NATIONAL REPORT OF SPAIN

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INTRODUCTION

The Spanish purse-seine fleet has been operating in the Western Indian Ocean (WIO) since the beginning of 1984. This report reflects and reviews the evolution of Spanish tuna statistics in the Indian Ocean.

The activities of the Spanish fleet were initially based in the Seychelles, and this is still the main base for part of the Spanish purse-seine fleet. In 1987, as a result of the high catch obtained during the Mozambique channel season (April-May), the fleet started to transship in the port of Diego Suarez (Madagascar). Later, in 1992, a similar shift occurred towards Mombasa (Kenya), where part of the fleet still remains every year from June until October. During the last month of 1994 and the beginning of 1995, a transshipment base was established on Gan Island (Adu Atoll, south of the Maldives), but there was little transshipment activity because of the poor catch in the Chagos Archipelago during the 1994-1995 season.

These changes in transshipment base correspond with the fleet's pattern of movement in recent years.

THE FLEET

The development of the tuna purse-seine fishery in the WIO was very fast, and from the beginning a significant number of boats have operated in the area. Table 1 shows the total number of Spanish purse seiners operating in the WIO since 1984. These statistics have been reviewed and several boats included in the Spanish statistics, but actually operating under flags of convenience, have been corrected. The IPTP statistics take into account the presence of any boat in the area during the year (*i.e.,* if a one boat operates during one month only, it will be counted as one record).

The Spanish fleet is one of the biggest purse-seine fleets operating in the Indian Ocean. The boats range from 833 to 2,640 GRT (the world's largest tuna purse-seiner), with a 1984-1994 fleet average of 1,400 GRT. During 1994 a total of 18 boats were present in the WIO, with a total of 26,271 GRT.

The carrying capacity of the Spanish fleet (Figure 1) is also one of the largest in the WIO. We have calculated the average carrying capacity in tonnes, dividing the capacity in cubic metres (m^3) by a conversion factor of 0.69 for small fish (skipjack, and yellowfin and bigeye less than 10 kg) and 0.64 for big fish (yellowfin and bigeye more than 10 kg). The carrying capacity of a boat is considered as the average of these two figures. The carrying capacities of the Spanish boats range from 700 t to 2,400 t, averaging 1,090 t for all the fleet from 1984 to 1994. During 1994 a total of 18 boats were present in the WIO, with a total carrying capacity of 21,900 t (average 18,600 t).

CATCH

Figure 1.- *Average carrying capacity, weighted by month, of the Spanish purse-seine fleet operating in the WIO, 1984-1994.*

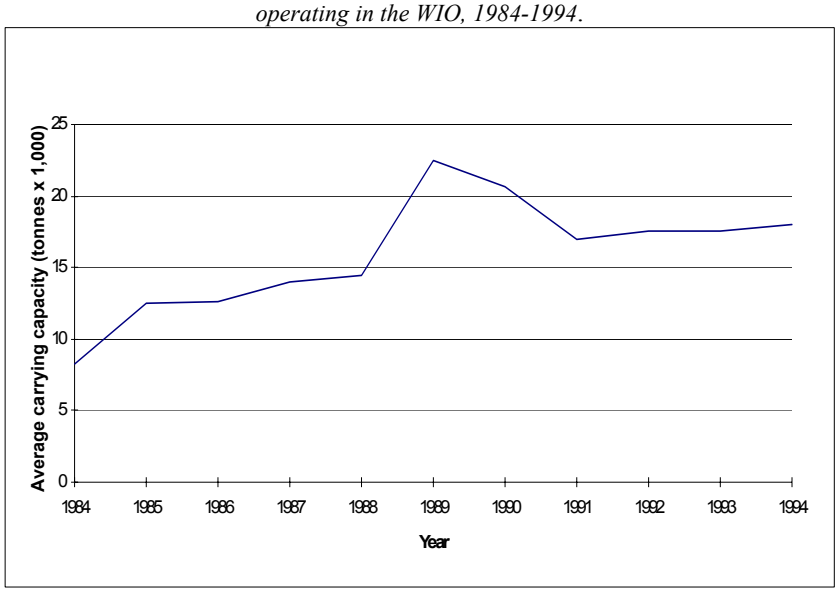


Table 1. Total number of Spanish purse-seiners, by size category (GRT), operating in the Western Indian Ocean, 1984-1994.

