IP1

NEW ALBACORE FISHING TECHNIQUES IN THE NORTH-EAST ATLANTIC (GILLNET AND PELAGIC TRAWL): DESCRIPTION AND INCIDENCE ON THE ALBACORE STOCK

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INTRODUCTION:

Figures for total North-Atlantic albacore catches have been displaying a slight downward trend since 1957. Detailed analysis suggests that this decline is due to a decrease in troll line catches and, to a lesser extent, to a decrease in the catches made by pole-and-line vessels (Table 1, Figure 1).

At the same time, the total fishing effort applied to the species has shown wide variations over the past 20 years but is currently at the lowest level in the series (report of the species group, ICCAT 1987).

The decline in albacore catches by French vessels is largely due to a decrease in the number of vessels engaged in albacore fishing. In 1966 production was 14,300 T. from 480 troll liners and 86 pole-and-liners. In 1987, 39 troll liners and 15 pole-and-liners only landed 1,830 T. of albacore. The reasons for this considerable decrease in fishing effort are many, including aging of a fishing fleet that has never been renewed and uses fishing techniques that have not been sufficiently upgraded; increase in the cost of outfitting the vessels each season for a type of fishing that is not consistently profitable; the long periods at sea required to give reasonable returns for the investment made, resulting in reluctance of young fishermen to practise this type of activity.

In order to arrest the decline, and considering, on the one hand, that an increased fishing effort could be applied to North-Atlantic albacore without endangering the future of the stock and, on the other hand, that there was a good potential market for albacore in France, the fishing industry and IFREMER have stepped up research into new fishing gear.

1. DESCRIPTION OF NEW FISHING TECHNIQUES

1.1 DRIFT GILLNET

On the basis of data available in 1985 in the literature we chose net units measuring 50 m. long x 20 to 36 m. stretched drop with mesh sizes ranging from 80 to 120 mm. wide. This net which does not float at all (nil buoyancy) is designed to remain balanced below the surface at the depth desired which is adjustable by a set of ropes and buoys attached at 50 m. intervals (Figure 2).

Fishing is done at night, with the nets being set out at dusk and hauled in during the night or just before dawn, which enables additional fishing by troll line to be done during the day.

1988 is regarded by the fishing industry as a year for true size trialling and the number of vessels (30) equipped for this type of fishing has enabled IFREMER to carry out more intensive sampling on the landed catches which will assist in the remainder of the study. The total length of nets set out varies with the vessel used, from 2,500 to 6,000 m.

The uncertainties of surface fishing are also observed in drift gillnet fishing, and our trial results reflect the wide variability in yields. Net catches were slightly greater in number than troll line catches and catch composition as regards commercial species was identical for both types of fishing gear.

Results:

From the data collected over the 3 years of trialling, supplemented by data collected by the research vessels "Thalassa" and by commercial fishermen, the following conclusions may be drawn:

- Most of the fish taken at night using the drift gillnet seemed to have been caught in the early part of the night.

- On the basis of the results of the two gillnetters operating in 1987, the use of nets supplemented by daytime trolling gives a yield in numbers for these vessels (187 fish/fishing day) that is twice that of vessels doing trolling only (94.2 fish/fishing day).

- The maximum yield per day of the "pure" trollers only exceptionally reaches 800 fish per fishing day, whereas the best catches recorded with the nets was 1,500 albacore in one night for 6 km of nets.

- In 1987 and 1988 it was observed that gillnetting at night combined with trolling during the day more than doubles the yield per fishing day compared with trolling only. Gillnet catches have a higher average weight (5.7 kg) than troll line catches (5.4 kg). In figure 4 gives a histogram of the fishing results of a combined net and troll line vessel breaks down the total catches into its daytime trolling and nighttime netting components.

1.2 PELAGIC TRAWLS

The trawls used are bagnets of very wide mesh at the mouth. A recent development has been to make the belly much longer which seems to give better results than do the conventional pelagic trawls (Figure 5). These nets, which are trawled at night at a speed of 3.5 to 4 knots, have a vertical opening of 40 m. and a lateral opening of 70 m. The trawling period is variable and can be up to 5 hours.

Results:

In 1988, this new fishing technique was tested throughout the season. The 27 pairs of trawlers that operated during part or the whole of the season had captured 1,105 T. of albacore in the 60 fishing trips made by 20 November 1988. Best catches were 3,000 fish caught in a single day but yields were very variable. Trawlers as a rule capture fish of larger size in greater numbers. The average weight of catches made by troll line during the day and by the

pelagic trawl at night was 6.36 kg in 1988, the yields by weight or by number being three times as high as those of the pure trollers, bearing in mind that the yields are for a pair of trawlers (two vessels operating together).

The complementarity of the fishing techniques used (daytime trolling to detect fish concentrations in conjunction with echo-sounding of areas that seem promising for the species considered, and trawling at night in the promising areas), is such that one cannot really dissociate the catches made by the two types of gear, as was also the case for the combination of drift net and troll line. This is why we shall define the pelagic technique as a combination of daytime troll-lining and night-time other trawling.

The size composition of the catches for a pair of trawlers operating together clearly shows the distinction between the two population fringes affected respectively by the two different types of gear (Figure 6).

Lastly, in 1988, the proportion of albacore in the total catch of pelagics was never below 86%.

2. EFFECT ON THE STATE OF THE STOCK

The North Atlantic stock of albacore, separated from the South Atlantic stock by the 5° North parallel of latitude, is fished by several different types of gear which capture different age classes depending on the depth fished by the gear. The distinction usually made is between a surface fishery consisting mainly of pole-and-lines and trollers which capture the juvenile portion of the stock, and a deep-water fishery affecting the adult stock and almost exclusively consisting of longliners, which has been operating since 1956. According to the most recent data available for 1986, the total catch for the North Atlantic stock was 43,647 T. 38% of which was taken by longline, 35% by pole-and-line and 25% by troll line. Data for 1987 are as yet incomplete, but are unlikely to be different from those for 1986. However, a slight decline in catches is expected in 1988, because of the poor weather conditions that prevailed in August.

