THE FRENCH TROPICAL PURSE-SEINE FISHERY, 1981-1997, WITH SPECIAL EMPHASIS ON 1995-1997

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Overview of the fishery

France has been one of the main fishing nations using industrial purse seiners in the Indian Ocean since the beginning of this fishery in the early 1980s. Its fleet operates over a wide area, covering the western side of the Indian Ocean, and centred around the Seychelles Islands. Catches are either transhipped to reefers in Victoria (Seychelles) and Antsiranana (Madagascar) or delivered to local canneries.

Catch and effort Statistics

Fleet

The fleet has remained quite stable, with some 15-18 vessels, after a peak of 22 in 1985. This is reflected in Figure 1, which shows the evolution of nominal effort in vessel-years (the mean number of active vessels in a whole year) as well as in terms of total carrying capacity of the fleet (also weighted by the vessel activity).

Effort

The evolution of the effective effort is shown in Table 1 and Figure 2. Standard fishing days are computed using a Robson type of fishing power for the different vessels of the fleet. This effort also remained very stable, with a slight increase since 1990, reflecting the move of the fleet towards more modern, larger and more efficient vessels.

Catches

Total catches are reported in Table 1 and Figures 3 (by type of school), 4 (by species, all catches combined), 5 (by species, for log schools) and 6 (by species, for free schools). The total catch has fluctuated between 85,000 and 95,000 tonnes in recent years. This stability reflects a strong evolution of the fishery towards log fishing since 1990, as is clearly shown by Figure 3; log catches rose from some 50 % of the total before 1990 to nearly 75 % in 1997. This phenomenon is also reflected in the declining proportion of yellowfin tuna in the catches since 1992.

Seasonal distribution of the catches

The monthly variations in the catch by species in the main fishing areas from 1995 to 1997 are shown in Figure 7 for both log (7A) and free (7B) schools. No major changes can be observed, except for the increased fishing in the eastern Indian Ocean at the end of 1997. This seems to be linked to the last ENSO phenomenon, whose effects were particularly strong in the Indian Ocean and led to very poor catches in the West during this period. However, it should be noted that some Japanese purse seiners have been fishing regularly in the East since 1994.

CPUE

Nominal catch per unit effort (CPUE) – expressed as total catch divided by total standardized effort - is shown in Figure 8, while effective CPUEs for yellowfin, skipjack and bigeye are shown in Figure 9. The CPUEs are standardized by correcting the individual fishing power of the purse seiners; effective CPUEs are computed as the mean of the individual 1-degree square by fortnightly CPUEs (excluding squares with less than 12 fishing hours of effort and fortnights with less than 12 squares fished) in the whole traditional fishing area (10°S–10°N, 35–75°E). The Mozambique Channel and Chagos were excluded because of the strong variability observed in these areas. CPUEs were computed on both log and free schools, even though the significance of a log CPUE is very questionable.

Total nominal CPUEs have declined in the last three years and have returned to the values observed at the beginning of the fishery. Yellowfin CPUE declined slowly from some 10 tonnes per day in 1992 to 6,5 tonnes per day in 1997 (more markedly in the last year), while skipjack CPUE fluctuated between 6 an 8 tonnes per day, and bigeye CPUE is stable at under 1 tonne per day.

The effective total CPUE for yellowfin exhibits a similar decline (stronger but limited in the two last years) for both log and free schools, returning to the values observed at the beginning of the fishery. Skipjack CPUEs are quite stable at a high level for log schools. Bigeye CPUEs show a marked increase, mainly in relation with the development of the log fishery. It should be noted that the strong development of the log fishery may directly affect yellowfin CPUEs by redirecting the purse-seine fishing effort.

Fishing areas

The distribution of effort and catches for 1995, 1996 and 1997 is shown in Figures 10, 11, and 12, respectively. The effort is quite widely distributed, while the distribution of the catches is more localised, with very different patterns for catches on logs and free schools. The most striking feature is the eastern extension of the fishery at the end of 1997, which continued throughout the first quarter of 1998.

Composition by Size and species

The composition of the catch by size and species continued to be monitored by the SFA in Victoria and USTA in Antsiranana, in collaboration with French scientists. The species composition is used to correct the logbooks according to the sampling (separating log and free schools) and raised on a spatio-temporal basis. The size composition of log and free schools during 1995-1997 is shown in Figures 13 (in number) and 14 (in weight). Sizes for all species remained relatively stable in the three last years; well reflected by the evolution of their mean weight since 1991 (Figure 15).

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Research

This period has seen the completion of the second Regional Tuna Project, funded by the European Union (EU) through the *Association Thonière*, part of the *Commission de l'océan Indien* (COI). The main results of this programme were presented in November 1996 at the *Conférence Thonière* organized by the COI in Mauritius, and a synthesis is being prepared.

This period was also characterized by two other projects funded by the EU and carried out jointly by French and Spanish scientists in both the Indian and Atlantic Oceans. The main results of the first project, a study of purse-seine bycatch through an extensive observer program, were presented at the *Conférence Thonière.* The second was aimed at improving the estimates of size and species composition for the European purse-seine fisheries through a thorough analysis of the samples collected since 1990 (INF/98/6). This program led to the design of a new sampling scheme, which was implemented in 1998, and of a new relational database and data entry system to be used for European data.

Table 1. Effort, in thousands of days, and catches, in thousands of tonnes, on logs, free schools and total, of the French purse-seine fishery,1981-1997.