	GRT		
Year	***<1,000 tons***	***>1,000 tons***	***TOTAL***
1984	4	10	14
1985	4	12	16
1986	4	8	12
1987	4	10	14
1988	4	14	18
1989	4	17	21
1990	4	17	21
1991	3	14	17
1992	1	16	17
1993	1	18	19
1994	2	16	18

Table 2. Spanish purse-seine nominal catch and effort by species in the Indian Ocean, 1984-1994. (catch unit = t; effort unit = fishing day).

Year	***Effort***	***YFT***	***SKJ***	***BET***	***ALB***	***Total***
1984	2,033	13,851	8,149	814	234	23,048
1985	2,644	16,632	19,093	351	118	36,194
1986	3,071	17,532	24,877	550	227	43,186
1987	4,429	20,469	35,760	1,925	13	58,167
1988	5,470	43,159	52,863	2,846	245	99,113
1989	7,259	33,852	77,632	3,537	220	115,241
1990	4,946	35,917	47,321	1,133	120	84,491
1991	3,841	46,339	37,898	7,279	1,065	92,581
1992	5,302	42,103	61,853	2,925	1,865	108,746
1993	4,548	54,259	37,130	4,048	634	96,071
1994	4,517	47,742	51,417	7,798	1,770	108,727

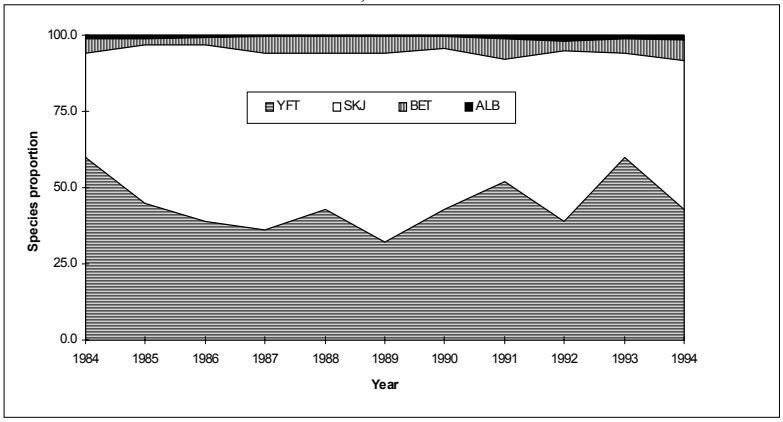
Table 2 reflects the total nominal catch and effort statistics of the Spanish purse-seine fleet operating in the Indian Ocean since 1984. Since 1988 the catch seems to have been stable, averaging 100,000 t in 1988-1994, and never falling below 90,000 t except in 1990.

The proportion of yellowfin tuna (*Thunnus albacares*) is quite variable among years, averaging 44% from 1984 to 1994, and fell well below 40% during only two years (1987 and 1989). Skipjack tuna (*Katsuwonus pelamis*) is the second target species of the fishery, contributing from 35 to 58% of the catch, with an average of 52%. Bigeye tuna (*Thunnus obesus*) is occasionally caught, and represents 3% of the catch. The catch of albacore tuna (*Thunnus alalunga*) is very sporadic (Figure 2). Figure 3 shows the monthly variation of the catch, by species, from free and log-associated schools in 1993 and 1994. Each pair of percentages in this section refers to these two years.

The catch from free schools represented 45 and 47% of the total catch, and yellowfin tuna accounted for 65 and 73% of the free-school catch. The rest of the catch from free schools consisted of skipjack (21 and 25%), bigeye (4 and 7%) and albacore tuna (1 and 3%).

Skipjack tuna was the main species associated with logs (53 and 67%); the contribution of yellowfin was quite important in 1993 (53% of the log catch) and similar to the average level of previous years in 1994 (25%). Bigeye represented 4 and 8% of the catch on log schools; the catch of albacore in log schools is null or just accidental

Figure 2.- *Proportions of species in the Spanish purse-seine catch in the Indian Ocean, 1984-1994.*



