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The "rasco": a gillnet fishery for Anglerfish (*Lophius piscatorius* L., 1758 and *L. budegassa* Spinola, 1807) in the Cantabrian Sea (ICES Division VIIIc)

By

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ABSTRACT

In Northern Spain a specially designed gillnet for fishing Anglerfish is used (*L. piscatorius* and *L. budegassa*), mainly at 100-800 m depth. This gear is estimated to catch up to the 40% (1980-1996 average) of all Anglerfish caught in ICES Division VIIIc. This document not only describes the gear itself, but also the fleet which works with it.

Due to its mesh size (280 mm) this is s a very selective gillnet and anglerfish relative frequency is one. The anglerfish makes up 97% of the total catch landed using this gear. The second best represented species is skate, whose relative frequency is 0.11 and makes up 1% of the landed catch.

The landed catch of anglerfish is composed of specimens of over 30 cm. The mean length of *L. piscatorius* is 66 cm, while *L. budegassa* mean length is 57 cm.

Discards of this fleet are mainly composed by fish in poor condition and occasionally invertebrates with no commercial value.

Key words: Gillnet, Anglerfish, *Lophius budegassa, Lophius piscatorius*, catch, Cantabrian Sea.

INTRODUCTION

Approximately thirty years ago, a direct gillnet fishery for anglerfish (*Lophius budegassa* and *L. piscatorius*) began over the continental shelf of the North of Spain. Previously, the anglerfish had only been taken as a bycatch of trawl catches. The fleet considered in this paper is that of the Northern Spanish ports and operates in the fishing grounds of ICES Division VIIIc. The historical roots of the anglerfish fishery are in the fishery targeting lobster when working in rocky bottoms and Squatina squatina L. 1758, tope (*Galeorhinus galeus* L.) and other fish when working in smooth bottoms (Rodriguez Santamaría 1923).

Small vessels normally working close to the coast make up the fleet, although they sometimes they move out to fish over the continental slope (500-800 m). These vessels, which work with 'rasco' (gillnet for Anglerfish), alternate this activity with other gears such as gillnet And in the coastal season they even use hand lines to fish for mackerel, cerco for anchovy or currican for tuna, mainly bluefin (Pereda and Villamor, 1991).

Annual landings of monkfish as a whole using rasco present two very distinct periods in the last fifteen years. In the 80's catches of both species were 2 400 t on average, whereas in the 90's the average falls to 930 t.

MATERIAL AND METHODS

In recent years the catches and distributions of landings have been obtained in the framework of the project: "Improvement of data collection for stock assessment in Sub-areas VII,VIII, IX and X. Study Project DG XIV Nº 94/013" co-financed by the EU and the IEO (Anon, 1998). In preceding years, from 1980 the IEO had its own sampling program in ports and wholesale markets.

Of the landings in 1996, 955 were sampled to obtain the catch composition in relative frequency (number of fishing trips in which one species is landed divided by the total number of fishing trips) and as a percentage with respect to the total landed with this gear.

The length distributions are obtained from length samplings carried out at the time of landing catches. The type of sampling is random stratified, taking the vessel as a sampling unit. Length sampling is carried out in the ports in which rasco landings are more representative: Santoña, San Vicente de la Barquera, Avilés and Cedeira. Length samplings obtained are pondered to total landings of each species and month for each port, the sum of the ports sampled is pondered to the total catch of the area. Landings are split by species based on their relative proportions in market samples.

Effort has been quantified as the number of fishing trips monthly between 1994 and 1996, these being obtaining directly from the sales sheets of landings or provided in the form of a table by the Fishermen's Associations, before being processed in the laboratories of the IEO. Due to the fact that in some ports there are gillnetters targeting hake and others fishing for monkfish, putting the landings down to one gear or another is done according to the catch composition landed. CPUE (catch of each species divided by effort) was obtained as the mean for the period 1994 to 1996.

RESULTS

Description of the Gear

Gillnets are based on a woven net which prevents the fish from passing through, the fish becoming trapped in it. These gears, once lowered, remain in position until they are brought in??? (González et al 1986). Gillnets are made up structurally of sections of connected net which remain vertical by means of two ropes called "relingas", one being the "relinga de plomos" along the lower part, which acts to weigh down the net, and the other "relinga de flotadores" along the upper part with cork or small synthetic buoys. The sections of net (pieces of net making up the gear) are made from different materials such as nylon due to their great resistence and durability. Natural fibres such as cáñamo or cotton are no longer used. The set of sections is called the "andana" or "linea", and its extremes are marked at the surface by senda buoy (Puente, 1993). The weight of the gear is mainly determined by the weight of the lower relinga or of the lead weights (250 gr each in the case of the gillnet for anglerfish) in such a way that the gear remains vertical at the bottom.

