REPORT FOR THE TUNA SAMPLING TECHNICAL WORKSHOP HELD IN TEMA, 2012 NOVEMBER 4 TO 16

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SUMMARY

As a complement to the first workshop conducted in july 2012, some additional comparative sampling operations were held in Tema with both MFRD and ICCAT sampling teams. This activity was followed by thorough checking of the database inputs (AVDTH) and associated control program reports (AKADO). Then the latest versions of AVDTH (4.1) and AKADO (4.2) were installed on MFRD computers and a training course was held to explain how to obtain wells maps from the vessels or how to elaborate reliable ones in order to follow the suitable sampling protocol.

RÉSUMÉ

En complément au premier atelier tenu en juillet 2012, quelques opérations supplémentaires d'échantillonnage comparatif ont été réalisées à Tema par les équipes d'échantillonnage du MFRD et de l'ICCAT. Un suivi de ces activités a été réalisé en vérifiant exhaustivement les données d'entrée de la base de données (AVDTH) et les rapports associés du programme de contrôle (AKADO). Ensuite, les dernières versions de AVDTH (4.1) et AKADO (4.2) ont été installées sur les ordinateurs du MFRD et un cours de formation a été dispensé afin d'expliquer la façon d'obtenir des plans des cuves des navires ou la façon d'élaborer des plans fiables en vue d'appliquer le protocole d'échantillonnage adéquat.

RESUMEN

Para complementar las primeras jornadas de trabajo realizadas en julio de 2012, se han realizado algunas operaciones de muestreo comparativas adicionales en Tema con los equipos de muestreo del MFRD y de ICCAT. Tras dicha actividad, se procedió a una comprobación exhaustiva de las entradas de la base de datos (AVDTH) y de los informes de programas de control asociados (AKADO). Finalmente, se instalaron las últimas versiones de AVDTH (4.1) y AKADO (4.2) en los ordenadores del MFRD y se impartió un curso de formación para explicar cómo obtener planos de cubas de los buques o cómo elaborar planos fiables para seguir un protocolo de muestreo adecuado.

KEYWORDS

Tuna fishery, purse seine, pole and line, statistical monitoring, species composition, length structure, imput and control applications

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1 Introduction

With the development of a purse seine fleet in the late 1990s, Ghanaian catches reported as task I to the ICCAT have been estimated at about 60.000 t to 80.000 t per year, making Ghana one of the major components of the tropical fishery operating in the Eastern Atlantic Ocean. In spite of some sampling efforts and progress obtained by Ghanaian scientists in the collection of fishery statistics, certain uncertainties and potential biases in tasks I species composition and in size distribution as well as a very low coverage for task II have stunted diagnostics in stocks assessments as well as analyses concerning the efficiency of protection plans for juveniles of tropical tunas based on time-area closures.

In order to improve Ghanaian statistics and to reduce uncertainties in stocks assessment and other analyses on tropical tunas, the Standing Committee on Research and Statistics (SCRS) of the ICCAT strongly recommended the organisation of a working group devoted to, among other issues, the improvement of Ghanaian statistics. As a consequence, an ICCAT working group on Ghanaian tuna statistics was held in Madrid in 2011 (phase II, 30 may – 3 june 2011) during which recent Ghanaian catch, effort, and size data were revised and alternative procedures to estimate past time series were proposed.

Following this working group, it has been decided to set in place a collaborative project between the IRD and Ghana in order to strengthen Ghanaian industrial purse seine fishery monitoring in the gulf of guinea. This project (Bannerman et al., 2012) was approved by the SCRS and it is included in the Tropical species 2012 work plan as addendum.

In july 2012, a preliminary mission in Tema of the sampling team took place (Damiano et al, 2012). During simultaneous sampling with MFRD team some problems were identified in the selection procedure of individual for species identification and length measurement.

This document presents the results of the training course planned within this project which took place in Tema in november 2012.

2 Objective

The objectives of this training course were:

(1) to analyze in situ the procedure followed to estimate the species composition of the tuna catch landed in Tema from multi-specific sampling;

(2) to determine whether differences detected between Ghanaian statistics provided to ICCAT and observed in other surface fisheries operating in similar conditions are real, resulting of a sampling bias, a result of a different process in processing data, or due to other causes and

(3) to check the Ghanaian 2008-2012 databases and see how they can fit to T3 for processing.

