NEW SAMPLING STRATEGY FOR PURSE SEINER FLEETS IN THE ATLANTIC AND INDIAN OCEANS

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ABSTRACT

A new sampling system for Spanish, French and NEI purse-seiners was developed by French (ORSTOM) and Spanish scientists (I.E.O. and O.E.P.) working together on the European Union Program: "Analyse du schéma d'échantillonnage multispécifique des thonidés tropicaux". The OEP and the ORSTOM have introduced it to the samplers, in three of the four most important tuna transhipment ports in the Indian Ocean as from March 1998.

This sampling method does not take into account the differences between flags of vessels, but relies on 80 newly defined strata (2 types of schools, 4 quarters and 10 areas). Each sampling needs two rounds, with a target number depending on the species and size of the fish to be measured and counted per round. A target has been established of 15 to 20 samplings per strata.

RESUME

A l'issue du programme de l'Union Européenne "Analyse du schéma d'échantillonnage multispécifique des thonidés tropicaux", les scientifiques espagnols (I.E.O. et O.E.P.) et français (ORSTOM) ont établit un nouveau système d'échantillonnage pour les prises des senneurs des océans Atlantiques et Indiens.

Depuis mars 1998, ce nouveau système a été présenté aux équipes d'échantillonneurs de trois des quatre principaux ports de débarquement de l'océan Indien.

La méthode prévoit de ne pas différencier les pavillons des navires. Elle repose sur 80 nouvelles strates (2 types de bancs, 4 trimestres et 10 zones. Chaque échantillonnage doit être effectué en deux tours, avec un nombre prédéfini, suivants les espèces et catégories, de poisons à mesurer et compter par tour. L'objectif fixé est de réaliser un minimum de 15 échantillons par strate.

Introduction

A new sampling system was developed in 1997 by French (ORSTOM[2]) and Spanish scientists (I.E.O - Instituto Español de Oceanografia and O.E.P Oficina Española de Pesca - Spanish Fisheries Office) working together on the European Union programme : "Analyse du schéma d'échantillonnage multispecifique des thonidés tropicaux". The objectives of this programme were to homogenise, update and improve the databases and sampling systems used in the Atlantic and in the Indian Oceans for Spanish, French and "NEI" (these are European-owned vessels flying various non-European flags).purse-seiners.

The system was introduced by the OEP and ORSTOM to samplers in the Atlantic (from October to December 1997) and in the Indian Oceans (from March to August 1998), and is being used in the most important Atlantic and Indian Ocean tuna transhipment ports.

In Victoria (Seychelles), the Seychelles Fishing Authority adopted the new system, which was presented by (OEP) to the SFA samplers in March and April. Since April 1998, the SFA, ORSTOM and OEP samplers have been using this system.

The "Unité Statistique Thonière d'Antsiranana" (USTA), in Madagascar, was visited by the OEP in May 1998, and the new sampling system explained. After some trials on board, the system was adopted by the USTA, and has been used since then.

The OEP has an agreement with the owner of the private port of Mombassa (Kenya) Wainanchi Marine Products Ltd., to record all purse-seiner transhipments. Sampling is possible on Spanish tuna vessels thanks to this agreement. Two samplers were trained in August 1998 on the new sampling system, which is being used.

It might be necessary to install such system in other ports of call for the fleet in the future, including Phuket in Thailand, where there have been some transhipments since December 1996.

Sampling strategy:

Selection of the wells.

During the trip, the fishing master fills in the IEO, ORSTOM or SFA logbook forms, that all record the same daily information: position of the vessel, activity and some environmental data; if there is a set, they also mention the hour, the estimated catch per species and category, the type of school and the type of association. He also completes a well map per trip, specifying in which well the catch of each set was stored.