	Effort		Log schools					Free schools					Total				
Year	Days at sea	Standard fishing days	YFT	SKJ	BET	ALB	Total	YFT	SKJ	BET	ALB	Total	Total catch	YFT	SKJ	BET	ALB
81	0,1	0,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,0	0,0	0,0
82	0,3	0,3	0,6	0,1	0,0	0,0	1,3	0,0	0,0	0,0	0,0	0,8	2,1	1,0	1,0	0,0	0,0
83	1,5	1,6	3,8	8,4	0,2	0,0	12,4	7,6	2,0	0,0	0,0	9,6	22,0	11,4	10,4	0,2	0,0
84	6,1	6,2	8,2	24,8	1,8	0,0	34,7	33,8	9,3	1,0	0,3	44,4	79,1	42,0	34,0	2,7	0,3
85	6,5	6,5	16,3	29,1	4,0	0,0	49,4	26,6	3,6	0,6	0,6	31,4	80,8	42,9	32,7	4,6	0,6
86	5,4	5,5	16,2	28,1	5,6	0,0	50,0	26,2	7,6	1,5	0,2	35,4	85,3	42,4	35,7	7,0	0,2
87	5,0	5,0	22,4	22,8	5,1	0,0	50,3	24,4	12,7	1,8	0,2	39,1	89,4	46,8	35,5	6,9	0,2
88	5,4	5,4	14,7	26,0	4,0	0,0	44,7	45,3	10,1	2,1	0,2	57,7	102,3	59,9	36,1	6,2	0,2
89	5,2	5,2	15,4	27,0	2,8	0,0	45,1	23,1	16,1	0,8	0,0	40,0	85,1	38,4	43,1	3,6	0,0
90	4,7	4,9	10,5	21,7	2,6	0,0	34,8	34,8	7,4	2,0	0,0	44,2	79,0	45,3	29,0	4,6	0,0
91	5,0	5,0	11,9	32,6	5,1	0,0	49,6	29,1	2,5	1,8	0,9	34,3	83,8	40,9	35,2	6,8	0,9
92	5,4	5,5	19,3	32,0	3,6	0,0	54,9	33,8	4,8	0,7	1,4	40,6	95,6	53,1	36,8	4,2	1,4
93	5,4	5,7	21,2	30,6	3,5	0,0	55,3	30,4	5,6	1,4	0,3	37,7	93,1	51,6	36,2	4,9	0,3
94	5,4	5,6	19,1	37,8	4,3	0,0	61,3	27,3	9,9	1,2	0,3	38,7	99,9	46,4	47,7	5,5	0,3
95	5,5	5,8	24,4	35,4	4,0	0,0	63,7	21,3	9,2	1,4	0,3	32,2	95,9	45,7	44,6	5,3	0,4
96	5,3	5,6	15,9	31,4	7,1	0,1	54,4	20,3	6,8	1,0	0,3	28,5	82,9	36,2	38,2	8,1	0,4
97	6,5	6,8	15,7	39,3	7,3	0,1	62,4	15,2	5,4	1,0	0,4	22,0	84,3	30,9	44,7	8,2	0,5

