Contrat PECOSUDE

"Caractéristiques des petites pêches côtières et estuariennes de la côte atlantique du sud de l'Europe"

EC./DG FISH (DGXIV) : Contrat N° 99/024

RAPPORT FINAL

(Période 24 mars 2000 - 23 avril 2002)

Nord Espagne

* Pays Basque (AZTI, UPV)

* Cantabrique et Galice (IEO)

This project has been carried out with the financial assistance of the European Commission

Dans le cadre du projet PECOSUDE "Caractéristiques des petites pêches côtières et estuariennes de la côte atlantique du sud de l'Europe", le secteur nord de l'Espagne a été étudié en 2 parties

- Le Pays Basque : étude halieutique (AZTI) et analyse socio-économique (UPV)
- La Cantabrique et la Galice : étude halieutique (IEO)

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FINAL REPORT

North Spain
Basque Country

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Team involved *: Ikerne del Valle (UPV), Kepa Astorkiza (UPV), Luis Arregi (AZTI), Raúl Prellezo (AZTI) (* Names in alphabetical order)

Fundacion AZTI & Universidad del Pais Vasco

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INTRODUCTION

A large number of small vessels (126) practise artisanal coastal fishing in the Basque Country, using different fishing gears in the fishing areas close to the coast. They fish during short periods (i.e fishing trips) usually less than 24 hours. Whilst their importance in terms of catch weight is reduced in comparison with other fishing sub-sectors, however in relation to their socio-economic importance as activity catalyser of the coastal fishing communities this study is of interest with a view to its maintenance.

The fishing ship population considered is delimited by defining criteria of the project, i.e. the fleet studied comprises vessels which meet the following requirements at one time or another during their annual activity cycle:

a) they fish for periods of less than 96 hours (4 days);
b) their fishing activity occurs within territorial water limits (outer limit of 12 miles);
c) they work in fishing areas of less than 1000 metres deep;
d) vessel length between perpendiculars is less than 15 metres.

In relation to the Spanish Basque Country geographical area, there have been several studies on artisanal coastal fishing in recent years, tackling different technical-fishing aspects: fishing gears (Ijelmo et al., 1984), Hondarribia pole and line fleet activity dynamics (Motos and Uriarte, 1986), velvet crab fishing (Borja, 1987), artisanal hake (Castro, 1988) and red bream fishing (Castro, 1990), bottom fixed net fishing (Puente, 1990) and artisanal fishing in its entirety (Puente, 1993). More recently other studies have tackled aspects related to artisanal gillnet fishery monitoring and management (Puente, 1997a, 1997b, 1997c).

The GAUR (1970) report in the fishery economy field, was the forerunner in the socio-economic analysis of the Basque Country surface artisanal fishing fleet. This report analysed the said fleet's basic characteristics. However, whilst this analysis referred exclusively to the purse-seine fishing fleet, the diagnosis and conclusions drawn triggered off the majority of the reflections made on the artisanal sub-sector and inshore fishing economic problems. Subsequently, Gonzalez Laxe (1977) generalised the debate on the artisanal and inshore fishing fleets' socio-economic characteristics, different branches resulting in the analysis made on this sector along the entire Cantabrian coast in the last decades.

In the following decade it was the Ikei (1985) study on the inshore fleet profitability and the need for reconversion in the light of the forthcoming adhesion to the EEC. In the nineties Perez (1992) and Espel (1992, 1995) analysed the specific problems of the artisanal sector in the Basque Country fisheries.

Recently, the anthropology field has focussed on the specific behaviour of the economic, ecological, social and cultural practices of the communities living on the activities of these fleets. Furthermore, they have provided new elements in the efficiency assessment of this sector.

Parallel to this a research area rooted in institutionalism has developed contributing a number of growing works related to the economic aspects of the institutions regulating the professional activity of these fishermen as in Astorkiza K., Del Valle & Astorkiza I. (2000; 2002) and Lopez (2000).

Throughout the second half of the 90s, an important dynamism of the coastal artisanal fleet has been registered with variations in the fishing strategies derived from changes in resource availability, not to mention modifications in fishing regulations at both state and autonomic levels.

This study proposes a knowledge update in this fleet's activity dynamics. Therefore, categories are being created which include homogenous fishing practices, followed by characterisation of the resulting typologies considering socio-economic and commercial aspects which finally determine its activity. The main targets of this study are:

- Establish activity typologies enabling fleet segmentation in vessel groups of homogenous characteristics as regards their activity both in terms of fishing gears used and targeted species.
- Estimate amount and diversity of exploited resources, plus their seasonal variation, stressing the possible degree of interaction with other fishing subsectors.
- Qualitative and quantitative analysis of production factors used in the productive process of each typology. Estimate their productivity and economic profitability.
- Discover the commercialisation circuits used by each activity typology to bring its output to the consumer.

The geographical area of this study is confined to the two Spanish Basque Country maritime provinces (Bizkaia and Gipuzkoa), centred on the activity of vessels with base ports in both territories. For convenience, 1999 is the reference year (the year prior to commencement of this study).

The study results are presented in two main parts:

. Part 1: The fishing fleet activity typology
. Part 2: Socio-economic and commercial analysis of the activity typologies extant in the coastal artisanal fishing

Part 1

Typology of the Basque Country fishing fleet activity

1. MATERIALS AND METHODS

1.1. Materials

In the section referring to the global description of the fishing activity, the operational fishing fleet characteristic data were obtained from the Official Fleet Census published by the Ministry of Agriculture, Fishing and Food, updating the data at 31st December 1999 from information AZTI collects regularly from the fishermen's guilds in the Basque Country ports, as well as a survey among fishermen performed within the project framework.

In the section referring to fishing gears used, the information came from the survey on fishermen via personal interviews with a sample of skippers who were surveyed based on the form presented in Annex 1. The survey information regarding the relation between fishing gears and target species was used in those vessels not surveyed which have a daily sales register per species in the guild for identification of the fishing gears used. This enabled an activity profile throughout the year to be established for a total of 118 vessels out of a total of 126 identified as the study target population. This information was completed with information referring to the fishing gear technical characteristics obtained from previous studies (Puente, 1993).

The landed weight estimation per species was made using a sales database per vessel, species and day created from AZTI's fisheries database, selecting and filtering vessels identified as the study target population. The Basque Country fishermen's guilds regularly provide AZTI with these data. Likewise, these data served to estimate the seasonal variation in species landing, thus offering the fishing activity seasonality.

Information referring to the fishing areas comes from the surveys on the fishing skippers, completed with the regulation dispositions extant referring to limitations in the use of certain fishing gears depending on water depths and/or areas along the Basque coast.

To obtain the different typologies two separate but complementary databases were created. The first specifies the fishing gears used by each vessel whilst the other determines the vessel catches per species. The relation between both databases is the vessel identification and its physical characteristics (length, power, GRT crew and vessel age).

Each database organisation has been slightly different. For the "gears" database, different fishing gears used per month by each vessel were introduced. A binomial variable was used for this, whereby use of the gear was 1 (i.e.; "presence"), and the "non-use" was 0 (i.e.: "absence") as shown in Table 1.

For the "species" database given difference in the numeric importance of fish landing weights among different sized vessels, the percentage of weight landed per species in relation to total annual weight per vessel was used for the database. 24 species representing over 95% of annual fish sales were selected for the database. The remaining species were grouped under the category "various" in the database. A quarterly breakdown has been made in the database given the enormous number of variables which would require processing if it had been done monthly. Each quarter has considered the proportion of landed weight per species in relation to the total per vessel. On the other hand, the proportion landed per species has been considered a sufficiently significant describer index of species importance for the effects of vessel group classifications. Furthermore, it "reduces" the important differences among the lands in absolute values of different sized vessels. Nevertheless, in some vessels particularly the small ones, classification using the index mentioned may be a little inaccurate, given the reduced weight of certain species landings with high commercial value.

Table 1. Schematic structure of the "fishing gears" (above) and "species caught" (below) databases used in the multivariant analysis to establish fishing activity typologies.

Database "FISHING GEARS"	**Fishing gear 1**												. . . . .	**Fishing gear "i"**											
	Months													**Months**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**. . . . .**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Vessel 1	1	1	1	0	0	0	0	0	0	0	0	0	. . . . .	0	0	0	1	1	1	0	0	0	0	0	0
Vessel 2	0	1	1	1	0	0	0	0	0	0	0	0	. . . . .	0	0	0	0	0	0	0	0	0	0	0	0
. . . . .	. . . . .												. . . . .	. . . . .											
. . . . .	. . . . .												. . . . .	. . . . .											
Vessel "y"	0	0	0	0	0	0	0	0	0	0	0	0	. . . . .	0	0	1	1	1	0	0	0	0	0	0	0

Database "SPECIES"	**Species 1**				**Species 2**				**Species 3**				**. . . . . .**				**Species 24**				**Other species**			
	Tr. 1	**Tr. 2**	**Tr. 3**	**Tr. 4**	**Tr. 1**	**Tr. 2**	**Tr. 3**	**Tr. 4**	**Tr. 1**	**Tr. 2**	**Tr. 3**	**Tr. 4**	**Tr. 1**	**Tr. 2**	**Tr. 3**	**Tr. 4**	**Tr. 1**	**Tr. 2**	**Tr. 3**	**Tr. 4**	**Tr. 1**	**Tr. 2**	**Tr. 3**	**Tr. 4**
Vessel 1	0,4	0,8	0	0	0	0,2	0	0,6	0,2	0	0,7	0	0,1	0	0	0,4	0	0	0,3	0	0,3	0	0	0
Vessel 2	0,3	0,7	0	0	0	0	0,5	0	0,7	0,3	0	0,3	0	0	0,4	0,7	0	0	0,1	0	0	0	0	0
. . . . .	. . . . .																							
. . . . .	. . . . .																							
Vessel "y"	0	0,1	0	0,5	0,2	0	0,3	0,4	0	05	0	0,1	0,8	0,4	0,3	0	0	0	0,3	0	0	0	0,1	0

1.2. Methods

Once the databases to be used were defined, each was analysed separately. In both typologies were obtained using the automatic group classification procedure (also known as cluster analysis). This classification method is based on formalised mathematic algorithms implying prior knowledge of possible results (should they exist) be subtracted, and only a posteriori (i.e., once an automatic classification method is used), is to be used to interpret results obtained.

Automatic classification statistical analysis is slightly different for each of the databases. For the "species" database, ascending hierarchical cluster analysis was used. Whereas in the "gears" database given the binomial nature of the variable introduced (1: "presence"; 0 "absence") binomial cluster analysis was chosen. The result is a hierarchical system of classes where some house others. The aggregation criterion followed for both was the Ward (1963) method, ensuring a good compromise is reached between class separation and homogeneity of the groups obtained.

Once analysis was done, two vessel groups were obtained, one for target species and the other for fishing gears. These two groups were processed as per the Léauté (2000) procedure. This method consists of generating a matrix where the longitudinal section represents classes obtained from analysis of one database whilst the cross section has the classes from the other database. Since the vessels are the same in both bases, each cell represents an absolute frequency of each class intersection obtained from each of the databases.

Those combinations with the most absolute frequencies and using the information from each of the individual cluster analysis, were identified as gravity centres for a series of groups classified as definitive typologies.

2. GLOBAL DESCRIPTIONS OF FLEET ACTIVITY

2.1. Legal framework of the Basque Country coastal artisanal fishing

The Basque Country coastal artisanal fishing is governed by regulations from different areas. As per the Spanish autonomic system, territorial water fishing regulation competence is shared between the Spanish State and Autonomous Community administrations. Therefore, the Autonomous Basque Country Community has competence in fishing regulations for the "interior waters" corresponding to delimited areas between the coast and an imaginary straight line between the main capes of the Basque coast. East to West these capes are: Cape Higuer, C. San Antón, C. Machichaco, C. Villano and Cobarón Point. Outside this imaginary line up to 12 miles of territorial water (known as "external waters") the fishing regulation competence corresponds to the Spanish State. Furthermore, European Union legislation in fishing matters is higher in rank to the previous, i.e., state and autonomic legislation must adjust their dispositions to those of community legislation. Having explained these points, below are the most important regulation dispositions affecting the subsector studied (Figure 1), highlighting only the most relevant aspects of the same conditioning the fishing activity:

A) European Union Regulations:

- *COUNCIL REGULATION 3760/92, 20th December 1992 fixing the general objective of the Common Fishing Policy, as the protection and organisation of marine resources and organisation, on a sustainable basis of a rational and responsible exploitation of the same*. Relevant aspects: This regulation creates a regulatory frame for the establishment of future fishing policies, specifically highlighting its orientation and objectives.

- *COUNCIL REGULATION (EC) Nº 850/98 30th March 1998, for the conservation of fishing resources via technical protection measures of juvenile marine organisms*. Relevant aspects: amongst other stipulations: the minimum dimensions of some gear characteristics, particularly static gear mesh size, and its relation to the proportions of target species retained on board.

B) Spanish State Regulations:

B.1) Static fishing gears:

- *ROYAL DECREE 410/2001 20th April, regulating fishing with fixed gears in the Cantabrian and Northwest National Fishing Grounds*. Relevant aspects: defines fishing gears (gillnet, hook lines, pots) and limits their dimensions; specifies how to use them; limits fishing activity to five days a week (does not specify which); limits "small gears" (*artes menores*) vessel engine power (i.e.: using small scale artisanal fishing gears) to 250 CV and length between perpendiculars to 15 metres; limits the activity to using a single fishing gear or line per day. Regarding artisanal fishing activity organisation, this is the most important regulation.

- *ORDER of 26th July 2001 establishing a fishing plan with "coastal nets" ("Redes costa") in a specific area of the Cantabrian coast.* Relevant aspects: specifies limitations of certain fishing gear characteristics and their amount in Gipuzkoa and Bizkaia waters, as well as maximum fishing gear depths in the latter province.

B.2) Mobile gears:

- *ORDER OF 28TH JUNE 1985 prohibiting "bottom trawling" in the central Cantabrian area.* Relevant aspects: prohibits trawling all year in Bizkaia between the Cape Villano (Plencia) meridian and that of Santa Catalina Point (Lekeitio) within the 12 mile limit.

- *ROYAL DECREE 1441/1999 of 10th September, regulating bottom trawling fishing activity in the Cantabrian and Northwest national fishing ground.* Relevant aspects: bottom trawling may only be practised in depths exceeding 100 metres.

- *ORDER OF 25TH JULY 2001 establishing certain season closed to bottom trawling in the Cantabrian and Northwest national fishing ground.* Relevant aspects: extends the trawling fishing prohibition in Gipuzkoa to a limit exceeding 100 metres in the areas of "Fuenterrabia", between the meridians 1º 552,0'W (C. Higuer) and 2º 08,0'W (Orio) all year and in the "Guetaria" area, between the meridians 2º 08,0'W (Orio) and 2º 24,0' W (Saturrarán Point), from 1st September to 31st December.

C) The Autonomous Basque Country Community Regulations:

- *DECREE 212/2000 OF 24TH OCTOBER, regulating small gear fishing along the Autonomous Basque Country Community coast.* Relevant aspects: in general terms includes the limitations imposed by the *ROYAL DECREE 410/2001 of 20th April* (see above) on the Basque Country internal waters, thereby harmonising the internal and external water dispositions.

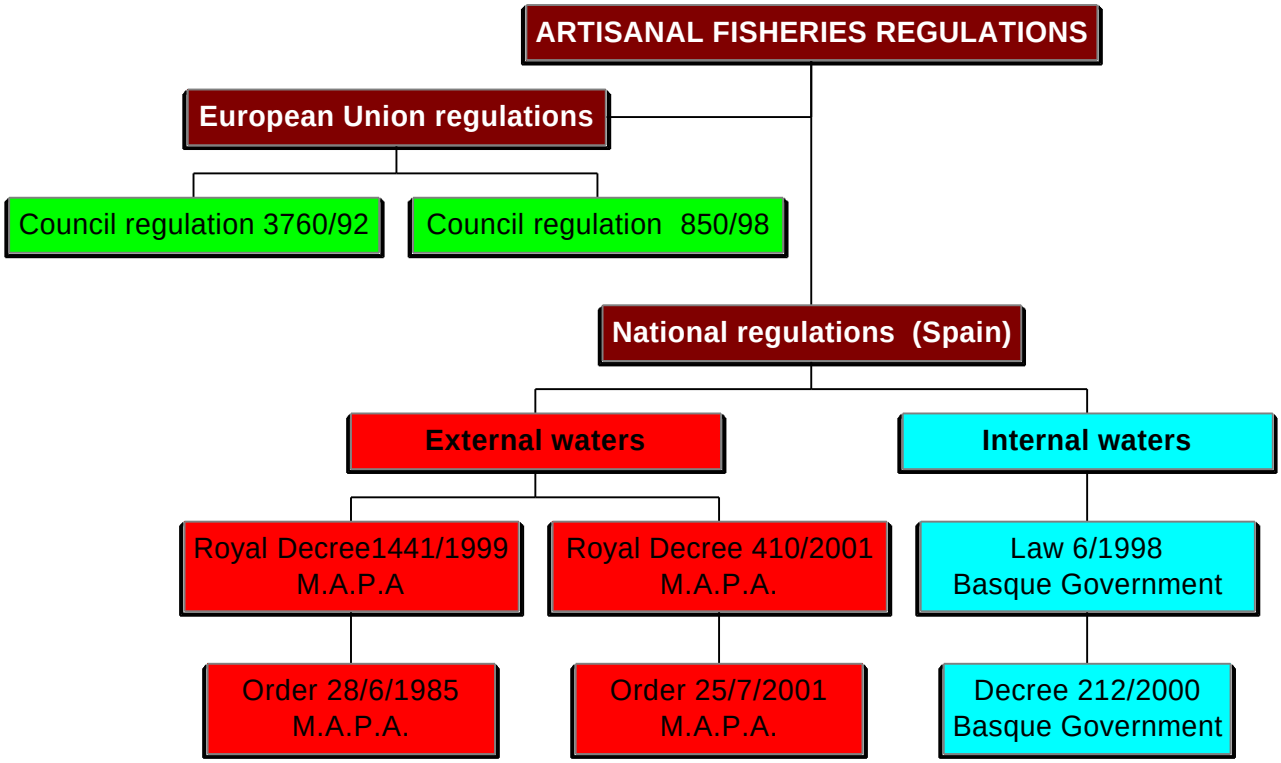


Figure 1. Flowchart or the main fishing regulations affecting the Basque Country coastal artisanal fishing practice.

Finally, it is worth highlighting the Bizkaia and Gipuzkoa Fishermen's Guild Federations have established "agreements" over the years to organise the different fishing modality activities, thereby ensuring coexistence at sea between fishermen using different methods. The "agreements" were negotiated and agreed every year by the fishermen themselves, and basically included the fishing practice uses and customs along the coastal areas. Whilst they are not supported by the competent authority, fishermen abided by them and some of their dispositions have been quite well reflected in the fishing regulations enacted by the State and Autonomous Basque Country Community authorities.

2.2. Technical characteristics of the fleet

The artisanal coastal fleet was delimited from the Official Spanish Fleet Census of 1999, updating information regarding activity entries and departures from information collected directly from the fishermen's guilds, and the surveys performed in the port within the study framework further on (see work methodology).

Bearing in mind the delimiting criteria of this study target fleet universe, the coastal artisanal fleet comprises 126 units irregularly distributed among the region's 17 fishing ports (Table 2 and Figure 2). Among them, 68 belong to the Bizkaia maritime province and 58 to Gipuzkoa. In order of importance as regards number of vessels, the main coastal artisanal fishing ports are Getaria, Donostia and Pasaia in Gipuzkoa, making 34.1% of the total number of vessels in the fleet studied, and Bermeo, Lekeitio and Plentzia in Bizkaia which together make 35.7% of the fleet.

The coastal artisanal fleet is characterised by the important variety of vessel types, from infrequent small vessels without bridge known as "motorised launches", to the numerous middle-sized classical vessels with bridge called "hake boats" (Photo 1) with maximum length of 15 metres.

When considering this fleet's technical characteristics (Table 3), average vessel size is 10.0 metres long between perpendiculars, and a Gross Registered Tonnage and engine power of 10.5 GRT and 65 Kw respectively. The crews of these vessels are reduced (average 2.6 men/vessel) and their mean age is high (mean construction year: 1985).

As per fleet describer parameter distribution (Figure 3), the most numerous vessels are less than 10 metres long (56% of them), although those of greater length (up to 15 metres) are well represented. Vessel capacity is small, dominating those of tonnages under 5 GRT and in most cases engine power is less than 120 Kw. The small size of the vessels is handled by reduced crews usually less than 3 men, although in one vessel, the crew may vary depending on the fishing season and greater or lesser manpower needs for the fishing métiers used. The coastal artisanal fleet comprises mainly very old units (55% of the vessels exceed 15 years).

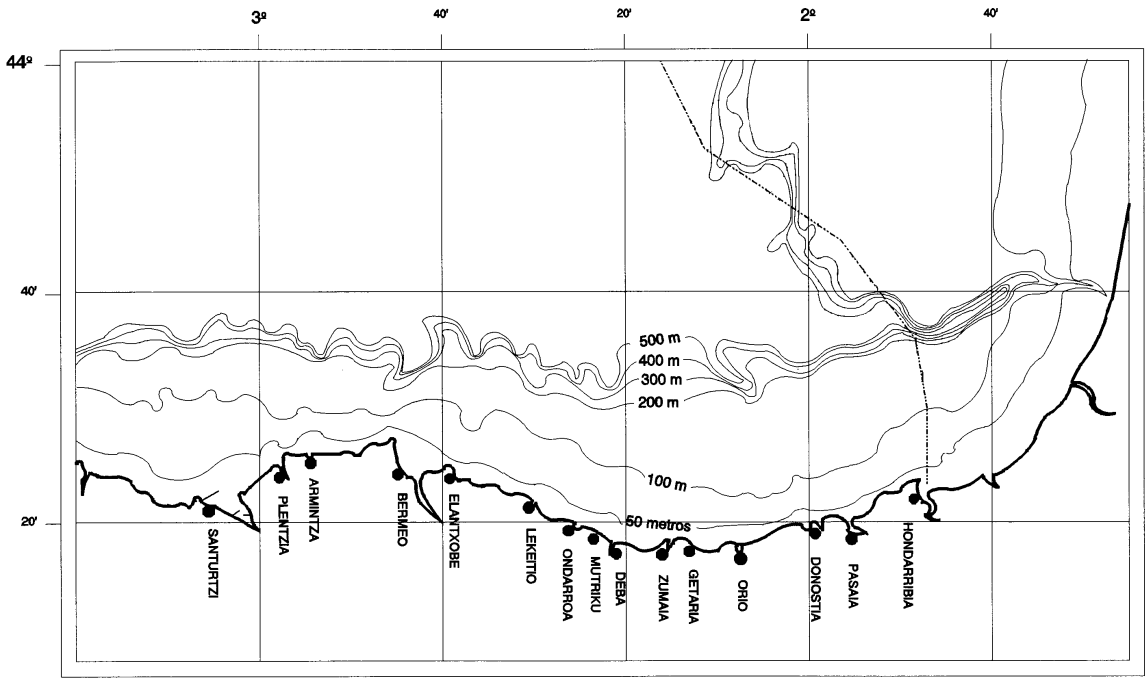


Figure 2: Geographical location of the Spanish Basque Country coastal artisanal fishing ports.

Table 2. Distribution of the Basque Country coastal artisanal fishing fleet per maritime provinces and ports (East to West). The vessels surveyed are those subjected to a detailed analysis of their activity throughout the year based on the questionnaire and/or monitorisation of their landings throughout 1999.

Maritime provinces	**Ports**	**Number of vessels**	**Number of vessels surveyed**
Gipuzkoa	Hondarribia	8	7
	Pasaia	12	9
	Donostia	14	12
	Orio	2	0
	Getaria	17	16
	Zumaia	1	0
	Mutriku	4	3
Bizkaia	Ondarroa	3	2
	Lekeitio	14	13
	Elantxobe	2	0
	Mundaka	3	0
	Bermeo	21	19
	Armintza	4	2
	Plentzia	10	3
	Portugalete	2	1
	Santurtzi	6	6
	Zierbena	3	3
Vessel total		**126**	**96**

Table 3. Basque Country coastal artisanal fishing fleet technical characteristics (126 vessels).

	Length	GRT	Kw	Crew	Construction Year
Average	10,0	10,5	65	2,6	1985
Standard deviation	2,8	8,1	42,7	1,4	13,2
Max.	15,0	31,0	202	7	1998
Min.	5,0	1,0	6	1	1960

Photo 1. Different coastal artisanal fleet vessel types studied (length between perpendiculars below 15 metres), from those of low capacity known as “motorised launch” (left) to those larger ones called “hake boats” (right).

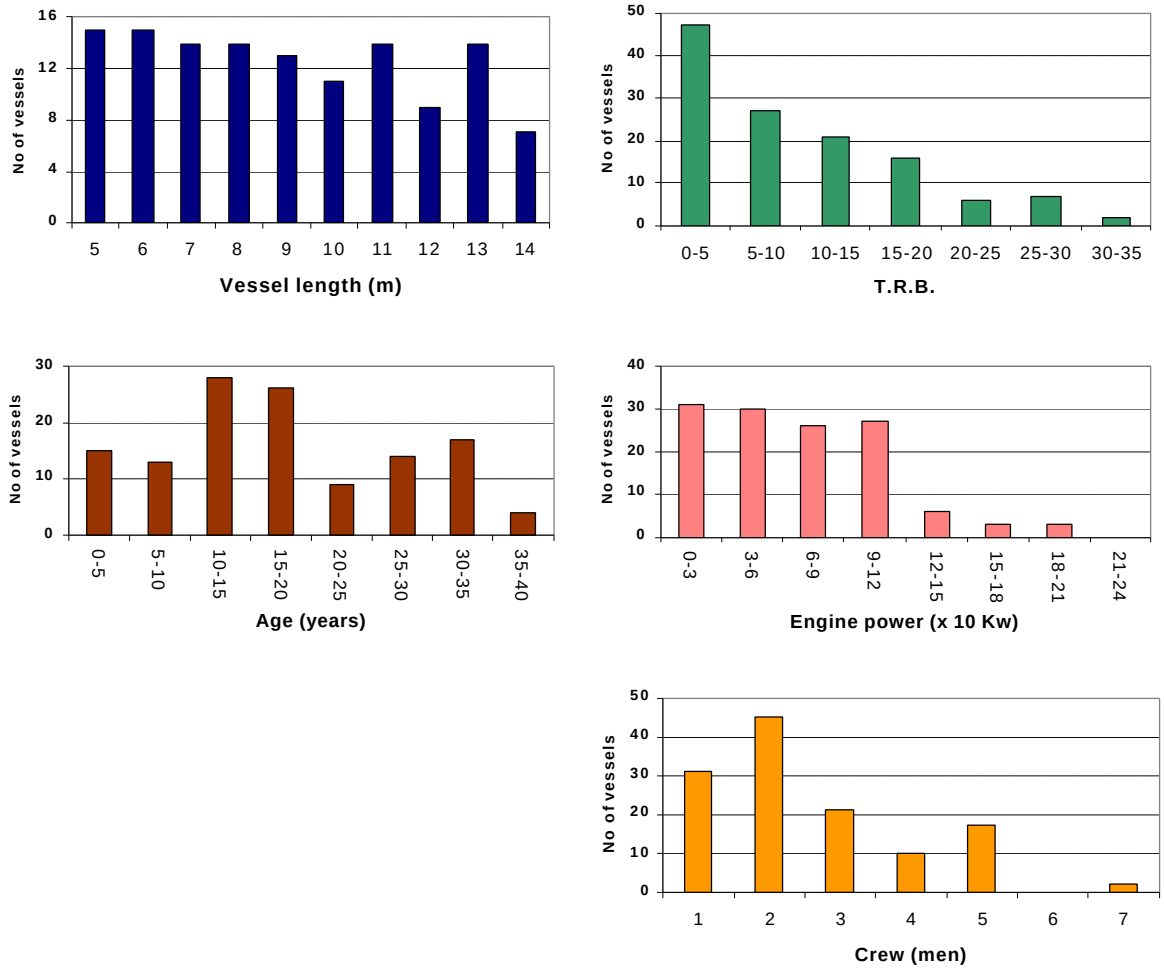


Figure 3. Distribution of length between perpendiculars values, Gross Registered Tonnage (GRT), engine power (Kw), crew and year of construction of the Basque Country coastal artisanal fleet (126 vessels).

2.3. Fishing gears used

The Basque coastal artisanal fleet uses a wide range of different fishing gears in line with the variety of target species exploited. As per the International Statistical Standard Classification of Fishing Gears –ISSCFG- (PRADO & NEDELEC, 1990), the fishing gears and lines used may be classified as follows as per increasing technical complexity order:

- FISHING LINE AND HOOK (code 09.0.0):
  - Hand lines and rods (LHP; code 09.1.0)
    - Mackerel line
    - Pole and line
  - Trolling lines (LTL; code 09.6.0)
    - White tuna line
  - Longlines (LL; código 09.5.0)
    - Surface longline
    - Semi-pelagic longline
    - Bottom longline

- TRAPNETS (code 08.0.0)
    - Pots (FPO; code 08.2.0)

- GILL AND TANGLE NETS (code 07.0.0):
    - Submerged gillnets (GSN; code 07.1.0)
        - Gillnet or *mallabakarra*
    - Submerged tanglenets (GSN; code 07.5.0)
        - Trammel net
        - Tangle

- DREDGES (code 04.0.0):
    - Boat dredges (code 04.1.0)

- PURSE-SEINE NETS (code 01.0.0):
    - With purseline (PS; code 01.1.0)
        - Anchovy net

Almost all the vessels use different fishing gears usually sequentially throughout the annual cycle in relation to its appropriateness for catching one target species or another. Only in a few cases some vessels are able to use more than one fishing gear in the same day, within the compatibility framework of gear use as per the Spanish state and Basque autonomous regulations. This limits the possibility of using simultaneously different fishing gears within the same modality (the regulation individualises three fishing modalities: gillnets, hook lines and pots).

Characterisation of the fleet activity throughout the year of most vessels (96 vessels) comprising this fleet enables establishment of fishing gear importance order in terms of numbers of vessels using them at one time or another during the year (Table 4).

The fishing gears used by the majority of vessels are gillnets, particularly trammel (58% of fleet vessels) and gillnet (57%). Hook lines are frequently used by vessels particularly the handline for mackerel (56%) and trolling lines for white tuna (44%). Other hook lines of less importance are the surface longline (26%), whose target species is sea bass and the bottom (23%) for conger eel. Figures 4 to 9 show the technical characteristics of these main fishing gears.

A reduced number of vessels concentrated in ports of East Gipuzkoa (17% of total) use dredges to collect clumps[1] of the red alga *Gelidium sesquipedale*. The gears least used by this fleet (less than 7% of vessels) are pots (to catch velvet swimming crab and lobster), and poles and lines. The latter were widely used in the past by the Hondarribia fleet to catch hake, but the stock decline of this species led to a drastic reduction in the use of these lines. Purse-seine is used for anchovy and the tangle net (tangle net used for monkfish) are used occasionally by a few vessels located in Santurtzi and Bermeo respectively.

[1] Clumps: name of bunches of algae torn from the rocks during storms and moved over the seabed at the mercy of the currents.

Table 4. Fishing gears used by the Basque Country coastal artisanal fishing fleet with their names in different languages, and importance in relation to the number of vessels using them (a sample of 96 vessels whose annual fishing activity has been characterised).

Name of the fishing gear or line in different languages					
Spanish	**Basque**	**French**	**English**	**Use (nº of vessels)**	**%**
Trasmallo	Hirumallako sarea	Trémail	Trammel net	56	58,3
Beta	Mallabakarra	Filet droit	Gillnet	55	57,3
Línea de mano	Eskuko aparejua	Ligne à main	Handlines	54	56,3
Línea curricán	Atunetako eskuko aparejua	Ligne de traîne	Lines/trolling	42	43,8
Palangre de superficie	Azaleko tretza	Palangre de surface	Surface longline	25	26,0
Palangre de fondo	Hondoko tretza	Palangre de fond	Bottom longline	22	22,9
Draga	"Porteria"	Drague	Dredge	16	16,7
Nasas	Otarre	Casier	Pots/Traps	6	6,3
Palangre semi-pelágico	Ur erdiko tretza/Arri-bola	Palangre semi-pélagique	Semipelagic longline	3	3,1
Líneas para caña	Pintxo kanabera	Lignes à la canne	Pole and line	3	3,1
Red de cerco	Inguratze sarea	Seine tournante	Purse seine	2	2,1
Rasco	Zapo sarea	Filet enmelant	Tangle net	1	1,0

2.4. Landings composition

Coastal artisanal fishing is characterised by the wide variety of target species with a very disparate weighting and economic importance. This diversity is due to the adaptive fishing of the fleet depending on the seasonal availability of the different species plus the commercial opportunities the fish product market offers. Table 5 shows landings by weight and estimated value of the first fishmarket sale for the thirty main species classified by both concepts from greater to lesser importance. Some categories correspond to groups of two or more species due to physical or commercial similarity are not distinguished in the fishermen's guilds sales notes where these data originate.

If we consider total landed weight estimate per species per coastal artisanal fleet in 1999, the mackerel – Scomber scombrus- *is by far the main species (73% of weight landings). It is followed in weighting importance though a long way off, the white tuna* –Thunnus alalunga- *(9%) and the alga* Gelidium sesquipedale *(8%). The rest of the species are landed in comparatively small proportions; among them the hake* –Merluccius merluccius- *(2%) occupies an important position. This species importance has reduced considerably throughout the 90s due to the decline in its populations. Other relevant species forming a part of the main target of the coastal artisanal fishing métiers, although with considerably smaller landings, are: conger eel* –Conger conger- *(1%), monkfish* – Lophius spp.- *(0,6%), red mullet* –Mullus spp.- *(0,4%), sea bass* –Dicentrarchus labrax- *(0,3%), sole* –Solea vulgaris- *(0,3%).*

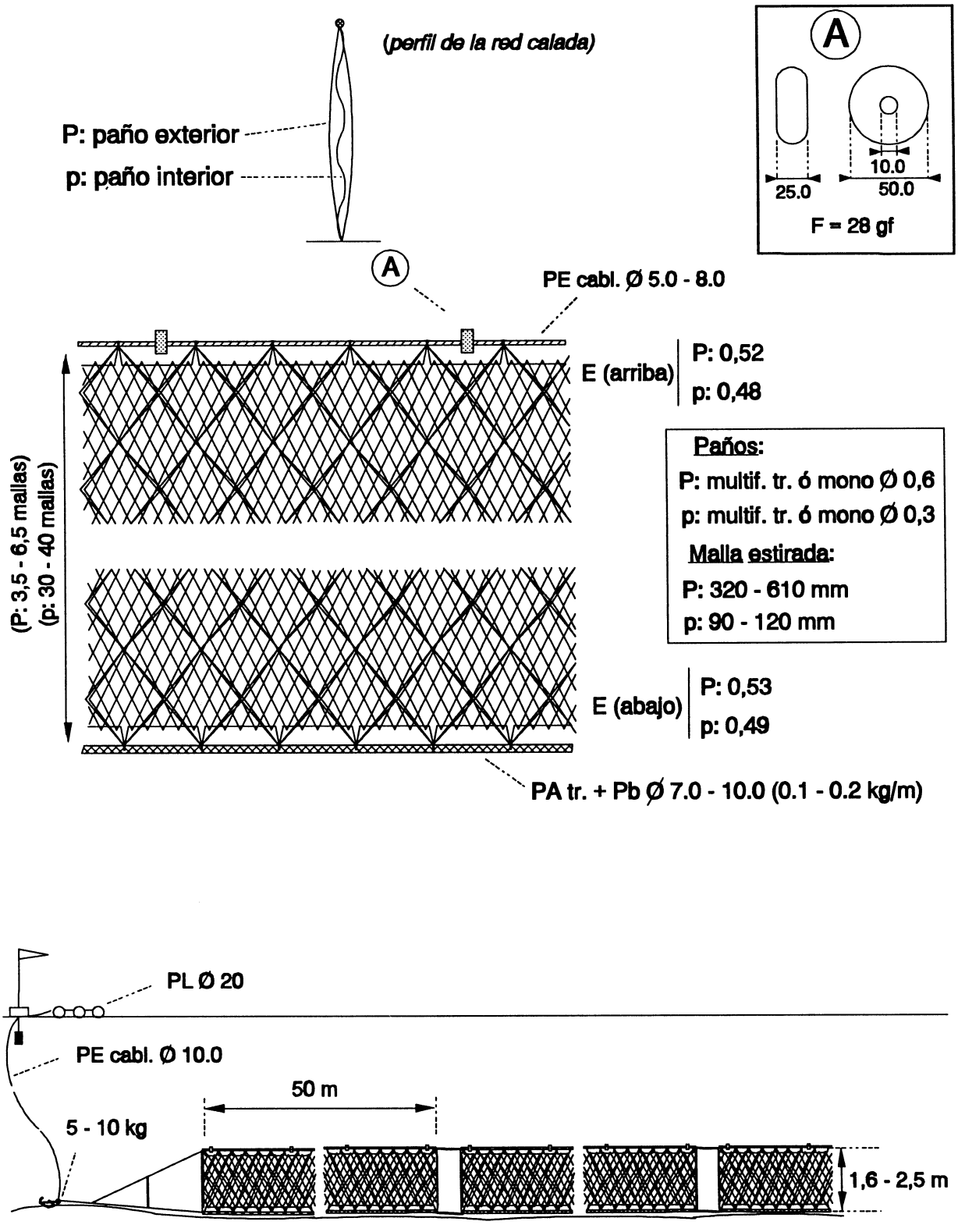


Figure 4. Technical characteristics of the TRAMMEL net used in the Basque Country
(Source: Puente, 1993).
Perfil de la red calada: set net profile; Paño exterior: outer panel (P); Paño interior: inner panel (p); arriba: up; abajo: down; malla estirada: stretched mesh; mallas: meshes.

