Pos. 4° 27,60′ 29° 12,90′ at 19.42 p.m.-20.18 p.m.
Sampling stop pos. 4° 27,79′ 29° 12,73′

TRAWL HAWL 7:
Starting trawl haul : 20.30 p.m.
Course: 90
Pos: 4° 27,83′ 29° 12.76′
Start hauling out: 20.30 p.m. at 4° 27,77′ 29° 13,27′
Otter boards out 20.38 p.m.
Start haul 20.45 p.m. pos 4° 27,87′ 29° 14,20′
Screening three depths:
Warps: 150 m 20.45 p.m. 4° 27,87′ 29° 14,20′ headrope 82 m (20) min).
250) , 21.07 p.m. 4° 28,07′ 29° 15,27′ headrope 57 m (20 min).
150 m 21.29 p.m. 4° 59,58′ 29° 23,24′ headrope 34 m (20 min).
Speed 3.9 knots.
Hauling in: 21.49 p.m. Pos: 4° 28,67′ 29° 17,59′
Doors up: 21.55 p.m.
Trawl up: 22.08 p.m. pos 4° 28,97′ 29° 18,49′

TRANSECT TS 7:
TR7-TR8:
Start at pos 4° 28,95′ 29° 18,75′ at 22.14 p.m.

Course: 79 to trawl station 8.
Layers pelagic, depth more than 700 m
Transect end 22.30 p.m. pos. Pos: 4° 28,37′ 29° 21,33′
Stop transect. Turning around.
Trying to catch the big school in 80 m depth. Fish larvae???

EXTRA TRAWL HAUL 7B:
Starting extra trawl haul: 22.35 p.m.
Course: 276
Pos: 4° 28,40′ 29° 21,12′
Start hauling out: 22.40 pm. at 4° 28,40′ 29° 21,12′.
No Plankton torpedos used.
Warps 350 m, headrope 74 m haul 74-86, start 22.45 pos 4° 28,41′ 29° 20,62′
Speed 3.9 knots to 3.5 knots and to 3.9 knots agam Headrope 74-82-74.
Hauling in: 23.05 p.m Pos: 4° 28,40′ 29° 19,68′
Doors up: 23.11 p.m. 4° 28,41′ 29° 19,38′
Trawl up: 22.08 p.m. pos 4° 28,97′ 29° 18,49′
Hauling time 20 mm Catch: Fish larvae (Clupeids 20-40 mm) + some predators (L. stappersii juveniles minly and some adults). Good observation!!!!) Big Lates angustifrons 1 spec. Stomach samples of predators taken!! Pages 96-99 on the echogram outputs.

TRANSECT TS 7 **continues:**
TR7-TR8:
Start at pos 4° 29,l0′ 29° 19,13′ at 23.34 p.m.
Course: 79 to trawl station 8.
Layers pelagic, depth more than 700 m
Hitting the same larvae school agam Pages 100-102 on echogram outputs.
Stop transect at 4° 29,10′ 29° 19,13′ at 23.55 p.m.
Start extra Gulf-V.

19.11.1995 (Sunday)

GULF-V STATION EXTRA NO I: FOR FISH LARVAE (SAME SCHOOL AS BEFORE):
Start: Pos: 4° 27,97′ 29° 22,91′
Up: Pos: 4° 27,52′ 29° 24,87′
Time: 00.01—00.35 (34 min) a.m.
Depth: 800 m
Gear depth: wire length 300 m, gear 90 m
Larvae at 80 m depth (avoiding predation!!!???) What are they eating there?
The school decreasing now at 4° 27,72′ 29° 23,91′. Gulf: wire out 300 m
Gulf sampling ended to trawl station 8:
Because uniform distribution trawl no. 8 cancelled.

CTD-STATION 8:
CTD-8: Bottom depth 730 m, CTD-depth 200 m at 00.40 a.m.
Pos:4° 27,43′ 29° 24,87′
CTD-up: 00.56 a.m. pos 4° 27,61′ 29° 24,85′

PLANKTON STATION 8: Plankton-net samples: 22-24. Depth 730 m
Hauls 100 m Pos. 4° 27,61′ 29° 24 85′ at 00.55 a.m.-0l.22 a.m.
Sampling stop pos. 4° 27,85′ 29° 24,91′.

TRANSECT TS 8 (after CTD and plankton):
TR8-TR9: Trawl 8 undone
Start at pos 4° 27,85′ 29° 24,91 at 01.27 a.m.
Course: 89 to trawl station 9. Layers pelagic at start. depth more than 700 m
Larvae again pos 4° 28,13′ 29° 27,61′
Larvae patches all the way in 80—1lO m depth. See echograms.
Larvae patches do not exist when depth is less than 500 m.
Stop transect 8 at pos 4° 27,50′ 29° 37,92′ at 02.50 a,m.

CTD-STATION 9:
CTD—9: Bottom depth 350 m, CTD—depth 200 m at 02.55 a.m.
Pos: 4° 27,53′ 29° 38,03′
CTD-up: 03.11 a.m. pos 4° 27,53′ 29° 38,03′

PLANKTON STATION 9: Plankton-net samples: 25-27, Depth 354 m
Hauls 100 m Pos. 4° 27,53′ 29° 38,01′ at
03.15 a.m.-03.45 a.m. Sampling stop pos. 4° 27,53′ 29° 38,01′.

TRAWL HAUL 9: (about 30 fishing vessels in the neighbourhood)
Starting trawl haul: 03.45 p.m.
Course: 145
Pos: 4° 27,53′ 29° 38,01′
Start hauling out: 03.45 a.m. at 4° 27,62′ 29° 38,17′
Otter boards out 03.57 a.m. pos 4° 28,15′ 29° 38,45′
Start haul 04.0)2 am. pos 4° 28,42′ 29° 38,59′
Screening three depths:
Warps: 250 m 04.02 p.m. 4° 28,42′ 29° 38,59′
headrope 58 m (20 min).

Extra big schools !! Very close to the shore about 200 m from the shore. Bottom depth 80-90 m. Turning same time when gear hitting and passing through fish school. Gear unbalanced. Starboard side lower than port side wire. Fishing cabability questioniable! Shit!

See echogram outputs pages 114 and 115. Super!! Symposium stuff'!

Warps: 150) m 04.22 a.m. 4° 29,15′ 29° 39,28′ headrope 35 m (20 min)
Warps: 100 m 20.42 a.m. 4° 29,98′ 29° 38,57′ headrope 24 m (20 min)
Speed 3.9 knots.
Hauling in: 05.02 a.m. Pos: 4° 31,13′ 29° 38,49′
Otter boards up: 05.10 a.m.
Trawl up: 05.25 a.m. pos 4° 31,85′ 29° 38,41′

Catch: Lates mariae, Stolothrissa, not such a catch expected. Because of the turn gear was not fishing properly.

Sailing to anchor place near the coast.

Anchoring at. 06.15 a.m. pos 4° 37,32’ 29° 38,21’

Anchor up 15.00 p.m.
Sailing to next Gulf station; station number 5.

TRANSECT TS 9 (anchoring place to Gulf-5):
Anchor-G5:
Start at pos 4° 37,32’ 29° 38,21’ 15.03 p.m.
Layers pelagic, depth more than 800m.
Intermediate stop transect 9 at pos 4° 37,08’ 29° 28,05’ at 16.10 p.m.

GULF-V STATION 5:
Start: Pos: 4° 37,09’ 29° 28,00’ 16.12 p.m.
Up: Pos: 4° 38,71’ 29° 26.79’ 16.46 p.m.
Time: 16.12—16.46 (34 min)
Depth: >800 m
Gear depth: 90 m

TRANSECT TS 9 continues:
GS-G6:
Start at pos 4° 38,7l’ 29° 26,79’ 16.47 p.m.
Course: 210 to Gulf station 6
Layer- pelagic, depth more than 700 m
Intermediate stop transect 9 at pos 4° 47.14’ 29° 18.1O’ at 18.06 p.m. for Gulf no. 6:

GULF-V STATION 6:
Start: Pos: 4° 47,21’ 29° 17,88’ 18.08 p.m.
Up: Pos: 4° 48,29’ 29° 16,41’ 18.42 p.m.
Time: 18.08—18.42 (34 min)
Depth: >1000 m
Gear depth: 90 m

TRANSECT TS 9 continues:
G6-TR10:
Start at pos 4° 48,51’ 29° 16,21’ 18.44 p.m.
Course: 210 to trawls station 10.
Layers pelagic, depth more than 1000 m
Stop transect 9 at pos 4° 57,59’ 29° 07,59’ at 20.06 p.m. for CTD. plankton and trawl:

CTD-STATION 10:
CTD—10: Bottom depth 500 m CTD—depth 200 m at 20.15 p.m.
Pos: 4° 57,59’ 29° 07,59’
CTD-up: 20.22 p.m. pos 4° 57,61’ 29° 07,41’

PLANKTON STATION 10: Plankton-net sample: 28-30, Depth 354 m, Hauls 100 m Pos. 4° 57,61’ 29° 07,41’ at 20.24 p.m.-20.45 p.m.
Sampling stop pos. 4° 57,26’ 29° 07,44’

TRAWL HAUL 10:
Otter boards rigging changed to give more spread of the trawl. Shackles moved toward center and attachment in the inner hole, not to the middle as before.
Hauling three layers. Beach seine boats in the area fishing pelagic with beach seines + lights.
Searching fish 20.55-21.15 p.m.

Starting trawl haul: 21.04 p.m.
Course: 90
Start hauling out: 21.06 p.m, at 4° 57,83’ 29° 07,27’
Otter boards out 21.15 p.m. 4° 57,39’ 29° 07,82’
Warps: 300 m headrope 65 m (20 min)
Start haul 21.18 p.m. pos 4° 57,37’ 29° 08,06’
Screening three depths:
Warps: 300 m 21.18 p.m. pos 4° 57,37’ 29° 08,06’ headrope 65 m (20 min).
350 m 21.38 p.m. pos 4° 57,90’ 29° 09,10’ headrope 80 m (20 min)
100 m 22.02 p.m. pos 4° 56,98’ 29° 10,27’ headrope 20 m (20 min)
Speed 3.9 knots.
Hauling in: 22.22 p.m. Pos: 4° 57,10’ 29° t 1,32’
Otter boards up: 22. 25 p.m.
Trawl up: 22.40 p.m.
Catch: Lower layers Stollo juveniles, but bigger than yesterday and day before. Trawl meshes full of juveniles. Larvae and juveniles seem to be in the deep pelagic zone in very dense patches. Big predators L. inariae and juvenile and adult Luciohates. Trawl performance more balanced, catchability of the trawl open(???). Next couples of hauls will show that.

TRANSECT TS 10:
TRIO-TR11:
Start at pos 4° 56,91’ 29° 12,91’ at 22.50 p.m.
Course: 91 to trawls station II.
Layers pelagic, depth more than 1000 m.

20.11.1995 (Monday)

Stop transect 10) at pos 4° 57,59’ 29° 24,29’ at 00.10 a.m. for CTD. plankton and trawl no. 11

CTD-STATION 11:
CTD-12: Bottom depth >800 m.
CTD-depth 200 m at 00.12 a.m.
Pos: 4° 57,59’ 29° 24,29’
CTD-up: 00.26 a.m. pos 4° 57,37’ 29° 25,06’

PLANKTON STATION 11: Plankton-net samples: 31-32 Depth >800 m Hauls 100 m Pos. 4° 57,37’ 29° 25,06’ at 00.24 a.m.—O0.54 a.m. Sampling stop pos. 4° 57,20’ 29° 25,04’

TRAWL HAUL 11:
Otter board’s rigging same as trawl haul 10. Warp lengths should be checked in Kigom
Starting trawl haul: 01.00 a.m.
Course: 90
Start hauling out: 01.04 a.m. at 4° 57,20’ 29° 25,04’
Otter boards out 01.11 a.m. 4° 57,20 29° 25,40’
Warps: 250 m, headrope 60 m (60) min)
Start haul: 01.16 a.m. pos 4° 57,30’ 29° 25,72’
Speed 3.9 knots.
Hauling in: 02.17 a.m. Pos: 4° 58,04’ 29° 28,90’
Otter boards up: 22.25 p.m.

Trawl up: 22.40 p.m.
Trawl Operation and Catch: Trawl is fishing much better now than before. Opens better and catches better.
Lates stappersii juveniles (20 mm), Limnothrissa larvae and adult Stolothirissa and others. Trawl rigging should be kept like this. Vertical opening reduced 2 m to about 10 m instead of about 12 m. See echogram!!!! It is not the same soup as before. Check TS—distributions!!

TRANSECT TS 11:
TR 11 -TR 12:
Start at pos 4° 58,01' 29° 29,56' at 02.40 a.m.
Course: 106 to trawl station 12.
Layers still pelagic, depth more than 800 m
Stop transect 11 at pos 4° 57,39' 29° 37,00' at 03.25 a.m, for CTD, plankton and trawl no. l2.

CTD-STATION 12:
CTD-12: Bottom depth 180 m
CTD-depth to 150 m at 03.30 a.m.
Pos: 4° 57,29' 29° 07,'
CTD-up: 03.39 a.m. pos 4° 57,14' 29° 37,06'

PLANKTON STATION 12: Plankton-net samples: 34-36, Depth m. Hauls 100 m Pos. 4° 57,14' 29° 37,04' at 03.40 a.m.-04.1O a.m.
Sampling stop pos. 4° 56,94' 29° 36,92'

TRAWL HAUL 12:
Otter board's rigging same as trawl hauls 10—11.
Starting trawl haul: 04.10 a.m.
Course: 298 heading north-north-west.
Start haulimig out: 04.14 amat 4° 56,75' 29° 36,92'
Otter boards out 04.19 a.m. 4° 56,60' 29° 36,76'
Warps: 210 m, headdrope 45 m (60 min)
Start haul: 14.22 a.m. 4° 56,40' 29° 36,50'
Speed 3.9 knots.
Haulimig in: 05.22 am. Pos: 4° 54,71' 29° 33,53'
Otter boards up 05.26 a.m.
Trawl up: 05.42 am.

Sailing to Kigoma harbour at 05.55 am. This hydroacoustic department is now closed.

In Kigoma harbour at 0)6.20 Anchor at harbour. Landed 08.15 a.m. local time (07.15 survey time).

21.11.1995 (Tuesday)

Sailing from Kigoma at 13.25 pin (local time; 14.25 surve~ time) to Gulf sampling point 7 and 8 along the transect 12.

TRANSECT TS 12:
Kigoma-TR 13:
Start at pos 4° 54,03' 29° 35,50' at 14.50 a.m. (survey time)
Course: 201 to trawl station 13.
Layers pelagic, depth more than 800 m
Stop transect 12 at pos 4° 02,85' 29° 31,56' at 03.25 am for CTD. plankton and trawl no l3.

GULF-V STATION 7:
Start: Pos: 5° 03,15’ 29° 31,54’ 11 p.m.
Up: Pos: 5° 38,71’ 29° 26,79’ l5.29 p.m.
Time: 14.55-16.29 (34 min)
Depth: >800 m
Gear depth: 90 m
Big school of larvae at the depth of 150 m

TRANSECT TS 12 continues:
G7-G8:
Start at pos 5° 38,71’ 29° 26,79’ 15.34 p.m.
Coitrse: 201 to Gulf station 8
Layers pelagic, depth more than 700 m
Intermediate stop transect 12 at pos 5° 15,24’ 29° 24.01’ at 16.50 p.m. for Gulf no. 8 and then extra CTD

GULF-V STATION 8:
Start: Pos: 5° 15,24’ 29° 24,01’ 16.50 p.m.
Up: Pos: 5° 17,27 29° 23,17’ 17.24 p.m.
Time: 16.50—17.24 (34 min)
Depth: >800 m
Wire lemmgth 300 m
Gear depth: 90m observe the school in 250 m depth.
Big school of larvae at the depth of 250 m

EXTRA CTD-STATION AT GULF-V STATION 8:
(because of the school of larvae or whatever)
CTD-Gulf-V no. 8 extra: Bottom depth >800 m CTD-depth 300 m at 17.37 p.m.
Pos: 5° 17,54’ 29° 23,11’
CTD-tmp: 03.39 am. pos 5° 17,64’ 29° 23,03’
Visibility is impressive. Lot of jellyfish near the surface!!!

