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Overview of Continental Shelf Elasmobranch Fisheries in the Cantabrian Sea

(Elasmobranch Fisheries – Poster)

by

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Abstract

A brief review of the main elasmobranch species landed in the Cantabrian Sea (ICES Division VIIIc)[1] is presented. Special attention has been paid to dogfish (*Scyliorhinus canicula*) and some Rajidae species *(Raja clavata, Raja montagui* and *Leucoraja naevus)*, which represent more than the 90 % of rays landings. A market sampling program has been carried out in 2001 to improve the knowledge on these species which are frequently landed mixed together and occasionally gutted or in pieces (wings). Commercial length distributions by gear, area and quarter have been obtained as well. Discards represent a significant percentage of the catches in the trawl fishery about 35 %. The estimated annual average of dogfish catch is around 1500 t, 80 % of which are discarded. In the case of Rajidae species, the estimated catch is 600 t, around 30 % being discarded.

Introduction

The Cantabrian Sea is the southern part of the Bay of Biscay (ICES VIIIc Division). Its continental shelf is characterised by its narrowness compared to other adjacent areas like the French continental shelf and by some remarkable bathimetric features (canyons, marginal shelves, etc.). On the other hand, the existence of important enriching processes (upwelling and slope currents), together with the high diversity of the bottom determines the existence of a complex ecosystem and the presence of many species that contribute with other seasonal migratory species to the great fishery richness of this area (Sánchez *et al*., 1995; Sánchez and Olaso, 1999).

Therefore, many species are caught including sharks, skates and rays; with the exception of some local and seasonally fisheries targeting deep water sharks and blue shark, most of these species are taken as a by-catch.

The fact that many elasmobranchs have a low commercial value and are taken as a by-catch, implies that traditionally these species were landed together in the same category, making it impossible to know the landings by species, as the case is for rays or deep water sharks.

The demersal fishery along the north and north-west coasts of Spain is considered to be a multi-specific and multi-gear fishery: many species are caught with a great variety of gears depending on their abundance and seasonally. Traditionally, the gears used in the Cantabrian Sea are classified in four types: trawl, longline, gillnet and purse seine. Each type includes several varieties, their target species and their patterns of exploitation being different (González *et al*., 1986; Punzón and Gancedo, 1998, 2000).

[1] The Subareas and Divisions cited in the text are those of the region of the International Council fore the Exploration of the Sea (ICES).

In this paper landings of elasmobranch species by fishing gear made by the Spanish fleet in the Cantabrian Sea have been compiled from 1996 to 2001; special attention has been paid to rays and dogfish; their species and length composition of the catch by gear have also been recorded.

Material and Methods

Landings have been collected on a monthly basis from most of the fishing ports in the Cantabrian Sea during 1996 to 2001. A market sampling programme has been carried out under DELASS project (Development of Elasmobranchs Assessments) during 2000-2001 mainly in order to obtain the length composition of some elasmobranch species landed by gear, to identify the Rajidae species landed (mixed together or wings) and to obtain biological and conversion factors for some elasmobranchs. Information on vessel characteristics is provided by the official census made in 2000 and by interviews in the fishing ports. The information provided here can be considered as the best possible estimates of catch data since it is not always possible to record data from all the fishing ports at a species level or to know the specific fishing area or fishing gear.

Results and Discussion

1. Species Composition

For the purpose of distinguishing and characterising commercial fisheries, elasmobranchs can be divided into four groups: pelagic sharks, deep-water sharks, coastal sharks, and skates and rays.

Pelagic sharks: The most representative species of this group is the blue shark *Prionace glauca* which supports a local and seasonal fishery in the south-eastern area of the Bay of Biscay (Basque Country). Besides this species, other pelagic sharks are caught as by-catch; these are *Lamna nasus*, *Isurus oxyrinchus*, both included in the Lamnidae category, *Alopias vulpinus* and *Galeorhinus galeus.*

Deep water sharks: With the exception of a local and seasonally fishery targeting deep-water sharks based on one fishing port (San Vicente de la Barquera); the rest of these species are the by-catch of mixed fisheries. Many of the species caught belong to the family Squalidae: *Etmopterus spinax*, *Centroscymnus coleolepis*, *Centrophorus squamosus*, *Deania calceus*, *Dalatias licha*, *Scymnodon ringens;* they are included in the same group. The other significant species in this area is the black mouth catshark *Galeus melastomus.*

Coastal sharks: This group comprises *Scyliorhinus canicula*, *Scyliorhinus stellaris* and *Squalus acanthias.* Despite both dogfish *S. canicula* and *S. stellaris* are present in the Bay of Biscay, the first is much more abundant and represents most of the catch; for this reason we will only refer to this species.