3 Operationnal work

3.1 Sampling

The structure of MFRD staff is described in the **Table 1**. The MFRD staff is split into two teams (A and B). Alternatively, for one month, each team is on duty for:

- Monitoring Panofi transshipments (at anchor in Tema harbor) and sampling
- Monitoring landings alongside quay in Tema port and sampling

Sampling schedule (**Table 2**): during the stay in Tema 4 sampling sessions were held by ICCAT and MFRD teams on the following landings:

- Rico Uno (Rico Co BB)
- Marine 707 (World Marine Co BB)
- Ace 1 (G-L Fisheries BB)
- Cap St Paul (TTV Co PS)

The comparison between ICCAT and MFRD samplings are presented in **Figures 1** to **5.** As ICCAT team was smaller than MFRD the samples held by ICCAT team were often compared to two MFRD samples but as we can see on the graphs, no significant differences in species or in size repartition were evidenced. This is confirmed by the Kolmogorov-Smirnov test result (**Table 3**) showing that there is no significate difference between YFT and SKJ size histograms. The numbers of BET, FRI and LTA fishes sampled by length intervals are quite low; consequently the tests results should be interpreted with caution.

As the species distribution observations for both teams are now very close we can suppose that the recommendations done during our previous training course in July 2012 have been taken in account and that MFRD team follows now the sampling protocol.

3.2 Database situation and description of the main problems

A) From 2008 to 2011, data have been entered with AVDTH version 3.2. It would be better to convert them into AVDTH 2010 by using the Dconvert application.

B) 2012 data are not yet entered because there is no computer available to perform this task. We strongly recommend that 2012 data be entered with AVDTH 2010.

C) The main problem observed concerns the lack of reliable logbooks and wells map. The MFRD staff explained that the captain's declarations about the identification of the wells where are stored the different sets are not reliable. It was evidenced that aboard baitboats, and aboard small Purse Seiner the catch is shifted to other wells after freezing. For instance: the first set of 25 tons is declared to be put in wells 1 PortSide and 1 StarBoard containing brine. However when the freezing temperature is reached fish is picked out from wells 1 PS and SB and put into the front hatch as dry freezing (as this hatch is not equipped for freezing in brine). The second set of 30 t is also declared to be thrown into wells 1 PS and SB but it is then moved to front hatch or rear hatch or another well, a.s., till these secondary wells are completely full. In conclusion 300 or 350 tons of each trip may be declared to be in primary wells but in fact the fish is moved to other wells.

D) Control program (AKADO) messages:
Checking the MFRD databases, the main problems encountered by the programme AKADO were the following:

Trip 1/2:

E/W	Marée			Jour départ				Jour arrivée			Distance		Séquence
-	C_BAT	Type	D_DBQ	D_DEPART	Act_J_deb	S_tm_d	S_tp_d	Act_J_fin	S_tm_f	S_tp_f	V_LOCH	S_Dist	-
W	531	BB	17/07/2012	12/06/2012	12/06/2012	24	12	17/07/2012	24	12	-	3228	-
W	642	PS	13/07/2012	27/05/2012	27/05/2012	24	12	13/07/2012	24	12	-	5360	-
W	694	PS	14/07/2012	06/06/2012	06/06/2012	24	12	14/07/2012	24	12	-	4321	-
W	787	PS	12/07/2012	21/06/2012	21/06/2012	24	12	12/07/2012	24	12	-	1053	-
W	841	PS	06/07/2012	01/06/2012	01/06/2012	24	12	06/07/2012	24	12	-	5386	-

A day-at-sea duration of 24 hours is not possible for the first and last day of a fishing trip. Consequently, departure and arrival hours must be taken into account for the computation of the exact time at sea for those days.

Trip 2/2:

E/W	Marée			Temps Mer		Temps Pêche		Poids débarqué		Départ	Captures	R.	Enquête	Echantillon		
-	C_BAT	Type	D_DBQ	TM	S_tm	TP	S_tp	V_POIDS	S_P_Lots	F_CAL_VID	S_P_Capt	-	F_ENQ	N	S_Pond	S_Poids
E	531	BB	17/07/2012	864	864	432	432	187	187	1	364 | 364	0.59	1	2	171.5	171.5
W	841	PS	06/07/2012	864	864	432	432	0	0	0	724 | 724	0	1	2	-	-

In case 1 (C_BAT=531) the landing manifest is uncompleted and as a result such situation creates an erroneous raising factor of 0.59 between the declared catch and the landed catch.