In the gillnet for Anglerfish each section is denominated 'rasco' (figure 1), with an estimated price per "rasco" (1 piece or section) of around 1800 pts, approximately equivalent to 11 euros. The length of each "rasco" is about 50 m and the total length of the gear varies according to the TRB of the vessel. Thus, vessels of up to 10 TRB can work with gears of 7,000 m, vessels of 10 to 50 TRB with 9,000 m and with more than 50 TRB the maximum sized gears of 11,000 m are possible. The height of the gear cannot be over 2.5 m, which corresponds to a height of nine gaps. The gear is fixed to the bottom by means of a anchorage, called "rezón" in the shape of a rake at each extreme of the line. The mesh size, defined as the distance between two opposing vertices of the extended gap excluding knots, measures between 280 and 290 mm measured when wet, the minimum measurement permitted by Spanish legislation.

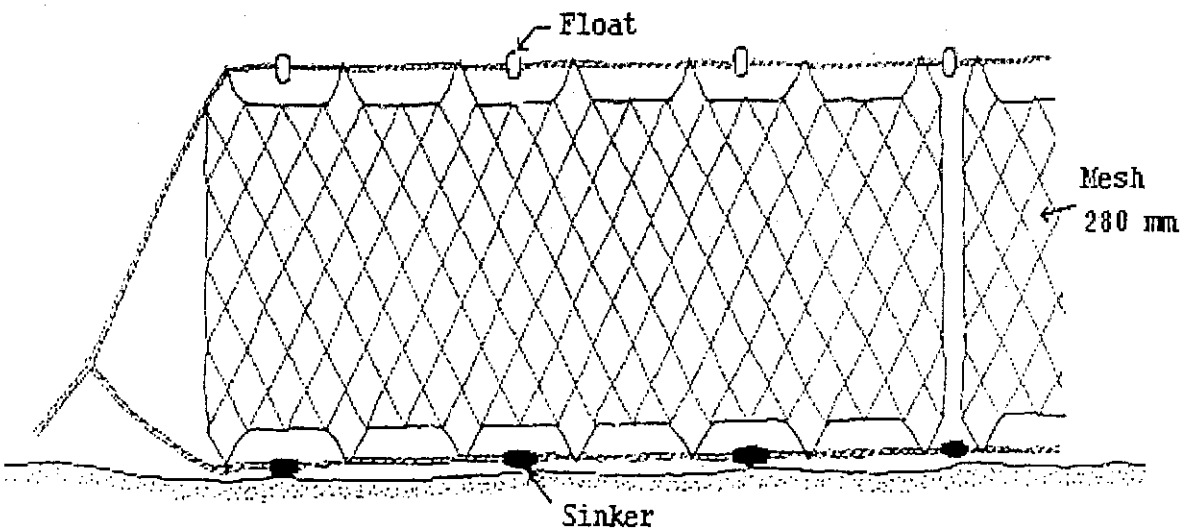

Figure 1. Scheme of gillnet for Anglerfish

Gillnetters begin work at around four o'clock in the morning when they leave port for the fishing grounds They return at between four and eight in the evening. The number of fishermen per vessel variess according to vessel size (length and tonnage). Pereda and Villamor (1991) report the number of people per vessel in the Cantabrian Sea between 3 and 10. The gear always works for more than 24 h, and it is quite usual for it to spend between 2 and 8 days at the bottom. The depth at which it is used varies between 70 and 800 m approximately, the mean value being around 400 m depth.

Once the vessel arrives at the buoy the gear is lifted aboard and the fish removed from the mesh. In a gillnet the fish are literally "enmeshed", that is to say, they are retained by the mesh which be tight to the body (Pope J. A. *et al.*, 1983). As the fishes are extracted from the net they are opened and gutted. Although normally all of the guts are extracted, sometimes part or all of the liver is left, mainly when dealing with small sizes or when vessels from ports in which fish are sold with the liver intact.

By-catch and discards

The target species is anglerfish (*L. piscatorius* and *L. budegassa*) whose frequency of occurrence is 1.0. Accompanying species, although in very small quantities, are made up of rays (*Raja* spp), hake (*Merluccius merluccius*), *Scorpaena* sp., Turbot (*Psetta maxima*) Greater fork beard (*Phycis blennoide*) and Horse mackerel (*Trachurus trachurus*). Occasionally some specimens of European Lobster (*Hommarus gammarus*) and Lobster (*Palinurus elephas*), *Lithocarpia* sp, *Marthasterias glacialis*, *Cidaris cidaris* are caught. The species composition of the landings is presented as percentage of the total landings in figure 2 and as frequency of occurrence in figure 3.

