THE STATUS OF RÉUNION ISLAND (FRANCE) - BASED TUNA FISHERIES IN THE INDIAN OCEAN

René F., Poisson F., Guyomard D.

ABSTRACT

The Réunion fishery has experienced rapid growth and development in all segments (artisan fishery, Antarctic deep sea fishery, longline fishery) for the last five years, in marked contrast to the situation experienced by the huge majority of other European Union fishing communities.

*The longlining sector, which began five years ago, has shown the most rapid of development. Longlining has, since 1996, not only equalled but overtaken the artisan fishery, with more than 2,300 t production in 1997 and an active fleet of 21 vessels which range from 9 to 33 m long. This fishery targets swordfish (*Xiphias gladius*) mainly throughout the year, from the equator to 32°S, using deep freeze conservation techniques.*

The artisanal segment has also shown a rapid extension due to the development of FAD-associated techniques. In the Réunion Island coastal waters (up to 15 miles), there are now more than 30 FADs, exploited by local fishermen from small fishing units with troll and drifting hand lines for scale on the local market.

Introduction

The Réunion fishery has experienced rapid growth and development in all segments (artisan fishery, Antarctic deep sea fishery, longline fishery) for the last five years, in marked contrast to the situation experienced by the huge majority of other European Union fishing communities.

The most rapid of these developments is in the longlining sector, which began operating five years ago, and which has overtaken the artisan fishery since 1996, with more than 2,300t production in 1997. The techniques have been considerably modernised, following the example of the Hawaiian longline fleet. The mainline is of monofilament nylon and is cast and hauled by a hydraulic winch. Light sticks are used, baited with squid. The fishery has an efficient land-based support system, with the ORSTOM SEAS station (satellite thermal charts integrating fishing and environmental data evolution and evaluation).

The sum of these advances has enabled net productivity gains and the Réunion fleet, which has high labour costs, has become a real contender on the market, competing with an Asian fleet with cheap labour. The profitability of this fishery is also due to the privileged access to the European Union market through a demanding and solvent local market and a particularly profitable export market to Europe, with sales in France, Spain and Italy.

The artisanal segment has also shown a rapid extension due to the development of FAD-associated techniques. In the Réunion Island coastal waters (up to 15 miles), there are now more than 30 FADs, exploited by local fishermen from small fishing units with troll and drifting hand lines for scale on the local market (Tessier & Poisson, 1997).

Fisheries monitoring

The IFREMER laboratory in Réunion Island ensures scientific monitoring of the fisheries. The artisanal and longlining fleets have been studied during the PTRII (Programme Thonier Régional II, Commission de l'océan Indien).

A logbook monitoring system has been implemented in association with longlining fishermen, while artisanal fishermen are covered by a specific survey. Both systems have provided good results and are expected to be sustainable in the future.

Effort

Longline fleet

The longline fleet, based on Pointe-des-Galets harbour, has increased for the last 7 years, attaining 21 active units in 1998 (Figure 1). The bigger boats are up to 30m long, and the smaller ones 12m.

The Réunion longlining fleet has been exploring fishing areas in the south-western Indian ocean since 1993 (Figure2). The larger vessels, which freeze their catches, have been able to fish in distant areas such as the Seychelles and the Mozambique Channel.

Figure 2 shows the density of fishing operations per year, each set representing an effective effort of 500 to 2000 hooks. Nevertheless, there is a clear trend towards an increase over time in the number of hooks per set.

The artisanal fleet

Two kinds of fishing boats are used in Réunion by artisanal fishermen (Roos & al, 1997):

- small plastic or wooden open boats, up to 6m long, used for up to 12 hours at sea, motorised by 6 to 25 Hp engines and fishing up to 10 miles offshore (5 miles according to the official regulations).
- modern decked "vedettes", from 6.5 to 11m long, powered by 40 to 250 Hp, permitting trips longer than 12 hours and exploiting fishing areas up to 20 miles away from the island.

