



RESULTS ON THE SPANISH "GULF OF CADIZ" DISCARD PILOT SURVEY (ICES DIVISION IXa FOR 2005)

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2.2.1 Sampling coverage from MP Spanish National Sampling Program

The Spanish National Sampling Scheme, adopted by the European Regulation (EC) N° 1639/2001 of July 2001 is the Minimum Program of the European Commission. According to Appendix XII of Commission Regulation (EC, 1639/2001 modified in N° 1581/2004,), the species to be considered within the Division IXa, (as a consequence including Gulf of Cadiz) for discards are as follow:

English Name	Spanish Name	Latin Name	ICES Area
Scabbard fishes	Sable negro	<i>Aphanopus spp.</i>	IXa, X
Argentines	Argentinas	<i>Argentina spp.</i>	All areas
Edible crab *	Buey	<i>Cancer pagurus</i>	All areas
Gulper shark *	Quelvacho	<i>Centrophorus granulosus</i>	All areas
Leafscale gulper shark *	Quelvacho	<i>Centrophorus squamosus</i>	All areas
Portuguese dogfish	Pailona	<i>Centroscymnus coelolepis</i>	All areas
Roundnose grenadier *	Granadero	<i>Coryphaenoides rupestris</i>	All areas
Anchovy	Anchoa	<i>Engraulis encrasicolus</i>	IXa (only Cadiz)
Blue-mouth rockfish	Cabra	<i>Helicolenus dactylopterus</i>	IXa, X
Lobster *	Bogavante europeo	<i>Homarus gammarus</i>	All areas
Orange roughy *	Reloj anaranjado	<i>Hoplostethus atlanticus</i>	All areas
Four-spot megrim	Gallo con manchas	<i>Lepidorhombus boscii</i>	VIIIc, IXa
Megrim *	Gallo sin manchas	<i>Lepidorhombus whiffiagonis</i>	VIIIc, IXa
Common squid	Calamar	<i>Loligo vulgaris</i>	VIIIc, IXa
Black-bellied angler *	Rape negro	<i>Lophius budegassa</i>	VIIIc, IXa
Anglerfish	Rape blanco	<i>Lophius piscatorius</i>	VIIIc, IXa
Whiting *	Merlán	<i>Merlangius merlangus</i>	IX, X
Hake	Merluza europea	<i>Merluccius merluccius</i>	VIIIc, IXa
Blue whiting	Bcaladilla	<i>Micromesistius poutassou</i>	I-IX, XII, XIV
Ling *	Maruca	<i>Molva molva</i>	All areas
Striped red mullet	Salmonete de roca	<i>Mullus surmuletus</i>	All areas
Norway lobster	Cigala	<i>Nephrops norvegicus</i>	2-3 E2-E3
Common octopus	Pulpo comun	<i>Octopus vulgaris</i>	VIIIc, IXa
White shrimp	Gamba de altura	<i>Parapenaeus longirostris</i>	IXa
Saithe *	Carbonero	<i>Pollachius virens</i>	VII, VIII, IX, X
Blond ray *	Raya boca de rosa	<i>Raja brachyura</i>	All areas
Thornback ray *	Raya comun	<i>Raja clavata</i>	All areas
Spotted ray	Raya pintada	<i>Raja montagui</i>	All areas
Cuckoo ray	Raya santiaguesa	<i>Raja naevus</i>	All areas
Other rays and skates	Rayas	<i>Rajidae</i>	All areas
Sardine	Sardina	<i>Sardina pilchardus</i>	VIIIc, IXa
Spanish mackerel	Estornino	<i>Scomber japonicus</i>	VIII, IX
Mackerel	Caballa	<i>Scomber scombrus</i>	II, IIIa, IV-IX
Cuttlefish	Sepia	<i>Sepia officinalis</i>	VIIIc, IXa
Sole	Lenguado comun	<i>Solea solea</i>	IXa
Sea breams	Sparidos	<i>Sparidae</i>	IXa, X
Blue jackmackerel	Chicarro	<i>Trachurus picturatus</i>	VIIIc, IXa, X
Horse mackerel	Jurel	<i>Trachurus trachurus</i>	VIIIc, IXa
Pouting	Faneca	<i>Trisopterus luscus</i>	VIIIc, IXa

* No caught species during sampling the Gulf of Cadiz Pilot Survey.