Activities

E/W	Activité					Opération	Poids			Associations		Position						T °C
-	BAT	Type	D_DBQ	D_ACT	N_ACT	OPERA	POIDS_CAP	S_capt_elem	S_pond_act	TBANC	Assoc	Q	LAT	LON	A terre	OA/OI	N_Ech	-
E	642	PS	13/07/2012	25/06/2012	2	1	21	21 | 21	19	1	24	4	223	1224	non	1	-	
E	642	PS	13/07/2012	26/06/2012	1	1	47	47 | 47	33	1	24	4	218	1218	non	1	-	
E	642	PS	13/07/2012	26/06/2012	2	1	66	66 | 66	56.5	1	24	4	225	1209	non	1	-	
E	642	PS	13/07/2012	27/06/2012	1	1	27	27 | 27	13.5	1	24	4	236	1218	non	1	-	
E	694	PS	14/07/2012	23/06/2012	1	1	65	65 | 65	32.5	1	23	4	437	557	non	1	-	
E	694	PS	14/07/2012	26/06/2012	1	1	50	50 | 50	12.5	1	24	4	404	657	non	1	-	
E	694	PS	14/07/2012	10/07/2012	1	1	30	30 | 30	15	1	23	1	220	155	non	1	-	
E	694	PS	14/07/2012	11/07/2012	1	1	40	40 | 40	20	1	24	1	224	146	non	1	-	
E	787	PS	12/07/2012	25/06/2012	1	1	22	22 | 22	11	1	23	1	532	113	non	1	-	
E	787	PS	12/07/2012	26/06/2012	1	1	41	41 | 41	20.5	1	23	1	511	54	non	1	-	
E	787	PS	12/07/2012	07/07/2012	1	1	92	92 | 92	46	1	23	1	452	57	non	1	-	
E	841	PS	06/07/2012	04/06/2012	1	1	10	10 | 10	5	1	24	4	35	256	non	1	-	
E	841	PS	06/07/2012	07/06/2012	1	1	110	110 | 110	55	1	24	3	55	1436	non	1	-	

The problems encountered concerns mainly samples weighting:

- There may be wrong inputs. For instance in line 1 the right figure must be 21 t and not 19 t, and in line 2 the right figure is 47 t.
- Since well maps are not provided by captains, the rule adopted by MFRD team when one day's catch has been split into 2 wells, is to split the catch in 2 equal parts. For instance, the catch of day (D_ACT) 27/06/2012 has been put in SB5 and SB8, but because only well SB5 was sampled 13.5 t was reported (i.e., 27/2) instead of 27 t.

It is worth noting here that the majority of errors identified by AKADO are similar. All errors identified during the training session have been explained to MFRD team and would easily be corrected in the 2008-2011 databases. A corrected version of the database (i.e. with no error reported by AKADO) will be brought for next planned meeting in Sète during the first semester of 2013. As trip documents are in Tema and there is no scan available presently, all the correction should be made in Tema

4 Recommendations

4.1 Working conditions, computer hardware and sampling tools

- MFRD staff should have an office in the Tema port for a better efficiency in survey and sampling of tuna landings.
- The computers are down and the sampling tools are now very old, so the following equipments should be available for the samplers:
    - 2 or 3 computers for entering AVDTH database
    - 1 scanner/printer
    - 4 ichtyometers
    - 6 calipers (2x 1,2m and 4x0,8m)
    - Gloves, boots, writing tablets, etc…

4.2 Database

- The 2008 to 2011 databases must be converted from AVDTH 2005(V3.2) into AVDTH 2010(V.3.3)
- The 2012 database should be computerized into AVDTH2010 application as soon as computers are available

4.3 Scanning documents

- For checking the database we need to go back to the original documents (logbooks, sampling forms, landing manifests). The documents should be scanned, grouped by trip and saved in pdf format (beginning with 2012 year and progressively going back to 2008). Each pdf document will be named as follows : PPPBBBYYYYMMDD where PPP is the landing port code, BBB the Turbobat vessel code, YYYYMMDD the date of arrival to the port for landing.