Figure 1 – French purse seine nominal fishing effort – 1981-1997

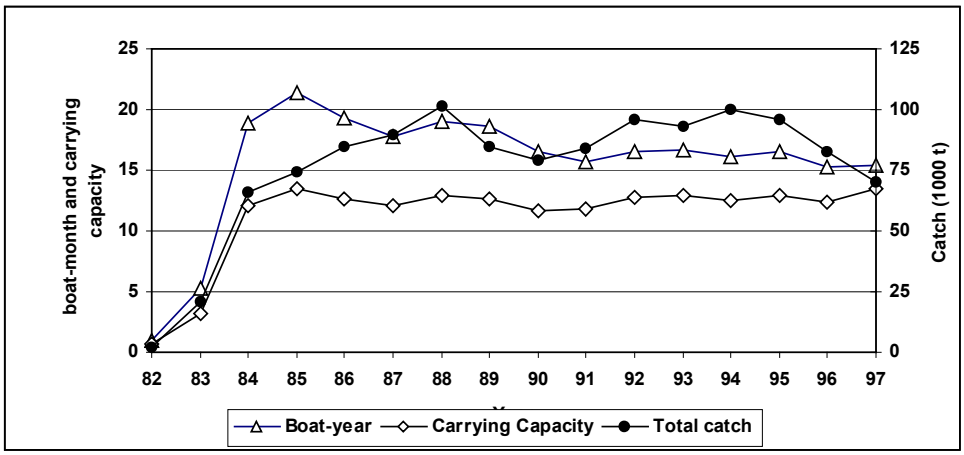


Figure 2 - French purse seine effective effort

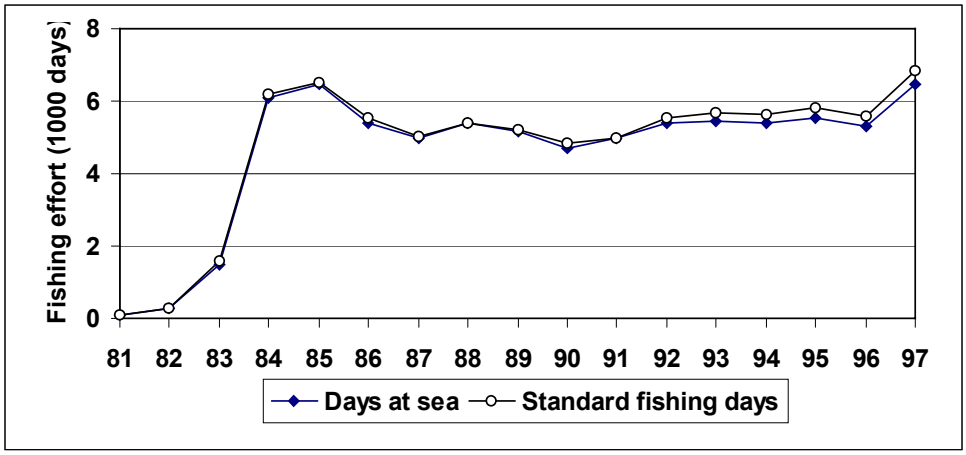


Figure 3 - French purse seine total catch on Log and Free schools

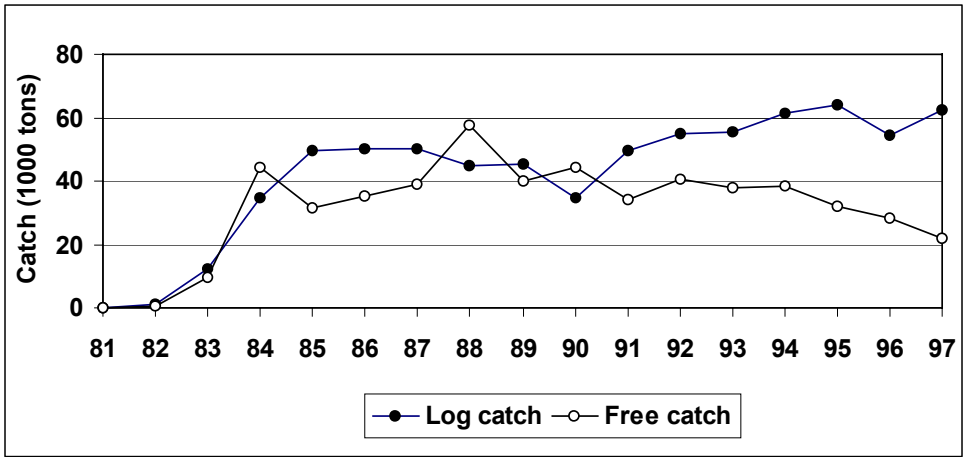


Figure 4 - French purse seine total catch by species (Log and Free schools)

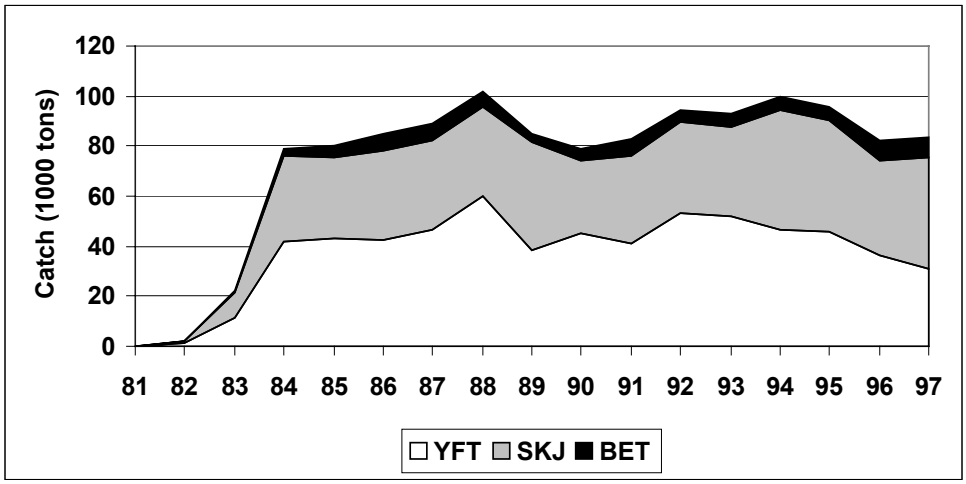


Figure 5 - French purse seine Log schools catches by species

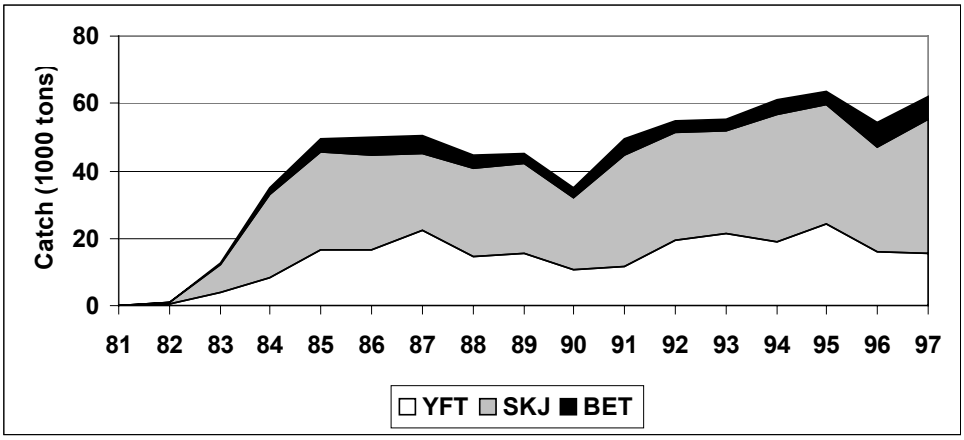


Figure 6 - French purse seine Free schools catches by species

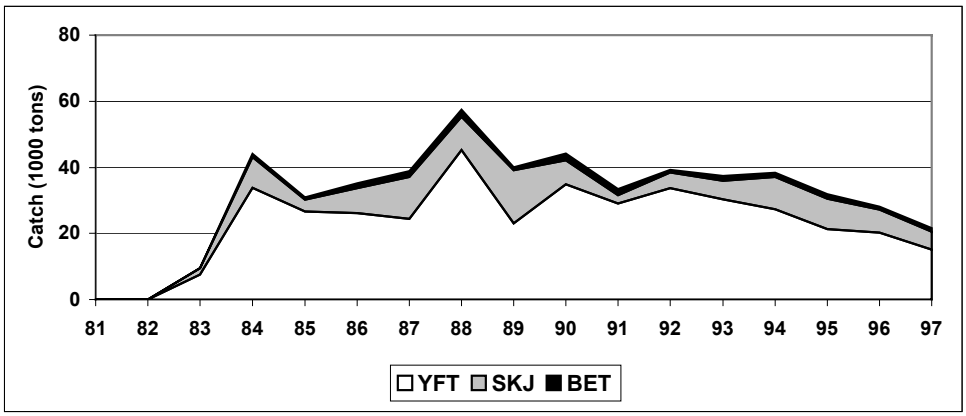
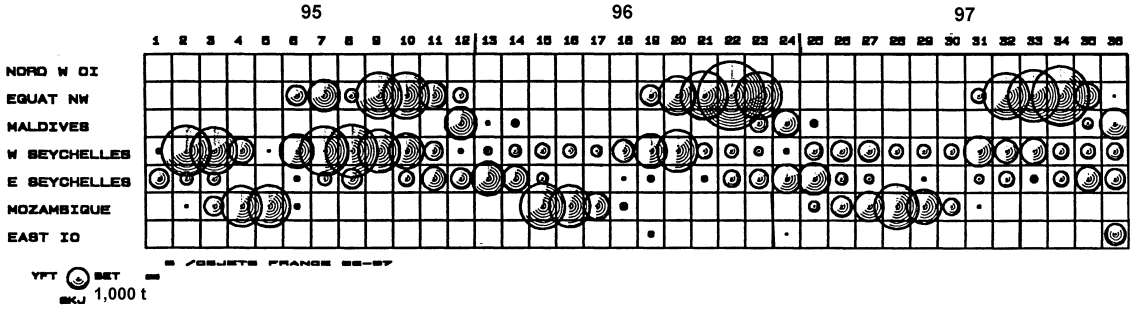