2.3.2 Number of “Fishing Activity Unit” sampled

The Gulf of Cadiz Fishing Activity is characterised by its marked multi-fleet and multi-gear aspect. Among the different fleets that operate we see as more important the Bottom otter trawl with a high mixed catch composition. More mono-specific seine Fishing Activity with relation to the target species and Artisanal fishing Activity characterised by the diversity of fishing nets used. In this pilot study Trammel nets have been sampled.

Based on the “Ad Hoc Meeting on Independent Experts on Fleet-Fishery Based Sampling” (STECF, 2005) the following Table presents the generic segmentation of Fishing Activities used in this Pilot Survey. Trawls, Nets and Seines.

Level 1	Level 2	Level 3	Level 4	
Activity	Classes of gears	Gear group	Gears EU/DCR level	Sampled
Fishing activity	Trawls	Bottom trawl	Bottom otter trawl	Yes
	Nets	Entangling nets and Gill nets	Tangle net	No
			Trammel net	Yes
			Set gillnet	No
			Driftnet	No
	Seines	Surrounding seines	Purse seine	Yes

A short definition of the three Fishing Activity defined is presented below based on Millán, M., 1992; Ramos, *et al.*, 1996 and Sobrino *et al.*, 1994.

2.3.2.1 Bottom otter trawl Fishing Activity

The trawl fleet in the Gulf of Cadiz consists of small capacity boats compared to those operating in other areas of the Iberian Peninsula. During the period between 1993-2003, there were 227 boats with bottom trawl fishing permits. The average technical characteristics of the boats ranged between 5.4 and 78.4ton of GRT (average 23.5ton), a power of 60 to 442HP (average 212.5HP), and a length that goes from 9 metres, for the smallest boats, to 22,5 metres for the largest (Sobrino *et al.*, 1994).

As regards landing ports, those in Isla Cristina, Huelva, Sanlúcar de Barrameda and Santa María Port stand out for having 97.5% of the trawl landed. The fishing nets mainly used by the fleet are the “Baca” type, offering different modification based on the technical characteristics of the boats, the types of sea beds and the bioecologic characteristics of target species (Ramos, *et al.*, 1996).

The legal mesh size of the cod end of the trawl gear in the Gulf of Cadiz is 40mm, as stated in Commission Regulation 3094/86. Other regulations regarding the practice of “bottom trawl” fishing in the Gulf of Cadiz are stated in the Royal Decree 632/1993 of 3 May. Last year an urgent plan was approved for the conservation and sustainable management of bottom trawl fishing in the National Fishing ground of the Gulf of Cadiz (Order APA/3423/2004 of 22 October). In this Order, in article 2 referring to the fishing effort, a limit of 18 hours fishing per day was established, thus the trip duration may not exceed one day. The number and duration of catches per trip varied according to depth, the distance from the coast and the target species,



with purse seine nets on a permanent basis and those that practice temporal seine fishing, whose numbers amount to 16 units (trawl and artisanal boats). The technical measurement characteristics of the monovalent fleet of great tonnage (29 units) are: GRT 48.99ton., 358 HP with an average length of 19.40 metres. The fleets of small tonnage (82 units) have much lower power: GRT14.87ton, 132 HP and a total average length of 14.07 metres.

The main species caught are sardine and anchovy, which make up for 51% and 35% respectively of the average landings of recent years, followed by the mackerel and the horse mackerel.

The fishing gear used by all the fleets is the purse seine net with netting. The characteristics and dimensions of this type of purse seine net vary with the length and tonnage of the boat and the fishing area. The high-tonnage boats use a purse seine net with netting with a trapezoid-shaped central unit 450m in length and 80m in height at the most. The cod end, at the top of the fishing net, has the smallest mesh opening of all the fishing nets with 14mm (Millán, M., 1992).

The seine fishing fleet regularly fishes for a duration of one day only. The number of hauls they carry out is not fixed, depending on the yields obtained during the trip.