The effort data (number of fishing units and number of fishing days, cf. Table1 and 2, and Figure3) have been precisely assessed in 1994 by Tessier and Poisson (1997). It is actually difficult to estimate the global effort of the artisanal fleet, where non professional fishermen represent quite a substantial part of the total fishing effort and fishing techniques are very different from one boat to another. Tessier and Poisson (1997) nevertheless show that the FADs are responsible for a great part of the increase in catches of the artisanal segment, and represent a part of this total effort (Figure 4).

Catches

Figures 5 and 6 show the evolution of total catches and values for each sector of the Réunion Fisheries. The large pelagics (including tunas and billfishes) are particularly important in the catches of the artisanal sector, mainly due to FADs.

Longline catches attained more than 2,300 t in 1997 (66 % swordfish) and have increased rapidly by exploring more distant areas from Réunion. Figures 6 to 10 show the progression of the composition in catches of the longlining fleet.

Fishing results (catches per unit of effort)

The artisanal fleet

No particular trend has been observed in the evolution of annual catches from 1993 to 1997 (Figure 11). Yellowfin abundance (representing 30 % of the total catches) nevertheless shows great seasonal variations, the best period being from January to April. Production depends on what local fishermen consider as "tuna runs", i.e., the annual abundance of migrating tunas around Réunion Island. This is difficult to link with the local effort on the stock.

Longlining fleet

Figure 12 shows the evolution of the CPUE of the longline fleet. It appears that, after a period of learning and mastery of new techniques (1992-1994), CPUE attained 13 swordfish caught per 1,000 hooks in 1995, and a significant decrease (down to 8-10 individuals) followed. Poisson and Tessier (1997) consider that this evolution is not due to reduction of exploited swordfish populations in the area : the increase of the number of hooks used on the same line length and the exploration of new remote fishing areas could explain this trend. Anyway, the definition of a better abundance index (including kilometres of line, number of hours per number of hooks set...) seems crucial to understand the evolution of the CPUE (Poisson et René, 1997).

Research activities

The two institutes concerned with fisheries research in Réunion (IFREMER and ORSTOM) have complementary capabilities, sets of data and interests. They therefore set up a three year co-operative project on the relationship between resources and environment in a dynamic perspective.

The integration in a dynamic GIS of environmental data, sea surface temperature, Ekman pumping, dynamic topography, sea water colorimetry and bathymetry, obtained on a daily to weekly basis with a spatial resolution of 1 to 10 miles will define a seascape closer to the one perceived by the pelagic species than any previous approach.

In a second phase, individual-based and multiple-agent models, established in co-operation with the University of La Réunion, will provide information about decision making of the fishes in this environment and allow to refine our knowledge about the ethology of the targeted species without heavy physical oceanographic modelling. The results will be validated by fish catch statistics as well as archival tags.

The new paradigm of this research project is the evaluation of the environment parameters as a major factor for the dynamics of exploited populations. Thus, new questions will arise: how will this allow us to re-consider the management of the fisheries system ? How to apply this approach to other high seas species such as mammals, turtles and birds? We can now understand how fisheries sciences can benefit from new research fields to contribute to the development of emerging requests to take into account the patrimonial value of marine resources.

Acknowledgements

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Table 1 - Composition of the artisanal fleet in 1994

District	Name of the harbour	non-professional small boats	professional small boats	non professional vedettes	professional vedettes
north-west	Le Port	88	30	64	20
north-west	La Possession	45	10		
north-west	Saint Leu	48	21	2	1
north-west	Saint Gilles	83	23	41	17
north-west	Saint Paul	26	20		
north-east		69	10		
south-east		53	32		
south-east		104	32	39	19
TOTAL		**517**	**178**	**146**	**57**

Table 2 – Part of the fishing effort on FADs (in number of one day sea trip) for each sector of the artisanal fleet fishing in 1994