The samplers go on boat to collect the trip information from the fishing master each time a vessel arrives in port. A selection is made subsequently of the tanks to sample, in relation to the newly defined strata:

Four QUARTERS: First (1st): From January to March
Second (2nd): From April to June

[1] Spanish Fisheries Office, Victoria (Republic of Seychelles)
[2] L'Institut français de recherche scientifique pour le développement en coopération
[3] Seychelles Fishing Authority

Third (3rd): From July to September
Fourth (4th): From October to December

Two SCHOOL types: Free School (FRS)
Log (LOG)

FISHING ZONES: (ten in the Indian Ocean):

1-. West Somalia
2-. East & South Seychelles
3-. Northwest Seychelles
4-. Mozambique Channel
5-. South Indian Ocean
6-. Maldives & Chagos
7-. West Indonesia
8-. Bay of Bengal
9-. India & Laccadive
10-. Arabian Sea

Wells containing catches coming from sets, made in different quarters, fishing schools or zones are not sampled.

After selection on the wells according to the strata, the more important wells to sample are chosen. A maximum has been established of between 15 and 20 samples per stratum of quarter, fishing school and fishing zone. If this maximum has already been reached for a stratum, samplers should focus on other strata.

Sampling technique.

There are two types of sampling, depending on the homogeneity or heterogeneity of fish in the well:

1. There are no fish below 10kg weight in the well: this is the case of large yellowfin (rarely of bigeye or albacore) from free-schools, which are often over 30kg weight.

   The well is sampled twice (for example once in the morning and once in the afternoon), with between 50 and 100 fish measured each time in order to limit possible bias caused by the different stratification of species and categories in the well. Specimens (all species mixed) are taken at random as they are unloaded, until the required number of samples is attained.

   In the Indian Ocean large tunas are abundant seasonally, usually in June and July. Some large tuna samples were taken in 1998 from this type of school.

2. There are fish below 10kg weight in the tank: there may be either only small fish, or large (more than 10kg weight) and small fish mixed in the tank. Sampling depends on the size category:

   a. Fish over 10kg weight: The goal is to measure any large fish while sampling small fish (there is no maximum number of fishes to sample). Both the total quantity of fish (either in weight or in number of specimens) over 10kg and the total weight of catch in the well are taken from the well map. This information is needed to correct the set information from the logbooks.

      The sampling of large and small fish is separate as it is impossible to sample large and small tunas all together. Large tunas are usually placed temporarily on the deck while small tunas are placed on a conveyor belt or in baskets by the stevedores.

   b. Fish below 10kg weight: Small fish are sampled at random, in two rounds, with 300 fishes sampled for the first round (from the upper part of the well) and 200 fish for the second round (from the bottom of the well). The maximum number of specimens to measure for the small tuna species (frigate or bullet tuna and kawakawa) is also limited to 25 fish per round and species. Therefore, 50 specimens is the maximum number to attain for one species in one sampling.

      When 25 specimens (on each round) for small tuna species (frigate/bullet tuna and kawakawa) have already been measured, sampling continues but small specimens are only counted, not measured. Small yellowfin, bigeye and longtail tunas are always measured, even if they are numerous.

Some samples have already been completed for the 2nd and 3rd quarter 1998 by samplers in Victoria, Mombassa and Antsiranana. New data entry software for logbooks and sampling forms is being tested in Victoria since September and is supposed to be ready for the beginning of 1999.

The forms to be filled by the samplers are shown below.

Table 1: Catches corresponding to sampled sets for 1998 2nd quarter

	Second quarter			
(in tonnes)	area	catches	sampled	%
Free schools	1	2,487	291	11.7 %
	2	8,801	1623	18.4 %
	3	7,849	1423	18.1 %
	4	9,530		0.0 %
	5			
	6	20		0.0 %
	7	152		0.0 %
Log	1	2,297	209	9.1 %
	2	655		0.0 %
	3	3,706	531	14.3 %
	4	13,819	772	5.6 %
	5			
	6	7		0.0 %
	7	1,781		0.0 %
	8	5		0.0 %

