STATISTICS OF THE PURSE SEINE SPANISH FLEET IN THE INDIAN OCEAN (1984-2006)

by

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Abstract

This document presents summary statistics of the purse seiner Spanish fleet fishing in the Indian Ocean from 1984 to 2005. 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.

1-Introduction

Since the beginning of the tropical tuna Spanish fishery in 1984, 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 Español de Oceanografia (IEO) and Spanish Fishing Agency 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.

In this document we present statistics of the fishery since its beginning in 1984 until 2005. We present, too, 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.

2- Data collection

2-1-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. Since 1984 the coverage of the logbooks have been nearly 100%

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

2-2-Species composition and sizes

Until 1998 the size distribution of catches was obtained using a monospecific sampling. The sampling scheme used was 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.

In the Indian Ocean analyses made at the beginning of the fishery showed a systematic bias in the log book species composition. The main bias was related with the small yellowfin, partially declared as skipjack, and small bigeye, always declared as yellowfin or skipjack, 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.

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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 has been introduced in all the sampling ports in 1999.

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 combined because the statistical analysis made during the ET project showed that there was not a significant fleet effect.

3-Statistics

3-1-Catch

Table 2 and figure 1 show the total yearly catches by species and tables 3-4 and figure 2, 3 and 4 show catches by fishing mode. The total catch in 2005 has reached 182562 t, the highest Spanish catch in this ocean. By species skipjack has been the main component of catch with 94312 t in 2004. Figures 9 to 14 show the distribution of total catch and catches by fishing mode, species and 1ºx1º squares for 2005 compared with previous years. Tables 17-18 show catch and effort by FAO area.

3-2-Effort

Table 1 and figures 5 and 7 show the carrying capacity and number of boats by category of the Spanish fleet from 1984 to 2005, this year a total of 20 Spanish vessels fished in the area. Table 5 and figure 7 show the nominal effort in fishing days and searching days. Since 1995 the nominal effort has been stable. Table 6 and figure 6 show 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 15 and 16 that compare the distribution of effort by 1ºx1º squares in 2005 with the average of the period 2000 - 2004.

3-3-Yield

Table 7 shows total number of sets and number of sets by fishing mode. The frequency distribution of sets by catch size is shown in Table 8, 9 and 10.

Figure 8 shows total number of positives and nulls sets.

Tables 11 to 16 show different catch rates by species and fishing mode.

3-4-Mean weight

Table 19 and figures 17, 18 and 19 show the mean weight by species and fishing mode, as usual catches on logs have a lower mean weight than catches on free school.

3-5-Length

Figures 20, 21 y 22 show 2004 length distribution of yellowfin, skipjack and bigeye, respectively.

Class	50-400	401-600	601-800	801-1200	1201-2000	>2000	total	C.Cap.	Supp	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	0	0	3	6	8	0	17	16568	-	-
1992	0	0	1	6	11	0	18	16711	-	-
1993	0	0	1	6	11	1	19	18953	-	-
1994	0	0	2	4	11	1	18	18779	-	-
1995	0	0	2	5	11	1	19	20908	-	-
1996	0	0	2	6	13	1	22	24090	-	-
1997	0	0	2	6	14	1	23	26128	-	-
1998	0	0	2	6	12	0	20	21243	-	-
1999	0	0	2	6	12	0	20	20260	6	7
2000	0	0	1	7	9	0	17	19473	7	9
2001	0	0	1	7	9	0	17	20479	5	5
2002	0	0	1	6	10	1	18	20490	8	9
2003	0	0	1	6	9	2	18	21007	8	9
2004	0	0	1	4	10	5	20	23832	15	-
2005	0	0	1	4	10	5	20	29052	13	-

(*) Vessel associated with supply

Table 1. Number of Spanish Purse seiners by category, carrying capacity in tons, number of supplies used in association with Spanish boat 1984 - 2005.

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	44023	41790	6005	1066	92923
1992	37836	46694	3638	1461	89629
1993	47792	51272	5418	904	105385
1994	43128	61608	5924	1773	112433
1995	65143	69587	12233	561	147524
1996	59431	66276	11374	826	139134
1997	60977	62914	15897	1029	141025
1998	38565	58646	11245	269	108725
1999	51875	74285	16034	232	142426
2000	52070	77187	10769	410	140872
2001	47571	68346	7930	339	124389
2002	53205	91462	11096	217	156386
2003	78968	88035	8544	520	176200
2004	80810	64393	8634	76	154106
2005	77519	94312	10290	48	182562

Table 2. Spanish purse seiners total catch by species in the Indian Ocean, 1984-2005.

CATCH ON LOGS BY SPECIES					
	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	9900	33906	3748	55	47634
1992	13726	37055	3118	6	53906
1993	13932	36839	2753	0	53524
1994	12822	43072	4117	39	60050
1995	36328	56534	10280	29	103171
1996	25996	45944	9396	12	81348
1997	38170	54240	14654	63	107127
1998	22043	49422	8562	18	80046
1999	34689	63459	14301	1	112450
2000	32046	67961	8719	43	109119
2001	18860	56964	6404	4	82415
2002	24710	84063	9566	4	118718
2003	32808	73288	5590	2	111797
2004	20264	56556	7597	0	84610
2005	29367	76328	6775	15	112833

Table 3. Spanish purse seiners catch on FADs by species in the Indian Ocean, 1984-2005.

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	34123	7883	2257	1011	45289
1992	24110	9638	520	1455	35724
1993	33860	14432	2664	904	51861
1994	30306	18536	1807	1734	52383
1995	28815	13054	1953	531	44353
1996	33435	20332	1977	814	57786
1997	22807	8673	1243	966	33898
1998	16522	9224	2683	250	28679
1999	17186	10826	1732	231	29976
2000	20024	9225	2050	367	31753
2001	28712	11382	1526	335	41974
2002	28494	7398	1530	212	37668
2003	46160	14746	2954	517	64403
2004	60546	7837	1036	76	69496
2005	48152	17984	3515	33	69729

Table 4. Spanish purse seiners catch on free schools by species in the Indian Ocean, 1984-2005.

