STATISTICS OF THE PURSE SEINE SPANISH FLEET IN THE INDIAN OCEAN (1984-1999)

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ABSTRACT

This document presents summary statistics of the purse seiner Spanish fleet fishing in the Indian Ocean from 1984 to 1999. Data include catch and effort statistics as well as some fishery index by species and fishing mode. Information about the sampling scheme and the coverage of sampling, together with maps and diagrams representing the fishing pattern of this fleet by time and area strata is also included.

INTRODUCTION

The Spanish purse seiner fleet started to fish in the Indian Ocean in 1984. This new fishery was developed during the first four years, with a constant increase in number of boats and catches until 1988. After that year, the nominal fishing effort of the fleet was stabilized, and its catches fluctuated without trend.

Since the beginning of the fishery, data of catch and effort have been collected by a logbooks system created to get information of the fleet in the Atlantic Ocean. The sampling of the sizes landed has been conducted under the control of experts of the Instituto Espanol de Oceanografia (IEO) in close collaboration with the Seychelles Fishing Authorities (SFA) and the IRD's scientist team. Since the beginning of the 90's a Spanish expert on fisheries has been permanently based in Mahe, Seychelles Islands, in order to follow "in situ" this fishery. An important improvement of the sampling coverage and of the accuracy of the Spanish statistics was observed since that year. Also two research programs, funded by the European Commission and coordinated by the IEO and IRD, have been conducted. The first one was a two years (1995-1996) observer's program targeted in the knowledge of by catch in the purse seine fisheries in the Atlantic and Indian Oceans. The second program, developed in 1996 and 1997, had as a goal the improvement of the tropical tuna sampling scheme and data processing. Now, a new program to analyze the fishing power increase of the purse seiner is being conducted as well as two more programs for improving the collection and processing of basic catch, effort and sampling data.

As a result of these programs a new series of improved statistics has been created. In this document we present statistics of the fishery since its beginning in 1984 until 1999. We also include some information about how the data were collected, and a brief description of the sampling scheme used. Finally we present catch and effort statistics, as well as information on sizes in the catch. Fishing maps and diagrams representing the fishing pattern of this fleet by time and area are also given. This paper covers primarily the Spanish flag fleet.

DATA COLLECTION

Catch and effort

Catch and effort data were collected by logbooks. This system, established in the Atlantic Ocean at the end of the 70's has been implemented in a regular way by most of the Spanish fleet, resulting in a very good and detailed data base. In the Indian Ocean this system was establish at the beginning of the fishery using the Atlantic system adapted to this Ocean. However, an important difference between those two oceans was noticed in relation with the large quantities of tunas taken under logs in the Indian Ocean. This mode of association was then taken into account in the Indian Ocean.

The good experience of the skippers to fill in detailed logbooks in the Atlantic was a key factor to allow the accurate catch and effort Spanish statistics in the Indian Ocean. Since 1984 the logbooks have been obtained with nearly 100% of coverage.

The basic information of the logbooks is raised trip by trip to unloading data.

Species composition and sizes

Until 1998 the size distribution of catches was obtained using a monospecific sampling. The sampling scheme used was a two steps sampling that considered the set as primary unit of sampling and the fish as secondary unit. The samples were taken by species. The sample size was the same for all species.

As regards the species composition of the catch, the ICCAT has shown in the Atlantic a systematic bias in the log book species composition. The main bias was related with the small yellowfin, partially declared as skipjack, and small

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bigeye, always declared as yellowfin or skipjack. After that analysis, the ICCAT recommended a statistical procedure that should be applied in order to correct the species composition of the tropical tuna catches. In the Indian Ocean analyses made at the beginning of the fishery showed that similar bias occurred; then a procedure of counting the fishes according their species composition (during the unloading) was routinely established in order to correct the species composition of the catches.

Furthermore, during 1996 and 1997 a large scale research program, called ET, targeting the analysis of the tropical tuna sampling schemes, funded by the European Commission and coordinated by the IEO and ORSTOM, was conducted. At the end of this program a new sampling and statistical procedure to process the data has been proposed in order to improve the accuracy of statistics in the Atlantic and Indian Oceans. This new data processing will be used since 1991 and the new sampling method have been applied in 1999. Detailed information of this new system is included in Pianet et al. (in press).

The change of the old sampling method to the new one has produced several problems in the sampling process affecting the quality of the species composition and sizes distribution of the catch in 1999. For this reason the catch by species estimated for 1999 as well as the sizes distribution should be considered as provisional.

The correction of the species composition of the catches as well as the estimation of their size distribution was made using the samples taken from all the purse seine fleets because the statistical analysis made during the ET project showed that there was not a significant fleet effect. That conclusion allowed an increase of the sampling coverage (table 20) and an improvement in the accuracy of the species composition and size distribution of catches of the French, Spanish and NEI purse seine fleets.