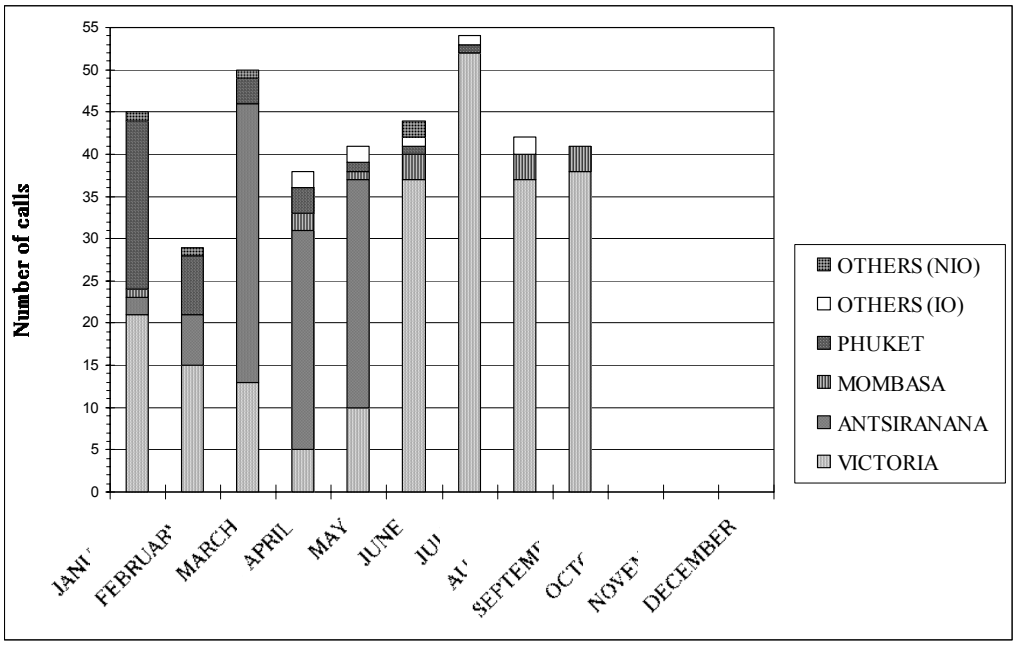

Figure 1: Number of calls by transhipment port in the WIO

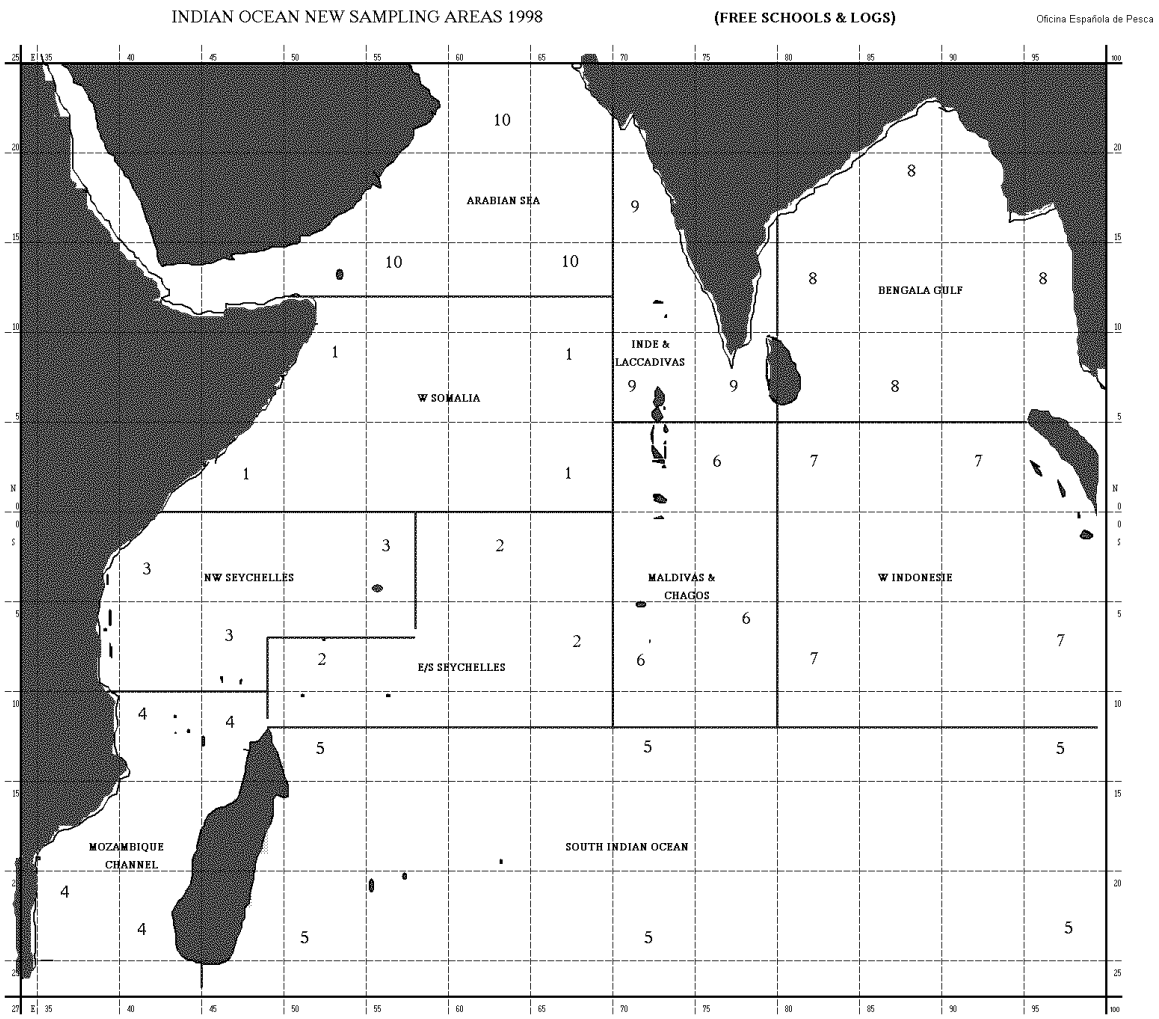

Figure 2: Chart of space and time strata

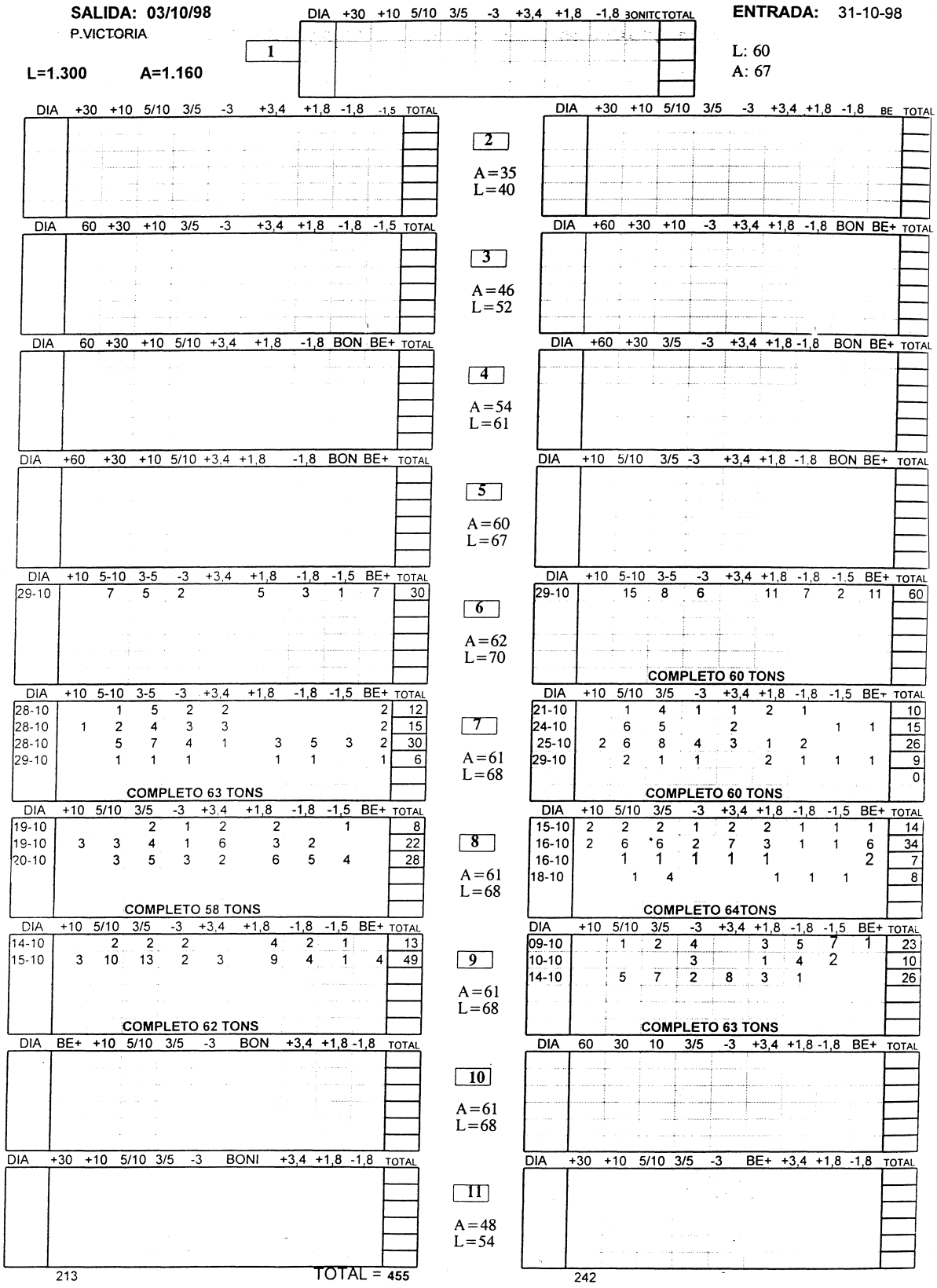

Figure 3: Spanish well map

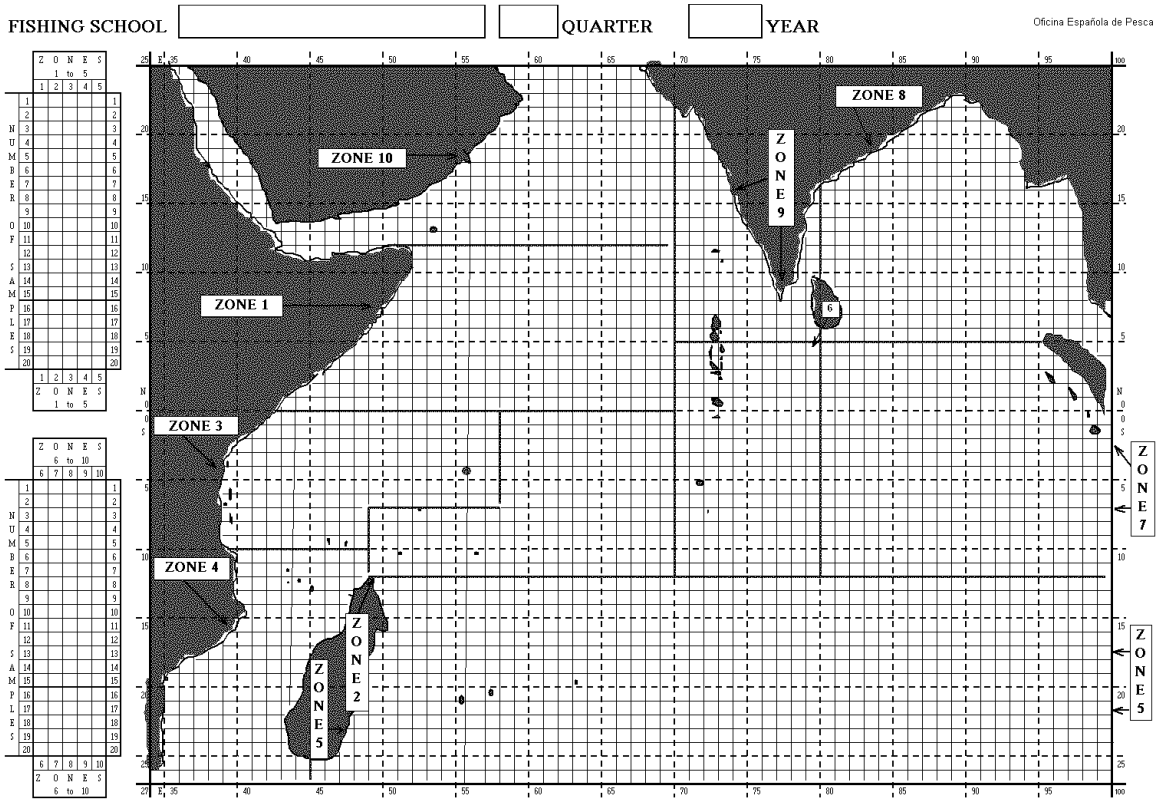

Figure 4: Map to fill in by stratum

ROUND	VESSEL	DATE / /	WELL /
SAMPLER/S		TOTAL CATCH -10 k (Well)	tons

ALL SPECIMENS OF YELLOWFIN AND BIGEYE SHOULD BE MEASURED

n	YELLOWFIN LF						n	BIGEYE LF						n
1							1							1
2							2							2
3							3							3