TRANSECT TS 12 continues:
G8 (extra CTD)-Trawl 13: Speed settings wrong.
Speed 3.5 knots on paper. Actual speed 9.0 knots.
Start at pos 5° 17,64’ 29° 23,O3’ 18.03 pm
Course: to Trawl station 13. Layers pelagic,depth more than 700m
There was a school of fish at 250 m depth, but signal lost.
Observe: There is life beyond 200 m depth in some areas.
pos. 5° 25,66’ 29° 18,94’.
Trawl station 13. At 5° 27,45’ 29° 18,08’

CTD-STATION 13:
CTD-13: Bottom depth 360 m, CTD-depth 200 m at 19.15 pm
Pos: 5° 27,59’ 29° 18,13’
CTD-up: 19.26 p.m.

PLANKTON STATION 13: Plankton-net samples: 37-39, Depth 364 m
Hauls 100 m Pos. 5° 27,28’ 29° 18,28’ at 19.26 p.m.-19.55 p.m.
Calm weather.

TRAWL HAUL 13 (Ernesto Che):
Otter board’s rigging same as trawl hauls 10-12. Warps checked and 20 cm cut on port side.
Starting trawl haul: 19.55 pm 42 fishing boats fishing close to the shore.

Course: 126 heading east-southeast.
Start hauling out: 19.55 p.m. at 5° 27,89’ 29° 18,51’
Otter boards out 20.04 pm 5° 27,99’ 29° 19,12’
Screening two depths: 45-55 m and 30-40 m
Warps: 200 m , headrope 45 m (30 min)
Start haul 20.08 pm pos 5° 28,03’ 29° 19,47’
Warps: 150 m on winches headrope 30 m (30 mm).
Pos. 5° 28,28’ 29° 21,13’
Speed 3.9 knots.
Hauling in: 21.08 p.m. Pos: 5° 28,67’ 29° 22,78’
Otter boards up 21.12 p.m.
Trawl up: 21.25 pm
Small inmmature (20-30 mm) Stolothrissa !! (Limnothmrissa??, a sample taken for species determination)

TRANSECT TS 13:
TRL13-TR 14:
Start at pos 5° 29,25’ 29° 23,58’ 21.26.03 pm
Course: 81 to Trawl station 14.
Layers pelagic, depth more than 700 m
Trawl statiomi 14. At 5° 27,54’ 29° 34,90’ at 22.40 p.m.

CTD-STATION 14:
CTD-14: Bottoma depth >800 mCTD-depthi 200 ma at 22.45 pm
Pos: ~0 27,54 29° 34,90’
CTD-up 22.54: pos ~0 27,38 29° 34.88’

PLANKTON STATION 14: Planktoim-net samples: 40-42. Depth >800 m
Hauls 100 m Pos. ~0 27,54’ 29° 34,88’ at 22.55 p.mn.-23.20 pm
Sampling stop 50 27,48’ 29° 34,76’.

TRAWL HAUL 14:
Starting trawl haul: 23.22 pm Pos. 5° 27,44’ 29° 35,09’
Course: 77 headimig north-east-east.
Start haulimig omit: 23.22 p.m., at 5° 27,48’ 29° 34,70’
Otter boards out 23.35 p.m. 5° 27,47’ 29° 35,26’
Screening two depths (68-78 m; 15-25 m).
Warps: 300 m, headrope 68 m (30 min) very demise school at 60-80 meters depth.
Start haul 23.35 p.m. pos 5° 27,38’ 29° 35,70’
At the beginning a dense school. Machine takes it as bottom!!!! See echogramn. Second bottom echo also on time echogram. Dense school ends at l)OS. 5° **27,13’ 29° 36,36’**

22.11.1995 (Wednesday)

Warps: 50 ma, headrope 15 m(30 min) upper layer scattered. Start in the upper layer 00.12 pos. ~0 26,96’ 29° 37,07’.
Hauling in: 00.42 pm Pos: 5° 27,31, 29° 38,70’
Otter boards up 00.45 p.m.
Trawl up: 00.55 p.m.
Dense school was Stolothrissa juveniles!!! Uninderestimates on echogram. the number of Stolo juveniles in this catch enormous (billions of specimens)!!

TRANSECT TS 14:
TR14-TR 15:
Start at pos 5° 27,33’ 29°39,36’ 01.01. a.m.

Course: 99 to Trawl station 15.
Layers surface, depth less than 500 m
Stop transect at 5° 27,43’ 29°44,64’ at O1.36 a.m.
Turning south along the coast. Searching fish.
Station 15: at O1.45 a.m.

CTD-STATION 15:
CTD-15: Bottom depth 212 ma, CTD-depth 150 m at 02.45 am.
Pos: 5° 27,78 29° 44,47’
CTD-up: Pos: 5° 27,68’ 29° 44,37’

PLANKTON STATION 15: Plankton-net samples: 43-45, Depth 233 m
Hauls 100 m Pos. 5° 27,68’ 29° 44,37’ at 02.04. a.m-02.15 p.m.
Stop plankton sampling pos. 5° 27,65’ 29° 44,15’

TRAWL HAUL 15:
Starting trawl haul: 02.34 a.m. Pos. 5° 27,44’ 29° 35,09’
Course: 77 heading south.
Start hauling out: 02.35 a.m. at 5° 27,55’ 29°44,09’
Otter boards out 02.45 a.m. 5° 27,91’ 29° 44,36’
Haul in two layers (15-25 m).
Start haul 02.46 am pos 5° 28,06’ 29° 44,50’
Warps: 50 m , headrope 15 m (30 min). *
Changing depth to 68 m (headrope) at 03.16 am.
pos 5° 29,11’ 29° 45,37’
Warps: 300 m, headrope 68 m (30 min), start 03.16 am.
Hauling in: 0)3.46 am Pos: 5° 30,74’ 29° 46,66’
Otter boards up 03.56 a.m.
Trawl up: 04.05 a.m.

Sailing north to anchoring place near Cap Kabogo.

TRANSECT EXTRA TSE 2:
TR 15-Anchoring place:
Start at pos 5° 31,38’ 29° 47,14’ 04.09 a.m.
Course: 292 to anchoring place.
Stop transect at 5° 27,43’ 29°44,64’ at 01.36 a.m.
Note TS table changed for short while for -65 dB and -75dB not used. Testing. Stop transect at pos 5° 24,84’ 29° 44,17’ at 04.58 a.m.

Amuchoring at pos. 5° 23,88’ 29°44,77 05.15 a.m.

CALIBRATION (11.30-14.30)
Standard copper sphere ø 23.0 mm with TS of -40.4 dB supplied by SIMRAD used. Standard procedure followed (old fashion type). Com/Com connection missing between PC and EY-500 and thus lobe.exe program not used (unfortunately). There seems to be too much wind and drifting although we are anchored. Difference between old and new gain is in range 3-5%. Calibration was somehow unsuccessful and I doubt the results, thus settings already in use has been kept and not changed. See calibration report file: *CALIBR1.XLS*

TRANSECT TS 15:
Anchoring place-G9:
Start at pos 5° 23,92’ 29° 44,74’ 15.19 pm

Course: 220 to Gulf station 9.
Layers surface at the beginning. depth less than 500 m All layers refer to pelagic:
16.55pm depth more than 800 m
Second bottom echo on echogram pos. 5° 36,86′ 29° 4,32′
Stop transect at 5° 37,56′ 29° 33,97′ at 17.08 pm
Station 9: at 17.10 p m

GULF-V STATION 9:
Start: Pos: 5° 37,78′ 29° 33,90′ 17.13 p.m.
Up: Pos: 5° 39,52′ 29° 32,31′ 17.47 p.m.
Time: 17.13-17.47 (34 min)
Depth: >800 m.
Gear depth: 90 m

TRANSECT TS 15 continues:
G9-G10:
Start at pos 5° 39,53′ 29° 32,82′ 17.48 pm
Course: 220 to Gulf station 10. Layers pelagic, depth more than 800 m HP PaintJet runnimig short of ink. Running cartridges empty. Echograms looks funny without all the colors. Blue color out. Pinky echograms. One set (own private cartridge) available before Mpulungu!!
Shallow water, layers refer to surface.
Intermediate stop transect 15 at pos 5° 47,41′ 29° 23,04′ at 19.08 p.m. for Gulf no. 10.

GULF-V STATION 10:
Start: Pos: 5° 47,52′ 29° 22,94′ 19.12 p.m.
Up: Pos: 5° 49.35′ 29° 22,25′ 19.46 p.m.
Time: 19.12—19.46 (34 min)
Depth: 159 m Wire length 300 m
Gear depth: 90 m

TRANSECT TS 15 continues:
G10-TR 16:
Start at pos 5° 49,46′ 29° 22,21′ 19.47 pm
Course: 224 to Trawl statiomi 16.
Stop transect 15 at pos 5° 57,14′ 29° 15,38′ 20.55 pm

CTD-STATION 16: No CTD taken. Bottom depth 41 m.

PLANKTON STATION 16: Plankton-net samples: 46-48, Depth 4lm. Hauls 35 ni. Pos. 5° 57,14′ 29° 15,52′ at 21.02 p.m.-21.15 pm

TRAWL HAUL 16 (Pink Panther): (position changed, new position : 5° 57,14′ 29° 15,52′ about 4 nm from the shore, shallow water area. Haul started at 40 m depth heading to east to deeper water area)
Starting trawl haul: 21.19 pm Pos. 5° 57,07′ 29° 15,54′
Course: 94 heading east.
Start hauling out: 21.24 p.m. at 5° 57,01′ 29° 15,92′
Otter boards omit 21.32 pm 5° 56,98′ 29° 16,17′
First depth: 15—25 m (20 min)
Warps: 50 m, headrope 15 m (20 min).
Start haul 21.33 p.m. pos 5° 56,96′ 29° 16,27′.
Second depth: 68-78 m (40 min)
Warps: 300 m headrope 68 m (40 min), start 21.56 pm pos. 5°

56,89’ 29° 17,55’

Hauling in: 22.33 pm Pos: 5° 56,50’ 29° 19,69’
Otter boards up 22.48 pm
Trawl imp: 22.50 p.m.

TRANSECT TS 16:
TR16-TR 17:
Start at pos 5° 56,33’ 29° 20,42’ 22.52 p.m.
Course: 99 to Trawl statiomi 17.
Stop transect 16 at pos 5° 57,36’ 29° 27,87’ 23.54 pm

23.11.1995 (Thursday)

CTD-STATION 17:
CTD-17: Bottom depth 578 m, CTD-depthu 200 m at O0.05 a.m.
Pos: 5° 57,37’ 29° 29,87’
CTD-up: Pos: 5° 57,31’ 29° 30,43’

PLANKTON STATION 17: Plankton-net samples: 49-51. Depth 579 m
Hauls 100 m
Pos. 5° 57,28’ 29° 30,49’ at 00.12 a.m-00.30 a.m.
Round the vessel huge amount of Lates stappersii feeding at the surface.

TRAWL HAUL 17:
Starting trawl haul: 00.37 am Pos. 5° 57,26’ 29° 30,49’
Course: 94 heading east.
Start hauling out: 00.38 a.m. at 5° 57,26’ 29° 30,49’
Otter boards out 00.55 am 5° 57,l6’ 29°30,53’
First depth: 80-90 m. (20 min)
Warps: 350 m headrope 80 m (20 min).
Start haul 00.55 am pos 5° 57,09’ 29° 31,24’.
This layer is almost empty.
Second depth: 68-78 m (20 min)
Warps: 250 m, headrope 58 m (20 min), start 0l.17 am
pos. 5° 56,87’ 29° 32,28’.
In this layer there must be some Lates stappersii.
Third depth: 7—17 m (20 min)
Warps: 50 m on winches. headrope 7 m (20 min), start 01.42 am
pos. 5° 56,78’ 29° 33,68’.
There seem to be lot of noise in this layer. This has been the case throughout the whole survey.
Hauling in: 02.02 am Pos: 5° 56,80’ 29° 35,16’
Otter boards up 02.07 pm
Trawl up: 02.15 a.m.
Catch: °Expected° catch. Linaio. Lates stappersii and some batybates. Upper layer is noise, not very many fish, but still we are missing some of the biomass in the upper layer (5-15 m depth). Some of the Lates stappersii are obviously from the upper layer, because they were in such a good condition.

Vessel has been invaded by dragon flies and bats during this night.

TRANSECT TS 17:
TR17-TR 18:
Start at Pos 5° 56,86’ 29° 35,89’ 02.20.52 p.m.

Course: 82 to Trawl station 18.
Stop transect 17 at pos. 5° 57,36’ 29° 45,06’ 03.15 a.m.

CTD-STATION 18:
CTD-18: Bottom depth 203 m CTD-depth 180 m at 03.20 a.m.
Pos: 5° 57,36’ 29° 45,10’
CTD-up: Pos: 5° 57,31’ 29’ 45,13’

PLANKTON STATION 18: Plankton-net samples: 52-54, Depth 2O3 m
Hauls 100 m
Pos. 5° 57.31’ 29° 45,13’ at 03.32 a.m.-04.0O a.m.

TRAWL HAUL 18:
Starting trawl haul: 04.02 am. Pos. 5° 57,15’ 29° 45,12’
Course: 92 heading east
Start hauling out: 04.06 am 5° 57,15’ 29° 45.12’
Otter boards out 04.12 am 5° 56,94’ 29° 45,52’
Screenimig two depth layers:
Depth 1 (30 min): Warps 200 m, headrope 45 m hauling 45-55 m depth. Start at 04.16 am. pos. 5° 56,68’ 29° 45,76’.
Depth 2 (30 min): Warps 10)0) ma . headrope 25 m hauling 35—45 m depth. Start at 04.46 am pos. 5° 55,75’ 29° 47,35’.
Hauling in: 05.16 am Pos: 5° 54,73’ 29° 48,67’
Otter boards up 05.19 a.m.
Trawl up: 15.25 a.m.

Sailing to anchoring place. Anchor at pos. 5° 57.48’ 29° 50,59’ at 06.05.

End of pink ink night!

Anchor up at 15.15. pos 5° 57,48’ 29° 501,59’

TRANSECT TS 18:
Anchoring place—G11:
Start at pos 5° 57.66’ 29° 50,62’ 15.18. p.m.
Course: 251 to Gulf-station II:
Intermediate stop transect 18 at pos. 6° 07,41’ 29° 38,17’ 17.05 p.m. for Gulf 11:

GULF-V STATION 11:
Start: Pos: 6° 07,67’ 29° 38,10’ 17.06. p.m.
Up: Pos: 6° 09,48’ 29° 37,02’ 17.40 p.m.
Time: 17.06—17.40 (34 min)
Depth: 817 m Wire length 300 m
Gear depth: 90 m

TRANSECT TS 18 continues:
G11 -G12::
Start at pos 6° 09,48’ 29° 37,02’ 17.41 pm
Course: 210 to Gulf—station 12:

Intermediate stop transect 18 at pos. 6° 17,71’ 29° 32,60’ 18.43 p.m. for Gulf 12:

GULF-V STATION 12:
Start: Pos: 6° 17,85’ 29° 32,57’ 18.45. p.m.

Up: Pos: 6° 19,50’ 29° 31,45’ 19.19 p.m.
Time: 18.45—19. 19 (34 min)
Depth: 446 m Wire length 300 m
Gear depth: 90 m

TRANSECT TS 18 continues:
G12-TR19:
Start at pos 6° 19,36’ 29° 31,53’ 20.11 p.m.
Course: 210 to TR19:
Stop transect 18 at pos. 6° 27,39’ 29° 26,05’ 21.17 p.m.

CTD-STATION 19:
CTD-19: Bottom depth 99m CTD-depth 80 m at 21.17 pm
Pos: 6° 27,39’ 29° 26,05’
CTD-tmp: 21.25 pm

PLANKTON STATION 19: Plankton-net samples: 55-57, Depth 98 m
Hauls 100 m Pos. 6° 27,53’ 29° 26,19’ at 21.25 a.m.-21.45 a.m.

TRAWL HAUL 19:
Rigging changed. Black warps taken out. Fishing depth m have changed.
Starting trawl haul: 21.45 p.m. Pos. 6° 27,65’ 29° 26,32’
Course: 92 heading east to TR2O.
Start hauling out 21.50 p.m. 6° 27,77’ 29° 26,35’
Otter boards out 21.57 pm 6° 27,54’ 29° 26,86’

Screening three depth layers:
Depth 1 (20 min): Warps 250 m . headrope 60 m,
hauling 60-70 m depth. Start at 22,01 p.,. pos.
6° 27,54’ 29° 26,86’.
Depth 2 (20 min): Warps 500 m . headrope 115 m hauling 115—125 m depth. Start at 22.21 p.m. pos. 6~’26,68’ 29° 28,08’. Fish migrating top from 115 m depth. See echogram. Captain turning course. Fishing questionable and ability
to fish how. See catches!!
Depth 3 (20 min): Warps 200 m , headrope 45 m, hauling 45-55 m depth. Start at 22.43 p.m. pos. 6° 26,16’ 29° 29,12’
Hauling in: 23.03 pm Pos: 6° 25,79’ 29° 30,09’
Otter boards up 23.13 pm
Trawl unclear. Warps attached to the trawl wrongly!!! That is why it did not fish properly. Material not so
good. Used for species caught only and for otolith’s.
Trawl up: 23:30 p.m.