STATISTICS

Catch

Table 2 and figure 1 show the total yearly catches by species; tables 3-4 show catch and effort by FAO area and tables 5-6 and figure 2 show catches by fishing mode. The total catch in 1999 has reached 142.426 t. closed to the high level of 1995-1997. By species skipjack has been the main component of catch with the historical pick of 80.010 t. in 1999. Considering the fishing mode, no significant changes have occurred in the last year. Figures 3 to 6 show the distribution of catches by fishing mode, species and 1ºx1º squares for 1999 and for the period 1994-1998.

Effort

Table 1 shows the carrying capacity and number of boats by category of the Spanish fleet from 1983 to 1999, this year a total of 20 Spanish vessels fished in the area. Table 7 shows the nominal effort in fishing days, searching days and standardized fishing days. Since 1995 the nominal effort has been stable. Table 8 shows the number of 1º by 1º degree square explored by the Spanish fleet under different filtering criteria. The fishing area has been maintained since 1996. A similar conclusion is reached from the figures 7-8 that compare the distribution of effort by 1ºx1º squares in 1999 with the average of the period 1994-1998.

Yield

The frequency distribution of sets by catch size is shown in table 10, 11 and 12. The proportion of sets under the different categories of catches has remainded stable since 1988 with a percentage of small sets (less than 20 t.) closed to 40%, intermediate sets (between 20 and 50 t.) around 35% and a 25% of big sets (more than 50 t.).

Tables 13 to 18 show different catch rates by species and fishing mode. Yield seems to be maintained without any special change. In 1999 the overall yield has been in the high level of the historical series.

Mean weight

Table 19 and figures 9-11 show the mean weight by species and fishing mode, as usual catches on logs have a lower mean weight than catches on free school.

Table 1. Number of Spanish Purse seiners by category, carrying capacity in tons, number of supplies used in association with spanish boat and number of vessels fishing in association with supplies 1984 - 1999.

Class	6	7	8	9	total	C.Capacity	supplies	VAS*
1984	2	5	5	0	12	5343	-	-
1985	2	5	7	0	14	9142	-	-
1986	2	5	3	0	10	8793	-	-
1987	2	4	6	0	12	10504	-	-
1988	2	6	8	0	16	14361	-	-
1989	3	8	9	0	20	20050	-	-
1990	3	8	9	0	20	17908	-	-
1991	3	6	8	0	17	16929	-	-
1992	1	6	11	0	18	17219	-	-
1993	1	6	11	1	19	19539	-	-
1994	2	4	11	1	18	19450	-	-
1995	2	5	11	1	19	21673	-	-
1996	2	6	13	1	22	24731	-	-
1997	2	6	14	1	23	26770	-	-
1998	2	6	12	0	20	21868	-	-
1999	2	6	12	0	20	20694	6	7

Class:

6	**de**	**601**	**a**	**800**	**toneladas**
7	**de**	**801**	**a**	**1200**	**toneladas**
8	**de**	**1201**	**a**	**2000**	**toneladas**
9			**>**	**2000**	**toneladas**

(*) Vessel associated with supply

Table 2. Spanish purse seiners total catch by species in the Indian Ocean, 1984-1999.

TOTAL CATCH BY SPECIES					
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
1984	11453	6393	759	197	18802
1985	18431	18643	1330	145	38549
1986	20030	19108	1845	0	40983
1987	26301	27936	4974	4	59215
1988	44948	39742	6810	65	91565
1989	41146	64003	5863	0	111012
1990	43728	47926	4867	145	96666
1991	44021	41802	5994	1066	92923
1992	37782	46756	3631	1461	89629
1993	47704	51372	5405	904	105385
1994	43130	61626	5904	1773	112433
1995	65159	69594	12210	561	147524
1996	59424	66296	11360	826	139134
1997	60912	63057	15818	1029	141024
1998	37372	57702	13383	269	108725
1999	43921*	80010*	18263*	232*	142426

(*) provisional data

Table 3. Spanish purse seiners total catch by species in the FAO area 57, 1984-1999.

CATCH AND EFFORT PS DATA AREA: F57							
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**	**FISH. DAYS**	**#SETS+**
1991	0	0	0	0	0	1	0
1992	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0
1996	27	107	23	0	157	21	6
1997	123	147	35	0	305	33	14
1998	6166	4588	2165	6	12926	762	328
1999	78*	126*	43*	0*	248	33	11

(*) provisional data

Table 4. Spanish purse seiners total catch by especies in the FAO area 51, 1984-1999.