4.4 Wells maps and sampling protocol

- To improve the mapping of species catches it is very important to fit with the general sampling protocol including the communication of reliable logbooks and wells maps. This could be reached progressively. The recommendation by fleets are:

    - **TTV vessels.** Because these vessels seem to operate in a similar process as European fleets (freezing and landing with brine) we recommend to get from their captains a reliable wells plan on the model of annex 1 or to elaborate such a document from the logbook indications (catch by species and commercial category put in the different wells; the Access application TALLY developed by René Dedo in 2009 could be helpful for this task). The final objective is to sample the wells according to the usual AVDTH sampling protocol with weighting of the wells repartition.
    - **Panofi vessels.** Since the end of 2011 these vessels come to Tema harbor and transship the fish onto Panofi carreers under MFRD monitoring. We suggest that MFRD responsible persons get in touch with the company manager and obtain that the "shifting" from one well to another one should be avoided and ask for reliable wells plan.
    - **Other PS and BB vessels.** Carry on for the moment the usual sampling, considering that the vessel is one unique well (same process as BB vessels in Dakar) but try to improve progressively the logbook and the wells map.

5 Further actions

A meeting has been scheduled in the first semester of 2013 to summarize observations made on Ghanaian statistics and to establish an appropriate procedure for processing 2008-2012 data. Among other things, this important meeting should debate on the following points:

- How to remove unnecessary warnings in AVDTH and identify the causes of the main warnings in AKADO?
- How to handle the problem of the lack of wells map?
- Based on the analysis of the sampling data collected during the two ICCAT's team trips conducted in Tema in 2012, which species composition should be applied for the 2008-2011 period with the aim to correct the bias in SKJ and which type of sampling should be recommended for the future to avoid such a bias?
- How many fleet components should be considered in the Ghanaian fishery (e.g. TTV PS, Panofi PS, mixed small PS + BB)?
- Is there any spatio-temporal stratification by fishing mode in species composition and in size structure?
- Check the transfer from AVDTH to T3
- If there are specific features in the Ghanaian fishery which should be included in T3?
- Which sort of report should be produced by MFRD team in order to inform regularly the Ghanaian fishery administration about tuna activities in Tema;

Based on these considerations, the IRD team will conceive and build a specific Ghanaian processing procedure (T3) during the end of 2013, with a continuous exchange and validation with MFRD team.

6 Conclusions

This first training session planned within the IRD/MFRD/ICCAT programme has been very useful. The sampling protocol for species composition seems to be now well followed by MFRD staff and the 2008-2012 AVDTH databases will soon be corrected and available for processing. A technical workshop is scheduled to be held in Sète in 2013 for identification of adequate processing procedure.

Aknowledgement

We are very grateful for the assistance, transparency and receptiveness of these persons during our stay in Tema and in particular MFRD team. We also thank Pilar Pallares (ICCAT) and Daniel Gaertner (IRD) for orgnaizing this training course in Tema, ICCAT for its financial support, Laurent Dubroca (IRD) for his help in building the statistical graphs and Pierre Chavance (IRD) for revision and comments of the final mansucript.

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Table 1. MFRD sampling staff in Tema

Name	*Fish Selection*	*Measuring*	*Filling forms*	*Coding*	*Data entry*
Sylvia Ayivi (A) Sampl. Resp.	/	/	X	X	X
Victor Anaba (Head of A)	X	X	X	X	
Isaac Quaye (A)	X		X		
Joseph Badu Kotey (A)	X				
Bortei Weku (A)	X				
Eric Sawyer (Head of B)	X	X	X	X	X
Charles Darko (B)	X		X	X	X
Isaac Narh (B)	X				
Jacob Okoh (B)?	X				
Jones Tetteh (B)	X				/
Ebenezer Addi					X
Vlivlinyui					X
Priscilla Ankamah			X	X	X