The catch in tonnes of the French fleet constitutes only a tiny fraction of the total taken from the stock.

FRENCH FLEET CATCHES TO 20.10.1988 (LIVE WEIGHT IN TONNES) AND FISHING EFFORT

Fishing gear	Number of gear	Number of vessels	Catch (kg)
Troll line	11	11	230 950
Gillnet	20	20	491 580
Longline	27	2*27	1 105 430
Total	58	85	1 827 960

2.1 CATCH COMPOSITION IN WEIGHT PER GEAR

Representative samples of the catches by different types of gear were collected from documents supplied by ICCAT. For this study we confined ourselves to the years 1983 to 1986, the data for 1987 being too incomplete as yet. We considered the following annual sampling ranges:

GEAR	YEAR	ORIGIN
Troll line	83	Spain
" "	84	"
" "	85	"
" "	86	"
Pole-and-line	83	Spain
"	84	"
"	85	"
"	86	"
Longline	83	China + Korea
"	84	China + Korea
"	85	Japan
"	86	Japan

Histograms showing length frequencies of albacore fished by the three conventional types of gear are shown in Figure 7. Although there are differences between the years, the size range normally affected by each type of gear nevertheless stand out clearly.

Comparison of these histograms with those concerning with the catches made by France in 1988 shows that the new types of gear affect a size range similar to that fished by the trollers and pole-and-liners. However the proportion of large specimens is greater for the trawls (Figure 8).

In order to eliminate the annual variations that occur, an average year was calculated from catches made in 1983 + 1985 + 1986 by the conventional fishing methods. It is shown in Figure 9, which clearly brings out the sequential pattern of the catches made successively by the trollers, the pole-and-liners, and the long-liners, as well as the very small catches in number and weight of the French vessels, compared with those of the Spanish surface fishing fleets.

The essential and indisputable conclusion to be drawn from this analysis of size structures (Figure 8 and Figure 9) is that there is no evidence of a new size range in the captures, but exploitation of the same size and age class as in the conventional surface fishery. In particular, it can be observed that the new methods: troll line + drift gillnets
troll line + pelagic trawls
exploit the same age group, but with a specific difference: the drift gillnets take the albacore normally caught by the trollers and pole-and-liners, while the trawlers take the large albacore fished more intensely by the pole-and-liners.

2.2 ESTIMATION OF FISHING MORTALITY FOR EACH TYPE OF FISHING GEAR AND METHODS

Using a cohort analysis based on lengths (of the JONES type) an estimation of fishing mortality (Fi) for each size class was carried out on catches for the years 1983, 1984, 1985, 1986 (Figure 10), and for the year 1986 for each type of fishing gear (troll line, pole-and-line, long-line) (Figure 11).

The simplifying assumption used, i.e. that natural mortality was constant (M=0.2) throughout the life of the fish, no doubt leads to over-estimation of the fishing mortality in adults caused by the long-liners. The value obtained (Fi=0.5) is certainly too high.

Nevertheless, our comparative analysis of the years 1983 to 1986 shows 1984 to be a very special year (Figure 10) in which the fishing mortality due to pole-and-liners in the size class centered on 80 cm (Figure 11) was exceptionally low. Because the north-east Atlantic albacore stock was at too great a distance in 1984, the Spanish pole-and-liners lost a lot of bait on the way and were unable to fish properly: they caught only 8,300 T. in 1984 against 21,100 t. in 1983 (cf. Table 1). Total albacore landings in 1984 were therefore the lowest recorded in the period 1982-86.

This sharp drop in the total landings, resulting from an accidentally reduced pole-and-line fishing effort in 1984, is consistent with previous analyses for the North Atlantic albacore stock which concluded that the stock was not overfished.

The review of albacore catches from 1966 to 1986 (Figure 1) shows that the stock has sustained much greater fishing pressure in the past than is applied at present, and has produced over 50,000 T/year, whereas at present yearly production is below 45,000 T. This short-fall of about 10,000 T. is largely due to the reduction in the French fishing fleet of trollers and pole-and-liners.

The pelagic trawls tend to catch the large albacore. An increase in the trawler fishing effort is therefore in line with the aim of increasing the yield per recruit, while decreasing catches of young albacore.

3. CONCLUSIONS

1) French catches of north-east Atlantic albacore will in 1988 remain very small, despite the new fishing techniques that have come into use (drift gillnetting and pelagic trawling), amounting to only about 2,500 T. against a total anticipated production of about 45,000 T.

2) Comparison of the age and size classes of the albacore caught by the new techniques (drift netting and trawling) with the size and age classes caught by conventional techniques (trolling and pole-and-lining) shows that the new French techniques cut into the same size and age range as the Spanish pole-and-liners and that the impact on the stock of these two different fisheries (Spanish pole-and-liners on the one hand, French netters and trawlers on the other) is the same in terms of yields by weight, total production, and stock fertility.

3) Recent figures on yields and landings for the fishery as a whole suggest that the stock is under-fished and capable of sustaining a fishing effort that has in the past produced some 55,000 T. per year, in contrast to a production of less than 45,000 T/year in recent years.

4) The drop in annual production, from 55 to 45,000 T., is due to the recent disappearance of the French trolling fleet. This reduction in fishing effort resulting in a short-fall in total landings can be counteracted by stepping up for by very extensive use of two new fishing techniques: drift gillnetting and pelagic trawling. From the point of view of stock management and dynamics, the only effect of these techniques will be to increase the fishing mortality at present caused in albacore of the same age by the pole-and-line technique which is used essentially by the Spanish fleet.

5) In terms of fisheries management, the main problem to be considered is the number of sea-going jobs involved. For the same total production, a choice will need to be made between the older less productive fishing techniques (pole-and-line, and troll line) that require a lot of manpower at sea and the recent more efficient fishing techniques (netting and trawling) that generate fewer jobs.