YEAR	F.DAYS	S.DAYS
1984	1713	1432
1985	2846	2379
1986	2634	2161
1987	2938	2300
1988	3331	2613
1989	5164	4241
1990	5006	4205
1991	4325	3544
1992	4296	3591
1993	4565	3842
1994	4463	3771
1995	5221	4470
1996	5793	4925
1997	6407	5584
1998	5644	4888
1999	5224	4496
2000	4526	3825
2001	4940	4214
2002	4570	3889
2003	4468	3671
2004	4730	3891
2005	5808	4619

Table 5. Nominal fishing effort in fishing days and searching days of the purse seine Spanish fleet (1984 – 2005).

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
2000	585	450	430	428	223
2001	506	426	405	412	262
2002	534	436	259	448	430
2003	511	396	252	421	403
2004	492	368	221	376	359
2005	514	391	250	414	383

Table 6. Number of 1x1 degree squares explored by the purse seine Spanish fleet. The same considering different minimum effort limits and number of 1x1 degree squares with sets and with catch (1984 – 2005).

	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
2000	3856	3169	687	2331	2236	95	1525	933	592
2001	4050	3105	945	2088	2004	84	1962	1101	861
2002	3681	3088	593	2331	2239	92	1350	849	501
2003	3801	2926	875	1932	1822	110	1869	1104	765
2004	4247	3021	1226	1884	1775	109	2363	1246	1117
2005	5815	4228	1587	2768	2620	148	3047	1608	1439

Table 7. Total number of sets, positive sets and null sets. Same statistics by fishing mode.

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	474	462	374	258	213	145	96	79	58	50	187
1992	518	538	421	316	199	153	124	72	51	54	148
1993	443	518	400	316	217	177	119	107	63	82	251
1994	513	556	419	286	208	171	117	104	89	71	278
1995	469	603	500	391	300	204	166	122	113	84	389
1996	681	865	594	463	292	225	159	118	105	80	242
1997	716	901	614	488	317	218	147	125	70	72	226
1998	672	837	620	417	221	168	103	94	66	30	153
1999	466	621	544	341	264	205	175	125	97	75	305
2000	441	638	502	348	256	216	145	127	96	67	331
2001	534	685	502	366	226	179	125	89	76	63	257
2002	346	594	454	373	281	217	150	117	93	63	398
2003	290	462	404	337	264	201	173	113	97	75	510
2004	325	567	508	346	231	204	151	128	117	49	395
2005	552	924	698	488	354	265	218	160	116	62	391

Table 8. Frequency of positive sets 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	242	295	201	135	122	81	49	42	37	25	78
1992	223	263	221	191	107	87	77	37	39	32	100
1993	223	287	204	160	117	93	66	52	34	33	103
1994	181	241	204	154	117	88	59	58	46	34	145
1995	252	363	314	266	203	133	116	89	70	64	281
1996	330	476	323	269	160	142	97	71	51	52	131
1997	499	665	451	377	236	164	112	91	58	57	178
1998	499	637	464	311	154	126	75	69	45	20	112
1999	232	397	381	242	205	167	143	101	77	60	262
2000	244	393	359	257	191	159	113	101	85	51	281
2001	300	441	341	247	154	118	81	58	52	42	168
2002	210	424	313	280	203	169	117	92	72	49	309
2003	170	271	246	215	174	125	105	76	62	50	328
2004	175	344	326	209	138	125	94	83	54	27	200
2005	314	579	434	317	227	169	125	109	66	37	243

Table 9. Frequency of positive sets in FADs 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.**
1984	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	232	167	173	123	91	64	47	37	21	25	109
1992	295	275	200	125	92	66	47	35	12	22	48
1993	220	231	196	156	100	84	53	55	29	49	148
1994	332	315	215	132	91	83	58	46	43	37	133
1995	217	240	186	125	97	71	50	33	43	20	108
1996	351	389	271	194	132	83	62	47	54	28	111
1997	217	236	163	111	81	54	35	34	12	15	48
1998	173	200	156	106	67	42	28	25	21	10	41
1999	234	224	163	99	59	38	32	24	20	15	43
2000	197	245	143	91	65	57	32	26	11	16	50
2001	234	244	161	119	72	61	44	31	24	21	89
2002	136	170	141	93	78	48	33	25	21	14	89
2003	120	191	158	122	90	76	68	37	35	25	182
2004	150	223	182	137	93	79	57	45	63	22	195
2005	238	345	264	171	127	96	93	51	50	25	148

Table 10. Frequency of positive sets in free schools by size of catch.

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	21.50
1990	8.35	10.65	0.29	0.03	19.32
1991	10.18	9.66	1.39	0.25	21.49
1992	8.81	10.87	0.85	0.34	20.86
1993	10.47	11.23	1.19	0.2	23.09
1994	9.66	13.8	1.33	0.4	25.19
1995	12.48	13.33	2.34	0.11	28.26
1996	10.26	11.44	1.96	0.14	24.02
1997	9.52	9.82	2.48	0.16	22.01
1998	6.83	10.39	1.99	0.05	19.26
1999	9.93	14.22	3.07	0.04	27.26
2000	11.5	17.05	2.38	0.09	31.12
2001	9.63	13.84	1.61	0.07	25.18
2002	11.64	20.01	2.43	0.05	34.22
2003	17.67	19.70	1.91	0.12	39.44
2004	17.08	13.61	1.83	0.02	32.58
2005	13.35	16.24	1.77	0.01	31.44

Table 11. Catch rate (catch/fishing day) 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	14.59	18	1.4	0.56	34.55
1993	17.75	19.04	2.01	0.34	39.13
1994	15.33	21.89	2.11	0.63	39.95
1995	19.5	20.83	3.66	0.17	44.16
1996	15.54	17.33	2.97	0.22	36.38
1997	15.64	16.13	4.08	0.26	36.16
1998	11.41	17.35	3.33	0.08	32.16
1999	16.12	23.08	4.98	0.07	44.25
2000	16.43	24.36	3.4	0.13	44.45
2001	15.32	22.01	2.55	0.11	40.06
2002	17.23	29.62	3.59	0.07	50.64
2003	26.99	30.09	2.92	0.18	60.22
2004	26.75	21.32	2.86	0.03	51.01
2005	18.33	22.31	2.43	0.01	43.18