TRANSECT TS 19:
TR19-TR2O:
Start at pos 6° 25,77’ 29° 31,16’ 23.32. pm
Course: 93 to TR2O.

24.11.1995 (Friday)

Stop transect 19 at pos. 6° 27,50’ 29° 44,98’ 01.03 a.m.

CTD-STATION 20:
CTD-19: Bottom depth 802 m, CTD-depth 200 m at 01.05 a.m.
Pos: 6° 27,54’ 29° 45,05’
CTD-up: 21.25 pm Pos: 6° 27,67’ 29° 45,16’

PLANKTON STATION 20: Plankton-net samples: 58-60, Depth 801 m
Hauls 100 m Pos. 6° 27,92’ 29° 45,3’ at 01.22 a.m-0 1.45 a.m.

TRAWL HAUL 20:
Rigging checked and comrected. Let’s see what happens with the next haul.
Starting trawl haul: 01.47 am Pos. 6° 28,03’ 29° 45,36’
Course: 92 heading east to TR2 I.
Start hauling out: 0)1.47 am at 6° 28,03’ 29° 45,36’
Otter boards out 02.04 a.m.
Fishing only omie depth layer (pelagic amea almost empty)
Depth 1 (30 min): Warps 150 m , headrope 35 m, hauling 35-45 m depth. Start at 02.08 am. pos. 6° 28,33’ 29° 46,41’.
Hauling in: 03.08 pm Pos: 6° 29,27’ 29° 50,31’
Otter boards up 03.13 am.
Trawl up: 03.30 a.m.
Catch: Lates stappersii adults, juveniles and larvae. 1 Lates mariae. No Stolo or Limno at all.

TRANSECT TS 20:
TR2O-TR21:
Start at pos 6° 29,48’ 29° 51,52’ 03.32 pm
Course: 98 to TR2l.
Stop transect 20 at pos. 6° 29,99’ 29° 54,83’ 03.53. am

CTD-STATION 21 (position changed):
CTD-21: Bottom depth 833 m CTD-depth 200 m at 03.55 a.m.
Pos: 6° 30,17’ 29° 55,07’
CTD-up: 04.15.25 p.m.

PLANKTON STATION **21 (position chamiged):** Plankton-net samples: 61-63, Depth 801 m
Hauls 100 m Pos. 6° 30,17’ 29° 55,07’ at 04.20 a.m—04.40 am
Plankton tows little bit horizontal. bccause of the wind,

TRAWL HAUL 21 (position changed): New position 6° 30,00’ 29° 55,00’;
Starting trawl haul: 04.55 am. Pos. 6° 31,83’ 29° 56,32’
Course: 92 heading south—east to the coast.
Start hauling out: 04.55 a.m. at 6° 31,83’ 29° 56,32’
Otter boards out 05.02 am 6° 31,83’ 29° 56,74’
Wimud speed about 8—10 m/s. Aanderaa station gone bananas.
Fishing only one depth layer (pelagic area empty), heading to the shore.
Depth 1 (30 min): Warps 150 m , headrope 35 m, hauling 35-45 m depth. Start at 05.05 am. pos. 6° 31,85’ 29° 56,98’. Turning closer to the coast. Turns are difficult for our fishing team. The gear does not fish during turning and is very unstable after that! Turning should be trained some day with the crew. It is not so difficult.
Sun coming up 05.37 am and echo recordings has changed. See echograms. Example of vertical migration in the morning. Symposium stuff again!! Look TS distributions in diffement layers. Pages 310—313 **in output echograms.**
According to catch they are mainly Limno.
Hauling in: 06.05 am. Pos: 6° 31,37’ 30° 00,17’
Otter boards up 06.12 a.m.

Trawl up: 06.20 a.m.
Catch: Limnothrissa (big adults). Lates stappersii, one big catfish.

Sailing to anchoring place.

Anchor at 6° 29,22' 30° 00,61' 06.45 am.

Anchor up 15.15. pm Heading to Gulf station 13.

TRANSECT TS 21:
Anchoring place—Gulf station 13:
Start at pos 6° 29,36' 3O° OO,44' 15.20. pm
To Gulf 13 station.
Stop transect 20 at pos. 6° 37,59' 29° 52,60' 16.30 pm

GULF-V STATION 13:
Start: Pos: 6° 37,59' 29° 52,60' 16.35. pm
Up: Pos: 6°,50' 29° 31,45' 17.09 pm
Time: 16.35-17.09 (34 min)
Depth: 446 m Wire length 300 m
Gear depth: 90 m

TRANSECT TS 21 continues:
Gulf 13-Gulf 14:
Start at pos 6° 39,77' 29° 51,82' 17.10. pm
Intermediate stop transect 21 at pos. 6° 47,07' 29° 47,67' 18.15. p.m.

GULF-V STATION 14:
Start: Pos: 6° 47,7l' 29° 47,67' 18.15. p.m.
Up: Pos: 6° 49,78' 29° 47,22' 18. 49 pm
Time: 18.15-18.49 (34 min)
Depth: 733 m Wire length 300 m
Gear depth: 90 m

TRANSECT TS 21 continues:
G14-TR22:
Start at pos 6° 49,78' 29° 47,22' 18.52. pm
Course: 98 to TR22.
Stop transect 21 at pos. 6° 57,47' 29° 46,00' 19.42. p.m.

CTD-STATION 22:
CTD-22: Bottom depth 563 m CTD-depth 200 m at 19.45 pm
Pos. 6° 57,47' 29° 46,00'
CTD-up: 19.55 pm

PLANKTON STATION 22: Plankton-net samples: 64-66, Depth 543 m Hatmls 100 m Pos. 6° 57,61' 29° 45,88' at 20.05 p.m.-20.25 p.m.

TRAWL HAUL 22:
Starting trawl hmatml: 20.30 pm Pos. 6° 57,71' 29° 45,75'
Course: 92 heading east.
Start hauling out: 20.35 p.m. at 6° 57,63' 29° 45,86'
Otter boards out 20.48 pm 6° 57,40' 29° 46,71'
Fishing two depth layers (pelagic area almost empty):
Depth 1 (30 min): Warps 200 m . headrope 43 m hauling 43-53 m depth. Start at 20,52 p.m. pos. 6° 57,38' 29° 46,93' Depth 596 m

Depth 2 (30 min): Warps 300 m , headrope 68 m, hauling 68-78 m depth. Start at 21.22 p.ni. pos. 6~’57, 14’ 29° 48,41’.
Hauling in: 21.52 p.m. Pos: 6° 56,88’ 29° 51,19’
Otter boards up 22.13 pm
Trawl up: 22.08 pm
Catch: Lowest on record!!!

TRANSECT TS 22:
TR22-TR23:
Start at pos 6° 56,73’ 29° 50,66’ 22.10 p.m.
Course: 98 to TR23. Speed at the echogram 3.9 knt: adjusted to 9.0 knt at 23.20.
Stop transect 22 at pos. 6° 57,38’ 30° 04,84’ 23,39 p.m.

On the trawl station 23 only plankton samples taken to verify that pelagic zone is more or less empty of both plankton and fish. No CTD necessary. We have seen this kind of situation nuw several nights. Trawl haul only 30 minutes in the upper layer (i.e. 20-25 m) to see the blind area for echuosounding.

CTD-STATION 23:
CTD-23 not taken.

PLANKTON STATION 23: Plankton-net samples: 67-69. Depth 560 m Wind 6-8 knt’s. Samples little bit horizontal. Hauls 100 m Pos. 6° 57,38’ 30° 04,84’ at 23.40 p.m-00.06 a.m.

25.11.1995 (Saturday)

Sampling stop. Pos. 6° 57,67’ 30° 05,05’ at 00.06 a.m.

TRAWL HAUL 23: Wind about 8-10 m/s
Starting trawl haul: 00.08 a.m. Pos. 6° 57,67’ 30° 05,05’
Course: 92 heading east to the coast. Speed 4.4 knots because upper layer haul.
Start hauling out: 00.10 a.m.
Otter boards out 00.18 a.m. 6° 57,65’ 30° 05,52’
Fishing in two depth layers (pelagic area seems almost empty):
Depth 1 (20 min): Warps 50 m , headrope 12-15 m, hauling 12-22 m, 15-25 ma depth. Start at 00.20 am. pos.
6° 57,68’ 30° 05,61’ Depth 559 m
Fish in 80-100 m depth. Start fishimig second layer.
Depth 2 (40 min): Warps 400 m , headrope 85 m, hauling 85-95 m depth. Start at 00.43 am pos. 6° 57,83’ 30° 07,41’ Depth 559 m
Hauling in: 01.20 am. Pos: 6° 58.,44’ 30° 09,45’
Otter boards up 01.28 a.m.
Trawl up: 01.40 a.m.
Catch: Lower layer obviously Lates stappersii + same size Limnnothrissa. Upper layer small immatures
Heading to the east coast for shallow water, where there are more fish. Not too bad catch

TRANSECT TS 23:
TR23-TR24 (the longest transect across the deep area).
Start at pos 6° 58,88’ 30° l0,53’ 01.44. a.m.
Course: 98 to TR24.
Course: 124 to TR24 along wind because of sampling on deck. Pos. 6° 59,55’ 30° l4,91’ at 02.13-02.18. Turning back

to original course agam

Because of the wimid, pitch and moll some of the crew members and some of the scientific crew members are
rather quiet and not such a wonderful appetite observed. Some of them are eating backwards.
Stop transect 23 at pos. 6° 57,65’ 30° 31,50’ 04.15. a.m.
Big batybates school at bottom: Echogram pages 356—357.

CTD-STATION 24:
CTD-24 not taken. Shallow area. Depth 68 m.

PLANKTON STATION 24: Plankton-net samples: 70-72, Depth 560 m Wind 6-8 m/s. Samples little bit horizontal. Hauls 100 m Pos. 6° 57,38’ 30° 04,84’ at 23.40 p.m.-00.06 a.m.

TRAWL HAUL 24:
Starting trawl haul: 04.21 a.m. Pos. 6° 57,79’ 30° 31,85’
Course: heading to shout to Utinta.
Start hauling out: 04.22 a.m.
Otter boards out 04.33 a.m. 6° 58,39’ 30° 31,72’
Fishing in one depth layer:
Depth 1 (20 min): Warps 100 m headrope 25m, hauling 25—35 mS tart at 04.38 am. pos. 6° 58,69’ 30° 31,65’
Depth 85 m to 61 m **(real shallow water pelagic haul!!!!, in Lake Tamiganvika scale of course)**
Hauling in: 0538 a.m. Pos: 7° 02,56’ 30° 31,05’
Otter boards up 05.45 a.m.
Trawl up: 0)5.55 aiim.
Catch: Three Lates species. big catfish, big Limnothrissa and bathybates. Very few Stolo.
Anchoring outside Utinta. Pos 7° 06,82’ 30° 31, 35’ at 06.30 a.m.

Anchor up pos. 7° 06,82’ 30° 31,35’ at 15.15 pm on Saturday.
Anno Domini 1995

TRANSECT TS 24:
Anchor-Gulf-15.
Start at pos 7° 06,82’ 30° 31,35’ 15.20. p.m.
Course:268 to G15.
Intermediate stop transect 23 at pos. 7° 07,04’ 30° 25,18’ 15.57 pm

GULF-V STATION 15:
Start: Pos: 7° 07,18’ 30° 25,04’ 16.01 p.m.
Up: Pos: 7° 08,78’ 30° 23,81’ 16.35 p.m.
Time: 16.01—16.35 (34 min)
Depth: 689-750 m Wire length 300 m
Gear depth: 90 m

TRANSECT TS 24 continues:
Gulf-l5-Gulf 16. All layers refer to pelagic. Deep water area.
Start at pos 7° 08,78’ 30° 23,81’ 16.36 pm
Course: 218 to G16.
Intermediate stop transect 24 at pos. 7° 17,57’ 30° 17,36’ 17.42. pm

GULF-V STATION 16:
Start: Pos: 7° 17,55’ 30° 17,09’ 17.47 p.m.
Up: Pos: 7° 19,67’ 30° 15,98’ 18.21 p.m.
Time: 17.47-18.21 (34 min)
Depth: 733 m Wire length 300 m
Gear depth: 90 m

TRANSECT TS 24 continues:
Gulf 16-TR 25.
Start at pos 7° 19,67’ 30° 15,98’ 18.22 pm
Cotirse: 219 to TR2S. Passing the deepest area of the lake. Depth more than 1.2 km. Trawl eye should be painted green and relocated here permanently.
Stop transect 24 at pos. 7° 27,23’ 30° 13 04’ 19.14 pm. for CTD. Plankton and trawl 25.

Hook and line fishing boats near the coast.
One of the cabin’s windows leaking. Chief engineer tries to fix it with silicon paste during the next trawl haul.

CTD-STATION 25:
CTD-25: Bottom depth 246 m, CTD-depth 150m at 9.15 pm
pos: 7° 27,45’ 30° 12,75’
CTD-tmp: 19.30 pm

Huge amount of jellyfish in this area.

IODINE SAMPLES:
First four samples taken at pos. 7° 27,45’ 30° 12,75’
Limnos water samples (iodine) to Ossi and Hannu taken at this position ,too. Depth of samples:
lOOm, 50 m, 10 m and surface (Risto took care of that).

PLANKTON STATION 25: Plankton-net samples: 73-75, Depth 241 m
Hauls 100 m Pos. 7° 27,54’ 30° 12,79’ at 19.30 p.m.-20.25 p.m.
Lot of jellyfish in plankton samples.

Distance to the coast less than 100 m and depth is 241 m
Mountains are like a wall in this Zairean coast.

TRAWL HAUL 25:
Starting trawl haul: 19.56 pm Pos. 7° 27,62’ 30° 12,82’
Course:
Start hauling out: 20.01 p.m.
Otter boards out 20.13 p.m. 7° 27,49’ 30° 14,36’
Fishing in one depth layer only:
Depth 1 (30 min): Warps 300 m . headrope 65 m. hauling 65—35 m
Start at 2.18 p.m. pos. 7° 27,53’ 30° 14,17’
Depth >850 m (in the pelagic zone again). Lates stappersii layer!!
Haulingg in: 21.18 p.m. Pos: 7° 27,56’ 30° 15,05’
Otter boards up 21.23 p.m.
Trawl up: 21.40 pm
Catch: Stappersii, Lates, Limno

TRANSECT TS 25:
TR25-TR 26:
Start at pos 7° 27,80′ 30° l8,44′ 21.38 p.m.
Course: 98 to TR26. Passing the deepest area of the lake. 7° 27,63′ 30° 20,36′ huge school. Turning back and making an extra haul. Stop transect 24 at pos. 7° 27,63′ 30° 20,36′ 21.55 p.m. for extra haul. Hope we catch it.

TRAWL HAUL 25B (extra trawl haul, only 20 minutes):
Starting extra trawl haul: 22.00 pm Pos. 7° 27,04′ 30° 20,00′
Course: 142
Start hauling out: 22.01 p.m.
Otter boards out 22.05 p.m. 7° 27,30′ 30° 20,10′ **No torpedos used.**
Fishing in two depth layers
Depth 1(10 mim): Warps 100 m headrope 25 m, hauling 25-35. Start at 22.08 p.m. pos. 7° 27,53′ 30° 14,17′ Depth >more than 1.2 km.

Depth 2 (10 min): Warps 50 m , headrope 12-15 m, hauling 12-22 and l5-25 m. Start at 22.18 pm pos. 7° 27,89′ 30° 20,40′. Bottom depth >more than 1.2 km.
Hauling in: 22.28 pm Pos: 7° 28,46′ 30° 20,68′
Otter boards up 22.30 pm
Trawl up: 21.40 pm
Catch: Fish babies all of them. Sample taken. One big Lates microlepis.

TRANSECT TS25 continues:
TR 25B-TR26:
Start at pos 7° 28,89′ 30° 21,12′ 22.38 pm
Course: 98 to TR26.
Stop transect 24 at pos. 7° 27,63′ 30° 20,36′ 21.55 p.m.

CTD-STATION 26:
CTD-26: Bottomm depth >1.0 km, CTD-depth 200 m at 23.05 p.m.
Pos: 7° 27,58′ 30° 22,23′
CTD-up: 23.10 pm

PLANKTON STATION 26: Plankton-net samples: 76-78, Depth >1.2 km. Hauls 100 m Pos. 7° 27,78′ 30° 22,21′ at 23.10 p.m.-23.35 p.m.