Rays: The main Rajidae species found in the commercial Spanish landings are *Raja montagui*, *R. clavata*, *Leucoraja naevus*, *R. brachyura*, *R. undulata*, *R. microocellata*, *R. oxyrinchus* and *R. circularis*. By market samplings carried out during the period 2000/2001 the contribution of each species to the total landings by gear has been estimated.

2. Fleet

Different types of gears operate in the Cantabrian Sea, according to the depth, ground type and target species: trawl, gillnet (*volanta*, and *rasco*) and longline, and others grouped as "small artisanal gears". Under the name of gillnet several gears are found all of them bottom gears with different target species (Rodriguez Santamaría, 1923; Pereda and Villamor, 1991). *Rasco* (gillnet for anglerfish) is a gear in one single piece, with 280 mm of mesh size usually drew at depths between 100 and 800 m (Pereda *et al*., 1998). *Volanta* (gillnet for hake): made up of a single piece, with a 80 mm minimum mesh size frequently laid at 100 to 400 m depth. Included in the group of "small artisanal gears" are all those gears which work on the coastal depths of less than 150 mm like; *Beta* (small gillnet): made of one single piece with a mesh size not less than 60 mm. *Trasmallo:* made up of three pieces, with mesh size not less than 400 mm in the two outer pieces and 60 mm in the inner piece. *Miño* similar to the trasmallo made up of three pieces, with mesh size not less than 500 mm in the two outer pieces and 90 mm in the inner piece. *Beta* is frequently included in this group as well and other gears which are mostly modifications of the ones previous described (Punzón and Gancedo, 1998).

Last census made in 2000 gave a total of 8479 vessels fishing in the Cantabrian Sea (277 less than in 1998), 167 of which operated with trawl gear, 207 with longline, 163 with gillnet and the rest, approximately 7942, were small boats working near the coast with artisanal gears (90 % in Galicia, north-western Spain). Trawlers are the biggest vessels, with mean dimensions of 500 HP, 150 GRT and 27 m length. Gillnet and longline vessels are very similar in size, around 130-160 HP, 20-25 GRT and 14-16 m length. Most of the fleet is 20 years old and over (Table 1).

The Spanish fleet has traditionally been fishing in the North Atlantic targeting the main commercial species (hake, monkfish, megrim, sole, etc.). They take place in ICES Sub-areas VI, VII and in Divisions VIIIIa,b,c,d and IXa (Fig. 1). The description of elasmobranchs fisheries in the different Sub-areas and Divisions is rather difficult since frequently these species are included in the same category. In this paper we have collected data from areas: VI, VII VIIab VIIIc and IXa for rajidae species and lesser spotted dogfish.

3. Landings

As it has been mentioned above, the majority of elasmobranchs are not commercial species in Spain, and landings come from the by-catch of different fishing gears, although most of this by-catch is discarded.

Pelagic sharks

Landings of blue shark *Prionace glauca* oscillate between 177 tons in 1999 and 470 in 1996; however only landings from ICES Division VIIIc are considered, including data from the fishery in the Basque Country. Data on the by-catch of the longline fishery targeting on swordfish in North Atlantic waters have not been included since they come from outside the area studied (for more information see Mejuto *et al*., 2001). This species is basically caught with surface longline occasionally catches with trawl, gillnet and purse seine (Fig. 2). The contribution of this species to the total elasmobranchs landings ranges from 14% to 27% (Fig. 2).

Galeorhinus galeus is mainly caught in the western area of the Cantabrian Sea (Galicia). Around 80% of the landings are from longline vessels, followed by those from trawl and small gillnets. Some fluctuations appear in total landings because the fishing port where most of the landings take place does not report data since 1998. For this reason we cannot precise if landings have decreased in last years (Fig. 2).

Isurus oxyrinchus and *Lamna nasus* are commonly included in the same group, although landings of the first in some fishing ports have been provided in the last years, when it is apparently more frequent. As with other elasmobranch species, problems arise sometimes in defining the fishing area. *A prior*, these species show fluctuations among years with an average of 30 tons (Fig. 2).

Deep-water sharks

Squalidae comprise many deep water elasmobranch species which are commonly landed together in the same group. It is not possible to estimate the percentage of each specie without a specific market sampling design. The most frequent species are *Etmopterus spinax, Centrophorus squamosus, Deania calceus* and *Dalatias licha.* Landings of these species show a decreasing trend with the exception of year 2000, when they reached 224.7 tons (Fig. 3). The contribution of squalidae to the total elasmobranchs landings oscillates between 12% and 31% (Fig. 3). A review of Spanish deep-water fisheries exploiting these species in the northeast Atlantic can be found in Piñeiro *et al*., 2001.

Galeus melastomus is frequently landed in some fishing ports and most of the times not mixed with other species; however, landings of this species hardly represent 1% of the total elasmobranchs landings (Fig. 3). Landings have decreased in the last years although probably some fishing ports are missing and landings are slightly underestimated.