Table 12. Catch by positive set 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	11.01
1992	3.19	8.62	0.73	0	12.55
1993	3.05	8.07	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	5.96	8.47	2.29	0.01	16.72
1998	3.91	8.76	1.52	0	14.18
1999	6.64	12.15	2.74	0	21.52
2000	7.08	15.02	1.93	0.01	24.11
2001	3.82	11.53	1.3	0	16.68
2002	5.41	18.39	2.09	0	25.98
2003	7.34	16.40	1.25	0	25.02
2004	4.28	11.96	1.61	0	17.89
2005	5.06	13.14	1.17	0	19.43

Table 13. Catch rate (catch/fishing day) in FAD 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	25.86	2.86	0.04	36.33
1992	9.97	26.91	2.26	0	39.15
1993	10.15	26.85	2.01	0	39.01
1994	9.66	32.43	3.1	0.03	45.22
1995	16.89	26.28	4.78	0.01	47.96
1996	12.37	21.86	4.47	0.01	38.7
1997	13.2	18.76	5.07	0.02	37.04
1998	8.78	19.67	3.41	0.01	31.87
1999	15.3	27.99	6.31	0	49.6
2000	14.33	30.39	3.9	0.02	48.8
2001	9.41	28.43	3.2	0	41.13
2002	11.04	37.55	4.27	0	53.02
2003	18.01	40.22	3.07	0	61.36
2004	11.42	31.86	4.28	0	47.67
2005	11.21	29.13	2.59	0.01	43.07

Table 14. Catch in FADs by positive set 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	5.61	2.24	0.12	0.34	8.31
1993	7.42	3.16	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	1.35	0.19	0.15	5.29
1998	2.93	1.63	0.48	0.04	5.08
1999	3.29	2.07	0.33	0.04	5.74
2000	4.42	2.04	0.45	0.08	7.02
2001	5.81	2.3	0.31	0.07	8.5
2002	6.24	1.62	0.33	0.05	8.24
2003	10.33	3.3	0.66	0.12	14.41
2004	12.80	1.66	0.22	0.02	14.69
2005	8.29	3.10	0.61	0.01	12.01

Table 15. Catch rate (catch/fishing day) in free school 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	2.07	0.93	41.51
1992	19.81	7.92	0.43	1.2	29.35
1993	25.63	10.93	2.02	0.68	39.26
1994	20.39	12.47	1.22	1.17	35.25
1995	24.21	10.97	1.64	0.45	37.27
1996	19.42	11.81	1.15	0.47	33.56
1997	22.63	8.6	1.23	0.96	33.63
1998	19.01	10.61	3.09	0.29	33.00
1999	18.05	11.37	1.82	0.24	31.49
2000	21.46	9.89	2.2	0.39	34.03
2001	26.08	10.34	1.39	0.3	38.12
2002	33.56	8.71	1.80	0.25	44.37
2003	41.81	13.36	2.68	0.47	58.34
2004	48.59	6.29	0.83	0.06	55.78
2005	29.95	11.18	2.19	0.02	43.36

Table 16. Catch in free school by positive set by species and total.

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	5736	4468	2716	6	12926	762	328
1999	59	149	40	0	248	33	11
2000	67	88	13	0	167	30	9
2001	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0
2004	1	4	1	0	5	1	1
2005	0	0	0	0	0	0	0

Table 17. Spanish purse seiners total catch by species in the FAO area 57, 1991-2005

CATCH AND EFFORT PS DATA AREA: F51							
YEAR	YFT	SKJ	BET	ALB	TOTAL	FISH. DAYS	#SETS+
1991	44023	41790	6005	1066	92923	4324	2402
1992	37836	46694	3638	1461	89629	4296	2594
1993	47792	51272	5418	904	105385	4565	2693
1994	43128	61608	5924	1773	112433	4463	2814
1995	65143	69587	12233	561	147524	5221	3341
1996	59404	66169	11351	826	138977	5771	3818
1997	60855	62767	15862	1029	140720	6374	3886
1998	32829	54179	8529	262	95799	4882	3053
1999	51816	74137	15994	232	142179	5192	3208
2000	52004	77099	10756	410	140705	4496	3160
2001	47571	68346	7930	339	124389	4940	3105
2002	53205	91462	11096	217	156386	4570	3088
2003	78968	88035	8544	520	176200	4468	2926
2004	80809	64389	8633	76	154101	4729	3020
2005	77519	94312	10290	48	182562	5808	4228

Table 18. Spanish purse seiners total catch by species in the FAO area 51, 1991-2005

	YFT		SKJ		BET	
YEAR	**LOG**	**F.SCHOOL**	**LOG**	**F.SCHOOL**	**LOG**	**F.SCHOOL**
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	8	37.0	2.7	2.7	5.5	20.6
1992	9.9	36.8	3.0	2.9	5.2	13.5
1993	10.8	40.2	2.7	3.1	4.3	26.7
1994	6.2	39.8	2.5	3.5	4.9	34.4
1995	9.7	27.3	2.4	3.0	5.3	21.7
1996	5.2	27.8	2.4	3.2	4.7	11.3
1997	4.8	26.6	2.3	2.8	3.7	13.0
1998	6.9	14.5	2.6	2.5	5.3	9.2
1999	4.6	22.5	2.5	2.5	4.9	8.9
2000	6.0	23.6	3.0	3.2	4.9	13.7
2001	4.6	29.7	2.6	3.6	3.6	14.5
2002	3.7	34.8	2.4	3.3	3.7	30.5
2003	5.6	34.6	3.1	3.9	4.4	24.4
2004	4.2	39.7	2.5	3.6	4.8	30.4
2005	5.6	34.5	2.9	3.3	4.8	29.6

Table 19. Mean weight by species and fishing mode.

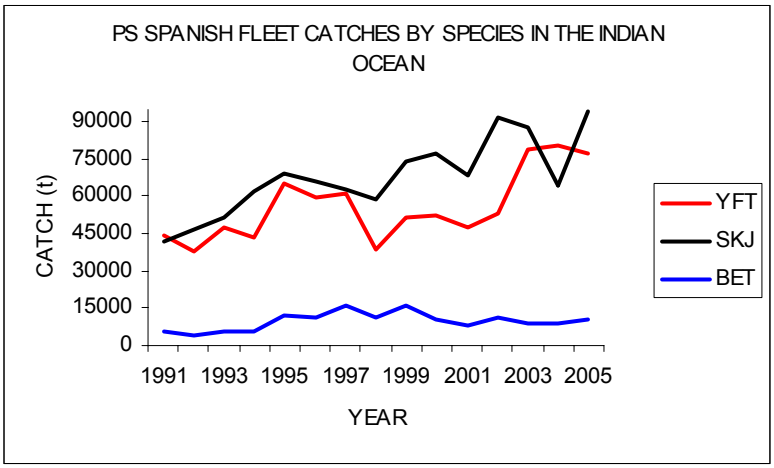

Figure 1. Catch by species of the purse seine Spanish fleet.