Paris, 3 November 1988

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Fig.1 NORTH ATLANTIC ALBACORE CATCHES

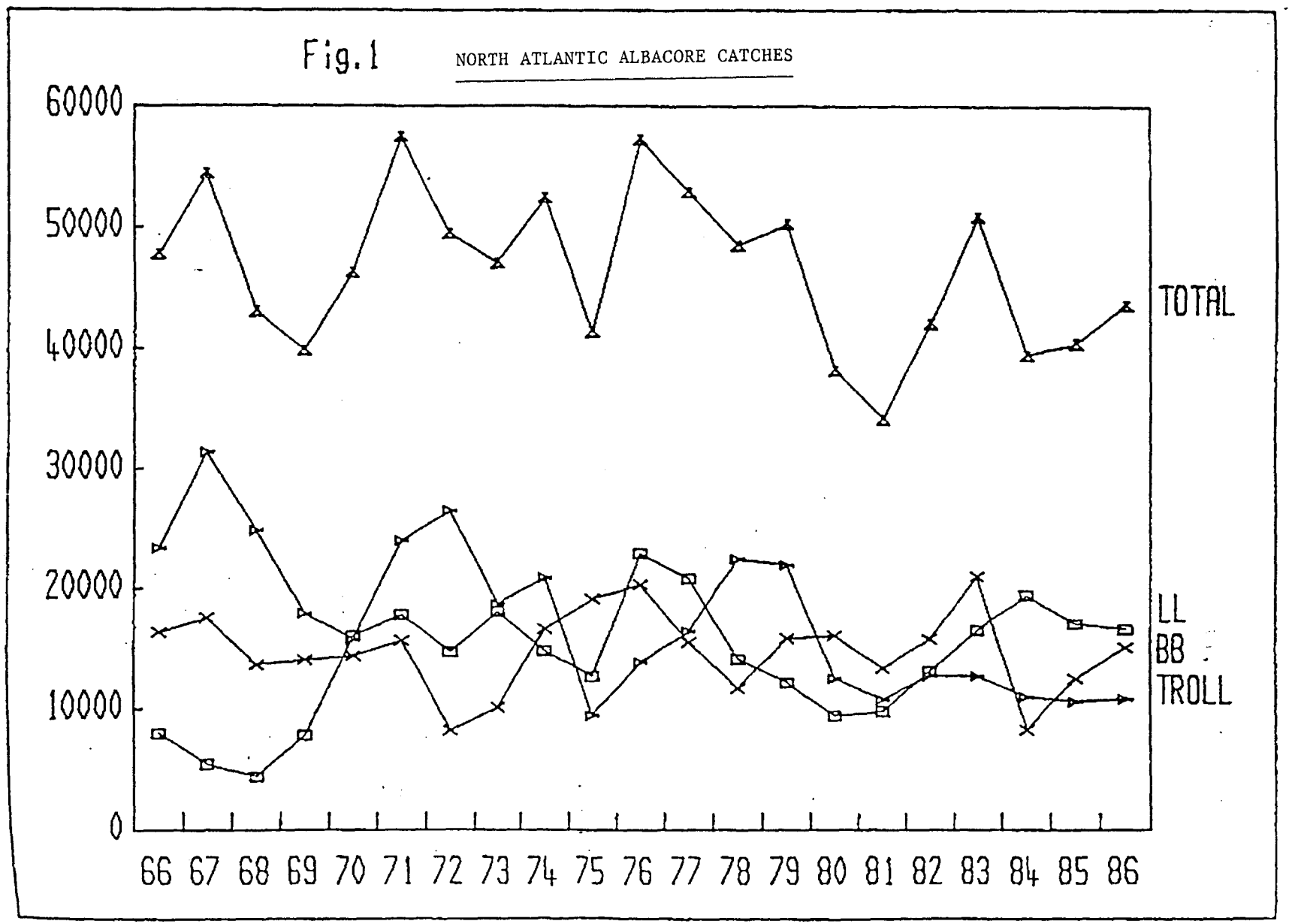
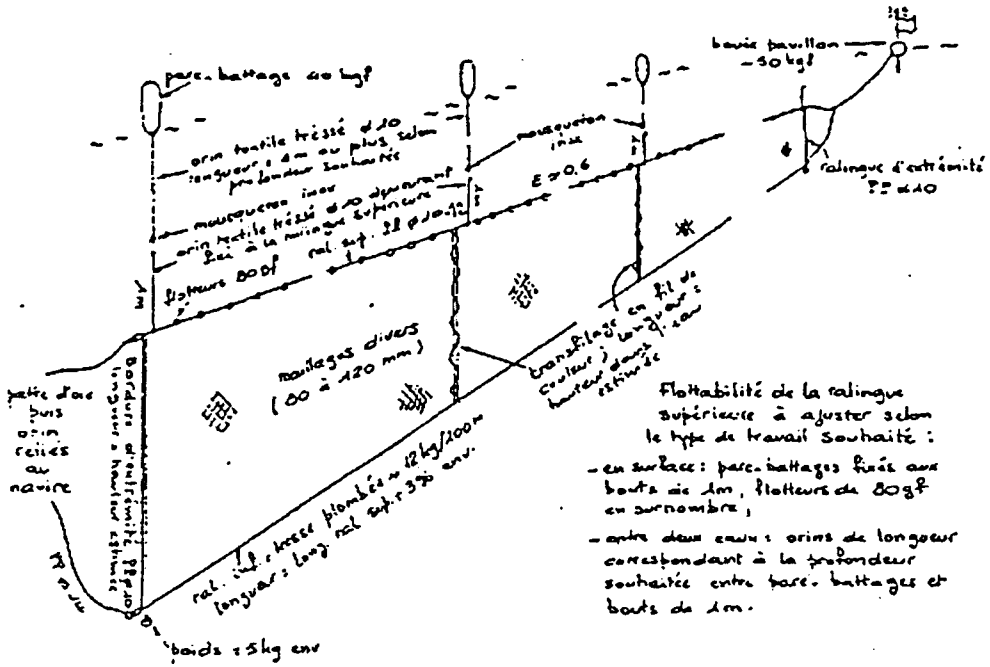
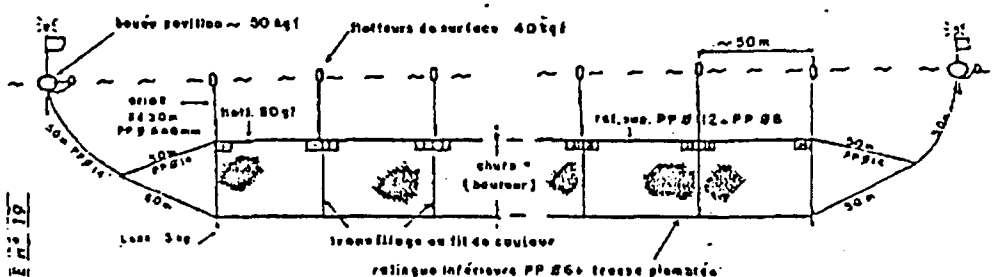