Discards take place when fish are in poor condition. This is usually due to the gear having remained longer than normal in the sea as a consequence of bad weather, which prevents vessels from moving to fishing grounds to lifted the gear. Discards also occur of invertebrates of no commercial interest such as: *Geyon longipes*, *Paromola cuvieri*, *Lithocarpia sp.*, *Marthasterias glacialis*, *Cidaris cidaris*, *Pagurus prideauxi*, etc

In 1994 the Instituto Español de Oceanografía carried out a program to assess discards among fishing gears working in the different ICES areas, including gillnet for angerfish. The results of this program (including both gillnet for Anglerfish and "volanta" or gillnet for Hake) give discard values of 38% in weight of the total discards for *L. picatorius*. For *L. budegassa* dicards made up 3% (Pérez *et al.* 1996).

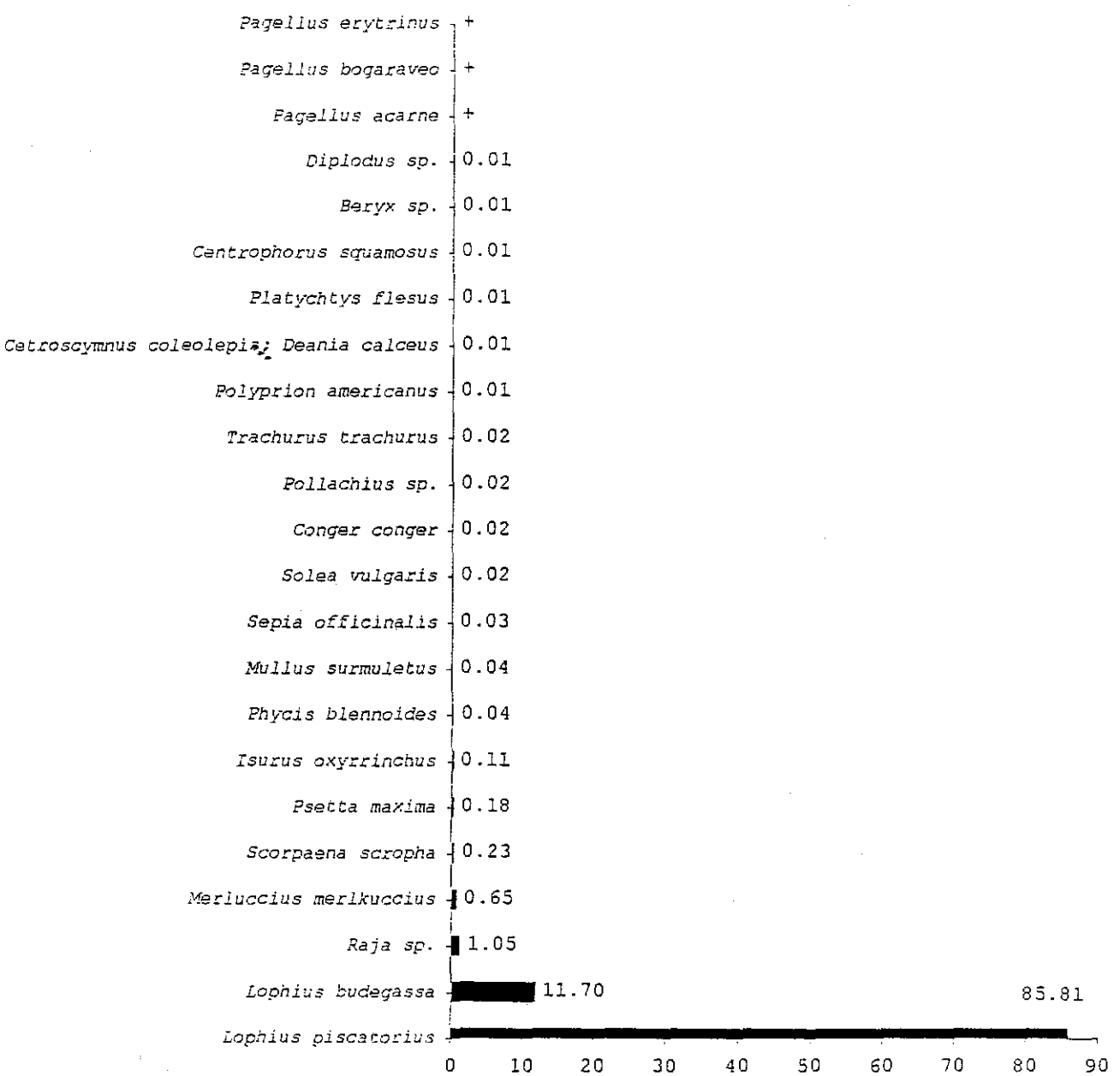

Figure 2. Total landings in percentage

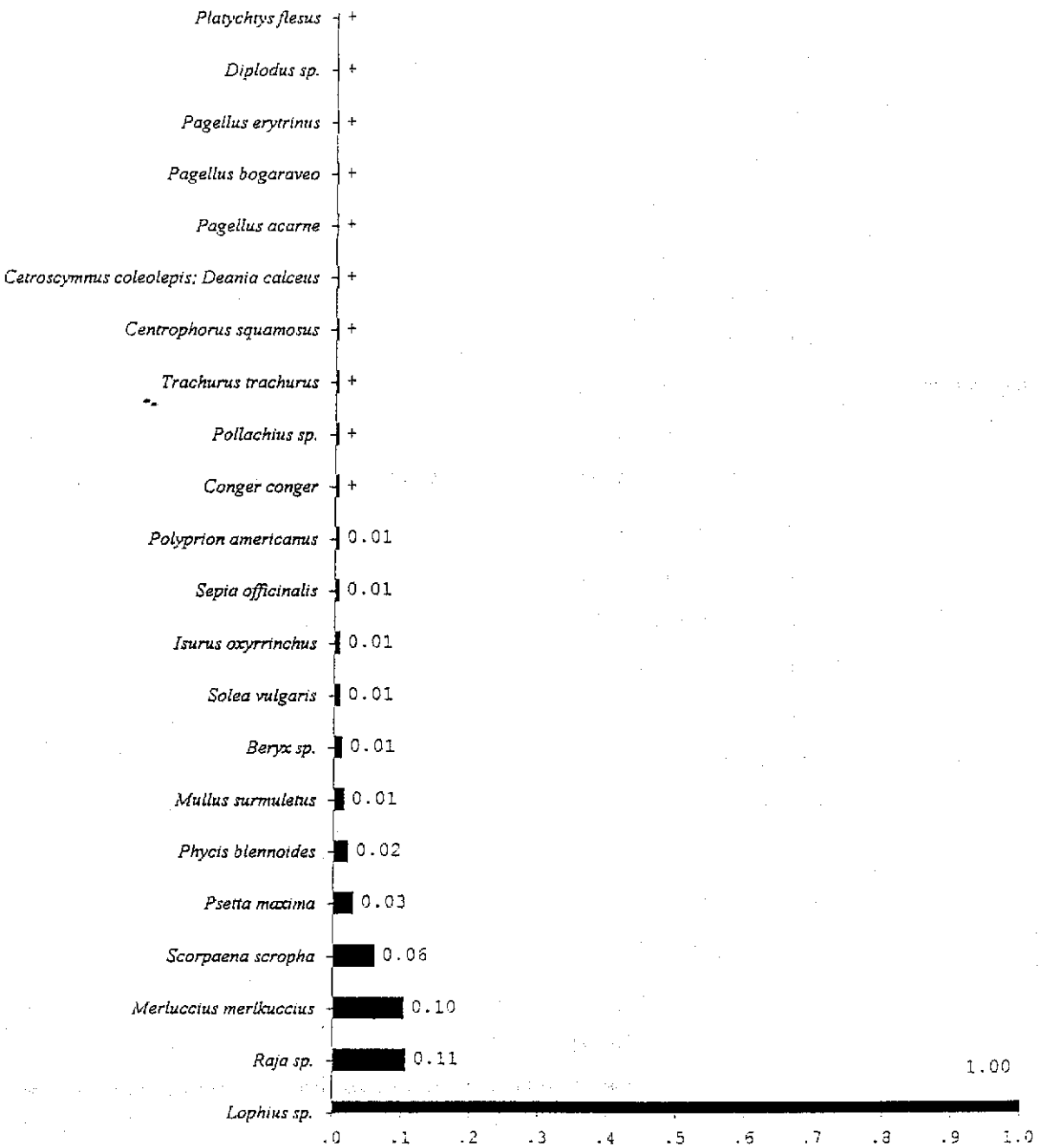

Figure 3. Frequency of occurrence.

Catch Trends

Annual mean catch of *L. piscatorius* in the 80's was 2000 t, whereas in the years considered in the 90's it was 800 t. *L. budegassa* is less represented in catches than *L. piscatorius*, the mean catch in the 80's coming to 400t and in the 90's 140t. In 1989 the catch was as high as 1,010 t. Figure 4 shows the evolution of catches of the two species since 1980.