TRAWL HAUL 26:
Trawl haul hot taken, hwcause **of uniform distribution of mainly larvae** in the upper water column. Trawl does not catch larvae quantitatively. No adult fish in the area.

GULF-V STATION EXTRA 2 (because of time larvae in the upper layer):

Start: Pos: 7° 27,96′ 30° 22,13′ 23.37 pm,
26.11.1995 (Sunday)
Up: Pos: 7° 27,63′ 30° 24,31′ 00.11 a.m.
Time: 23.37—00.11 (34 min)
Depth: >1.2 km. Wire length 300 m
Gear depth: 90 m

High concentration of larvae earlier in the upper laer. Look echograms on pages 381—382. Lower concentration continues throughout the whole Gulf haul.

TRANSECT TS 26:
Gmmlf extra 2-TR 27:
Start at pos 7° 27,63’ 30° 24,31’ 0O.15. a.m.
Immediately next larvae patch. **(Observe: Speeed 9.0 knots on echogram).**

Course: 98 to TR27.
Passing Kipili islands 01.09 am pos 7° 27,54’ 30° 32,50’.
Stop transect 26 at pos. 7° 30,33’ 30° 33,l1’ 01.25 am.

CTD-STATION 27:
CTD-26: Bottom depth 650 m. CTD-depth 200 m at 01.30 a.m.
Pos: 7° 30,45’ 30° 32,98’
CTD-up: 01.45 a.m.

PLANKTON STATION 27: Plankton-net samples: 79-81, Depth 650 m Hauls 100 m Pos. 7° 30,42’ 30° 33,00’ at 01.40 a.m.—01.59 a.m.

TRAWL HAUL 27: (26 fishing boats in the area):
Fishmermen told, that fishing is bad at the moment in the Kipili area.
Starting trawl haul: 02.15 am. Pos. 7° 30,27’ 30° 33,19’
Course: 129
Start hauling out: 02.15 a.m.
Otter boards out 02.22 am. 7° 30,63’ 30° 33,29’
Fishing only in one depth layer:
Depth 1 (60 min): Warps 200 m, headrope 45 m, hauling 45-55.
Start at 02.26 a.m. pos. 7° 30,85’ 30° 33,53’
Bottom depth: 627 m
Hauling in: 03.26 am. Pos: 7° 33,20’ 30° 35,75’
Otter boards up 03.28 a.m.
Trawl up: 03.41 am.

Heading to Kipili for anchoring. Anchoring at pos 7° 26,85’ 30° 35,89’ 06.30 am.

Anchor up 15.15 pm Starting transect 27.

TRANSECT TS 27:
Anchoring place- 2-Gulf 17:

Start at pos 7° 26,79’ 30° 35,13’ 15.20 pm
Passing Kipili islands 15.34 pm pos 7° 27,59’ 30° 32,97’
Course to Gulf 17: 177.
All layers in integration refer to pelagic. Depth > 800 m
Intermediate stop transect 27 at pos. 7° 36,97’ 30° 32,l0’ 16.33 p.m.

No soft drinks anymore onboard, except (suprise, suprise) some beers. Dependent on time water boiled each evening and put in a piastic container. Soft drinks should be bought in Mpulungu for five days survey back to Bujumbura.

Fuel consumption has been about 700 l/day throughout the survey.

Bunkering in Mpulungu should be about 14 barrels (2.4 tons) for next part of the survey. In Kigoma we have 1.3 tons waiting which should be enough to Bujumbura.

~~GULF V STATION l7~~
~~Start: Pos: 7° 37,25' 30° 32,21' 16.36 p.m.~~
~~Up: Pos: 7° 49,70' 30° 32, 70' 17.10 p.m.~~
~~Time:16.36 17.10 (31 min).~~
~~Depth: 810 m Wire length 300 m~~
~~Gear depth: 90 m~~
~~**Gear depressor stacked. Bad sample. A new sample will be taken!**~~

GULF-V STATION 17 (new sample):
Sta ml: Pos: 7° 40,36' 30° 32,l8' 17.21 p.m.
Up: Pos: 7° 42,87' 30° 32,08' 17.55 p.m.
Timmie: 17.21—17.55 (34 min)
Depth: 810 m Wire length 300m
Gear depth: 90 m

A school of fish (Clupeidae) jumping at the surface just in front of R/V Tanganyika Explorer.

TRANSECT TS 27 continues:
Gulf 17-Gulf 18:
Start at pos 7° 42,87' 30° 32,08' 17.56 pm
Course to TR 28: 122.
All layers in integration refer to pelagic. Depth > 800 m
intermediate stop transect 27 at pos. 7° 47,42' 30° 28,00' 18.35 pm

~~**GULF V STATION 18:**~~
~~Start: Pos: 7° 47,62' 30° 27,70' 18.39 p.m.~~
~~Up: Pos: 7° 50,05' 30° 27,09' 19.13 p.m.~~
~~Time:18.39 19.13 (31 min)~~
~~Depth: 810 in Wire length 300 m~~
~~Gear depth: 90m~~
~~**Bad sample. Continuing to the next station. Depressor was stack agam This sample deleted.**~~

TRANSECT TS 27 continues:
Gulf Gulf 18-TR28:
Start at pos 7° 50,43' 30° 27,01' 19.18 pm
Course to TR 28: 124.
All layers in integration refer to pelagic. Depth > 800 m
Stop transect 27 at pos. 7° 57,54' 30° 26,60' 20.02 p.m.

Plankton taken first, because first CTD was not successful.

PLANKTON STATION 28: Plankton-net samples: 82-84, Depth 687 m
Hauls 100 m Pos. 7° 57,81' 30° 26,57' at 20.18 p.m.-20.45 p.m.

CTD-STATION 28 (new CTD taken):
CTD-26: Bottom depth 341 m. CTD-depth 200 m at 20.45 pm
Pos: 7° 58,17' 30° 26,64'
CTD-up: 20.58 p.m.
Also this CTD failed. To be tested next station.

Sailing closer to the coast to search fish.

TRAWL HAUL 28:

Starting trawl haul: 21.11 p.m. Pos. 7° 58,74′ 30° 26,49′
Course:
Start hauling out; 21.11 pm.
Otter boards out 21.17 pm 7° 58,74′ 30° 36,65′
Hauling along the coast, about 1.0 nm from the coast.
Fishing three layers:

Depth 1:

Warps 200 m . headrope 45 m hauling 45-65. Start at 21.26 pm pos. 7° 59,49′ 30° 97,84′ Bottom depth 343 m

Depth 2:

Warps 450 m , headrope 105 m hauling 105-115. Start at 21.46 pm pos. 7° 59,83′ 30° 28,32′ Bottom depth 343 m

Depth 3:

Warps 350 m , headrope 80 m hauling 80-90. Start at 22.06 p.m. pos. 8° O0,35′ 30° 29,21′ Bottom depth 475 **m**
Hauling in: 22.26 pm Pos: 8° 00,91′ 30° 30,20′
Otter boards up 22.28 p.m.
Trawl up: 22,40 p.m.

TRANSECT TS 28:

TR28-TR29:
Start at pos 80)1.27′ 30)° 30,66′ 22.41 pm
New startimug poimit because of the TR28 alomig the coast.
Course to TR 29: 87.
All layers in integration refer to pelagic. Depth > 800 m
Stop transect 28 at pos. 7° 57,47′ 30° 39,88′ 23.45. pm **Observe: Echmogramns speed manual 3.9 knots, but each section represent 8 min of sailing. I′m starting to make more mistakes. Tired!**

CTD-STATION 29:

CTD-26: Bottom depth 786 m. CTD-depth 200 m at 23.45 pm
Pos: 7° 57,47′ 30° 39,82′
CTD-tmp: 23.58 p.m.

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PLANKTON STATION 29: Plankton-net samples: 85-87, Depth 796 m
Hauls 100 m Pos. 7° 57,62′ 30° 39,85′ at 00.05 p.m.-00.25 pm

TRAWL HAUL 29:

Starting trawl haul: 00.11 am. pos. 7° 57,83′ 30° 39,80′
Course: 127.
Start hauling out: O0.31 a.m.
Otter boards omit t)0).44 aiim. 7° 58,09′ 30° 40,44′.
Fishing two layers:

Depth 1 (30 min)

Warps 100 m , headrope 25 m, hauling 25-35. Start at 00.47 am. pos. 7° 58,l5′ 30° 40,58′. Bottom depth 813 m

Depth 2 (30 nun):

Warps 300 m , headrope 65 m, hauling 65-75. Start at 01.18 a.m. pos. 7° 58,86′ 30° 42,59′ Bottom depth 664 m
Hatihing in: 01.47 a.m. Pos: 7° 59,42′ 30° 44,06′
Otter boards up 01.55 a.m.
Trawl up: 02.05 a.m.

Catch: Total water end. Pelagic zone is really empty here. See echograms and TS-distributions as well. What is going on in this lake? One Lake Tanganyika mystery more? No food———>no Chupeids———>No predators!!!

TRANSECT TS 29:
TR29-TR3O:
Start at pos 7° 59,94’ 30° 44,65’ 02.07 a.m.
Course to TR 30: 95
All layers in initegration refer to surface. Depth less than 700 m
Stop transect 29 at pos. 7° 59,75’ 30° 50,47’ 02.53. a.m.

CTD-STATION 30:
CTD-30): Bottom depth 81 m CTD-depth 600 m at 02.55 a.m.
Pos: 7° 59,63’ 30° 50,55’
CTD—up: 03.05 a.m.

PLANKTON STATION 30): Plankton-net samples: 88-90. Depth 60 m Hauls 100 m Pos. 7° 59,68’ 30° 50,52’ at 03.05 p.m.-03.15 p.m.

TRAWL HAUL 30):
Starting trawl haul:03.30 a.m. Pos. 7° 59,79’ 30° 50,41’
Course: Heading to south along to coast.
Start hauling out: 03.34 a.m.
Otter boards out 03.44 a.m. 7° 58,09’ 30° 40,44’.
Fishing two layers:
Depth 1 (20 min):
Warps 300) m headrope 65 m, hauling 65—75, Start at 03.45 a.m. pos. 8° OO,70’ 30° 50,86’ Bottom depth 110 m to 218 m Near the bottom there is some biomass at depth of 150 m! Look echograms.
Depth 2 (40 min):
Warps 500 m headrope 125 m hauling 125-135. Start at 04.05 a.m. pos. 8° 01,58’ 30° 50,93’ Bottom depth 328 m There are lot of biomass in the depth of 125 m in pelagic. Trying to catch them. Note that on the echogram super layer setting incorrect when passing the school.
Hauling in: 04.45 a.m. Pos: 8° 03,88’ 30° 52,07’
Otter boards up 04.55 a.m.
Trawl up: 05.08 a.m.
Catch: Diversity catch, various species, also L stappersii, but we did not hit the school. All catch from the beginning of the haul. Real ‘bottom trawl° haul.

Sailing to Kala to anchor.

TRANSECT EXTRA TS 29B:

TR3O—Kala anchoring place:
Start at pos 8° 05,13’ 30° 53,04’ 05.11 a.m.
Stop transect 29B at pos. 8° 07,29’ 30° 54,98’ 05.32 a.m., close to thee entrance to Kala bay.

Anchoring at Kala pos. 8° 08,14’ 30° 57,31’ at 05.50 a.m.

Anchor up at 14.10 p.m.

TRANSECT TS 30:

Kala anchoring place—Gulf 19:
Start at pos 8° 08,06’ 30° 57,22’ 14.15 pm
Intermediate stop transect 30 at pos. 8° 06,o7’ 30°46,06’ 15.35. p.m. at Gulf station 19.

GULF-V STATION 19:
Start: Pos: 8° 06,20’ 30° 45,77’ 15.41 pm
Up: Pos: 8° 07,53’ 30° 44,37’ 16.15 pta.
Timume: 15.41—16. 15 (34 min)
Depth: 692 m Wire length 300 m
Gear depth: 90 m

TRANSECT TS 30 continues:

Gulf 19-Gulf 20:
Start at pos 8° 07,53’ 30° 44,37’ 16.16 p.m.
First Clupeidae schools on echograms in many days!
Intermediate stop transect 30 at pos. 8° 16,98’ 30° 37,05’ 17.32. p.m. at Gulf station 20.

GULF-V STATION 20:
Start: Pos: 8° 17,09’ 30° 36,98’ 17.34 p.m.
Up: Pos: 8° 18,87’ 30° 35,78’ 18.08 p.m.
Timmie: 17.34—18.08 (34 min)
Depthm:317 m Wire length 300 m

Gear depth: 90 m

TRANSECT TS 30 continues:

Gulf 20-TR3 1:
Start at pos 8° 18,91’ 30° 35,81’ 18.43 p.m..
Stop transect 30 at pos. 8° 27,00’ 30° 28,13’ 19.55. p.m. at TR31 for fishing.

CTD-STATION 31:
No CTD-taken Depth 45 m

PLANKTON STATION 31:
No plankton samples taken. Depth only 45 m

TRAWL HAUL 31: (beach seining on the coast; several units)
Starting trawl haul: 20.03 p.m. Pos. 8° 27,14’ 30° 28,19’
Course: Heading to east to the next station. 52 degrees.
Start hauling out: 20.03 p.m. 0.8 nm from the coast.
Otter boards out 20.13 p.m. 8° 26,77’ 30° 28,78’
Fishing three layers:
Depth 1 (15 min):
Warps 100 m headrope 25 m, hauling 25—35. Start at 20.16 pm pos. 8° 26,70’ 30° 29.00’ Bottom depth 75 m
Depth 2 (15 min):
Warps 300 m headrope 65 m, hauling 65—75. Start at 20.33 pm pos. 8° 26,58’ 30° 29,91’ Bottom depth 94 m
Lot of biomass in time bottom: Bathybates and other Cichlids?

Depth 3 (7 min):
Warps 400 m, headrope 85 m, hauling 85—95. Start at 20.51 p.m. pos. 8° 26,45’ 30° 31,26’ Bottom depth 94 m
Depth 4 (23 min):
Warps 350 m, headrope 78 m, hauling 78-88. Start at 20.58 p.m. pos. 8° 26,38’ 30° 31,29’ Bottom depth 102 m
Hauling in: 21.16 p.m. Pos: 8° 26,06’ 30° 32,58’
Otter boards up 21.24 p.m.
Trawl up: 21.35 p.m.
Last part of thee haul is symposium stuff. Pages 458-459 on echogram outputs.
Catch: About 102 kg. All target species + predators + catfishes.

TRANSECT TS 31:
TR3l-TR32:
Start at pos 8° 25,72’ 30° 34,23’ 21.47 p.m.
Stop transect 31 at pos. 8° 27.44’ 30° 49,87’ 23.23 p.m. at TR31 for CTD, plankton and fishing.
Observe: The mammual speed 3.9 knt throughout the transect.

CTD-STATION 32:
CTD-32: Bottom depth 413 m, CTD-depth 200 m at 23.25 p.m.
Pos: 8° 27,54’ 30° 50,04’
CTD-up: 23.40 a.m.

PLANKTON STATION 32: Plankton-net samples: 91-93, Depth 413 m
Hauls 100 m Pos. 8° 27,51’ 30° 50,14’ at 23.40 p.m.-00.00 pm

28.11.1995 (Tuesday)

TRAWL HAUL 32: (one purse seine unit in the area)
Starting trawl haul: 00.10 a.m. Pos. 8° 27,51’ 30° 50,24’
Course: 124 heading to east to the trawl station 33.
Start hauling out: 00.10 a.m.
Otter boards out 00.18 a.m. 8° 27.44’ 30)° 50,89’.
Fishing one layer only (pelagic zone almost entirely down to 150 m depth):
Warps 150) m, headrope 32 m, hauling 32-42. Start at 00.26 a.m. pos. 8° 27,52’ 30° 51,13’. Bottom depth 405 m
Hauling in: 01.26 am Pos: 8° 27.32’ 30° 54.99’
Otter boards up 01.20 a.m.
Trawl up: 21.35 a.m
Catch: Zero is zero.

TRANSECT TS 32:
TR32-TR33:
Start at pos 8° 27,03’ 30° 55.50’ 01.40 a.m.
Entering L. stappersii world nearer to the east coast. Central deep part also in the south is empty.
Stop transect 32 at pos. 8° 27,40’ 31° 07,38’ 02.56 a.m. at TR33 for CTD, plankton and fishing.

CTD-STAT1ON 33:
CTD-33: Bottom depth 70 m. CTD-depth 60 m at 03.05 a.m.
Pos: 8° 27,40’ 31° 07,38’
CTD-up: 03.10 a.m.