Figure 7 - French purse seine monthly distribution of the catches by species within 7 areas (as described below)

NW Indian Ocean	NW Equator	Maldives	W Seychelles	E Seychelles	Mozambique Channel	East IO
12-30°N 45-70°E	0-12°N 40-70°E	5°N-13°S 70-80°E	0-10°S 30-55°E	0-13°S 55-70°E	10-25°S 35-50°E	20°N-13°S 80-120°E

A - Log schools – 1995-1997



B – Free schools – 1995-1997

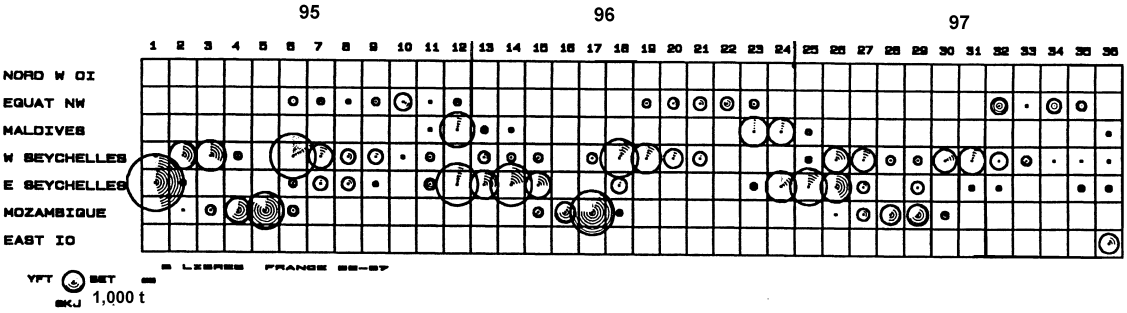


Fig 8 – Nominal CPUEs of the French purse seine fishery.

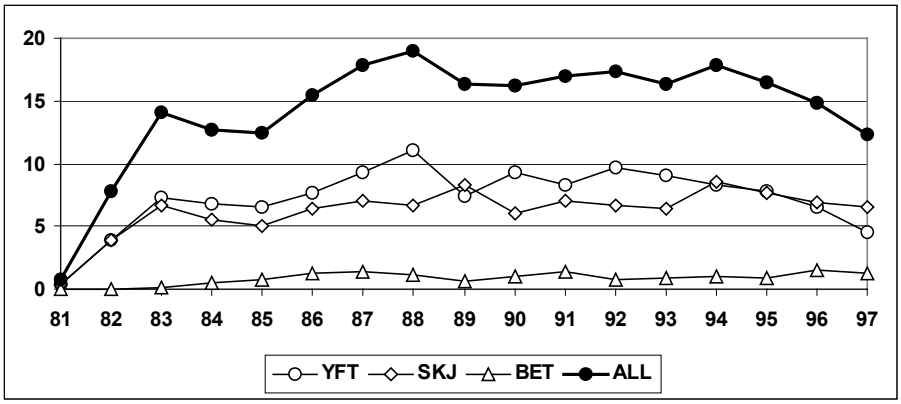
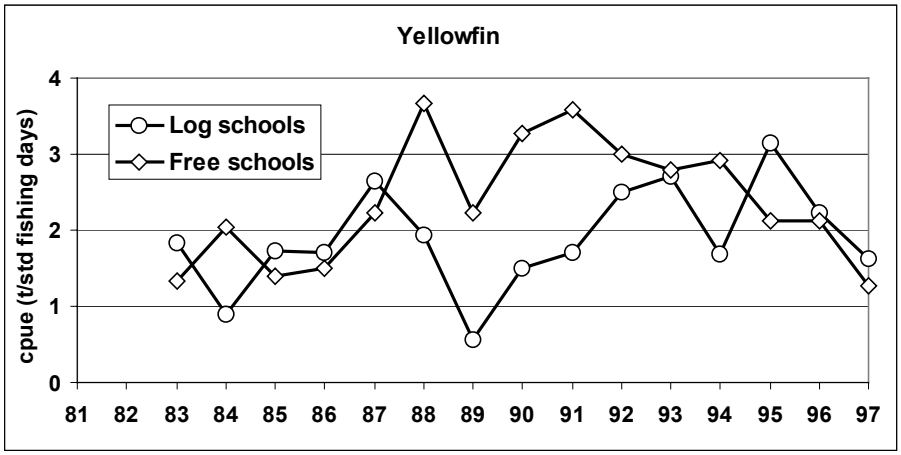
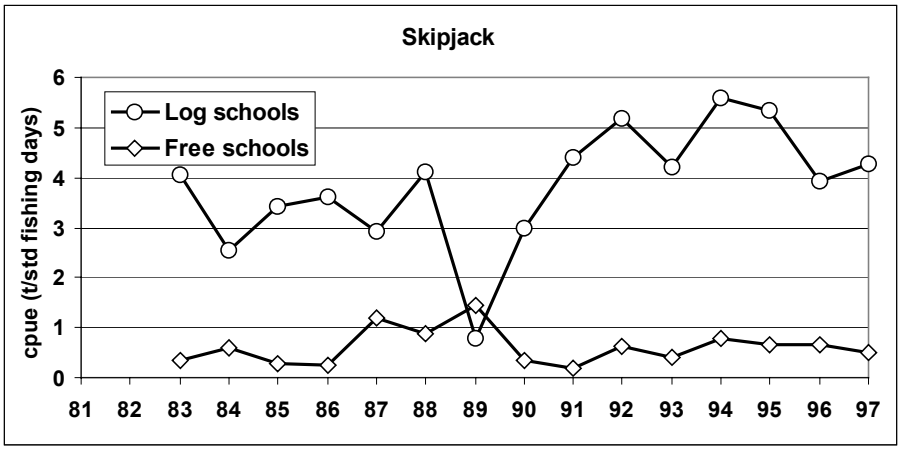