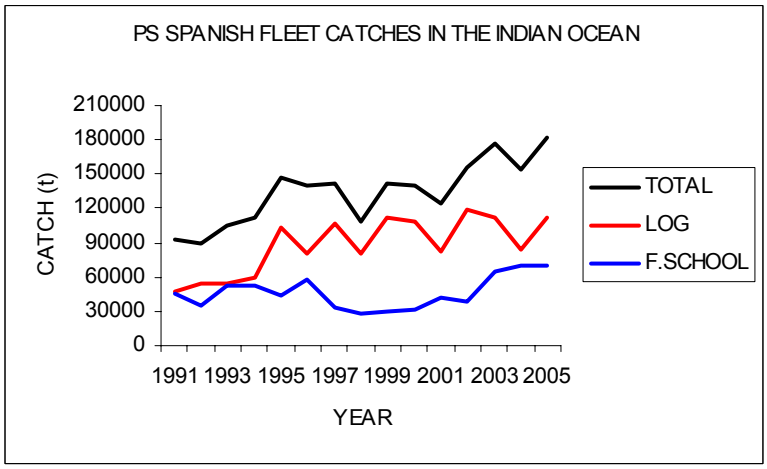

Figure 2. Total catch and catch by fishing mode (floating object and free school) of the purse seine Spanish fleet.

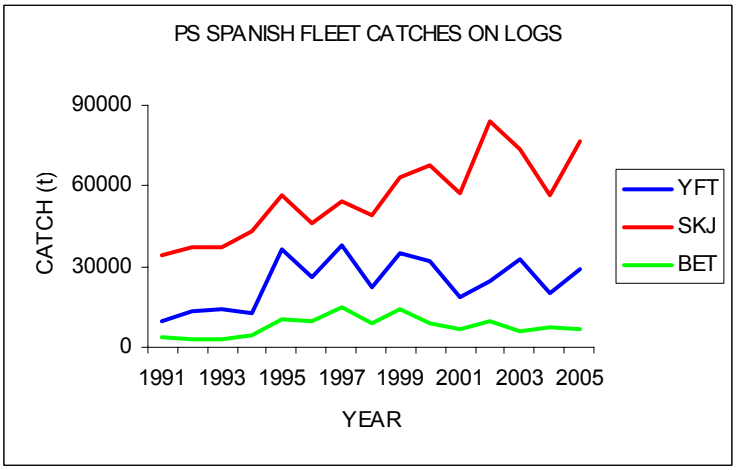

Figure 3. Catch by species on logs of the purse seine Spanish fleet.

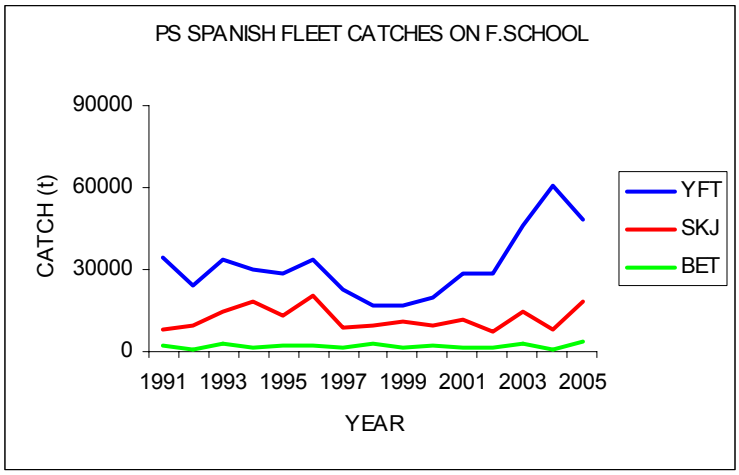

Figure 4. Catch by species on free school of the purse seine Spanish fleet.

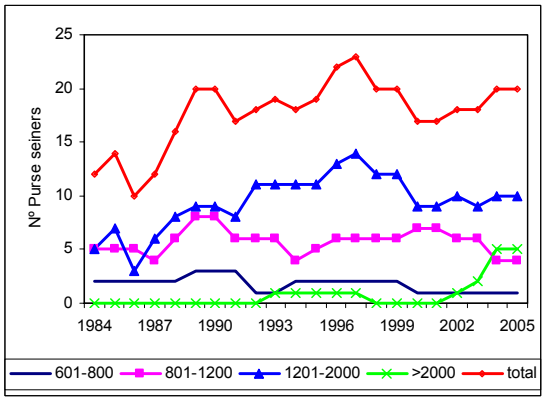

Fig.5. Spanish purse seiners number by GRT category

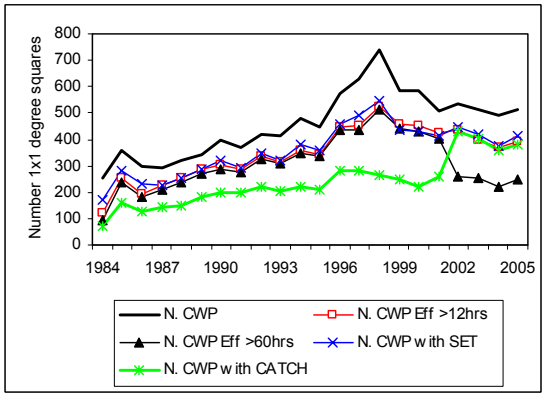

Fig.6. Number of one degree squares visited with different efforts

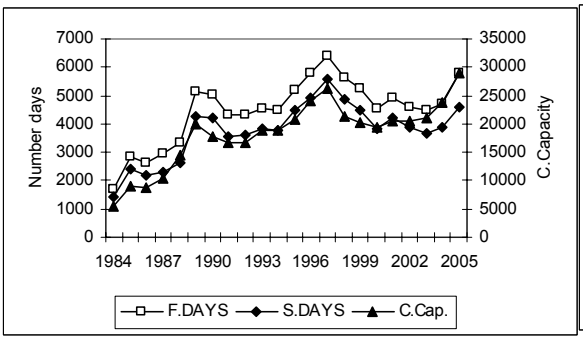

Fig.7. Fishing and searching days and carrying capacity.