PLANKTON STATION 33: Plankton-net samples: 94-96, Depth 68 m

Hauls 100 m Pos. 8° 27,50’ 31 °07.27’ at 03.10 p.m. 03.25 a.m.
TRAWL HAUL 33 (Grande Finale of the night hauls, Pace: Andante moderato e allegro):
Starting trawl haul: 03.30 a.m. Pos. 8° 27.56’ 31° 07.27’
Course: 1 heading to south to Mpulungu.
Start hauling out: 03.33 a.m.
Otter boards out: 03 am. 8° 28,07’ 31’ 07.06’.
Fishing two layers:
Depth 1 (20 min):
Warps 40 m, headrope 105 m. hauling 105-115. Trying to catch lower layer fish. Start at 03.47 a.m. pos. 8° 28,53’ 31° 07,02’. Bottom depth 163 m.
Depth 2 (40 min):
Warps 150 m, headrope 35 m, hauling 35-45. Trying to catch upper layer fish. Start at 04.09 am. pos. 8° 29,46’ 31°07,04’. Bottom depth 115 m
This is ‘very nice haul! Echogram pages 480—485.
Hauling in: 04.47 a.m. Pos: 8° 31,82’ 31° 07,28’
Otter boards up 04.50 a.m.
Trawl up: 05.00 a.m.
Catch: Very nice catch composition of target species.

TRANSECT TS 33:

TR33-Mpulungu:
Start at pos 8° 32,89’ 31° 07,20’ 05.07 a.m.
Observe: Manual speed 3.9 knt again ,shit.
Stop transect 33 at pos. 8° 40,00’ 31° 05,89’ 05.52. a.m. at entrance of Mpulumugu.

CALIBRATION CHECK AFTER THE FIRST TRY:
(Standard copper sphere ø 23.0 mum with TS of -40.4 dB supplied by SIMRAD Standard procedure followed (old fashion style). Com/Comn connection still missing (without a software manual it is not possible to have all settings right) and thus hobe.exe program not used (unfortunately). Difference between old and new gain less than 1%. Settimigs in EY-500 menu will be kept. This calibration was successful and results are stable. Nice calm weather outside Mpulungu harbour. Summary of results are given in Excel file CALIBR1.XLS For the future a better rigging of calibration sphere should be developed. Present system is nerve killer with twisting twines, cheapest handwinches and low quality lines.

Observe: Hull mounted transducer is port side much more astern than expected and indicated by many persons.

Sailing to Mpulungu harbour.

Mpulungu harbour at 08.20 a.m.

29.11.1995 (Wednesday)

Sailing from Mpulungu harbour at 09.10 a.m. to next trawl station no. 34.

TRANSECT TS 33B:

Mpulungu—Gulf station 21:
Start at pos 8° 44.05′ 31° 06.33′ 09.22 a.m.
Stop transect 33 at pos. 8° 40,00′ 31° 05,89′ 05.52 a.m. at Gulf station 21 for iodine samples and Gulf.

IODINE SAMPLES:
Second four samples taken at pos. 8′ 22,95′ 31° 04,98′
Limnos water samples (iodine). Sampling depths: 100 m 80 m 60 m, 40 m and 20 m Drifting. Samples a little bit horizontally.

GULF-V STATION 21:
Start: Pos: 8° 22,94′ 31° 05,32′ 12.16 p.m.
Up: Pos: 8° 21,72′ 31°03,55′ 12.50 p.m.
Time: 12.16—12.50) (34 min)
Depth: 156 m Wire length 300m
Gear depth: 90 m

TRANSECT TS 33B continues:
Gulf station 21-TR34:
Start at pos 8° 21,72′ 31° 03.55′ 12.51 p.m.
Stop transect 33 at pos. 8° 13,17′ 30° 55,81′ 14.08 p m at TR34.

PLANKTON STATION 34: Plankton-net samples: 97-99, Depth 404 m
Hatmls 100 m, Pos. 8° 13,20′ 30° 55,66′ at 03.10 p.m.—03.25 a.m

Starting first day haul. Hauling to more shallow water.
TRAWL HAUL 34:
Startimug trawl haul: 14.44 pm Pos. 8° 12,81′ 30° 55,88′
Course:
Start hauling out: 14.44 p m
Otter boards out 14.55 p.m. 8° 12,30′ 30° 55,93′
Fishing two layers:
Difficulties with the bottom and fitting right wire lengths to depth. This means that trawl is sailimig up and down and not stabihazing well for fishing.
Depth 1 (40 min):
Warps 30)0) in hmeadrope 85 mum, hmaulimug 85-95. Tryimug to catch lower layer fish. Start at 15.05 p.m. pos. 8°1 1,564′ 30)0 06,0)0)′. Bottomim depth 95—180) m Bottomum topography variable.
Depth 1 (20 min):
Warps 250-200 m headrope 65 to 45 m, hauling 45-55. Start at 15.45 p.m. pos. 8° 09,l4′ 30° 55,91′. Bottom depth 66-100 m Bottom topography variable. See echograms.
Hauling in: 16.05 p.m. Pos: 8° 08,30′ 30° 55,56′
Otter boards up 16.08 p.m.
Trawl up: 16.15 p.m.
Catch: Zero. The trawl was perhaps too high in the water and thus we missed them all.

The need of trawl eye is even more important in daytime hauls when biomass is not scattered.

TRANSECT TS 34:
TR34-G22:
Start at pos 8° 05,22′ 30° 55,62′ 16.17 p.m.
Sailing too far from land because of some mysterious rock nearer to the coast about 1 nm froum the coast. Distance to land about 4 nm.
Intermediate stop transect 33 at pos. 7° 50,12′ 30° 45,26′ 18.30 p.m. at G22

GULF-V STATION 22:
Start: Pos: 7° 50,12′ 30° 45,26′ 18.33 p.m.
Up: Pos: 7° 47,86′ 30° 44,23′ 19.07 p.m.
Tinue: 18.33—19.17 (34 min)
Depth: 156 m Wire length 300 m
Gear depth: 90 m

TRANSECT TS 34 continues:
G22-TR35:
Start at pos. 7° 47,86′ 30° 44,23′ 19.08 p.m.
Stop transect 34 at pos. 7° 37,8 1′ 30° 39,26′ 21.25. p.m. at TR35.

PLANKTON STATION 34:
Noplankton samples taken at this station.

TRAWL HAUL 35 (trainimg haul):
Startimug trawl haul: 20.27 p.m. Pos. 7° 37,81′ 30° 29,26′
Trying to catch transect 34 school.
Course:Heading south—west, south—south—east.
Start hauling out: 20.28 p.m.
Otter boards otit 20.36 p.m. 7° 38,07′ 31° 38,69′
Fishing layer:
Depth 1 (90 min): Observe!! 1.5 hour haul
Warps 500 m, headrope 115 m, hauling 115—125. Trying to catch lower layer fish. Start at 21.43 p.m. pos. 7° 38,41′ 30° 38,34′. Bottom depth 200 m We did not hit the school. We are in too deep water, depth about 370 m **We missed the school about 300 m** front west side. This haul is a kind of training haul, how to turn with the trawl and how **to find exact the same spot to fish certain fish school.**
Hauling in: 22.16 p.m. Pos: 7° 40,50′ 30° 40,57′
Otter boards up 22.25 p.m.
Trawl up: 22.37 p.m.
Catch: Non—target species mainlv. Better luck tomorrow. This day was a training course for everybody.

TRANSECT TS 35:
TR3S-Kipili:
Start at pos. 7° 40,50′ 30° 41,57′ 22.38 p.m.

We hit the school of bathybates again Page 543 on the echograms.

TRAWL HAUL 35 (training haul):
Starting trawl haul: 20.27 p.m. Pos. 7° 37,81′ 30° 29,26′ Trying to catch transect 34 school.
Course:Heading south-west, south-south-east.
Start hauling out: 20.28 p.m.

Otter boards out 20.36 p.m. 7° 38,07’ 30° 38,69’
Fishing layer:
Depth 1(90 min): Observe!! 1.5 hour haul
Warps 500 in , Imeadrope 115 in, hmaimhimug 115-125. Tryiuig to catch lower layer fish. Start at 20.43 pm pos. 703841~
300 38,34’. Bottomim depth 200 mWe did muot hit the school. We are in too deep water, depth about 370 m**We missed the selmool about 300 mu froma ivest side. This haul is a kind of training haul, how to turn with the trawl and how to fimid exact the same spot to fish certaimi** fish school.
Hauhimug in: 22.16 pm Pos: 70 40,50’ 30)° 4057’
Otter boards up 22.25 pm
Trawl up: 22.37 p.1n.
Catch: Non-target species minly. Better luck tomorrow. This day was a training course for everybody.

TRANSECT TS 35:
TR3S-Kipili
Start at pos. 7° 40,50’ 30° 40,57’ 22.38 p.m.
We hit the school of batybates again. Page 543 on the echograms.

30.11.1995 (Thursday)

Stop transect 35 at pos. 7° 26,93’ 30° 33,33’ 00.25. a.m. at Kipili.

Anchoring at Kipili, pos. 7° 26,77’ 30° 35,94’ at 00.51 a.m.

Gone to bed.

Anchor up at 07.01 a.m.

TRANSECT TS 3511:
Kipili anchoring place-Gulf 23:
Start at pos. 7° 26,87’ 30° 34,88’ 07.15 a.m.

Sailing absolutely to too deep water area. Captain is afraid of ‘shallow’ water areas less than 800 m. This is not going to work to screen shallow water areas for fish schools. Ordering Captain to keep the transect track in depth range of 100—250 m as in the chart.

Continuing the track, at 08.10 a.m. 7° 22,12’ 30° 30,52’ Heading to the coast.

Turning north pos. 7° 21,93’ 30° 31,70’ at 08.21 a.m.
Nearer to the coast at. 0)8.35 a.m. pos. 7° l9.56’ 30° 31,85’
Stop transect 35B at pos. 7° 11,57’ 30° 30,28’ at 09.20 a.m.

IODINE SAMPLES AT GULF STATION 23:
Third time four samples taken at pos. 7° 11,57’ 30° 30,28’
Limnos water samples (iodine). Sampling depths: 100 m, 80 m, 60 m, 40 m and 20 m
Bottom depth 125-121 m

GULF-V STATION 23:
Start: Pos: 7° 11,51’ 30° 30,37’ 10.01 a.m.
Up: Pos: 7° 09,39’ 30° 29,97’ 10.35 a.m.

Time: 10.01—10.35 (34 min)
Depth: Variable between 85—121 m Wire length 300 m
Gear depth: 90 m
After Gulf station 1 nm recording of Clupeidae recordings. Symposium stuff. Echogram pages 562-563.

TRANSECT TS 3511 continues:
Gulf 23-TR36:
Start at pos. 7° 08,66' 30° 29,76' 10.43 a.m.
Stop transect 35B at pos. 7° 08,65' 30° 29,93' at 11.35 a.m. for TR36:

TRAWL HAUL 36:
Starting trawl haull: 11.35 a.m. Pos. 7° 00,65' 30° 29,93'
Trying to catch schools at 80 m depth.
Course: 003 , hmeadiuig almost north.
Start hauling out: 11.40. a.m.
Otter boards out 11.48 am 6° 59,91' 30° 29,85'
This bottom is **excellent for bottom trawling.**
Fishing layers:
Depth 1 (15 min):
Warps 350 m, headrope 80 m, hauling 80-90. Trying to catch lower layer fish. Start at 11.52 a.m. pos. 6° 59,56' 30° 29,97' Bottom depth 143 m
Depth 2 (45 min):
Warps 400 m , headrope 93 m, hauling 93-103. Trying to catch lower layer fish. Start at 12.08 pm pos. 6° 58,68' 30° 30,15'. Bottom depth 143 m
Hauling in: 12.52 p.m. Pos: 6° 56,17' 30° 30,90'
Otter boards up 13.01 p.m.
Trawl up: 13.10 p.m/
Catch: Zero. Something wrong with the fishing of the net and hauling depth? Fish avoidance of the gear?? We should try to increase the speed to 4.5 knots next time!! (1800 rpm)

TRANSECT TS 36:
TR36-Gulf 24:
Start at pos. 6° 55,97' 30° 30,91' 13.10 p.m.
Pos. 6° 51.98' 30° 26,60' 13.49 p.m.
Outside River Ifume delta pos. 6° 47.71' 30° 22,97' 14.23 p.m.
Enteringg Stolothrissa fishing grounds northern side of Ifume delta. Searching for fish.
Stop transect 36 at pos. 6° 36,97' 30° 16,86' at 16.00 p.m. for TR37:

TRAWL HAUL 37:
Startimug trawl haul: 16.00 p.m. Pos. 6° 36,97' 30° 16,86'
Trying to catch schools at 125 m depth.
Course: 280 heading north-northwest.
Start hauling out: 16.02 p.m.
Otter boards out 16.06 p.m. 6° 36,72' 30° 16,54'
Using more speed. 4.5 knots during the haul.
Fishing layers:
Depth I (15 nmin):
Warps 550 m, headrope 115 m, hauling 115-125 (uncertain). Trying to catch lower layer fish. Start at 16.14 p.m.

pos. 6° 36,32′ 30° 16,01′ Bottom depth 161 m
Depth 2 (45 min):
Warps 400 m, headrope 93 m. hauling 93—103. Trying to catch lower layer fish. Start at 16.53 p.m. pos. 6° 34,70′ 30° 14.39′. Bottom depth 108 m and then 138 m immediately we lifted our gear above the bottom. This is a joke.
Echogram output pages 589—592 is a demonstration of difficulties to fit the net to right depth without a trawl sonde.
Hauling in: 17.14. p.m. Pos: 6° 33,77′ 30° 13,44′
Otter boards up 17.15 p.m.
Trawl up: 17.28 p.m.
Catch: 38 spec. Lates mariae and 1 L. angustifrons. They were caught in deeper area, because all of them had swimbladder in the mouth.

TRANSECT TS 37:
TR36-Gulf 24:
Start at pos. 6° 33,49′ 30° 12,81′ 17.40 p.m.
Pos. 6° 33,01′ 30° 03,05′ at 18.40 p.m.
Pos. 6° 31,60′ 29° 53,69′ at 19.48 p.m. about 4 nm from the coast and outside the survey track by 3 miles.

Captain is again afraid of shallow water areas and does not follow the survey track. Today I have said to him five times that we trv to keep between 100-250 m depth range to monitor fish schools in that area. Somehow I understand his concern being too close to the shore, but on the other hand we should get our material too.
Unfortunately we have spent again most of the time in depth range 500 m or more. This track is useless for shallow water monitoring.

Stop transect 37 at pos. 6° 17,56′ 29° 45.09′ at 21.40 p.m. and taking otter boards inside. Wind about 10- 12 m/s.

GULF-V STATION 24:

Gulf station 24 not taken because of the wind. Gulf-V is turning to a surfing board, when the wind is more than 12 m/s.

TRANSECT TS 37 continues:
Continuingg transect 37 at pos. 6° 17,34′ 29° 44,88′ at 21.43 p.m. Wind about 12 m/s and still rising. **This is going to be deep water track all the way.**
Stop recording transect 37 at pos. 6° l2,62′ 29° 42,50′ at 22.26. Too much noise in the recordings. Air bubble attenuation. Wind about 12-14 m/s. Rather nice big waves.
The Holy Bible seems to be very popular reading at the momemt. Most of the people are in horizontal position.

Heading to anchoring place.

01.12.1995 (Friday)

Anchor at pos. 5° 58,20′ 29° 50,79′ at 01.00 a.m. at Mgamgo. Wind about 12 m/s. Decreasing

Anchor up pos. 5° 58,20’ 29° 50,79’ at 08.10 a.m. Wind has calmed down. Only 4 m/s. Old waves. Heading to next Gulf station 25.

Trying to monitor shallow water areas today. Keeping depth between 100—250 m.

TRANSECT TS 37B:
Anchoring place—Gulf 25:
Start at pos. 5° 57.80’ 29° 50,65’ 08.15 a.m.
Stop recording transect 37B at pos. 5° 50,90’ 29° 52,50’ at 09.00. a.m. for Gulf 25.

GULF-V STATION 25:
Start: Pos: 5° 50,64’ 29° 52,64’ 09.04 a.m.
Up: Pos: 5° 49,31’ 29° 53,49’ 09.26 a.m.
Time: 09.04—09.26 (22 min)
Depth: lO5 m Wire length 200 m
Gear depth: 85 m

TRANSECT TS 37B **continues:**
Gulf 25-TR38:
Start at pos. 5° 49,31’ 29° 53,49’ 09.28 a.m.
Stop recording transect 37B at pos. 5° 37,79’ 29° 51,65’ at 10.43 a.m. for plankton, water samples and TR38

PLANKTON STATION 38: Plankton-net samples: 100-102. Depth 165 m
Hauls 100 m, Pos. 5° 37,64’ 29° 51,58’ at 10.45 a.m.—l1.15 a.m.