Fig. 2 - Characteristics of albacore nets



SUGGESTIONS DE MONTAGE
DES FILETS MAILLANTS A GERMON



* Pour un rapport d'armement E = 0.6 la hauteur réelle des filets dans l'eau représente 20 % de leur coupe étirée. Le transfilage entre elles de deux pièces voisines est fait selon les hauteurs dans l'eau estimées.

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ASSEMBLAGE ET GREEMENT DES FILETS À GERMON UTILISÉS PAR L'IFREMER

Fig. 3 - Trial results obtained with drift nets (efficiency of different mesh sizes used)

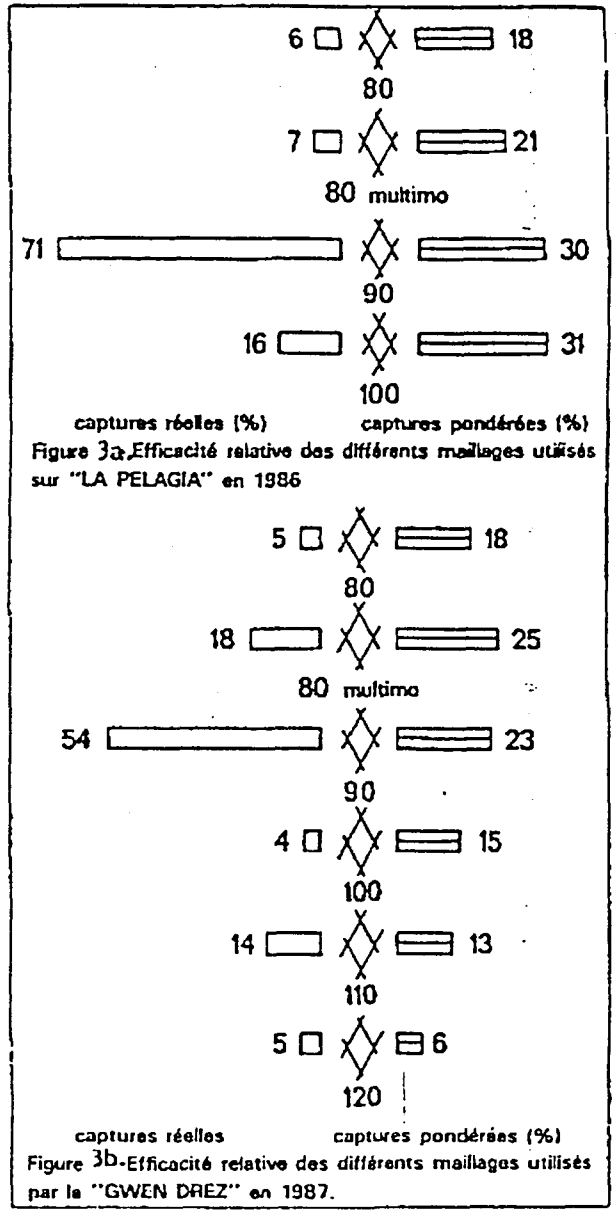


Figure 3a-Efficacité relative des différents maillages utilisés sur "LA PELAGIA" en 1986

Figure 3b-Efficacité relative des différents maillages utilisés par le "GWEN DREZ" en 1987.