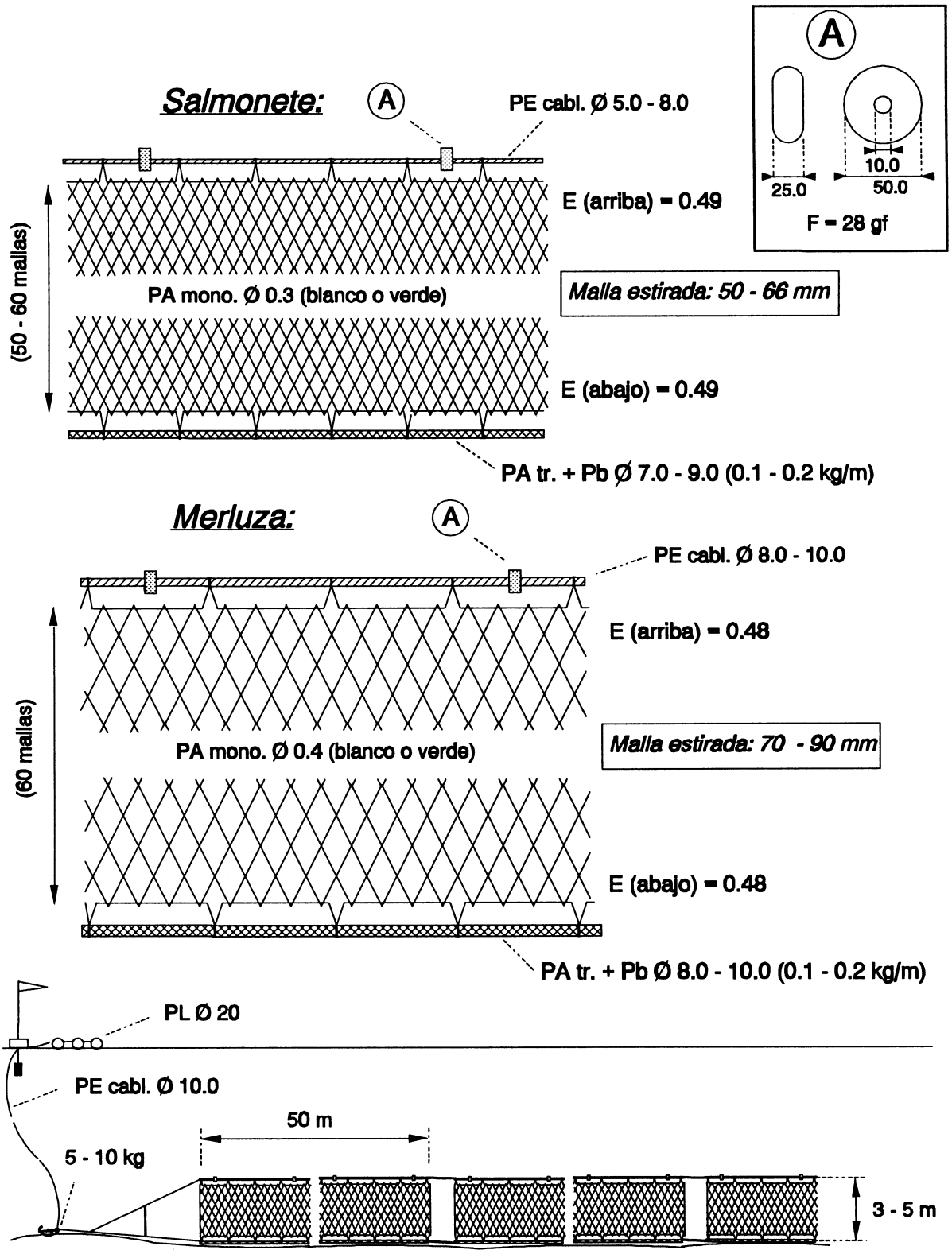


Figure 5. Technical characteristics of the GILLNET used in the Basque Country (Source: Puente, 1993). *Salmonete: red mullet; Merluza: hake; Arriba: up; Abajo: down; Malla estirada: stretched mesh; Mallas: meshes*.

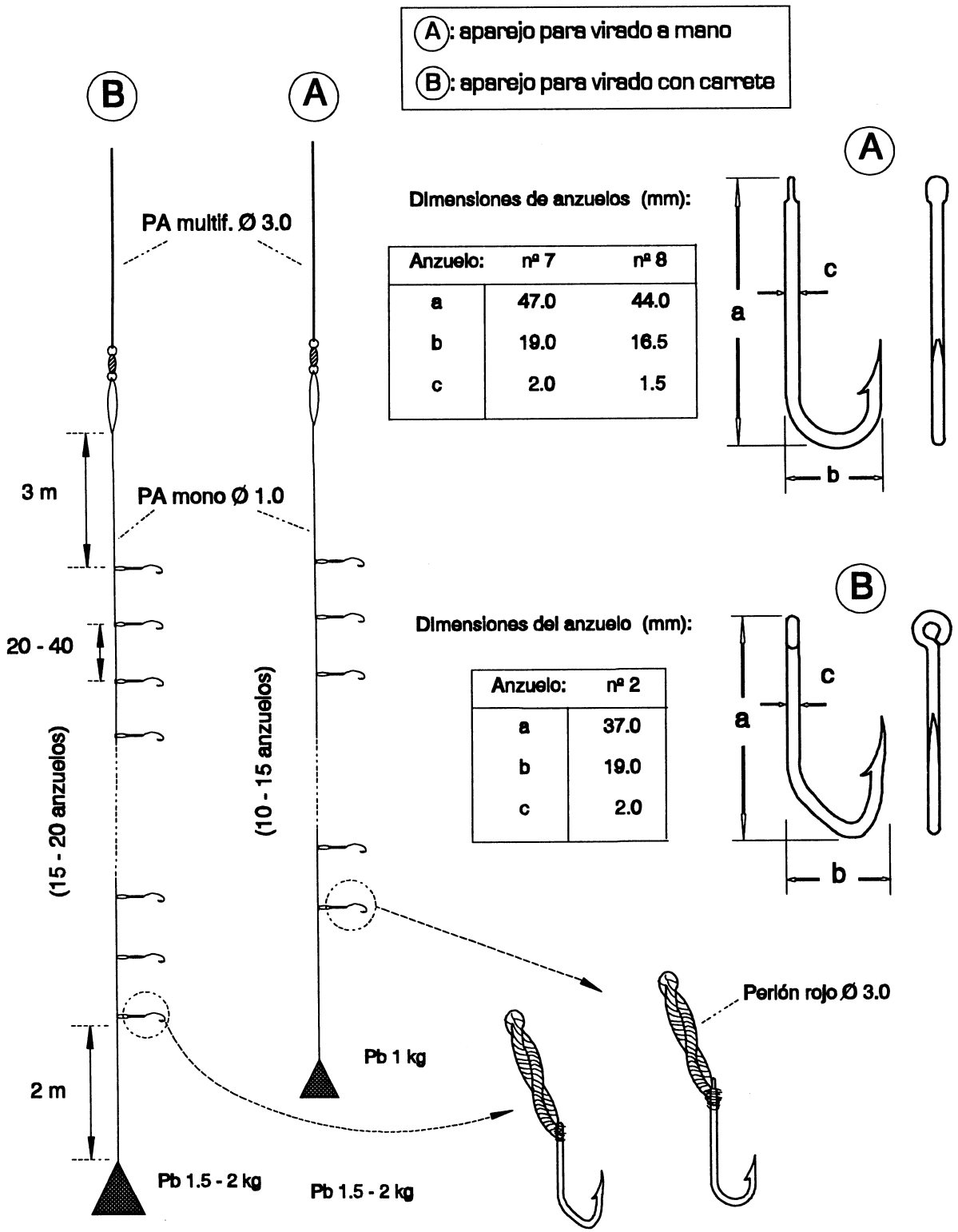


Figure 6. Technical characteristics of the HANDLINES used in the Basque Country for mackerel (Source: Puente, 1993).
Aparejo para virado a mano: fishing tackle used with hand; Aparejo para virado CON CARRETE: fishing tackle used with hauler; Dimensiones de anzuelos: hook sizes.

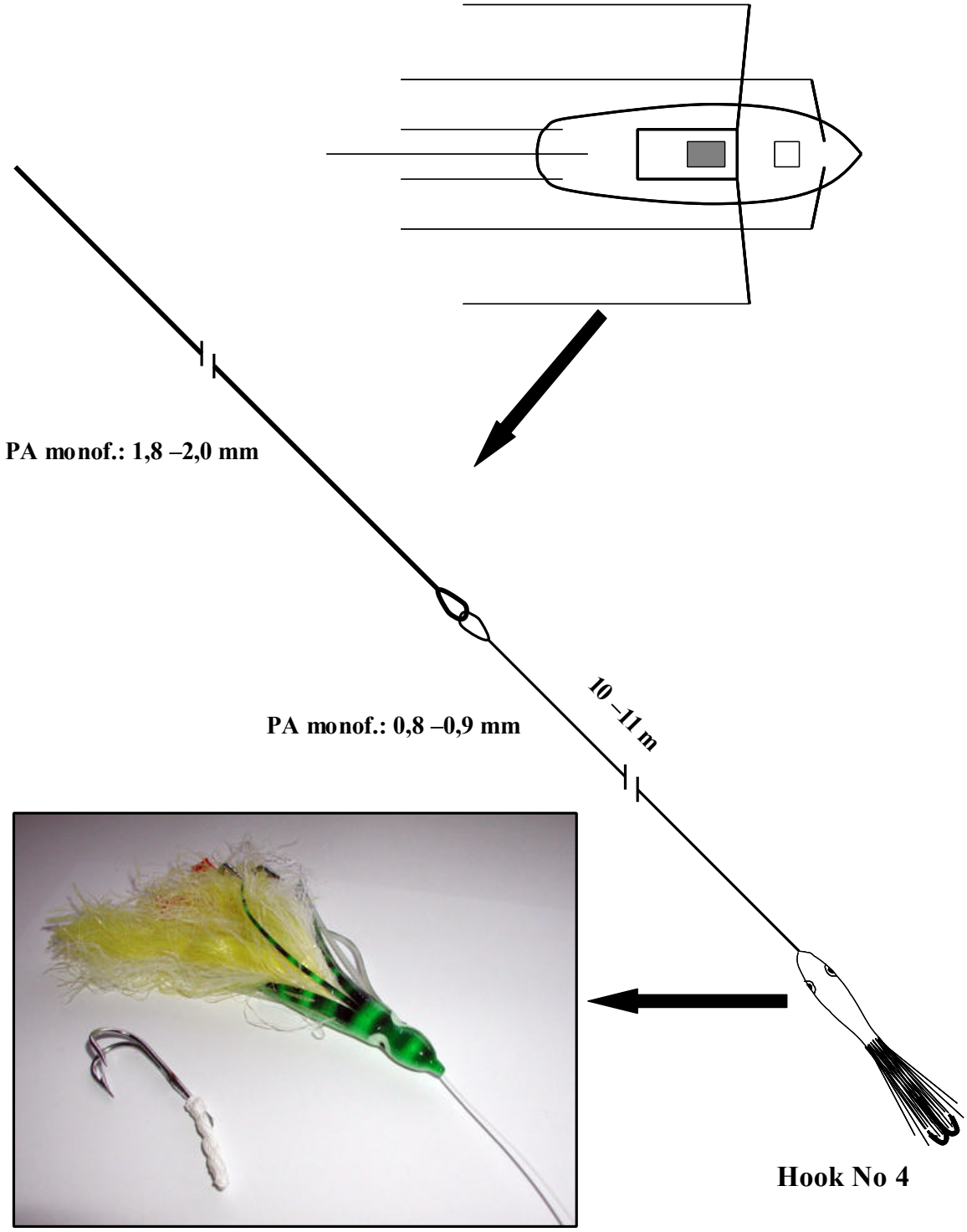


Figure 7. Technical characteristics of the TROLLING LINES used in the Basque Country for white tuna .

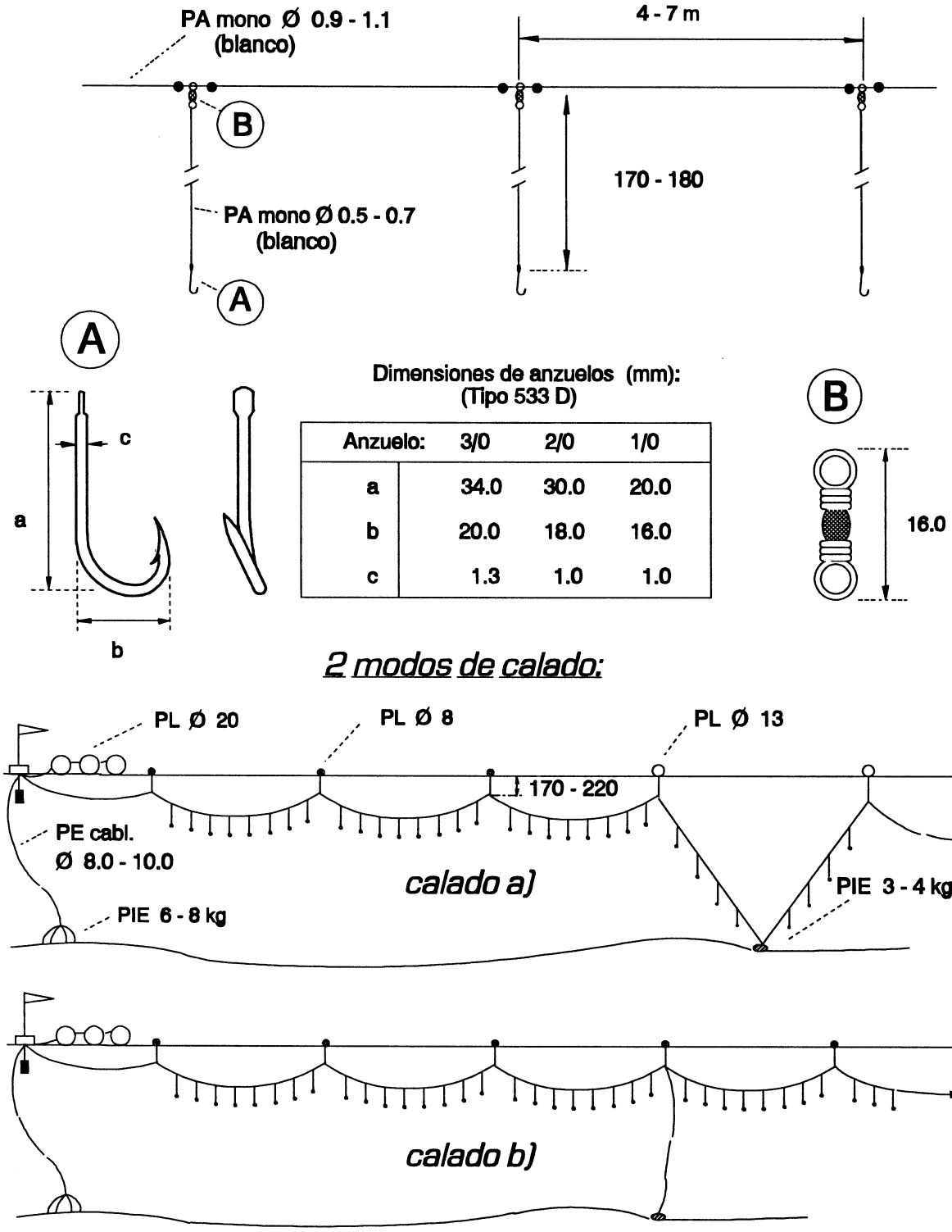


Figure 8. Technical characteristics of the SURFACE LONGLINES used in the Basque Country for sea bass and sparidae (Source: Puente, 1993).
Blanco: white; Dimensiones de anzuelos: hook sizes; Dos modos de calado: two ways of setting the gear; Calado: setting.

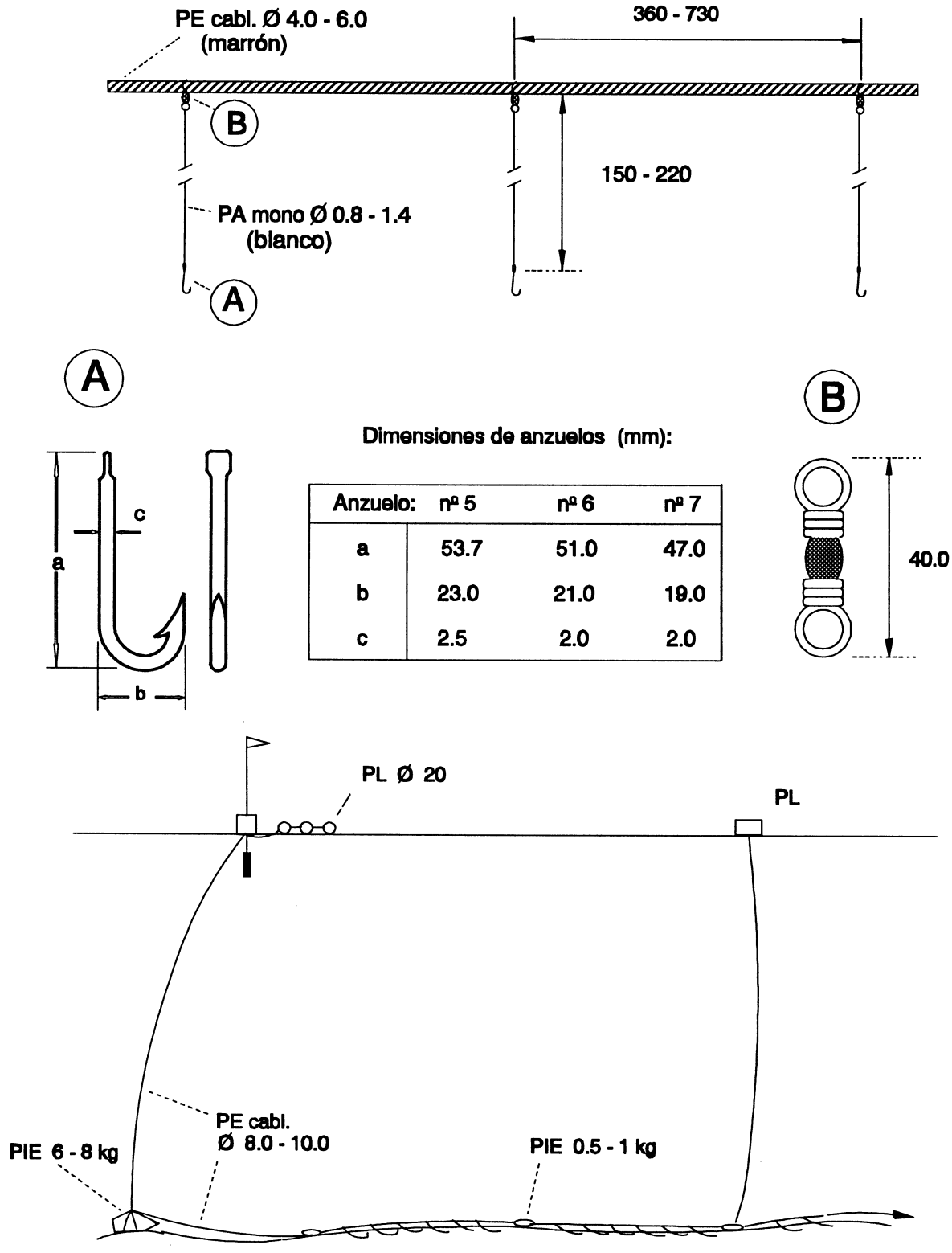


Figure 9. Technical characteristics of the BOTTOM LONGLINES used in the Basque Country for conger eel.
Marrón: brown; Blanco: white; Dimensiones de anzuelos: hook sizes; Dos modos de calado: two ways of setting the gear; Calado: setting.

If we consider the total estimated economic value of the landed species at first sale in 1999, the economically most important species for the artisanal fleet is the white tuna (35% of total first fish sale value) together with the mackerel (22%). Both species altogether represent over 50% of the total first fish sale value of this fleet. Other important species are the hake (17%) and, at a great distance the red mullet (3,3%), sole (2,8%), monkfish (2,5%), scorpionfish –*Scorpaena spp*.- (2,1%), conger eel (1,7%) and octopus (1,6%).

Given their important mean sale price per kilo, a first group of valuable species with values exceeding 10€ stand out: the crayfish –*Nephrops norvegicus*- (20,84€), turbot –*Psetta maxima*- (15,99€), sole (15,92€), red mullet (11,48€), sea bass (11,40€), hake (10,41€) and scorpionfish (10,07€). With a first sale price under 10 € are: the gilthead bream –*Sparus aurata*- (9,41%), black monkfish – *Lophius budegassa*- (6,71€), loach – *Phycis spp.*- (6,10€) white tuna (5,75€) and sea bream –*Pagellus erythrinus*- (5,49€). The rest of the species have a mean sale price under 5€; amongst which the mackerel is worthy of mention as the main target species, whose mean sale price is only 0,44€.

2.5. Fishing areas

Coastal artisanal fishing is largely practised on the continental shelf fishing grounds. Only exceptionally do some fishing vessels work on the continental slope fishing grounds using tangle nets for monkfish or semipelagic longlines for hake. In addition, some large capacity vessels travel to oceanic waters far from the coast to fish white tuna.

The coastal artisanal fleet fishing areas are delimited by current fishing, and the traditional fishermen uses and customs. Below are the most frequent fishing areas for the main fishing modalities (annex 2).

2.5.1. Gillnets

Gillnet fishing occurs mainly along the most coastal stretch of the continental shelf. The fishing area extension is greater in Gipuzkoa than in Bizkaia due to the different continental shelf orography opposite the two territories. Generally speaking, the fishing areas for the reference year of this project (1999) were the following:

- GIPUZKOA: From Cape Higuer (water limits with France) to the length of San Sebastián (1º 59' 00'') the fishing area extends from the coast to a depth of 90 metres (50 fathoms). From San Sebastián to Saturrarán Point (water limits Gipuzkoa-Bizkaia) between the coast and the 6 mile line taken in relation to the base-line[2]. This 6 mile line is located in depths ranging from 100 to 130 metres.

- BIZKAIA: The external gillnet fishing limit is dictated by the Fishermen's Guilds Federation agreements at 72 metres (40 fathoms) for the coastal stretches between the Saturrarán Point and Ea longitudes and between Cape Villano and Ontón. For the intermediate area between the two previous (from Ea to C. Villano) the maximum gillnet fishing depth is 52 metres (30 fathoms).

[2] Base-line: imaginary line drawn between the main coastal capes (Cape Higuer, C. San Antón, C. Machichaco, C. Villano).

Table 5. Annual estimated landing per species of the Basque Country coastal artisanal fleet in 1999 for the 30 species with greatest landing weight values and the other species (altogether) in descending order (lefthandside of the table). Estimated first sale value for landings of the 30 species with biggest values and the other species (altogether) in descending order (righthandside of the table).

Latin name	Weight (Tonnes)	% of total	Latin name	Value (k€)	% of total	Mean price (€/Kg)
Scomber scombrus	4 485,1	72,8	*Thunnus alalunga*	3 156,8	35,3	5,75
Thunnus alalunga	549,0	8,9	*Scomber scombrus*	1 973,4	22,1	0,44
Gelidium sesquipedale	485,3	7,9	*Merluccius merluccius*	1 468,9	16,4	10,41
Merluccius merluccius	141,1	2,3	*Mullus* spp.	290,4	3,3	11,48
Conger conger	62,1	1,0	*Solea vulgaris*	248,4	2,8	15,92
Trisopterus luscus	46,8	0,8	*Dicentrarchus labrax*	193,8	2,2	11,40
Octopodidae	45,8	0,7	*Scorpaena* spp.	186,3	2,1	10,07
Mullus spp.	25,3	0,4	*Lophius budegassa*	151,6	1,7	6,71
Diplodus vulgaris	22,6	0,4	*Conger conger*	147,2	1,7	2,37
Lophius budegassa	22,6	0,4	Octopodidae	138,3	1,6	3,02
Scorpaena spp.	18,5	0,3	*Sparus aurata*	114,8	1,3	9,41
Dicentrarchus labrax	17,0	0,3	*Gelidium sesquipedale*	106,8	1,2	0,22
Rajidae spp.	16,6	0,3	*Diplodus vulgaris*	101,5	1,1	4,49
Solea vulgaris	15,6	0,3	*Lophius piscatorius*	64,2	0,7	4,90
Sepia officinalis	15,2	0,3	*Trisopterus luscus*	64,1	0,7	1,37
Lophius piscatorius	13,1	0,2	*Triglidae* spp.	53,7	0,6	4,10
Triglidae spp.	13,1	0,2	*Nephrops norvegicus*	52,1	0,6	20,84
Sparus aurata	12,2	0,2	*Rajidae* spp.	37,5	0,4	2,26
Scomber japonicus	9,1	0,2	*Sepia officinalis*	36,0	0,4	2,37
Trachurus trachurus	8,3	0,1	*Pagellus acarne*	19,0	0,2	2, 72
Sarda sarda	8,3	0,1	*Galeorhinus galeus*	13,6	0,2	1,94
Pagellus acarne	7,0	0,1	Lamnidae	13,1	0,2	3,53
Galeorhinus galeus	7,0	0,1	*Lithognatus mormyrus*	13,1	0,2	4,52
Scyliorhinidae	6,0	0,1	*Phycis* spp.	12,8	0,1	6,10
Trachurus mediterraneus	5,3	0,1	*Psetta maxima*	12,8	0,1	15,99
Trachinus draco	5,3	0,1	Lophiidae	12,5	0,1	4,64
Thunnus thynnus	4,9	0,1	*Pagellus erythrinus*	12,1	0,1	5,49
Mugilidae	4,8	0,1	*Sarda sarda*	11,0	0,1	1,33
Thunnus obesus	4,6	0,1	*Thunnus thynnus*	10,7	0,1	2,19
Lamnidae	3,7	0,1	*Pleuronectidae*	10,5	0,1	6,99
Other species (>46 spp.)	80,4	1,3	Other species (>46 spp.)	209,0	2,3	-
Total	**6 161,7**	100	**Total**	**8 935,8**	100	

Notes:

- *Mullus* spp.*: Mullus surmuletus and Mullus barbatus*
- *Scorpaena* spp.: *Scorpaena notata*, *Scorpaena porcus* and *Scorpaena scrofa*.
- Rajidae*: Raja undulata*, *Raja clavata* and *Raja montagi*
- Triglidae*: Trigla lucerna, Aspitrigla obscura* and *Aspitrigla cuculus*
- Scyliorhinidae: *Scyliorhinus canicula* and *Scyliorhinus stellaris*
- Laminidae: *Lamna nasus* and *Isurus oxhyrinchus*
- *Phycis* spp.: *Phycis phycis* and *Phycis blennoides*

After 1999 there were a series of changes in the gillnet fishing areas (see new regulations in section II.1), these changes are laid down in the Order of 26th July 2001 ("Coastal net fishing plans for the Bizkaia and Gipuzkoa provinces"), modifying the depths these gears can be used in Bizkaia (Gipuzkoa fishing areas remain unchanged) as follows:

- BIZKAIA: From Ontón (bordering on the Cantabria province) to Cape Villano 75.6 meters (42 fathoms). From C. Villano to Ea 72 metres (40 fathoms) except from 15th May to 15th June and from 1st October to 30th November when reduced to 57,6 metres (32 fathoms) and from Ea to Saturrarán Point 97,2 metres (54 fathoms).

Finally, tangle net fishing is governed by a different regulation than that of other gillnet fishing gears. In the Basque Country it is used targeting monkfish outside the 12 mile limit generally on muddy fishing beds of the continental slope.

2.5.2. Longlines

According to the Order of 30th July 1983 regulating the bottom longline fishing gear use in the Cantabrian and Northwest national fishing ground: in Bizkaia trawling is prohibited within the 12 mile limit between Cape Villano and Santa Catalina (the majority of the waters opposite this maritime province). Therefore, this area outside the coastal stretch reserved for gillnet fishing is for longline fishing (mainly with *stone-ball* longline type).

Normally semipelagic longlines (*stone-ball* type) are used in the continental slope fishing grounds, especially with depths ranging between 200 and 300 metres destined to catching hake, although at certain times of the year this can also be done on the intermediate continental shelf bottoms (around 100 metres deep). Nevertheless this longlining modality has declined in recent years (reduction in vessel number and fishing activity in general) and is losing importance in favour of gillnet fishing which some longline vessels use temporarily.

The true bottom longline is used to fish conger eels on rocky bottoms on the inner part of the continental shelf (depths of less than 120-150 metres). Whilst the surface longline is used for sea bass and sparidae usually along the bottoms close to the coast.

2.5.3. Lines

Among the handlines there are three clearly defined types not only because of characteristics but also fishing areas:

- Pole and line: typical of the Hondarribia port, this fishing gear also known locally as *pintxo-caña* has been frequently used for catching hake until recent years in the fishing grounds bordering the Capbreton Basin (Erreka and Gaztelu on its interior, Garro and Eskote to the north) on the slope bottoms at depths ranging from 180 to 360 metres deep (100 to 200 fathoms). This fishing modality is clearly in retreat due to the decline in its target species populations.

- Handline: mackerel fishing with handlines is done in surface waters close to the coast where this species approaches to lay eggs in spring. No specific area has been assigned for this modality, which can be used in widely differing neritic waters depending on the erratic behaviour of fish shoals.

- Trolling line: trolling with the line gear for tunny fish (mainly white tuna) occurs in oceanic waters outside the continental shelf. The trips from base ports to the fishing areas are normally greater than the other modalities (exceeding in some cases 100 miles at the beginning of the fishing season), therefore only a few vessels of the subsector studied had capacity for this fishing modality.

2.5.4. Pots

Velvet swimming crab pot fishing is the most coastal of all the fishing modalities considered. When the velvet swimming crab season is open (1st October to 30th April), the pots are cast on rocky bottoms with depth inferior to 18-36 metres (10-20 fathoms). Generally speaking the less depth there is the greater the catch. The depth for pot use was limited after 1999, its lower limit being 10 metres (5,5 fathoms) as per the Decree 212/2000, of 24th January regulating fishing with small gears along the coastal area under jurisdiction of the Autonomous Basque Country Community. When used for catching lobster and crayfish (between 1st June and 31st August), pots are set on rocky bottoms of greater depth usually between 36 and 108 metres (20 and 60 fathoms).

2.6. Fishing seasons

Coastal artisanal fisheries are characterised by the wide range of fishing seasons depending on the target species and to a certain extent fishing gears. The monthly landing variation of the main target species enables characterisation of activity seasonality.

A group of ten have been selected from the main landed species (Table 5) as comprising the main target species, albeit for their weighting and/or economic importance, as well as defining the activity of a specific fishing métier. These ten species represent 94.5% of the total landed weight for the fleet in 1999, and 88.7% of the first fishmarket sale value for the said year. The seasonal landing variation of these species is shown in Figure 10. Below are the most relevant aspects of the species fishing seasons:

- The mackerel (*Scomber scombrus*) is a clearly seasonal species whose maximum catches occur at the beginning of spring (April: 2 373,3 t) when a large part of the artisanal fleet is dedicated exclusively to fishing it with handlines. The first catches of the season in February are with gillnets, when apparently the species is closer to the bottom.

- The white tuna (*Thunnus alalunga*) fishing season is also limited to a short period of time in summer, with an landing maximum in August (326,9 t). Fishing of this species with trolling lines is together with that of the mackerel the main occupation of the largest capacity vessels of the fleet studied during the year. Only the largest vessels of the fleet studied practise this activity as they occur in far off fishing grounds (outside the jurisdictional water limits), where only these vessels offer the safety and habitability necessary for these long fishing trips.

- Recovery of the red alga (*Gelidium sesquipesdale*) clumps torn from the rocks by the first strong autumn storms is a complementary extraction activity for some of the vessels of East Gipuzkoa. Recovery of these algae is done with a rudimentary version of a dredge (known locally as "goalpost") towed along shallow bottoms in the sandy bays (particularly the San Sebastian La Concha Bay). Maximum landings for this alga occur in October (304,9 t).

- The hake (*Merluccius merluccius*) has a longer fishing period, with important landings in summer, especially June (24,5 t). This species landings have a relative second maximum in October (18,7 t) coinciding with the re-incorporation of the vessel gillnet modality at the end of the white tuna season. Hake fishing is done mainly with gillnets in the fishing grounds near the coast with depths of less than 100-120 metres during the summer months and beginning of autumn. At the beginning of the 90s, this species was caught with both gillnets and semipelagic longlines, known locally as *stone-ball*. This latter fishing modality used to be done in the continental slope fishing grounds with the species adult population usually concentrate at the end of spring. The decline of hake population abundance throughout that decade meant the use of longline has decreased drastically until becoming a marginal activity. This decline is associated with the high bait costs and the high *stone-ball* hake selectivity with few accessory catches of other species with an interesting commercial value.

- The conger eel (*Conger conger*) has a much localised fishing season in spring, with maximum landings in May (34,7 t). They are generally small capacity vessels practising this activity on shallow rocky bottoms.

- The red mullet (*Mullus spp.*) is a very important resource for small vessels using gillnets which do not fish tuna during the summer season due to physical limitations. The biggest catches of this species occur mainly in summer with a maximum in August (5,5 t). Nevertheless there are red mullet landings of a certain amount throughout the year.

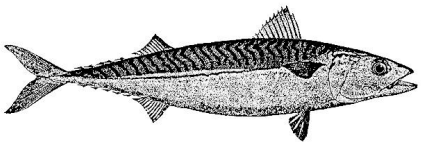
- The black monkfish (*Lophius budegassa*) is a complementary target species for trammel net catches in spring months, with maximum landings in May (6,3 t). Sporadic monkfish catches occur in other seasons of the year, always as a species associated with gillnet catches.

- The scorpion fish (*Scorpaena spp*.) are clearly seasonally vulnerable species whose maximum landings are very concentrated in time (maximum June: 9,5 t). Generally, small vessels using trammel nets fish this species on the shallow rocky bottoms.

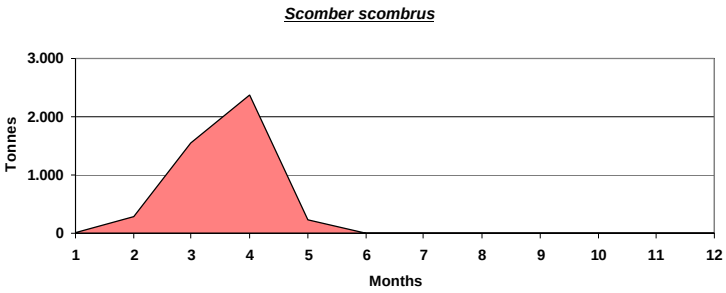
- The sea bass (*Dicentrarchus labrax*) is fished throughout the autumn and winter months, with maximum landings registered in September (3,3 t). Most of the catches are due to small longliners, which fish this species using a kind of surface longline in waters close to the coast. Surface longline catches are usually accompanied by sparidae particularly sea breams (*Diplodus vulgaris*). The sea bass may occasionally be caught with trammel and gill nets.

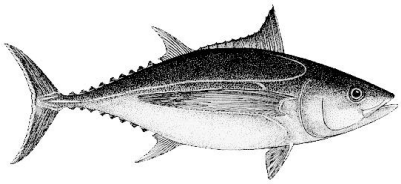
- The sole (*Solea vulgaris*) is fished continually throughout the year with greater landing periods in autumn (2,8 t in October; 2,1 t in December) and to a lesser extent in winter-spring (1,6 t in March). This species is almost exclusively caught with trammels on soft bottoms with depths between 50 and 80 metres in autumn-winter and shallower (depths under 60 m) in spring-summer (Erzini *et al.,* 2001).

Generally speaking, it may be concluded there is a succession in the fishing season times of the main target species of the coastal artisanal fishing, with greater or lesser overlapping of the same. This seasonality of the fishing activity is related to seasonal availability cycles of the species thereby explaining the adaptive behaviour of the fleet in its alternation of fishing gears and practices throughout the annual cycle to benefit from these cycles.