IODINE SAMPLES AT TRAWL STATION 38:
Fourth time four samples taken at pos. 5° 37,49’ 29° 51,62’
Limnos water samples (iodine). Sampling depths: 100 m 80 m, 60 m, 40 m and 20 m
Bottom depth 179-164 m

EXTRA PLANKTON SAMPLES:
Extra 10 plankton samples taken here also for extra special analysis: Samples to be sent to Prof. Andre **Dunmont**
fronm Bujumbura later.
Hauling depth 100 m, Pos. 5° 37,52’ 29° 51,64’ at 11.15 a.m.-12.00 a.m. First 5 samples.
Bottom depth 160-115 m.
Moving to deeper water.
Hauling depth 100 m. Pos. 5° 37,34’ 29° 51,46’ at 12.05 p.m.-12.40 pm Last 5 samples.
Bottom depth 160—138 m

TRAWL HAUL 38:
Sailing back about 1 nm to shot the trawl. Trying to hit schools observed durimig plankton sampling.
Starting trawl haul: 12.53 p.m. Pos. 5° 34,47’ 29° 43,58’ Trying to catch schools at layer between 40-50 m depth
Course: Heading north-northwest
Start hauling out: 12.54. p.m. Pos. 5° 37,53’ 29° 48,58’
Otter boards out 12.58 p.m. 5° 37,94’ 29° 51,98’
Using more speed again. 4.5 knots during the haul.
Fishing layers:

Depth 1 (30 min):
Warps 150 m; marks on winches headrope 22 m, hauling abot 22-32. Start at 13.02 p.m. pos. 5° 37,74’ 29° 51,91’
Bottom depth 149 m.
Depth 2 (30min):
Warps 400 m, hmeadrope 80 m, hauling 80-90 m. Trying to catch lower layer fish. Start at 13.32 p.m. pos. 5° 35,93’ 29° 50,64’ Bottom depth 219 m. **This might be a little bit too deep. Depth should be round 100—150 m Not hitting the schools properly.**
Hauling in: 14.02 p.m. Pos: 5° 34,09’ 29° 49,96’
Otter boards up 14.12 p.m.
Trawl up: 14.20 p.m.
Catch: About 217 kg Stolothrissa and Limnothrissa. At last clear Clupeidae catch!!!! Echogram output pages 628-632. Check TS distributions agaimist LF distributions!! 94 % of Stolo, 6 % of Limno.

TRANSECT TS 38:
TR38-TR39:
Start at pos. 5° 33,20’ 29° 49,13’ 14.24 p.m. Lot of small schools here!!
Pos. 5° 25,44’ 29° 44,33’ at 15.17. p.m.
Stop transect pos. 5° 17,45’ 29° 46,96’ 16.08 p.m.
Comitinime transect pos. 5° 17,29’ 29° 46,96’ 16.18 p.m. This part of the transect is Malagarasi delta area and no integration whatsoever.
Stop transect 38 at pos. 5° 15,13’ 29° 46,35’ at 16.29 p.m. at sedimentatioin area.
Sailing to west out of the sedimentation area.

TRAWL HAUL 39:
Starting trawl haul: 16.49 p.m. Pos. 5° 14,47’ 29° 43,58’ Trying to catch schools at layer between 45-55 m depth.
Start hauling out: 16.50. p.m. Pos. 5° 14,47’ 29° 43,58’
Course: Heading north—horthwest
Otter boards out 16.58 p.m. 5° 13,98’ 29° 43,46’.
Usimig more speed again. 4.5 knots durimw the haul (1825 rpm)
Fishing Layers:
Depth 1 (30 min):
Warps 250 m; headrope 45 m. hauling abot 45-55. Start at 16.58 p.m. pos. 5° 13,79’ 29° 43,38’. Bottom depth 69 m
Depth 2 (30 min):
Warps 200 m, headrope 40 m. hauling 40-5Om. Start at 17.28 p.m. pos. 5° 12,21’ 29° 42,79’.
Nice example of day time distribution of fish schools in shallow **area. Symposium stuff! Also highlighting again the difficulties to fix gear depth right without a trawl sonde when bottom depth changes and verical distribution changes.**
Hauling in: 17.58 p.m. Pos: 5° 10,48’ 29° 42,18’
Otter boards up 18.02 p.m.
Trawl up: 18. 15 p.m.
Catch: 241 kg Stolo and Limno + 10 kg Lates augustifrons (= 251 kg). Echogram pages 673—677. Symposium stuff!!

PLANKTON STATION 39: Plankton-net samples: 103-lO5. Depth 123 m. Hauls 100 m Pos. 5° 09,65’ 29° 41,93’ at 18.17 p.m. — 18.45 p. m.

TRANSECT TS 39:
TR39-G26:
Start at pos. 5° 09,33’ 29° 42,03’ 18.47 p.m.
Course: 0)08
Intermediate stop transect 39 pos. 5° 02,08’ 29° 42,91’ 19.35 pm. for Gulf station no. 26.

GULF-V STATION 26:
Start: Pos: 5° 01,81’ 29° 42,85’ 19.37 p.m.
Up: Pos: 5° 00,52’ 29° 40,90’ 20.11 p.m.
Tiune: 19.37—20.11(34 min)
Depth: 117 m. Wire length 300 m.
Gear depth: 90 m.

TRANSECT TS 39 continues:
G26-Midnight Special:
Start at pos. 5° 00,52’ 29° 40,90’ 20.12 p.m.
Course: 008
Stop transect pos. 4° 57,33’ *29*° 37,55’ 20.40 p.m. for Midnight special:

TRAWL HAUL 39 B (MIDNIGHT SPECIAL):
Starting trawl haul: 20.44 p.m. Pos. 4° 57,33’ 29° 37,43’ Trying to catch schools at layer 100-110 m depth.
Start hauling : 20.54. p.m. Pos. 4° 56,72’ 29° 36,74’
Course: 306
Fishing layers (very valuable, trying to follow bottom topography)
Warps 450 m -300 m -250 m - 350 m - 450 m; headrope 110 m - 55 m -85 - 110 m. Bottom depth variable.
Hauling in Midnight special: 21.54 p.m. Pos: 4° 56,91’ 29° 32,95’
Otter boards up 22.10 p.m.
Trawl up: 22.15 p.m.
Catch: Lates mariae, Stolothrissa and very few Limno.

Sailing from Midnight Special to Kigoma:
Start at pos. 4°5654’ 29° 3242’ 22.17 p.m.
In Kigoma harbour for anchoring at 23.10 p.m.

02.12.1995 (Saturday)

Kigoma harbour at 07.20 a.m. survey time. Bunkering, service of the vessel. Samples to project office etc.

03.12.1995 (Sunday)

Sailing from Kigoma 18.20 (survey time) a.m. to Gulf station 27. Starting the last lap of the survey.

TRANSECTS 39B:
Kigoma-Gulf 27:
Start at pos. 4° 52,06’ 29° 35,92’ 08.30 p.m.
Course: to the northi. variable between 350-110 following coastline
Intermediate stop transect pos. 4° 37,49’ 29° 37,69’ 11.10 a.m.

for Gulf 27:

GULF-V STATION 27:
Start: Pos: 4° 37,04′ 29° 37,81′ 11.12 a.m.
Up: Pos: 4° 34,53′ 29° 38,39′ 11.46 a.m.
Time:10.12—10.46 (34 min)
Deptlm: 117 mum. Wire length 300 m.
Gear depth: 90 m.
Gear upside down. Depressor stacked again. No new sample taken.

TRANSECT TS 39B continues:
Gulf 27-TR40):
Start at pos. 4° 34,53′ 29° 38,39′ 10.49 a.m.
Course: to the north, variable between 350—010 following coastline.
Stop transect pos. 4° 24,30′ 29° 38,46′ 11.55 a.m. for plankton station 40 and TR4O:

PLANKTON STATION 39: Plankton-net samples: 106-108, Depth 54 m. Hauls 50 m. Pos. 4° 24,30′ 29° 38,46′ at 11.57 a.m.-12.17 p.m.

TRAWL HAUL 40:
Starting trawl haul: 12.17 p.m. Pos. 4° 24,30′ 29° 38,46′ Trying to catch schools at upper layer. between 20—30 m
Start hauling out: 12.20 p.m. Pos. 4° 24,21′ 29° 38,52′
Course: Heading north—northwest
Otter boards out 12.25 p.m. 4° 23,96′ 29′ 38,28′.
Using more speeed again. 4.5 knots during the haul (1825 rpm).
Excellent bottom trawling area.
Fishing layers:
Depth 1 (15 min):
Warps 150 m, headrope 20 m hauling abot 20-30. Start at 12.28 p.m. pos. 4° 23,75′ 29° 38,09′. Bottom depth 46 m
Real shallow water area.
Depth 2 (45 min):
Warps 110 m; headrope 15 m hauling abot 15-25. Start at 12.42 pm pos. 4° 23,13′ 29° 37,57′. Bottom depth 40 m
Real shallow water area. One real school observed.
Stop hauling 13.28 pos. 4° 21,15′ 29° 35,14′
Otter boards up 13.30 p.m.
Trawl up: 13.38 p.m.
Catch:Zero catch at this shallow water ai′ea. Fish school are in the areas where bottom depth is between 70—130 m. Too shallow area for pelagic species.

TRANSECT TS 40:
TR4O-Gulf 28:
Start at pos. 4° 20,82′ 29° 34,79′ 13.40 p.m.
Burundi patrol boat met 13.45 p.m. Side by side disscussing a while. Information deficiency again. We should have informed thiem passing the border between Tanzania and Burundi. Otherwise no problems.
Transect continues at 13.57 p.m. 4° 20,29′ 29° 34,48′
Course: to the north. variable fo1lowing coastline.
Intermediate stop transect 40. pos. 4° 10,06′ 29° 29,47′ 11.55 a.m. for Gulf 28 and iodine station.

GULF-V STATION 28:
Start: Pos: 4° 09,69′ 29° 28,82′ 15.15 p.m.
Up: Pos: 4° 08,23′ 29° 26,77′ 15.49 p.m.
Time: 15.15-15.49 (34 min)
Depthm:98 m Wire length 300 m
Gear depth: 90 m

IODINE SAMPLES:
Third time samples taken at pos. 4° 07,45′ 29° 26,75′
Limnos water samples (iodine) to Ossi and Hannu taken at this position ,too. Depth of samples:
lOOm, 80m, 60m, 40m. 20m.

TRANSECT TS 40 continues:
Gulf 28-TR4l:
Start at pos. 4° 14,72′ 29′ 26,76′ 16.30 p.m.
Transect continues at 13.57 p.m. 4° 20,29′ 29° 34,48′
Course: to the north variable following coastline.
Stop transect 40. pos. 4° 03.59′ 29° 26,26′ 10.55 a.m. for last trawl haul and phankton.

TRAWL HAUL 41:
Starting trawl haul: 16.57 p.m. Pos. 4° 03,59′ 29° 26,26′ Trying to catch schools at upper layer. between 40-5O m
depth. Not very much fish in this area either.
Start hauling out: 16.58. p.m. Pos. 4° 03,25′ 29° 26,11′
Course: Heading northi—northwest
Otter boards out 17.03 p.m. 4° 02,98′ 29° 25,96′.
Using more speed again. 4.5 knots during the haul (1825 rpm).
Fishing layers: (Example of vertical migration of the trawl)
Depth 1 (5 min):
Warps 200 m headrope 40 m, hauling abot 40-5O. Start at 17.05 p.m. pos. 4° 02,77′ 29° 25,84′. Botto depth 78 m.
Real shallow water area.
Depth 2 (10 min):
Warps 150 m; headrope 30 m, hauling abot 30-40. Start at 17.13 p.m. p05. 4° 02,46′ 29° 25,70′. Bottom depth 72 m
Depth 3 (17 min):
Warps 110 m, headrope 20 m, hauling abot 20—30. Start at 17.23 p.m. pos. 4° 0l,94′ 29° 25,50′ Bottom depth 88 m
Depth 4 (28 min):
Warps 30)0) in; hicadrope 55 mum, hmamihimig abot 55—65. Start at 17.40 p.m. pos. 4° 00,97′ 29° 25,03′. Bottom depth 215 m
This is really difficult to try to follow fish in various layers. Now we are in too deep area again. bottom depth about 250 m.
Stop hauling 18.05 pos. 3° 59,43′ 29° 24,48′
Otter boards up 18.11 p.m.
Trawl up: 18.20 p.m.
Catch: Nice catch of L/ microlepis, mariae, catfish, Stolo etc.

NO PLANKTON SAMPLES TAKEN AT THIS STATION. I FORGOT THEM TOTALLY.

TRANSECTS 41:
TR41 Bujumbura:

Start at pos. 3° 58,00’ 29° 23,52’ 18.29 p.m.
Course: to the north, variable following coastline.
Stop transect 41. pos. 3° 27,48’ 29° 19,24’outside Bujumbura. at 21.54 p.m.

Anchoring in Bujumbura harbour at. 22.30 p.m. pos. 3° 22,98’ 29° 20,50’.

04.12.1995 (Monday)

In Bujumbura harbour at 08.00 a.m. End of the second hydroacoustic-trawl and fish biology survey. Unloading the vessel and equipments. Total working hours during the survey were 230 hours. Thank you very much.

GCP/RAF/271/FIN/TRAM/71

Report of travel

to

**Bujumbura (Burundi), Kigoma (Tanzania),
Kalemie (Zaïre), Mpulungu (Zambia)
and to Lake Tanganyika
21.10.–6.1l.1995**

by

Timo Huttula and Kalevi Salonen

GCP/RAF/271/FIN.10

cc. Lindqvist/Mölsä
Mann, TCO4
Kapetsky
Turner, FIIT
Everett, FIPP
Kotilainen
All LTR stations
SSP
Sarvala
Jârvinen
Vuorinen
Aro

1. INTRODUCTION

1.1 Objectives

The objectives of the travel was to conduct the sixth hydrodynamic expedition on the lake. This expedition was the fourth scientific expedition on the R/V Tanganyika Explorer. On this expedition, studies related to the carbon/energy cycling in the lake were also done.

The tasks in hydrodynamics during this mission were: (1) for hydrodynamic model development, to study the variation of water currents in certain parts of the lake, (2) to collect data on wind fields and water stratification in the lake, (3) to visit Kalemie for wind station maintenance, measurement of the Lukuga Rivers discharge and to introduce the vessel to local officials, (4) to change memory units of recording devices and (5) to train counterparts and crew in hydrodynamic measurements.

The tasks in carbon energy studies were: (1) to estimate the role of picoplankton as a potential food source of plankton animals, (2) to make further determinations of bacterial productivity, (3) to obtain more data on the photosynthesis-irradiance relationship of phytoplankton and (4) to obtain more data on nutrient ratios in plankton organisms.

1.2 Itinerary

	Arrival Departure	
Helsinki		21. 10.95
Bujumbura	22.10.95	23.10.95
Kigoma	24. 10.95	24.10.95
Kalemie	25.10.95	25.10.95
Mpulungu	28.10.95	29.10.95
Kigoma	31.10.95	1.11.95
Bujumbura	2.11.95	5.11.95
Helsinki	6.11.95	

1.3 Persons met In Bujumbura

Dr. G. Hanek, Project coordinator, LTR
Mr. R. Kanyaru, Directeur, Direction des Pêches, Burundi
Mr. B. Nyakageni Boniface, conseiller, Direction des Pêches, Burundi
Mr. L. Tumba, Scientist, Direction des P~ches, Bujumbura

In Kigoma

Mr. P. Mannini, Expert, Limnologist, LTR
Mr. D. Chitamweba, Director, TAFIRI
Mr. N. Challe, Technician, TAFIRI
Mr. A. Kihakwi, Scientist, TAFIRI
Mr. E. Peltonen, Scientist, LTR
Ms. H. Kurki, Scientist, LTR

In Mpulungu

Dr. P. Plisnier, LTR
Mr. P. Verburg, Scientist, LTR
Ms. E. Bosma, Scientist, LTR
Mr. L. Makassa, Scientist, Fisheries Training Station, Mplungu

In Kalemie

Mr. S. Ndonga, Regional Commissionaire
Mr. M. Ma Enonga, Naval Commendant
Mr. K. Masikini, Tourism Inspector
Mr. K. Kitobo, Maritime Commissionaire
Mr. K. Lumbala, Director of the Harbour
Mr. N. Tiavungu, Director of Customs
Mr. M. Wa Maluba, Environmental Inspector
Mr. M. Lumuanga, Immigration Officer

In addition

Mr. M. Kakogozo, Scientist, LTR, Uvira
Mr. K. Tshibangu, LTR, Uvira
Dr. Z. Mbondi, LTR, Kalamie

2. RESULTS

2.1 Water current measurements

The time variation of flows was followed with six cylinders down to a depth of 120 m. The longest measurements extended over 14 hours. For the first time, we were able to follow the hypolimnetic flows. It was also very interesting to observe that in the Mpulungu region, in the hypoliminion, the speed of the horizontal flows were almost as high as in the epilimnion. This was not the case in other areas (the Moliro, Karema and Kigoma regions).