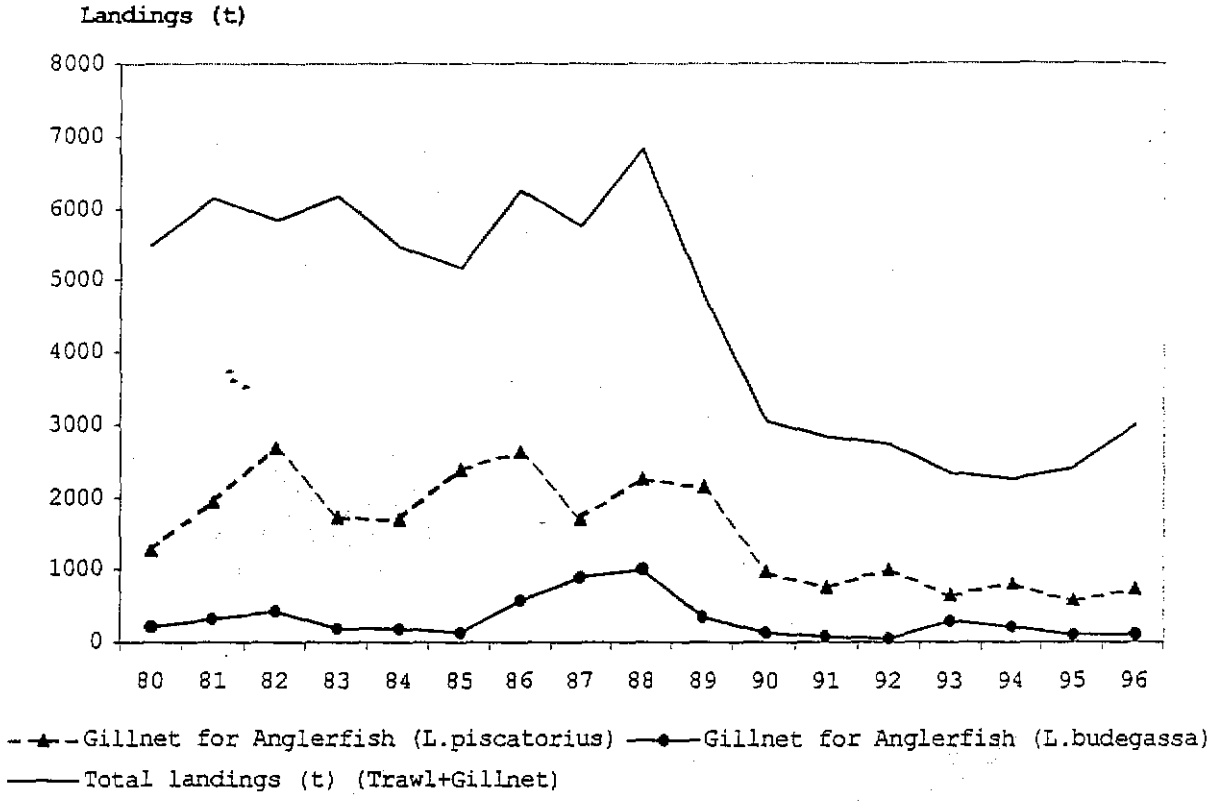

Figure 4. Evolution of the catches of *L. piscatorius* and *L. budegassa* of the Southern Stocks. Data from ICES W.G. on the assessment of Southern Shelf Demersal Stocks.

Length composition of the catches

Length composition of the landings of *L. piscatorius* and *L. budegassa* caught by the Spanish gillnet fleet for Anglerfish in the years 1986-1996 are shown in figure 5a and 5b respectively.

It is seen that in both species the width of the length range covered by rasco is quite regular throughout the decade. The landed catch of Anglerfish is composed of specimens over 30 cm. *L. piscatorius* reaches a greater maximum length than *L. budegassa* (Landa et al 1998), the largest sizes observed in the catch being 148 cm for *L. piscatorius* and 105 cm for *L. budegassa*.The mean length of *L. piscatorius* was 66 cm during the years 1986-1996. The modal length was particularly small in 1991 and 1993. Lengths of specimens of *L. piscatorius* are greater than those of *L. budegassa*, the mean length for this latter being 57 cm during the same period, remaining around this mean with only slight variations throughout the years considered (figures 6a and 6b).