Figure 9 – Standard CPUE on log and free schools of the French purse seiners in the main fishery area (10 S – 10 N, 35 – 75 E).





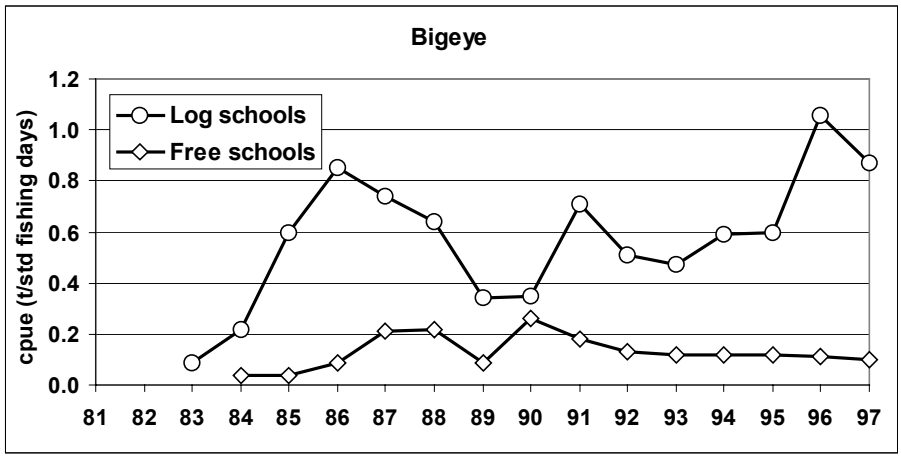
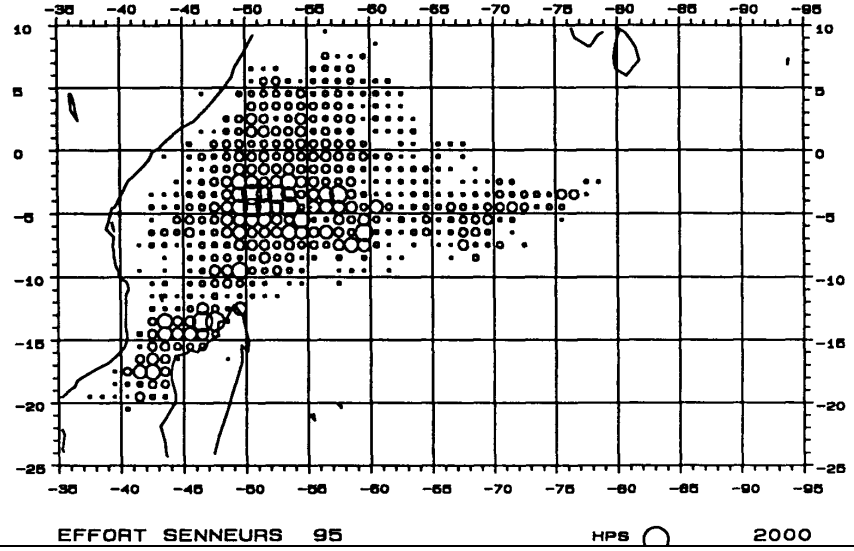
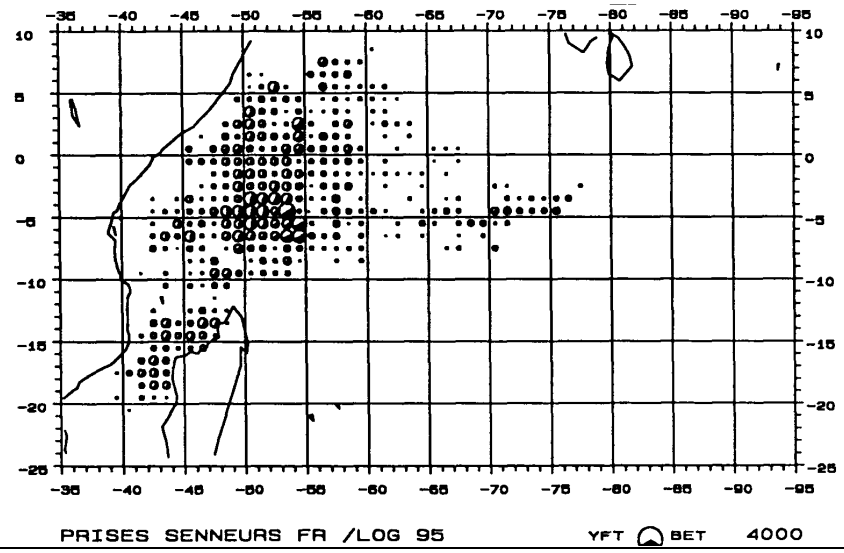


Figure 10 - French purse seine catch and effort distribution - 1995

Total effort (standardized fishing days)