Coastal sharks

S. canicula landings from Divisions VIIIab and VIIIc are very similar showing fluctuations among the different years, with the highest values in 1998 (340 tons) and 2001 (259 tons) respectively. Next are Sub-area VII and Division IXa, while landings from Sub-area VI are very low (Fig. 4a). Landings of this species from Division VIIIc are more or less constant, close to 200 t, with an increasing trend in the last two years. As it happens with rays, the

highest landings are those of bottom trawl (75%) followed by longline (21%) and gillnet (3 %); some landings of purse seine or traps have also been occasionally recorded (Fig. 5).

Squalus acanthias has not been included because landings in the region are insignificant and not all fishing ports separate this species.

Rays

The highest landings of the Spanish fleet operates from Sub-area VII, reaching 2 647 tons in [¿1999?]. Landings from Divisions VIIIab and VIIIc are quite similar about 500 tons; landings from Division VIIIab show a decreasing trend, while the trend of those from Division VIIIc is increasing. Landings from Division IXa and Sub-area VI are very scarce (Fig. 4b). Annual landings of rays are about 500 tons, with an increasing trend in the last two years. The highest landings from Division VIIIc are from trawl (8%) followed by gillnet (11%) and longline (8%); some landings with purse seine or traps have also been occasionally recorded (Fig. 6).

R. montagui, *R. clavata* and *L. naevus* are the most abundant rays in the landings from Division VIIIc, while R. brachyura, R. undulata R. microocellata and R. circularis are very scarce, particularly the last two ones, however significant differences exist among fishing gears. For example, *R. brachyura* represents 30% of landings of gillnet, while this species is not usually landed by the other gears. Landings of *R. clavata* are always above 20%; however; longline is the gear with highest landings of this species (Fig. 7).

4. Discards

A study carried out in 1994 to estimate the discards of the Spanish fleet in ICES area revealed that almost the 90% of the total catch of dogfish in the VIIIc is discarded, later studies made in 1999 and 2000 estimated the proportion of discards in 77% and 83%, respectively (Pérez *et al*., 1996). For rajidae species the values obtained were 20%, 25 % and 33 % respectively.

5. Catch size composition

As it has been previously mentioned above, a sampling programme was carried out in 2000/2001 to estimate the species and size composition of rays and dogfish landings from Division VIIIc (Fig. 8).

Dogfish

The length distribution shows that most the specimens landed are above 40 cm, ranging up to 66 cm. No significant differences exist among the catches of the different fishing gears, the mean size of specimens caught by trawl, longline and gillnet being 53.6 cm, 55.2 cm and 54.0 cm respectively. Considering that first maturity length of females is 54.5 cm, most specimens landed are adults.

Rays

R. montagui: Approximately 84% of landings come from trawling, which catches specimens of total length ranging from 30 to 90 cm. Gillnet and longline landings represent around 8 % each; gillnet catches include small specimens less than 20 cm and some large individuals, while longline catches medium size specimens, mainly from 45 to 60 cm.

R. clavata: The length distribution of the specimens in trawl landings of this species (80%) ranges from 32 to 95 cm. Gillnet, which represents around 6% of the landings, catches specimens mainly form 50 to 70 cm. Longline (14%) also covers a length range as wide as trawl, but most of the individuals landed are 45 to 55 cm of total length.

L. naevus: Only specimens from longline (6%) and trawl (94%) have been sampled, there are no gillnet landings recorded for this species during the study period. The length distribution of the trawl catch of *L. naevus* ranges from 35 to 77 cm, while longline catches medium size specimens from 47 to 67 cm.

Acknowledgements

Many colleagues are involved in collecting data from the fishing ports, sampling and processing the information. We are very grateful to the Spanish Institute of Oceanography (IEO) data base team of La Coruña, specially to Roberto Morlán, and Baltasar Patiño from Vigo IEO, whom provided information from Galicia main fishing ports and to the Technological Fishery and Food Institute (AZTI) specially to Iñaki Arteche and Guzmán Díez who assisted with data from the Basque fishing ports.

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Table 1. Characteristics of the fleet operating in the Cantabrian Sea based on a census in 2000.