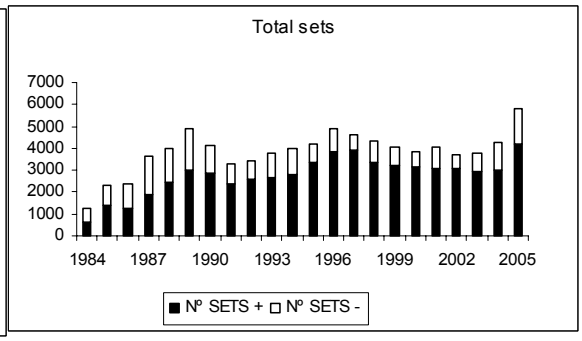

Fig.8. Number of positives and nulls sets

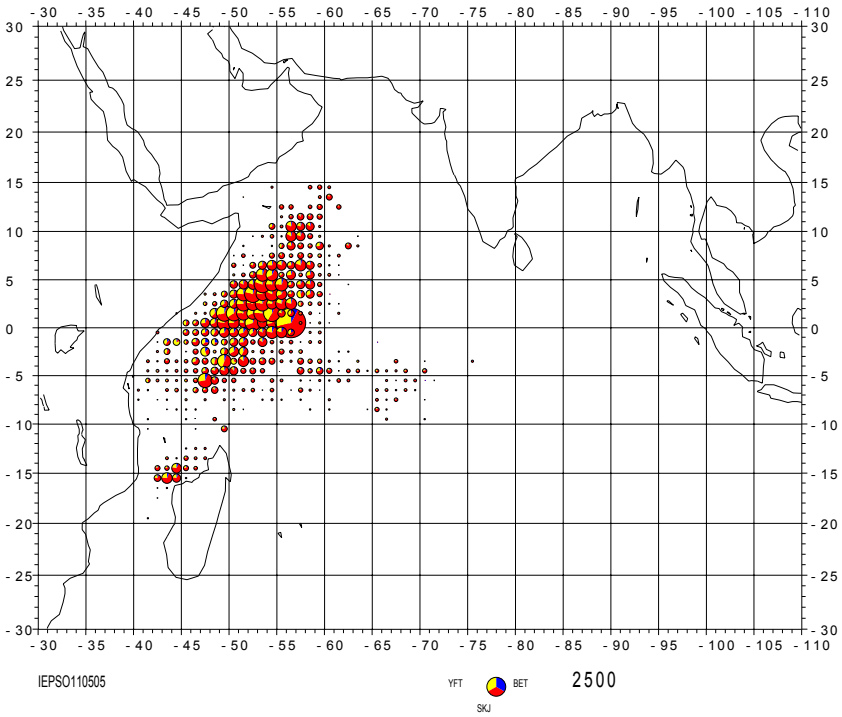

Figure 9. Distribution of catches on FADs by species and 1ºx1º squares of the purse seine Spanish fleet in 2005.

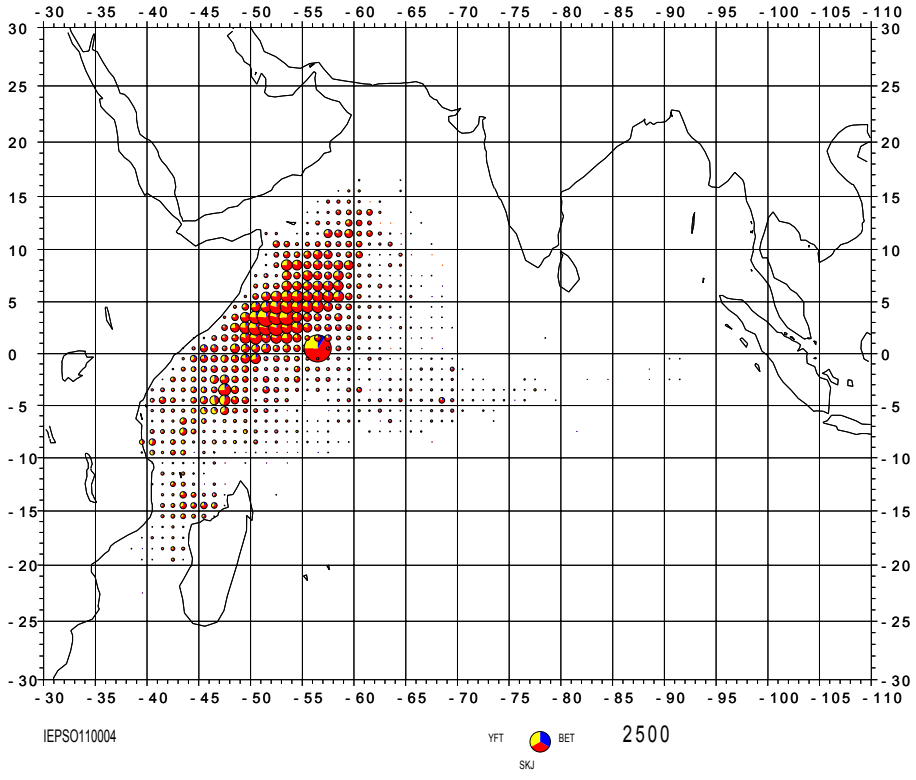

Figure 10. Distribution of average catches (2000-2004) on FADs by species and 1ºx1º squares of the purse seine Spanish fleet.