CATCH AND EFFORT PS DATA AREA: F51							
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**	**FISH. DAYS**	**#SETS+**
1991	44021	41802	5994	1066	92923	4323	2402
1992	37782	46756	3631	1461	89629	4296	2594
1993	47704	51372	5405	904	105385	4565	2693
1994	43130	61626	5904	1773	112433	4463	2814
1995	65159	69594	12210	561	147524	5221	3341
1996	59397	66189	11337	826	138977	5771	3818
1997	60789	62910	15783	1029	140719	6374	3886
1998	31206	53113	11217	262	95800	4882	3053
1999	43843*	79884*	18220*	232*	142179	5192	3208

(*) provisional data

Table 5. Spanish purse seiners catch on FADs by especies in the Indian Ocean, 1984-1999.

CATCH ON LOGS BY SPECIES					
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
1984	2115	3142	281	0	5538
1985	5286	12465	686	0	18437
1986	5765	10187	1273	0	17225
1987	10644	14949	2766	0	28359
1988	13578	30148	3578	0	47304
1989	15995	37185	3820	0	57000
1990	11789	35320	2375	40	49524
1991	9895	33917	3741	55	47634
1992	13706	37081	3113	6	53906
1993	13856	36913	2755	0	53524
1994	12814	43086	4111	39	60050
1995	36337	56536	10268	29	103171
1996	25997	45949	9390	12	81348
1997	38116	54368	14580	63	107126
1998	21013	48210	10805	18	80046
1999	27593*	68896*	15960*	1*	112450

(*) provisional data

Table 6. Spanish purse seiners catches on free schools by especies in the Indian Ocean, 1984-1999.

CATCH ON FREE SCHOOL BY SPECIES					
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
1984	9338	3251	478	197	13264
1985	13145	6178	644	145	20112
1986	14265	8921	572	0	23758
1987	15657	12987	2208	4	30856
1988	31370	9594	3232	65	44261
1989	25151	26818	2043	0	54012
1990	31939	12606	2492	105	47142
1991	34126	7885	2252	1011	45289
1992	24076	9675	517	1455	35724
1993	33848	14459	2650	904	51861
1994	30316	18540	1793	1734	52383
1995	28822	13058	1942	531	44353
1996	33427	20347	1970	814	57786
1997	22796	8689	1238	966	33897
1998	16360	9492	2578	250	28679
1999	16327*	11114*	2303*	231*	29976

(*) provisional data

Table 7. Nominal fishing effort in fishing days, searching days and standardised fishing days of the purse seine spanish fleet (1984 – 1999).

YEAR	F.DAYS	S.DAYS	F.DAYS ST.
1984	1713	1432	1591
1985	2846	2379	2817
1986	2634	2161	2517
1987	2938	2300	2841
1988	3331	2613	3532
1989	5164	4241	5349
1990	5006	4205	5207
1991	4324	3543	4589
1992	4296	3591	4900
1993	4565	3842	5409
1994	4463	3771	5337
1995	5221	4470	6055
1996	5793	4925	6723
1997	6407	5584	7227
1998	5644	4888	6285
1999	5224	4496	5900

Table 8. Number of 1x1 degree squares explored by the purse seine Spanish fleet. The same considering different minimun effort limits and number of 1x1 degree squares with sets and with catch.

NUMBER OF 1ºX1º SQUARE PROSPECTED BY THE SPANISH FLEET					
YEAR	**N. CWP**	**N. CWP Eff >12hrs**	**N. CWP Eff >60hrs**	**N. CWP with SET**	**N. CWP with CATCH**
1984	256	119	96	170	73
1985	361	253	235	281	158
1986	297	195	182	229	127
1987	290	225	212	228	141
1988	319	254	240	254	150
1989	340	288	271	287	183
1990	395	301	286	319	199
1991	370	289	277	290	197
1992	419	338	324	347	223
1993	415	317	308	318	202
1994	479	359	348	380	218
1995	447	343	339	357	210
1996	574	446	437	459	280
1997	627	454	437	490	281
1998	742	525	512	547	263
1999	584	459	442	438	247

Table 9. Total number of sets, positive sets and nul sets. Same statistics by fishing mode.

	ALL			LOGS			SCHOOL		
YEAR	**Nº SETS**	**Nº SETS +**	**Nº SETS -**	**Nº SETS**	**Nº SETS +**	**Nº SETS -**	**Nº SETS**	**Nº SETS +**	**Nº SETS -**
1984	1293	602	691	174	146	28	1119	456	663
1985	2320	1397	923	586	538	48	1734	859	875
1986	2355	1233	1122	521	468	53	1834	765	1069
1987	3656	1909	1747	1244	960	284	2412	949	1463
1988	3967	2461	1506	1199	1080	119	2768	1381	1387
1989	4897	3040	1857	1876	1664	212	3021	1376	1645
1990	4131	2876	1255	1612	1461	151	2519	1415	1104
1991	3291	2402	889	1409	1311	98	1882	1091	791
1992	3422	2594	828	1435	1377	58	1987	1217	770
1993	3756	2693	1063	1425	1372	53	2331	1321	1010
1994	3974	2814	1160	1413	1328	85	2561	1486	1075
1995	4197	3341	856	2287	2151	136	1910	1190	720
1996	4929	3824	1105	2166	2102	64	2763	1722	1041
1997	4592	3900	692	3004	2892	112	1588	1008	580
1998	4339	3381	958	2651	2512	139	1688	869	819
1999	4040	3219	821	2363	2267	96	1677	952	725

Table 10. Frequency of positive sets by size of catch.