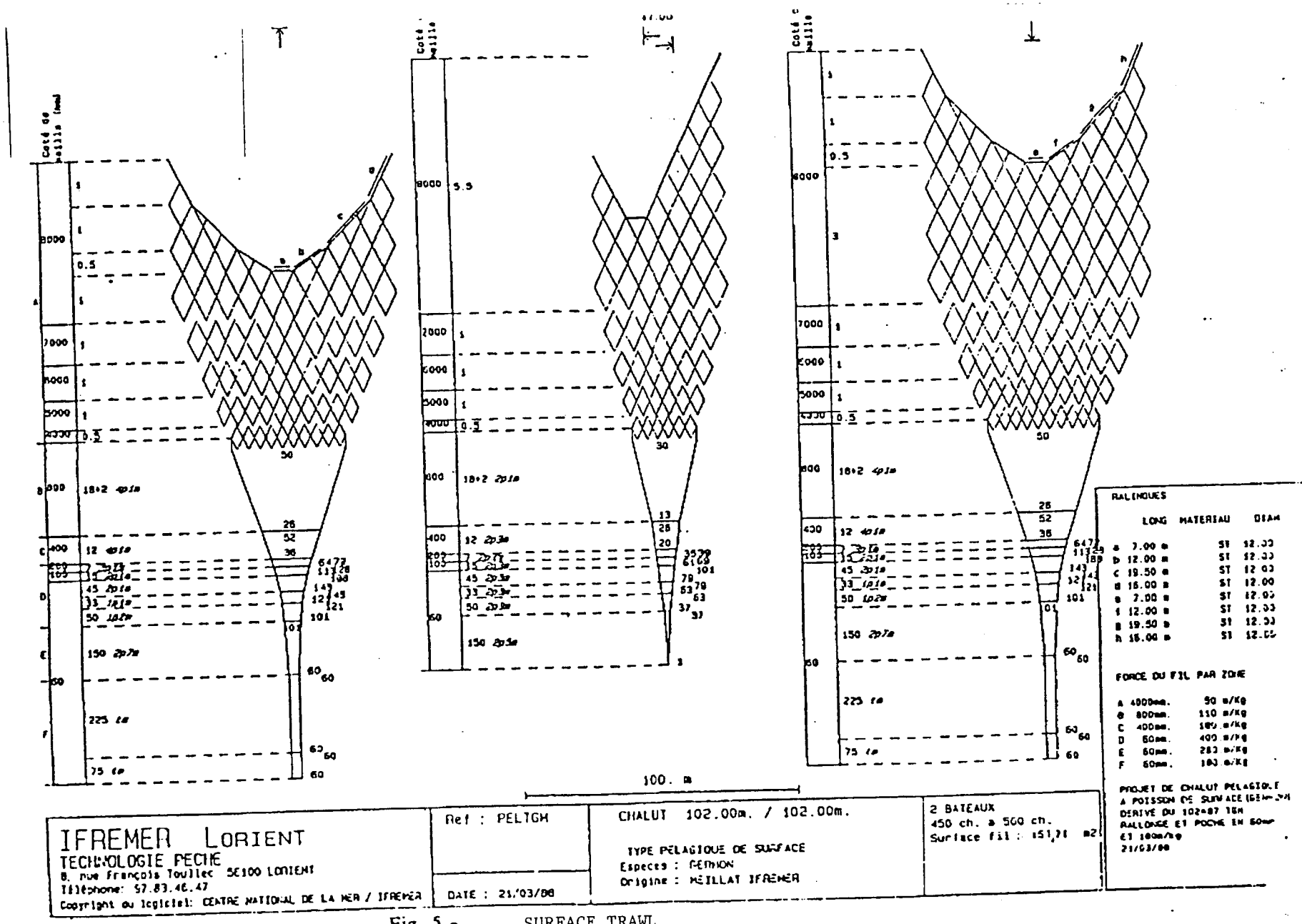


Fig. 5 - SURFACE TRAWL

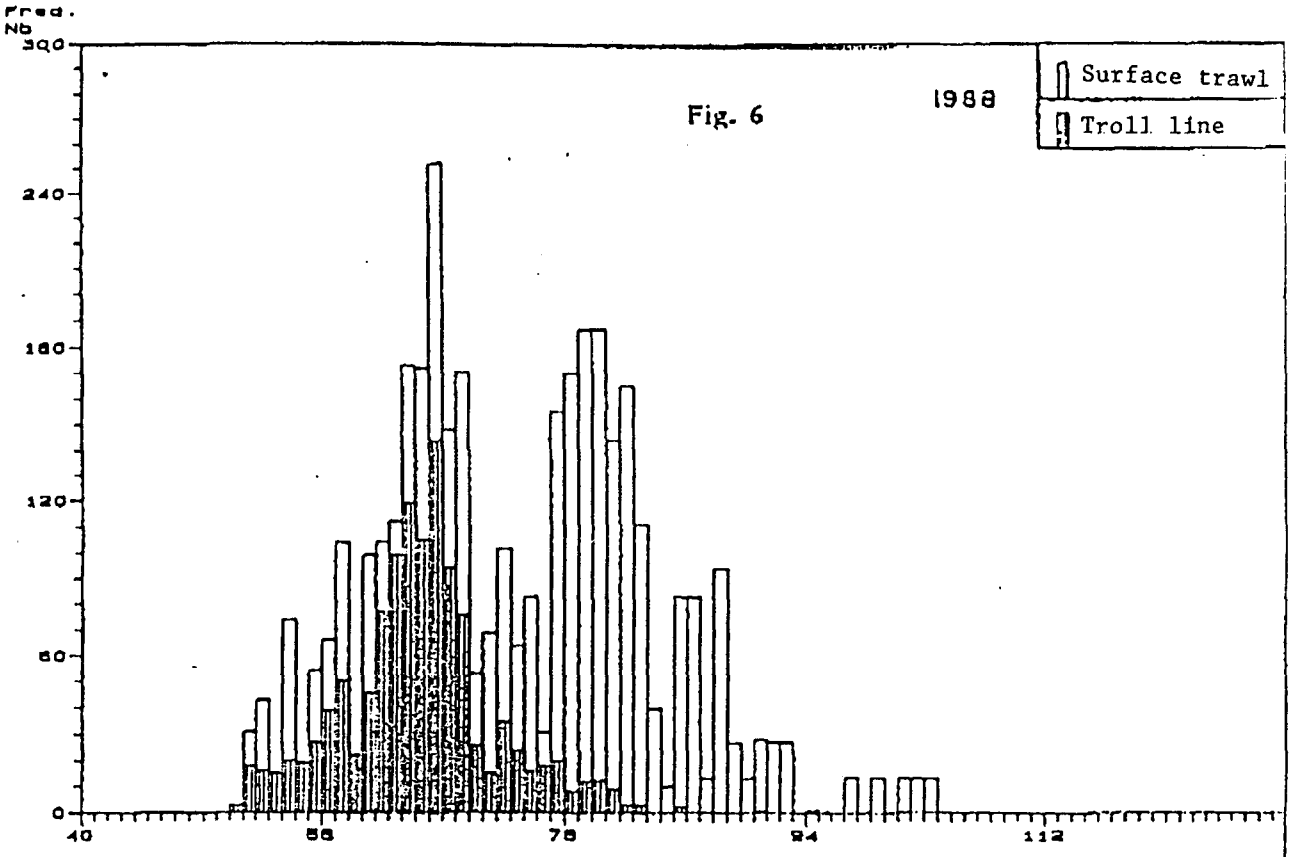


Fig. 6