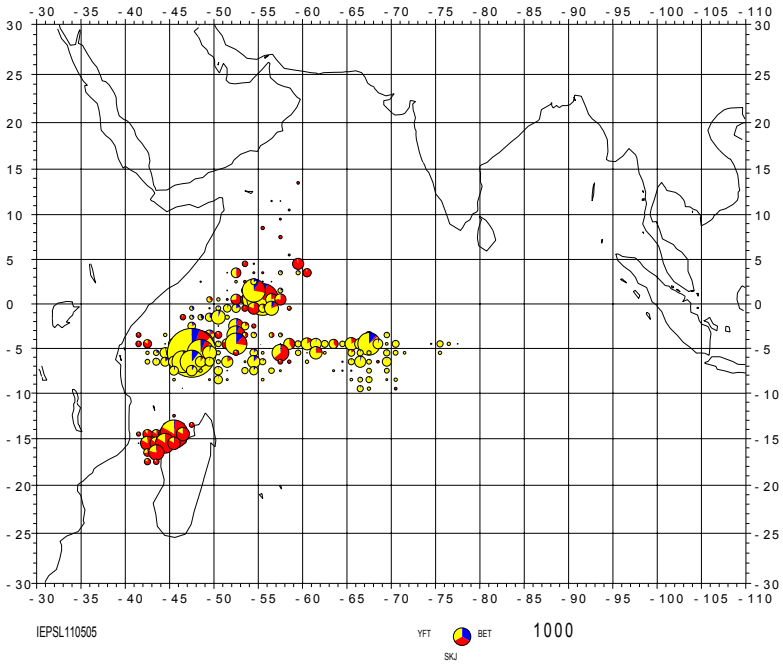

Figure 11. Distribution of catches on free schools by species and 1ºx1º squares of the purse seine Spanish fleet in 2005.

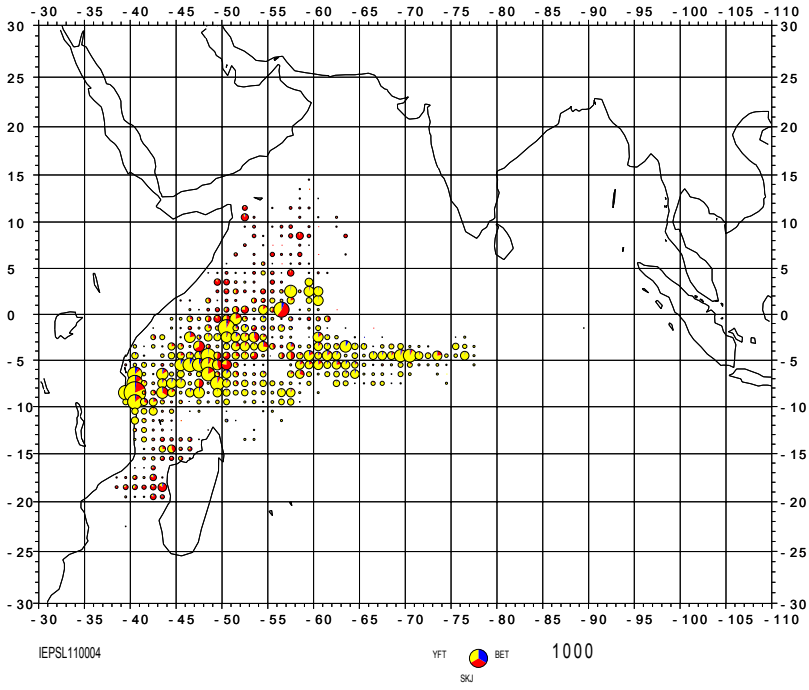

Figure 12. Distribution of average catches (2000-2004) on free schools by species and 1ºx1º squares of the purse seine Spanish fleet.

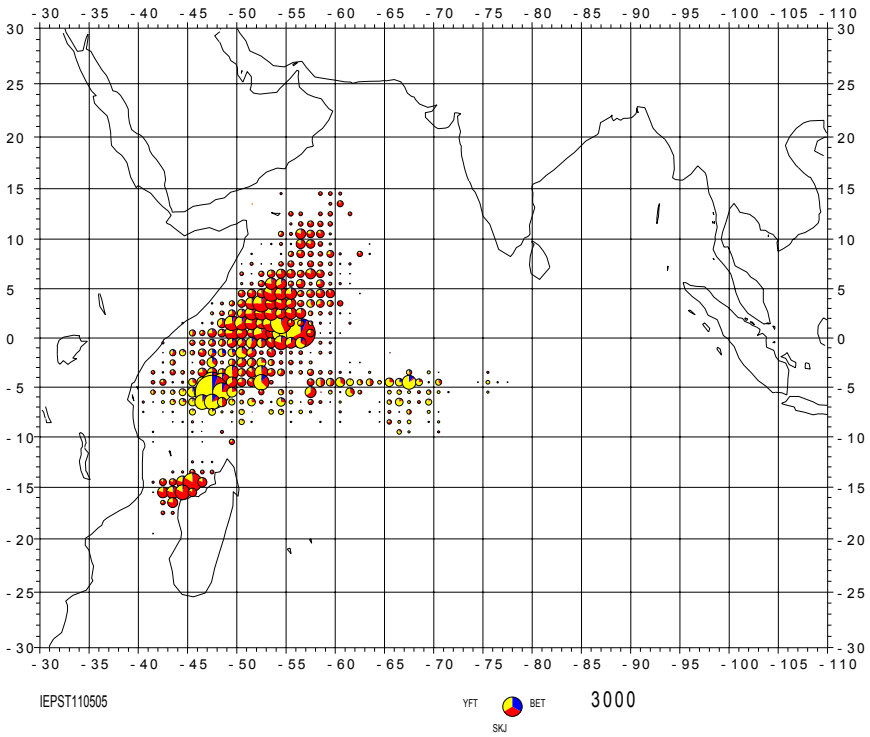

Figure 13. Distribution of catches by species and 1ºx1º squares of the purse seine Spanish fleet in 2005.