	Trawl	Longline	Gillnet		Small
			Volanta	Rasco	Artisanal
Nº vessels	167	207	85	78	7942
HP mean	500	130	160	80	20
GRT mean	150	20	25	10	3
Length mean	27	14	16	11	6
Years	21	20	17	21	29

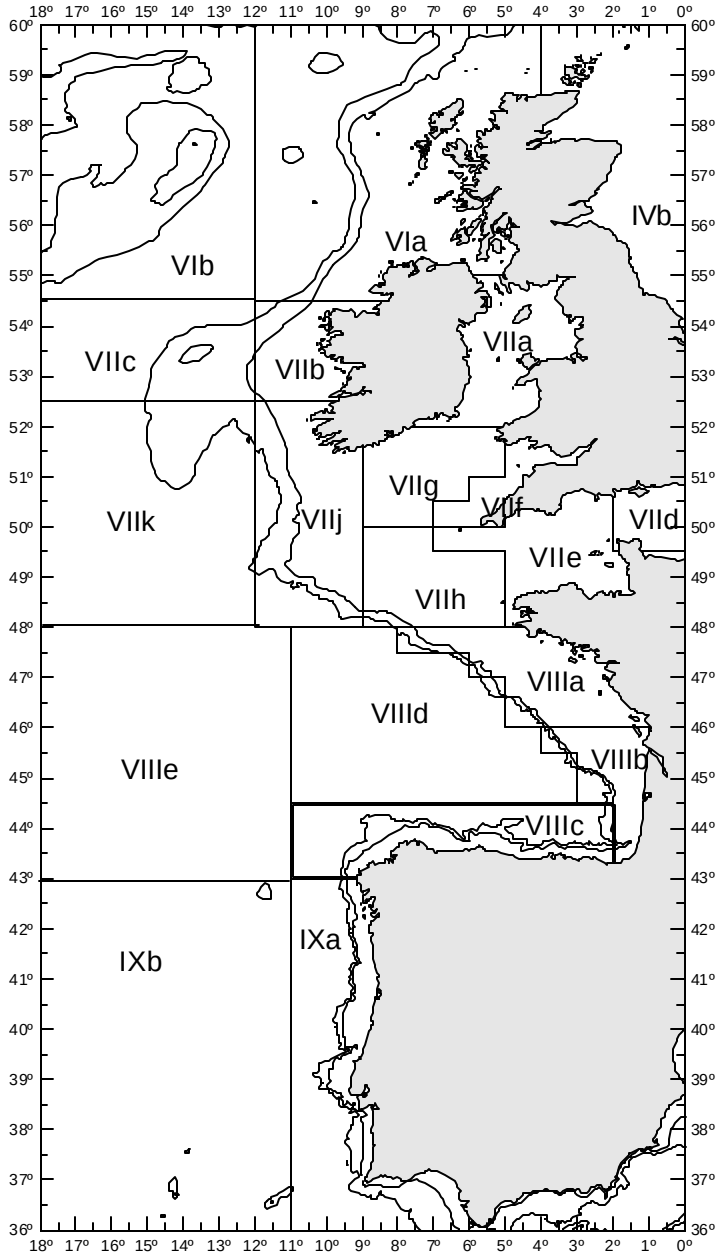

Fig. 1. Map showing the different ICES fishing Sub-areas and Divisions in the North Atlantic.

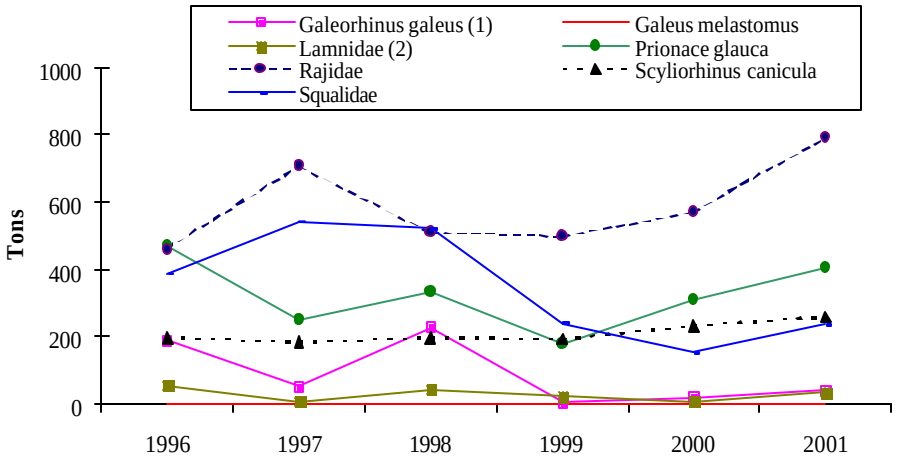

Fig. 2. Landings (t) of the most abundant elasmobranch species in Division VIIIc.