District	sector	Total effort	Effort on FAD	FAD activity in %
north-west	boat non professional	13,387	633	4.7
	boat professional	11,046	1,418	12.8
	vedette non professional	5,646	292	5.2
	vedette professional	4,659	2,530	54.3
north-east	boat non professional	2,577	75	2.9
	boat professional	761	0	0.0
	vedette non professional	0	0	0.0
	vedette professional	0	0	0.0
south-east	boat non professional	3,798	414	10.9
	boat professional	2,865	1,271	44.4
	vedette non professional	0	0	0.0
	vedette professional	0	0	0.0
south-west	boat non professional	6,368	781	12.3
	boat professional	2,236	625	28.0
	vedette non professional	1,862	323	17.4
	vedette professional	2,606	2,086	80.1
Total non professional		33,638	2,518	7.5
Total professional		24,173	7,930	32.8
TOTAL		57,811	10,448	18.1

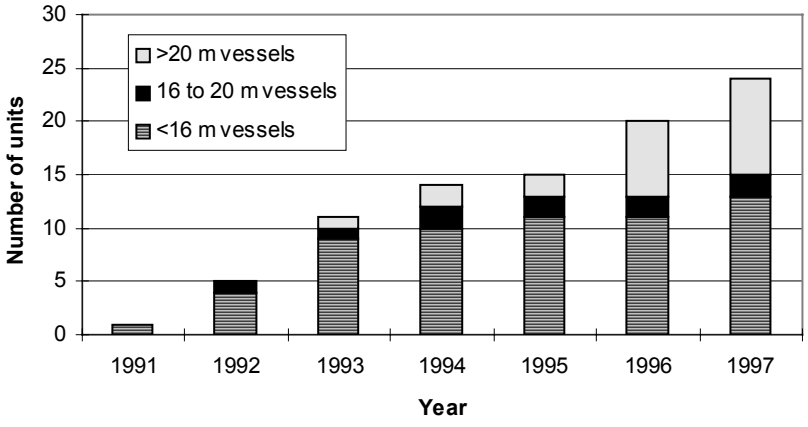
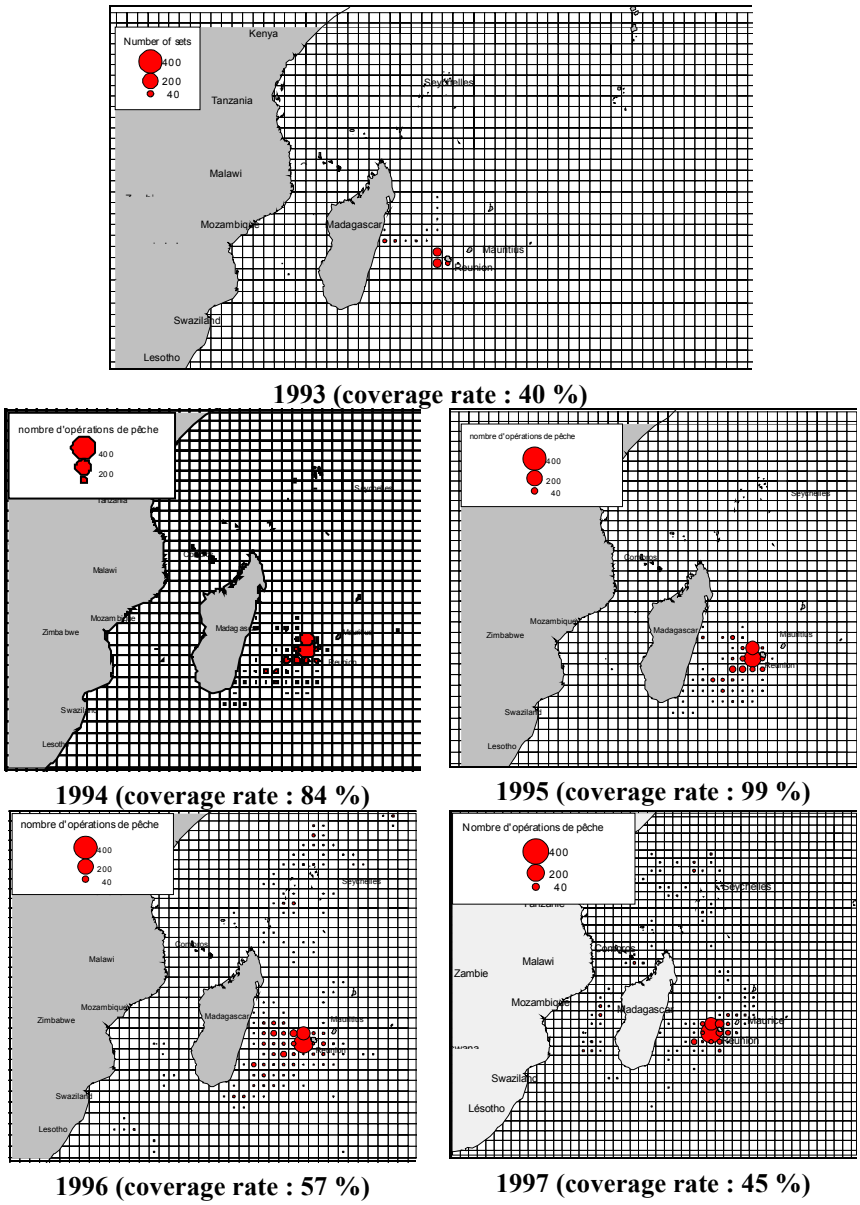