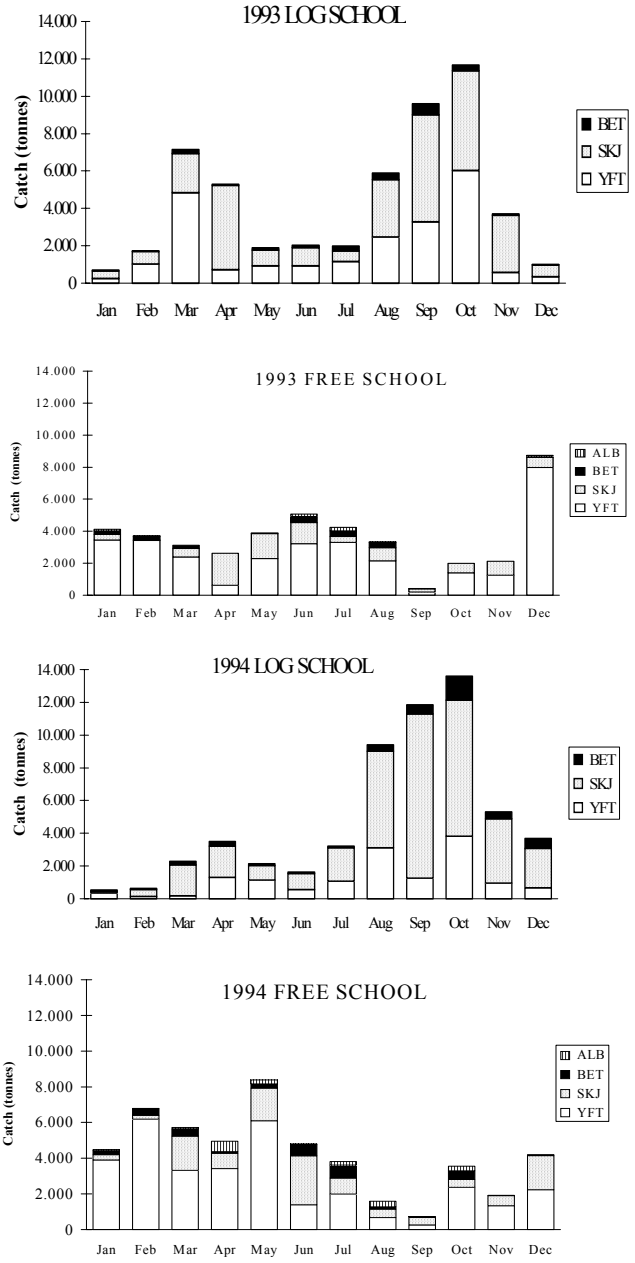
EFFORT

The nominal effort is presented in Table 1. An increasing trend can be seen from the beginning of the fishery until 1989, when the maximum effort was recorded (7,259 fishing days). From 1990 to 1994 the average effort is around 4,500 fishing days, corresponding with the catch stability mentioned above.

The number of boats actually operating each per month is different to the IPTP boat statistics presented above. Figure 4 shows the variation in the number of boats operating simultaneously each month. Some discrepancies can be seen between the maximum number of boats in the figure and the IPTP boat statistics because, as mentioned above, the IPTP statistics reflect the different boats operating throughout the year.

It is quite clear that the stability in the

Figure 3.- *Monthly catch variation by species on free and log schools for 1993 and 1994.*



effort and catch after 1990 is related to the number of boats actually operating. Since 1991 the minimum and the average number of boats operating simultaneously has been fixed at 13 and 15, respectively, and the maximum is also almost constant.

CATCH PER UNIT OF EFFORT

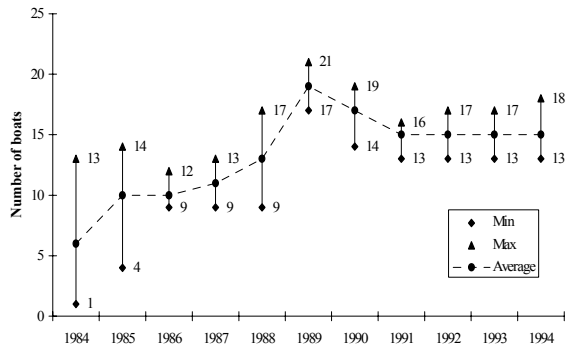
The total catch per unit of effort (CPUE) has increased steadily since the beginning of the fishery (Figure 5). From 1984 to 1987 the CPUE never exceeded 15 tons/fishing day. In 1988 it rose to 18 t/f.day, then decreased slightly in 1989 (16 t/f.day) and 1990 (17 t/f.day). During 1991-1994 the CPUE has gone over 20 t/f.day, with two very good years, 1991 and 1994 (24 t/f.day). The increase in the CPUE in the last four years seems to be related to the increase in yellowfin CPUE. From 1984 to 1990 the average yellowfin CPUE was around 6 t/f.day, but after 1991 it went up to 8 to 11 t/f.day. The skipjack CPUE seems to be stable around 10 t/f.day since 1988, except during 1993 when it went down to 8 t/f.day.