Table 2. Description of ICCAT and MFRD sampling schedule

Sample on Bait Boat Rico Uno on 6/11/2012. "Dry" Landing: All wells opened										
Sam-ple	Institution	Team	Stage	DATE	Start time	End time	Fish selection	Measuring	Filling form	Comment
111	ICCAT	1	1	06/11/2012	10.50	11.27	Alain	Barrigah	Vanessa	Normal
111	ICCAT	1	2	06/11/2012	11.30	11.58	Vanessa	Barrigah	Alain	Normal
211	MFRD	A	1	06/11/2012	10.50	11.20	Quaye, Kotei, Weku	Victor	Sylvia	Normal
211	MFRD	A	2	06/11/2012	11.30	11.58	Quaye, Kotei, Weku	Victor	Sylvia	Normal
212	MFRD	B	1	06/11/2012	10.35	11.05	Darko, Narth, Okoh, Tetteh	Eric	CharLes	Normal
212	MFRD	B	2	06/11/2012	11.25	11.45	Darko, Narth, Okoh, Tetteh	Eric	CharLes	Normal
213	MFRD	A	1	06/11/2012	*10.50*	*11.20*	Quaye, Kotei, Weku	Victor	Sylvia	Tt mesuré
213	MFRD	A	2	06/11/2012	*11.30*	*11.58*	Quaye, Kotei, Weku	Victor	Sylvia	Tt mesuré
214	MFRD	B	1	06/11/2012	11.58	12.26	Darko, Narth, Okoh, Tetteh	Eric	CharLes	Normal
214	MFRD	B	2	06/11/2012	12.38	12.52	Darko, Narth, Okoh, Tetteh	Eric	CharLes	Normal
Sample on Bait Boat Marine 707 on 8/11/2012. "Dry" landing; All wells opened										
Sam-ple	Institution	Team	Stage	DATE	Start time	End time	Fish selection	Measuring	Filling form	Comment
121	ICCAT	1	1	08/11/2012	10.43	11.20	Alain	Barrigah	Vanessa	Normal
121	ICCAT	1	2	08/11/2012	11.30	11.47	Vanessa	Barrigah	Alain	Normal
221	MFRD	A	1	08/11/2012	10.44	11.13	Quaye, Kotei, Weku	Victor	CharLes	Normal
221	MFRD	A	2	08/11/2012	11.20	11.35	Quaye, Kotei, Weku	Victor	CharLes	Normal
222	MFRD	A	1	08/11/2012	11.50	12.10	Quaye, Kotei, Weku	Victor	CharLes	Normal
222	MFRD	A	2	08/11/2012	12.15	12.25	Quaye, Kotei, Weku	Victor	CharLes	Normal
Sample on Bait Boat Ace 1 on 14/11/2012. "Dry" landing; Wells 5P et 5S										
ple N°	Institution	Team	Stage	DATE	Start time	End time	Fish selection	Measuring	Filling form	Comment
131	ICCAT	1	1	14/11/2012	10.35	11.00	Vanessa	Barrigah	Alain	Normal
131	ICCAT	1	2	14/11/2012	11.30	11.50	Alain	Barrigah	Vanessa	Normal
231	MFRD	A	1	14/11/2012	10.35	10.55	Quaye, Kotei, Weku	Victor	CharLes	Normal
231	MFRD	A	2	14/11/2012	11.30	11.45	Quaye, Kotei, Weku	Victor	CharLes	Normal
Sample on Purse Seiner Cap St Paul on 14/11/2012. "In brine" landing; Wells 4P, 4S, 5S										
Sam-ple	Institution	Team	Stage	DATE	Start time	End time	Fish selection	Measuring	Filling form	Comment
141	ICCAT	1	1	14/11/2012	13.10	14.08	Vanessa	Barrigah	Alain	Normal well 4P
141	ICCAT	1	2	14/11/2012	14.10	14.27	Alain	Barrigah	Vanessa	Normal well 4P
241	MFRD	A	1	14/11/2012	13.20	13.40	Quaye, Kotei, Weku	Victor	CharLes	Normal well 4S
241	MFRD	A	2	14/11/2012	14.05	14.45	Quaye, Kotei, Weku	Victor	CharLes	Normal well 4S
242	MFRD	A	1	15/11/2012	10.10	10.22	Quaye, Kotei, Weku	Victor	CharLes	Normal well 5S
242	MFRD	A	2	15/11/2012	11.00	11.40	Quaye, Kotei, Weku	Victor	CharLes	Normal well 5S

Table 3. Kolmogorov-Smirnov test result

samples id	YFT	SKJ	BET	ALB	LTA	FRI
111 vs 211	ns	ns	NA	NA	ns	ns
111 vs 212	ns	ns	NA	NA	ns	ns
213 vs 214	ns	*	NA	NA	NA	ns
121 vs 221	*	ns	NA	NA	NA	ns
121 vs 222	*	ns	NA	NA	NA	ns
131 vs 231	*	ns	NA	NA	NA	ns
141 vs 241	ns	ns	NA	NA	NA	ns
141 vs 242	*	ns	ns	NA	NA	ns

Ns : no significative difference between size histogram

* : significative difference betweeb size histogram (two sample Kolmogorov-Smirnov tests with p value < 0.05)

NA : no or not enough data (ie fishes number less than 10 for the two samples)

The numbers of fishes sampled by length intervals are quite low consequently the tests results should be interpreted with caution.