Figure 1 : Evolution of the Réunion Island longlining fleet from 1991 to 1997, sorted by size (in meters)



1993 (coverage rate : 40 %)

1994 (coverage rate : 84 %)

1995 (coverage rate : 99 %)

1996 (coverage rate : 57 %)

1997 (coverage rate : 45 %)

Figure 2: Evolution of fishing operations (number of sets) of the Réunion longlining fleet in the south-western Indian ocean from 1993 to 1997 [1].

[1] Coverage rate is defined by the ratio between the number of trips listed in the fishing logbooks (IFREMER data base) and the total number of estimated trips by the entire fleet (Fisheries Administration data base).

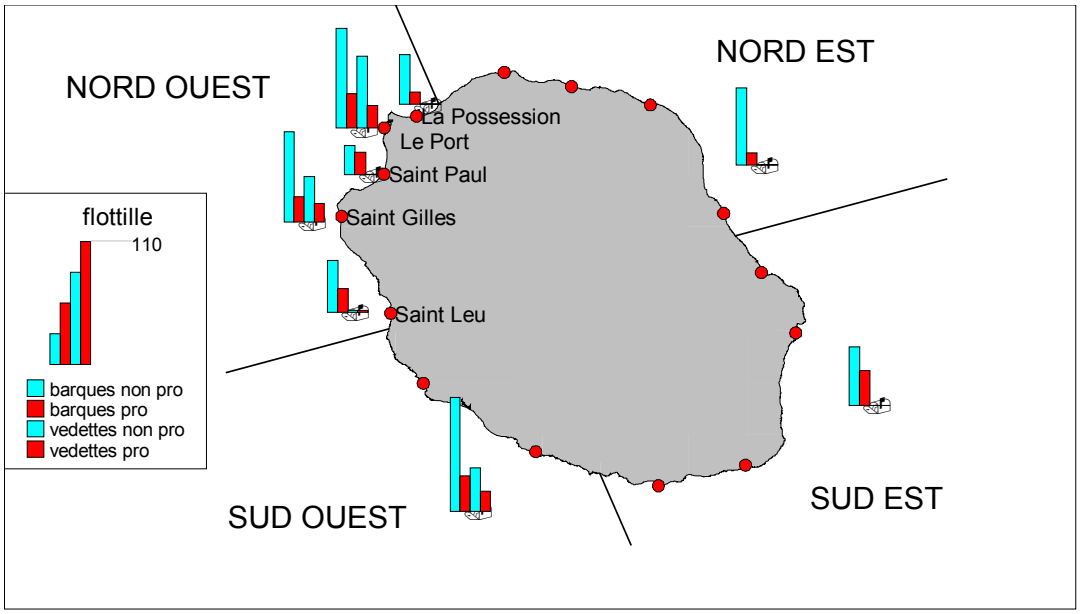


Figure 3 - Location of the artisanal fleet in Réunion in 1994

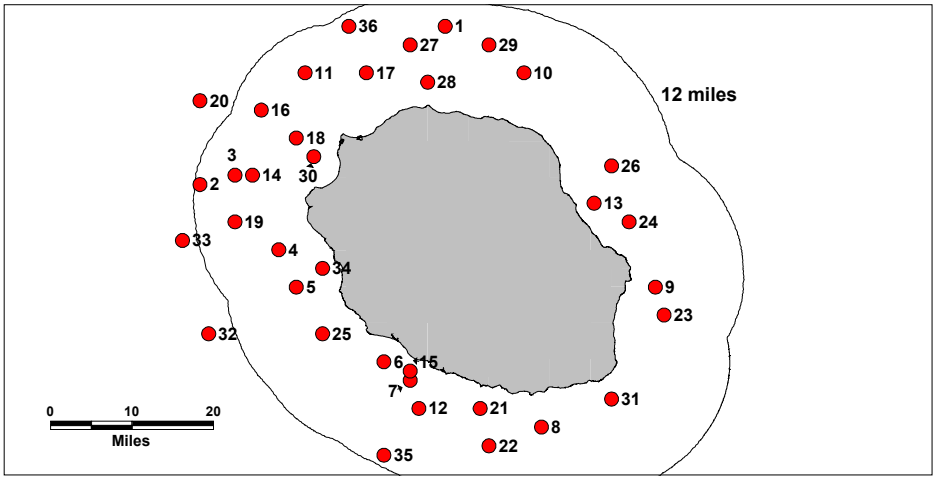


Figure 4 - Location of FADs around Réunion on January 30th 1997

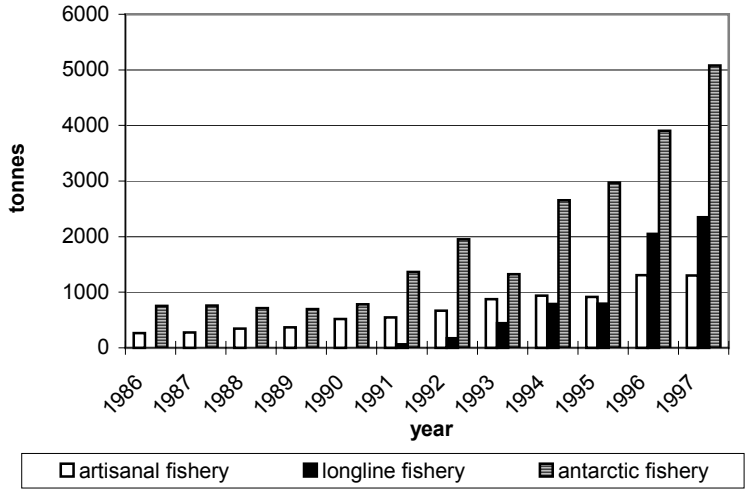


Figure 5 : Evolution of Réunion fish production from 1986 to 1997

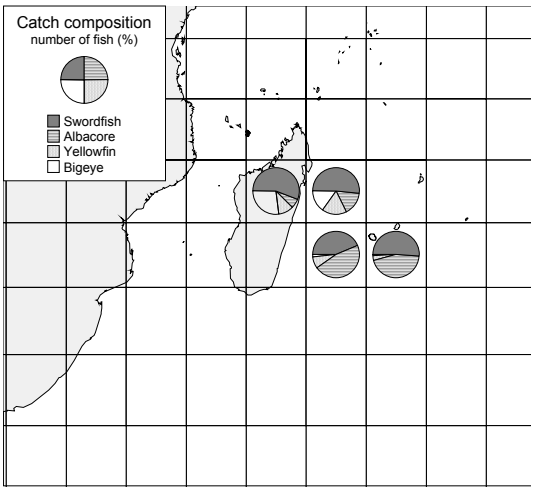


Figure 6 : Composition of the main catches of the longlining fleet in 1993 (percentage in number of individuals)