The first preliminary (=gamma) version of the LTR model on PC was used onboard to predict the surface currents in prevailed wind situations. The flows calculated by model and the observed currents were compared. In general, the model calculated the surface flows very well. More measurements are still needed in different wind and stratification situations to calibrate and validate the model. The gamma version of the LTR model was given to the stations for testing and feedback for the models development.

2.2 Wind field and water stratification measurements

The meteorological station onboard the R/V Explorer was used to collect data throughout the expedition.

The results calculated by the wind model of Professor Hannu Savijärvi at Institute of Meteorology were compared to the observed ones. The model seems to predict the onshore—offshore wind system very well. Still, there is much to be done in model

development for ensuring accurate wind direction calculation.

There has been discussion about the operation of the meteostation onboard. During the 10-day expedition, the meteo station onboard had to be restarted 41 times. Of these, 20 were caused by the operator during radio contact or on arrival into harbour, 7 were because of trials, training and wind speed sensor maintenance. Four cut—of fs were due to the operation of the microscope power unit, which was closely connected to the meteo station PC. The remaining 11 cut—of fs were due to the meteostation system itself. Two of these 11 times, it was found to be caused by the loose serial port in the PC. For 9 cut—off s, no explanation was found. These seem to be due to interference in the electronic system in the dry laboratory. It has to be noted that the ship's radio also does not function properly because of similar problems. The meteo station system was also left logging during CTD profiling and operation of the research winch did not normally affect the system's functioning.

Altogether 38 CTD profiles were collected. The purpose was to collect CTD data as frequently as possible in certain stations. This way the time variations of the temperature profile could be detected. The most frequent profiling was done in the Mpulungu region (4 profiles/day).

2.3 The visit to Kalemie

The visit to Kalemie was most interesting to our staff. We have had a wind station functioning there quite some time and also, estimating the Lukuga River's discharge is very important for the water balance of the lake. In the following Newsletter, a special article about the discharge measurement will be drafted by Misters Kagoso and Kihakwi. It was proved that the discharge in Lukuga was not exceptionally high and that the recent water level decrease in the lake is merely due to less precipitation. The wind station in Kalemie was not in a suitable place. A television tower was inspected and discussions carried out with the television station operator about the possibility of installing the meteo station in the tower. Technical plans and figures were drafted by T. Huttula together with Mr. Charile.

One very important objective of the Kalemie visit was to introduce the research vessel to the officials in Kalemie. We highly appreciated the visit of Mr. S. Dnonga (Kalemi's Regional Commissioner) with his party, including the highest naval and civil officers. From now on, the staff of LTR are warmly welcomed by them, and it seems that the Tanganyika Explorer can make short visits with sufficient safety in the harbour.

2.4 The change of memory units at recording stations

The following units were visited and units exchanged:

1. Kigoma, land station
2. Kigoma, buoy station

3. Kalemie, land station, stopped due to the unsuitable place
4. Mpulungu, land station
5. Mpulungu, lake station
6. Bujumbura, pier station

Only one water level data was off loaded (Bujumbura). The time did not allow for visits to the other water level stations. However, the memory units of these station allow more than 4 months of data recording from now on.

The following checks were done:

1. Mpulungu lake station,
—orientation sensor data was compared to the orientation sensor brought by consultant. The results were parallel. The water temperature sensor at the depth of 70 m gives odd values occasionally. The sensor should be replaced or recalibrated.

2. Kigoma lake station,
—when data was unloaded, it was noticed that the wind speed sensor did not function properly. The sensor was exchanged with the ship's wind speed sensor. Later the extremely dusty sensor from the buoy was cleaned and installed in the ship's meteostation

2.5 Estimation of picoplankton biomass

For the first time, the abundance of picoplankton in Tanganyika was determined extensively. Vertical distributions of picoplankton were determined at 17 stations. The samples were counted on board with an epifluorescence microscope.

Picoplankton proved to be abundant in the epilimnion, and hence it seems to be a significant component in the carbon flow of Tanganyika. According to its fluorescence under green light excitation, it seemed to contain plenty of phycocyanin and only very little chlorophyll a visible under blue excitation. Therefore the picoplankton of Tanganyika was almost totally composed of cyanobacteria.

2.6 Bacterial production

At present there is only very preliminary information on bacterial production in Tanganyika. During this cruise, the existing amount of data was triplicated by vertical leucine uptake measurement series at four stations.

2.7 *In vivo* fluorescence of chlorophyll *a*

In vivo fluorescence was used for rapid and sensitive estimation of vertical distributions of phytoplankton biomass. Determinations were made at most hydrodynamic sampling stations. Additional samples were occasionally collected to obtain more precise information of the horizontal distribution.

During the cruise, the results revealed an order of magnitude areal differences in *in vivo* fluorescence over the lake. It seems likely that highly fluorescent patches, which were large in area, are the result of an earlier upwelling situation.

Sometimes the high density of a large colonial Anabaena *fios aquae* f. *circularis* was not much reflected in fluorescence readings. This is not surprising due to the specific pigment composition of Cyanobacteria.

2.8 Nutrient ratios

The determination of nutrient ratios in particulate matter proved too difficult to realize. The filtration funnel, primarily meant for the counting of picoplankton, resulted in too slow filtration with manual vacuum creation and yielded uneven distribution over glass fiber filters.

2.9 Production to irradiance relationship of phytoplankton

Four series of bottles with water from different depths in the epilimnion were incubated at 5 light intensities to obtain the light saturation curve of phytoplankton photosynthesis. Fortunately, during this cruise it was possible to make these experiments with samples covering high differences in algal biomass.

3. RECOMMENDATIONS

3.1 Walkie-talkies

A pair of walkie—talkies are needed for extended flow measurements. During longest flow measurements, the cylinders travelled more than 3 km. They are followed by a rubber boat and the Tanganyika Explorer. For communication and also the safety of the persons in rubber boat, walkie—talkies are needed. (Action: Project Coordinator).

3.2 Wet laboratory

The ventilation is still not done. The temperature can increase up to 40°C. The exhort pipe is mounted in the corner of the room and it heats the room. The walls must be restuctured with appropriate insulating material with reflective aluminium foil on both sides.

Water from the floor does not drain out when the vessel is moving. The floor must be redone so that the leakage water is always lead out. (Action: Project Coordinator).

3.3 Research winch

The counter was not working. It must be fixed. Extra wire should be added so that deep water samples and CTD can be taken. There is space on the drum and by having more wire, the wire speed over short distances (0—200 m) would also be higher

than at present (Action: Project Coordinator)

3.4 Execution of new SSP in hydrodynamics (special flow measurements)

This must be implemented as soon as possible, according to instructions given by the consultant. (Action: Project Coordinator, Field Coordinator in Hydrodynamics)

3.5 Fluorometer

The fluorometer, while on board, should be made full use of. It could yield important information on the horizontal distribution and patchiness of phytoplankton almost free of charge during each cruise. The facilities are already available for automatic and continuous collection of data. Water could be taken from a side arm to be installed on the underside (to avoid air bubbles) of the existing inlet to the water system of the vessel, nearest to its mouth.

3.6 Vacuum pump and filtration unit in the wet laboratory

A simple and inexpensive water jet vacuum pump should be part of the basic facilities of the wet lab. A filtration funnel and a vacuum bottle (both of plastic) are also essential, since they cannot really be taken from the stations, where they are needed for routine sampling.

RESEARCH FOR THE MANAGEMENT OF THE FISHERIES ON LAKE TANGANYIKA
GCP/RAF/271/FIN

GCP/RAF/271/FIN/TRAM/72

Report of Travel

to

Rome, Italy
(8–11.1.1996)

by

George Hanek
LTR Coordinator

GCP/RAF/271/FIN.10

cc: Mann, TCO4
Kapetsky, FIRI
Everett, FIPP
Kambona/ Ssentongo, FIPL
Turner/Smith, FIIT
Lindqvist/Mölsä, Kuopio
FAOR's-BDI, URT, ZAI, ZAM
All LTR Stations
TRAM
Chrono
Diary: Hanek

GCP/RAF/271/FIN **January, 1996**

1. INTRODUCTION

1.1 Objective

The objectives of this duty travel were: (1) to brief FAO–HQ officers on LTR progress to date; (2) to detail LTR's Programme of Work for January– June 1996; (3) to discuss the Inter-Agency Agreement (UNOPS/FAO); and (4) to deal with number of other matters.

1.2 Itinerary

	Arrival	Departure
Rome*	8.1.96	11.1.96
Brussels**	11.1.96	14.1.96
Bujumbura	14.1.96	

* from Family Visit

** for medical exams (NOTE: to all coming back from Africa sick with all kinds of strange or yet unknown bugs/diseases I strongly recommend to visit the Institute of Tropical Medicine in Antwerpen; tel: 32–3–247–64–28; fax: 32- 3–247–64–32 noting Prof. J. Van den Ende is especially good!!)

1.3 Persons met

Mr. P. Gonzalez-Alberdi, Chief, TCO4
Mr. M. Mann, SPOO, TCO4
Ms. D. Blessich, P00, TCO4
Dr. S. Garcia, Director, FIR
Dr. J. Kapetsky, SFRO, FIRI
Mr. J.J. Kambona, Chief, FIPL
Mr. G.V. Everett, SFPO, FIPP
Mr. G. Ssentongo, FLO, FIPL
Mr. J. Turner, SF10, FlIT
Mr. A.R. Smith, FIO, FlIT
Mr. S.C. Venema, PM, GCP/INT/575/DEN
Ms. Emblem, APO, GCP/INT/575/DEN
Ms. J. Collins, Librarian, FIBL
Mr. D. Galletti, BFO, FIDX
Ms. P. Cross, P0, TCOX

2. RESULTS

2.1 LTR Progress

LTR progress to date was outlined during general meeting with key officers. In addition, the following aspects were covered:

* programme of work for January–June, 1996 – was proposed, discussed and approved;

* Inter–Agency Agreement UNOPS/FAO – was discussed in details;

* Workshop on Acoustics - its timing was proposed and agreed that Mr. Venema will confirm it asap;

* mission of Ms. Emblem – was discussed and agreed that her ETA Bujumbura is likely around 10.3.96; her mission will start in Bujumbura and include visits to LTR stations in Kigoma and Mpulungu; Mr. Everett will confirm the timing;

* cooperation with GEF – meeting was informed that their first Joint Meeting should be held in Dar–es–salaam in the near future; its was agreed that Messrs. Mann and Hanek should take part. Hanek is to confirm the timing;

* 7th Session of CIFA Sub–Committee for Lake Tanganyika; it was agreed to hold this meeting in Kigoma, Tanzania, back to back with LTR's 5th Joint Meeting and brain–storming' session of LTR staff; dates: 23–27.9.1996.

2.2 Other matters

A number of operational and technical matters was treated as follows:

* CSA7 for the University of Kuopio was agreed upon;

* TOR's for Kotilainen and national expert in hydrodynamics were prepared;

* timing of Mr. Smith's (FlIT) mission to Bujumbura was discussed;

* replenishment of LTR's Bujumbura accounts was requested;

* second phase of LTR - PRODOC was already sent to FINNIDA; only after FINNIDA confirms the level of funding the PRODOC can be forwarded to other donors;

* contracts for LTR personnel – Mr. Mann is to propose budgetary revision for GCP/RAF/271/FIN once Inter–Agency Agreement is signed; funds already spent by LTR (weather station, thermistor chain, Savinainen consultancy, etc.) should be recovered in order to allow for contract extensions of LTR international staff;

* navigation charts for Lake Tanganyika - it was agreed that Mr. Turner will copy the proposal to IHO asap;

* terminal report for GCP / RAF / 221/AGF - Mr. Mann kindly offered to make several required modifications soonest;

* author contracts for Plisnier and Kotilainen were agreed upon;

* LTR Documentation Centre - Ms. Collins kindly promised to continue to supply our DC with documentation; and

* Monthly Attendance and Absence Report – it was agreed that these will be prepared separately for GS and international personnel.

3. CONCLUSIONS AND FOLLOW-UP

3.1 Provide Mr. Mann with medical certificates and data on monthly earnings of the officers of R/V Tanganyika Explorer (Action: LTR Coordinator).

3.2 Confirm arrival to Bujumbura of Ms. Emblem (Action: Mr. Everett).

3.3 Confirm arrival to Bujumbura (Action: Mr. Smith).

3.4 Confirm the timing of LTR's Workshop on Acoustics (Action: Mr. Venema).

3.5 Follow–up on URT acceptance of Verburg and Bosma (Action: Mr. Mann).

3.6 Finalize terminal report of GCP/RAF/221/AGF (Action: Mr. Mann).

3.7 Confirm the timing of GEF's project First Joint Meeting (Action: LTR Coordinator).

3.8 Contact Plisnier re: colour figures (Action: LTR Coordinator).

3.9 Finalize author contracts for Plisnier and Kotilainen (Action: Mr. Mann).

3.10 Select national expert for hydrodynamics (Action: LTR Coordinator).

GCP/RAF/271/FIN/TRAM/73

Report of Travel to Kigoma (Tanzania) and Kalemie (Zaïre) (30.1–6.2.1996)

by

George Hanek

LTR Coordinator

GCP/RAF/271/FIN.10

cc: Mann, TCO4
Kapetsky, FIRI
Everett, FIPP
Kambona/Ssentongo, FIPL
Turner/Smith, FlIT
Lindqvist/Mö1sä, Kuopio
DG-CRH/Uvira
Chitamwebwa, TAFIRI/Kigoma
All LTR Stations
Chrono
Diary: Hanek

GCP/RAF/271/FIN **February, 1996**

1. INTRODUCTION

1.1 Objective

The objectives of this duty travel were: (1) to take part in the 6th scientific cruise; (2) to meet TAFIRI/LTR staff; and (3) to initiate local arrangements for the 7th Session of CIFA Sub-Committee and the LTRs 5th Join Meeting.

1.2 Itinerary

	Arrival	Departure
Bujumbura		30.1.96
Kigoma	31.1.96	31.1.96
Kalemie	1.2.96	1.2.96
Kigoma	2.2.96	5.2.96
Bujumbura	6.2.96	

1.3 Persons met

Mr. Chitamwebwa and all TAFIRI/Kigoma staff
Mr. P. Mannini, LTR fisheries biologist
Dr. J. Craig, LTR biostatistician
Ms. H. Kurki
numerous administrative and military authorities in Kalemie

2. RESULTS

2.1 6th scientific cruise

This cruise was devoted to hydrodynamics. As a visit to Kalemie was on its itinerary I decided to joint the cruise. After changing Data Storing Unit on thermistor chain off Kigoma we arrived to the port of Kalemie early in the morning of 1.2.1996. As always the authorities of all four countries were provided information on cruises objectives and itinerary. In order to avoid any problems in Kalemie the information on the project, cruises objectives and itinerary are normally sent few days before ETA to Kalemie with one of our colleagues from CRH/Uvira. This was done prior to the first visit of *R/V Tanganyika Explorer* to Kalemie in October 1995. This time it was not possible since the cargo/passenger vessel which services Uvira/Kalemie was delayed. Consequently, contacts with Kalemie authorities were made by radio. In addition, and immediately upon arrival to Kalemie, all documentation relative to the cruise was distributed. Subsequently, the local transport was arranged for (car of former project UNDP/FAO-ZAI/92/004 AT NO COST!!) and two teams formed. The objective of the first team was to remove our wind station from Mr. Detsimas's house and install it at the local TV reception station (NOTE: this was

arranged during the first visit to Kalemie by Dr. Huttula and his team; unfortunately, when we wanted to install it the officer—in—charge of these installations requested outrages amount of money to have our wind station installed on Governments property..). Consequently an alternative site was identified and the wind station installed. The second team's objective was to take numerous measurements (length, depth, current speed, etc.) of Lukuga River. While verifying the progress of the wind station installation our car was stopped by what turned up to be the military commander of the region. He informed me that the 'Lukuga team' was arrested since it is of 'strategic importance'. It became clear that the commandant was not informed about our mission and after I have provided him with the explications, etc. he wrote a note with which I was able to 'liberate' our Lukuga team. The rest of our stay in Kalemie went OK although we had to deal with numerous 'officials' who all wanted to visit and/or inspect our vessel and, particularly, to receive 'refreshments'. In order to 'reduce our costs' I have decided to cut our stay in Kalemie and we have thus left the harbour at 1830 hrs. The vessel returned to Kigoma following morning when I left the vessel while the cruise continued southward; the full cruise report will be presented as TRAM/74.