As regards the fishing area, it differs according to the type of fleet. The high-tonnage fleets carry out longer displacements and fish in seabeds between 50-100m depth, however the small-tonnage fleets fish in shallower seabeds between 20-60m depth in front of the mouth of the main river that flows into the Gulf of Cadiz: the Guadalquivir.

2.3.3 On board sampling protocol

The observer has two main workplaces:

The bridge, where he collects data related to haul location, course, speed, cable length, etc..

The deck, where he collects data related to the fishing catch and makes samples.

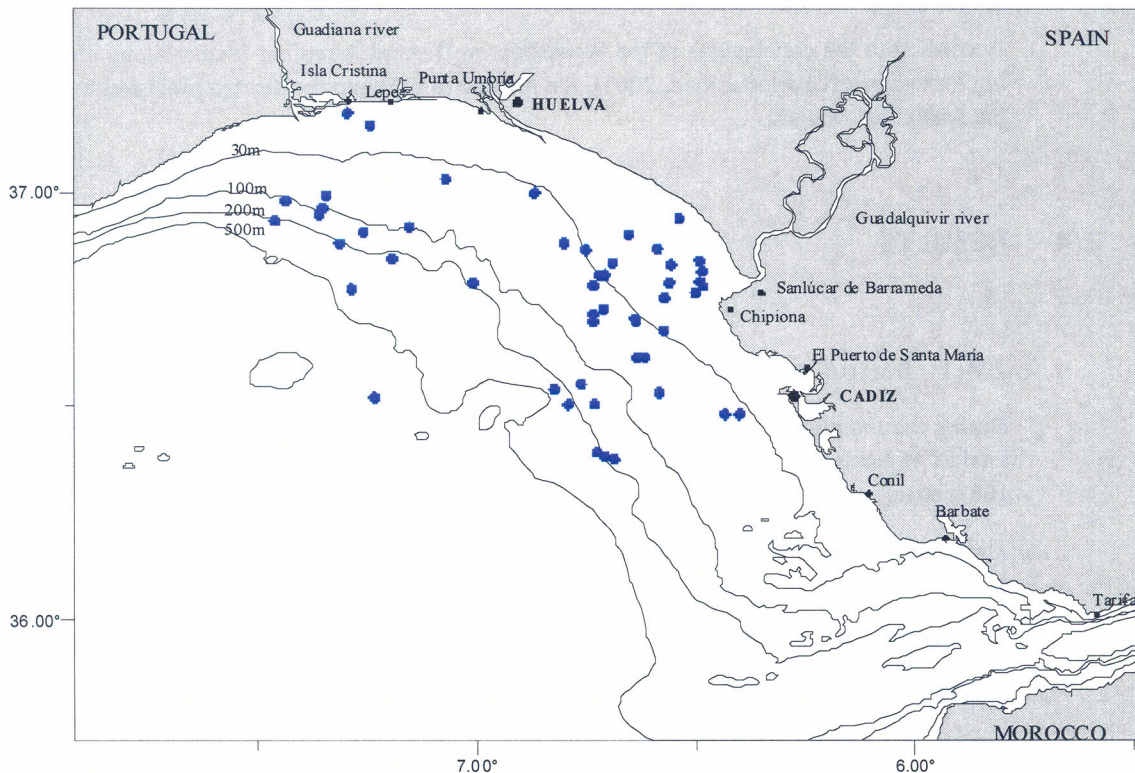
After hauling a catch on board, it is classified by the crew into retained catch and discards. To obtain the volume of retained catch of all species the observers record the catch retained by the crew and the length composition of the most representative species. When retained catches have been sorted into length categories, the sampling is stratified. Total discard weight was estimated according to the discarding method used by the crew, i.e., basket, shovels, etc. From the discarded part of the catch, one basket or more (around 13 kg), depending on the size and diversity of discards, is collected. Afterwards, the discard is sorted by species in order to obtain the discard weight and length composition.

Catch and discard values are standardised into kilograms and length number per trawling haul.