	TOTAL SET FREQUENCY BY CATCH.										
YEAR	**0.1-10**	**10.1-20**	**20.1-30**	**30.1-40**	**40.1-50**	**50.1-60**	**60.1-70**	**70.1-80**	**80.1-90**	**90.1-100**	**>100.**
1984	151	139	96	56	34	22	26	17	10	13	38
1985	462	340	168	123	78	60	37	30	27	12	60
1986	323	254	163	108	77	71	55	41	29	12	100
1987	487	442	267	183	116	71	68	49	52	31	143
1988	501	496	382	262	198	120	96	69	63	50	222
1989	617	665	451	343	214	152	111	84	86	57	260
1990	562	648	490	345	235	155	101	87	54	48	150
1991	480	453	374	262	208	143	102	77	59	51	187
1992	529	524	410	318	221	148	118	72	52	57	145
1993	438	524	402	318	213	178	117	107	64	79	253
1994	516	562	411	287	206	170	118	104	88	73	277
1995	465	604	501	391	304	200	170	119	109	90	388
1996	685	869	588	462	296	220	158	120	105	79	242
1997	715	903	614	482	322	216	147	126	70	74	225
1998	671	837	620	419	221	166	104	93	67	30	153
1999	466	621	544	342	262	206	175	125	97	75	305

Table 11. Frequency of positive sets in FADs by size of catch.

SET FREQUENCY BY CATCH. FADs.											
YEAR	**0.1-10**	**10.1-20**	**20.1-30**	**30.1-40**	**40.1-50**	**50.1-60**	**60.1-70**	**70.1-80**	**80.1-90**	**90.1-100**	**>100.**
1984	31	22	25	16	11	5	8	7	5	7	9
1985	153	105	67	55	41	25	21	13	15	6	37
1986	110	97	54	45	28	36	24	17	10	6	41
1987	214	228	137	93	59	44	46	24	24	17	74
1988	176	201	159	119	104	55	44	34	33	22	132
1989	332	393	248	201	125	76	56	50	42	31	110
1990	229	336	268	176	137	74	47	55	33	29	77
1991	253	278	204	140	118	81	52	42	35	26	78
1992	234	255	209	195	118	85	71	37	39	36	98
1993	223	287	204	164	110	96	66	51	36	31	104
1994	183	248	195	156	116	87	60	57	46	35	144
1995	248	364	314	269	205	132	118	86	71	62	282
1996	334	474	324	266	165	138	95	73	51	51	131
1997	498	668	453	368	241	161	114	91	58	59	177
1998	498	637	464	313	153	125	76	68	46	20	112
1999	232	397	381	243	203	168	143	101	77	60	262

Table 12. Frequency of positive sets in freeschools by size of catch.

SET FREQUENCY BY CATCH. FREE SCHOOL											
YEAR	**0.1-10**	**10.1-20**	**20.1-30**	**30.1-40**	**40.1-50**	**50.1-60**	**60.1-70**	**70.1-80**	**80.1-90**	**90.1-100**	**>100.**
	120	117	71	40	23	17	18	10	5	6	29
1985	309	235	101	68	37	35	31	24	19	6	23
1986	213	157	109	63	49	35	31	24	19	6	59
1987	273	214	130	90	57	27	22	25	28	14	69
1988	325	295	223	143	94	65	52	35	30	28	90
1989	285	272	203	142	89	76	55	34	44	26	150
1990	333	312	222	169	98	81	54	32	21	19	73
1991	227	175	170	122	90	62	50	35	24	25	109
1992	295	269	201	123	103	63	47	35	13	21	47
1993	215	237	198	154	103	82	51	56	28	48	149
1994	333	314	216	131	90	83	58	47	42	38	133
1995	217	240	187	122	99	68	52	33	38	28	106
1996	351	395	264	196	131	82	63	47	54	28	111
1997	217	235	161	114	81	55	33	35	12	15	48
1998	173	200	156	106	68	41	28	25	21	10	41
1999	234	224	163	99	59	38	32	24	20	15	43

Table 13. Cath rate (catch/fishing day) by species and total.