Log school catches



Free school catches

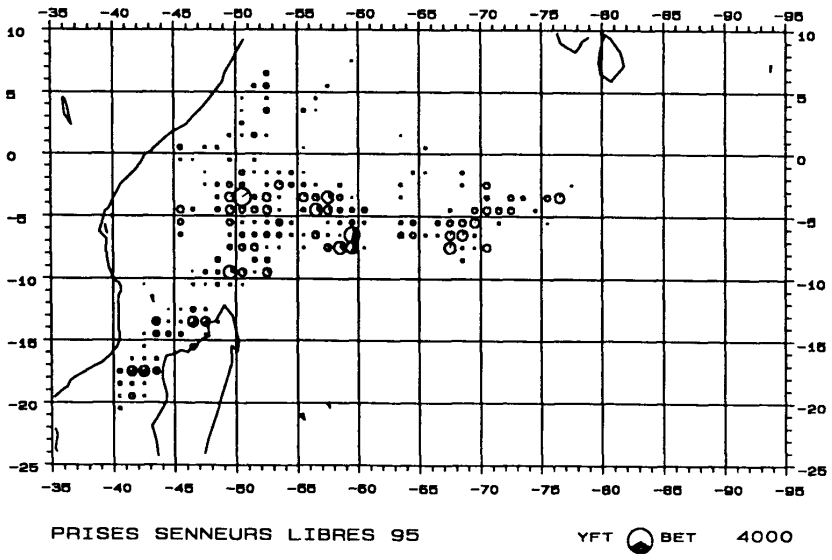
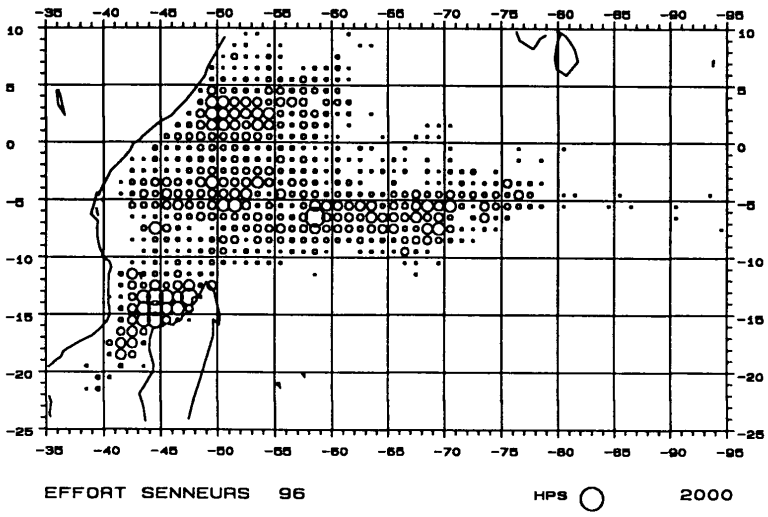
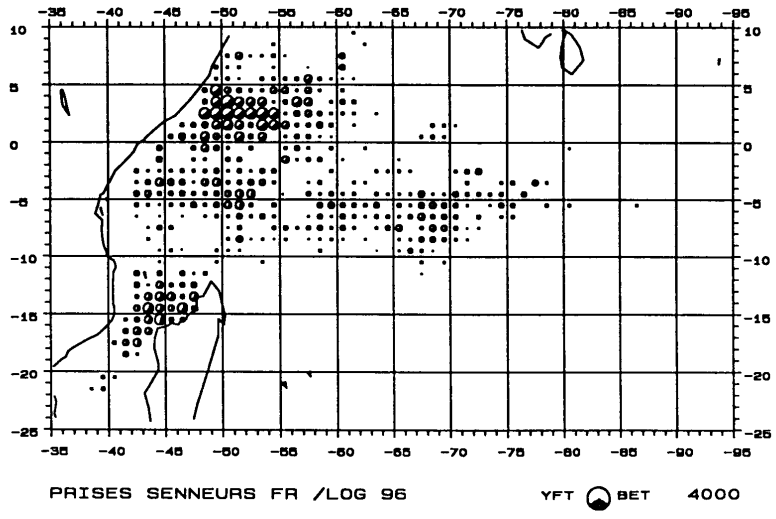


Figure 11 - French purse seine catch and effort distribution - 1996

Total effort (standardized fishing days)