2.3.4 Databases and specific software to manage discard data

Specific software was used in order to conduct and manage all relevant fishery and biological data from the Spanish (ICES waters) discard Program. This software was written by Visual Basic, with *Data Storage* based in Microsoft Access 2000. An import tool was added to the software to allow input of historical data

The software makes use of *Master Files* (comprising species, vessels, fishing areas, etc...) to enable discard data recording. It also includes particular algorithms to calculate results, and finally it produces reports. Database structure and relationships can be seen in the following graph.



2.3.6 Raising procedures

Two raising methods are applied commonly to the whole time series of Spanish discards: Raising by landings (weight or number) according to the standard procedure suggested by Trenkel et al (2000) and Rochet et al (2002), and Raising by effort (number of trips). The former was usually more suitable to the Spanish information due to:

- previous information about the relationship between discard rates and technical characteristics of vessels (Trujillo et al., 1997),
- a lack of information concerning the Spanish fleet, specially the fleet effort per hour per ship.

In the report of their meeting in 2003, the ICES Planning Group on Commercial Catch, Discards and Biological Sampling (PGCCDBS) recommended that a workshop on Discard sampling methodology and raising procedures be conducted among the different EU countries, meeting experts both from the Commission and the National Institutes. This workshop took place at DIFRES, Denmark on 2 and 4 September 2003. One of the main outputs of this workshop was to clarify and state the sequential steps on raising as well as the mathematical formulas to estimate variance. It was agreed that the primary sampling unit will be “trip”, instead of “haul”.

On the other hand, a common protocol and assessment of discards was produced, with the main aim being to provide advice to the Commission regarding the main items to be evaluated in a discard national programme.



Wedge sole	<i>Dicologoglosa cuneata</i> *	1.1
	<i>Alloteuthis sp</i> *	0.9
Red bandfish	<i>Cepola macrophthalma</i> *	0.8
Allis shad	<i>Alosa alosa</i> *	0.7
Anchovy	<i>Engraulis encrasicolus</i>	0.7
Flying squid	<i>Ommastrephidae</i> *	0.5
Anglerfish	<i>Lophius piscatorius</i>	0.5
Spanish mackerel	<i>Scomber japonicus</i>	0.4
Red mullet	<i>Mullus surmuletus</i>	0.4
Scaldfish	<i>Arnoglossus laterna</i> *	0.3
Common squid	<i>Loligo vulgaris</i>	0.3
Bivalve		0.3
Horse mackerel	<i>Trachurus trachurus</i>	0.2
Portuguese shark	<i>Centroscymnus coelolepis</i>	0.2
Sole	<i>Solea solea</i>	0.2
Brown comber	<i>Serranus hepatus</i> *	0.2
Spotted ray	<i>Raja montagui</i>	0.1
Blue-mouth rockfish	<i>Helicolenus dactylopterus</i>	0.1
Dogfish	<i>Scyliorhinus canicula</i> *	0.1
Marbled electric ray	<i>Torpedo marmorata</i> *	0.1
Shortfin spiny eel	<i>Notacanthus bonapartei</i> *	0.1
Buccinum	<i>Buccinum sp.</i> *	0.1
Sardine	<i>Sardina pilchardus</i>	0.1
	<i>Munida sp.</i> *	0.1
Stone bass	<i>Polyprion americanus</i> *	0.1
John dory	<i>Zeus faber</i> *	0.1
Shads	<i>Alosa spp.</i> *	+
Sea bass	<i>Dicentrarchus labrax</i> *	+
Bobtail	<i>Sepiola spp.</i> *	+
Lesser flying squid	<i>Todaropsis eblanae</i> *	+
Conger	<i>Conger conger</i> *	+
Dabs	<i>Limanda spp.</i> *	+
	<i>Triglidae</i> *	+
Lesser silvert smelt	<i>Argentina sphyraena</i>	+
Pouting	<i>Tripsopterus luscus</i>	+
Horned octopus curle	<i>Eledone cirrosa</i> *	+
Blue-leg swimcrab	<i>Liocarcinus depurator</i> *	+
Common spiny lobster	<i>Palinurus elephas</i> *	+
Senegal sole	<i>Solea senegalensis</i> *	+
Solenette	<i>Buglossidium luteum</i> *	+
Black sea turbot	<i>Psetta maxima</i> *	+
Brown meagre	<i>Sciaena umbra</i> *	+
Small-scaled scorpion	<i>Scorpaena porcus</i> *	+
Poor cod	<i>Tripsopterus minutus</i> *	+
Four-spot megrim	<i>Lepidorhombus boscii</i>	+
Cuckoo ray	<i>Raja naevus</i>	+