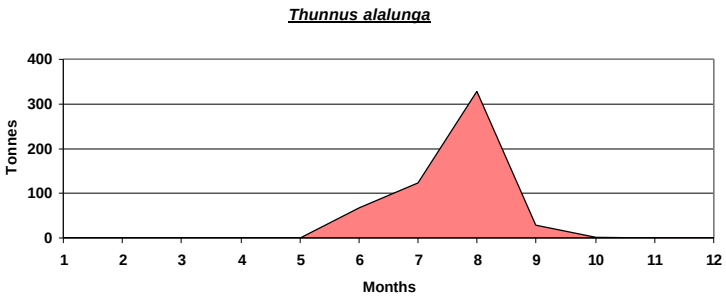


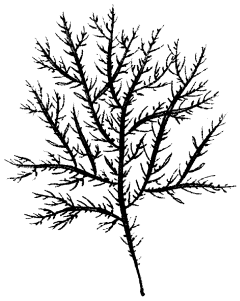
Scomber scombrus
(according to Massey & Harper, 1993)



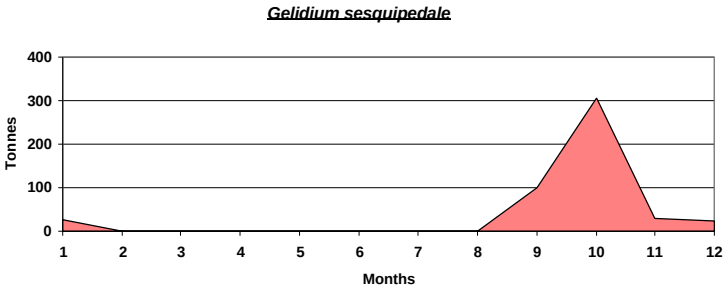


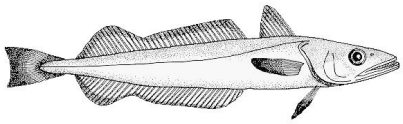
Thunnus alalunga
(according to Collette, 1995)



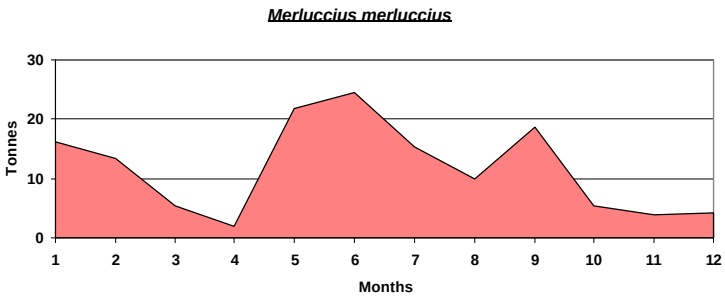


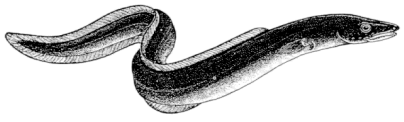
Gelidium sesquipedale
(according to Campbell, 1979)





Merluccius merluccius
(according to Cohen *et al.*, 1990)





Conger conger
(according to Reiner, 1996)

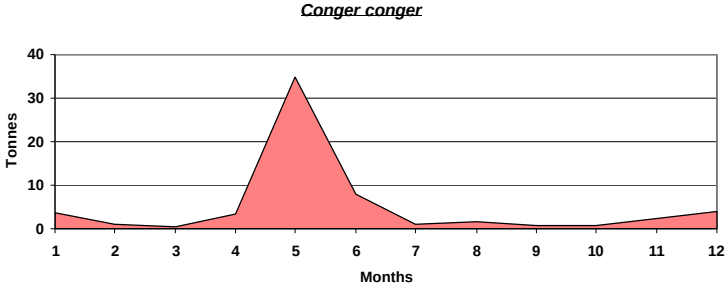
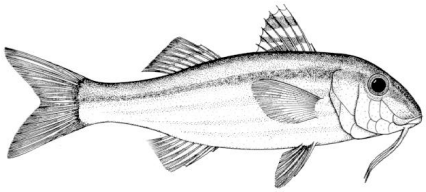
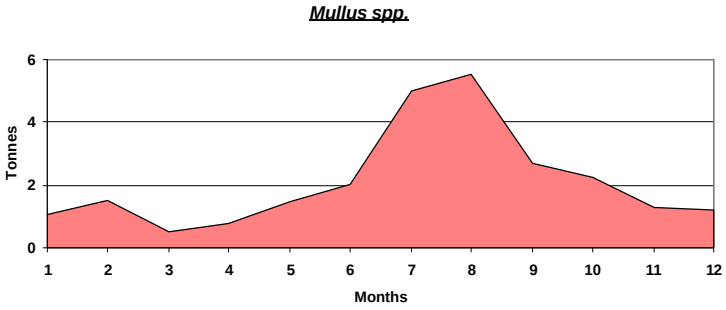


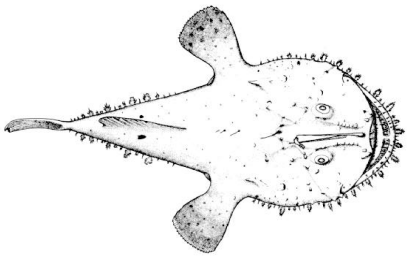
Figure 10. Monthly landing variation of the main target species of the Basque Country coastal artisanal fleet in 1999.

Figures 10. (continuation)

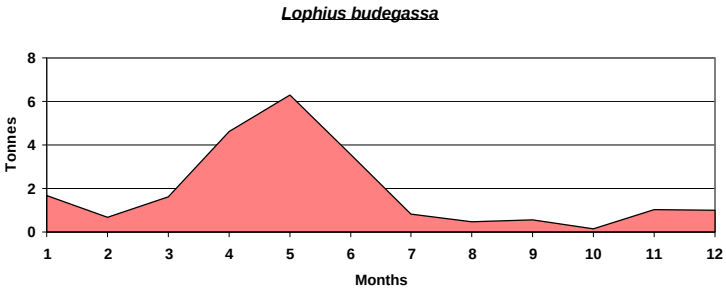


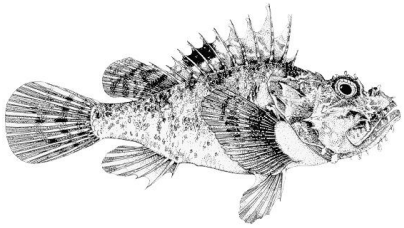
Mullus spp.
(according to Bauchot, 1987)



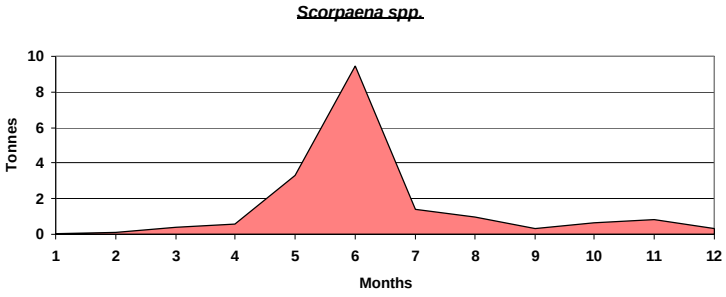


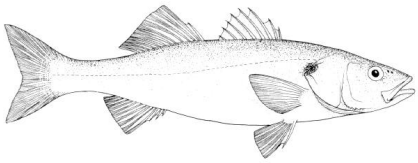
Lophius budegassa.
(according to Bauchot, 1987)



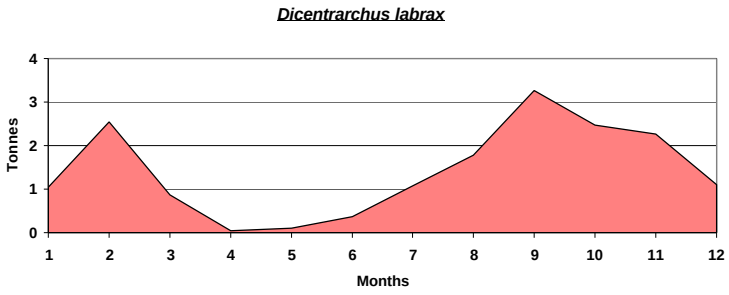


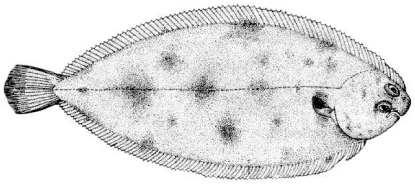
Scorpaena spp.
(according to Bauchot, 1987)



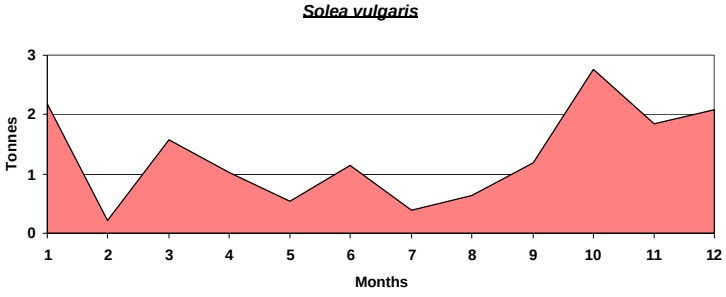


Dicentrarchus labrax
(according to Bauchot, 1987)





Solea vulgaris
(according to Bauchot, 1987)



3. IDENTIFICATION AND DESCRIPTION OF THE ACTIVITY TYPOLOGIES

From the results in Section 2 one can deduce coastal artisanal fishing is distinguished by its use of a wide variety of fishing gears to catch a large number of species. To enable systemisation of the activity study, the idea of "fishing métier" is used. This being considered an extractive activity using a specific fishing gear to catch one or several target species on certain bottoms and time of the year. This concept is similar to the "fishing métier" term frequently used by the fishermen themselves when describing their fishing activity.

The purpose of establishing fishing activity typologies is to sub-divide the fleet in vessel sub-groups with a greater or lesser degree of similarity regarding the fishing métier sequence practised throughout the year.

The twin purpose of activity typology establishment is:

1. Make a systemised fishing activity description applying objective criteria.
2. Establish homogenous vessel groups as per their activity to perform other subsequent analysis such as the socio-economic one tackled in Part 2 of this study.

3.1. Data analysis

As mentioned previously there are two different databases, one for gears used and another for species caught. Therefore each database was analysed separately.

Starting with the species database, the analysis was performed as per the automatic descending classification method[3]. The data were not typified because the variables are expressed as percentages, making that procedure unnecessary.

The optimum cluster number was chosen depending on the dendogram, by cutting along the largest branches. After different tests, the number of clusters chosen was seven. A lower number of clusters did not provide sufficiently homogenous groups, whilst a greater number simply separated individual vessels.

With clusters or groups established, their gravity centres were identified. Thereby enabling determination of predominant species in each of the group landings. Table 6 shows the five main species for each of the groups obtained.

Regarding the fishing gear database, the analysis was considerably different. The binomial nature of the variable introduced in the database (1 presence, 0 absence), conditioned the option for a binomial cluster analysis[4]. The number of clusters was determined analogously as described above for the species database. In this case, the best number of clusters was six.

The clusters established, the gravity centre of each was identified, to determine the predominant gears, and which periods of the year for each of the groups. Table 7 shows the five gears used by each of the groups.

[3] This analysis was performed with Software Statgraphics v5.0 ®.
[4]This analysis was performed with Software Splus 2000 ®.

Table 6. Main species per cluster (from the "Species" database)

		Cluster						
		1	**2**	**3**	**4**	**5**	**6**	**7**
Species	1	Monkfish	Red mullet	Sea bass	Sole	Octopus	Hake	White tuna
	2	Hake	Hake	Sparidae	Scorpionfish	Velvet swimming crab	White tuna	Mackerel
	3	Sole	Mackerel	Conger eel	Monkfish	Sea bass	Mackerel	Hake
	4	Mackerel	Scorpionfish	Sea bream	Shellfish	Squid	Red mullet	Crayfish
	5	Red mullet	Monkfish	Rays	Hake	Conger eel	Sole	Edible crab

Table 7. Main fishing gears per cluster (from the "Fishing gear" database)

		Cluster					
		1	**2**	**3**	**4**	**5**	**6**
Fishing gears	1	Surface Longline	Gillnet	Trolling lines	Trammel	Gillnet	Pots
	2	Bottom Longline	Trammel	Lines	Gillnet	Trammel	Trammel
	3	Pots	Hand Lines	Algae	Purse seine	Trolling lines	Surface Longline
	4	Lines	Pots	Pots	Trolling	Hand Lines	
	5	Dredge	Trolling lines	Gillnet			

Established the number of clusters and their description from both the species and fishing gear databases, the results obtained from the two databases were analysed jointly to obtain a series of activity groups combining both gears used and species landed.

To do this, knowing the vessel name and number comprising each of the clusters, the results were unified in matrix of 6 x 7, where the rows (6) represent the clusters obtained from the fishing gear database and the columns (7) the clusters obtained from the species database. This way each of the cells represents one of the 42 possible combinations among the groups obtained from gears and species. As the vessels are the same in both groups, the value appearing in each of the cells corresponds to the number of vessels in this combination of gears and species. The results obtained are shown in table 8.

The next step was to identify which combinations were the greatest absolute frequencies (shown in red in table 8). These combinations establish the "gravity centres" of the definitive typologies. Table 8 shows six gravity centres, although the definitive typologies will be five. The reason for the latter is that gravity centres (2.1) and (2.2) with ten and twelve vessels respectively represent practically the same activity, after activity analysis of each of the vessels comprising the same. So the five definitive typologies for the Basque coastal artisanal fleet are those in table 9.

The correspondence of these typologies with all the vessels is shown in table 10. As shown in the previous table all the sample vessels are identifiable with one of the defined typologies except on (4,3). The typology descriptions are set forth in the following section.

Table 8. Resulting frequencies (number of vessels) and gravity centres (on red font) from cross of the "fishing gears" clusters with the "species" clusters.

		Species clusters							
		1	**2**	**3**	**4**	**5**	**6**	**7**	Total
Fishing gears clusters	**1**			15		4			19
	2	10	12	2	3		4		31
	3					2	1	14	17
	4	1	1	1	2	1			6
	5	3	1		2		9		15
	6			2		5		1	8
	Total	14	14	20	7	12	14	15	96

Table 9. Fishing activity typologies established for the Basque Country coastal artisanal fleet determined from the gravity centres (and acronyms used to call them in a shortened form in the report).

Typology nº	**Name**	**Gravity Centre (row, column)**	**Acronym**
1	"Potters"	(6.5)	POTT
2	"Longliners"	(1.3)	LONG
3	"Small Gillnetters"	(2.1) and (2.2)	SGILL
4	"Large Gillnetters"	(5.6)	LGILL
5	"Small Tuna Fishing Boats"	(3.7)	STUN

Table 10. Discrimination of the Basque Country coastal artisanal fleet fishing activity typologies on the cross of the "gears" clusters with the "species" clusters and related designation (bottom table).

		Species Clusters							
		1	**2**	**3**	**4**	**5**	**6**	**7**	General total
Fishing gear clusters	**1**			15		4			19
	2	10	12	2	3		4		31
	3					2	1	14	17
	4	1	1	1	2	1			6
	5	3	1		2		9		15
	6			2		5		1	8
		14	14	20	7	12	14	15	**96**

Fishing typology name	**Colour codes**	**Acronym**
Potters		POTT
Longliners		LONG
Small gillnetters		SGILL
Larger gillnetters		LGILL
Small tuna fishing boats		STUN

3.2. Description of the groups obtained (Activity typologies)

Therefore, the typology analysis has established five activity categories from a sample of 96 vessels which we had detailed information on the fishing activity out of a total of 126 vessels comprising the fleet population studied.

The information gathered on the activity of another group of vessels outside the sample (22 units), which we did not have such detailed information on, meant the number of vessels classified in the 5 established typologies be increased to 118. The assignation of each of these vessels to one of the 5 typologies was done via simple analysis of each vessel's activity in relation to the "typical" activity of each typology, thereby deducing the degree of similarity in relation to one of the established typologies.

It was not possible to characterise the activity of the remaining 8 vessels (to complete the classification of the entire population of 126) due to the inexistence of any data whatsoever on their activity. The majority of the cases are vessels which despite being on the professional vessel census have a little activity (fishermen guilds' communication).

On analysing the fleet global characteristics of each typology (Figure 11, on the left), we see the most important vessel group is that of the "small gillnetters" (42 vessels) comprising 35,6% of the coastal artisanal fleet. This typology is also that of largest total tonnage (401 GRT; 31,6% of the total) and total power (2 812 Kw; 34,0% of the total). Following in typology importance are the "small tuna fishing boats", which despite not representing more than 14,4% of the vessels, its total tonnage and power are nevertheless high: 371 GRT (29,2% of the total); 2 119 Kw (25,6% of the total).

Third place of importance is the "longliner" typology signifying 28,0% of the vessels, 17,1% of the tonnage and 16,7% of the total power. A slightly lower importance than the previous segment are the "large gillnetters" (11,0% of the vessels; 16,1% of the tonnage and 14,9% of the power). The least important segment regarding fleet global values is that of the "potters" (11,0% of the vessel; 6,1% of the tonnage; 8,9% of the power).

When considering the mean vessel characteristics of each typology (Figure 11, on the right), the "small tuna fishing boat" typology is that of vessels with the greatest mean size (13,9 metres; 21,8 GRT; 124,6 Kw), followed by the "large gillnetters" (11,5 metres; 15,7 GRT; 94,8 Kw). The most numerous vessels are the "small gillnetters" which are the intermediate size segment (10,2 metres; 9,6 GRT; 67 Kw), whilst the smallest are the "longliners" (8,4 metres; 6,6 GRT; 41,9 Kw) and that of the "potters" (8,5 metres; 5,9 GRT; 56,5 Kw).

The distribution analysis among typologies of the landings corresponding to the 10 main landed species of the coastal artisanal fleet (Figure 12), enables confirmation of the following:

- The two most important species, mackerel (*Scomber scombrus*) and white tuna (*Thunnus alalunga*), are mainly landed by typologies with large capacity vessels. In the case of the mackerel, they are the "small tuna fishing boats" (40%) and the "small gillnetters" (31%) with the highest landing proportion for this species. Regarding the white tuna, the largest landings correspond to the "small tuna fishing boats" (52%) and "large gillnetters" (33%).
- The red alga (*Gelidium sesquipedale*) is a back-up resource for all almost the activity typologies, although it is only exploited by the East Gipuzkoa vessels.
- The rest of the species are characterised by the strong preponderance of a certain typology in the landings, which appears to indicate specialisation of certain typologies in their catch.
- The hake (*Merluccius merluccius*) is the main "small gillnetter" target species (79% of landings), with little weight in the activity of the other typologies.
- Important target species of the "small gillnetters" are the red mullet *Mullus spp*. (90% de of total landings), black monkfish *Lophius budegassa* (96%), scorpionfish *Scorpaena spp.* (82%) and sole *Solea vulgaris* (80%).
- A characteristic species of the longliners is that of the conger eel *Conger conger* (90% of total landings) and the sea bass *Dicentrarchus labrax* (72%).

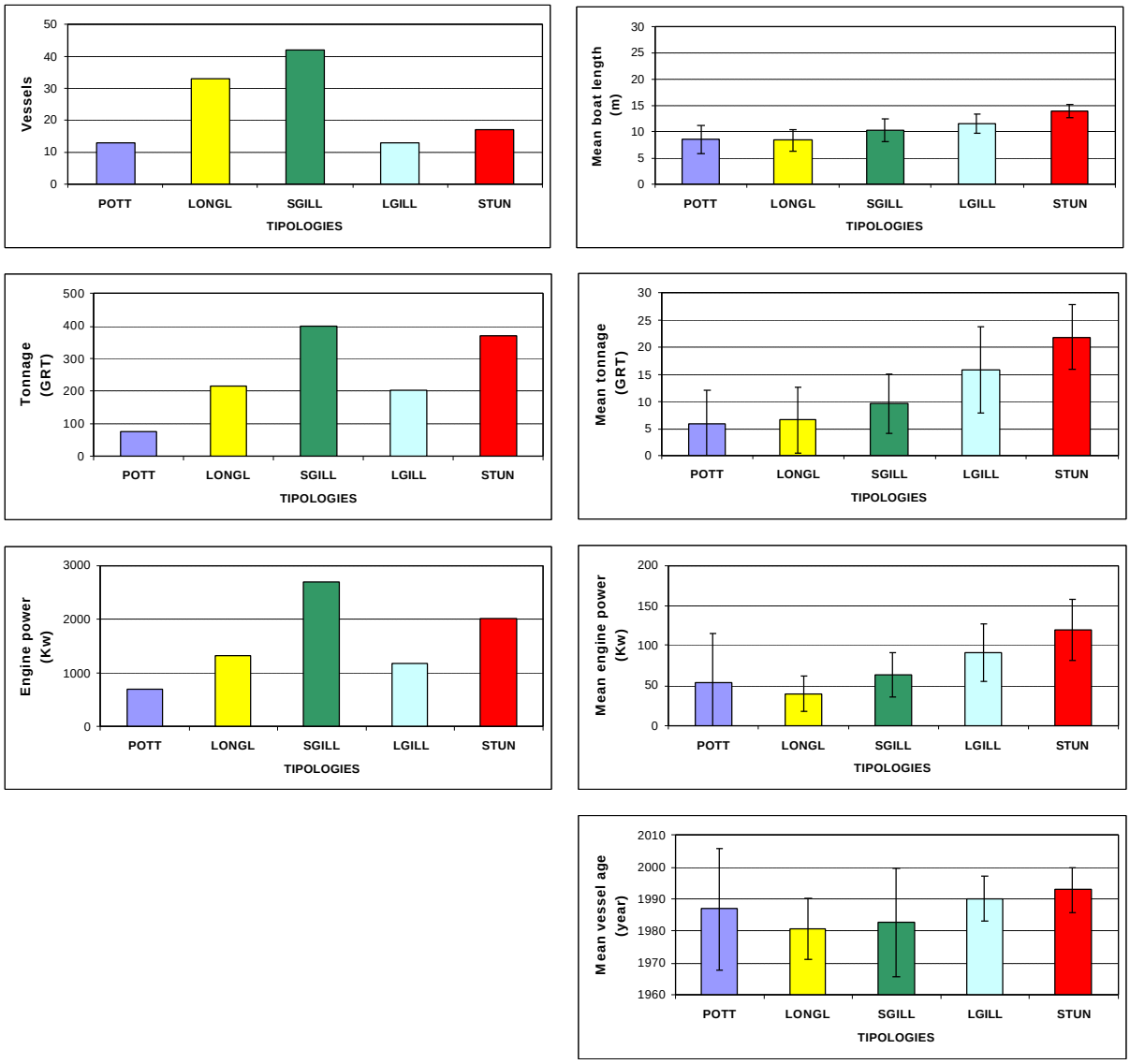


Figure 11. Basque Country coastal artisanal fleet characteristics according to activity typologies. POTT:"potters"; LONG:"longliners"; SGILL: "small gillnetters"; LGILL: "larger gillnetters"; STUN: small tuna fishing boats". The mean values are accompanied by bars representing the standard deviation.

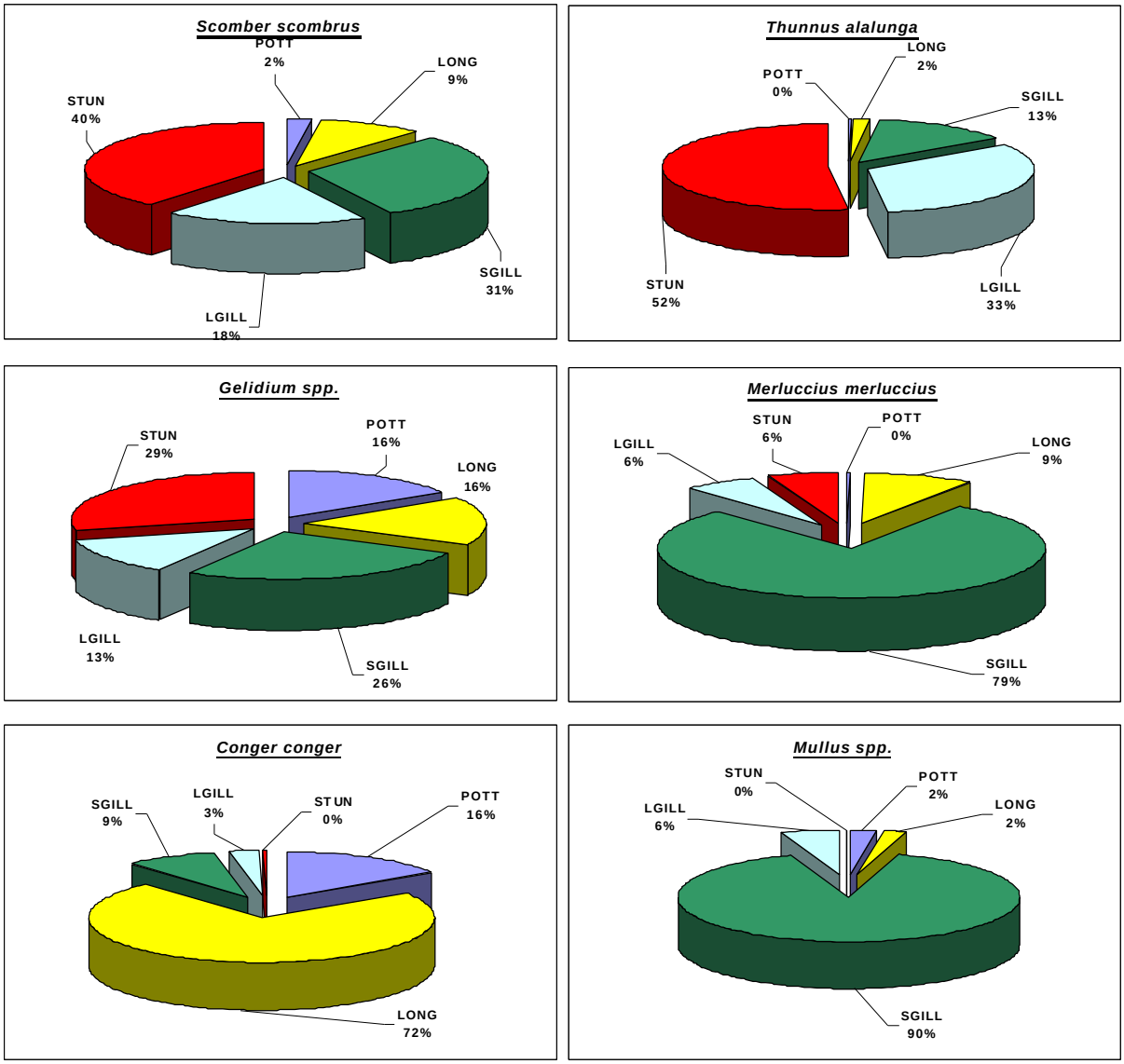
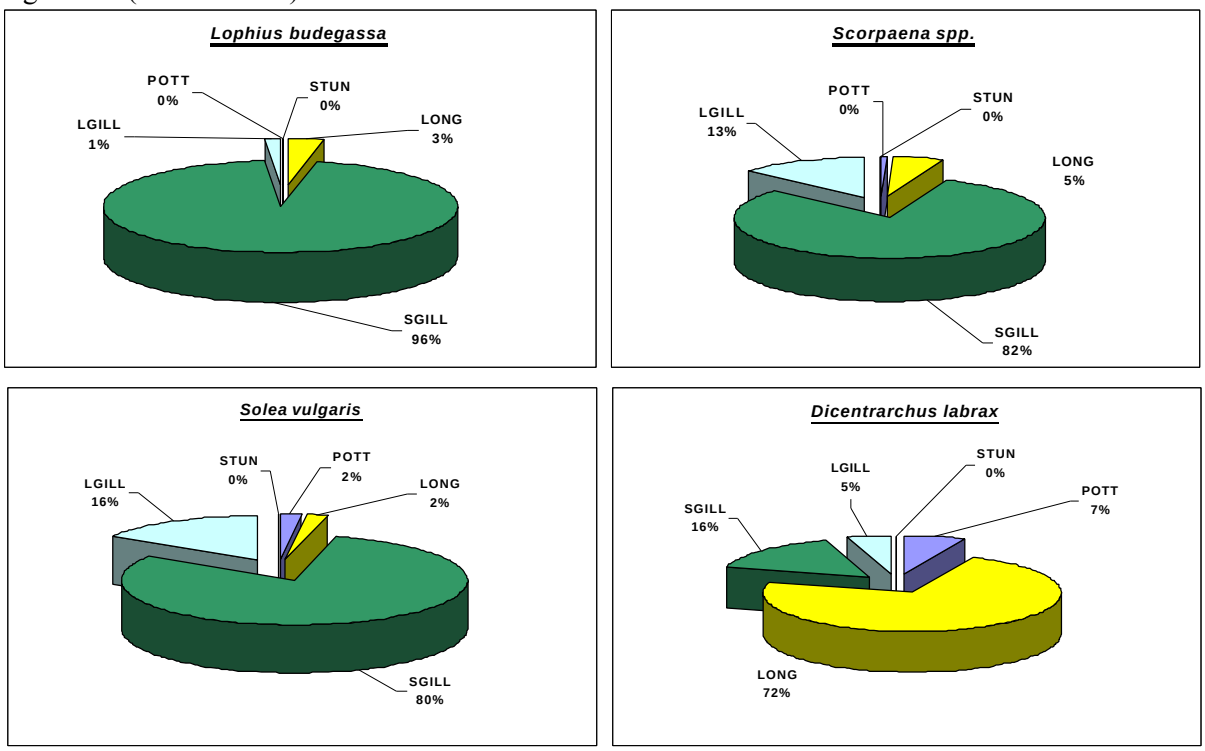


Figure 12. Landing distribution for the 10 main species of the Basque Country coastal artisanal fleet among the fleet activity typologies.
POTT:"potters"; LONG:"longliners"; SGILL: "small gillnetters"; LGILL: "larger gillnetters"; STUN: small tuna fishing boats"

Figure 12. (Continuation)



Description of each of the typologies is set out in greater detail in figures 13 to 22, based on the relative importance of the gears used (total months of use of all the vessels in each typology) and the importance of landed species annually both in weight and first sale value, taking as reference the 30 main species identified in Section 2.4. Also represented is the monthly variation of landings of the five first species by order of importance in annual landed weight on the one hand, and the five first species in first sale value on the other. Finally, detailed information is also provided on the characteristics of the vessels in this typology.

3.2.1. POTTERS Typology (17 vessels):

The "potter" typology (Figure 13) comprises small capacity vessels with a mean crew of 2 men. As its name indicates, its activity is widely dominated by the pot fishing modality, whilst the other fishing gears are used marginally (mainly gillnets, surface and bottom longlines, as well as handlines). The majority of their landings in weight are distributed among mackerel, red alga and octopus. Nevertheless, the most important species in annual first sale value is the octopus, followed by the group "other species" and mackerel. It is worth mentioning the landings of this typology are probably underestimated, particularly those referring to crustacean, since they do not follow the sales circuit of the fishermen's guilds and therefore there is no register of the same.

The monthly variation of the five first species landings (Figure 14 above) indicate there are two marked seasonal peaks of this activity: one with handlines for mackerel registered at the beginning of spring and another of dredging to collect algae at the beginning of autumn. Octopus is caught throughout the year although landings are slightly higher in spring. Other species landed are of lesser weighting importance. If we consider the economic value of the sale of the five main species (Figure 14 below), it can be seen this typology activity is economically supported by octopus, mackerel and conger eel during winter and spring, whilst the second half of the year is the "other species" group, together with the red alga, octopus and sea bass to a lesser extent, that provide the biggest income for the first fish sale .

3.2.2. LONGLINER Typology (33 vessels):

This group comprises small vessels with a reduced crew, similar to the previous typology (Figure 15), although their mean age is higher (a little over 20 years). The main fishing gears used are surface and bottom longlines. Some vessels also use sporadically other fishing gears such as pots, gillnets; and to a lesser extent handlines. The weighting importance order of the annual landings, the most important species is mackerel, followed by red alga, conger eel, sea bass and hake. If we consider the economic importance of the annual landings, the species order of importance changes due to the important differences among the sale prices of the same. So, although the mackerel sale value continues to be the most important, it is now followed by sea bass, hake and conger eel. Some vessels of this typology (probably the largest ones) catch white tuna, although the economic relevance for this typology is marginal.

The monthly weight variations of the "longliners" landings is strongly conditioned by the mackerel ones, which have a marked maximum in April (Figure 16 above). The conger eel catches in May and red alga ones in autumn having a certain but lesser weighting importance.

Bearing in mind the first sale income seasonal variation (Figure 16 below), most of this typology's economic activity comes from the mackerel and conger eel in spring, also the hake, sea bass and the "other species" group throughout summer and autumn-winter. Total sales dropped considerably during the last season probably due to bad weather conditions implying fewer fishing days .

3.2.3. SMALL GILLNETTER Typology (42 vessels):

The "small gillnetters" typology comprises vessels with a mean length in the 10 metre range and very old, nearly 20 years (Figure 17). As its name implies, the main fishing gears used are gillnets (both gillnet and trammel net). As with most of the typologies studied, handlines are also used for mackerel and trolling lines for white tuna; although the latter is a minority. Regarding the annual landings in weight, again the mackerel clearly dominates other species, which are relegated to a small proportion of these landings. When analysing the annual first sale value, the hake is the biggest income sources, followed by the mackerel and white tuna. The activity is also sustained to a lesser extent by different target species typical of different gillnet fishing métiers, such as red mullet, sole, monkfish and scorpionfish.

The monthly landing variation in weight (Figure 18 above) again shows the marked seasonal dominance of mackerel in spring, and smaller maximums for tuna fish catches in August and red algae in October. Hake catches normally occur throughout summer and the beginning of autumn. The "other species" group constitutes a significative catch fraction as corresponds to the wide diversity of species caught with gillnets.

On considering the first sale monthly values for the main species of this typology (Figure 18 below), we see an important seasonal variation in the income contribution per species. During spring, the income is dominated by mackerel from February to April. Subsequently, coinciding with the beginning of summer, hake and the "other species" group occupy most of the sales. In August maximum sales income is registered due mainly to the white tuna landings and red mullet to a lesser extent. With the end of the white tuna campaign in September, again hake is one of the main species regarding sales income through autumn and the beginning of winter.

3.2.4. LARGE GILLNETTER Typology (13 vessels):

The typology comprises a reduced number of vessels with mean length exceeding 11 metres and a 3 man crew (Figure 19). They are recently built units in comparison with the previous typologies (they are little more than 10 years). As with the previous typology, the main modality is gillnets, nevertheless, the use of trolling lines and handlines gears are more important than in previous typologies. The annual weight landings for this typology is dominated by the mackerel, and to a lesser extent white tuna and red alga. Regarding the annual first sale value, the white tuna is the most important species followed by the mackerel. Other species with a certain relevance in economic terms are hake, sole, scorpionfish and red mullet.

The monthly variation in landing weight for this typology (Figure 20 above) is distinguished by the strong maximum mackerel landings in spring, followed by a less important one of white tuna in

July and August. With the end of this species campaign in autumn, red alga landings of a certain importance are registered. The seasonal landing variations of the other species are disguised by the strong mackerel and white tuna values.

The monthly income variation for first fish sale (Figure 20 above) reveals the big domination of white tuna sales during the three summer months and those of mackerel in spring. During autumn and winter, sales were significatively lower, particularly those of hake and sole, also those of the "other species" group .

3.2.5. SMALL TUNA FISHING BOATS Typology (17 vessels):

This typology has the biggest vessels in the fleet studied; with a mean length around 14 metres and a 4,5 man mean crew (Figure 21). These are the most recently built units (less than 7 years). Their fishing activity is strongly dominated by trolling and handline gears. The tuna fishing boats sporadically use other fishing gears amongst those worthy of mention are dredging for alga collection and gillnets (gillnets, trammel and tangle). The annual landings in weight for this typology are greatly dominated by mackerel and to a lesser extent white tuna. The order of importance for these two species is inverted when considering the annual fish sale amount. Hake is of marginal importance in the annual income.

The monthly landing variation for this typology shows a similar pattern to that of the "large gillnetters" (three fishing season sequence throughout the year: mackerel in spring, white tuna in summer, red alga in autumn). Curiously the other species landings (hake, monkfish and other species) are virtually inappreciable in the season series shown in the graph (Figure 22 above).

The monthly fish sales income is strongly dominated by mackerel in spring months and white tuna in the summer ones (Figure 22 below). Between both seasons, there are small sales of hake in May-June, red alga in autumn and monkfish at the beginning of winter. The low income for this typology in autumn and beginning of winter would indicate a large number of vessels are inactive.

Figure 23 shows the coastal artisanal fleet vessel distribution by fishing port and activity typology. The following is deduced:

- In Gipuzkoa, port importance is distributed from East to West between Hondarribia the Gipuzkoa port of "small tuna fishing boats", Pasaia with the largest number of "small gillnetters", Donostia with the largest "longliner" fleet and Getaria with an important varied fleet as regards activity typologies.