Log school catches



Free school catches

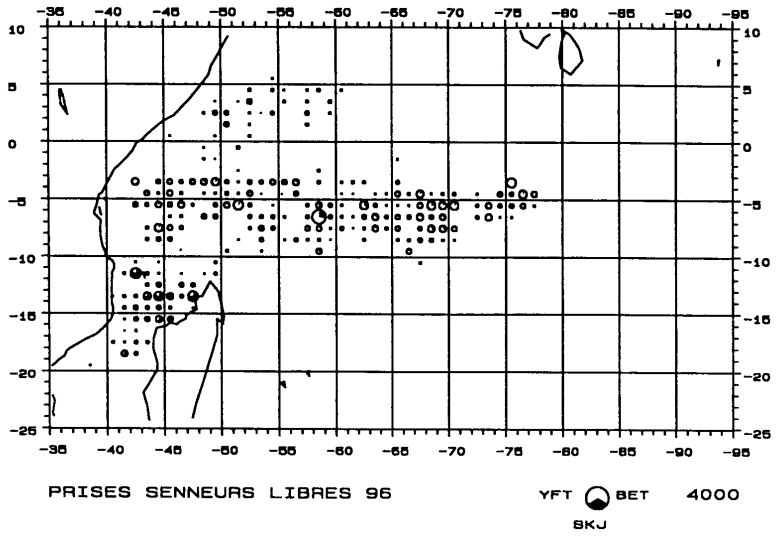
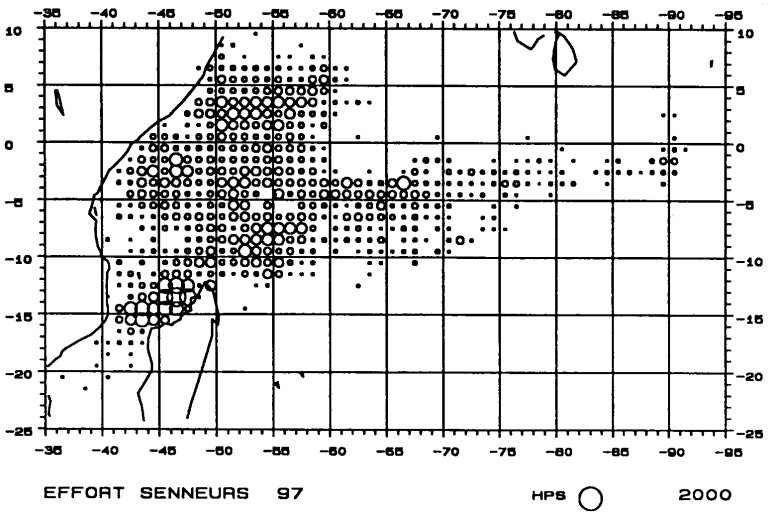
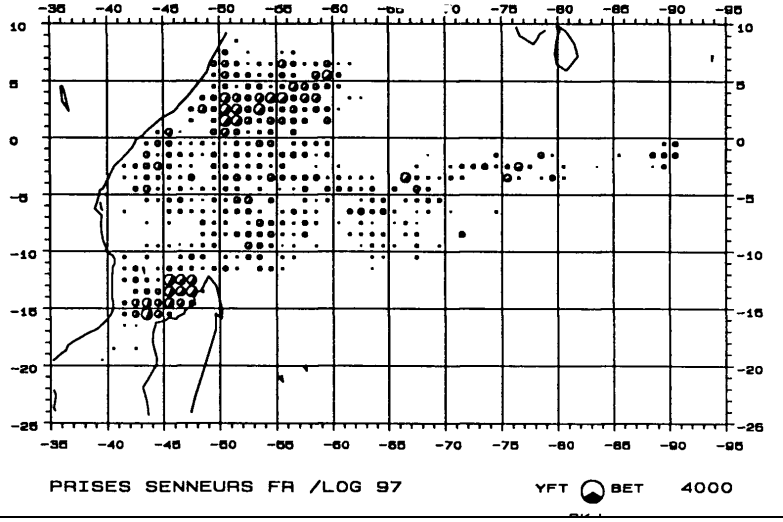


Figure 12 - French purse seine catch and effort distribution - 1997

Total effort (standardized fishing days)



Log school catches



Free school catches

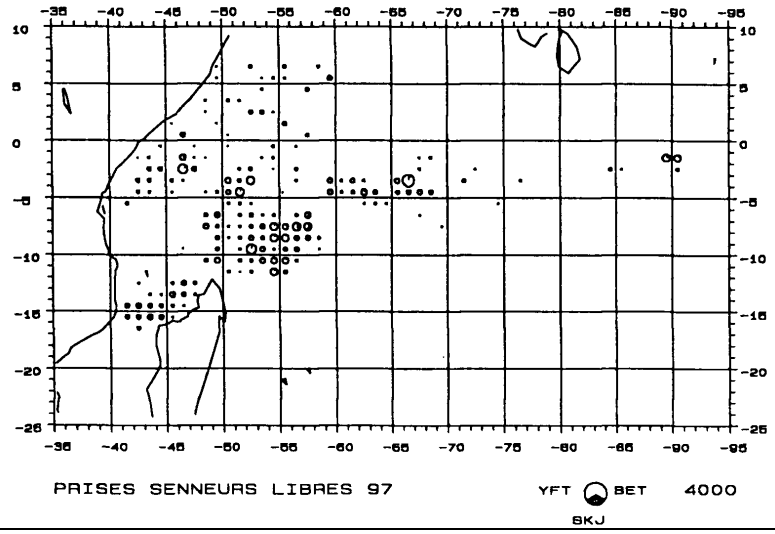


Figure 13 - French purse seine catch size distribution in numbers - 1995-1997
Log (left) and Free (right) schools ; Yellowfin (top), Skipjack (centre) and bigeye (bottom).