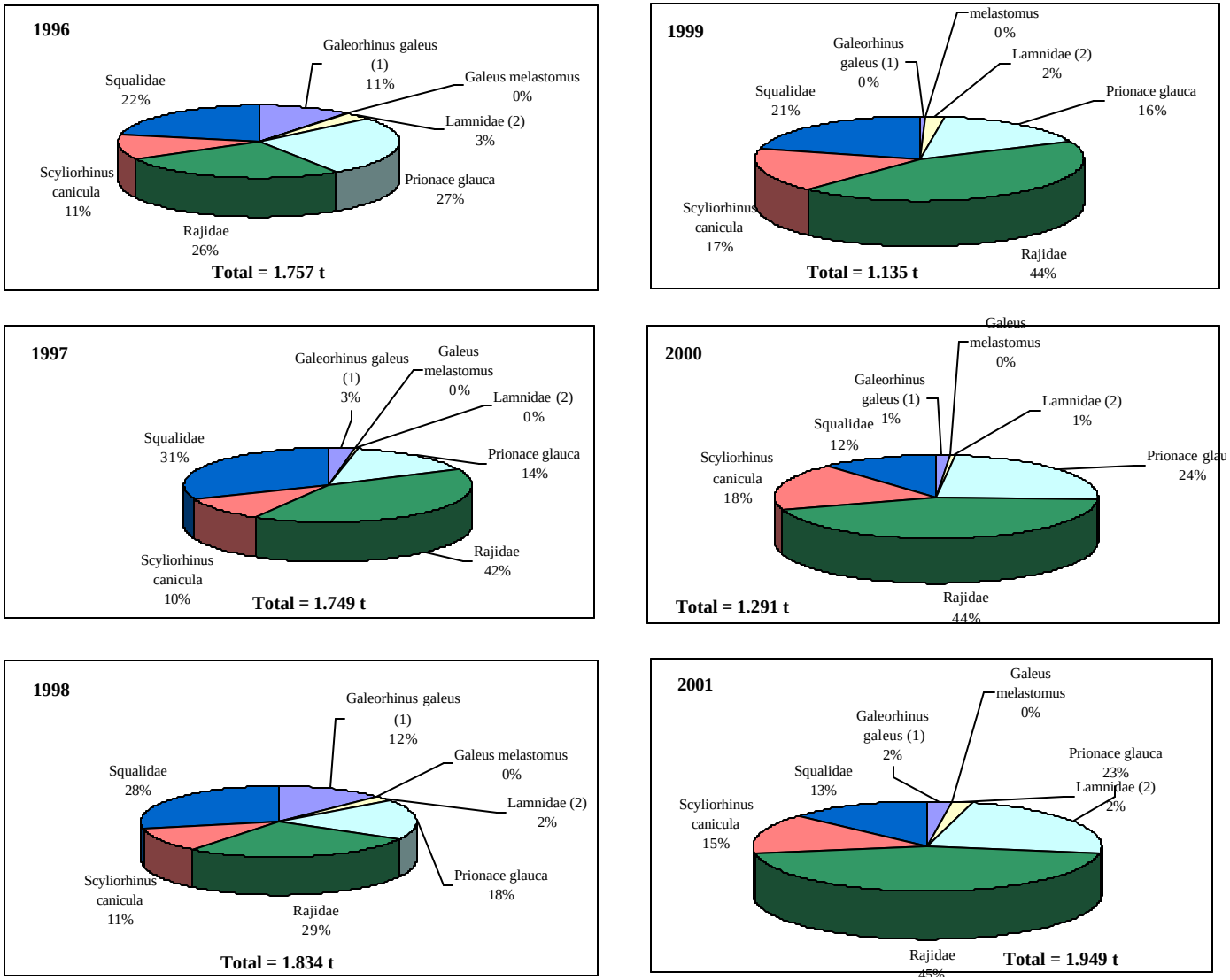

Fig. 3. Landings of the main elasmobranch species in Division VIIIc for the period 1996-2001.