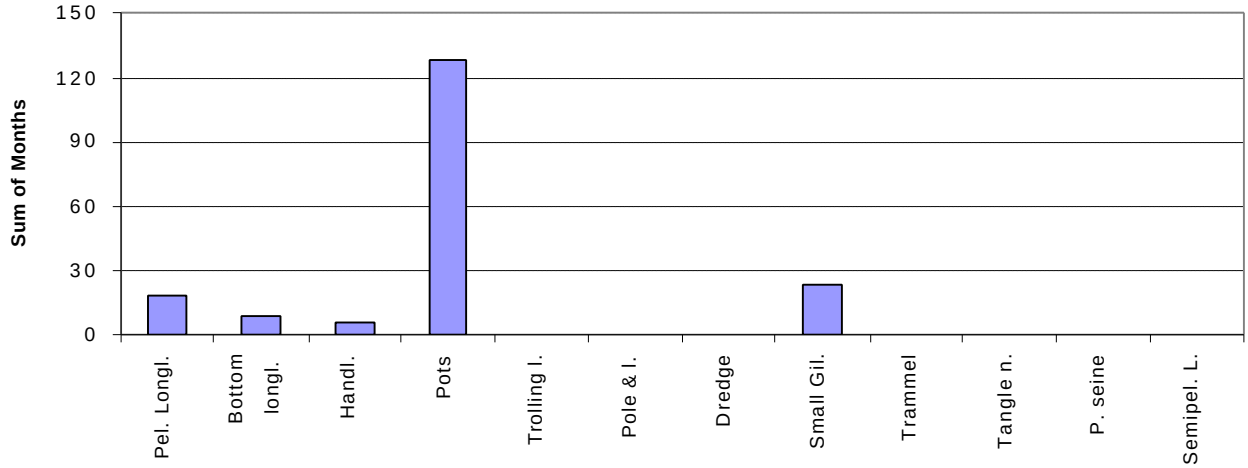
- In Bizkaia, the main coastal artisanal fleet ports are Bermeo, with the largest number of "small tuna fishing boats", and Lekeitio with the largest number of "small gillnetters"; whilst the port of Plentzia has the largest number of "longliners". The other ports are distinguished by small diversified fleets as regards typologies.

POTTERS
(n= 13)

(Photo: E. Puente)

	Total	Average	Std. deviation	Max.	Min.
Length		8,5	2,6	14,0	6,0
GRT	77	5,9	6,1	24,0	2,0
Kw	706	54,3	59,6	199,0	9,0
Crew	28	2,2	1,6	7,0	1,0
Year		1987	19,1	1998	1965

USE OF FISHING GEARS



LANDINGS

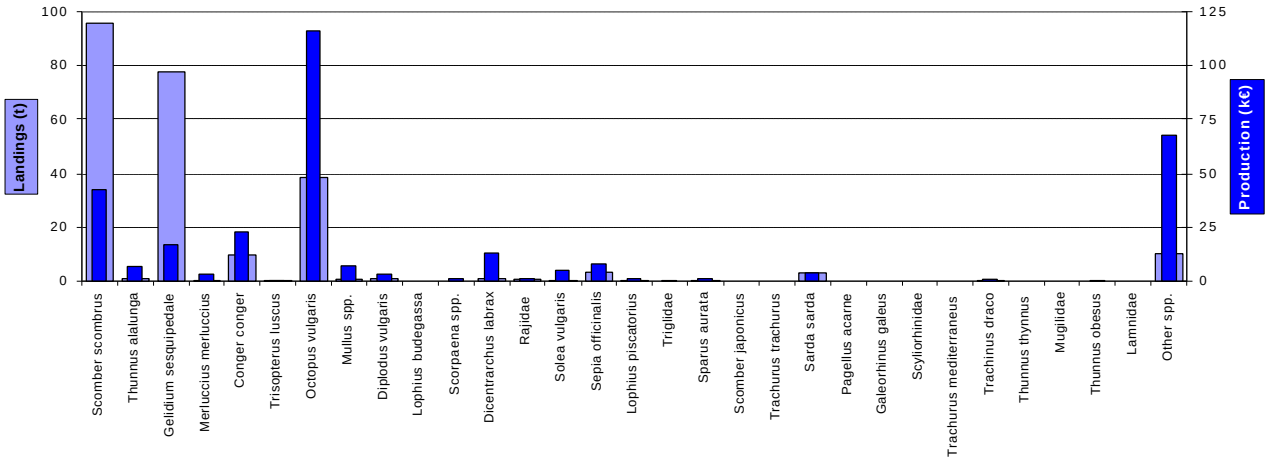


Figure 13. Description of the POTTERS typology characteristics considering the fleet characteristics (above), the total number of months using the fishing gears of the vessel group they belong to (in the middle), as well as the total weight and value of the species landed in 1999 (below).

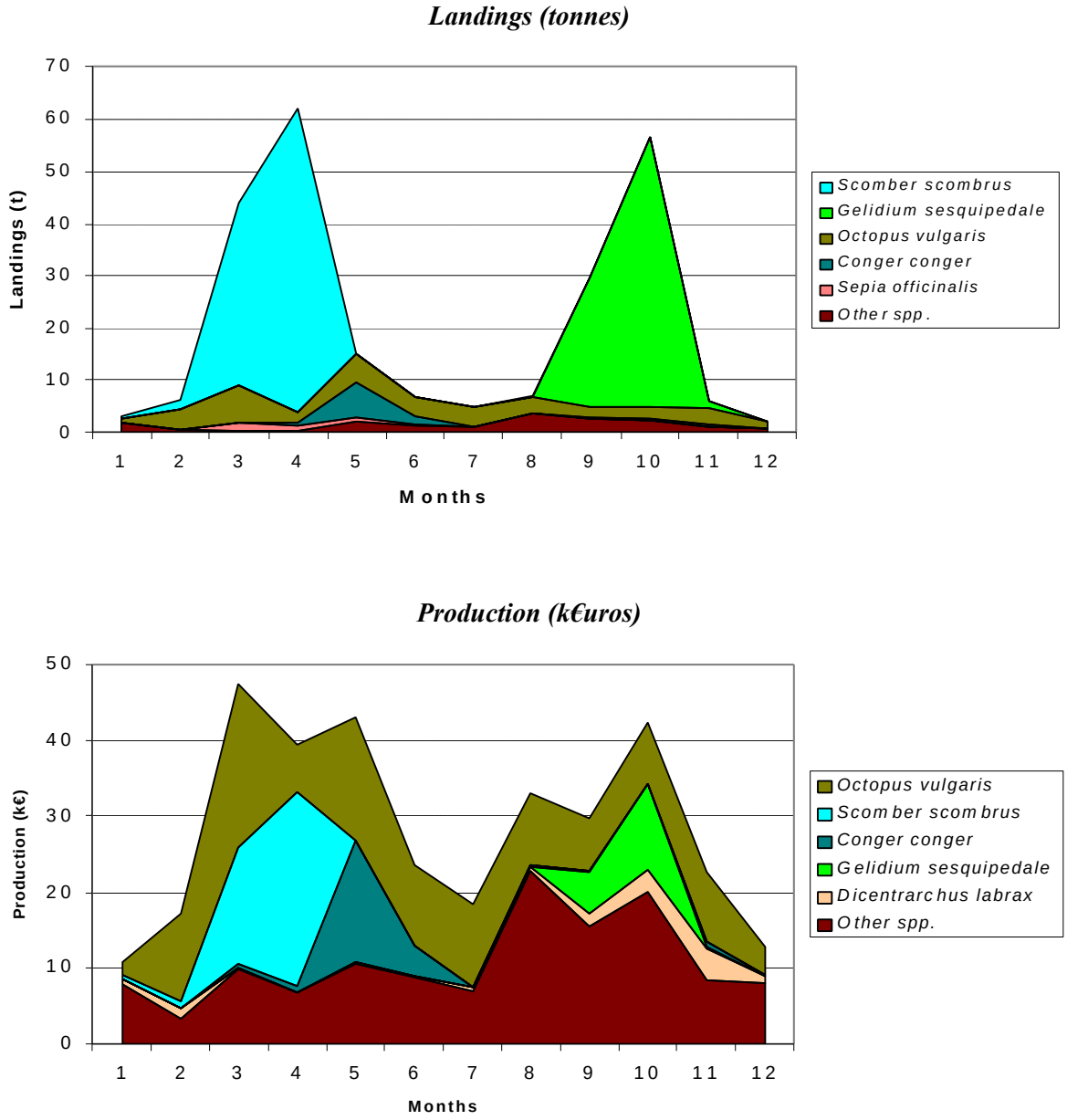


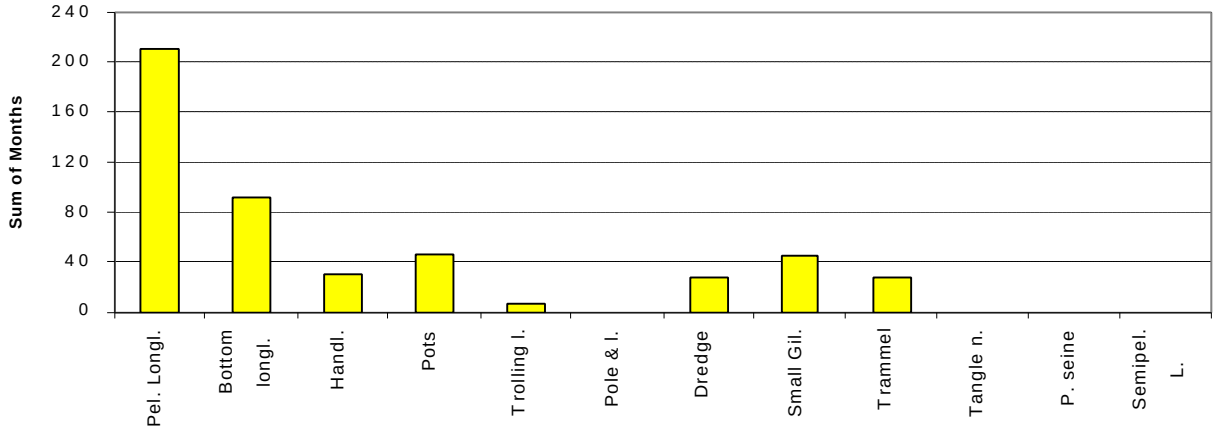
Figure 14. Monthly variation of the landings of the five main species of the POTTERS typology in weight (above) and first sale value (below) during 1999. The species in the figure legends are listed in descending importance (from top to bottom) except the group " Others".

LONGLINERS
(n= 33)

(Photo: E. Puente)

	Total	Average	Std. deviation	Max.	Min.
Length		8,4	2,1	15,0	6,0
GRT	217	6,6	6,1	31,0	1,0
Kw	1329	40,3	21,8	118,0	7,0
Crew	60	1,8	1,1	7	1
Year		1980	9,7	1998	1964

USE OF FISHING GEARS



LANDINGS

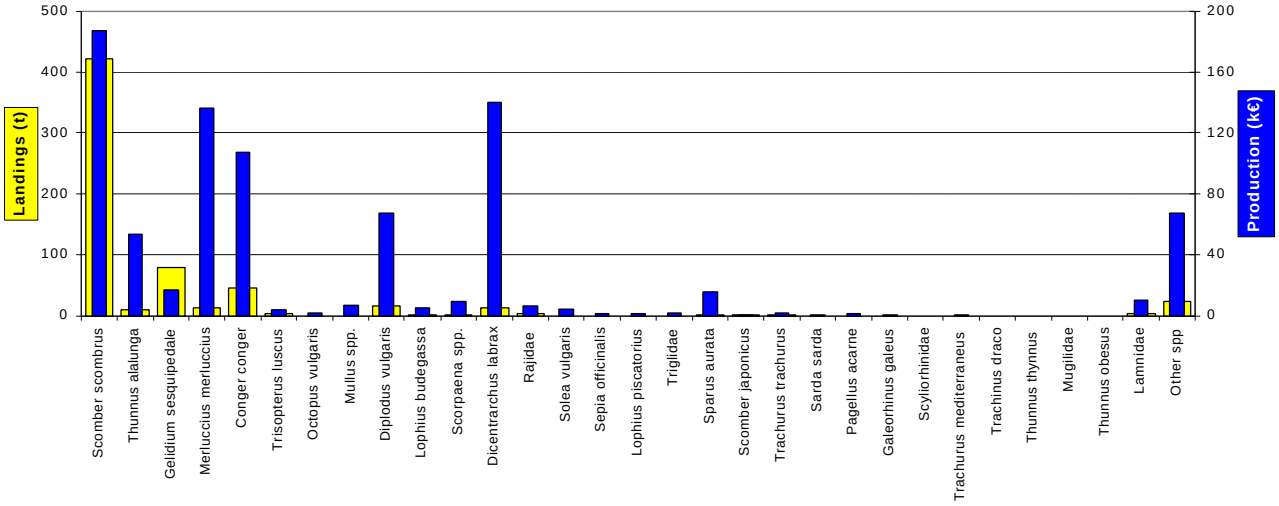


Figure 15. Description of the LONGLINERS typology characteristics considering the fleet characteristics (above), the total number of months of use of the fishing gears of the vessel group they belong to (in middle), also the total weight and value of the species landed in 1999 (below).

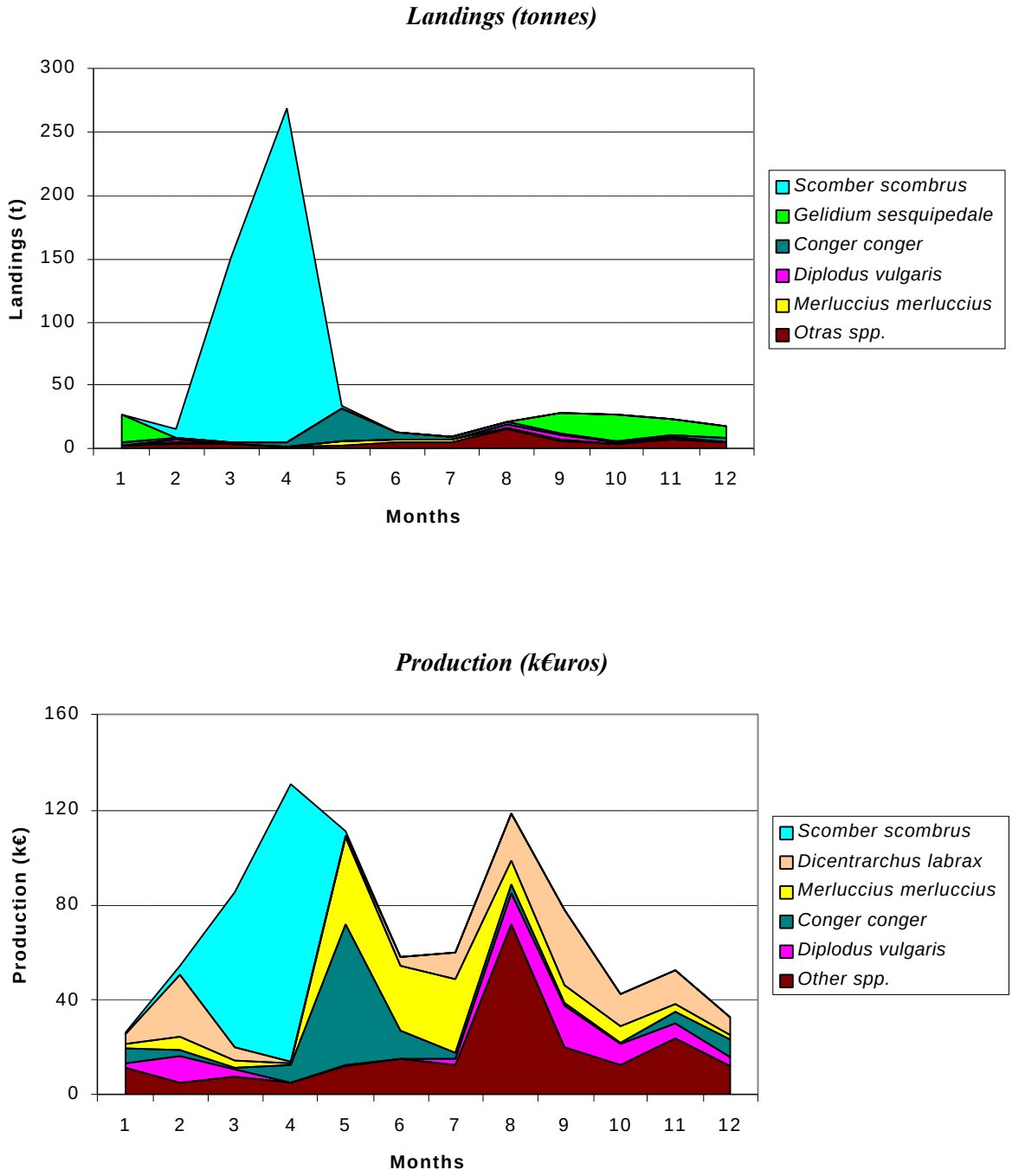


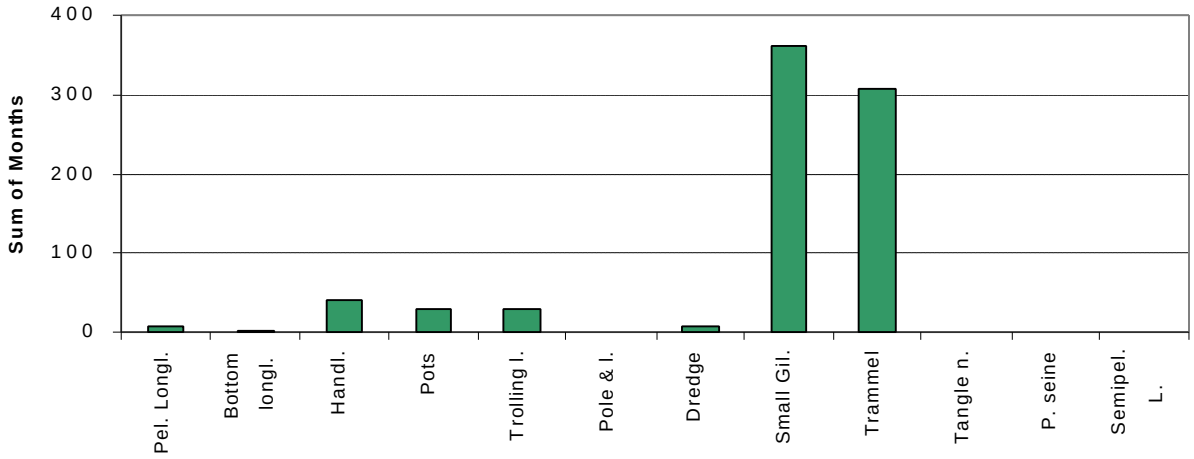
Figure 16. Monthly variation of the five main species landings of the LONGLINERS typology in weight (above) and first sale value (below) during 1999. The species in the figure legends are listed in descending importance (from top to bottom) except the group "Others".

SMALL GILLNETTERS (n= 42)

(Photo: E. Puente)

	Total	Average	Std. deviation	Max.	Min.
Length		10,2	2,2	14,0	5,0
GRT	401	9,6	5,5	25,0	2,0
Kw	2694	64,1	27,5	104,0	17,0
Crew	102	2,4	1,0	5	1
Year		1983	17,0	1998	1960

USE OF FISHING GEARS



LANDINGS

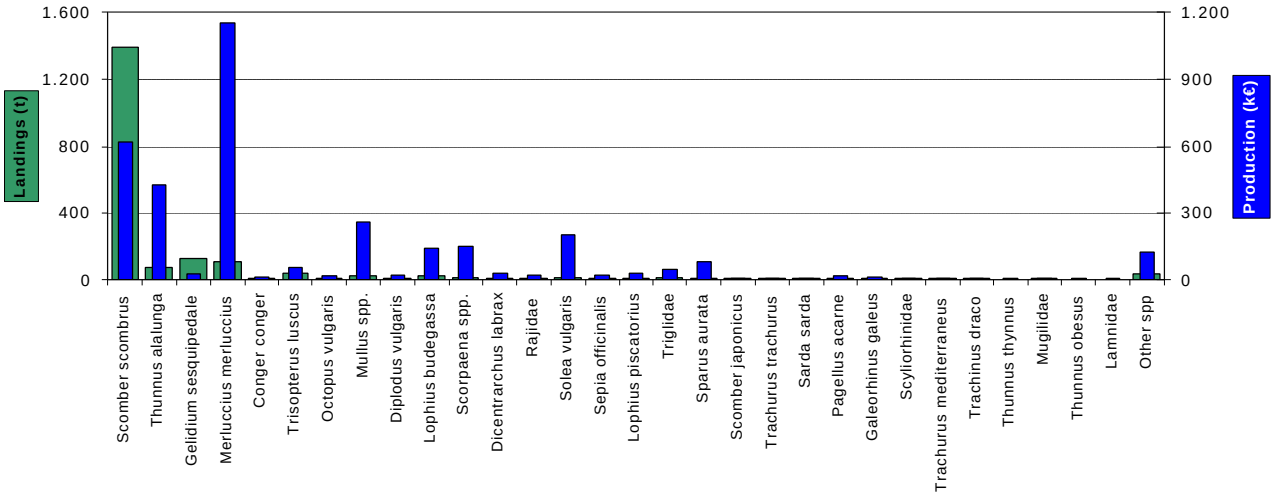


Figure 17. Description of the SMALL GILLNETTERS typology characteristics considering the fleet characteristics (above), the total number of months use of the fishing gears of the vessel group they belong to (in the middle), and the total weight and value of the species landed in 1999 (below).

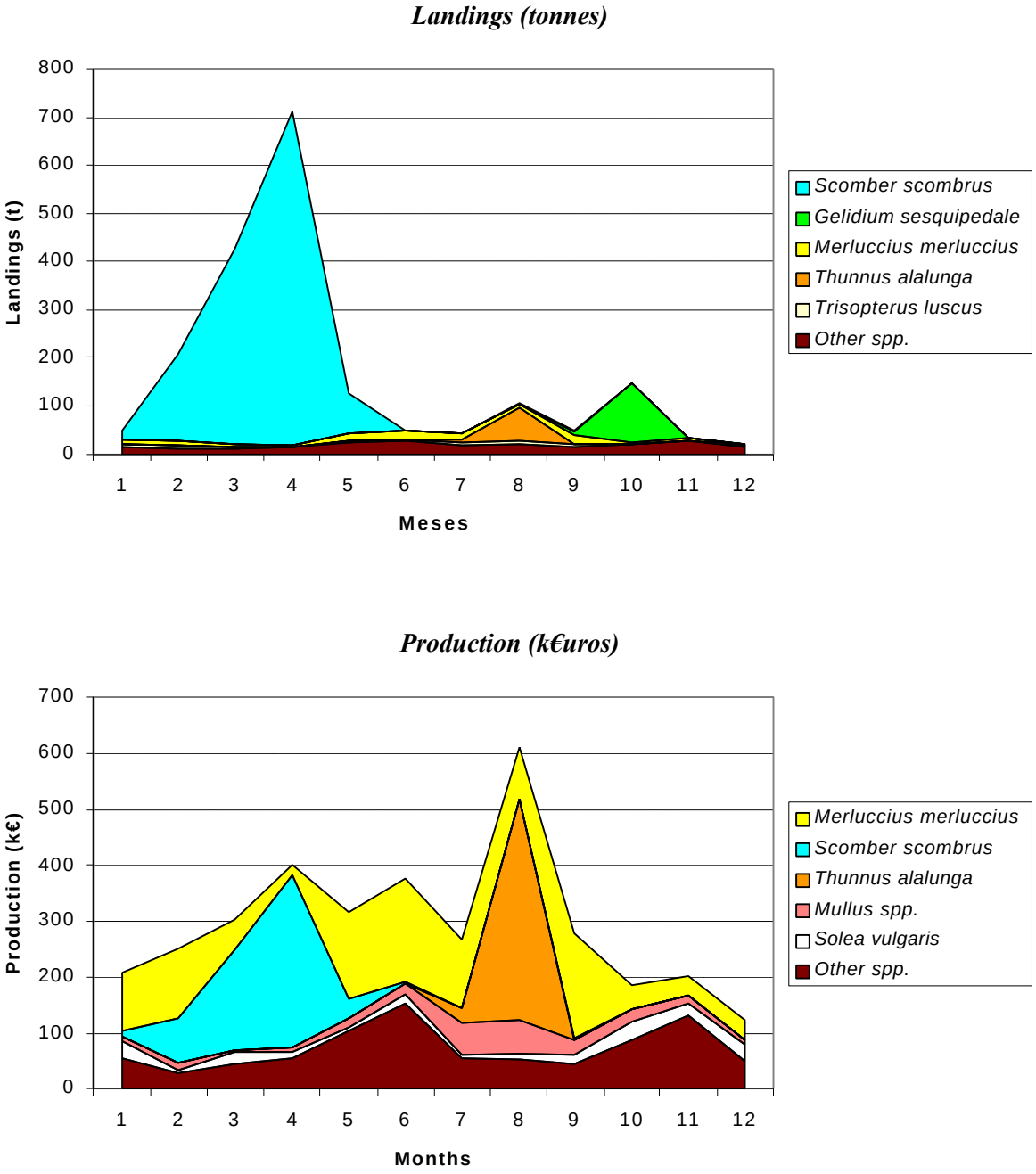


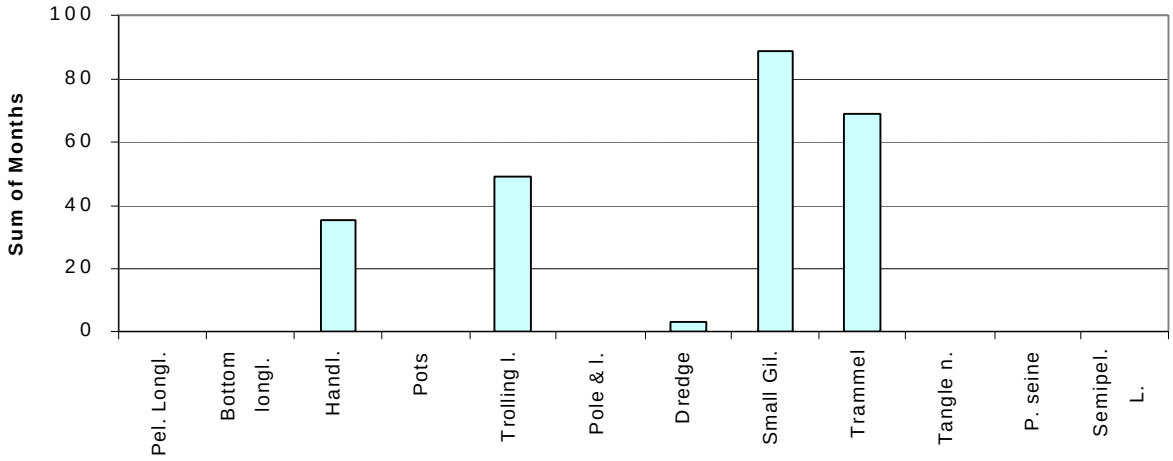
Figure 18. Monthly variation of the five main species landings of the SMALL GILLNETTERS typology in weight (above) and in first sale value (below) during 1999. The legends in the figures are listed in descending importance (from top to bottom) excepting the group "Others".

LARGE GILLNETTERS (n= 13)

(Photo: E. Puente)

	Total	Average	Std. deviation	Max.	Min.
Length		11.5	1,9	14,0	8,0
GRT	204	15,7	7,9	28,5	4,9
Kw	1184	91,1	35,8	158,0	34,0
Crew	41	3,2	1,2	5	1
Year		1990	7,1	1995	1985

USE OF FISHING GEARS



LANDINGS

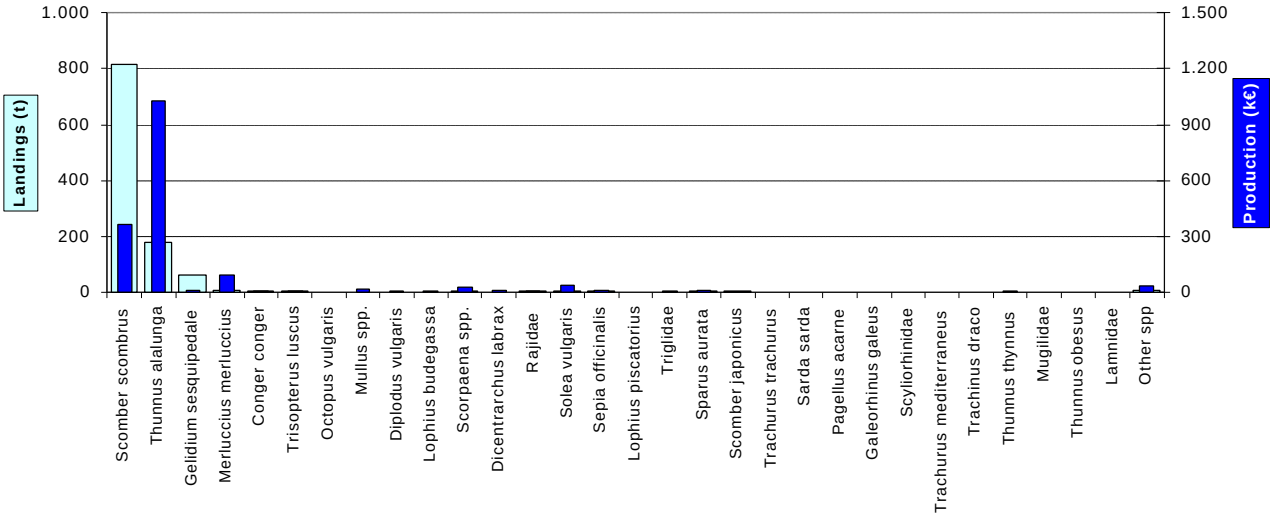


Figure 19. Description of the LARGE GILLNETTERS typology characteristics considering the fleet characteristics (above), the total number of months of use of the fishing gears of the vessel group they belong to (in the middle), and the total weight and value of all the landed species in 1999 (below).

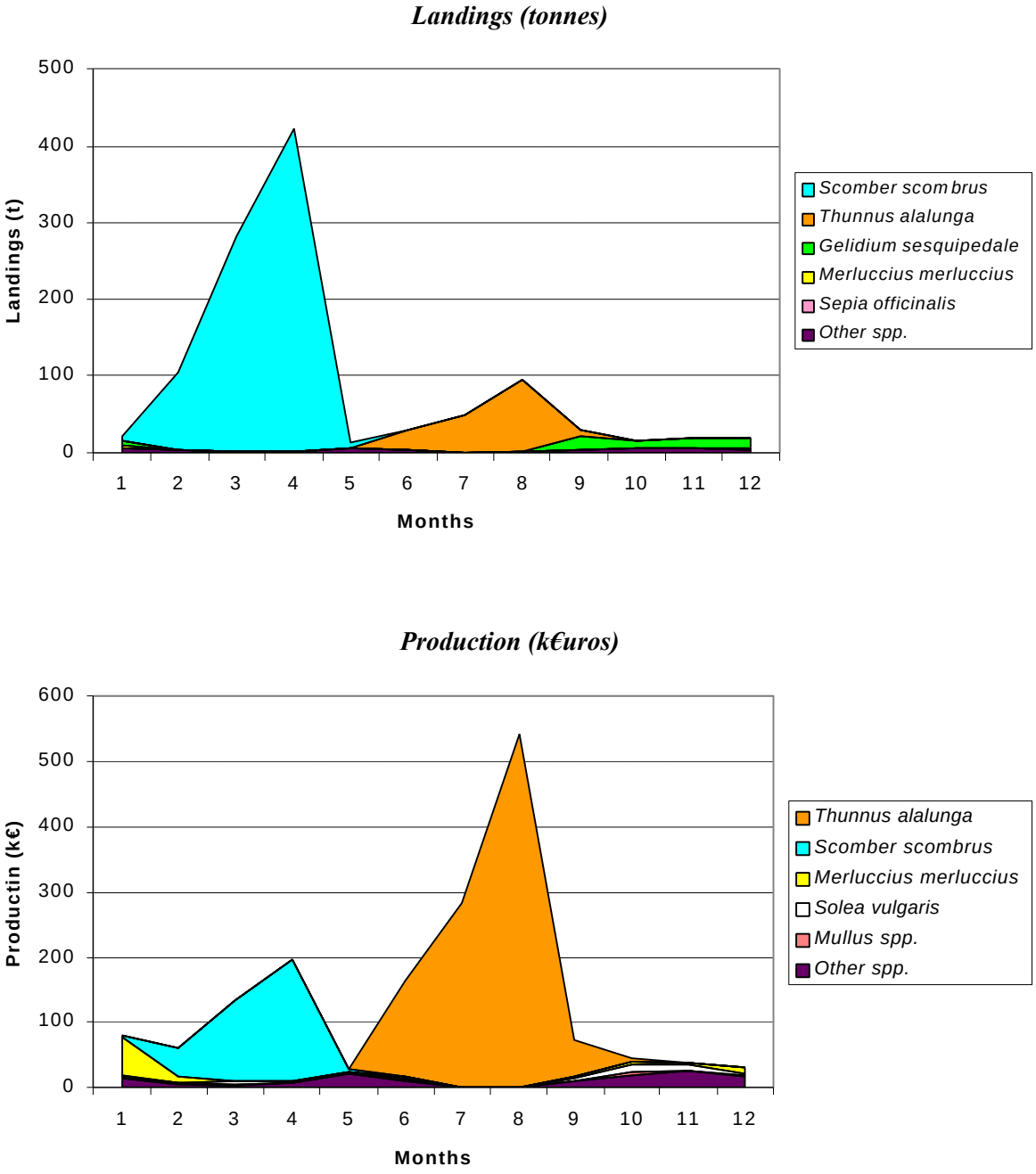


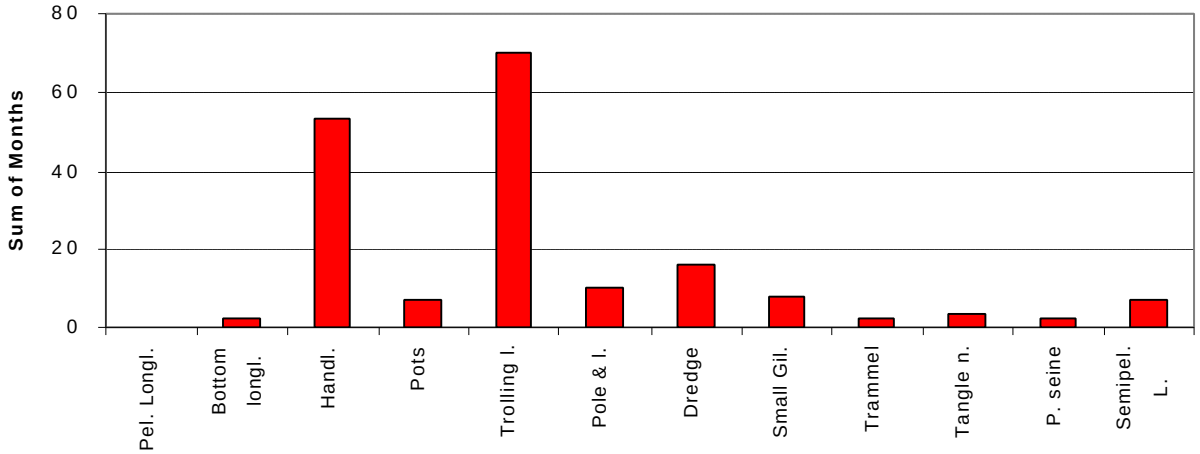
Figure 20. Monthly variation of the five first species landings of the LARGE GILLNETTERS typology in weight (above) and in the first sale value (below) during 1999. The species in the figure legends are listed in descending importance (from top to bottom), the group "Others".

SMALL TUNA FISHING BOATS (n= 17)

(Photo: E. Puente)

	Total	Average	Std. deviation	Max.	Min.
Length		13,9	1,2	15,0	11,0
GRT	371	21,8	5,9	31,0	11,0
Kw	2033	119,6	38,3	202,0	48,0
Crew	77	4,5	0,7	5	3
Year		1993	7,0	1998	1988

USE OF FISHING GEARS



LANDINGS

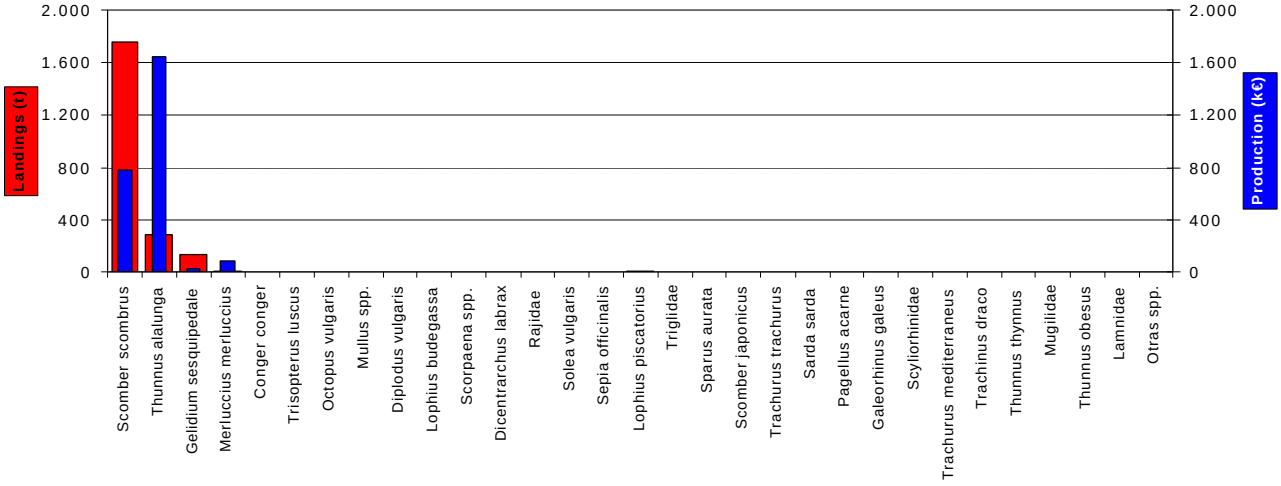


Figure 21. Description of the SMALL TUNA FISHING BOATS typology characteristics considering the fleet characteristics (above), the total number of months of use of the fishing gears of the vessel group they belong to (in the middle), and the total weight and value of the landed species in 1999 (below).