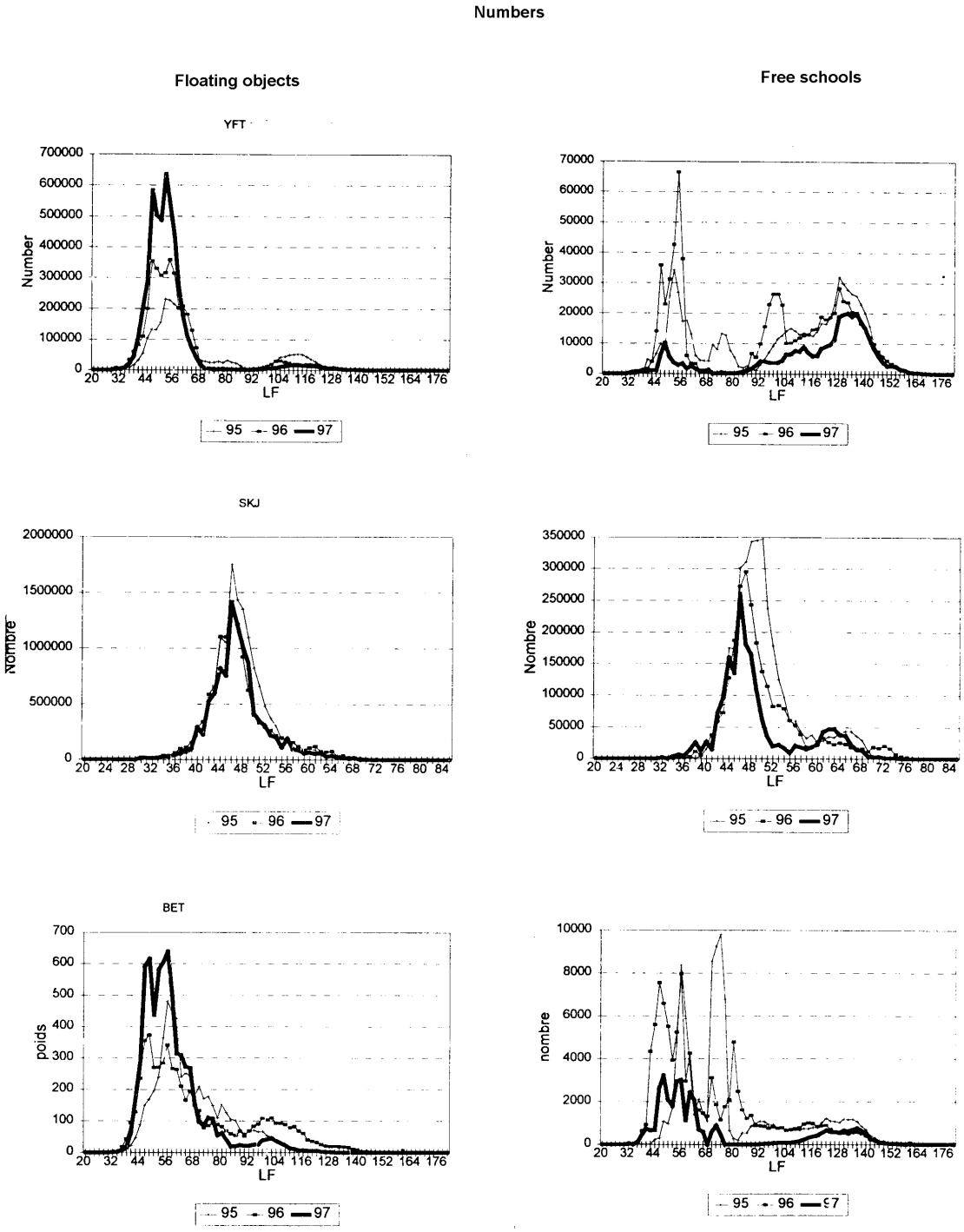


Figure 14 - French purse seine catch size distribution in weight - 1995-1997
Log (left) and Free (right) schools ; Yellowfin (top), Skipjack (centre) and bigeye (bottom).

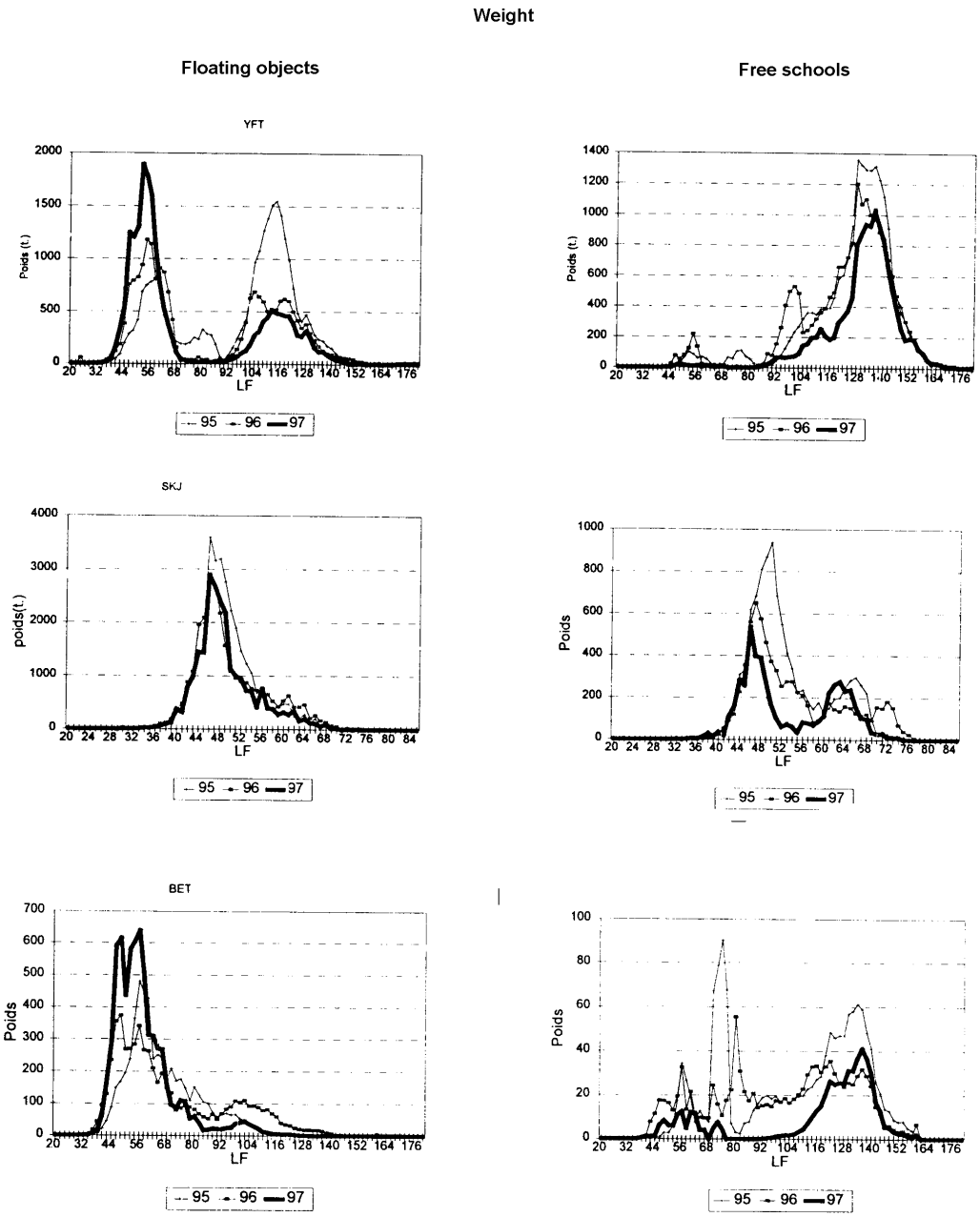


Figure 15 - French purse seine catch mean weight - 1991-1997
Yellowfin (top), Skipjack (centre) and bigeye (down).