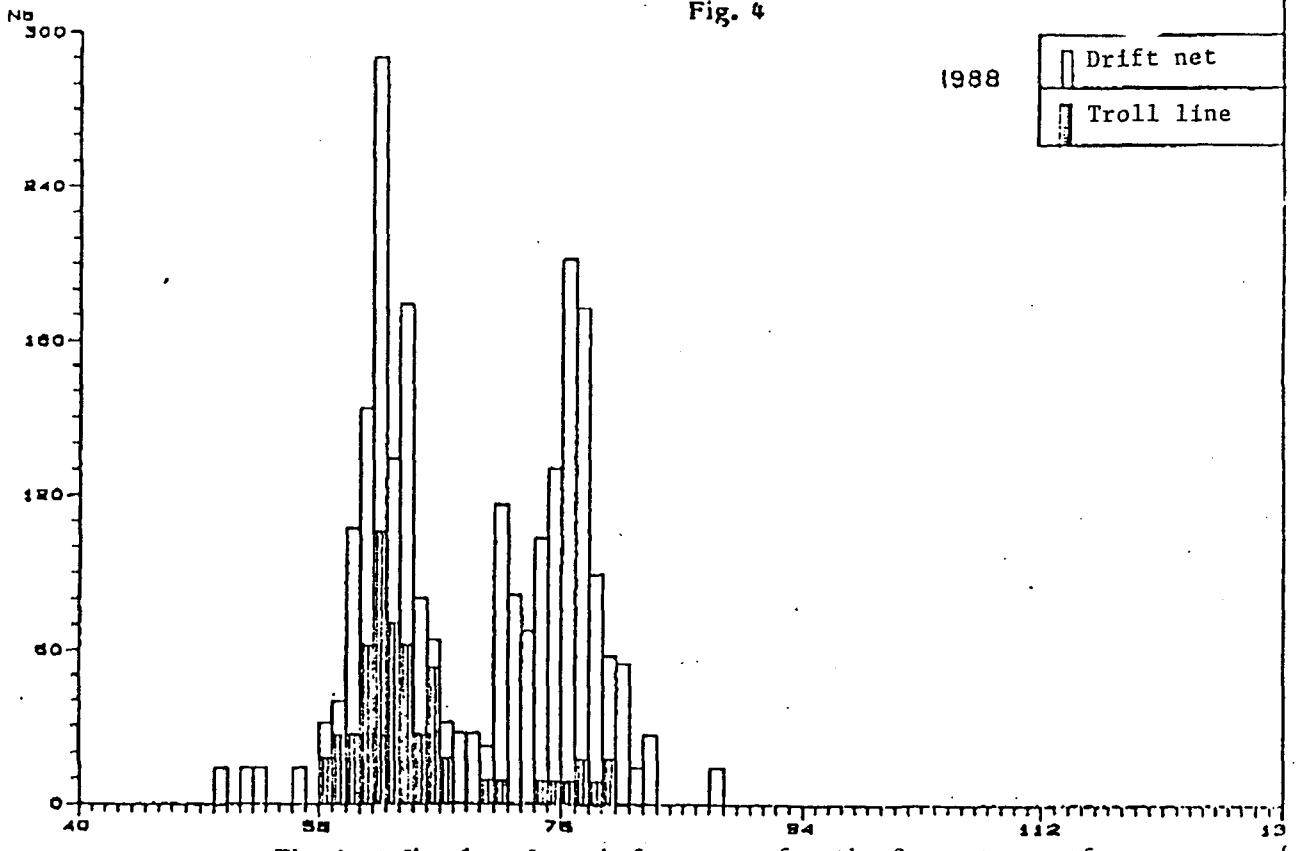


Fig. 4

Fig. 4 et fig. 6 - Length frequency for the 2 new types of gear compared with the conventional troll line