Figure 5 also shows the evolution of annual production rates per boat, calculated as the sum of the monthly production rates of boats actually operating. These rates followed a steadily increasing trend from 1984 to 1988, when they reached 7,300 t/boat/year (600 t/boat/month). In the following two years, 1989 and 1990, they declined to around 5,000 t/b/y (500 and 400 t/b/m, respectively). In the last four years, 1991-1994, the average number of boats actually operating remained constant and the production averaged 6,700 t/b/y (average 570 t/b/m).

The trends in production by species are different. Yellowfin production was stable at about 1,800 t/b/y (average 150 t/b/m) until 1990, except for 1988 when it rose to 3,300 t/b/y (250 t/b/m), and seems to have been responsible for the big increase in total boat production. During 1991-1994, average production of yellowfin reached a level similar to that of 1988 (3,200 t/b/y, or 250 t/b/m) and slightly surpassed the average skipjack production for that period (3,000 t/b/y).

Skipjack production followed a steadily increasing trend from 1984 to 1989 (up to 4,100 t/b/y, or 350 t/b/m), but fell in 1990, severely affecting the total production. Since then skipjack production has remained around 2,500 t/b/y (average 230 t/b/m), except in 1992, when it reached 4,200 t/b/y again (370 t/b/m). Since yellowfin production has been quite stable during the last four years, the variations in skipjack production are responsible for fluctuations in total production.

Figure 4.- *Range and average number of Spanish purse-seine boats operating simultaneously by month in the Indian Ocean from 1984 to 1994.*



September, and the other three started joint operations later. At the beginning of 1994 the last boat arrived in the area, and finished operations in April of that year. Since then no Spanish boats have fished with longlines in the WIO. The results of this experiment were not as encouraging as expected, especially because of the small average size of the fish. At the moment no further activities are expected in the short term.

The definitive boat statistics and provisional catch by year and species for the longline fleet are presented in Table 3. The target species for this fleet is swordfish (*Xiphias gladius*). A more detailed paper describing the results of this campaign (discards at sea, swordfish biology and CPUE analysis) is in preparation.

LENGTH FREQUENCIES

Figures 6 to 8 show the annual length-frequency distribution of the Spanish catch on logs and free schools in 1993 and 1994. The charts represent total catch percentage raised from the Spanish sampling only.

The yellowfin size distribution has a mode at 44 cm in both years for log and free school catch. There is a smaller mode for medium-sized fish (mode = 86 cm) in log-associated schools in 1993 that it is not present in 1994. There is a significant proportion of large fish caught in free schools in both years (modes = 120-130 cm).

Skipjack tuna show a similar size distribution during the two years, with a common modal value of 44 cm. Figure 7 shows the length frequency distributions for log and free schools combined, because there are no significant differences between the two distributions.

The length frequencies for bigeye (Figure 8) in 1993 and 1994 are quite similar. The modal value for the log catch is 48 cm in both years, and for the free-school catch the modal value increases slightly from 42-46 cm in 1993 to 52 cm in 1994. The largest (152 cm) fish are always caught in free schools.

LONGLINE ACTIVITIES IN THE WIO

During 1993 and 1994, a total of five Spanish longliners fished in the WIO under an "Experimental Fishing Campaign" financed by the European Union (EU). Four boats fished in 1993: the first started fishing in

Figure 5*. Total CPUE, CPUE by species, and production per boat of the Spanish purse seine fishery from 1984 to 1994.*