4							4							4
5							5							5
6							6							6
7							7							7
8							8							8
9							9							9
10							10							10
11							11							11
12							12							12
13							13							13
14							14							14
15							15							15
16							16							16
17							17							17
18							18							18
19							19							19
20							20							20
21							21							21
22							22							22
23							23							23
24							24							24
25							25							25

TOTAL YFT		LF	TOTAL BET		LF

Figure 5: Large tunas form for use aboard

ROUND	VESSEL				DATE / /		WELL /	
SAMPLER/S					TOTAL CATCH -10 k (Well)			tons
LD1	Species	Species	Species	Species	Species	Species	Species	Species
n								
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Small yellowfin and bigeye form for use aboard

ROUND	VESSEL					DATE / /			WELL /	LF
SAMPLER/S									TOTAL CATCH -10 k (Well)	tons
SKIPJACK								OTHER SPECIES		
n	SIZE	NUMBER	ACCUMULATED	n	SIZE	NUMBER	ACCUMULATED	n	SIZE	NUMBER	ACCUMULATED	NAME	NUMBER	WEIGHT (K)
1				1				1				1		
2				2				2				2		
3				3				3				3		
4				4				4				4		
5				5				5				5		
6				6				6				6		
7				7				7				7		
8				8				8				8		
9				9				9				9		
10				10				10				10		
11				11				11				11		
12				12				12				12		
13				13				13				13		
14				14				14				14		
15				15				15				15		
16				16				16				16		
17				17				17				17		
18				18				18				18		
19				19				19				19		
20				20				20				20		
21				21				21				21		
22				22				22				22		
23				23				23				23		
24				24				24				24		
25				25				25				25		
26				26				26				26		
27				27				27				27		
28				28				28				28		
29				29				29				29		
30				30				30				30		
LF	TOTAL SKJ			LF	TOTAL			LF	TOTAL			LF	OTHER		