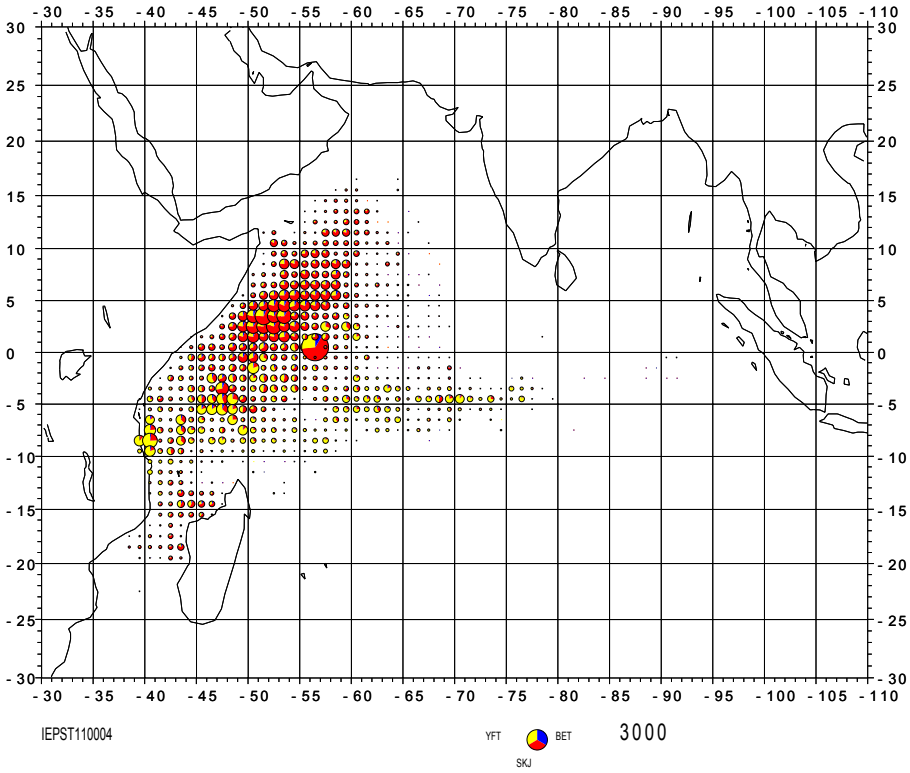

Figure 14. Distribution of average catches (2000-2004) by species and 1ºx1º squares of the purse seine Spanish fleet.

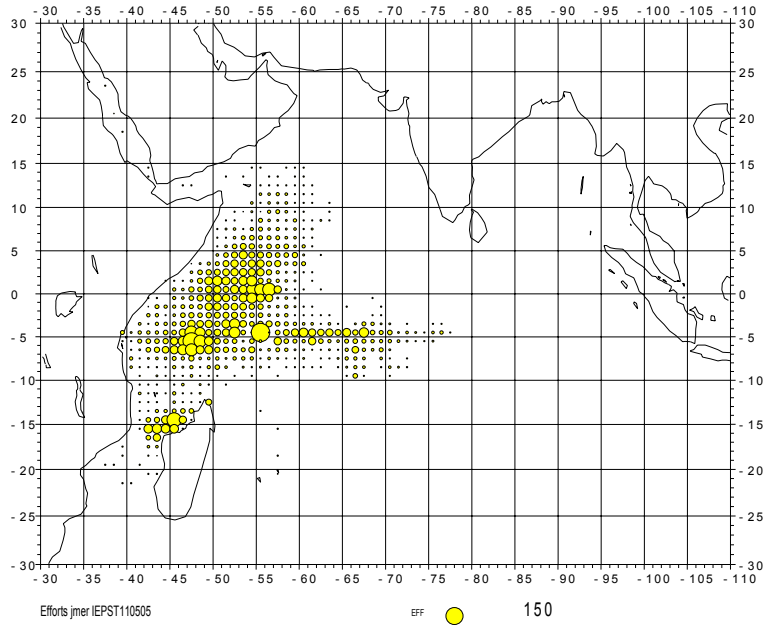

Figure 15. Distribution of effort (fishing days) by 1ºx1º squares of the purse seine Spanish fleet in 2005.

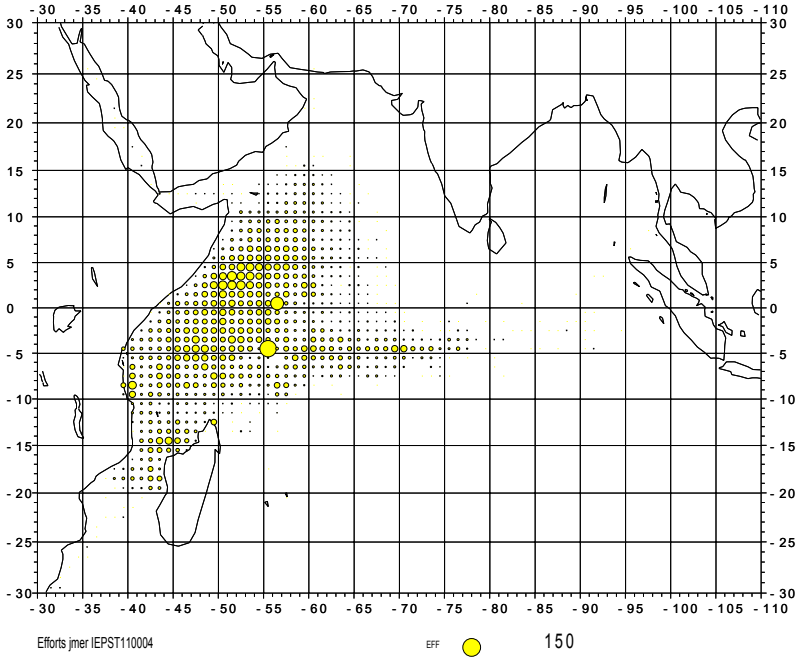

Figure 16. Distribution of average effort (fishing days) by 1ºx1º squares of the purse seine Spanish fleet for the period 2000-2004.

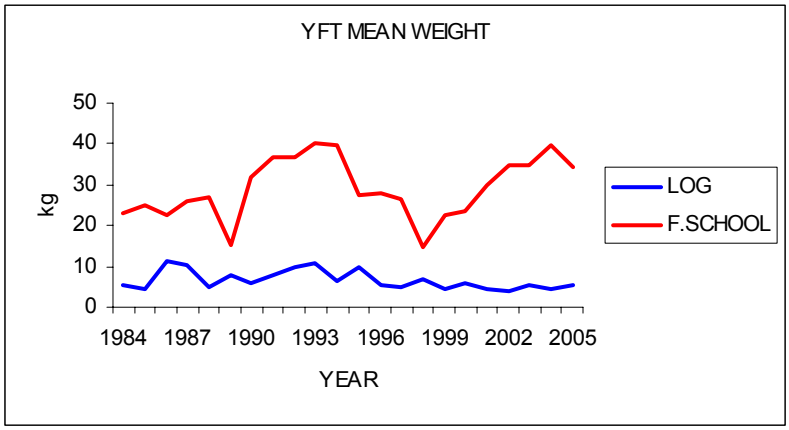

Fig.17. Yellowfin mean weight by fishing mode (log and free school) for the period 1984-2005.