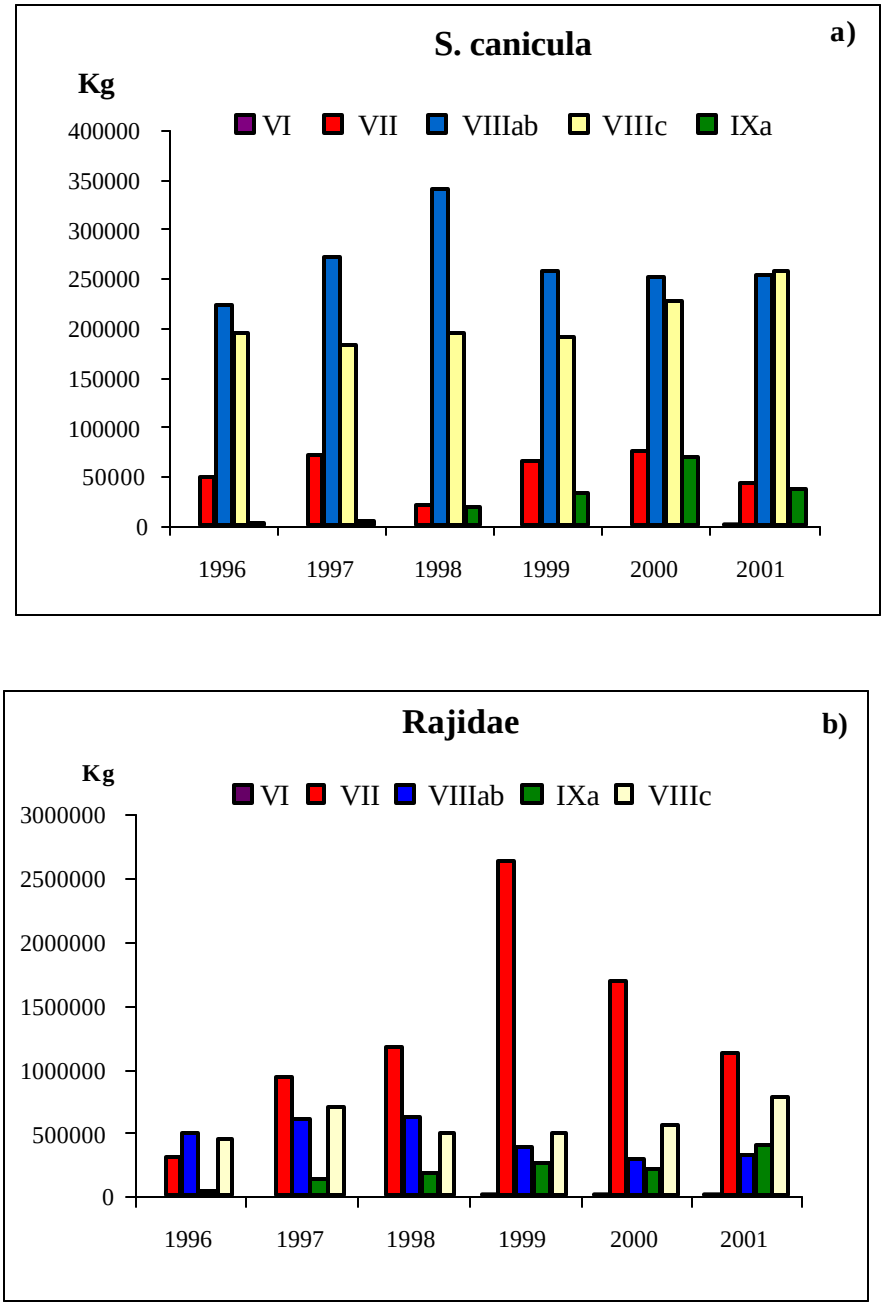

Fig. 4. Landings (kg) of a) *Scyliorhinus canicula* and b) *Raja* sp. by the Spanish fleet in different ICES sub-areas and Divisions.

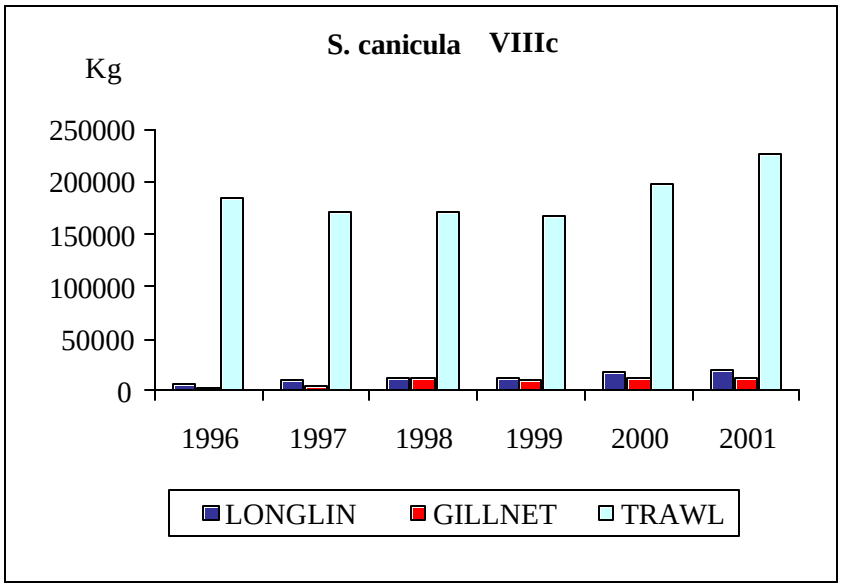

Fig. 5. Dogfish (*Scyliorhinus canicula*) landings (kg) by fishing gear in Division VIIIc.