+ Less than 0.1% of Total Catch

* Species no included in Appendix XII of Commission Regulation

The next tables show the average number and weight (kg) per trip of individuals (discarded, retained and total catch) and the percentage discarded per species for of the most important commercial species of Bottom otter trawl Fishing Activity. The estimated Coeficiente of

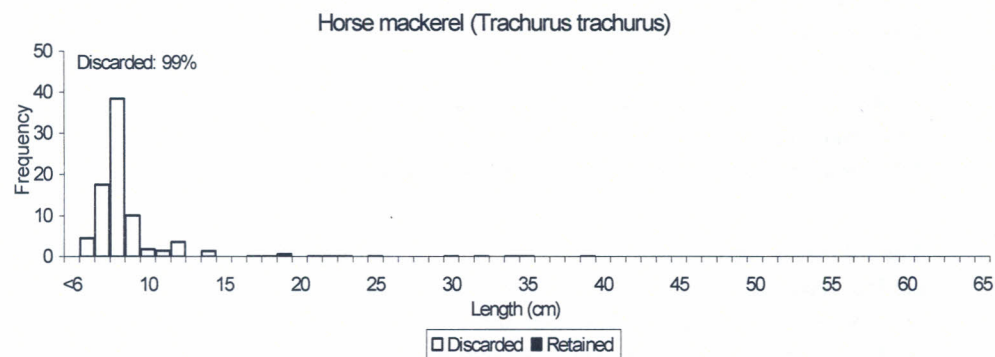
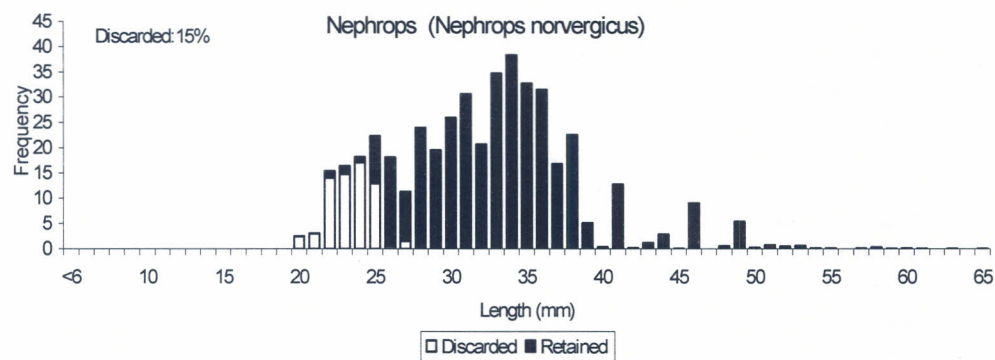
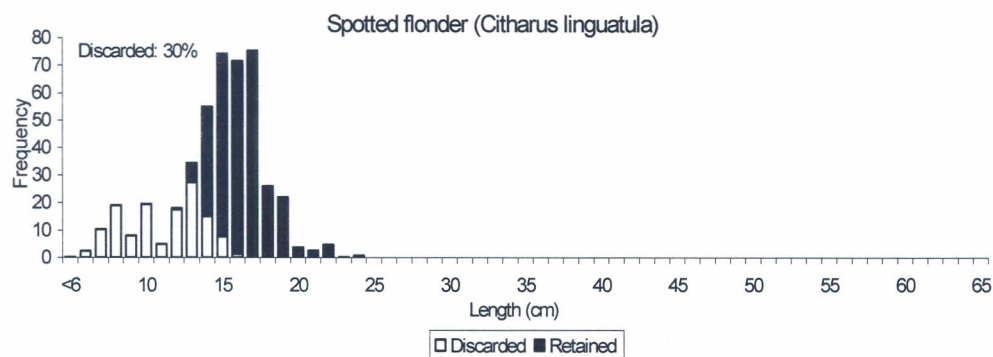
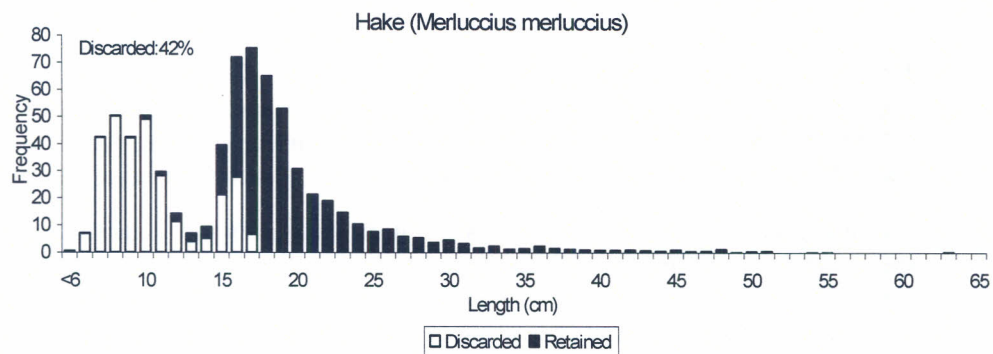