Figure 6: Skipjack and small tunas form for use aboard

ARRIVAL					CATCH (SETS)		SA
PORT	YEAR	MON	DAY	NUM	>10 Kg	<10 Kg	

DETAIL OF THE SETS							
Q	LATITUDE	LONGITUDE	YEAR	MON	DAY	CATCH	SCHOOL

VESSEL NAME	
DATE OF SAMPLING	WELL
QUARTER	ZONE / TYPE OF SCHOOL

LF	YELLOWFIN	no	LF	BIGEYE	no	LF	SKIPJACK	no	LF	FRIGATE	no	LF		no	LF
20			20			20			20			20			20
21			21			21			21			21			21
22			22			22			22			22			22
23			23			23			23			23			23
24			24			24			24			24			24
25			25			25			25			25			25
26			26			26			26			26			26
27			27			27			27			27			27
28			28			28			28			28			28
29			29			29			29			29			29
30			30			30			30			30			30
31			31			31			31			31			31
32			32			32			32			32			32
33			33			33			33			33			33
34			34			34			34			34			34
35			35			35			35			35			35
36			36			36			36			36			36
37			37			37			37			37			37
38			38			38			38			38			38
39			39			39			39			39			39
40			40			40			40			40			40
41			41			41			41			41			41
42			42			42			42			42			42
43			43			43			43			43			43
44			44			44			44			44			44
45			45			45			45			45			45
46			46			46			46			46			46
47			47			47			47			47			47
48			48			48			48			48			48
49			49			49			49			49			49
50			50			50			50			50			50
51			51			51			51			51			51
52			52			52			52			52			52
53			53			53			53			53			53
54			54			54			54			54			54
55			55			55			55			55			55
56			56			56			56			56			56
57			57			57			57			57			57
58			58			58			58			58			58
59			59			59			59			59			59
60			60			60			60			60			60
61			61			61			61			61			61
62			62			62			62			62			62
63			63			63			63			63			63
64			64			64			64			64			64
65			65			65			65			65			65
66			66			66			66			66			66
67			67			67			67			67			67
68			68			68			68			68			68
69			69			69			69			69			69
70			70			70			70			70			70
71			71			71			71			71			71
72			72			72			72			72			72
73			73			73			73			73			73
74			74			74			74			74			74
75			75			75			75			75			75
76			76			76			76			76			76
77			77			77			77			77			77
78			78			78			78			78			78
79			79			79	COUNTED SKIPJACKS			COUNTED FRIGATES			COUNTED		
80			80			80									
	TOTAL			TOTAL			TOTAL			TOTAL			TOTAL		
LF	YELLOWFIN	no	LF	BIGEYE	no	LF	SKIPJACK	no	LF	FRIGATE	no	LF		no	LF

Figure 7: Length-frequency form

VESSEL							PAGE		
PORT			DATE (SAMPLING)				WELL		
LD1	YELLOWFIN	no	LD1	BIGEYE	no	LD1	ALBACORE	no	LD1
24			24			24			24
24.5			24.5			24.5			24.5
25			25			25			25
25.5			25.5			25.5			25.5
26			26			26			26
26.5			26.5			26.5			26.5
27			27			27			27
27.5			27.5			27.5			27.5
28			28			28			28
28.5			28.5			28.5			28.5
29			29			29			29
29.5			29.5			29.5			29.5
30			30			30			30
30.5			30.5			30.5			30.5
31			31			31			31
31.5			31.5			31.5			31.5
32			32			32			32
32.5			32.5			32.5			32.5
33			33			33			33
33.5			33.5			33.5			33.5
34			34			34			34
34.5			34.5			34.5			34.5
35			35			35			35
35.5			35.5			35.5			35.5
36			36			36			36
36.5			36.5			36.5			36.5
37			37			37			37
37.5			37.5			37.5			37.5
38			38			38			38
38.5			38.5			38.5			38.5
39			39			39			39
39.5			39.5			39.5			39.5
40			40			40			40
40.5			40.5			40.5			40.5
41			41			41			41
41.5			41.5			41.5			41.5
42			42			42			42
42.5			42.5			42.5			42.5
43			43			43			43
43.5			43.5			43.5			43.5
44			44			44			44
44.5			44.5			44.5			44.5
45			45			45			45
45.5			45.5			45.5			45.5
46			46			46			46
46.5			46.5			46.5			46.5
47			47			47			47
47.5			47.5			47.5			47.5
48			48			48			48
48.5			48.5			48.5			48.5
49			49			49			49
49.5			49.5			49.5			49.5
50			50			50			50
50.5			50.5			50.5			50.5
51			51			51			51
51.5			51.5			51.5			51.5
52			52			52			52
52.5			52.5			52.5			52.5
53			53			53			53
53.5			53.5			53.5			53.5
54			54			54			54
54.5			54.5			54.5			54.5
55			55			55			55
55.5			55.5			55.5			55.5
56			56			56			56
56.5			56.5			56.5			56.5
57			57			57			57
57.5			57.5			57.5			57.5
58			58			58			58
58.5			58.5			58.5			58.5
59			59			59			59
59.5			59.5			59.5			59.5
60			60			60			60
TOTAL			TOTAL			TOTAL			
LD1	YELLOWFIN	no	LD1	BIGEYE	no	LD1	ALBACORE	no	LD1

Figure 8: LD1 form for length-frequency measurements on large fish