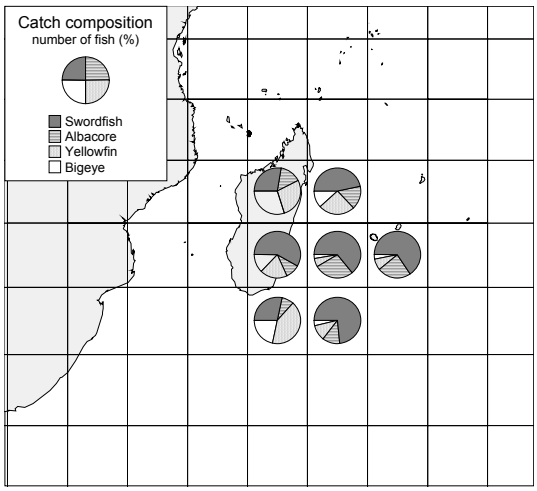


Figure 7 : Composition of the main catches of the longlining fleet in 1994 (percentage in number of individuals)

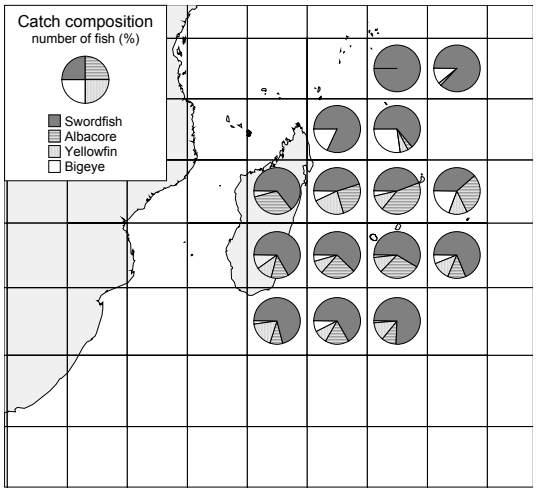


Figure 8 : Composition of the main catches of the longlining fleet in 1995 (percentage in number of individuals)

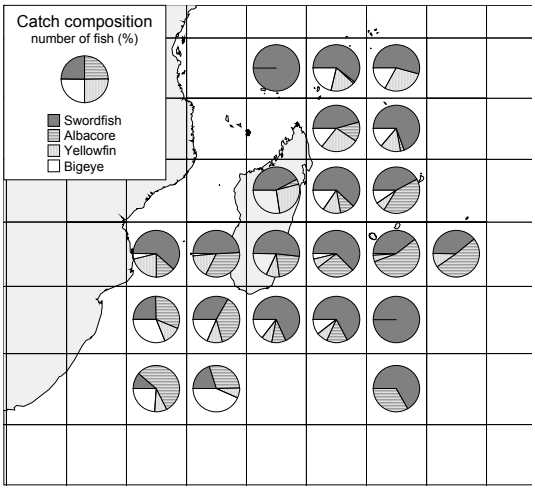


Figure 9 : Composition of the main catches of the longlining fleet in 1996 (percentage in number of individuals)

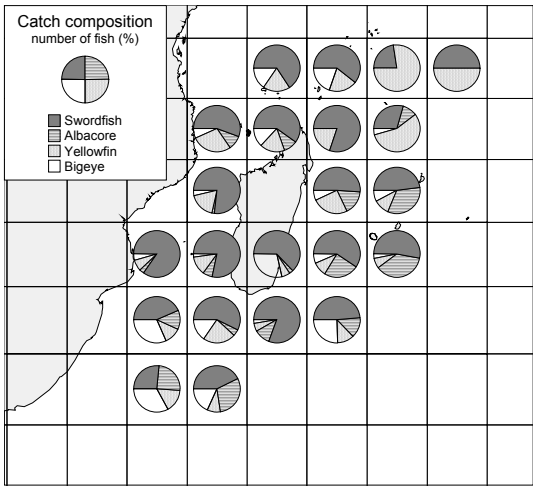


Figure 10 : Composition of the main catches of the longlining fleet in 1997 (percentage in number of individuals)