NOMINAL CATCH RATE (F.DAYS) ALL					
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
1984	6.7	3.86	0.3	0.12	10.98
1985	6.01	7.3	0.16	0.05	13.54
1986	6.21	9.13	0.22	0	15.57
1987	7.32	12	0.65	0	20.16
1988	11.83	14.74	0.89	0.02	27.49
1989	6.25	14.48	0.71	0	21.5
1990	8.35	10.65	0.29	0.03	19.32
1991	10.18	9.67	1.39	0.25	21.49
1992	8.79	10.88	0.85	0.34	20.86
1993	10.45	11.25	1.18	0.2	23.09
1994	9.66	13.81	1.32	0.4	25.19
1995	12.48	13.33	2.34	0.11	28.26
1996	10.26	11.45	1.96	0.14	24.02
1997	9.51	9.84	2.47	0.16	22.01
1998	6.62	10.22	2.37	0.05	19.26
1999	8.41*	15.31*	3.5*	0.04*	27.26

(*) provisional data

Table 14. Catch by positive set by species and total.

NOMINAL CATCH RATE (Nº POSITIVES SETS) ALL					
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
1984	19.08	10.98	0.84	0.33	31.24
1985	12.23	14.87	0.33	0.1	27.59
1986	13.26	19.51	0.47	0	33.25
1987	11.27	18.47	1	0	31.02
1988	16.01	19.94	1.2	0.03	37.21
1989	10.62	24.6	1.21	0	36.52
1990	14.53	18.54	0.51	0.05	33.62
1991	18.33	17.4	2.5	0.44	38.69
1992	14.57	18.02	1.4	0.56	34.55
1993	17.71	19.08	2.01	0.34	39.13
1994	15.33	21.9	2.1	0.63	39.95
1995	19.5	20.83	3.65	0.17	44.16
1996	15.54	17.34	2.97	0.22	36.38
1997	15.62	16.17	4.06	0.26	36.16
1998	11.05	17.07	3.96	0.08	32.16
1999	13.64*	24.86*	5.67*	0.07*	44.25

(*) provisional data

Table 15. Cath rate (catch/fishing day) in FAD by species and total.

NOMINAL CATCH RATE (F.DAYS) FADS					
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
1984	1.17	2.09	0.16	0	3.42
1985	1.5	5.02	0.11	0	6.63
1986	1.15	5.46	0.08	0	6.69
1987	2.12	8.08	0.42	0	10.63
1988	2.38	11.54	0.36	0	14.28
1989	2.34	8.44	0.41	0	11.24
1990	1.58	8.54	0.14	0.01	10.26
1991	2.29	7.84	0.87	0.01	11.02
1992	3.19	8.63	0.72	0	12.55
1993	3.04	8.09	0.6	0	11.73
1994	2.87	9.65	0.92	0.01	13.46
1995	6.96	10.83	1.97	0.01	19.76
1996	4.49	7.93	1.62	0	14.04
1997	5.95	8.49	2.28	0.01	16.72
1998	3.72	8.54	1.91	0	14.18
1999	5.28*	13.19*	3.05*	0*	21.52

(*) provisional data

Table 16. Catch in FADs by positive set by species and total.

NOMINAL CATCH RATE (Nº POSITIVES SETS) FADS					
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
1984	13.73	24.52	1.88	0	40.18
1985	7.95	26.55	0.57	0	35.07
1986	6.5	30.73	0.44	0	37.66
1987	6.5	24.73	1.3	0	32.54
1988	7.35	35.57	1.11	0	44.04
1989	7.26	26.19	1.27	0	34.88
1990	5.4	29.27	0.46	0.03	35.16
1991	7.55	25.87	2.85	0.04	36.33
1992	9.95	26.93	2.26	0	39.15
1993	10.1	26.9	2.01	0	39.01
1994	9.65	32.44	3.1	0.03	45.22
1995	16.89	26.28	4.77	0.01	47.96
1996	12.37	21.86	4.47	0.01	38.7
1997	13.18	18.8	5.04	0.02	37.04
1998	8.36	19.19	4.3	0.01	31.87
1999	12.17*	30.39*	7.04*	0*	49.6

(*) provisional data

Table 17. Cath rate (catch/fishing day) in free school by species and total.

NOMINAL CATCH RATE (F.DAYS) F.SCHOOL					
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
1984	5.53	1.77	0.14	0.12	7.55
1985	4.5	2.28	0.05	0.05	6.91
1986	5.05	3.67	0.14	0	8.87
1987	5.2	3.92	0.22	0	9.52
1988	9.45	3.2	0.53	0.02	13.21
1989	3.91	6.04	0.3	0	10.26
1990	6.77	2.11	0.16	0.02	9.05
1991	7.89	1.82	0.52	0.23	10.47
1992	5.6	2.25	0.12	0.34	8.32
1993	7.41	3.17	0.58	0.2	11.36
1994	6.79	4.15	0.4	0.39	11.74
1995	5.52	2.5	0.37	0.1	8.5
1996	5.77	3.51	0.34	0.14	9.98
1997	3.56	1.36	0.19	0.15	5.29
1998	2.9	1.68	0.46	0.04	5.08
1999	3.13*	2.13*	0.44*	0.04*	5.74

(*) provisional data

Table 18. Catch in free school by positive set by species and total.