Upon return to Bujumbura I have met with the Director—General of CRH/Uvira and his senior staff. I have informed him that *R/V Tanganyika Explorer* will not visit Kalemie nor work close to shore (see TRAM/71=incident in October 1995) unless (1) he personally assures me, in writing prior to any future cruise which is to work in Zairian waters, that all authorities were informed and (2) senior researcher of CRH is present on board *R/V Tanganyika Explorer* at all times while the vessel is working in Zairian waters. In view of the above, it is certainly unwise to follow on one of the recommendation of the recent Evaluation Mission i.e. to establish LTR station in Kalemie. This matter should be reviewed only once the second phase of the LTR is approved.

2.2 Meeting with the TAFIRI/Kigoma staff

As always a general meeting with all the staff of TAFIRI was held. The present situation of the project was presented and the future possibilities explained. There was some confusion re: allowances paid by LTR to the national colleagues. It was agreed that a clear memo will be prepared by me and circulated at all of LTR stations.

2.3 Meeting with LTR/Kigoma staff

This focused mainly on technical discussions concerning this year activities. In addition, long discussions were held with Dr. Craig mainly re:
expected outputs and length of his contract. He should confirm it by the end of this month.

I have also met with Ms. Kurki, our former APO. Considering that she decided to stay in Kigoma few more months a possibility of completing several outstanding tasks was discussed. Eventually, she agreed to 'author's contract' for 2 months (starting immediately) to undertake the following:

* preparation of Technical Document **(=** analysis of zooplankton data for SSP's second year);

* preparation of Technical Document (=Synthesis of the first two years of SSP—zooplankton);

* analysis of zooplankton data collected during the first two acoustics surveys;

* transfer of responsibilities for SSP—zooplankton to Ms. Bosma; and

* preparation of Field Guide (No. 20) on zooplankton sampling during 'multidisciplinary cruises'.

2.4 Logistics for the 7th Session of CIFA Sub-Committee and the 5th Joint Meeting of LTR Committees

Several facilities were visited in order to find appropriate place to held our September meetings. The Municipal Hall is by far the best facility. It should not be difficult to use it.

3. CONCLUSIONS AND FOLLOW-UP

3.1 Continue discussions with the DG of CRH/Uvira in order to find the most effective way of keeping the Zairian administrative and military authorities up to date on LTR activities (Action: DG-CRH/Uvira and LTR Coordinator).

3.2 Prepare memo on PRA and other allowances (Action: LTR Coordinator).

3.3 Decide re: length of contract (Action: Dr. Craig).

3.4 Approve author's contract for Ms. Kurki (Action: Mr. Mann).

3.5 Contact authorities of Kigoma Regional office to obtain their permission to use the Municipal Hall from 23-26.9.1996 (Action: Mr. Chitamwebwa).

GCP/RAF/271/FIN/TRAM/74

Report of Travel

of

**the 6th Scientific Cruise
(30.1 – 9.2.1996)**

by

I. M. Kimosa, R.E. Makere and P. Verburg

GCP/RAF/271/FIN.10

cc: Mann, TC04
Kapetsky, FIRI
Turner, FIIT
All LTR stations
SSP
Chrono
TRAM

FORM TE/3

LAKE TANGANYIKA RESEARCH

PROGRAMME:R/V TANGANYIKA EXPLORER CRUISE 06
NAME POSITION

1. Verburg, P:Hydrodynamics Field Coordinator, Cruise Leader
2. Makasa, L Hydrodynamics Station Responsible, Mpulungu
3. Kihakwe, P:Hydrodynamics Station Responsible, Kigoma
4. Kakogozo, B: Hydrodynamics Station Responsible, Bujumbura
5. Butoyi, K Limnologist, Zooplankton Assistant

DURATION 30.01.96 – 09.02.96

LOCALITY

1. Bujumbura 30.01.96
2. Kigoma 31.01.96
3. Kalemie 01.02.96
4. Kigoma 02.02.96
5. Mpulungu 04.02.96
6. Kigoma 07.02.96
7. Bujumbura 09.02.96

PLAN (all times are Greenwich Mean Time + 2)

LTR Coordinator

Date: 28.2.96

INITIALED.....GH

DISTRIBUTION: Mann, TCO4
Kapetsky, FIRI
Fitzpatrick/Turner, FIIT
Chrono

CRUISE PLAN **FORM TE/4**

SHIP: **R/V TANGANYIKA EXPLORER** **CRUISE NUMBER**: **06**

CRUISE ITINERARY REQUIRED:
(start, stop, port call(s), track chart)

1. Departure from Bujumbura 30.01.96

2. Arrival in Kigoma 31.01.96 and departure from Kigoma 31.01.96

3. Arrival in Kalemie 01.02.96 and departure from Kalemie 01.02.96

4. Arrival in Kigoma 02.02.96 and departure from Kigoma 02.02.96

5. Arrival in Mpulungu 04.02.96 and departure from Mpulungu 05.02.96

6. Arrival in Kigoma 07.02.96 and departure from Kigoma 07.02.96

7. Arrival in Bujumbura 09.02.96

SENIOR SCIENTIST: Mr. P. Verburg, LTR/Mpulungu

SCIENTIFIC STAFF LIST: (including affiliation)

			DATES	
Name	Laboratory	Institution, etc.	**Boarding**	**Disembarking**
Verburg,P	Hydrodynamics	LTR/Mpulungu, Cruise Leader	Kigoma 31.01.96	Kigoma 07.02.96
Makasa,L	Hydrodynamics	LTR/Mpulungu	Kigoma 31.01.96	Kigoma 07.02.96
Kihakwe,P	Hydrodynamics	LTR/Kigoma	Kigoma 31.01.96	Kigoma 07.02.96
Kakogozo,B	Hydrodynamics	LTR/Bujumbura	Bujumbura 30.01.96	Bujumbura 09.02.96
Butoyi,K	Limnologist,	LTR/Bujumbura	Bujumbura 30.01.96	Bujumbura 09.02.96

EQUIPMENT TO BE USED:

1. Equipment supplied by LTR/Bujumbura

   Portable computer (for unloading water level recorders)
   Current cylinders plus buoys
   Plankton net
   Plankton torpedoes
   Limnos water sampler 7.4 liters

2. Equipment supplied by LTR/Kigoma Current Cylinders plus buoys

3. Equipment supplied by LTR/Mpulungu

Rope, 4 mm, 5 x 100 yards
Software for unloading recorders
Memory Replacement Aanderaa Recorders

4. Equipment from other sources:

Meteorological station on board
Global Positioning System
Inflatable Dinghy with outboard engine 15 hp
Thermistor chain 300 m
Flow meter
Tool Box

5. Winch and wire requirements. Oceanographic winch 300 m

SCIENTIFIC OR SURVEY OBJECTIVES:

1) To perform current measurements, up to 120 m depth, of long duration in areas shown of interest by previous measurements and modelling work.

2) Maintenance, and unloading of memories, of the 9 automatic land meteo stations, wind stations, lake meteo stations and TELOG water level recorders in and around the lake. The 300 m thermistor string of the lake meteo station in Zambian waters was to be replaced.

3) To measure the discharge of the Lukuga river.

4) Meteorological measurements along the lake with the vessel based meteo station.

5) Sampling of limnological parameters and zooplankton.

CRUISE PROCEDURES AND STATION PATTERN REQUIRED:

FORM TE/5

CRUISE SUMMARY - SENIOR SCIENTIST

SHIP: R/V TANGANYIKA EXPLORER CRUISE NUMBER: 06

SENIOR SCIENTIST: Mr. P. Verburg LTR/Mpulungu

LIST OF SCIENTIFIC STAFF ACTUALLY PARTICIPATING

Name	Laboratory	Institution, etc.	DATES Boarding	Disembarking
Verburg, P	Hydrodynamics	LTR/Mpulungu, Cruise Leader	Kigoma 31.01.96	Kigoma 07.02.96
Makasa, L	Hydrodynamics	LTR/Mpulungu	Kigoma 31.01.96	Kigoma 07.02.96
Kihakwe, P	Hydrodynamics	LTR/Kigoma	Kigoma 31.01.96	Kigoma 07.02.96
Kakogozo,B	Hydrodynamics	LTR/Bujumbura	Bujumbura 30.01.96	Bujumbura 09.02.96
Butoyi, K	Limnologist,	LTR/Bujumbura	Bujumbura 30.01.96	Bujumbura 09.02.96

ITINERARY ACCOMPLISHED: (including actual track chart)

1. Arriving in Kigoma 31.01.96, boarding of scientists and material.
2. Lake Meteo Buoy near Kigoma 31.01.96
3. Kalemie 01.02.96
4. Kigoma, disembarking Project Manager 02.02.96
5. Cape Bangwe, current measurement 02.02.96
6. Karema, current measurement 03.02.96
7. Lake Meteo Buoy near Mpulungu 04.02.96
8. Arriving in Mpulungu 04.02.96, 1000 1 fuel bunkering, work on Buoy Thermistor String etc, departure 05.02.96
9. Lake Meteo Buoy near Mpulungu 05.02.96
10. Kapembwa, current measurement 05.02.96
11. Moliro, current measurement 06.02.96
12. Kigoma 07.02.96, disembarking of scientists
13. Cap Banza – Cap Katende, current measurement 08.02.96
14. Arrival in Bujumbura Harbour 09.02.96

SCIENTIFIC OR SURVEY ACCOMPLISHMENTS:
(with brief statements explaining failures to achieve objectives)

1) In Kigoma the wind station was checked, unloaded, the battery replaced and the arm with the sensors, which had somewhat subsided, straightened. The Lake Meteo Buoy and the water level recorder in Kigoma were unloaded. Both in Bujumbura and in Mpulungu the weather stations and water level recorders were unloaded.

2) The Lake Meteo Buoy near Mpulungu was lifted on deck, the recorder unloaded, and the thermistor chain replaced while stopping in Mpulungu. Missing special tools for dismantling were

found available in Mpulungu. The extra rope, installed previously for easy lifting of the chain, was foundcompletely entangled in the temperature sensor string, even though it had been placed, with an extra buoy, anchor and weights, at a distance of 150 m from the buoy chain, with a connection over the bottom at about 340 m depth. This probably damaged the sensors, due to continuous movement with the currents, the internal wiring was in several places exposed.

3) In Kalemie the wind station was intended to be installed in the TV tower, agreed upon during a previous trip with the Explorer. This was however made impossible by the responsible authorities, due to a reluctance to give permission. Therefore is was reinstalled in the old location, a rooftop on a hill, on a iron pole for stability.

4) Measuring the discharge of the outflowing river Lukuga, was unfortunately discontinued prematurely. Military forces, that could not possibly have been informed of our intended visit and activities by mail (the only cargo boat from Bujumbura stopping at Kalemie, used for mail, had a break down) nor by telephone, decided to arrest the team working on the bridge over the river. The depth had been measured of part of the river, the width was found to have increased since the cruise in October last year to 121 m, the flow speed could not be determined before the arrest was made.

5) Meteorological station on board: The following parameters were recorded while sailing: time, position, wind speed and direction relative to the vessel, air temperature, relative humidity, air pressure, solar radiation, sun minutes and rainfall. Logging interval was set at 2 minutes. Several times the logging was blocked due to interference with other equipment.

6) Current measurements were performed, in five different locations, at 1, 20, 40, 60, 80, 100 and 120 m depth. The latter to were conducted with thin ropes (4 mm) connecting the cylinders with the buoys. The measurements were performed at Cape Bangwe, Karema, Kapembwa, Moliro and between Cap Banza and Cap Katende. Once per hour position and time were recorded. A trial was done to continue the measurements at night, with a signal light attached to the buoys. Several signal lights that were tried were found inadequate, and one cylinder was lost. In general currents were found slow, due to unusual calm weather, throughout the survey. Currents in the deep layers were often found as fast or faster than at the surface.

7) Samples for the determination of nutrient contents, and for zooplankton were take at six stations.

PROBLEMS ENCOUNTERED, SUGGESTED IMPROVEMENTS, ETC.

1) Work planning in Kalemie appears highly hazardous and should not be performed unless all the necessary authorities have been duly informed in detail each time, and permissions received beforehand.

2) The buoy near Mpulungu was installed without an extra rope for easy lifting in the future of the whole apparatus. This seems now the safest option, possibly also for the buoy near Kigoma, to prevent damage to the sensor string by this rope.

GCP/RAF/271/FIN/TRAM/75

Report of Travel

to

Kalemie (Zaïre)

(16–25.02.1996)

by

MAMBONA WA BAZOLANA

GCP/RAF/271/FIN.10

cc: Mann,TCO4
Kapetsky, FIRI
All LTR Stations
TRAM
Chrono

1 INTRODUCTION

1.1 Objectives

The objectives of this travel duty travel were: (1) to bring the allowance paid by LTR to the national colleagues, the sampling money and some additional materials; (2) to explain my responsibility as station field component supervisor, discuss and clarify several technical problems; and (3) to deal with other matters.

1.2 Itinerary

	Arrival	Departure
Uvira		16.02.96
Kalemie	17.02.96	24.02.96
Uvira	25.02.96	26.02.96

1.3 Persons meet

M. Mundula:	coordinator of ECNT subregion of Tanganyika at Kalemie and Supervisor of LTR/Kalemie and Moba substation.
M. Nkiansi:	Responsible of SNSAS (Service National des Statistiques Agricoles) ,UNDP/FAO project, Kalemie.
M. Mandji :	Resposable of Vulgarization of fishery technology office SENADEP (Service National de Développement de la Pêche) in ministry of ECNT, Kinshasa.
M. Chalula Lumbwe:	ECNT and LTR/Kalemie staff.
M. Masudi Ngongo :	ECNT and LTR/Kalemie staff.
M. Katamata Kibi :	Supervisor of ECNT, Kalemie.

+ Numerous administrative and military authorities of Kalemie.

2 RESULTS

2.1 Allowance, sampling money and additional materials

The money problems and materials were treated with M. Mundula who is our supervisor of LTR/Kalemie and Moba. Consequently we paid immediately the allowance for all of LTR/Kalemie staff. For Moba, the allowance, sampling money and materials will be send as soon as possible.

2.2 Briefing with LTR/Kalemie

As always when I arrive at Kalemie, a small briefing with all the LTR staff of ECNT/Kalemie was held. This focused mainly on technical discussion concerning this first six month activities and my responsibility in our SSP components fish biology and statistics in Zaïre. A clear explanation was given to them about sampling work, data collection and analysis in laboratory following the change in our SSP since August 1995.

2.3 Other matters

Other matters were treated as follows:

- Moba, LTR substation – it was not possible to visit Moba. Our schedule coincided with the funeral ceremony of the Moba customary chief. So a great delegation from all parts of the Shaba region travelled Moba at the same time. Consequently, instructions were given to M. Mundula to travel to Moba.

- With M. Nkiansi - he was very kind with me and helped me greatly with transport. We discussed his possible association/cooperation with LTR/staff when they visit Kalemie.

- With M. Mandli – we discussed the Simultaneous Frame Survey 1995. He said that his Ministry is now waiting this report.

- Radio of LTR/Kalemie - on Friday 8.30 a.m. I visited the radio with Messrs. Mundula and Nkiansi trying to contact LTR/Bujumbura; unfortunately, no contact with Bujumbura was possible. But this radio is in regular contact with the Greek. After some speculation, M. Nkiansi suggest me one military technician to check the radio. We discussed with the technician about it and I decided to discuss it first with M. Hanek.

3 CONCLUSION AND FOLLOW-UP

3.1 More frequent visits to the LTR/Kalemie and Moba are needed in order to encourage, bring sampling money and control the LTR activities there.
(Action: LTR Coordinator and M. Mambona)

3.2 Contact authorities of Zaïre, especially of Kalemie to find the possible way to finally establish the LTR/Kalemie station.
(Action: DG–CRH/Uvira)

3.3 Check or repair the LTR radio at Kalemie.
(Action: LTR Coordinator and Messrs. Mundula and Nkiansi)

3.4 An additional staff for LTR/Moba is needed (see Office Memorandum PP95/06,23.07.1995; PP95/07,24.07.1995 and PP95/17,26.12.1995.
(Action: LTR Coordinator)