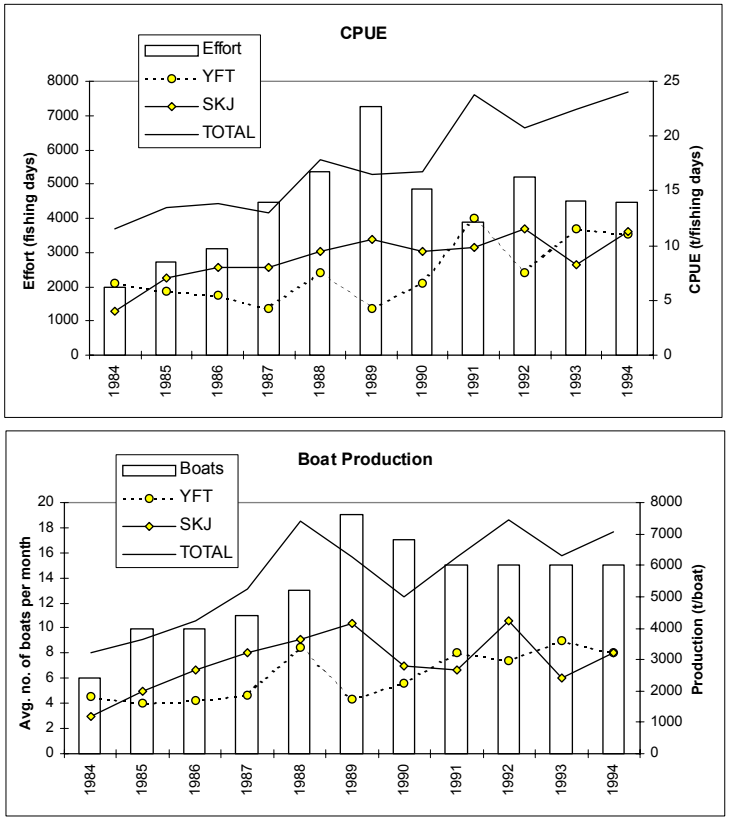


Figure 6.- *Annual length frequency distribution of yellowfin tuna caught by the Spanish purse-seine fleet on log and free schools, 1993-1994.*

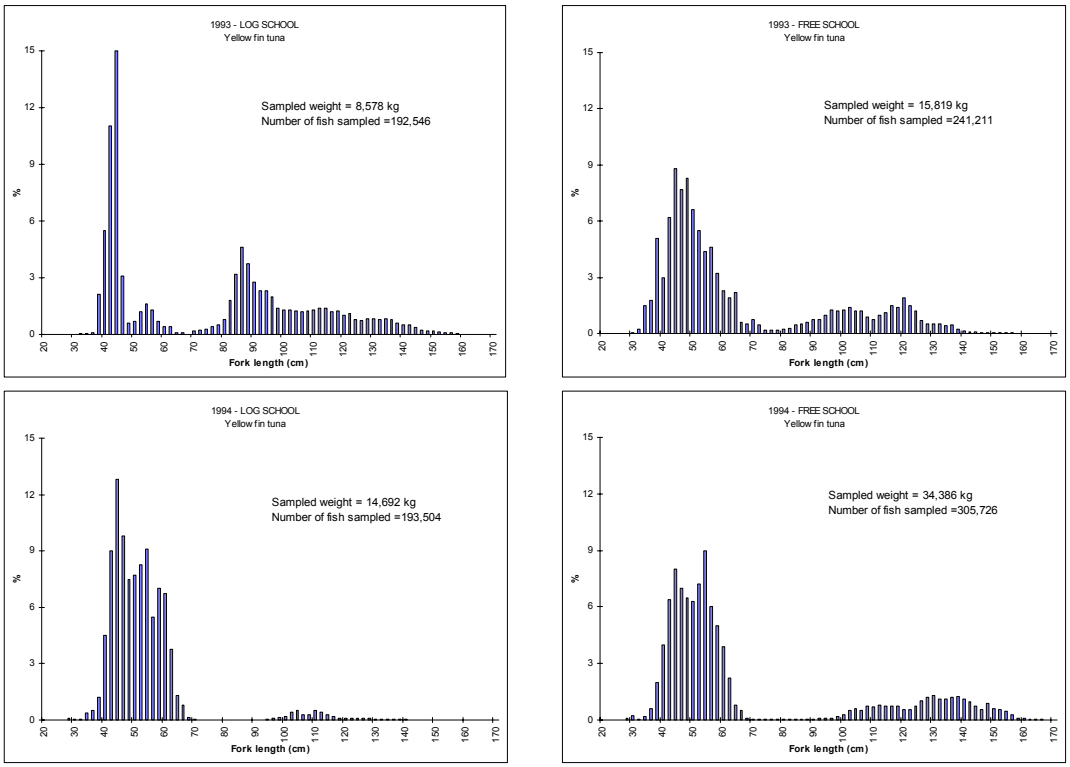
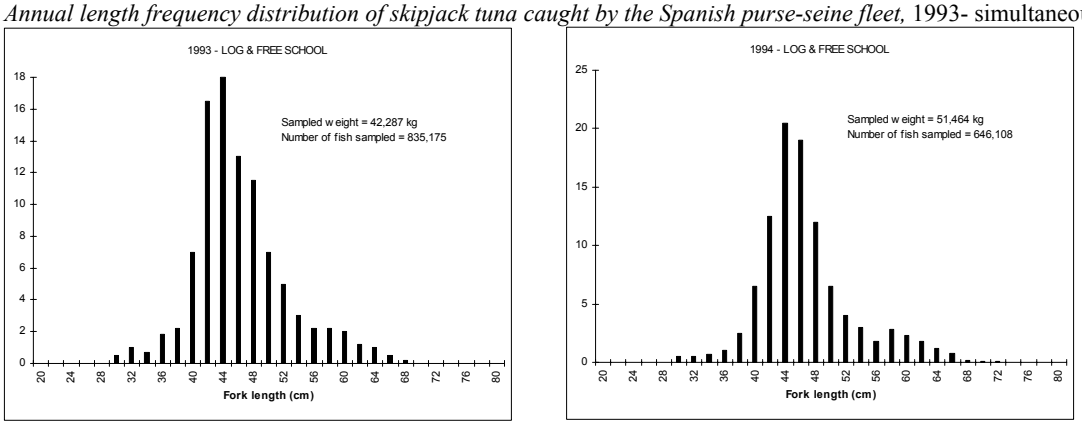