NOMINAL CATCH RATE (Nº POSITIVES SETS) F.SCHOOL					
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
1984	20.79	6.64	0.51	0.43	28.37
1985	14.92	7.55	0.18	0.17	22.91
1986	17.4	12.65	0.49	0	30.55
1987	16.09	12.13	0.69	0	29.49
1988	22.78	7.72	1.27	0.05	31.87
1989	14.69	22.68	1.14	0	38.51
1990	23.95	7.45	0.55	0.07	32.03
1991	31.28	7.23	2.06	0.93	41.51
1992	19.78	7.95	0.42	1.2	29.35
1993	25.62	10.95	2.01	0.68	39.26
1994	20.4	12.48	1.21	1.17	35.25
1995	24.22	10.97	1.63	0.45	37.27
1996	19.41	11.82	1.14	0.47	33.56
1997	22.61	8.62	1.23	0.96	33.63
1998	18.83	10.92	2.97	0.29	33
1999	17.15*	11.67*	2.42*	0.24*	31.49

(*) provisional data

Table 19. Mean weight by species and fishing mode.

	YFT		SKJ		BET	
YEAR	**LOG**	**F.School**	**LOG**	**F.School**	**LOG**	**F.SchoolL**
1984	5.5	22.8	2.8	3.1	4.6	12.2
1985	4.5	25.0	3.0	3.2	5.1	12.5
1986	11.4	22.5	3.3	3.4	6.7	11
1987	10.2	25.8	3.3	4.3	6.8	11.7
1988	5.1	27.0	2.9	2.9	5.3	11
1989	8.0	15.0	3.2	3.2	5.3	9.4
1990	6.1	31.8	2.8	3.0	4.3	25.2
1991	7.9	37.4	2.8	2.7	5.2	23.3
1992	9.9	34.6	3.0	3.0	5.3	13.3
1993	10.8	39.3	2.7	3.0	4.4	16.9
1994	6.9	40.9	2.5	3.4	4.7	31.1
1995	9.7	28.0	2.4	3.0	5.3	22.3
1996	5.4	28.8	2.4	3.2	4.8	11.0
1997	4.9	29.1	2.3	3.2	3.8	13.6
1998	5.1	23.4	2.5	2.7	4.4	10.7
1999	4.3*	22.7*	2.4*	2.5*	4.2*	9.0*

(*) provisional data

Table 20 . Number of samples and fishes mesured for the Purse Seiner fishery (1985 – 1999).

YEAR	**Nº**	**YFT**	**SKJ**	**BET**	**ALB**
		Nº fishes	**Nº fishes**	**Nº fishes**	**Nº fishes**
1985	486	5942	4223	2180	-
1986	436	1912	3939	508	-
1987	508	4016	6813	309	-
1988	805	10769	11962	3067	48
1989	541	6772	12593	1976	-
1990	637	8917	9033	1901	77
1991	600	21573	17485	5895	513
1992	651	13395	16628	3226	230
1993	690	35474	36507	7765	2137
1994	726	30747	37683	6070	2407
1995	858	59244	67806	34194	1052
1996	715	60500	50970	21926	1286
1997	528	41412	21139	19180	775
1998	309	27715	19109	12273	645
1999	420	48461	16348	19215	234

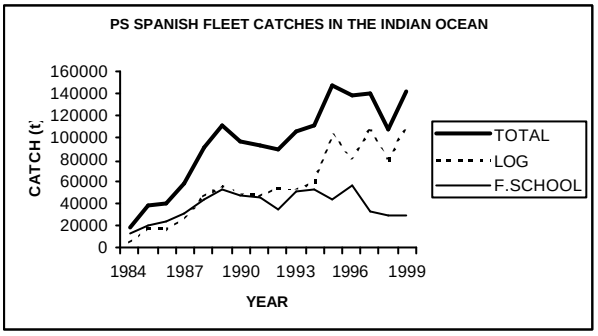

Figure 1. Total catch and catch by fishing mode (floating objet and free school) of the purse seine spanish fleet. Catches prior 1991 include other flags fleets.

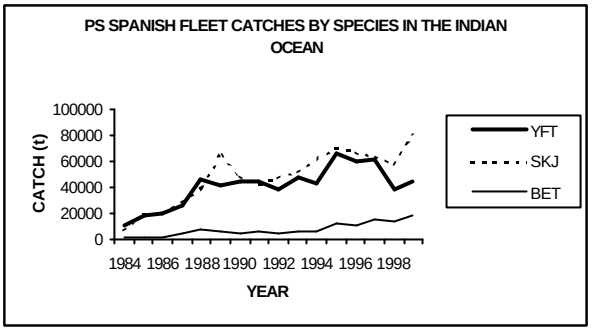

Figure 2. Catch by species of the purse seine spanish fleet. Catches prior 1991 include other flags fleets.