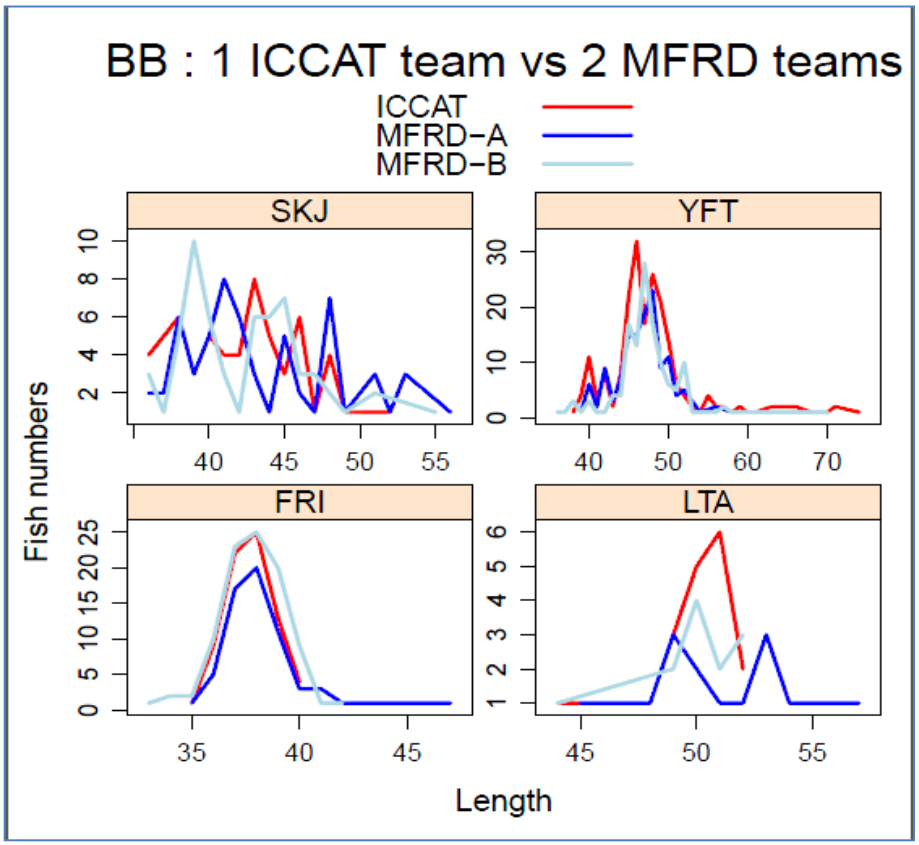

Figure 1. Bait Boat : ICCAT sample 111 Vs MFRD 211 and 212

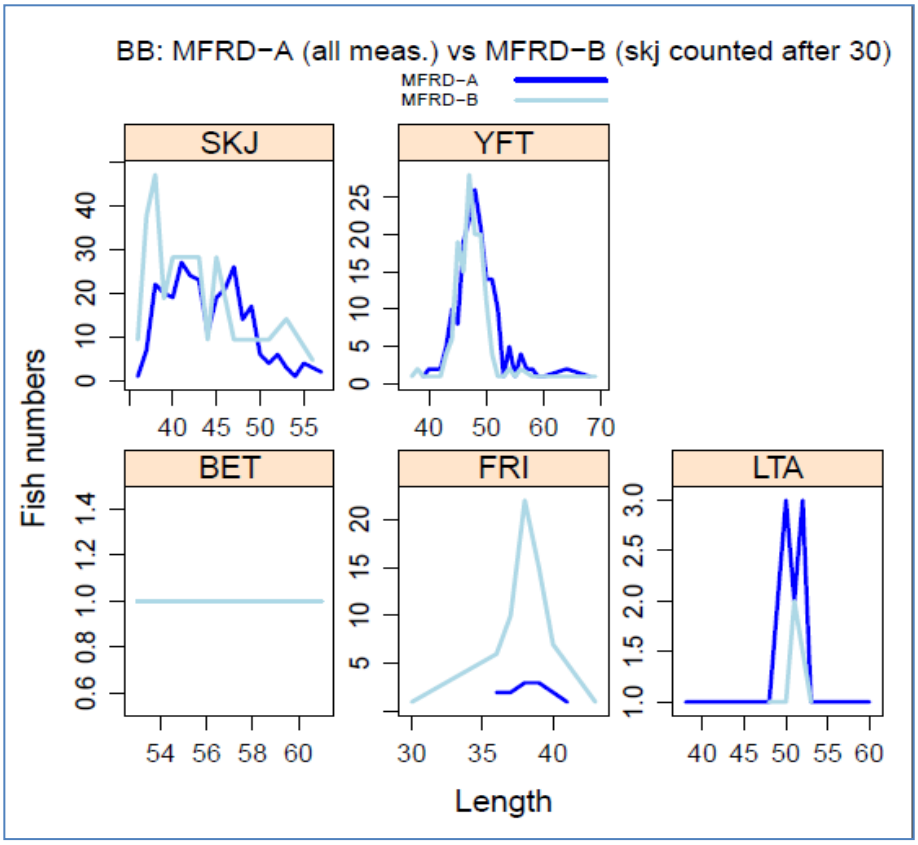