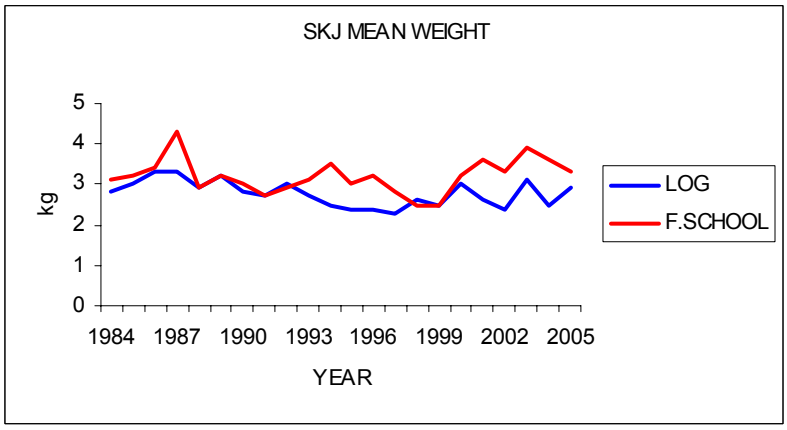

Fig. 18. Skipjack mean weight by fishing mode (log and free school) for the period 1984-2005.

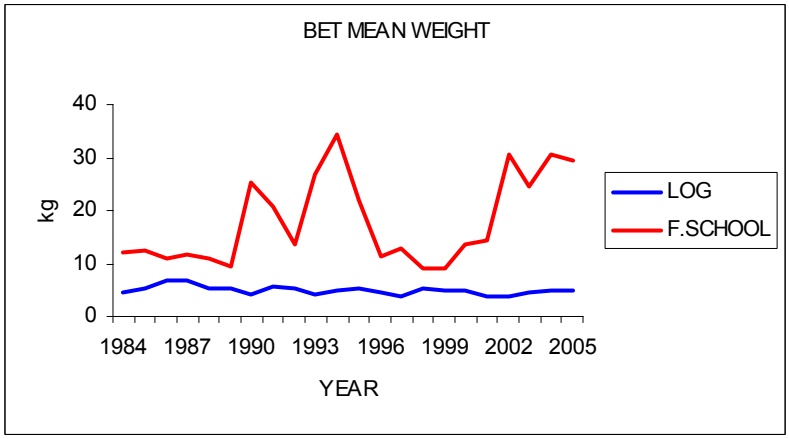

Fig. 19. Bigeye mean weight by fishing mode (log and free school) for the period 1984-2005.

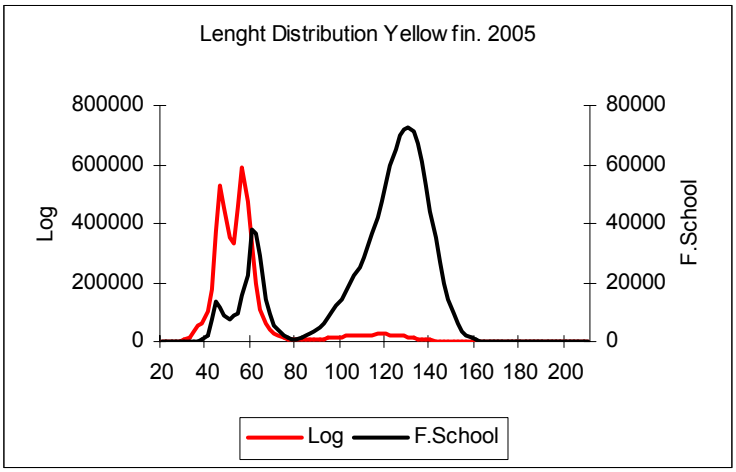

Fig.20. Yellowfin length distribution on Logs and Free School. 2005.

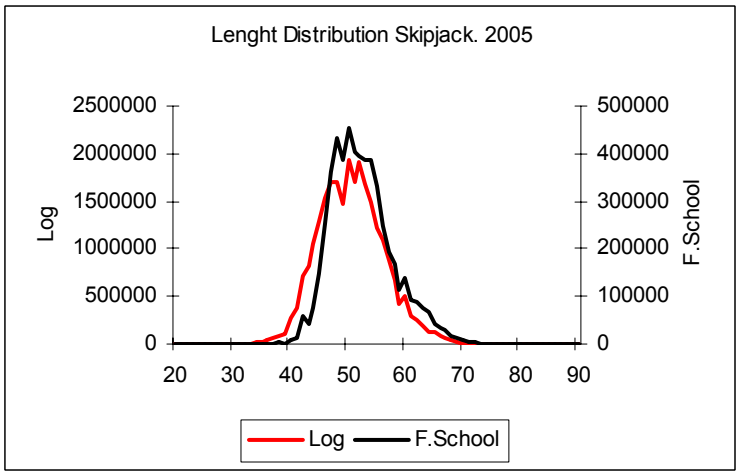

Fig.21. Skipjack length distribution on Logs and Free School. 2005.

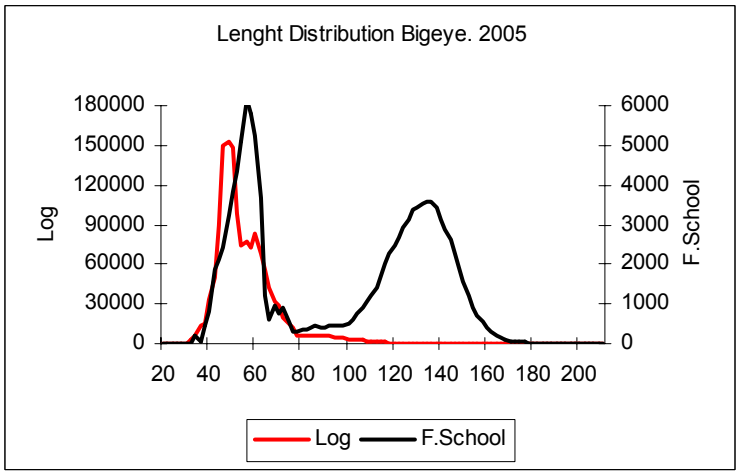

Fig.22. Bigeye length distribution on Logs and Free School. 2005.