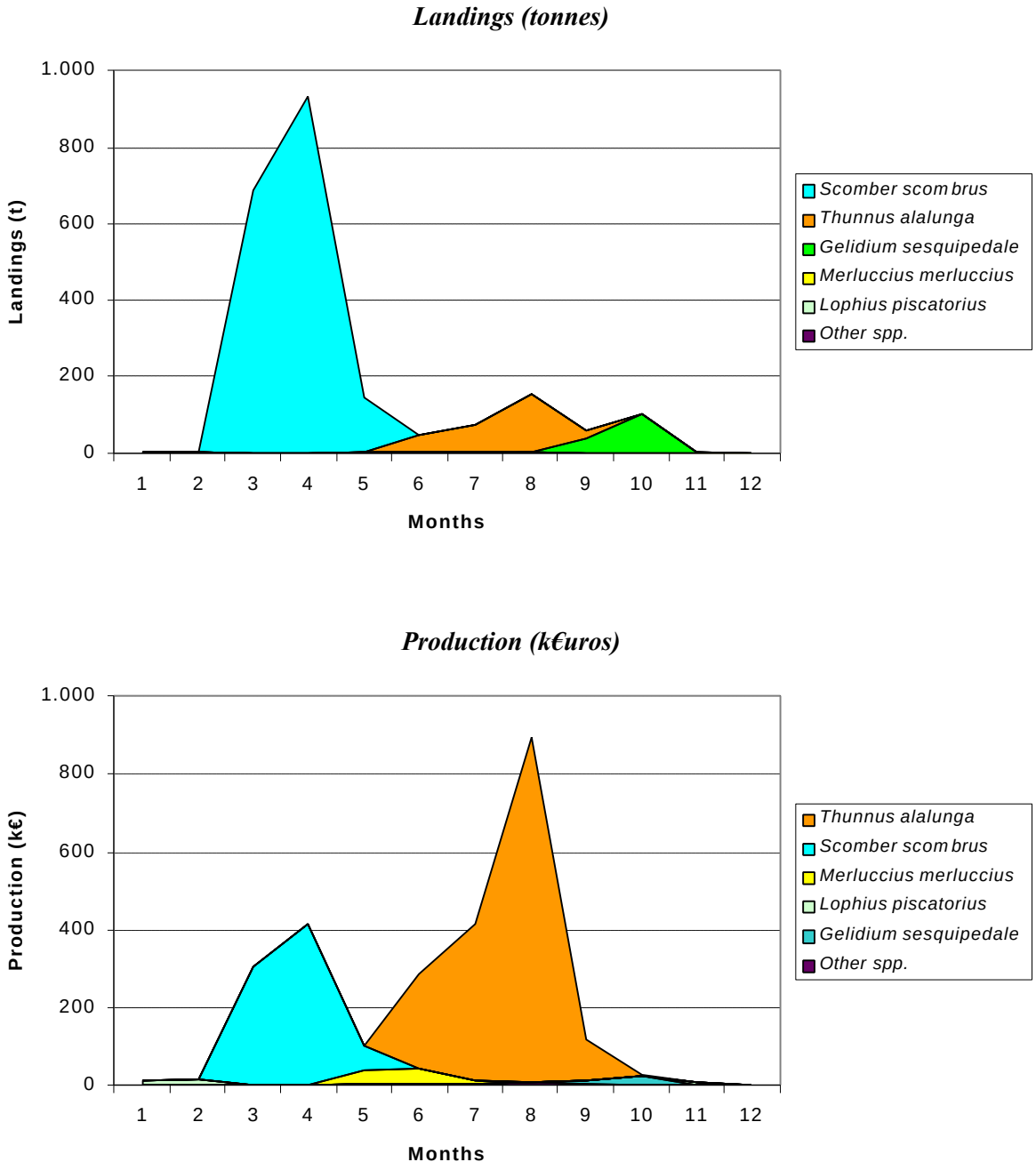


Figure 22. Monthly variation of the first five species landings of the SMALL TUNA FISHING BOAT typology in weight (above) and the first sale value (below) during 1999. The species in the figure legends listed in descending importance (from top to bottom) except for the group " Others".

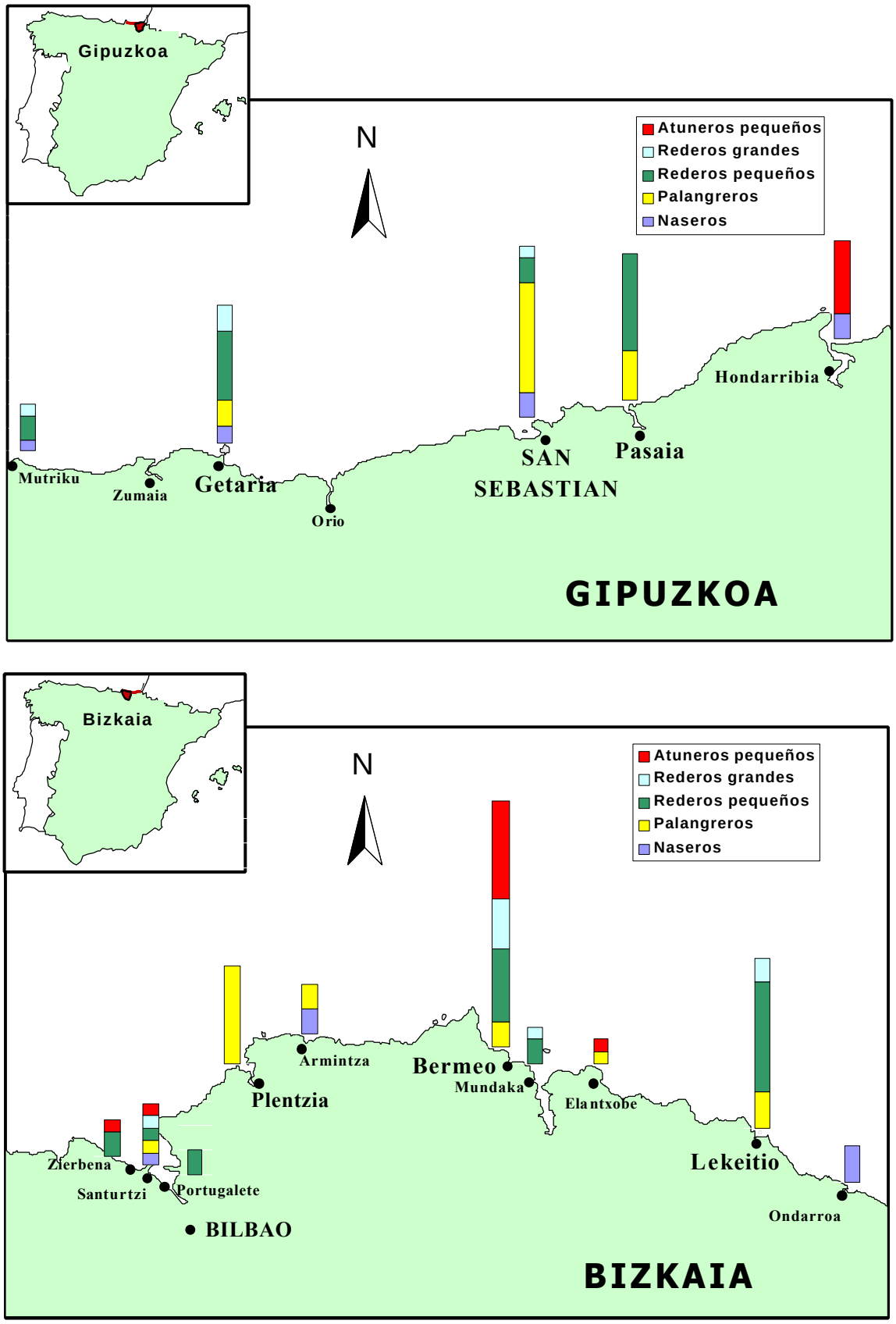


Figure 23 Distribution of the number of the two Basque Country maritime provinces' coastal artisanal fleet vessels, according to ports and activity typology (The height of the bars is proportional to the number of vessels and each colour identifies one of the five activity typologies).

4. INTERACTIONS AMONG THE FISHERIES

4.1. Interaction in resource extraction

The coastal artisanal fleet in particular that studied in this project, only has two fleet type competitors as regards resource extraction, namely: purse seine/live bait fleet catching pelagic species (large and small pelagic species); and that using bottom trawl gears in waters along the Basque Country coast, called the "coastal trawling" fleet.

Below is an approximation as to the degree of competition these two fleets exercises with coastal artisanal one object of this study.

Firstly, the purse seine/live bait fleet coincides with the coastal artisanal in mackerel and white tuna exploitation. Particularly the mackerel, which the artisanal fleet catches using gillnets in January and February, but which is not accessible to the purse seine fleet given the depth where this species is found at the beginning of the season. However, from March, season when the artisanal fleet catches this species with handlines, both fleets catch it, and is the main target species with massive landings for both fleets. With the white tuna, although the landings of both fleets does not reach mackerel levels, its economic importance is high in both cases. Unlike mackerel, the coincidence in season is total and in terms of income is the most important target species for both fleets.

The coastal trawling fleet case is very different. Again the mackerel is the species where there is the greatest interaction with the coastal artisanal fleet. Nevertheless, it is other species such as hake (mainly in the 2nd half of the year), gilthead bream (last quarter of the year) and monkfish (first quarter of the year) where there is fishing season coincidence of both fleets (see Table 11).

Table 11. Proportion of the main species in the annual landings in weight of the coastal artisanal and coastal trawling fleets (according to Prellezo, 2001; from year 2000 data)

Coastal artisanal fleet		Coastal trawling fleet	
Species	**kg %**	**Species**	**kg %**
Scomber scombrus	74%	*Micromesistius poutassou*	55%
Thunnus alalunga	13%	*Scomber scombrus*	20%
Gelidium sesquipedale	6%	*Trachurus trachurus*	16%
Prionace glauca	2%	*Merluccius merluccius*	6%
Triakidae	1%	*Illex spp.*	1%
Merluccius merluccius	1%	*Sparus aurata*	1%

From table 11 data we see the main coastal artisanal fleet species is mackerel (*Scomber scombrus)*, whilst for the coastal trawling fleet it is blue whiting (*Micromesistius poutassou*), for this last fleet the mackerel occupies second place in weighting importance. Hake (*Merluccius merluccius*) is sixth in the species catch composition of the artisanal fleet and fourth in the coastal trawling one. Nevertheless, on analysis of income percentage for each of the species (Table 12), it shows hake is another species where the two fleets interact in its extraction mainly due to its high price, although the total amounts for the artisanal float landing are relatively small.

Table 12. Proportion of the main species in the income for first fish sale corresponding to the annual landings of the coastal artisanal and coastal trawling fleets (according to Prellezo, 2001; from year 2000 data).

Coastal artisanal fleet		**Coastal trawling fleet**	
Species	**€ %**	**Species**	**€ %**
Thunnus alalunga	44%	Micromesistius poutassou	65%
Scomber scombrus	27%	*Merluccius merluccius*	20%
Prionace glauca	5%	*Trachurus trachurus*	4%
Merluccius merluccius	5%	Scomber scombrus	4%
Triakidae	3%	*Sparus aurata*	2%
Mullus surmuletus	2%	*Lophius piscatorius*	1%
Gelidium spp.	2%	*Lophius budegassa*	1%
Lophius piscatorius	2%	*Illex spp.*	1%

4.2. Space interaction

One of the main continental shelf characteristics opposite the Basque Country coast is its narrowness and small surface extension of its continental slope. Its north/south extension taken from the coast varies between a minimum of 8 and maximum of 16 miles. This feature means the continental shelf waters are densely occupied by vessels, using different fishing modalities at the same time.

The coastal artisanal fleet is distinguished by short fishing trips (usually less than a day). This together with the close proximity between ports, means these vessels travel short distances from base port to the fishing area, because increasing journeys rarely leads to a fishing ground free of competitors.

Physical space interaction along our coast can be divided into three large groups:

1. Interaction among vessels of the same modality with the same fishing gear.
2. Interaction among vessels of the same modality using different fishing gears.
3. Interaction among vessels of different modalities using different fishing gears.

The first is the most common and generally occurs among vessels using fixed gears (longlines, gillnets and pots). Although current regulations contemplate minimum distances being observed in relation to set fishing gears, small conflicts among vessels are frequent and generally settled via radio communication without any great damage to those involved.

The second occurs among artisanal fleet vessels using the modality called "small gears[3]" which allows a wide variety of static gears to be used, again the fixed gears interact with the fishing ground space. Nonetheless current regulations for this modality allow different fishing gears to share the same fishing area thereby minimising interactions. This way, conflicts among different gears of the same modality are less frequent than the previous case, although when they happen, the economic damage caused by fishing gear catching breakages is usually greater.

The last interaction case is the least frequent, although when it occurs, considerable economic damaged can be caused to one of the parties involved. The most common interaction is that among coastal trawling vessels and those of small gears using fixed gears. This interaction is due in part to the existence of fishing areas shared by both modalities and to a lesser extent the sporadic incursions of trawlers in fishing areas for the small gear fleet where trawling is banned.

Minimisation of these interactions and associated conflicts would be a distribution of fishing areas among the different fishing modalities practised on the shelf. Nevertheless, this task is very

[3] Name used in national and autonomic fishing regulations to designate a large number of fixed fishing gears used by the artisanal fleet vessels.

complex bearing in mind the reduced nature of the fishing ground area and the wide variety of gears used by the Basque Country coastal artisanal fleet.

4.3. Other interactions

A more complex kind of interaction to be analysed is that during the commercialisation process of the landed species. This interaction is important in the case of artisanal fisheries, because they have to compete on the market with semi-industrial type fleets such as that of "coastal trawling", which whilst it has fewer units, its catches are more important. This means the relatively small production of the artisanal fleet in relation to the total for both fleets, would not be reflected in its sale price.

Although *a priori* the above argument may appear valid, the truth is there are few coincidences in the commercialisation process of both fleets. In fact, only the mackerel caught by the two fleets in question appears to coincide on the commercialisation routes (although this does not always happen), whilst the other main species follow clearly differentiated routes for both fleets (Prellezo, 2001).

Another interaction effect among the different fisheries is on a social level due to labour movements from one fleet to another. So occasionally there are worker movements in both directions, albeit because a semi-industrial fleet crew member sets up as a ship-owner, usually in a small artisanal fishing vessel, or because artisanal vessel crew members go to semi-industrial vessels looking for bigger wages.

CONCLUSION (TYPOLOGY)

Fishing fleet

The small scale artisanal fishing fleet of the Basque Region is composed of 126 vessels irregularly distributed among 17 fishing ports. The average vessel characteristics are: length - 10 metres, 10,5 GRT and 65 kW engine power. Most of the fleet is older than 10 years (average age: 17 years) and the mean crew value is low (2,6 people/boat on average).

Fishing gears

The fishing gears used correspond mainly to the static gear category with some exceptions, i.e. trolling lines used to catch tuna fish, also dredges to collect algae. The most common fishing gears in terms of number of vessels are the enmeshing gears (over 50% of the vessels use them), predominating those of trammel and gill-net, followed by the hook gears. Among these, the hand lines for mackerel (*Scomber scombrus*) and trolling lines for white tuna (*Thunnus alalunga*) fishing are used by a large part of the fishing fleet. Both bottom and pelagic longlines, are the fishing gears commonly used for conger eel (*Conger conger*) and sea bass (*Dicentrarchus labrax*) respectively. Generally speaking, the smallest vessels of the fleet use mainly pots and longlines, whereas gillnets predominate the medium-sized vessel activity. The largest vessels of the fleet operate mainly with handlines and trolling lines, although they also use gill nets as a complementary fishing gear.

Target species

A common feature of the artisanal coastal fishing activity is the large variety of species targeted (over 50 species or groups of species are landed with all the different fishing métier types). Nevertheless, only a few species represent the bulk of the landings both in terms of weight and first fishmarket sale value. Thus *Scomber scombrus* is the main species in terms of landed weight (73% of total landings) followed by *Thunnus alalunga* (9%) which is the main species in economic terms (35% of fish sales). The rest of the species can be considered complementary income in the larger vessel fishing activity or a main target species for the smallest vessels which depend more on the high value species landed in small quantities. The main species among these are: *Merluccius merluccius*, *Conger conger*, *Mullus spp.*, *Lophius budegassa*, *Scorpaena spp*., *Dicentrarchus labrax* and *Solea vulgaris*. A small part of the fishing fleet collects red algae (*Gelidium sesquipedale*) which contribute to a large part of the landings for the region's eastern ports.

Fishing seasons

Another common feature of the artisanal coastal fishing is the activity seasonality in relation to the monthly variation in the target species availability. The main fishing seasons for the fleet medium-sized and largest vessels that of *Scomber scombrus* during March and April as well as that of *Thunnus alalunga* in July and August. In between these fishing seasons the fishing vessels target *Merluccius merluccius* with gillnets, as do other vessels with semi-pelagic longlines. The small vessels target *Conger conger* with bottom longlines in May, *Scorpaena spp*., with trammel nets in June and *Mullus spp*. with small meshed gillnets during the summer period. The annual activity of these small vessels is complemented throughout the rest of the year with the fishing targeting *Dicentrarchus labrax* and *Solea vulgaris* . The recovery of clumps of algae takes place during autumn. Generally speaking the different main target species fishing seasons are successive with a greater or lesser degree of overlapping among them.

Fishing areas

The Spanish fishing regulations ban trawling activity in depths below 100 metres. As a result most of the artisanal fishing activity targeting demersal or benthic species occurs in shallower waters to avoid gear conflicts between static and mobile fishing gears. Only a few of the fishing métiers targeting bottom species are practised in water deeper than the 100 m limit (i.e.: longlines and tangle nets targeting *Merluccius merluccius* and *Lophius spp.* respectively on the slope fishing grounds). Nevertheless the importance of those métiers in terms of number of vessels involved is very low. The fishing métiers targeting medium and large pelagic species (i.e. *Scomber scombrus* and *Thunnus alalunga*) are carried out beyond the inshore waters, particularly the tuna fishing. Most of the pot and pelagic longline fishing activity is done on the inshore fishing grounds, whereas those using gillnets and bottom longlines take place in deeper waters.

Fishing activity typologies

The cluster analysis has provided fishing activity classification for 118 out of 126 vessels in five main typologies according to the importance of the fishing gears used and species landed throughout the year. The typologies are as follows:

1. The "*potters*" (13 vessels) form part of the smallest fraction of the fishing fleet. Their activity is characterized by the predominance of pots used mainly to catch *Octopus vulgaris* and small crustaceans (not usually sold at the fish auction), although they also use handlines for *Scomber scombrus*, as well as longlines for *Conger conger* and *Dicentrarchus labrax* as a complementary activity.
2. The "*longliners*" (33 vessels) are the second group of the smallest vessels in the fishing fleet. The fishing activity of the "longliners" typology is based mainly on different types of longlines (pelagic, semi-pelagic and bottom ones) targeting different species (*D. labrax*, *M. merluccius*, *C. conger* respectively). Nevertheless the use of handline to catch *S. scombrus* is also relevant both in terms of weight and economic value of the fish landings.
3. The "*small gillnetters*" is the most common typology in terms of number of vessels involved (42 vessels). Its fishing fleet comprises medium size vessels of the artisanal fleet studied. They mainly fish with different types of trammel nets and gillnets all year round targeting *M. merluccius*, *Mullus spp.* and *Solea vulgaris* and inshore species. In spring time most of the vessels focus on the *S. scombrus* fishery with handlines. A few of the largest vessels in the group target *T. alalunga* during August when the species is most likely to approach the coastal area sufficiently to enable relatively small vessels to fish in safe conditions. Thus their fishing activity in this typology is quite diversified among target species too.
4. "*Large gillnetters*" (13 vessels) have their activity dominated by gillnetting in terms of total number of months in the fishing activity. They target different high value species like *M. merlucius*, *S. vulgaris*, *Scorpaena spp*. and *Mullus spp*.. Nevertheless, landing and income are mainly composed of the pelagic species *S. scombrus* and *T. alalunga* caught with handlines and trolling lines during short fishing seasons in spring and summertime respectively.
5. "*Small tuna fishing boats*" (17 vessels) are the newest (around 7 years on average) and largest vessels (14 m long on average) of the small scale artisanal fleet. Most of their fishing activity is based on handlines and trolling lines for pelagic species. They use other static gears but as a marginal activity. Their landings and income are based on *T. alalunga* and *S. scombrus* plus some small amounts of algae and *M. merluccius*.

Generally speaking the smaller the vessel, the more diversified its activity in relation to fishing gear and target species variation. Moreover, the fishing activity of the small vessel typologies (i.e. "potters" and "longliners") is based on a wider range of target species of high economic value landed in small quantities compared to the larger vessel typologies. As the size of the vessel increases (i.e. "small gillnetters") its fishing activity becomes more dependent on the two main fishing métiers of the artisanal fleet based on the pelagic species *S. scombrus* and *T. alalunga* whilst the other fishing

metiers are practised as an alternative fishing activity between the two “key” fishing métiers. The pelagic species fishing métiers are clearly dominant in the largest vessel typologies (i.e.: “large gillnetters” and “small tuna fishing boats”) where the other fishing activities have a marginal importance yet ensure complementary income for the vessels.

Fishery interactions

Competition in the exploitation of fishing resources by the artisanal fleet would take place mainly with the trawling fleet operating outside the coastal waters mostly for *M. merluccius* and *S. scombrus* which are relevant target species for both fleet types. Some incursions of purse seiners targeting small pelagic species in coastal waters may also be a source of competition on the coastal resources as in some cases the purse seiners can also fish bottom species when they fish along the inshore fishing grounds.

The Spanish fishing regulation banning trawling in depths below 100 m prevents physical interactions (gear conflicts) between static gears (commonly used in the artisanal coastal fishing) and mobile gears. Whereby, most of the space interaction among vessels would occur among the artisanal coastal fleet working with different or the same static gears sharing common fishing areas.

Part 2

Socio-economic and commercial analysis of Basque Country fishing fleet activity

5. SOCIO-ECONOMIC SURVEYS

The socio-economic survey is the culmination of a discussion on the contents of the base questionnaire that the IFREMER, IPIMAR and UPV-EHU teams involved in the project, worked with, throughout the year 2000. Nevertheless, the agreement reached on the basic features of the "common questionnaire" did not pose a problem for its adaptation to the peculiarities present in each country.

1999 was the reference year chosen for the questionnaire since a socio-economic analysis based on the activity typologies from the fishing section meant both the project parties had to use the same year to achieve greater coherence not to mention possibilities of result comparison/validation.

126 vessels practise coastal artisan fishing, defined as per criteria set out in the Introduction, in the Bizkaia and Gipuzkoa maritime regions subdividing the Basque Country in Spain. The socio-economic surveys performed on a sample of 61 skippers, represent a little over 48% of the said target population

5.1. Questionnaire objectives and contents

The questionnaire aims to be an information collection instrument of those aspects either not or insufficiently included in the primary information sources extant for the entire artisan subsector, and particularly regarding the activity typologies defining the same. Among those worthy of mention: production factors involved in each fishing activity typology (fishermen population characteristics and tools used in the activity -labour and capital-), structure of income and expenditure arising from said productive activity plus how catches are commercialised.

The objective is to provide a good description of the aspects mentioned, likewise creation of wealth and efficiency in the use of production means by the different activity typologies comprising the Basque Country coastal artisan fishing: potters, longliners, small gillnetters, etc.... The photograph obtained of the same gives quite a clear idea as to their modus operandi, which could be very useful when pondering possible trade-offs, which an eventual European policy reform might mean.

The survey is divided as follows (See Annex 3):

-*Labour factor characteristics: (a) skipper, (b) crew and (c) family participation in the exploitation.* Designed to describe the human factor involved in the activity, i.e.: total and monthly average effectives; skipper's age structure, origin and studies; owner, co-owner or employee status; membership of associated structures; mono/pluri-activity; family participation in exploitation related tasks, etc.)

-*Capital factor characteristics: (a) vessel, (b) electronic, hydraulic equipment, etc and (c) fishing gears.* Designed to describe the vessel (age, hull material, length, power, tonnage, etc.) and the production tools used (electronic/mechanical equipment, fishing gears, etc.); also how they were acquired, current estimated and insured values.

-*Landed production and its first sale value: (a) main species caught, (b) fishing gear/modality used throughout the year and (c) income per catch.* Designed to know the catch volume of main species and mean sale price; said information relates to the modality/gear used in the catch throughout the year. Total income per catches and breakdown per species and fishing modality/gear are more or less obtained directly.

-*Production costs: (a) fishing gear intermediate consumptions, (b) intermediate bait, ice and gas-oil consumptions, and (c) other costs arising from production.* Designed to obtain information on said consumptions, in physical and monetary units, per each fishing modality used. Information on other production costs not directly attributable to a specific fishing modality was also included in the questionnaire (E.g.: work remuneration, Social Security contributions, provisions, insurance, services, etc.).

-*Fish treatment, conditioning, storage and commercialisation*. Designed to discover the installations used on board and at port for: treating, conditioning and/or storing fish. The catch sales and distribution channels and the participation of the interviewees in any Producer Organisation were also considered.

5.2. Local peculiarities of the questionnaire

The questionnaire section requiring most adaptations to include local features was that related to fishing gears and/or modalities, and required the collaboration of AZTI. In this section skippers were asked not only total annual expenditure on fishing gears but also a detailed breakdown: number of units of each gear type owned, number of components comprising each gear unit, number of components repaired or replaced during that year, assembly method etc. Information which on crossing with corresponding unit prices aimed to quantify in detail the gear value and its annual replacement cost.

Despite efforts to simplify both the number and contents of questions posed, practical experience has shown they were not always fully understood by either the interviewees or interviewers themselves. The heterogeneity of the answers obtained – or on occasions, absence of the same – meant verification of their contents on paper and database correction where possible. This is why some of the detailed questions posed here had to be discarded in some surveys.

Another questionnaire section receiving particular attention was that related to production and its seasonality, i.e., main species caught bearing in mind the fishing gear/modality used at different times of the year. The results obtained thus show a marked coincidence, except for minor differences with the fishing section of this study.

Given their interest, the questionnaire included two additional questions on the possibilities of exploitation continuity or succession and number of days at sea.

5.3. Target population and sampling method

The target population practising coastal artisanal fishing throughout the Basque Country – i.e. from the French border to the Cantabrian region – comprises 126 skippers/vessels whose characterisation and categorisation in typologies was done in the fishing section of this study. Likewise it subdivided the Basque fleet into 5 strata or typologies as per "fishing metiers" describing their extraction activity: potters (POTT), longliners (LONGL), small gillnetters (SGILL), large gillnetters (LGILL) and small tuna fishing boats (STUN).

There are two purse-seiners, which satisfy the "coastal artisan fishing" criteria set out in the Introduction. Nevertheless, the fishing analysis opted to ignore their presence considering them "atypical cases" within the limits established by the aforementioned definition. However, given their specificity and long tradition in the Basque artisan sector, the economist team carrying out the socio-economic analysis upheld the contrary criterion of including this activity as an additional typology (PSEIN).

On learning the majority of the fleet vessels belonged to the different typologies and their percentage weight within the entire population, it was decided to use this preliminary information to determine the proportion of skippers to be interviewed in each stratum. A list of vessel names/skippers was drawn at random to be questioned and a reserve one in the event of incidences or refusals to enable the pertinent substitutions in each stratum. The advantages of a stratified random sampling over a simple random sampling are very documented in specific literature (Cochran, 1998; Des Raj, 1979; Levy & Lemeshow, 1999). To put it simply: (1) this sampling technique offers a more realistic representation of the target population. Furthermore, the resulting estimations can be extrapolated to the entire population and (2) improves estimator's precision –lower standard errors- given its greater homogeneity.

The sampling technique used was the result of the different variable interactions on the one hand, the survey objectives and preliminary knowledge of the target population characteristics, whilst on the other hand the survey type, time and budget available to do it.

Table 13 – Strata percentage weights in the sample and population

		POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Sample	**N**	6	15	20	9	9	2	61
	%	10	24	33	15	15	3	100
Population	**N**	13	33	42	13	17	2	126
	%	10	26	33	11	14	1.5	100

Note: 8 vessels from population were not identified with any typology

Taking into account all these factors, a sampling size of 61 skippers to be interviewed was determined. This figure represents a sampling rate exceeding 48% of the target population. Each strata weight in the entire target population and the surveyed sample is quite comparable, i.e. the sample may be considered well designed and correctly representing the classes present in the said population. Table 13 shows the sample proportions are similar to those of the population in POTT and SGILL typologies, but slightly higher in LGILL and STUN typologies. Only the LONGL typology is slightly under-represented in the sample.

Nevertheless, the sample design did not consider the strata representation at lower desegregation levels such as provincial; since the skippers' random extraction did not take into account either the port or province of origin of them. Therefore the proportion of skippers interviewed in each province is over/or under-represented, depending on the case, in relation to population strata and is not a good representation of the same.

5.4. Survey development and difficulties encountered

After presentation of the PECOSUDE project to the Bizkaia and Gipuzkoa Fishermen's Guilds' technicians and representatives to explain its objectives, interest for the artisan sector, etc.... explanatory letters and collaboration request were sent to each of the skippers who chosen at random have taken part in the sample. Finally they were telephoned to arrange an appointment to do the survey.

The first questionnaire field tests were carried out during the last week of January and the beginning of February 2001. The actual survey was launched in the middle of February and lasted until the end of May. The survey method used was the interview. Three pollsters took part interviewing the skippers based in the 17 Autonomous Basque Community fishing ports.

The difficulties encountered during the survey period were as follows:

o Difficulty in contacting and arranging an appointment with the skippers due to their occupations or fishing trips. Six skippers (9.8%) in the sample had to be replaced either because they could not be located or other incidents (inactivity due to illness).

o Refusal to complete survey. A further seven skippers in the sample (11.5%) had to be replaced for refusing to answer the questionnaire.

o Difficulty in appreciating and validating the quality of answers to the questionnaire. Management Centres have not been set up in the Basque Country, furthermore virtually all the skippers said they did their own accounting without the aid of accounting experts or advisers. It must be mentioned that compliance with their tax obligations does not oblige them to use accounts ledgers – income tax return as per modules -, an annual summary of income from catches issued by the Fishermen's Guilds suffices. Moreover, Social Security contributions and VAT are also managed by the Guilds.

The only sources available to check some of their answers are:

(a) Vessel Census drawn up by the Basque Government

(b) Basque Government fishing sector Economic Survey data.

(c) Fish auction data. Information made available on monthly catches, mean monthly prices and income for 31% of the vessels surveyed for validation purposes.

(d) Data on volume and value of landings per species in the auction for the entire Autonomous Basque Community used in the fishing analysis.

On comparison of the results obtained with the data mentioned it can be concluded a downward bias exists for the income declared by the skippers. However, this underestimate is within an acceptable range (under 30%).

5.5. Data treatment

The survey data were recorded on an Access database. Their statistical treatment was performed based on indicators agreed with the IFREMER, IPIMAR and UPV-EHU members involved in this section. The discussion and set-up of said indicators took place over several meetings with the partners (July and November 2001 and January 2002). During this process each partner stated problems and inconsistencies detected in their data and indicators, while some results obtained were contrasted. Moreover, it was decided to eliminate some indicators initially considered and to add new ones of greater interest.

The inconsistencies detected in some variables, led to a vessel-by-vessel check of the database information, where at times data transcription errors were detected and at others a lack of homogeneity in the interpretation and filling in of some of the survey questions by the interviewers. The solution to these problems was to go back to the original questionnaires on paper and contact the fieldwork leaders, meaning a considerable delay in the data analysis phase.

6. TREATMENT AND ANALYSIS OF SOCIO-ECONOMIC RESULTS

6.1. Production factors

6.1.1. Labour factor

The Basque Country artisan fleet fishermen in Bizkaia and Gipuzkoa are full-time mono-active professionals. Although pluriactivity is quite common in other areas and fisheries it is virtually non-existent in this sector.

6.1.1.1. The skipper

**** Age and years to retirement***

The mean age of the coastal artisan fleet skippers is 44. Not only there is an accumulation of professionals over the age of 40 but also a shortage of young people being incorporated. In effect, the sector is not among the preferred by the youngest working population. Difficulties in rejuvenation and generational takeover can be foreseen.

Nevertheless, the mean age of the skippers surveyed presents relatively sensitive differences among the different typologies. Whilst in the Potter (POTT) and Small Tuna Fishing boat (STUN) typologies the mean age of the skippers is considerably greater than the mean (55 and 47 respectively), in the Large Gillnetters (LGILL) and Purse-seiners (PSEIN) the mean age is 35 and 37. The Potter (POTT) typology is that which has the most worrying age pyramid, given its oldness. The youngest skipper surveyed was 42, which predicts difficulties in this typology's generational takeover.

In line with the above, the mean number of years of activity till retirement of the skippers is 15 for the entire coastal artisan sector[5]. A very high number of skippers are within the 0 to 10 year and 11 to 20 year ranges to retirement. Yet again this evidences the oldness of the skippers and the future trend implies a worsening of this process, as can also be seen in figures 24 and 25.

[5] This indicator has been obtained directly from the own estimation of the skippers when they were asked about the number of years until their retirement.

Table 14 – Skipper's age and years to retirement

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Skipper's age (years)							
Mean	55	45	42	35	46	36	44
SD	8	11	11	8	8	6	11
CV (%)	14.7	23.6	26.7	23.3	17.8	17.4	24.9
Years to retirement							
Mean	6	15	17	24	11	22	15
SD	6	10	10	10	8	12	11
CV (%)	113.1	69.7	60.3	41.1	74.2	53.4	68.2

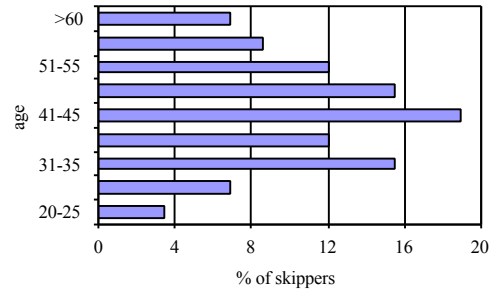


Figure 24 – Age pyramid

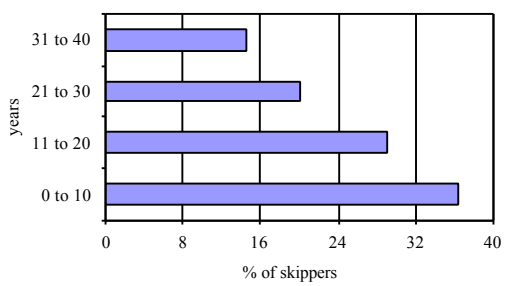


Figure 25 – Years to retirement

The Spanish fishermen's retirement system has some special features that are worthwhile to mention.

Under the special Social Security regime for seamen by virtue of the decree 2309/70 of 23rd July, partially modified by the 8th additional provision of the royal decree 863/1990, the application of correction coefficients is contemplated to allow early retirement in relation to the legal age of 65 till the theoretical limit of 55. This advancement is without any reduction in pension and maintains all retirement rights.

The reduction coefficients are established per vessel gross registered tonnes (GRT). This way, crewmembers (only workers) working on vessels up to 10 GRT, have a reduction coefficient of 0.1 equivalent to 1 year retirement age advancement[6] for every 10 years worked in vessels of these characteristics. Crewmembers working on vessels (no distinction between owners and workers) in the 10 GRT and 50 GRT range have a correction coefficient of 0.2, so for every 10 years worked on vessels of these characteristics retirement age is advanced 2 years.

For fishermen who have worked in different groups, the Marine Social Institution works out the retirement date depending on the years worked in each stratum. The reduction time is applied to the period dedicated to fishing, and is valid for early retirement even though the worker has changed later on to an activity governed by the general Social Security regime.

**** Continuity in the activity***

Only 28% of the skippers surveyed have a successor to carry on with the fishing activity after their retirement, whilst 72% have no clear succession.