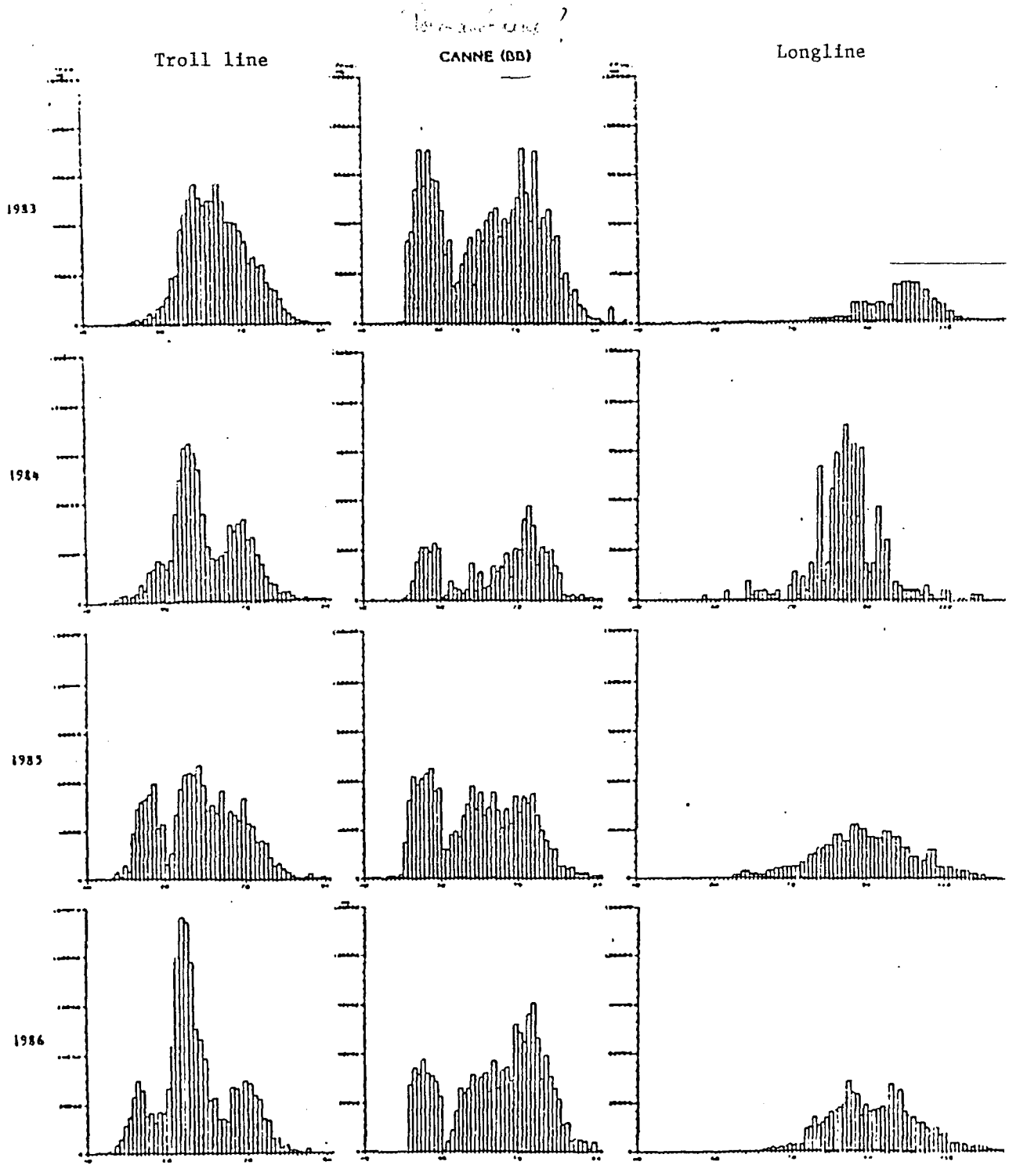


Fig. 7 - Length frequencies of albacore fished by the three conventional types of gear (1983-1986)