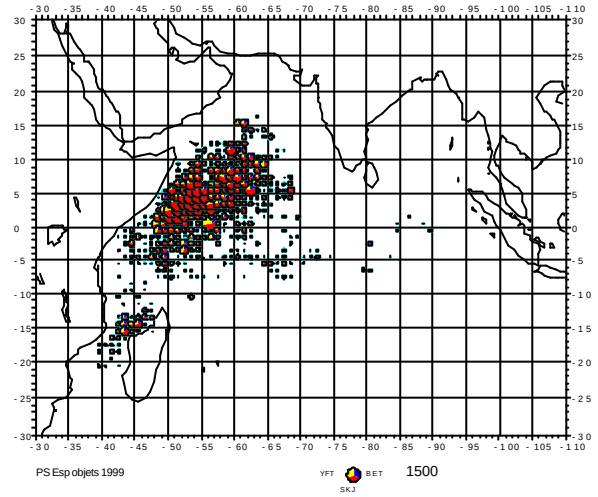

Figure 3. Distribution of catches on FADs by species and 1ºx1º squares of the purse seine spanish fleet in 1999.

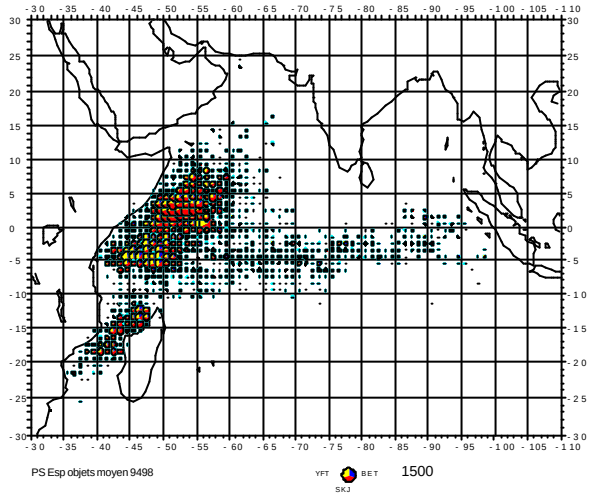

Figure 4. Distribution of average catches (1994-1998) on FADs by species and 1ºx1º squares of the purse seine spanish fleet.

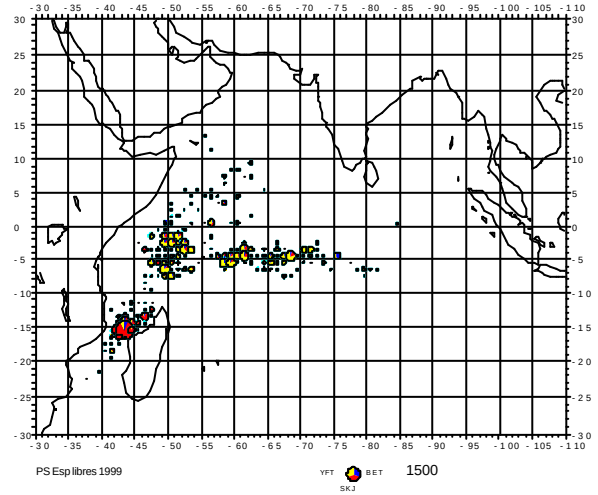

Figure 5. Distribution of catches on free schools by species and 1ºx1º squares of the purse seine spanish fleet in 1999.

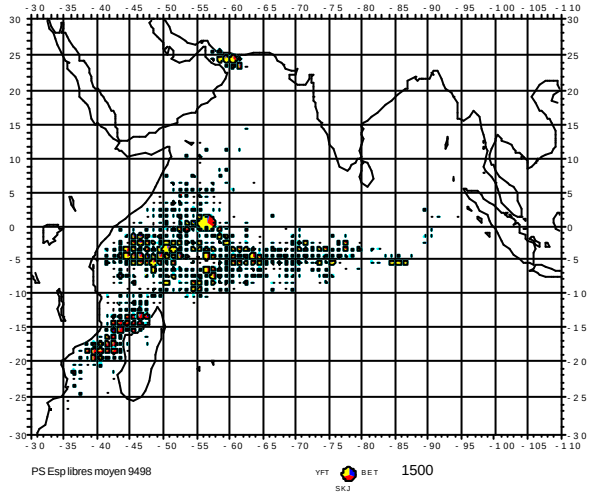

Figure 6. Distribution of average catches (1994-1998) on free schools by species and 1ºx1º squares of the purse seine spanish fleet.