[6] Crewmembers of vessels between 50-150 GRT have a reduction coefficient of 0.25. Crewmembers of vessels exceeding 150 GRT dedicated to inshore fishing have a coefficient of 0.3, whilst trawler vessels exceeding 250 GRT have a coefficient of 0.35. The vessel group of freezer trawlers, freezer tunny fishers, cod-fishers, double-rig trawlers and whalers have a reduction coefficient of 0.4.

It has to be remembered that traditionally this kind of business was a family one. Therefore, one of the main aims of the family unit has been to guarantee continuity of the business through one of the offsprings. In previous decades, this sector's tradition in the Basque Country meant the father's vessel had a dual purpose: on the one hand apprenticeship of the profession and on the other the means of accumulating the capital necessary for new units. The purpose of these new units consisted in enabling the skipper's offspring opting for the fishing profession with production means to continue the activity independently.

The results of the survey show there has been a kind of break in tradition. Moreover the aforementioned family accumulation model, highly important in the past, has undergone a profound transformation, to become a minority model. In any event, more than a quarter of those surveyed stated they have a successor to continue in the activity.

Again important differences are noted in the different typologies' succession behaviour. Those of the Large Gillnetters (LGILL) and Purse-seiners (PSEIN) behave very differently from the rest. The LGILL foresees continuity in 66.6% of those surveyed and the PSEIN in all the cases. The LONGL typology is around the sector average although slightly below the same, whilst the other typologies are way below the average. It is these typologies where the break in continuity can be most clearly seen.

Table 15 – Continuity in the activity (%)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Yes	17	27	15	67	11	100	28
No	83	73	85	33	89	0	72

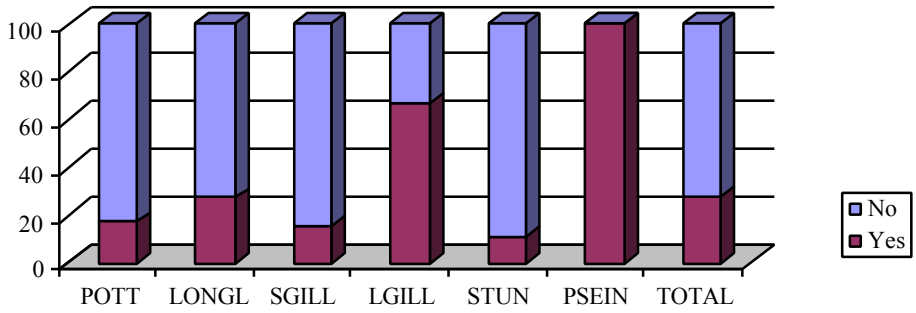


Figure 26 – Continuity in the activity

**** Skipper's origin***

90% of the sector's skippers are from the PECOSUDE area where they exercise their activity. The vast majority of the skippers are from the Basque Country ports, partly explained by the deep-rooted family tradition of these businesses. The relative importance of skippers from northern Spain's coastal regions included in PECOSUDE or skippers from Spanish regions outside the same are quite small, 3% and 2% respectively.

Table 16 – Skipper's origin (%)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Basque Country	83	93	89	89	89	100	90
Other Spanish regions in PECOSUDE	17	0	0	11	0	0	3
Other Spanish regions outside PECOSUDE	0	7	0	0	0	0	2
Foreigners	0	0	11	0	11	0	5

Foreign skippers from other countries amount to 5% of the total. Thus, verifying the gradual arrival of foreign skippers and fishermen to cover vacancies due to the lack of interest amongst native young people to take up fishing. Furthermore, the majority of the skippers' children choose different professions to that of their parents. This recent phenomenon is not exclusive to fishing, but has a qualitative importance in this sector and, besides, it may acquire a quantitatively important dimension in the future.

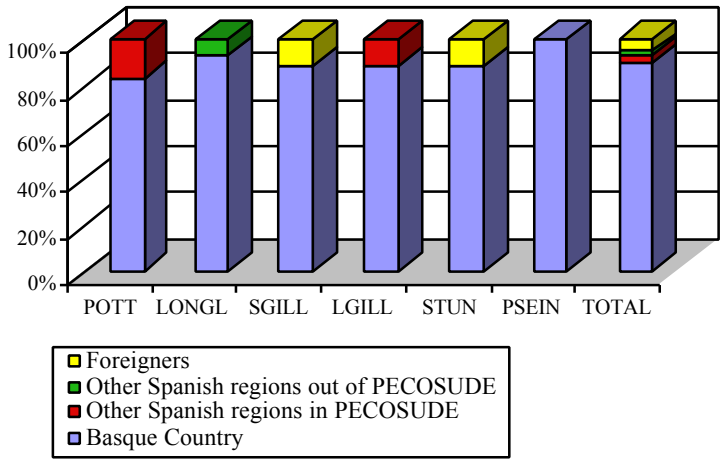


Figure 27 – Skipper's origin

**** Skipper's studies***

Only 22% of the skippers surveyed said they had done specific studies related to fishing, i.e. empiric knowledge dominates the profession.

74% have done some studies unrelated to the fishing sector. To be precise 21% have received primary education, another 21% hold the primary education certificate, 30% have received secondary education or Technical Studies and 2% have received university education. Whilst 4% of the skippers surveyed are without regulated studies

POTT typology has the highest percentage of skippers with no education, who also belong to the highest age group. However, 63% of the LGILL typology skippers have specifically studied to become skipper. Curiously enough most of the skippers with university studies are concentrated in the SGILL typology.

Table 17 – Skipper's studies (%)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
NO EDUCATION	20	21	0	0	0	0	4
GENERAL EDUCATION	80	72	83	37	83	100	74
-Primary	40	21	11	12	33	50	21
-Primary Certificate	20	22	39	0	0	0	21
- Secondary	20	7	17	0	17	50	13
- Technical Training	0	22	11	25	33	0	17
-University graduates	0	0	5	0	0	0	2
SPECIFIC STUDIES	0	21	17	63	17	0	22
-Skipper	0	14	11	63	17	0	18
-Captain	0	7	6	0	0	0	4

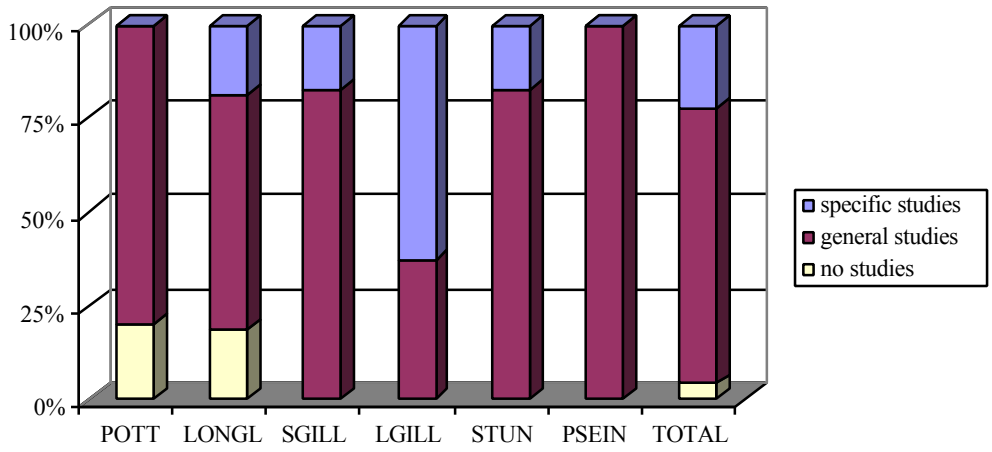


Figure 28 – Skipper distribution as per studies

**** Ownership***

93% of the skippers are owners or co-owners, and 7% are skilled workers. Among the first 62% are owners of the production means whilst 38% are co-owners. In a large number of cases these are family businesses, and co-ownership frequently occurs among members of the same family.

The SGILL, LGILL and STUN typologies concentrate 55%, 50% and 67% of co-owners respectively, whereas POTT, LONGL and PSEIN concentrate 83%, 87% and 100% of owners respectively.

Table 18 – Ownership (%)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Owner	83	87	45	50	33	100	62
Co-owner	17	13	55	50	67	0	38

Note: 4 skippers are employees, i.e. neither owners nor co-owners.

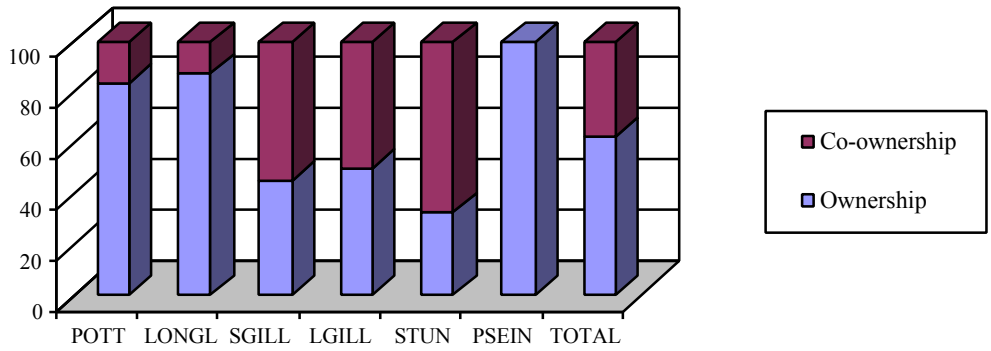


Figure 29 - Ownership (% of skippers)

In line with the sections related to the years left till retirement and activity continuity, we can deduce a significant number of owners (without excluding some co-owners from this) will abandon the activity as they retire. Insofar as many of them have no generational takeover of their own in the profession (as stated by 72% of the skippers surveyed), their vessels will be sold to third parties or scrapped, following the guidelines and incentives as established in the Multi-Annual Guidance Programmes (MAGP).

**** Membership of structures***

The Fishermen's Guilds[7] in the Basque Country agglutinate the entire artisan fleet. Consequently all the units professionally dedicated to fishing are included in the aforementioned Guilds.

The Guilds are professional fishermen's associations joining owners and crew members in their midst. They have a board of directors with equal representation of employers and employees.

The Guilds are classified as private professional associations subject to private law and at the same time as public law corporations. On its public side the Guilds have competences derived from the Public Administration itself. i.e. the State and Administration grant intervention capacity in the application of fishing plans, first sale commercialisation, management of fishing statistics, set-up of the necessary organisation means to create scale economies in the purchase of inputs (provisioning co-operatives, ice factories, etc), etc. They are also expressly assigned the task of consultation with the State in the drafting and application of fishing policy. In this line they share areas of management and are entrusted with handling the co-management between the fishing administration and fishermen. Historically they have acted as interlocutors (both between Administration and fishermen, and vice versa) for fishing sectors problems.

To adapt to current European legislation, the Bizkaia and Gipuzkoa Guilds' Provincial Federations have organised their respective producer organisations (PO) -OPESCAYA in Bizkaia and OPEGUI in Gipuzkoa-, whereby the guild members automatically belong to the corresponding provincial PO. Nevertheless, this does not occur in the guilds of all the coastal maritime regions. In some cases the Guilds' Provincial Federations have not reached an agreement to directly constitute Provincial POs. In fact, in some areas these have been constituted independently of the Guilds themselves.

However, as a result of certain needs arising from the professional activity not covered by the Guilds, several shipowner' associations have arisen in the Basque Country. One of these is in Bizkaia (Port of Bermeo) and the other in Gipuzkoa, whose organisation covers the entire province. Association is voluntary in all cases. In fact, only 10% of the interviewed shipowners belong to these organisations; although in some typologies such as STUN the membership rate is quite high (44%)

[7] A more detailed analysis of the Fishermen's Guilds in the Basque Country can be found in Astorkiza *et al.* (a)(2000), (b) (2000) and (c) (2001).

The association located in the port of Bermeo, known as the Hake Fishers' Co-operative (Cooperativa de Merluceras) specifically includes the coastal artisan vessels belonging to the port of Bermeo. This association takes care of providing fishing materials, advising on aid documents (loans, subsidies etc.), part of its members' social security administrative steps, as well as other daily operational aspects not covered by the guilds (supply of certain inputs, etc).

As already mentioned, the shipowners' association in Gipuzkoa covers the entire province. It started back in the 70s to set up a mutual insurance company (La Hermandad), also to organise the import of fishing detection sonar's. Today, although "La Hermandad", the mutual insurance company, is no longer a part of the Association and sonar import is minor activity, its attention is directed at labour and economic (loans, subsidies, etc.) advice like its Bizkaia counterparts.

Fishermen's unions are also present as organisation structures but have little importance in this fleet given the artisan fleet characteristics, with small crew units and frequently family linked, not to mention the special retribution system (catch share payment). Unions become more important in other fishing sectors

Accounting Management Centres have not been set up in the Basque Country. The skippers surveyed stated they did their own accounts without the aid of accounting experts or advisers. Tax regulations do not compel them to use accounts ledgers insofar as their individual income tax return is done with modules and a summary of annual income from auction sales issued by the Guilds suffices. The Guilds organise the Social Security contributions and VAT (Value Added Tax).

Table 19 – Structure membership (%)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Guild	100	100	100	100	100	100	100
Producer Organisation (P.O.)	100	100	100	100	100	100	100
Shipowners' association	0	0	5	11	44	0	10

6.1.1.2. The crew

**** Effective means***

Table 20 includes two alternative indicators for the mean embarked fishermen. The first (a) was calculated using the information of average embarked fishermen per month, whilst the second (b) was obtained from the skipper's own statement on annual average effectives. Consequently, the first enables us to discern the work factor seasonality.

As included in (a) the mean number of crewmembers per vessel is 2.5; whilst POTT, LONGL and SGILL typologies have lower averages i.e. 1.8, 1.9 and 2 crewmembers respectively. The three remaining typologies exceed the mean with 3.1 crewmembers in LGILL, 4.1 in STUN and 5.5 for PSEIN. Thus we note an increase in crewmembers among the POTT and PSEIN typologies. In general terms, the increase of crewmembers implies a greater complexity in labour division and company management with.

As already mentioned, (b) is comprised from the skipper's own statements. Thereby we are given the idea that the number of crewmembers is what the skipper considers necessary for the activity throughout the year irregardless of the seasonality component. In this version the mean number of crewmembers for the entire sample is 2.8 per vessel, exceeding the indicator including the seasonal effect. Comparison between the indicators suggests certain seasonality in the amount of labour concerned in the extraction activity particularly in the case of lines, purse-seine and gillnet

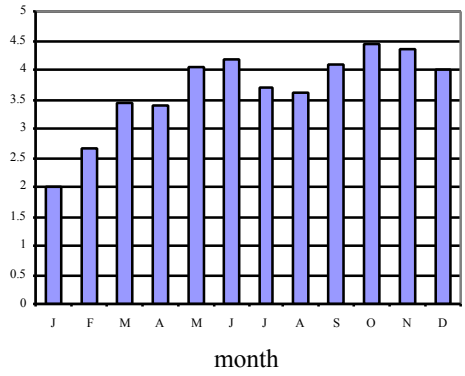


Figure 30 – Crew seasonal variation for LINES

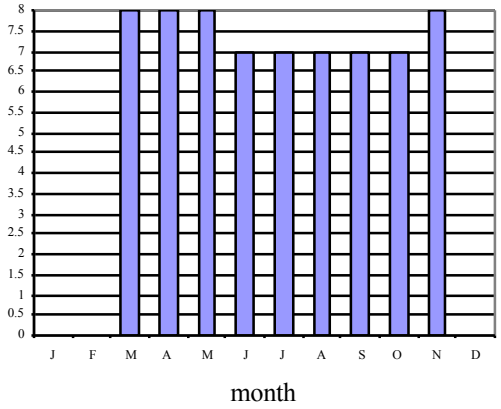


Figure 31– Crew seasonal variation for PURSE SEINER

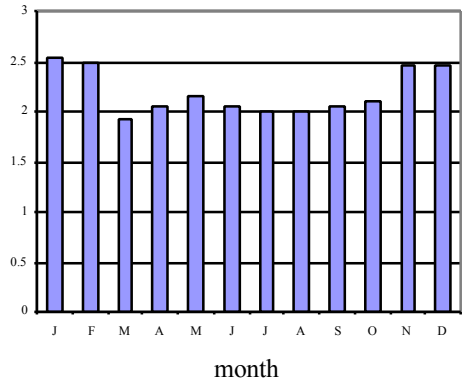


Figure 32 – Crew seasonal variation for NETS

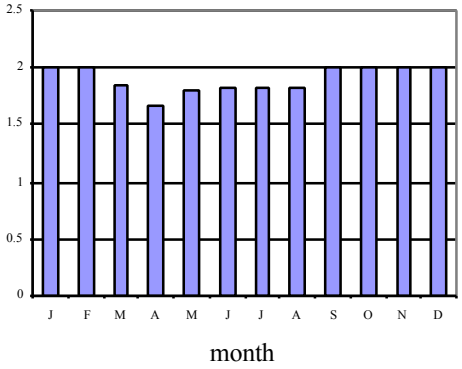


Figure 33 – Crew seasonal variation for POTS

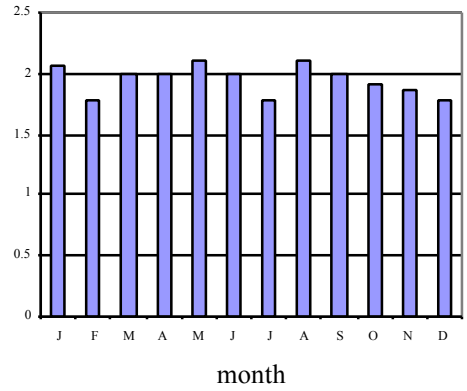


Figure 34 – Crew seasonal variation for LONG LINES

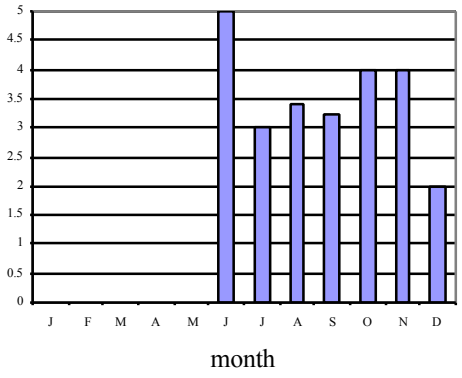


Figure 35 – Crew seasonal variation for OTHERS *

* It refers to the bottom trawl for algae and surface trawl for elver

Figures Nº 30-35 show monthly variations of the mean embarked fishermen for each of the fishing gears. Thus with line gears, the mean number of crewmembers is 4 between May and December, in January this drops to 2 increasing in February and April to 3. For purse-seine the mean number is 8 between March and May, dropping to 7 between June and October. For gillnet, January is

the heavy activity period with a mean number of 3 dropping to 2 for the rest of the year. For pots and longline the mean number of the sample is very stable throughout the year (2 crewmembers).

Table 20 – Number of crewmembers

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
(a) Bearing in mind seasonal variations							
Mean	1.8	1.9	2.0	3.1	4.1	5.5	2.5
SD	0.3	0.1	0.0	0.3	1.5	2.5	0.3
CV (%)	14.4	4.4	1.4	10.7	36.2	45.6	13.6
(b) Ignoring seasonal variations							
Mean	2.0	1.9	2.2	3.3	4.8	6.5	2.8
SD	1.3	0.8	0.9	1.4	1.0	2.1	1.6
CV (%)	63.2	41.3	40.7	42.4	20.3	32.6	56.0

**** Crew participation in land activities.***

The skippers state the crew's only dedication to land activities is that of vessel maintenance. They perform no activity related to commercialisation, management or/and others. Only 28% of the vessels surveyed had crew support for maintenance tasks.

Table 21 – Proportion of vessels with crew help in land activities (%)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Maintenance	33	7	30	33	56	0	28

Note: The crew does not participate in the rest of the land activities.

**** Family participation in land activities***

Only 7% of the skippers said they resorted to family help on land to support those activities other those of direct extraction. In all cases this help is referred to maintenance tasks. The only ones with this kind of assistance are the vessels of the SGILL, LGILL and STUN typologies, in the following percentages: 5%, 11% and 22% respectively.

Despite these results, skippers' wives or direct relatives are frequently found in commercialisation activities, particularly in port fish sales. Insofar as they have not responded, the quantitative importance cannot be established. However, there is abundant literature evidencing their existence and importance in the fishing activity of this sector[8].

Table 22 – Proportion of vessels with family help in land activities (%)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Maintenance	0	0	5	11	22	0	7

Note: The family does not participate in the rest of the land activities.

6.1.2. The vessel

6.1.2.1. Technical characteristics

**** Length, power and tonnage***

Mean vessel length is 10.3 m. However the mean dimension is gradually increasing from 8.3 m for POTT typology and 8.3 m for LONGL to the 13.8 m of the STUN, although their length drops again to 12.3 m for the PSEIN.

[8] A detailed analysis of the woman's role in the fishing sector can be found in Cabrera (1997, 1998), Cole (1991), Garcia and Montero (1989), Nakel and Lee (1988), Oliver Narvona (1989). For the specific Basque Country case consult the works of Rubio –Ardanaz (1997).

The average power for the fleet is 69 kW. By typology we have 52 kW for the POTT, and 33 kW for the LONGL to grow continuously between the SGILL (88 kW) and the STUN till reaching 126 kW for the latter. The power drops again to 79 kW for the PSEIN.

Mean tonnage for the entire sector is 11.1 GRT. The mean per typology is 7.4 GRT for POTT and 5.5 GRT for LONGL, continuing upwards for the successive typologies till the STUN 21.3 GRT, dropping to 16.4 GRT for the PSEIN.

Bearing in mind the information of table 23, the vessels of the LGILL, STUN and PSEIN typologies have the largest dimensions (greater capacity and length), plus more powerful engines than the POTT and LONGL typologies. Logically, the larger dimensioned vessels have the largest mean crew number.

Table 23 – Vessel length, power and tonnage.

	POTT	**LONGL**	**SGILL**	**LGILL**	**STUN**	**PSEIN**	**TOTAL**
Length (m)							
Mean	8.3	8.3	10.2	11.4	13.8	12.3	10.3
SD	3.1	1.9	2.1	1.9	1.1	1.9	2.7
CV (%)	35.8	22.5	20.4	16.9	7.9	15.1	26.0
Power (kW)							
Mean	52	33	67	88	126	79	69
SD	58	18	27	37	30	23	43
CV (%)	111	54	41	42	24	29	61
Tonnage (GRT)							
Mean	7.4	5.5	9.7	15.1	21.3	16.4	11.1
SD	8.6	3.7	5.8	8.4	6.4	3.1	8.0
CV (%)	115.8	66.6	60.2	55.5	30.1	19.1	71.4

**** Year of construction***

The mean construction year of the coastal artisan fleet is 1983, meaning it has an average age of 19 (taking as a reference the year 2002). The POTT typology has the vessels of most recent construction with a mean age of 16. The PSEIN typology is at the other extreme whose vessels have a mean age of 23. Below the global mean are the LGILL and STUN typologies with a mean age of 17, and over the same are the LONGL and SGILL typologies aged 20 and 21 respectively.

Table 24 – Year of construction

	POTT	**LONGL**	**SGILL**	**LGILL**	**STUN**	**PSEIN**	**TOTAL**
Mean	1987	1983	1982	1985	1985	1979	1983
SD	10	11	8	10	13	16	10

**** Mobility coefficient***[9]

The mean mobility coefficient for the entire sample is 7. Said coefficient is considerably higher in those vessels of the POTT and SGILL typologies. Furthermore, there is a positive correlation between the year of the last remotorisation and the mobility coefficient. This indicates a transformation trend of existing vessels to relatively faster units as time passes. The figure of dispersion between the mobility coefficient and year of the last remotorisation (Figure 36) shows there is a positive correlation[10] between the year of the last remotorisation and the mobility coefficient.

[9] Mobility coefficient = Power/ Tonnage

[10] The correlation coefficient between the mobility coefficient and the year of the last remotorisation is 0.4.

Table 25 – Mobility coefficient - Power / Tonnage (kW/GRT)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Mean	8.5	6.5	7.9	6.5	6.2	4.8	7.1
SD	3.5	2.6	2.9	2.2	1.3	0.5	2.6
CV (%)	41.5	40.2	36.0	33.8	20.4	9.7	37.3

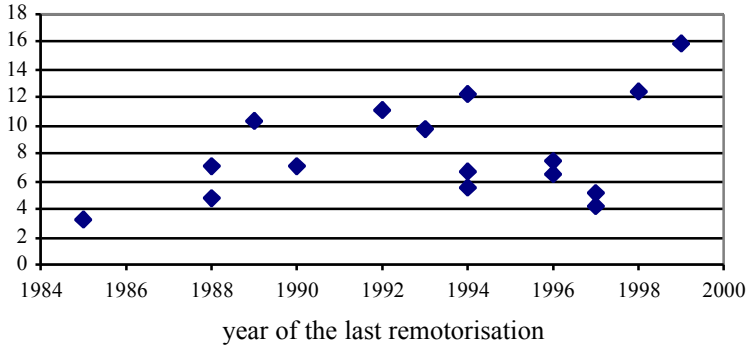


Figure 36 – Mobility coefficient dispersion and year of last remotorisation diagram

**** Hull material***

The majority of the units surveyed are wood (67%), whilst a third of all the vessels are built from materials other than wood; 30% of polyester and only 3% steel.

The LONGL and LGILL typologies have the smallest proportion of wooden units. Likewise it should be mentioned all the steel units belong to these typologies.

Table 26 – Hull material (%)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Steel	0	7	0	11	0	0	3
Polyesters	33	47	15	33	33	0	30
Wood	67	47	85	56	67	100	67

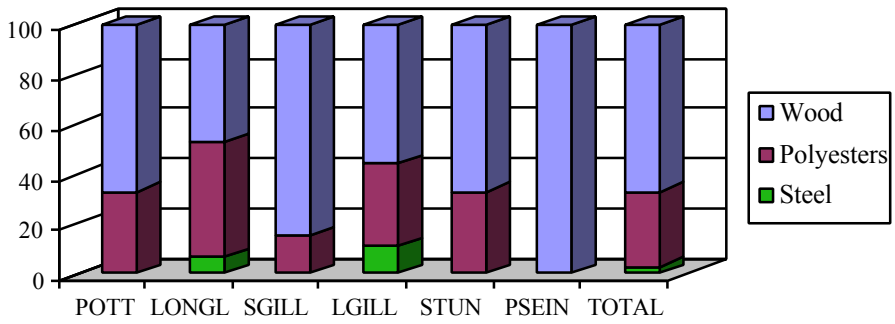


Figure 37 – Fleet distribution as per hull material (% of boats)

6.1.2.2. Acquisition form

**** New units and purchase year of the new units***

44% of the sample units are new acquisition, indicating the most widely extended access procedure is the acquisition of second-hand units. The STUN typology stands out for its high percentage of first-hand units at 83%, followed by POTT with 67%, both way above the mean. Below SGILL stands out at 32% of newly acquired units.

On average the purchase of new units was 13 years ago. LGILL typology has a considerably lower mean age (9) and SGILL typology with an age slightly higher than the mean.

Table 27 – New and second-hand vessel purchase (%)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
New	67	43	32	43	83	0	44
Second hand	33	57	68	57	17	100	56

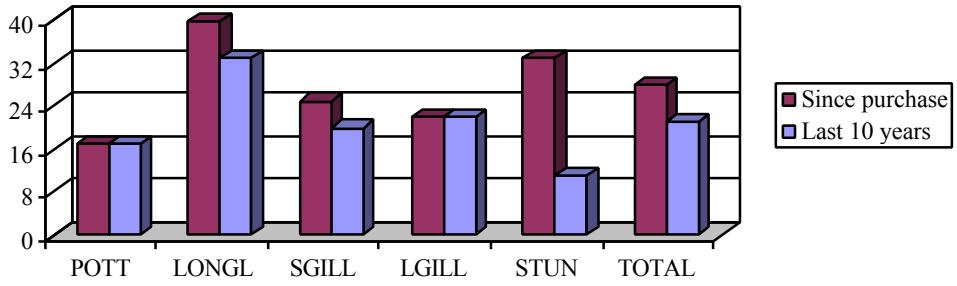


Figure 38 – New and second-hand vessels (%)

**** Year of purchase and age of purchased second-hand units***

56% of the units in the sample are used units bought 9 years ago, with a mean of 12 taking the current year as reference.

The LGILL typology vessels stand out with 1998 as average purchase year, the second-hand purchase was on average 4 years ago taking the present year as reference[11]. The POTT typology also stands out with a re-purchase of 6.5 year mean. The oldest vessels at the time of purchase belong to the SGILL typology with a mean of 14. All the other typology vessels are younger than the entire sample mean.

A very important part of the effort in fleet recomposition after entry in the European Union (EU) has been supported in these second-hand units. The EU, in its endeavour to reduce fleet capacity, is following a limitation strategy on new unit construction. Furthermore, this question must be related to the limited profitability of the fishing sector in relation to other sectors, likewise the lack of generational takeovers enabling investments with longer term horizons within the family unit.

Figure 39 shows between 1970 and 1982 the number of new vessels doubled those purchased second-hand, and likewise the period 1983-1986. However after entry in the EU and adoption of the Common Fisheries Policy (CFP), during the validity of the community MAGP-II (1987-1991) the purchase of new and second-hand vessels was nearly the same. During 1992-1996, under MAGP-III, the purchase of second-hand vessels soared whilst new ones were half. The two to one relation appeared again in MAGP-IV (1997-99), which exceeds the analysis period as it extends into the period 1997-2001.

[11] In this section we are taking the present year (2002) as reference.

This process is linked to the fishing effort adjustment and fishing capacity adaptation programmes to fish stock realities. This strategy has been encouraged by a scrapping policy with incentives and definitive paralyzation of part of the fleet.

Likewise, strict regulation of new constructions has been established to avoid fleet renovation and modernisation plans from generating capacity increases. In the fleet renovation, the new constructions are linked to existing units and the construction of new vessels is only possible on presentation of scrapping of old units. Thus the fleet's existing vessels have become a basic vector for the possibility of constructing new units. Furthermore the second-hand vessel market has been revitalised. Likewise the strict fleet capacity limitation appears to have boosted the replacement of the limited input by vessels with more powerful engines[12].

Furthermore, consequence of the criterion established in section 1.1a) of Annex IV of the Regulation 3669/93 and Royal Decree 798/1995, vessels less than 15 years old are entitled to higher scrapping premium than those over 15. The vessel residual value criterion prevails in these laws over the withdrawal of older more obsolete vessels. This criterion means the older the vessel the lower the premiums although maintenance of these old units is essential for the construction of new ones.

Table 28 – Year of new vessel purchase

	POTT	**LONGL**	**SGILL**	**LGILL**	**STUN**	**PSEIN**	**TOTAL**
Mean	1987	1989	1987	1993	1988	-	1988
SD	13	7	6	4	14	-	9

Table 29 – Year of second-hand vessel purchase and age

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Year of purchase							
Mean	1995	1991	1994	1998	1982	1988	1993
SD	5	6	5	1	-	11	5
Age at purchase (years)							
Mean	9	10	14	10	10	9	12
SD	3	6	8	2	-	5	6
CV (%)	37.2	59.4	53.9	21.6	-	52.1	53.7
Age in year of survey –1999 (years)							
Mean	13	17	19	11	27	20	18
SD	1	9	9	2	-	16	8
CV (%)	10.9	49.4	44.0	20.7	-	77.8	47.0

[12] The debate on the possibilities of replacing inputs in several regulated fisheries can be found in Squires (1987(a), (b)), Dupont (1991), del Valle *et al.* (1997), del Valle *et al.* (2000).

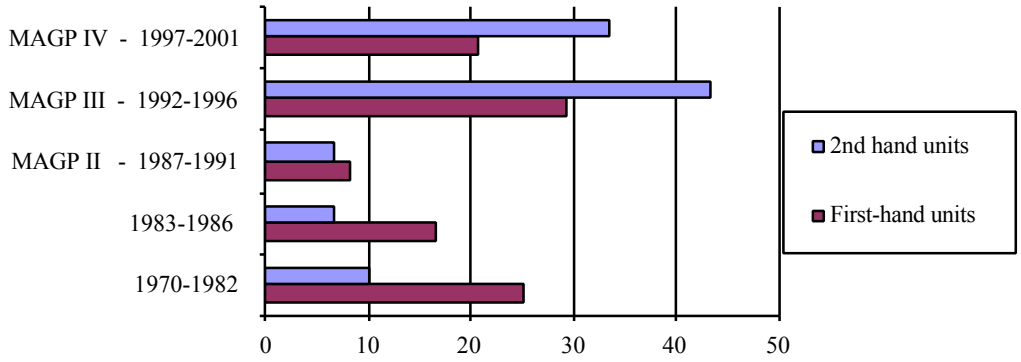


Figure 39 - Evolution of purchase of new vessels and second-hand (%)

**** Financing method of first- and second-hand vessels***

On average, 48% of all the sample vessels resort to external financing (i.e. between self-financing and subsidies the remaining 52% cover the financing).

On the one hand, POTT typology stands out for resorting to credit far less than the sector average (32%) and as such has a high self-financing capacity. On the other hand, LGILL typology has a strong dependence on external credit tan amounting to 58%.

Likewise, considerable differences can be observed in subsidies among the different typologies. The subsidy mean amounts to 18% distributed: 32% of STUN, and 9% of SGILL or 9% of LONGL. The other typologies are around the average for the entire sample.

Table 30 – Finance method of new or second-hand vessel (%)

	POTT	**LONGL**	**SGILL**	**LGILL**	**STUN**	**PSEIN**	**TOTAL**
Loan	32	50	47	57	40	35	48
Self-financing	48	41	44	26	28	48	34
Subsidy	20	9	9	17	32	17	18

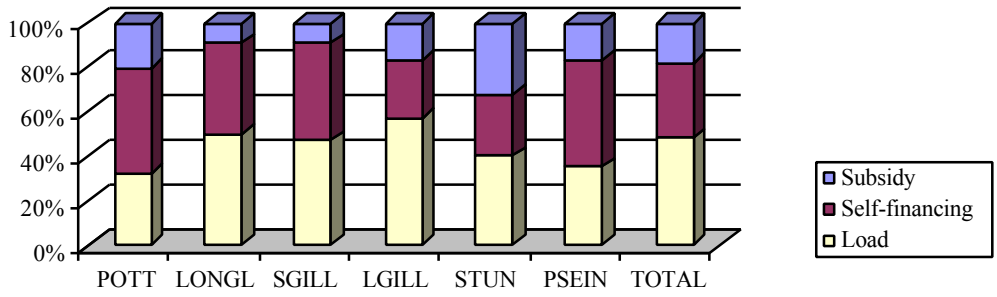


Figure 40 – Vessel finance method

6.1.2.3. Engine and deck equipment

6.1.2.3.1.The engine

**** Remotorization***

Remotorization after purchase has occurred in 28% of the vessels. This figure soars to 40% for the LONGL typology but non-exist for PSEIN. In POTT typology, it is 17% much less than the mean. Standing out to a lesser extent is the STUN at 33%. The other typologies are in 5% range or below the

mean. Unfortunately we have no data to explain the financing methods used for this nor the expenses this causes.

Table 31 – Remotorised vessels (%)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Since purchase	17	40	25	22	33	0	28
In last 10 years	17	33	20	22	11	0	21

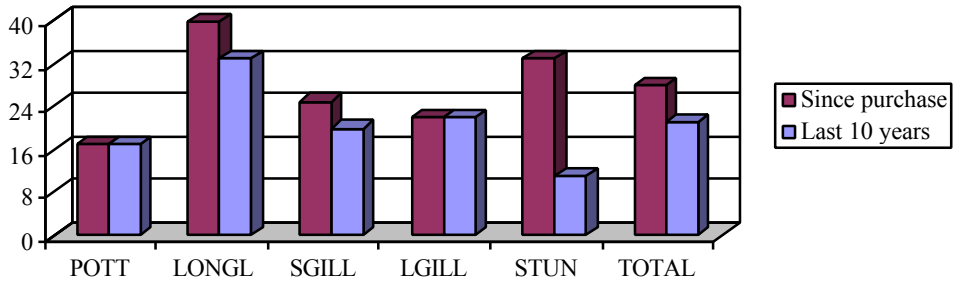


Figure 41 – Remotorised vessels (%)

**** Average engine life***

Average engine life is 6 years but again there are strong differences among typologies. Whilst in the POTT, LONGL, SGILL and STUN the mean values are very close to the mean values for the entire sample, in the LGILL mean engine life is 3 years with PSEIN at the other extreme with 10 years.

Table 32 – Mean engine life (years)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Mean	6	6	6	3	6	10	6
SD	5	3	5	3	6	11	5
CV (%)	96.1	55.1	85.3	119.3	107.6	101.0	85.7

**** Remotorizations in the last 10 years***

In the last decade an average of 21% vessels were remotorized. In line with the observations made in the "remotorization" section, in the LONGL this amounts to 33% with no remotorization in the PSEIN. In keeping with the observations in the "remotorization" section the STUN typology ought to have a relatively high number of remotorizations, yet its percentage at 11% is way below the mean. In any event, bearing in mind 83% of the fleet is relatively new, with 1988 as the mean construction year and in view of the years passed, we can assume the fleet will require investment in new engines in the short term.