Figure 7.- *Annual length frequency distribution of skipjack tuna caught by the Spanish purse-seine fleet,* 1993- simultaneously 1994.



ADVANCES IN DATA COLLECTION AND RESEARCH

In October 1994 the Oficina Española de Pesca (OEP; Spanish Fisheries Office) in Seychelles was reopened after being closed for one year. The Spanish data collection system has been redesigned to cover all the activities of the Spanish purse-seine fleet. The OEP is actively collaborating with other organizations involved with tuna research in the Indian Ocean.

The Spanish tuna sampling programme currently covers three transshipment bases used by our fleet: Victoria (Seychelles), Diego Suarez (Madagascar) and Mombasa (Kenya).

In Seychelles, where the OEP is permanently based, we work in close collaboration with the Seychelles Fishing Authority (SFA) and with the ORSTOM delegation in Seychelles. The OEP contributes financially to support the SFA sampling team.

Table 3. Total provisional catch (t), by year and species (SWO = swordfish; YFT = yellowfin tuna; BET = bigeye tuna; OTH = others), of Spanish longline boats in the WIO.

Species	*Boats*	*SWO*	*YFT*	*BET*	*OTH*	*TOTAL*
1993	4	163,39	4,85	8,62	12,24	189,10
1994	5	543,23	24,91	23,34	128,34	719,82

***Table 4**.- Summary of the activities of the Spanish sampling programme in Mombasa (Kenya) during 1993 (YFT = yellowfin tuna; SKJ = skipjack tuna, BET = bigeye tuna; ALB = albacore tuna).*