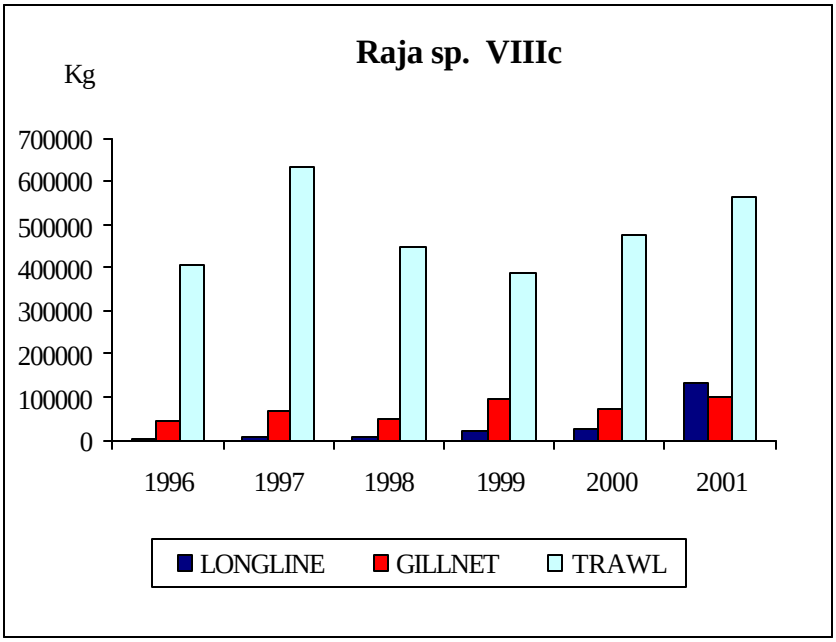

Fig. 6. Rajidae landings (kg) by fishing gear in Division VIIIc

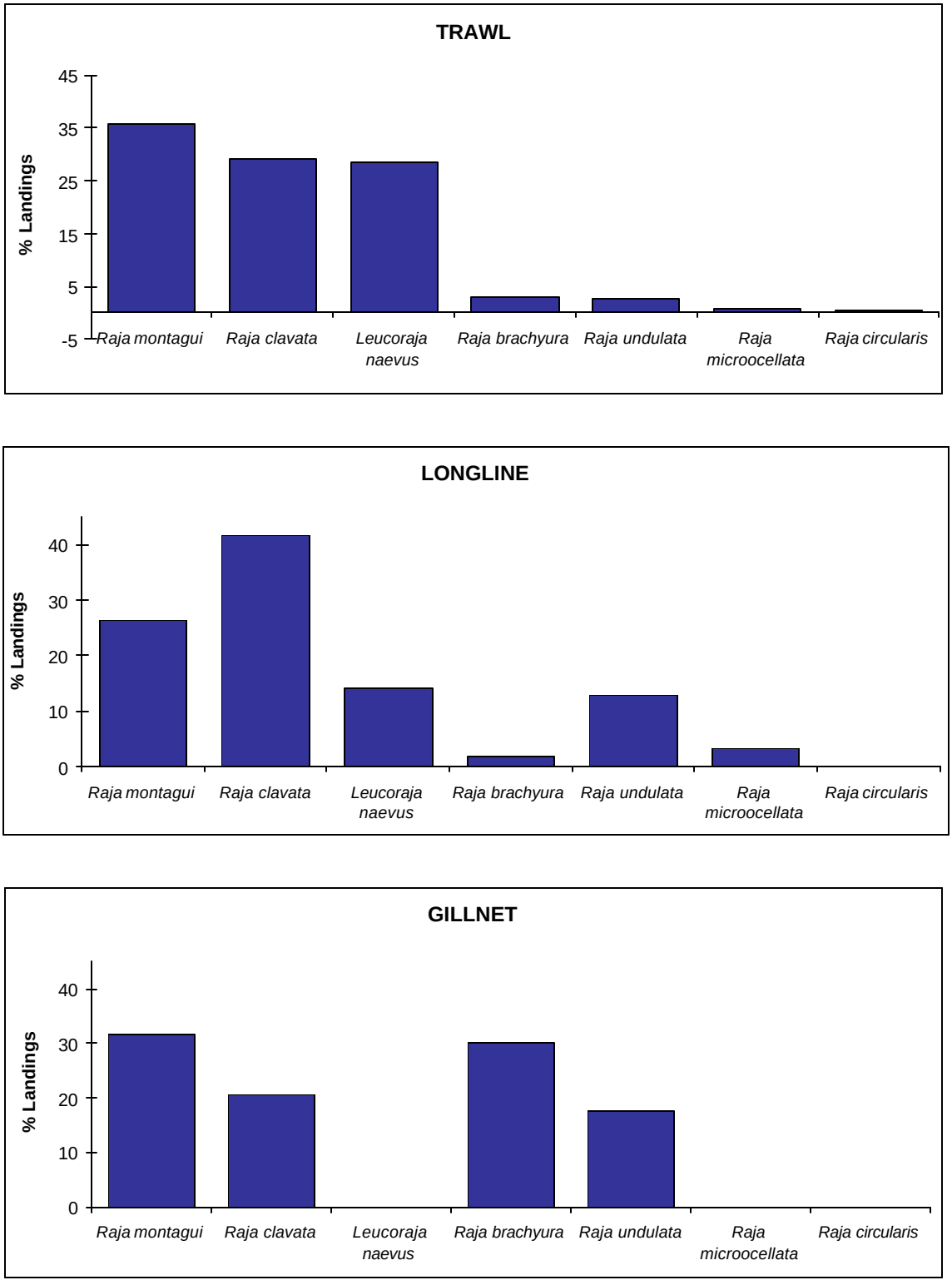

Fig. 7. Species composition of Rajidae landings from Division