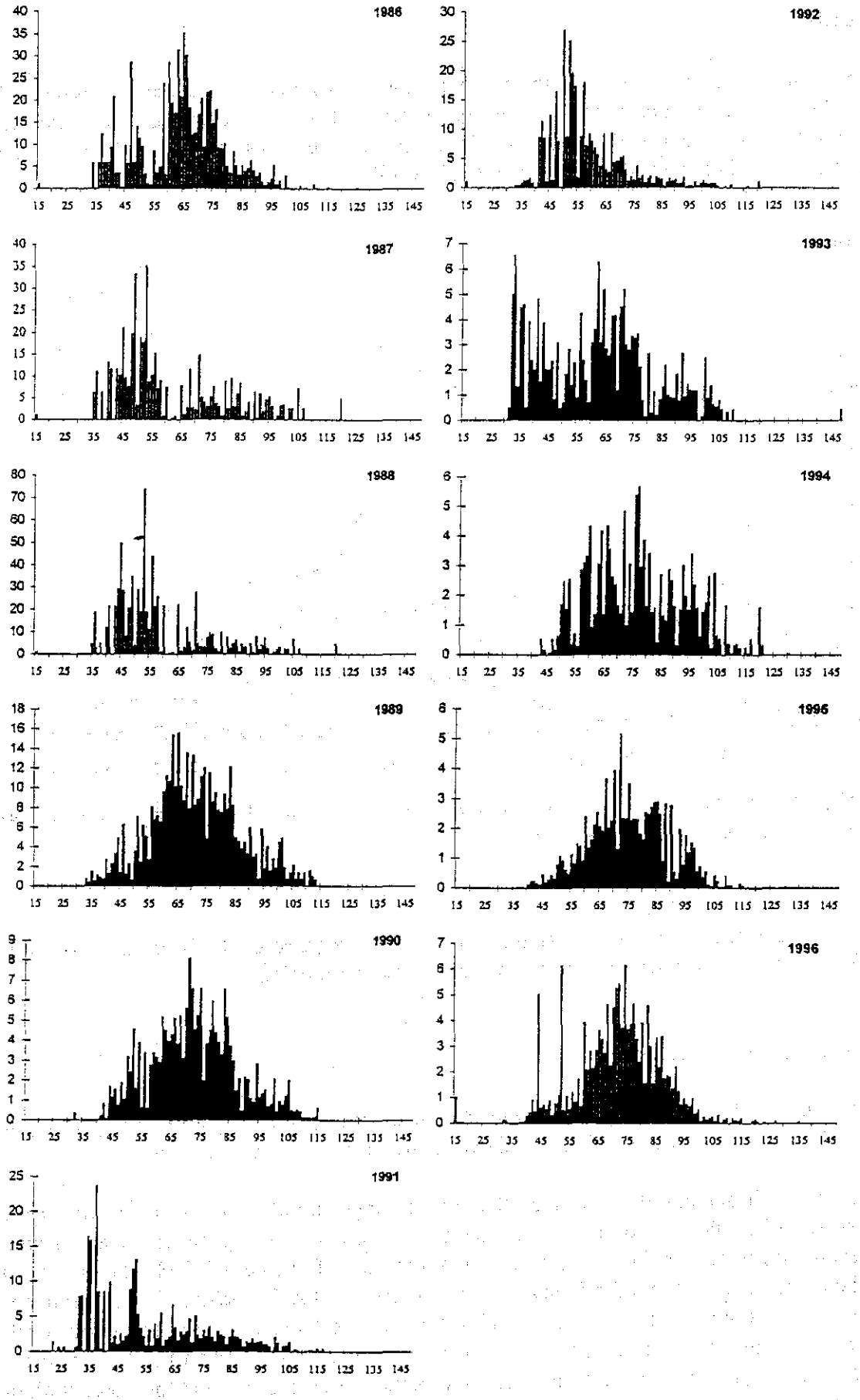

Figure 5 a. Length composition of *L. piscatorius* caught by Spanish gillnet for Anglerfish in VIIIc ICES Divisions.