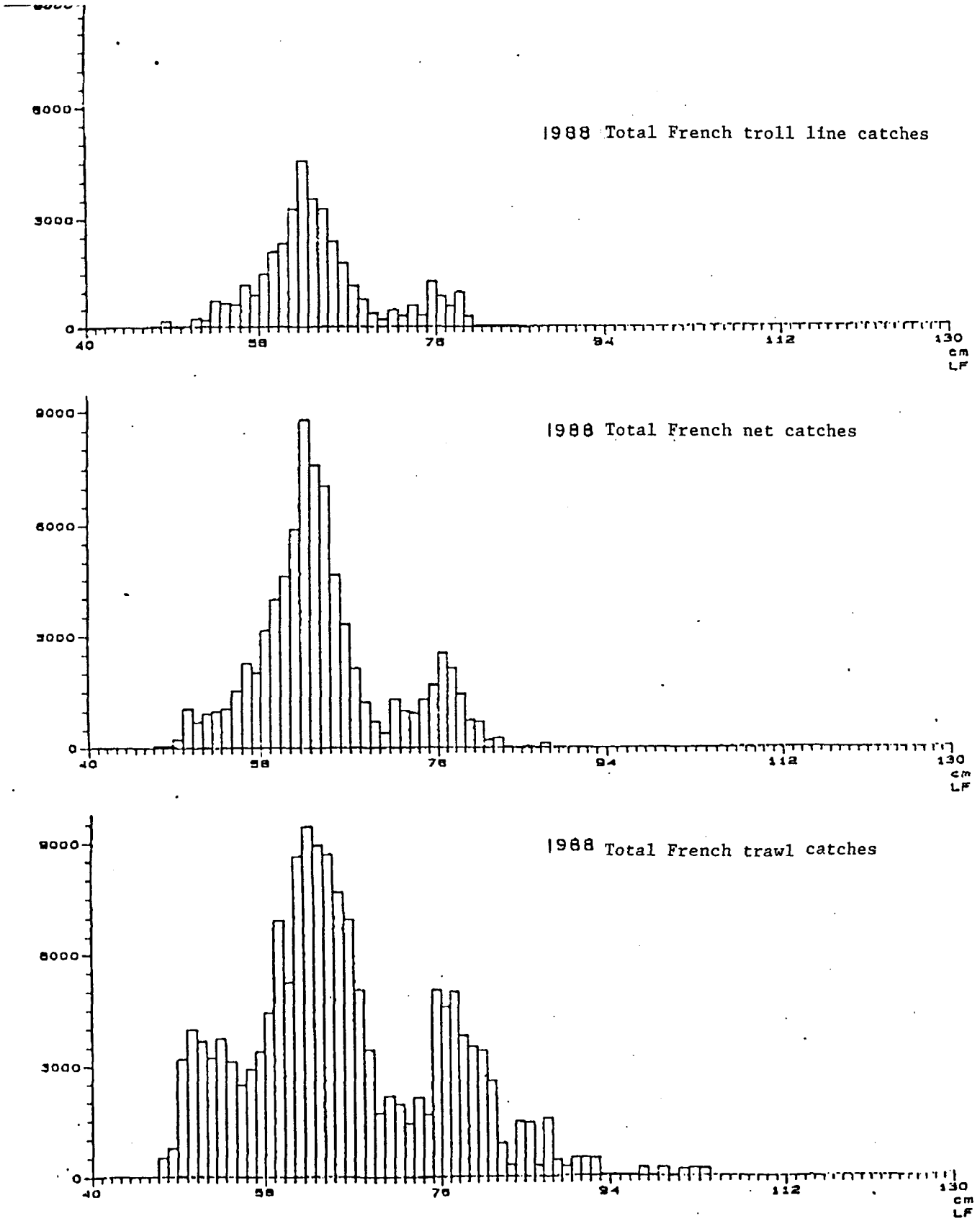
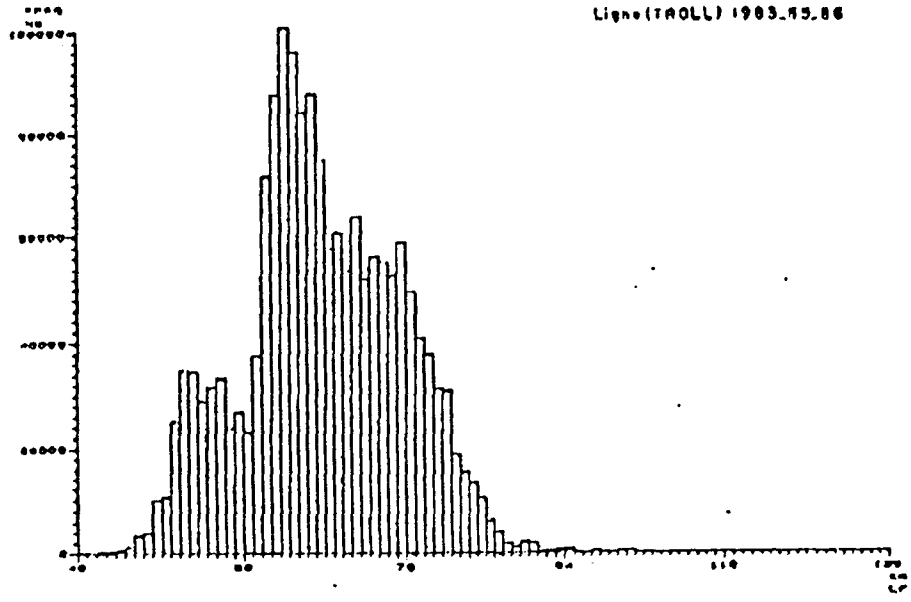
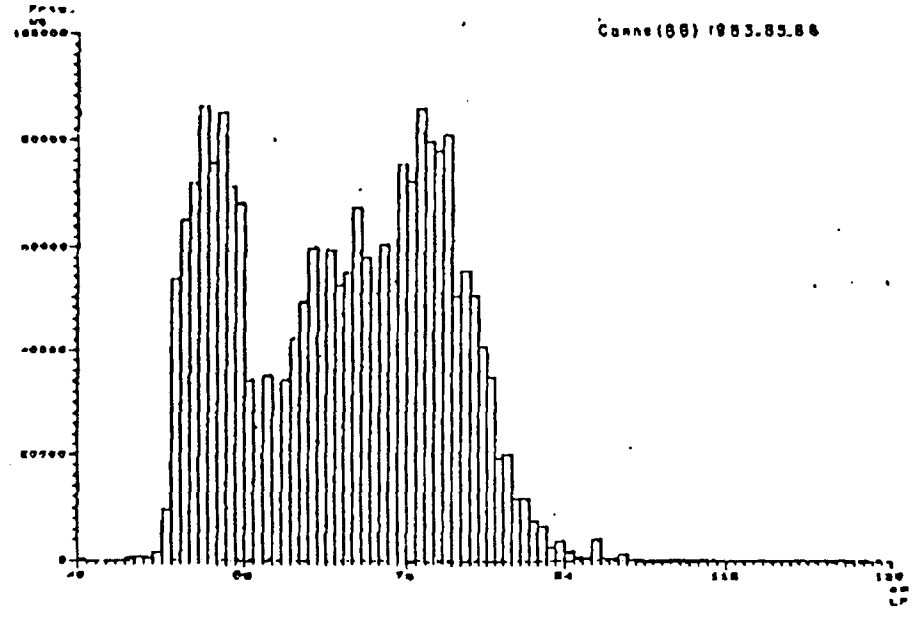


Fig. 8 - Length frequencies of albacore fishing by French fleets in 1988





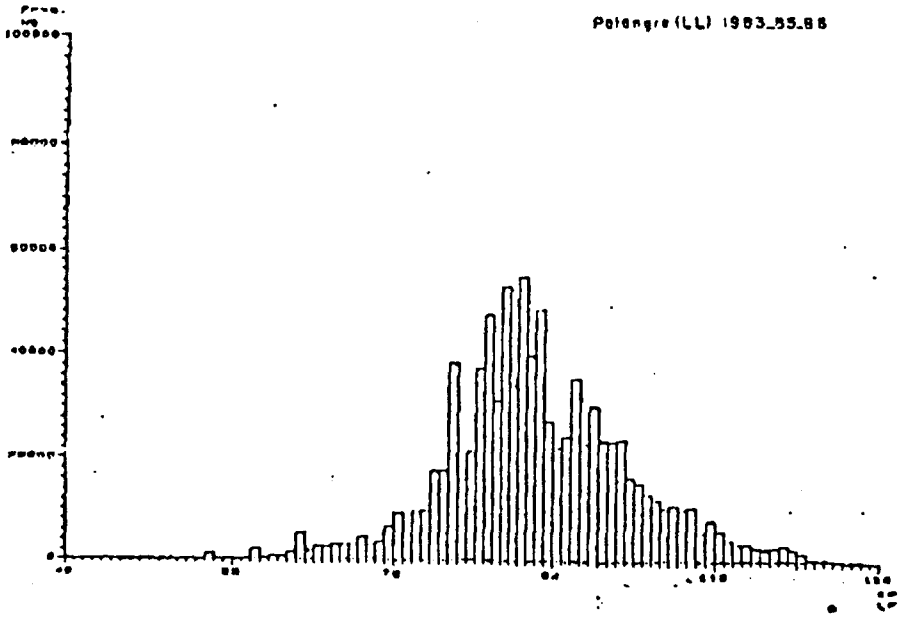


Fig. 9 - Length frequencies of albacore catches made by conventional techniques (catches 83 + 85 + 86 *0.33)