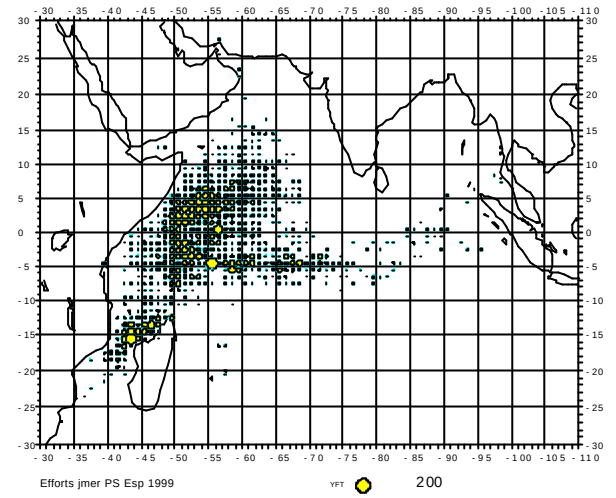

Figure 7. Distribution of effort (fishing days) by 1ºx1º squares of the purse seine spanish fleet in 1999.

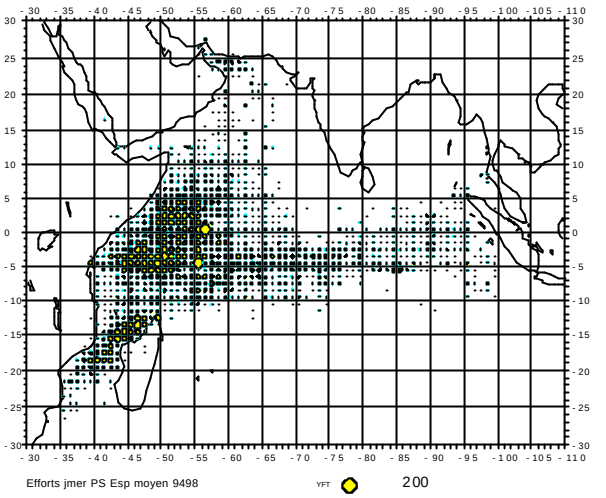

Figure 8. Distribution of averaqge effort (fishing days) by 1ºx1º squares of the purse seine spanish fleet for the period 1994-1998.

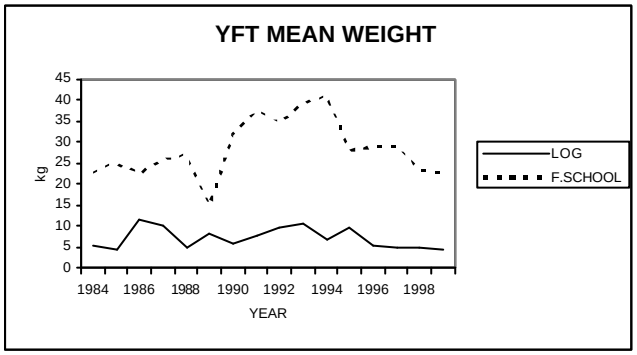

Fig. 9. Yellowfin mean weight by fishing mode (log and free school) for the period 1984-1999.

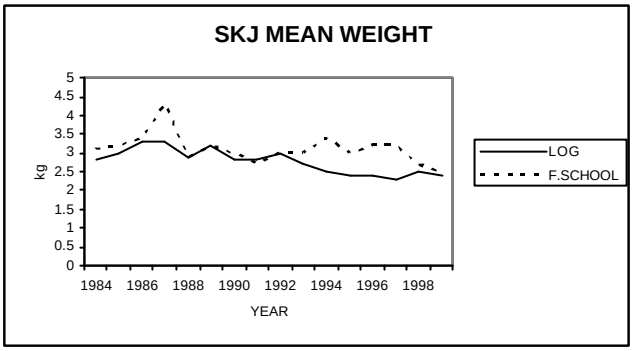

Fig. 10. Skipjack mean weight by fishing mode (log and free school) for the period 1984-1999.

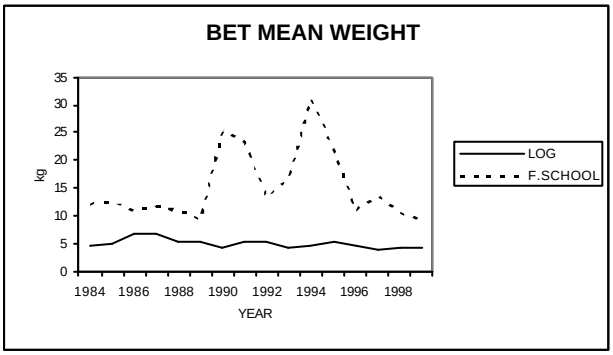

Fig. 11. Bigeye mean weight by fishing mode (log and free school) for the period 1984-1999.