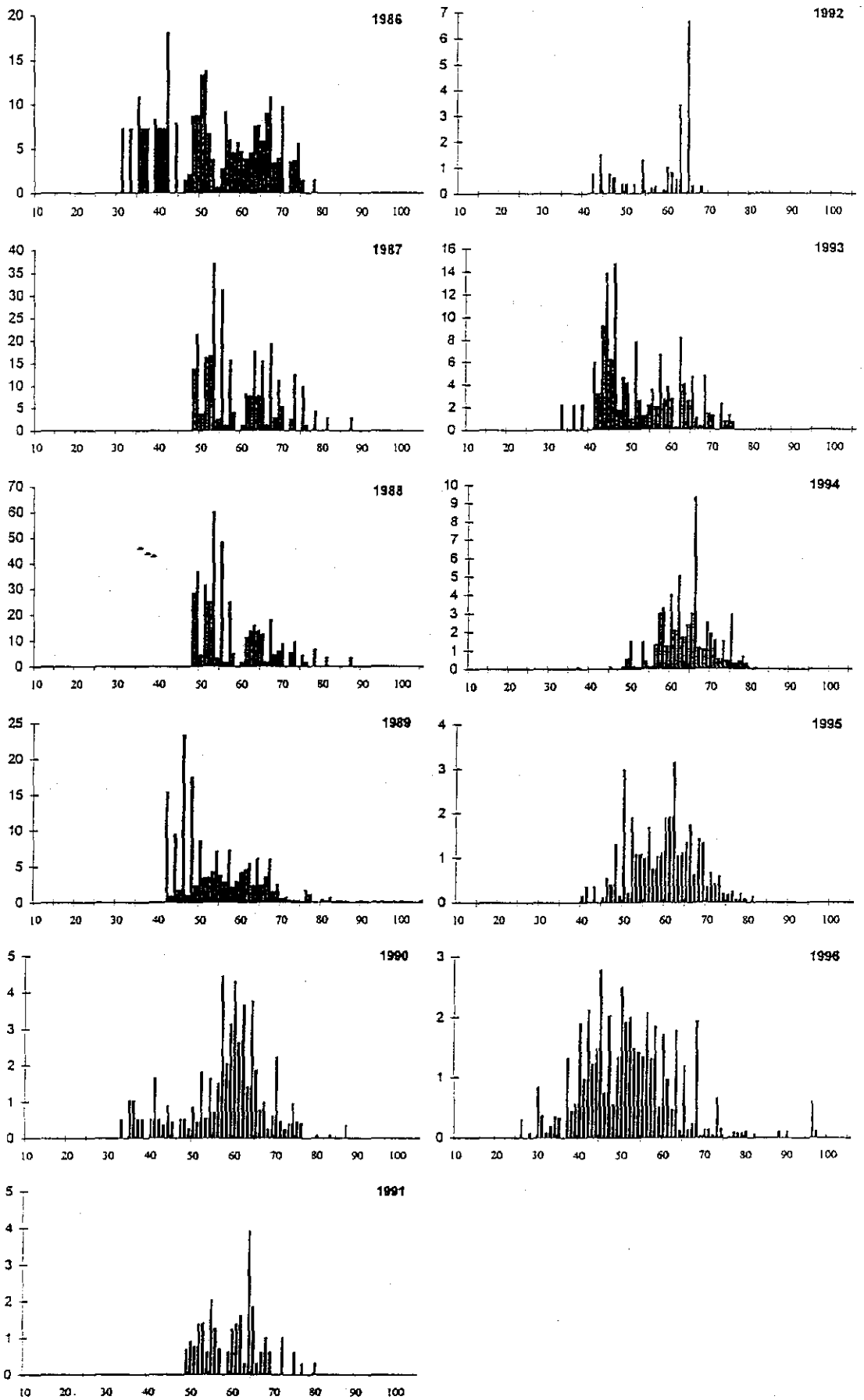

Figure 5 b. Length composition of *L. budegassa* caught by Spanish gillnet for Anglerfish in VIIIc ICES Divisions.

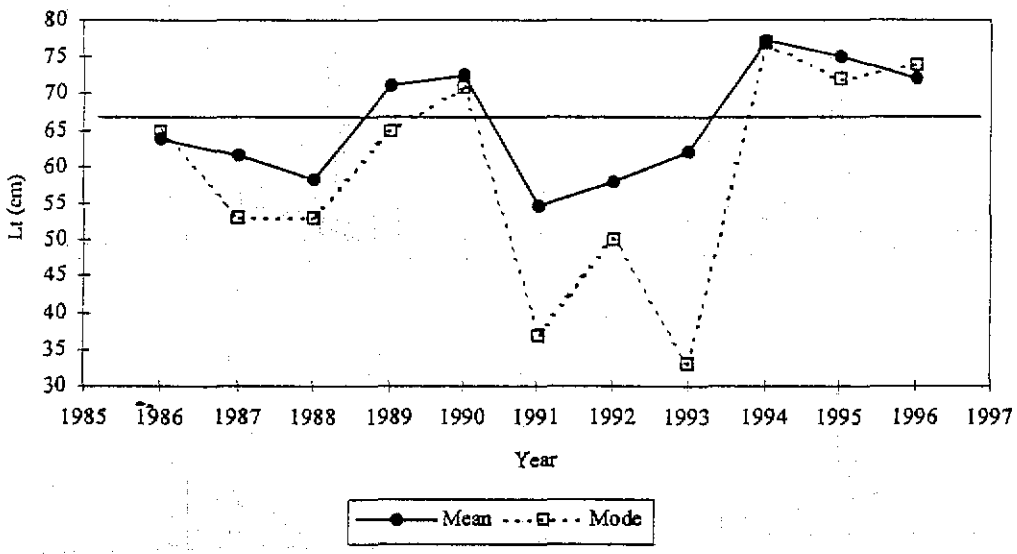

Figure 6 a . Mean length and mode evolution of *L. piscatorius* caught by gillnet for Anglerfish