6.1.2.3.2. Deck equipment

**** Electronic equipment per typology***

In STUN typology all the vessels are equiped with detection and navigation equipment, also hauling equipment among others. Computer equipment also has a bigger presence here than in other typologies. However, it is below the mean in terms of transmission equipment.

In LGILL 89% vessels/skippers answer this question and again they all have detection, navigation and hydraulic (hauling equipment) equipment. 67% have transmission equipment and 11% computer.

In SGILL 90% of the skippers answer the question and they all have some kind of hydraulic apparatus to haul in the nets, but only 85% have detection, navigation and transmission equipment. It is worth mentioning the high percentage of vessels with transmission but not computer equipment on board.

All the potters (POTT) answered the question but only 83% have detection and hauling equipment or hydraulic apparatus to all in the pot fleets. Navigation and transmission equipment are present in 67% of the vessels, and computer in 17%.

Longliners (LONGL) answered the question least (73%), although all said they had detection and hydraulic equipment. Computer systems are not installed in any vessel.

On analysing distribution of equipment throughout the typologies, worthy of mention is SGILL as this typology has the most vessels and equipment except for computer systems whose presence is non-existent.

However, the STUN has the largest proportion of computer equipment.

Table 33 – Distribution of each electronic equipment as per typologies (%)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Detection	10	21	33	16	18	2	100
Computer	25	_	_	25	50	-	100
Navigation	8	19	35	17	19	2	100
Transmission	10	23	37	14	14	2	100
Others	10	21	35	15	17	2	100

Table 34 – Vessels with electronic equipment within each typology (%)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
% of vessels affected	100	73	90	89	100	50	87
-Detection	83	73	85	89	100	50	84
-Computer	17	-	-	11	22	-	7
-Navigation	67	67	85	89	100	50	80
-Transmission	67	67	85	67	67	50	85
-Others	83	73	90	89	100	50	70

**** Average Price and installation year of electronic equipment***

The mean installation year of computer equipment is 1998, so it is now 4 years old and the average price payed for skippers for this kind of equipment is 1.7 k€.

6.1.3. Assessment of vessel capital

**** Insured vessels***

82% of the sample vessels are insured. In the POTT and LONGL typologies a third of the vessels are uninsured. 80% of the SGILL units are insured, whereas all the LGILL, STUN and PSEIN units are insured. The more expensive units are the higher the rate of vessels insured.

Table 35 – Insured and uninsured vessels (%)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Insured	67	67	80	100	100	100	82
Uninsured	33	33	20	0	0	0	18

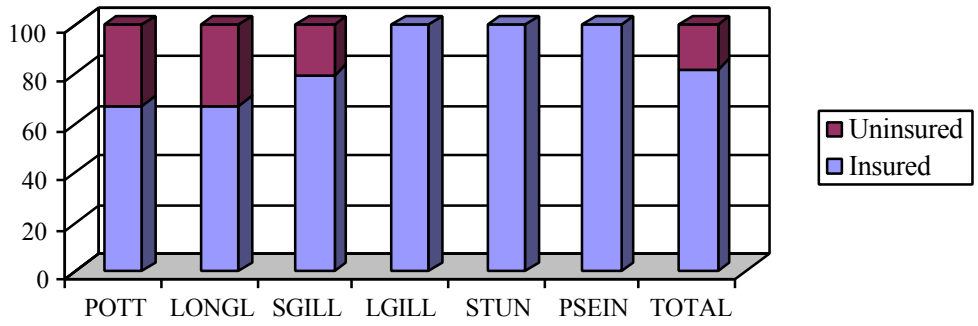


Figure 42 – Insured and uninsured vessels (%)

**** Insured vessel value; estimated value and difference between both***

On a widespread scale the insured value of the vessel is systematically less than the estimated real value. On average the difference between the two is 34 k€, and considerably less than the mean in LONGL and SGILL typologies at 15.1 k€ and 18.9 k€, yet the differential is considerably higher for STUN at 78.9 k€ and also in PSEIN at 45.5 k€. The more expensive the vessels the higher the percentage of insured vessels, yet simultaneously diminishing the cover percentage in relation to the vessel's estimated value done by the skipper himself. It has to be mentioned the method used in contracting the insurance, the contractor proposes the amount he wishes to insured, and an inspector in co-ordination with a Board values the vessel. The inspector's evaluation normally coincides with a figure close to that proposed by the shipowner. In view of the results, the shipowner's proposal is made with the aim of reducing costs. Therefore, the typologies most in debt are those with a higher deficit between the insured value and that estimated by the skippers.

Table 36 – Insured value, estimated value and difference between both (k€)

	POTT	**LONGL**	**SGILL**	**LGILL**	**STUN**	**PSEIN**	**TOTAL**
Insured value							
Mean	66.1	39.4	57.5	103.2	114.1	-	73.2
SD	55.9	28.5	28.2	47.4	107.4	-	60.3
CV (%)	84.6	72.5	49.0	46.0	94.1	-	82.4
Estimated value							
Mean	78.1	50.8	69.1	145.1	216.6	-	95.1
SD	82.1	38.9	39.6	105.8	118.2	-	84.4
CV (%)	105.1	76.7	57.3	72.9	54.6	-	88.7
Difference between estimated and insured value							
Mean	39.8	15.1	18.9	45.5	78.9	-	34.0
SD	34.8	17.3	30.1	70.9	49.0	-	44.0
CV (%)	87.4	114.1	158.9	155.9	62.2	-	129.4

**** Insured value and estimated value of electronic equipment***

In general terms, there is a positive balance of the electronic equipment insured value in relation to the estimated real value of the same. The difference between estimated and insured value is on average 3.6 k€. The electronic equipment installations took place on average from 1993-94. Considering the enormous obsolescence rate of these instruments it is very likely the insurance contracts include this aspect and are higher than the estimated real value of these embarked electronic instruments. In the event of loss through accident or any other contingency arising from their use, leads to the overvaluation of the insurance as means to replace with up-to-date material.

Table 37 – Insured and estimated value of electronic equipment (k€)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Insured value							
Mean	13.6	8.3	10.3	28.6	21.5	-	15.7
SD	6.6	4.3	9.0	14.0	7.9	-	11.0
CV (%)	48.6	51.8	87.1	49.0	36.5	-	70.4
Estimated value							
Mean	8.6	5.4	9.8	9.9	26.8	-	12.0
SD	8.4	4.0	8.0	2.8	12.1	-	10.3
CV (%)	97.2	72.6	81.9	28.1	45.1	-	85.0

**** Estimated value of fishing gears***

The mean value of the entire fleet in relation to fishing gears is 9.8 k€ however there are typologies clearly over this figure, i.e. the STUN at 16.5 k€ and LGILL at 11.9 k€. The SGILL is slightly below but very close with the mean at 9.6 k€. Below the mean are LONGL at 6.8 k€ and POTT at 8.1k€.

Table 38 – Estimated value of fishing gears (k€)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Mean	8.1	6.8	9.6	11.9	16.5	-	9.8
SD	9.0	8.2	8.4	6.8	7.6	-	8.1
CV (%)	112,0	121,2	87,0	57,0	45,8	-	82,6

6.1.4. Production factor productivity

6.1.4.1. Labour factor productivity [13]

The mean gross income per embarked worker, amounts to 19.9 k€ for the entire fleet. Again the POTT, LONGL, and SGILL typologies are below the said mean, however POTT and SGILL are quite close to the same. The LONGL has considerably lower labour productivity. On the other hand, LGILL, STUN and PSEIN typologies are above the global mean, with STUN having the highest productivity per embarked worker at 29.5 K€ on average.

When comparing the coastal artisan fleet labour productivity with the other sub-sectors working in the Basque Country fishing sector, it is slightly less than for purse-seine and live bait vessels, whose labour productivity amounts to 24 k€[14]. As with the coastal artisan fleet, the purse-seine and live bait vessels are included in the inshore fishing sector. The productivity differential between the deep sea fishing fleet and the coastal artisan fleet is considerably greater, reaching approximately 30 K€. Finally, with an income 9 times greater per crew-member than that estimated for the coastal artisan fleet, the freezer tunny fishing fleet has the highest productivity rate in the fishing sub-sectors.

Table 39 – Incomes / crewmembers embarked (k€)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Mean	18.7	12.9	17.7	28.5	29.5	-	19.9
SD	15.6	8.1	9.0	16.2	8.9	-	12.2
CV (%)	83.4	63.0	50.7	57.0	30.3	-	61.0

[13] Capital productivity = Gross Income / estimated vessel value

[14] Elaborated by the authors using data published in Anuario Estadístico del Sector Agroalimentario (1999). Servicio Central de Publicaciones del Gobierno Vasco.

6.1.4.2. Capital factor productivity[15]

The global mean of this productivity index is 0.7. The highest ratio is in the PSEIN typology, not so much due to high income as to the fact of having the oldest vessels (20 years), probably amortised already and with a lower estimated value. SGILL and LGILL typologies' ratio is lower than the mean. However the LONGL and STUN ratios are above the mean. In the case of LONGL this is due to the reduced estimated mean vessel value (50.8 k€) and in STUN its income figures.

Table 40 – Capital factor productivity (k€)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Mean	0.7	1.0	0.6	0.6	1.1	-	0.7
SD	0.4	1.1	0.4	0.3	0.7	-	0.5
CV (%)	62.1	112.2	60.3	45.6	63.9	-	70.6

6.2. COST OF THE FACTORS

6.2.1. Personnel expenses

Seamen come under a special Social Security Regime[16] based on the peculiarities of the working conditions of the maritime-fishing activity in relation to other production sectors; and also in line with the specific catch share payments occurring in the fishing sector.

The remuneration system used in all the surveyed vessels is that of the *catch share payment,* therefore the salaries have a marked correlation with the income obtained from the extractive activity[17].

Under the general Social Security regime in force for the majority of the sectors, the contribution for industrial accidents and professional illnesses is paid by the entrepreneurs. However, under the Special Fishing Regime the criterion is different due to the catch share payment: under this system gross income comes from fish sales, from which common expenses are deducted (supplies, bait, ice, packaging, etc.) and that remaining is divided in two parts; one part to the vessel owner and the other to the crew. This distribution varies from port to port, even from one modality to another; it is usually in the range of 50% each. Social security contributions specifically at the cost of the workers are deducted from the part destined to the crew, and that leftover is divided among the number of "parts" to which it is to be distributed. Hence, it is obtained the crewmembers net salary and the retribution denomination "à la part" (catch share payment).

The special seamen's regime contribution bases follow a specific procedure. In principle, the contribution base comprises the remunerations effectively received by the worker. For groups II and III, the Labour Ministry establishes the contribution bases annually after contrasting the sector situation with the representative trade unions and entrepreneurial organisations, the Guilds and Producer Organisations. This contribution base is established by province, fishing modality and professional category depending on the mean remuneration values perceived the previous year.

The different sections of contribution are synthesised in common contingencies, work contingencies, professional illnesses, unemployment contingency, salary guarantee fund and professional training.

The common contingencies of the special seamen's regime contribute as follows: 23.6% for the entrepreneur and 4.7% for the worker (concept total: 28.3%). The Salary Guarantee Fund contribution exclusively affects entrepreneurs and is 0.4%, and workers are exempt from this. The professional training contribution is 0.6% for the owners (shipowners) and 0.1% for the crewmembers (concept total: 0.7%). For unemployment, the company contributes 6% and the worker 1.55%

[15] Capital productivity = Gross Income / estimated vessel value

[16] Special Seamen's Regime (REM).

[17] The share payment system and the close relationship between income and salaries were analysed in the Informe Gaur (1970), IKEI (1983) and in del Valle *et al.* (1998).

(concept total: 7.55%). In synthesis, globally the entrepreneurial contribution is 30.6% and that of the workers 6.35%, altogether contributing 36.95%.

Under the special seamen's regime, three contribution groups[18] are regulated particularly affecting different areas of the fishing activity. In the section corresponding to artisan fishing, the crewmembers of this fleet come within two groups, specifically and individually affecting the contribution bases:

a) That which the law calls group II-B, for crew and shipowners fishing in units between 10 GRT and 50 GRT (basically LGILL, STUN, and PSEIN typologies).
b) Group III for crew and shipowners of vessels up to 10 GRT (basically POTT, LONGL and SGILL typologies).

To the contribution base for common contingencies the correction coefficient is applied to group II-B of 1/2 (only contributes 15 days) and in group III of 1/3 (only contributes 10 days). The same correction coefficients are applied to the unemployment contribution base.

The part of the contribution called "common contingencies" corresponding to the workers is deducted by the entrepreneurs from the "monte menor". In the case of self-employed fishermen – common in the artisan sector for units with a single crew-member-owner – this is exclusively at the cost of those affected who are obliged to satisfy the payment.

Regarding the particular case of self-employed skippers or crew-member-owners fishing singlehanded, these are differentiated from other shipowners and the regulation states they contribute exclusively for common contingencies, professional contingencies and professional training receiving special treatment.

Social security contributions corresponding to personnel are shown in the table and a growing scale can be seen in the same direction as the gross income stated for each typology.

**** Gross salary per crewmember***

The survey offers double salary estimation method: (a) direct (from the skipper's response to the question of salary costs) and (b) indirect (on discounting gross income from common expenditure, between 45% and 50% is for crew remuneration). Both indicators are included in Table 41.

When comparing both indicators, we see the direct survey response is systematically lower than that obtained for the same variable, via the indirect method. This bias is typical in most surveys carried out in the fishing sectors where income is distributed in "catch share payment". This is because skippers are sometimes reticent about declaring their real income. Our perspective is to use the information obtained from both methods to propose a lower mean gross salary limit per crewmember, because in any event a negative bias is likely between declared and estimated retributions.

Regarding the indicator obtained from the skippers' declarations, the sample mean of gross salary is 7.2 k€/crewmember and for the survey year. The POTT and LONGL typologies are below the sample mean. SGILL, LGILL and STUN are above the mean. The highest is STUN with 8.5 k€/crew member and the lowest LONGL at 6.4 k€. Evidently this band can be considered the lowest since it is not so different from the General Minimum Interprofessional Salary (GMIS) which was 5.8 k€ for 1999. (RD 2817/98).

Using the indirect procedure 11.7k€ is the mean gross salary for the artisan sector, and only LONGL is clearly below this. The highest mean gross salary is 14.9 k€ for the LGILL typology. To calculate the net remuneration per crewmember we have yet to deduct the social security contributions. These remunerations may be considered as the closest to those of other sectors. Although in relative terms it is not a very high income. Figure 43 shows a panoramic explanation of the two.

[18] Group I for workers and shipowners of vessels exceeding 150 GTR (No correction coefficient is applied to this Group)
Group II is comprised of workers and shipowners of two subgroups:
(A) Fishing in vessels between 50 GTR and 150 GTR (the correction coefficient is 2/3 –only contributes 20 days-)
(B) Above mentioned Group III

This gross salary level together with a greater randomness due to its catch relation and harder working conditions than other professions, explain the younger generations' preference for other professional activities.

On comparing the gross income/crewmember for the coastal artisan fleet with the other sub sectors operating in the Basque Country fishing sector, the salaries/crewmember of the purse-seine and live bait vessels (8.8 k€) are within the estimated salary band for the artisan fleet[19]. Furthermore, the salary difference between the coastal artisan fleet and that of deep-sea (23.3 k€) and the freezer tunny fishing fleet (31.7 k€) is also noteworthy.

Table 41 – Salary per crewmember (k€)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Direct estimation from survey							
Mean	6.6	6.4	7.2	7.7	8.5	-	7.1
SD	2.5	3.0	3.1	3.5	2.9	-	3.0
CV (%)	37.5	46.6	43.7	45.4	34.7	-	41.7
Estimated salaries deducting common expenses from income							
Mean	-	7.1	11.3	14.9	13.2	-	11.7
SD	-	2.8	7.9	7.3	4.3	-	4.9
CV (%)	-	39.9	69.4	49.3	32.7	-	41.0

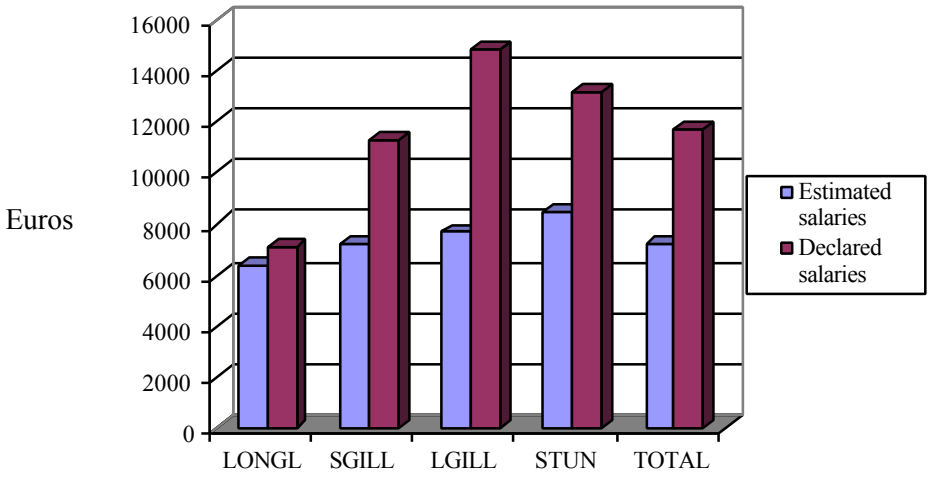


Figure 43 – Gross declared salaries vs estimated gross salaries

**** Social Security Contributions and Social Security Contributions/Income***

More relevant than the social security contributions themselves are those associated to the variables of income, crew number or gross salaries. In this sense and in relation to the social security contributions referenced to income, we obtain a global mean of 0.21. The SGILL typology mean is similar to the global, whereas those of LGILL (0.24), POTT (0.26) and LONGL (0.27) are above the same, yet the STUN is considerably lower with a ratio of 0.04. However, the typologies with the highest ratio of social security contributions in relation to income have social security contributions/crewmember below the mean, i.e. POTT 1.5 k€/crewmember and LONGL idem (1.5).

[19] Elaborated by the authors using data published in Anuario Estadístico del Sector Agroalimentario (1999). Servicio Central de Publicaciones del Gobierno Vasco.

Table 42 – Social Security Contributions ((k€)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Mean	3.1	2.8	4.3	5.9	6.6	-	4.8
SD	2.9	1.6	2.2	2.3	4.1	-	4.0
CV (%)	94.1	55.0	53.0	39.8	61.6	-	82.7

Table 43 – Social Security Contributions / Income

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Mean	0.26	0.27	0.21	0.24	0.04	-	0.21
SD	0.40	0.46	0.27	0.51	0.02	-	0.36
CV (%)	151.5	171.2	128.8	214.7	39.0	-	168.6

**** Social Security Contributions per crewmember***

The mean social security contributions per crew-member are 1.7 k€. These increase through the typologies in relation to their highest GRT. Yet surprisingly the STUN typology with the highest mean tonnage (21.3 GRT) has the lowest social security contributions per crewmember (1.3 k€).

Comparing the social security contributions per artisan fleet crewmember with the other sub sectors operating in the Basque Country fishing sector, there continues to be a similar differential to that of income and salaries per crewmember. Contributions per crewmember are slightly higher for the purse-seine and live bait fleet (2.2 k€). Obviously the differences are greater in relation to the deep-sea fishing fleet (5.5 k€) and that of the freezer tunny fishers (13.6 k€)[20].

Table 44 – Social Security Contributions per crewmember (k€)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Mean	1.5	1.5	1.9	1.9	1.3	-	1.7
SD	0.6	0.4	0.6	0.8	0.5	-	0.6
CV (%)	38.8	28.7	31.4	41.2	34.8	-	36.6

**** Social Security Contributions over Salaries***

The social security contributions included in the survey follow true to the line of the previous section results. An upward trend has been noted throughout the typologies and a behaviour peculiar to the STUN (0.19), which is considerably lower than the sample global mean (0.3).

Table 45 – Social Security Contributions / Salaries (included in the survey)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Mean	0.25	0.28	0.32	0.37	0.19	-	0.30
SD	0.13	0.13	0.19	0.22	0.13	-	0.13
CV (%)	53.0	46.3	58.6	59.4	65.6	-	57.7

6.2.2. Intermediate consumptions

The mean intermediate consumptions are 13.1 k€. Above this mean are the LGILL and STUN typologies at 20.2 K€ and 20.9 K€, whereas the other typologies are below the mean. LONGL is at the lowest end at 5.7 k€, followed by POTT at 6.4 k€ and SGILL close to the mean at 11.7 k€.

Fuel absorbs a very important proportion of intermediate consumptions, 27% of expenditure. Followed close behind are the fishing gears at 25%. The second important intermediate consumption

[20] Elaborated by the authors using data published in Anuario Estadístico del Sector Agroalimentario (1999). Servicio Central de Publicaciones del Gobierno Vasco.

expenditure block is that of repairs at 13% and insurance premium payments 13%, followed by supplies at 11%. The third important block between 3% and 4% is distributed between lubricants, bait and ice.

Consumption differences per typology are logical in relation to the specialities practised by each. Relative bait weight is large in those typologies using it, i.e. potters (21%) and longliners (22%). Yet in the others this is testimonial or non-existent. Food consumption weight is relatively small for those typologies with short trips to fishing grounds, i.e. SGILL and POTT 5% respectively (e.g. in LONGL these costs are non-existent). However those modalities which fish migratory species or in fishing grounds far from port, making long fishing trips obviously have the biggest weight for this concept, 11% in LGILL and 22% in STUN. Likewise repairs are more important in those typologies using nets than in the others. So LONGL and STUN are between 7% and 8%. In POTT repairs have no intermediate expense presence.

Figure 44 shows directly and intuitively the relative importance of each of the intermediate consumptions and total proportions of the same.

Table 46 – Intermediate consumptions (%)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Lubricants	3	3	2	3	4	-	3
Bait	21	22	0	0	3	-	4
Ice	1	1	2	4	5	-	4
Provisions	5	0	5	11	22	-	11
Fishing gears	52	25	35	22	17	-	25
Boat repairs	0	7	21	15	8	-	13
Fuel	10	26	26	31	25	-	27
Insurance	8	16	9	14	15	-	13
SUM	100	100	100	100	100	-	100

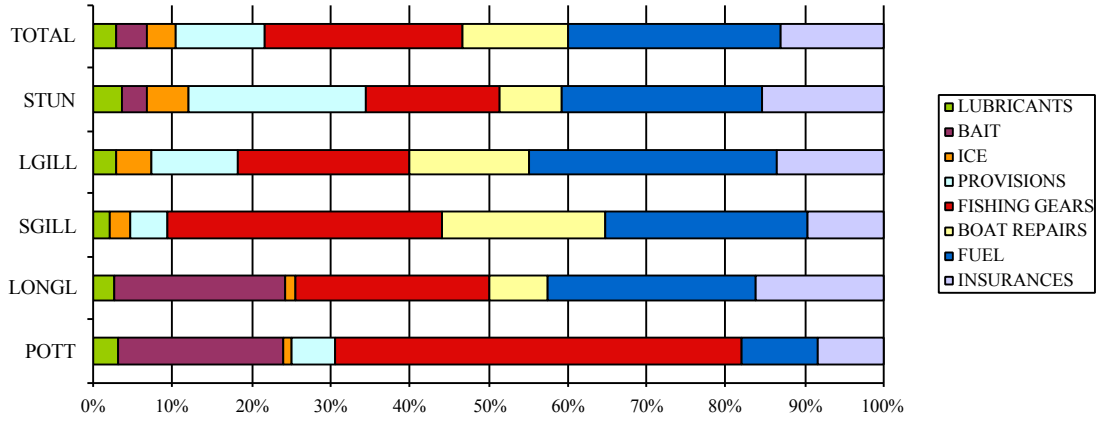


Figure 44 – Intermediate consumptions (%)

Table 47 – Total intermediate consumptions (k€)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Mean	6.4	5.7	11.7	20.2	20.9	-	13.1
SD	6.7	4.4	5.8	9.8	5.5	-	8.7
CV (%)	104.3	78.5	49.2	48.7	26.2	-	66.3

6.3. Economic indicators

6.3.1. Establishment of income

**** Income***

The average income for the entire fleet is 65.3 k€. Per typology, LGILL (102.6 k€) and STUN (144.2 k€) are above this mean and below the first three is LONGL with 28.5 k€ at the lowest end. In any event the result was predictable, insofar as they are the ones with the largest crew per vessel, highest power, highest fishing autonomy etc.

Table 48 – Income (k€)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Mean	50.1	28.5	42.5	102.6	144.2	-	65.3
SD	72.0	24.1	35.0	79.9	42.2	-	62.0
CV (%)	143.8	84.6	82.3	77.9	29.3	-	94.9

**** Income per gear***

The relation between income and gears used in their catch is clearly in favour of the line modalities whose use provides 60% of the income. The remaining 40% is subdivided between gillnets (14%), purse-seine (10%), pots (9%) and surface trawling (1%).

Table 49 – Income per gear (%)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Gillnet	0	14	49	17	0	0	14
Longline	5	48	0	0	1	0	6
Línes	3	9	49	82	98	14	60
Pots	85	25	2	1	0	0	9
Purse-seine	0	0	0	0	00	86	10
Others	7	4	0	0	1	0	1

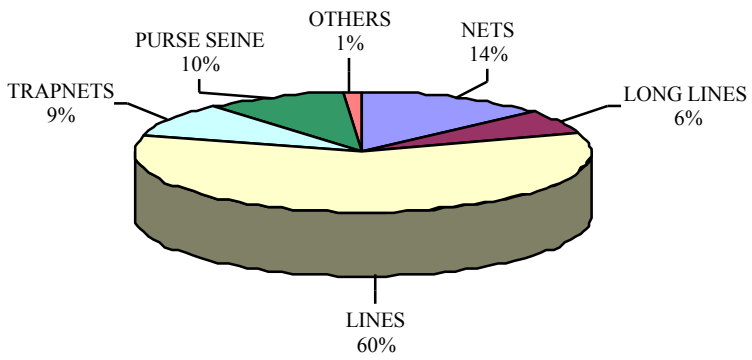


Figure 45 – Income distribution per gear for the total sample

In the POTT (Potters) typology, trapnets dominates in the catching of cephalopods and crustaceans, with 85% of their income. The other gears and species are more a complement to their income, i.e. the collection of algae with dredger provides 7% of their income, the capture of teleost fish (demersals, etc.) with longline 5% and finally the capture of small and medium-sized pelagic fish with handlines provides the rest of their income (3%).

Logically the LONGL (Longliners) typology obtains income from using longlines (48%). Its basic income (61%) comes from the sale of teleost fish – covering different species commonly called "white fish" – caught with longline and to a lesser extent with gillnet. 26% of the income comes from the sale of cephalopods and crustaceans caught essentially with pots, and almost 7% with capture of tuna fish with lines (trolling). The small and medium-sized fish – mackerel and horse mackerel – caught with handlines, and to a lesser extent with gillnet, provide 6% of their income. The elver caught with surface trawl provides 4% of their income.

In the SGILL (Small gillnetters) typology, the gillnet weight, equal to the lines, is very important (49%) in the income. 48% of their income comes from the capture of teleost fish – main white fish species – and "different fish" – covering the less economically important teleost fish, caught with gillnet. On the other hand, 26% of their income comes from the capture of tuna fish with trolling lines and 23% of other pelagic fish (mainly mackerel and horse mackerel) with handlines. Only a small part of their income (3%) comes from the capture of cephalopods, molluscs and crustaceans with pots and marginally with gillnet.

The LGILL (Large gillnetters) typology, despite its name obtains the majority of its income (82%) from lines and only 17% from gillnet[21]. Thus 54% of the income comes from the sale of tuna fish caught with trolling lines and 27% of the pelagic fish such as horse mackerel and mackerel with handlines. 17% is obtained from the main teleost and "diverse" fish caught with gillnet and nearly 2% from the sale of cephalopods and crustaceans caught basically with pots and marginally with gillnet.

In the STUN (Small tunny fishing boats) typology, the domination of lines (98%) and pelagic fishes (91%) in their income is overwhelming. 58% of the typology income is from the capture of tuna fish with trolling lines and 33% fishing medium-sized pelagic fish (mainly mackerel and horse mackerel) with handlines. Nearly 7% of their income is from the sale of teleost fish – white fish – caught with pole and line (typical of the Hondarribia port fleet) and marginally using longline. Moreover a little over 1% of its income is from bottom trawled algae.

The PSEIN (Purse-seiners) typology obtains 99% of its income from pelagic species. The small pelagic fish caught with purse-seine (mainly anchovy and sardine, as well as others under "diverse") provide 88% of their income. Medium sized pelagic fish such as mackerel and horse mackerel caught with handlines provide nearly 14%.

[21] So, the gear on which they spend the most time is not the gear they obtain the biggest incomes with.

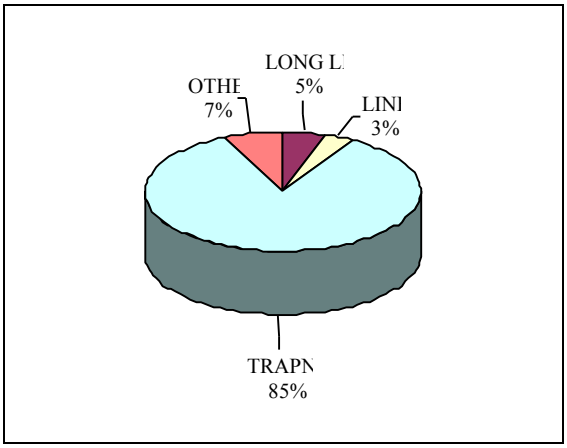


Figure 46 – Income distribution per gear POTT typology

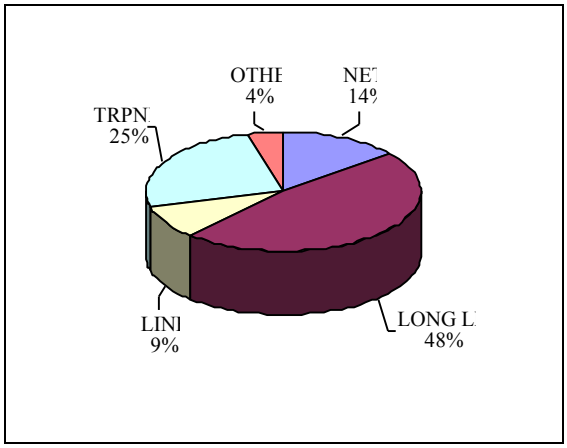


Figure 47 – Income distribution per gear LONGL typology

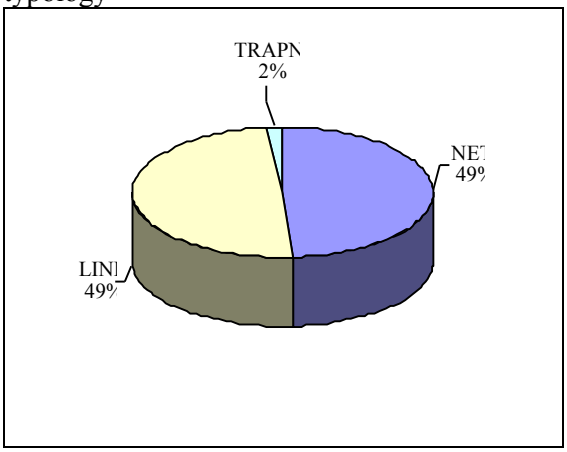


Figure 48 – Income distribution per gear for SGILL typology

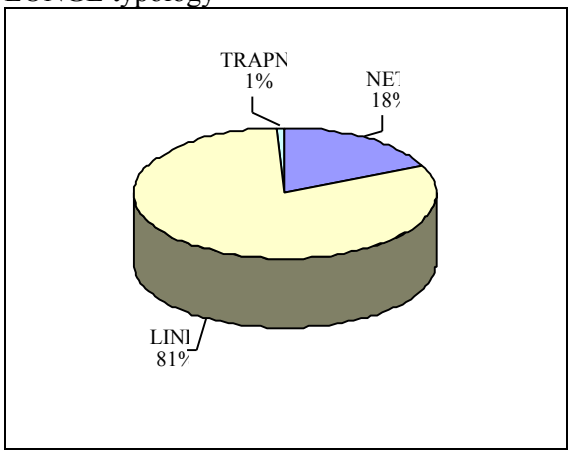


Figure 49- Income distribution per gear for LGILL typology

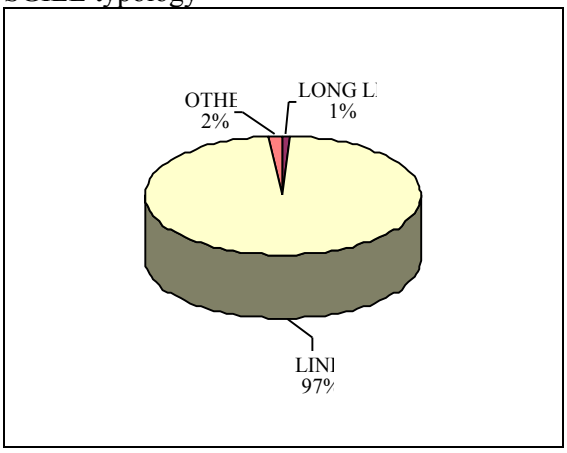


Figure 50 – Income distribution per gear for STUN typology

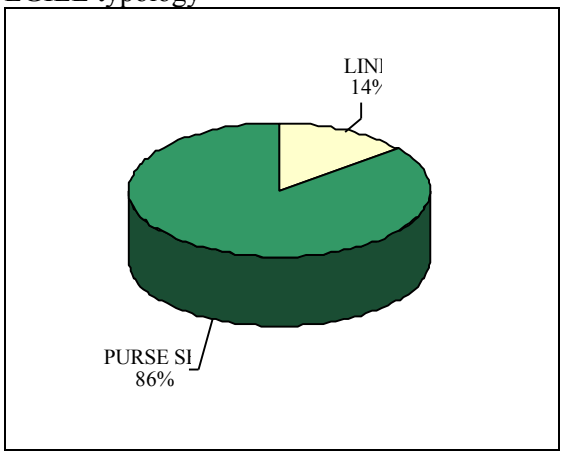


Figure 51 – Income distribution per gear for PSEIN typology

**** Income per species group***

On analysing the contribution of each species group to global mean income, we see 67% of the incomes come from pelagic species (35% tuna fish and 32% from small and medium sized pelagic fish mainly mackerel and horse mackerel). 19% comes from teleost fish (demersals, sparidae, etc.) and 10% from cephalopods and crustaceans. Algae represent a marginal portion of the income (1%) for the entire fleet. Only few vessels from Gipuzkoa collect these providing them with an appreciable supplement to their income. None of the vessels surveyed admitted catching elasmobranch fishes.

Figure 52 offers a global vision of income distribution per species group for all the typologies. Figures 53 to 58 show the income distribution per group for each of the typologies. These offer a global vision and breakdown of income weight per species group and typology.

Figure 45 offers a global vision of income distribution per gear type for the entire fleet considered. Figures 46 to 51 show income distribution per gear and typology.

It is easy to distinguish the fishing specialisations and adaptations of each typology from the two figure groups.