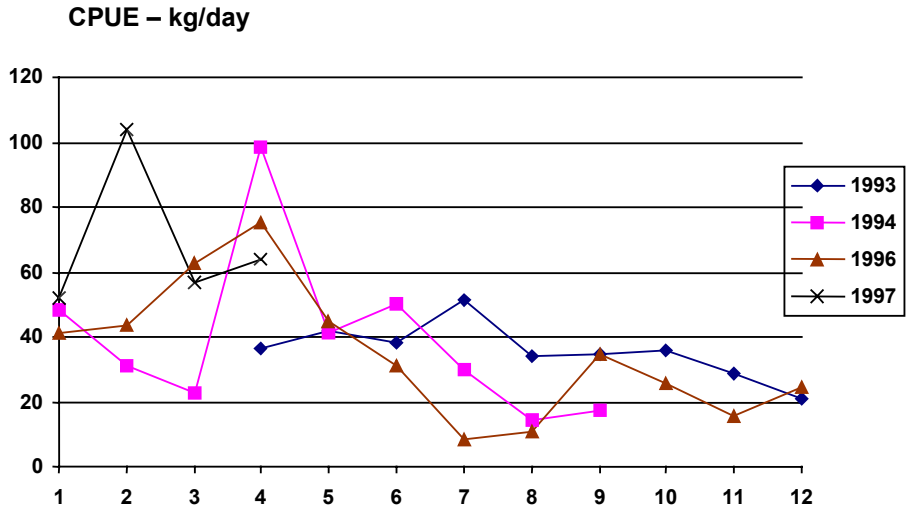


Figure 11 - Yellowfin tuna fishing results for the artisanal fleet CPUE in kg per day, averaged by month (data not available for 1997)

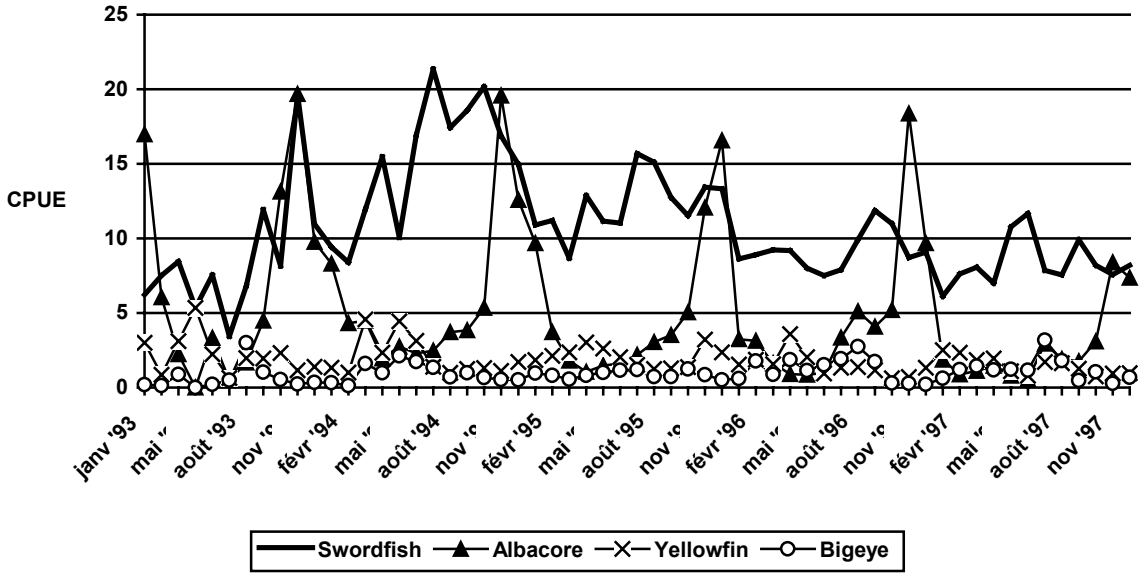


Figure 12: Evolution of the fishing results (in numbers of individuals caught by 1,000 hooks) of the longline fleet for the 4 main species from January 1993 to December 1997.