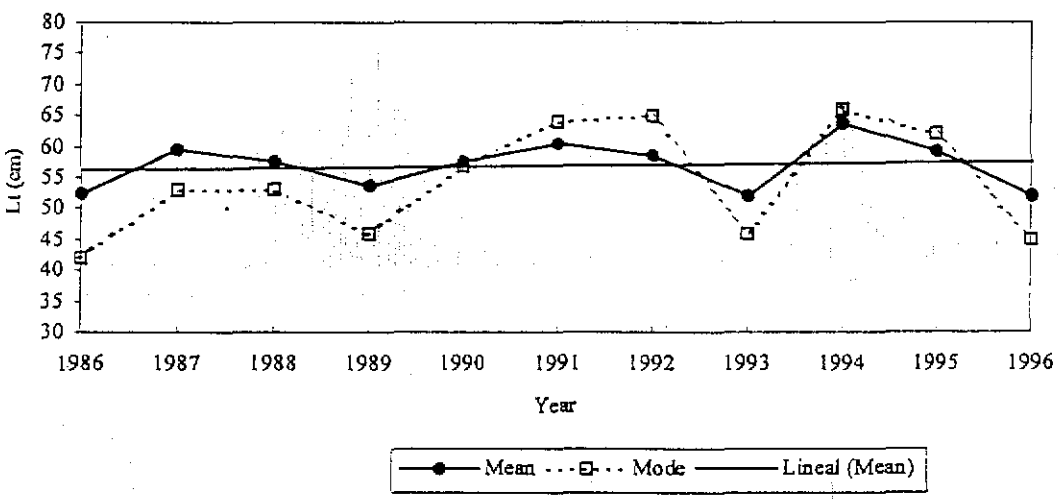

Figure 6 b . Mean length and mode evolution of *L. budegassa* caught by gillnet for Anglerfish.

Catch per unit effort

The evolution of the monthly average CPUE from 1994 to 1996 is presented in figure 7 media de los tres años by specie. A general and progressive fall in CPUE of *L. piscatorius* can be seen throughout the year, its maximum values appearing in the first quarter and minimums coming in the last. With respect to the CPUE of *L. budegassa* (figure 7), the figure remains approximately constant throughout the year (annual mean CPUE of 0.03), reaching maximum values in February and December.

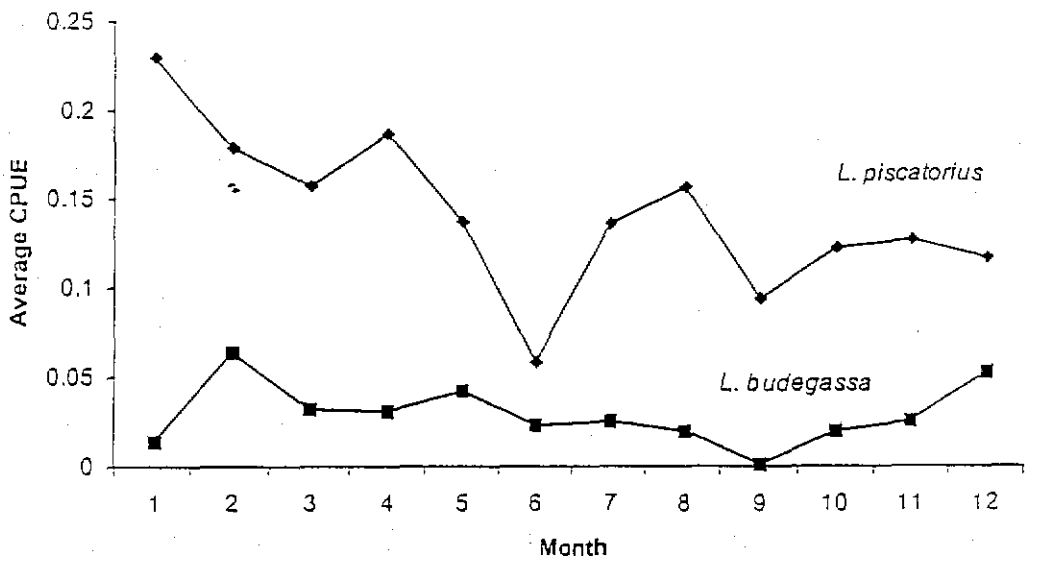

Figure 7. Average CPUE (1994-1996).

DISCUSSION

The gillnet fo angerfish is a highly selective gear with respect to species, due to both its design and its working areas. It catches almost exclusively *L. piscatorius* and *L. budegassa*, while remaining catches are very small and representation of other species in landings is highly limited. The reduction of the landings in the 90' was probably probably due to an overfishing during the 80', this reduction represent a 60% in the landings of *L. piscatorius* and 67% in *L. budegassa*..

The range of depths that the fleet covers the areas of bathymetric distribution of both species. The two species, nevertheless, have different bathymetric ranges. *L. budegassa* has a lower range of distribution and greater abundance at lesser depths, at between 70 and 200 m approximately. *L. piscatorius*, on the other hand, has a greater range of distribution and a greater abundance at great depths, its highest abundance appearing at between 100 and 1000 m approximately. Thus, although rasco covers the area of bathymetric distribution of *L. budegassa*, it works mainly in the area of distribution of *L. piscatorius*. This is shown by the greater proportion of catches of this species.

Whereas the CPUE's of *L. budegassa* remain more or less constant throughout the year, an increase is observed in CPUE's for *L. piscatorius* in the first part of the year, which seems to indicate a higher abundance of this species in the area. The fleet tends to work at greater depths at the beginning of the year (J. Landa and A. Punzón, pers. com.) when the highest concentrations of *L. piscatorius* appear. This characteristic may corroborate the hypothesis of a migration of these species to deep water in winter (Duarte et al., 1998).

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