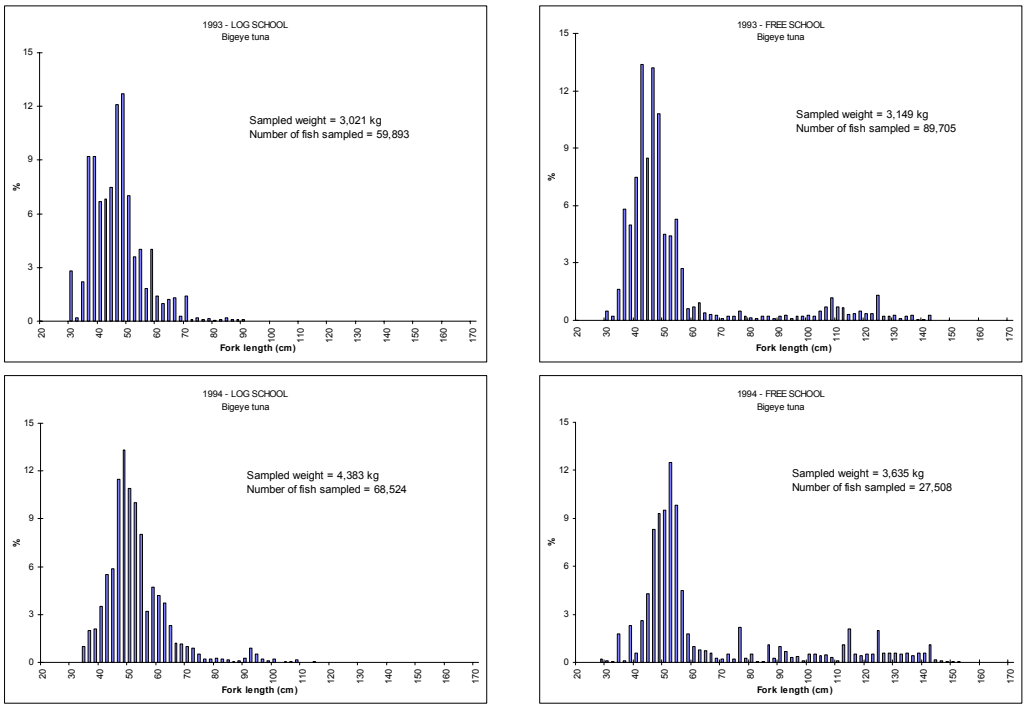
LENGTH FREQUENCY SAMPLING (n = 22)	*YFT*	*SKJ*	*BET*	*ALB*	*TOTAL*
Number of fish measured	2,114	1,306	456	35	3,911
Reference catch (t)	654	692	70	4	1,420
Average number of size classes	29	20	13	8	
SPECIES COMPOSITION SAMPLING (n = 22)	YFT	SKJ	BET	ALB	TOTAL
Number of fish counted	4,689	9,362	937	106	15,094
Reference catch (t)					1,322

In Madagascar, the OEP works in close collaboration with the Direction des Ressources Halieutiques (DRH) and its delegation in Diego Suarez, the Unité Statistique Thonière d'Antisaranana (USTA). OEP personnel work in close cooperation with the Association Thonière (AT) based in Antananarivo and actively participate in the meetings and working groups to which they are invited by the AT.

In Kenya, the OEP started a sampling programme in 1993 (Table 4). This was suspended in 1994, but was re-initiated in June 1995, and has sampled 15 boats up to August. The sampling scheme is similar to those used in Seychelles and Madagascar (described in the paper "Data recording system and sample strategy in the WIO purse-seine fishery"), and is under the technical and financial management of the OEP. The results obtained during the 1993 sampling have been processed and are included in the Spanish statistics.

The OEP is currently using the ORSTHON package for data entry and processing of the purse-seine statistics. The close collaboration between the ORSTOM and the OEP has the common target of tuning and improving the system used in the WIO to collect tuna statistics.

***Figure 8.-** Annual length frequency distribution of bigeye tuna caught by the Spanish purse-seine fleet on log and free schools, 1993-1994.*



A joint project between ORSTOM and the Instituto Español de Oceanografía (IEO), "Species Associated with Tropical Tuna Fisheries", financed by the EU, is currently under way. Two observers have been embarked on Spanish vessels in the WIO during 1995 under this programme, and a total of 12 observers, 6 Spanish and 6 French, will be embarked by the beginning of 1996. The OEP collaborates with the IEO to ensure shipment\embarcation in Victoria and Mombasa.

Also in collaboration with ORSTOM, the IEO presented a project to the EU entitled "Tropical Tuna Multispecies Scheme Analysis", currently under consideration in Brussels. This programme, if approved, will review and statistically validate all the data processing routines currently used to collect tuna statistics in the Indian and Atlantic Oceans by these two organisations.

Spanish scientists in the Indian Ocean have been collaborating with IFREMER and ORSTOM delegations in La Réunion in the preparation of a "Scientific accompaniment programme to the development of the longline fishery targeting swordfish in the southwestern Indian Ocean", currently under consideration at EU headquarters. The proposed Spanish participants in this project are the IEO (through the OEP) and the University of Las Palmas de Gran Canaria (ULPGC).