Table 50 – Income per species group (%)*

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
-GROUP 1 Large pelagic fish	-	7	26	54	58	-	35
-GROUP 2 Small and medium-sized pelagic fish	4	6	23	27	33	97	32
-GROUP 3 Teleost fish	5	61	39	13	7	1	19
-GROUP 4 Cephalopods, molluscs and crustaceans	84	26	3	2	1	-	10
-GROUP 5 Diverse fish	-	-	9	4	-	2	3
-GROUP 6 Algae	7	-	-	-	1	-	1

* See Annex 4 for the species included in each of the groups

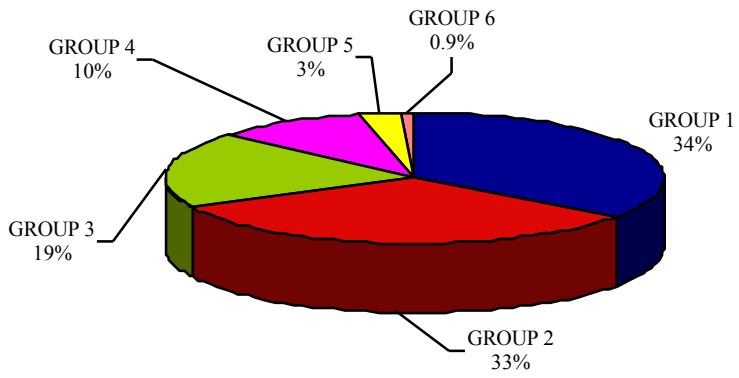


Figure 52 – Income distribution per species group for total sample

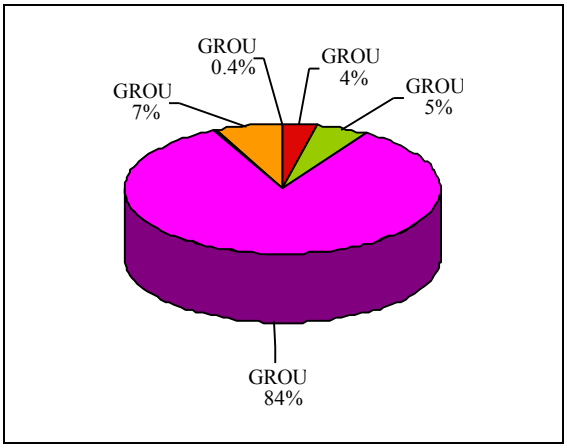


Figure 53 – Income distribution per species group for POTT typology

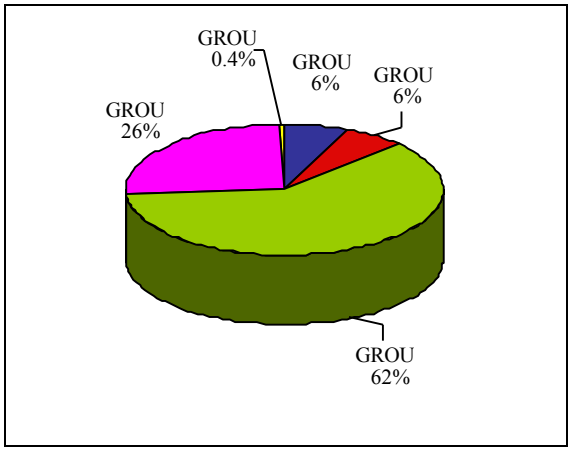


Figure 54 – Income distribution per species group for LONGL typology

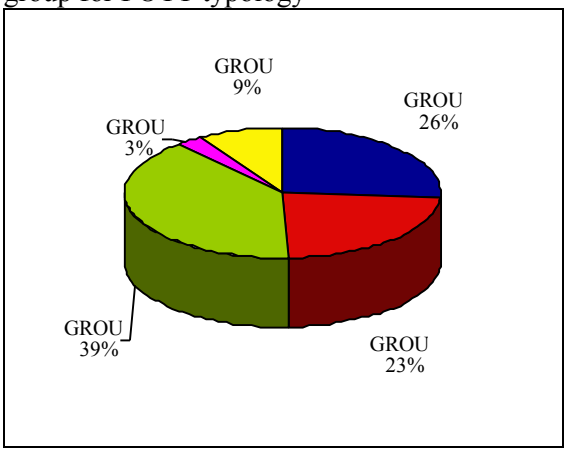


Figure 55 – Income distribution per species group for SGILL typology

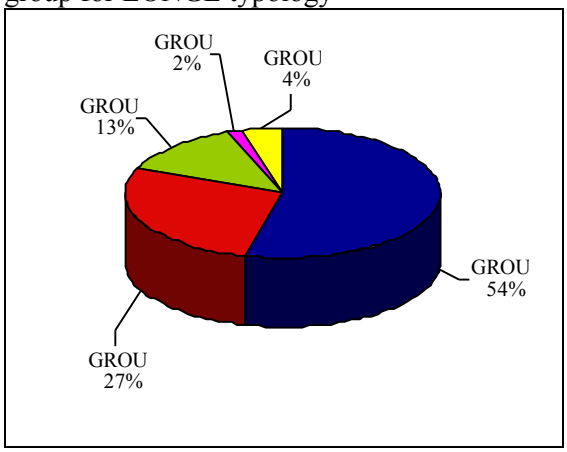


Figure 56 – Income distribution per species group for LGILL typology

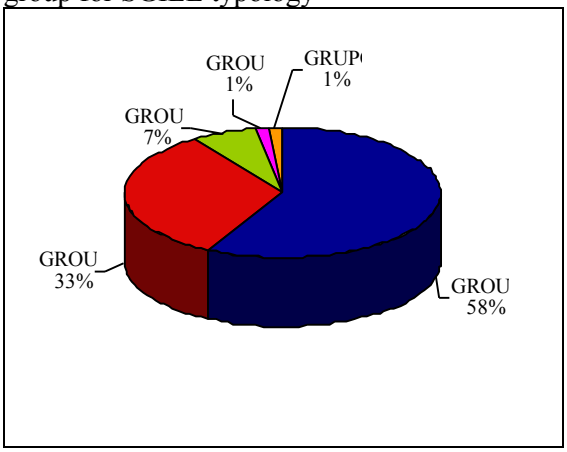


Figure 57 – Income distribution per species group STUN typology

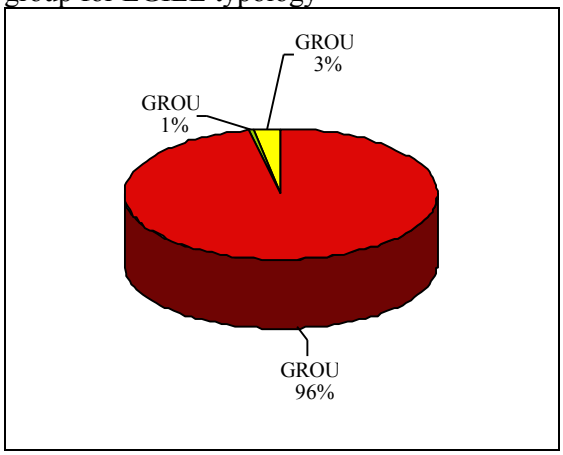


Figure 58 – Income distribution per species group for PSEIN typology

**** Income per power unit***

The mean is in this case an ambiguous indicator. The estimated mean values imply that a vessel with greater engine power does not necessarily obtain higher income. Nevertheless, it can be observed in some typologies, that the greater the power, they have simultaneously higher income on average. This can be seen on comparing SGILL and LGILL typologies, or among all the LGILL typologies or all the former. However, this logic does not work between STUN and LGILL; nor clearly between POTT and LONGL or between SGILL and POTT.

In any event despite examples in one direction and counter-examples in the opposite, it is worth expanding on the theme to make clear the enormous importance of the power on income (and catches)[22]. Whilst that indicated in the table 51 in one direction or another is true, it must not be forgotten 60% of the income is explained by the power, as demonstrated in the dispersion diagram of figure 59. Power is a decisive variable in the explanation of income turnover.

Table 51 – Income per power unit (k€)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Mean	0.80	0.81	0.71	1.11	1.11	-	0.99
SD	0.47	0.47	0.62	0.71	0.27	-	0.58
CV (%)	58.2	57.9	88.3	64.0	25.0	-	65.3

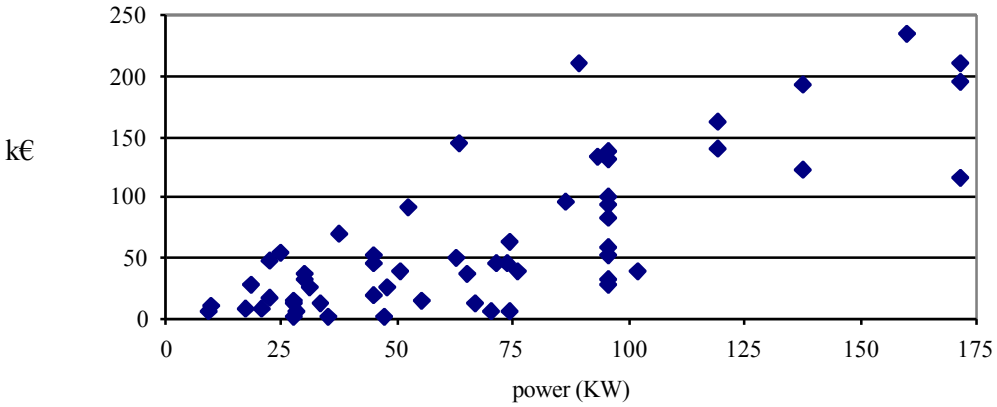


Figure 59 – Dispersion diagram between income and power

6.3.2. Economic indicators

**** Added value[23]***

As this is a variable including the value incorporated by each typology to the entire sector economy, those typologies with lesser power, smaller tonnage, etc., obviously provide a lower added value. However when referenced with other variables, the relative weights of their contributions vary. The mean added value of the entire fleet amounts to 63.2 k€, with POTT, LONGL and SGILL typologies below the same, whilst the rest are above.

Figure 60 gives a clear idea of each typology's participation in the added value of the fleet.

[22] There are several papers where from estimation of functions or production frontiers the existence of a close relation of power and catches is showed. Among others we can mention del Valle et al. (1997), Bjordal (1987), Squires (1987 (a), (b)), Squires (1992), Kirkley *et al.* (1992).

[23] Added value = Gross income – Intermediate consumptions

Table 52 – Added value (k€)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Mean	18.5	27.9	44.0	100.4	122.2	-	63.2
SD	11.3	20.2	30.9	68.8	43.9	-	54.3
CV (%)	61	73	70	69	36	-	86

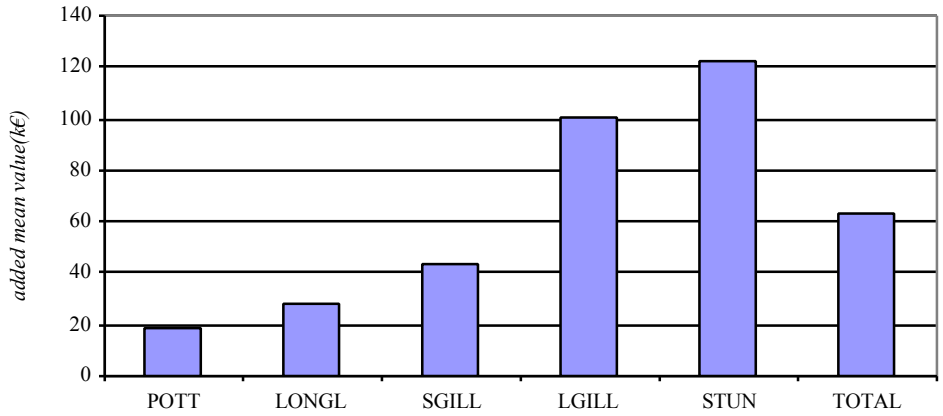


Figure 60 – Mean added value of each typology (k€)

**** Value added rate***[24]

The mean added value rate is 0.79. The SGILL typology is below this with a 0.72 ratio; POTT is virtually spot on the mean at 0.78, whilst LONGL and LGILL are above at 0.81. STUN typology has the highest ratio at 0.83.

Table 53 – Value added rate (Added value / Gross income)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Mean	0.78	0.81	0.72	0.81	0.83	-	0.79
SD	0.12	0.08	0.17	0.05	0.07	-	0.12
CV	15.2	10.1	23.1	6.1	8.1	-	14.8

**** Gross surplus exploitation rate***[25]

The mean profitability rate for the entire fleet is 0.33. LGILL and STUN are above this mean at 0.38 and 0.43 respectively. Way below the mean is LONGL with a ratio of 0.17. POTT typology has gradually been losing the necessary observations to complete this ratio; therefore the indicator calculation could not be completed.

Table 54 – Economic profitability rate

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Mean	-	0.17	0.33	0.38	0.43	-	0.33
SD	-	0.13	0.14	0.19	0.18	-	1.06
CV (%)	-	73.0	41.0	49.5	42.3	-	322.9

[24] Value added rate = Added value / Gross income
[25] Gross surplus exploitation rate = Added value – Salaries- Social security contributions – Taxes and Duties / Gross Income

Gross to be distributed[26]/crewmembers

The mean "gross to be distributed for the entire sector is 23.7 k€. LONGL at 14.7 k€ does not reach the mean whilst SGILL is virtually spot on the mean at 22.7 k€. STUN typologies at 28.1 k€ are above the mean whilst LGILL has the highest level at 31.3 k€. POTT typology has also been losing the observations necessary to calculate the indicator; therefore the calculation could not be completed.

Table 55 – Gross to be distributed / crewmembers (k€)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Mean	-	14.7	22.7	31.3	28.1	-	23.7
SD	-	6.8	6.1	15.7	8.8	-	10.8
CV (%)	-	47	27	50	31	-	46

7. TREATMENT AND ANALYSIS OF RESULTS RELATED TO PRODUCT COMMERSIALIZATION

**** Own consumption***

8% of the skippers surveyed claimed a small part of their catches (1%-2%) was for family consumption. These consumptions represent a minimum part of their mean income per catch (0.5 k€ year*)*

**** Fish treatment***

Given the type of market supplied by the artisan fleet, located very close to the landing ports, with fish caught by selective methods and very frequent landings, this sector has not dealt with markets requiring specific treatment of the fish for their commercialisation. Therefore except for fish maintenance in refrigerated conditions as per legally regulated health requirements there is no treatment or transformation equipment on board. There is no specific manipulation and whole fresh fish are landed packed in boxes. Once on land the Guild provides them with specialised infrastructures, which might be needed.

**** Sales destination***

63% of the mean value of sales goes through the fishmarket auction. The auctions are managed by the Guilds in the Basque Country. The remaining 37% follows commercialisation methods other than the fishmarket. Regarding the fishmarket sales discipline, the STUN typology places virtually all its landings (99.6%) through the fishmarket. PSEIN on the contrary only obtains 15% of its sales income from its landings at the fishmarket. The rest of this typology's income comes from direct sale to wholesalers.

The high percentage of income from sales declared by the potters (POTT) –67%- is surprising considering their target species are cephalopods and crustaceans, which due to their shortage and high price are usually commercialised through other channels. The authors feel this figure has been overvalued in the survey answers.

Table 56 – Mean percentage of the fishmarket sales value (%)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Mean	67	49	54	79	100	15	63
SD	52	48	42	24	1	2	42
CV (%)	77.5	99.3	76.5	30.0	1.2	141.4	67.4

[26]Gross to be distributed = Gross income – Common expenses. Common expenses include: bait, ice, supplies, boxes, packaging, butane gas bottles and port duties.

**** Percentage of vessels selling at different destinations***

82% of the skippers declared that at least a part of their landings were sold at the fish market. An important number of interviewees (except STUN typology) sold their catches in other place, which does not mean part of their landings do not go through the official fish market auction. In any event, the auction has a predominant role.

There are 7 large groups regarding the purchasers in the first sale. Fish markets in first place; the great distribution at 24.6% in second place; traditional fishmonger's at 18% in third place and restaurants at 11.5% in fourth place. Less than 5% of the vessels sell part of their catches to individuals and wholesalers. 23% of the vessels said they sold directly from the port's docks. This kind of activity is normally the job of the women in the skippers' families.

Figure 61 shows the percentage of sales through the fish market via auction, and sales outside them.

Table 57 – Percentage of vessels selling at each destination (%)

	POTT	LONGL	SGILL	LGILL	STUN	PSEIN	TOTAL
Great distribution	0	20	35	33	11	100	25
Fishmonger's	33	27	5	44	0	0	18
Restaurants	0	20	10	11	0	0	11
Wholesaler	0	7	0	11	0	0	3
Individual	17	7	5	0	0	0	5
Fishmarket / auction	67	60	90	100	100	50	82
Fisherman	0	0	0	0	0	0	0
Direct sale (port)	0	7	55	22	0	0	23

NOTE: Each vessel can sell in several destinations at the same time.

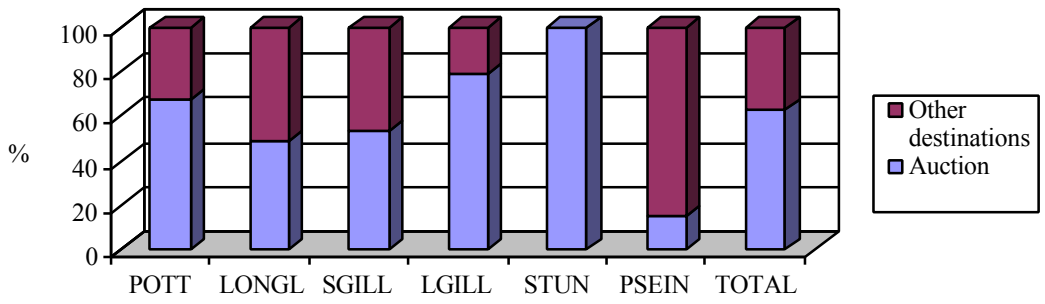


Figure 61 – Sales destination

CONCLUSION (SOCIO-ECONOMIC)

The PECOSUDE project is the desire to add in some small way to previous knowledge on coastal artisan fishing in the southern European Atlantic stretch, at a time of change and uncertainty over the future course of the European fishing policy. Its ultimate aim is for this knowledge to be useful in the debate and decision taking. Furthermore, to assess possible trade-offs using better criteria, which measures under discussion might mean for the sector not to mention those communities greatly dependent on this activity.

126 vessels comprise the population exercising coastal fishing throughout the Basque Country (from the French coast to Cantabria). The halieutic part of this study subdivided the fleet into 5 typologies as per "fishing métiers" describing their extraction activity: potters (POTT), longliners (LONGL), small gillnetters (SGILL), large gillnetters (LGILL) and small tuna fishing boats (STUN). When the somewhat atypical existence of a few purse-seiners meeting "coastal artisan fishing" definition criteria was observed and given their specificity and long tradition in the Basque artisan sector, it was decided to include it as an additional typology (PSEIN).

The socio-economic analysis on activity typologies is based on the information from the survey performed on skippers regarding their activity in 1999 (reference year). On learning a large number of the fleet vessels belonging to the different typologies plus their percentage weight in the entire population, we decided to use the preliminary information to perform a stratified random sampling. The sampling rate used was quite high, amounting to 48% of the target population.

The Basque coastal artisan fishing can be characterised as follows:

- All the Basque skippers and crewmembers are professionally engaged full-time in the fishing activity. Furthermore, pluri-activity is non-existent among them. The remuneration system *"catch share payment"* is practised exclusively in the subsector.

-The mean crew comprises 2.5 men – including skipper-. However some typologies such as LGILL, STUN and PSEIN use a bigger crew number (3.2, 4.1 and 5.5 respectively).

-The mean skipper age was 44. 33% of them will retire in less than 10 years. The POTT typology has the highest concentration of old skippers, their mean age being 55. Furthermore, the majority of the skippers (90%) are from the Basque Country. The remaining 10% are from other Spanish regions or abroad.

- Only a small percentage of skippers (7%) claimed they were receiving family help in activities linked to fishing exploitation – maintenance tasks-. The underestimation of women's work, which seems to be important in commercialisation and management tasks, is patently evident.

-The mean artisan vessel in the majority of cases is wooden (67%), with a length of 10.3 metres, a tonnage of 11.1 GRT and 69 kW of power. Vessel ownership and co-ownership is the most common (93.5%) among Basque skippers, since only 6.5% of them are mere employees.

-The purchase of new vessels amounts to 44% and purchase of second-hand to 56%. Application of the MAGP to restructure the community-fishing sector favours the purchase of second-hand units. This fact becomes particularly relevant as from the beginning of the nineties (MAGP -III and MAGP -IV).

-18% of the vessels are uninsured. This phenomenon is only observed in typologies with a high percentage of small-dimensioned poorly equipped vessels (POTT, LONGL and SGILL). However all the vessels of the LGILL, STUN and PSEIN typologies are insured.

-The estimated vessel value has been used as a *proxy* variable of the capital value which on average amounts to 95.1 k€. The insured vessel value is systematically lower than the estimated value (by 34 k€ on average), which partly explains the owners' incentive in undervaluing their vessel to pay lower premiums so reducing costs.

-With the electronic equipment on board the reverse phenomenon occurs, since its insured value is nearly always greater than the estimated value. The speed with which this equipment depreciates and becomes obsolete is the reason for this. However, it has to be mentioned none of the surveyed vessels has its fishing gear insured.

-The mean work productivity measured via income from catch sales per crewmember amounts to 19.9 k€ . Greatest productivity occurs in the LGILL and STUN typologies.

-However, the mean capital productivity calculated dividing the income from catch sales by the estimated vessel value amounts to 0.72.

-As the sole remuneration system used in this subsector is "the catch share payment" the gross salaries have a high correlation with income from catches. It has to be mentioned the gross salaries were estimated subtracting the common expenses (large amount) from the income obtained from catch sales; the resulting amount is shared between crew and shipowner in proportions varying depending on the port (45/55 or 50/50 usually). Therefore the gross salaries will include that percentage destined to crew payment for their work. The gross mean salary per crewmember amounts to 11.7 k€ . The social security contributions represent 30% of the gross salaries on average.

-The mean expense for intermediate consumptions amounts to 13.1 k€. The LONGL typology has the lowest intermediate consumptions (5.7 k€.) whilst STUN has the highest (20.9 k€). Gas oil and fishing gears occupy the highest percentages of the total intermediate consumptions (27% and 25% respectively) on average. The fishing gear expense is particularly relevant for POTT and SGILL typologies.

-The mean income amounts to 65.2 k€. LGILL and STUN typologies have the best results whilst LONGL has the smallest income.

-On analysing the contribution of each species group to the income, we see the pelagic species have the most income weight (67%). The other teleosts (demersals) contribute 19%, cephalopods, molluscs and crustaceans 10% and the remaining 4% comes from the capture of "diverse fish" and algae.

-However, the contribution of fishing gears to income is rather varied. The most important modality covers the different lines (handlines, trolling lines and, pole and line), which provides 60% of the income. Next in importance are gillnets at 14%, purse seine at 10%, trapnets at 9%, longlines at 6% and finally other modalities (bottom trawl nets for algae and surface trawl nets for elvers) with 1% of the income.

-Nobody, either on board or on land, has equipment installed for any kind of fish treatment or elaboration. The fish is landed fresh, whole and arranged in boxes. Once on land the Guild provides them with any infrastructure they might need.

-63% of the income comes from sales through the fishmarket auction. The rest is via sales with other destinations, i.e. wholesalers, restaurants, direct sale, etc. The fishmarket sale is used to a greater or lesser extent by 82% of the vessels surveyed.

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ANNEXES

AZTI
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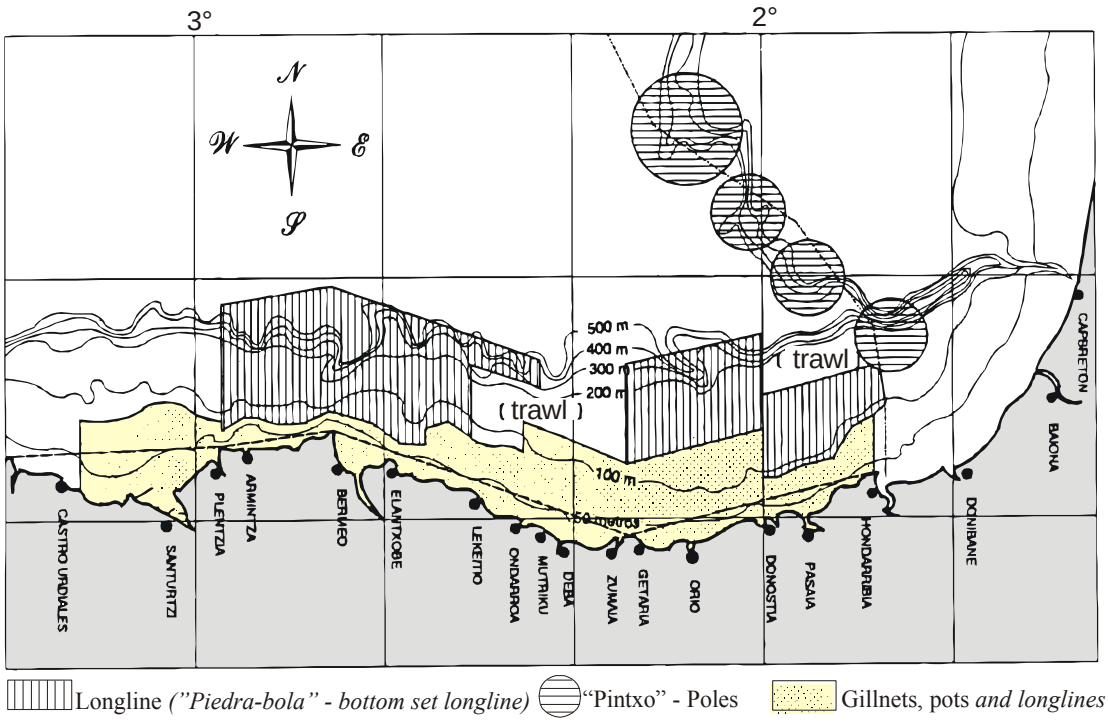
ANNEX 1 *SURVEY QUESTIONNAIRE GIVEN TO FISHING VESSEL SKIPPERS TO CHARACTERISE ANNUAL FISHING ACTIVITY.*

PORT:		*DATE:*		
VESSEL NAME:		*INTERVIEWER NAME:*		
REGISTER NUMBER:		***FISHING MODALITY CHANGE IN 1999***		
VESSEL LENGTH:	*M*	*FROM MODALITY:*		
ENGINE POWER	*KW*	*TO MODALITY:*		
TONNAGE	*GRT*	*DURATION:*		

FISHING MÉTIER	***1***	***2***	***3***	***4***
FISHING GEAR TYPE				
CHARACTERISTIC 1				
CHARACTERISTIC 2				
SOAK TIME				
NUMBER OF FISHING GEAR UNITS				
TARGET SPECIES				
FISHING SEASON				
FISHING AREA				
FISHING DEPTH				
CREW (MEN)				

FISHING MÉTIER	***5***	***6***	***7***	***8***
FISHING GEAR TYPE				
CHARACTERISTIC 1				
CHARACTERISTIC 2				
SOAK TIME				
NUMBER OF FISHING GEAR UNITS				
TARGET SPECIES				
FISHING SEASON				
FISHING AREA				
FISHING DEPTH				
CREW (MEN)				

ANNEX 2 - *FISHING AREAS FOR COASTAL FLEET* (*in* Puente, 1993*)* .



Longline *("Piedra-bola" - bottom set longline)* "Pintxo" - Poles Gillnets, pots *and longlines*

ANNEX 3: *SOCIO-ECONOMIC AND COMMERCIAL SURVEY ON THE BASQUE COUNTRY COASTAL ARTISAN FISHERY (YEAR 1999)*

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Universidad del País Vasco Euskal Herriko Unibertsitatea

I. Vessel(s) characteristics

Name of vessel :
Port :
Owner or co-owner :

License N° :
VAT :
Legal structure :

Length :
Power :
Hull material :

GRT :
Year of construction :
Estimated hull life :

YEAR OF ACQUISITION :

PURCHASE PRICE (WITH/WITHOUT FISHING GEAR) :

FINANCE METHOD :

(%) Loan (%) Self-financing (%) Subsidy

NUMBER OF REMOTORISATIONS SINCE PURCHASE :
DATE OF LAST REMOTORISATION:

New or second-hand engine :

	Current Estimated Value	Insured value
Vessel		
Electronic, mechanical and hydraulic apparatus		
Fishing gears		

Current bridge equipment :

	Transmission	Navigation	Detection	Computer on board	Others (fishing gears control : hauling gear…)
What ?					
Year of installation (on purchase or afterwards)					
Purchase price					

II. CREW CHARACTERISTICS, FAMILY PARTICIPATION IN THE EXPLOITATION AND ACTIVITIES OF THE EXPLOITATION MANAGER

Remuneration system (salaried, share-out, other...) :
When the remuneration is share-out, specify :
Crew share (%) : Shipowner(s) share (%) :
Land employees' share (if included in the share-out remuneration)(%) :

Crewmembers embarked Nº : Land employees Nº :

EMBARKED PERSONNEL SEASONAL VARIATIONS :

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Crewmembers embarked Nº												

CREWMEMBERS' YEARS OF BIRTH : (1)....., (2)....., (3)....., (4)....., (5).....

Embarked skipper's age of birth : Place of birth :
Skipper's studies : Estimated retirement date :
Exploitation continuity (Succession: Yes/No):

Exploitation participation :

Number of days/months	Skipper	Crew	Others (Personnel on land)	Shipowner's family State family relationship :…
Embarkation				
Maintenance Gears Vessel				
Commercialisation				
Management				
Others (state)				

Structure membership (state) :

- Producer organisation :
- Accounts management :
- Provisions :
- Commercialisation :
- Others :
- Trade Union :

Skipper's exclusive dedication to fishing (yes/no) : If no,

- Other economic activities (restaurant, tourism, shell fishing, agriculture, etc.) :
- Percentage of shipowner's time dedicated to fishing throughout the year :
- Income percentage derived from fishing in relation to income from other economic activities :

Nº days fishing per year (days at sea):
Inactive fishing periods of the full-time skipper :

	Rest	Caulking	Meteorology	Regulation	Insufficient yield
Nº days					

III. PRODUCTION AND ECONOMIC DATA (1999)

Main species and fishing modalities.

Species	Amount (™)	% A (*)	% B (*)	% C (*)	% D (*)	% E (*)	% F (*)	Mean price	Reference port price
1									
2									
3									
4									
5									
6									

*Species :(1)…….,(2)…….,,(3)…….,,(4)…….,,(5)…….,(6)…….,(7)…….,(8)…….,(9)…….,,(10), (11)…….(12)……(13)….(14)……,(15)…….(16)…..,(17)……,(18)…..,(19)……(20)……

*Fishing modality : (A) Gillnet, (B) Longline, (C) Hook, (D) Pots, (E) Purse-seine, (F) Others –State-

(*) Seasonal variations in quantities caught per species and modality used.

Species	Quantity (kilos)	%A (*)	%B (*)	%C (*)	%D (*)	%E (*)	%F (*)	J	F	M	A	M	J	Ju	A	S	O	N	D
1																			
1																			
1																			
1																			
1																			
1																			
1																			
2																			
2																			
2																			
2																			
2																			
2																			
2																			

NOTE: For each SPECIES, complete as many rows as modalities used in their capture.

*Species :(1)…….,(2)…….,,(3)…….,,(4)…….,,(5)…….,(6)…….,(7)…….,(8)…….,(9)…….,,(10), (11)…….(12)……(13)….(14)……,(15)…….(16)…..,(17)……,(18)…..,(19)……(20)……

Fishing modality : (A) Gillnet, (B) Longline, (C) Hook, (D) Pots, (E) Purse-seine, (F) Others –State-

Total income for catches (1999): .....k€

IV . PRODUCTION COSTS MEASURED IN PHYSICAL AND MONETARY UNITS (1999)

(A) INTERMEDIATE CONSUMPTIONS IN FISH GEARS/MODALITIES

Do fishing material repair/maintenance and purchases belong to common expenses ?
(Yes/No):

Total annual expenditure for fishing gears:.....(ptas)

GILLNET (NETS)	Gillnet	Trammel	Tangle	
Nº of fleets				
Nº of nets per fleet				
Nº of netting panels replaced during the year				
Assembly method (own/netter/factory)				
Cost per netting panel				
LONGLINE	Surface longline	Bottom longline	Semipelagic longline	Pel. longline (sharks)
Nº of baskets/ « longlines »				
Nº of « mainlines » per basket/ « longline »				
Nº of snoods per basket/ « longline »				
Nº of hooks per basket/ « longline »				
Assembly method (own/netter)				
Replacement during the year : Nº of « mainlines » Nº of snoods and hooks				
Cost per longline				
LINES (MACKEREL/WHITE TUNA/HAKE)	Handlines (Mackerel)	Trolling (White tuna)	Pole and line (Hake)	
Nº of gears/ « lines »				
Nº of « mainlines » per gear/ « line »				
Nº of snoods per gear/ « line »				
Nº of hooks per snood (mackerel lines)				
Assembly method (own/netter)				
Replacement during the year : 0 Nº of « mainlines » 1 Nº of snoods 2 Nº of hooks				
Cost per gear				
POTS	Small (velvet)	Large (lobster…..)	Artisan/ homemade	
Nº of fleets				
Nº of pots per fleet				
Nº of pots renewed during the year				
Cost per pot				
PURSE-SEINE				
Nº of nets				
Cost per net				
Cost of fore sweep				
Cost of aft sweep				
Cost of pursing line				
Replacement during the year o Nº netting panels o Total cost replaced panels				
Cost of the nettings				

(B) OTHER INTERMEDIATE CONSUMPTIONS PER FISHING MODALITY

Do they belong to common expenses ? (Yes/No) :

	Gillnet (Nets)	Longline	Handlines	Pots	Purse-seine	Others (State)
Other intermediate consumptions :						
• Nº of engine hours • Gas oil (litres/year) • Price (pts/litre)						
• Ice (Kg/year) • Price (pts/Kg)						
• Bait (Kg/year) • Annual expenditure						

C) OTHER FISHING ACTIVITY COSTS

	Amount (in Pts)	Remarks	Belong to common expenses ? (yes/no)
….* Handling material (boxes, knives, etc.)			
….* Provisions			
* Maintenance and repair : hull, engine, electron. and mech. apparatus (Fishing Gears excluded)			
* Services			
* Insurance (vessel, electron. apparatus, civil liability, etc.)			
* Taxes linked to production (Fishmarket, etc.)			
* Licences			
Salaries			
Social Security Contributions (comprises SS...)			
Taxes and duties			
Amortisations			
Reimbursement of loans Nº1 in Progress Nº2 (pts/quarter) Nº3		Object : Nº years : Object : Nº years : Object : Nº years :	
Others (state)			

Accounts management method (co-operative, advisory agency, accounts expert, …) :

V. FISH TREATMENT AND COMMERCIALISATION (1999)

Destination of landed fishing in % throughout the year :

% Sale : % Family consumption :

Fish treatment :

On board

Material description (tables, ...) :
Species concerned :

On land

Description ("atelier de marée", transformation,...) :
Species concerned :
What percentage of total income is from the transformation activity (other than headless and gutted)? :

Conditioning and storage :

ON BOARD	Species	Eventual packaging
Equipped hold		
Storage type (hatcheries, boxes, bulk,)		
Cold (if yes, type used)		

ON LAND	Species	Eventual packaging
Freezer		
Cold store		
Hatcheries		
Others		

Do you think your production could be sold at a higher price ?

If yes, how ? (Commercial trademark / quality label / …)

V. FISH TREATMENT AND COMMERCIALISATION (1999)

Annual sales distribution	Value	Weight	% (of value)	Species concerned
Great distribution				
Traditional fishmonger's				
Restaurant				
Wholesaler				
Individual				
Fishmarket/auction				
Fisherman				
Other (state)				

Main seasonal variations :

Do you commercialise your products through a producer group ?
If yes,
Which (PO, ...) ? Number of members ?
Do you actively participate in its operation ?
Species concerned :

***APPRECIATION OF SURVEY DEVELOPMENT**

Relationship with the professional (good, bad,……..) :
Quality of information collected (good, bad,…..) :

ANNEX 4 - SPECIES GROUPS

SPECIES GROUP	CO-ALF3	SPECIES (Latin)	SPECIES (English)	SPECIES (Spanish)
GROUP 1 Large pelagic fish	ALB	*Thunnus alalunga*	Albacore	Bonito del norte
	BET	*Thunnus obesus*	Bigeye tuna	Patudo
	BFT	*Thunnus thynnus*	Northern bluefin tuna	Cimarrón
GROUP 2 Small and médium-sized pelagic fish	ANE	*Engraulis encrasicolus*	European anchovy	Anchoa
	BON	*Sarda sarda*	Atlantic bonito	Bonito (Lampo)
	JAX	*Trachurus spp*	Jack and horse mackerels nei	Jureles (Chicharros)
	MAC	*Scomber scombrus*	Atlantic mackerel	Caballa (Verdel)
	PIL	*Sardina pilchardus*	European pilchard (Sardine)	Sardina
GROUP 3 Teleost fish	ANF	Lophiidae	Anglerfishes nei	Rapes
	BIB	*Trisopterus luscus*	Pouting (Bib)	Faneca
	BLL	*Scophthalmus rhombus*	Brill	Platusa
	BSS	*Dicentrarchus labrax*	Seabass	Lubina
	COE	*Conger conger*	European conger	Congrio
	FOX	*Phycis* spp	Forkbeards nei	Brótolas (Lochas)
	GUX	Triglidae	Gurnards, searobins nei	Tríglidos
	HKE	*Merluccius merluccius*	European hake	Merluza
	MUX	*Mullus spp*	Surmullets (Red mullets)	Salmonetes
	SBA	*Pagellus acarne*	Axillary seabream	Aligote
	SBG	*Sparus auratus*	Gilthead seabream	Dorada
	SCO	Scorpaenidae	Scorpionfishes, nei	Cabrachos
	SOL	*Solea vulgaris*	Common sole	Lenguado
	SRG	*Diplodus* spp	Sargo breams, nei	Sargos (Mojarras)
GROUP 4 Cephalopods and crustaceans	CRE	*Cancer pagurus*	Edible crab	Buey
	CRU	Crustacea	Marine crustaceans nei	Crustaceos
	CSH	*Crangon crangon*	Common shrimp	Quisquillón
	CTC	*Sepia officinalis*	Common cuttlefish	Sepia (Jibia)
	LBE	*Homarus gammarus*	European lobster	Bogavante
	LIO	*Leocarcinus puber*	Velvet swimcrab	Necora
	NEP	*Nephrops norvegicus*	Norway lobster	Cigala
	OCC	*Octopus vulgaris*	Common octopus	Pulpo
	SCR	*Maja squinado*	Spinous spider crab	Centollo
	SLO	*Palinurus elephas*	Common spiny lobster	Langosta
	SQC	*Loligo* spp	Common squids	Calamares
GROUP 5 Diverse fish	XXX		Mixed	Variado
GROUP 6 Est fish + algae	ELE	*Anguilla anguilla*	European eel (Elver)	Angula
	GEL	*Gelidium spp*	Gelidium	Gelidium (Algas)

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