Figure 2. Bait Boat : MFRD sample 213 Vs MFRD 214

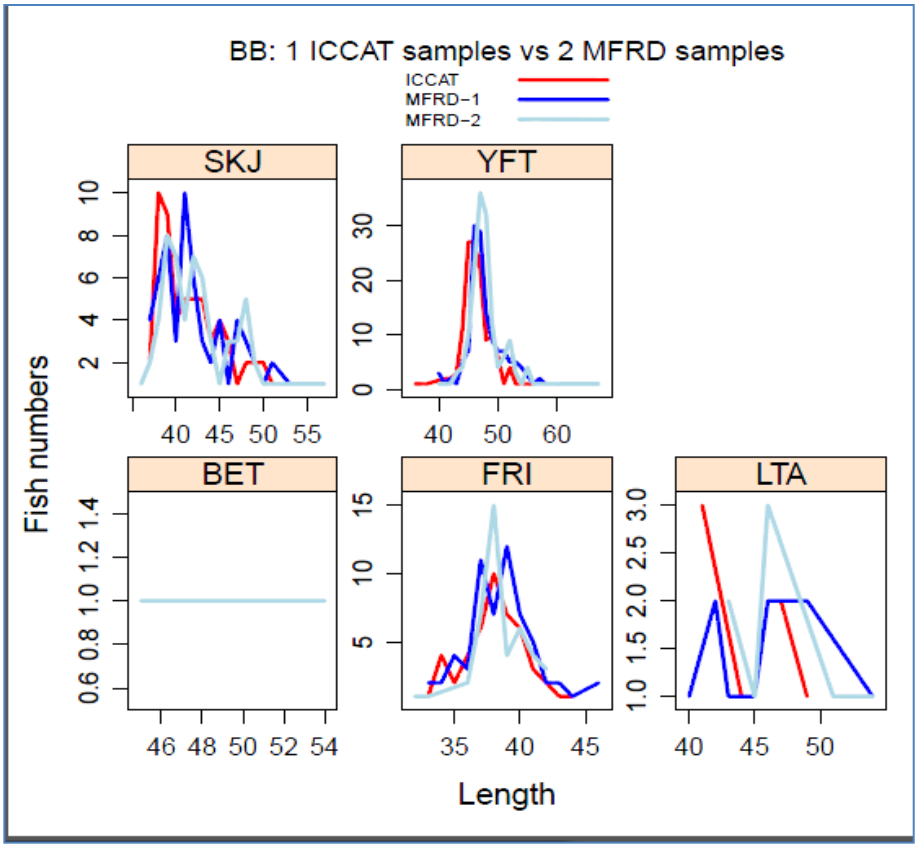

Figure 3.Bait Boat : ICCAT sample 121 Vs MFRD 221 and 222

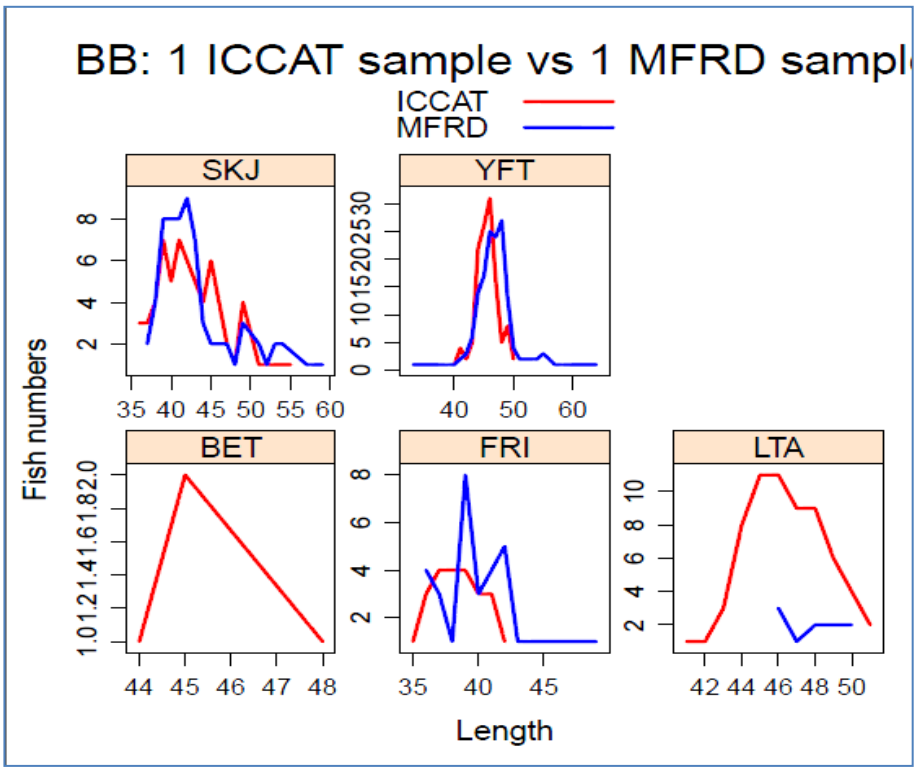