VIIIc based on a market sampling programme carried out in 2000-2001.

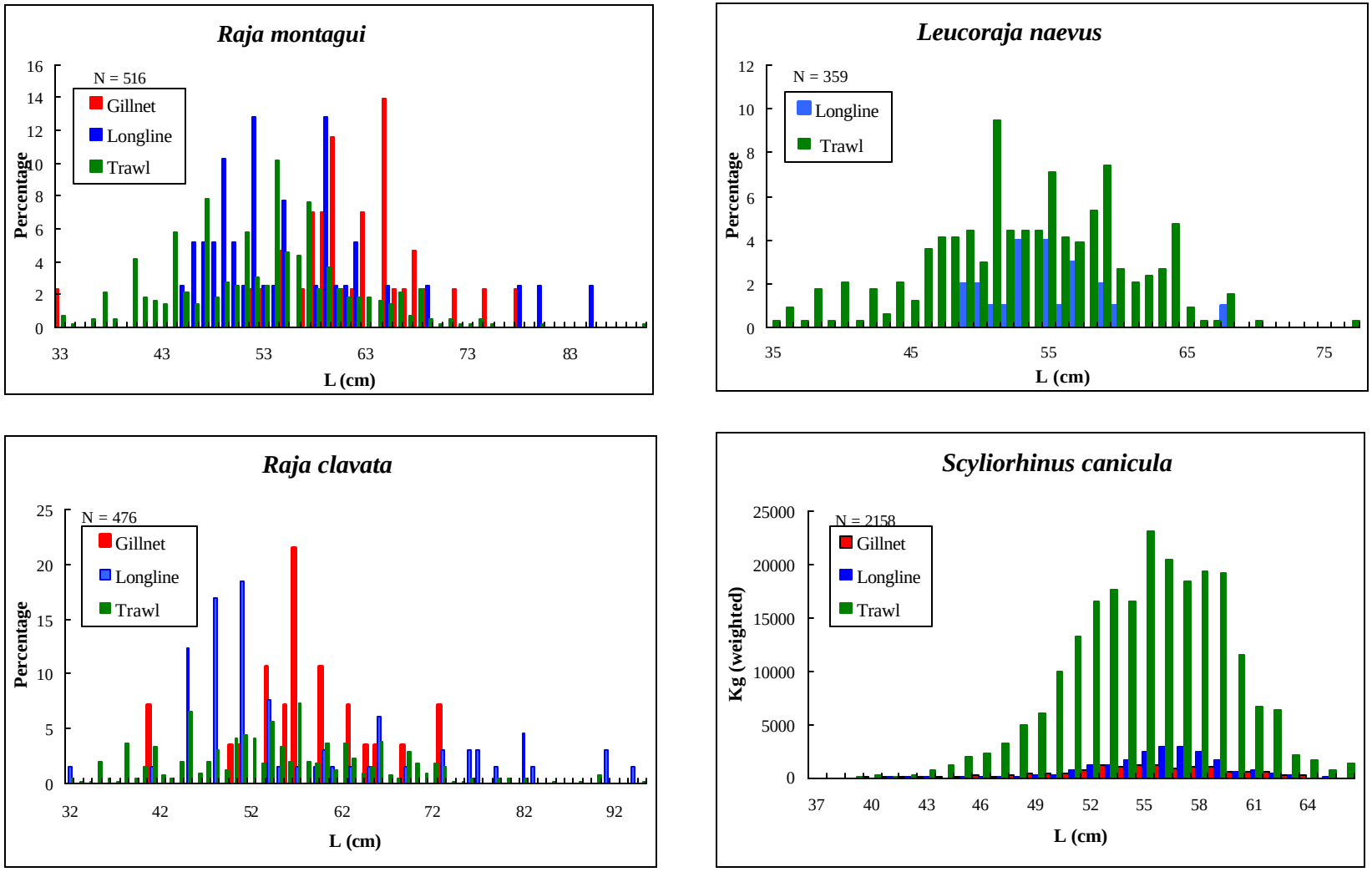

Fig. 8. Length composition of the catch of the main Rajidae species and lesser spotted dogfish.