Figure 4.Bait Boat : ICCAT sample 131 Vs MFRD 231.

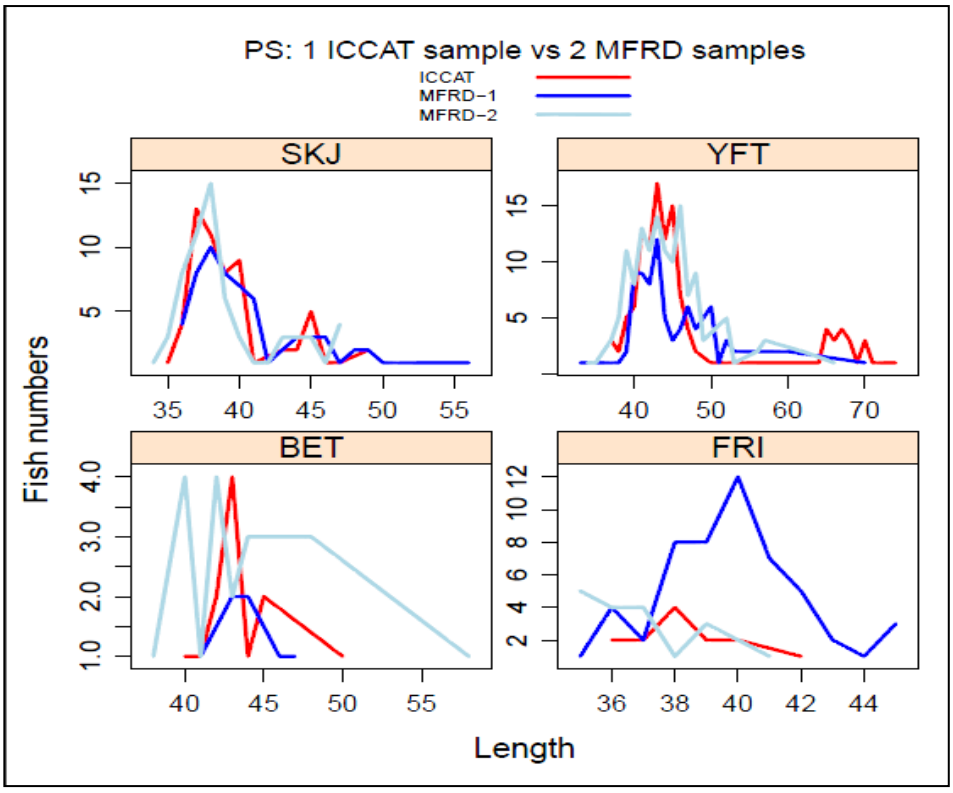

Figure 5. Purse seiner : ICCAT sample 141 Vs MFRD 241 and 242.