Sole	<i>Solea solea</i>			1	1	
Spotted ray	<i>Raja montagui</i>	+	447	+	+	2.4
Blue-mouth rockfish	<i>Helicolenus dactylopterus</i>	+	447	+	+	14.0
Sardine	<i>Sardina pilchardus</i>	+	297		+	100.0
Cuckoo ray	<i>Raja naevus</i>	+	447		+	100.0
Pouting	<i>Tripterus luscus</i>			+	+	
Lesser silvert smelt	<i>Argentina sphyraena</i>	+	383	+	+	16.7
Four spot megrim	<i>Lepidorhombus boscii</i>			+	+	

+ Less than 0.5 kg per trip

* Species no included in Appendix XII of Commission Regulation

The following figures show the average length distributions per trip value (discarded and retained) of the most important commercial species of Bottom otter trawl Fishing Activity (Total length in fish and cephalothorax length in crustaceans)





Spanish mackerel	<i>Scomber japonicus</i>	6		6	100.0
Hake	<i>Merluccius merluccius</i>		1	1	0.0
Striped red mullet	<i>Mullus surmulletus</i>	+		+	100.0
Anchovy	<i>Engraulis encrasicolus</i>	+		+	100.0
Caramote prawn	<i>Melicertus kerathurus</i>	na	704	-	-
Mantis shrimp	<i>Squilla mantis</i> *	na	na	-	-

+ Less than 1 specimen per trip

* Species no included in Appendix XII of Commission Regulation

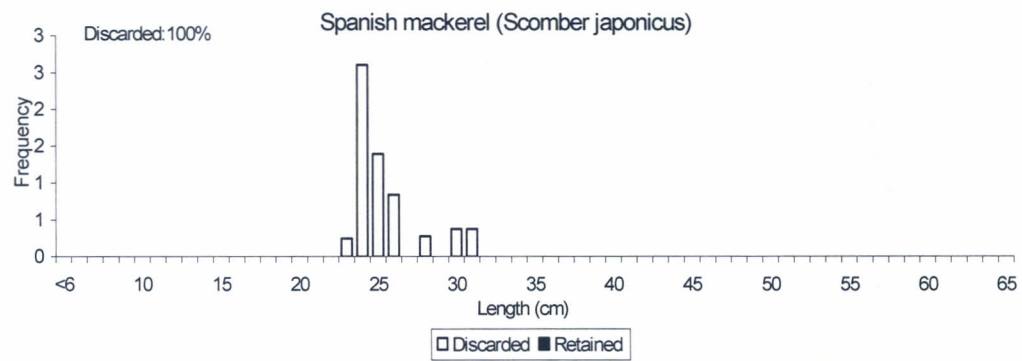
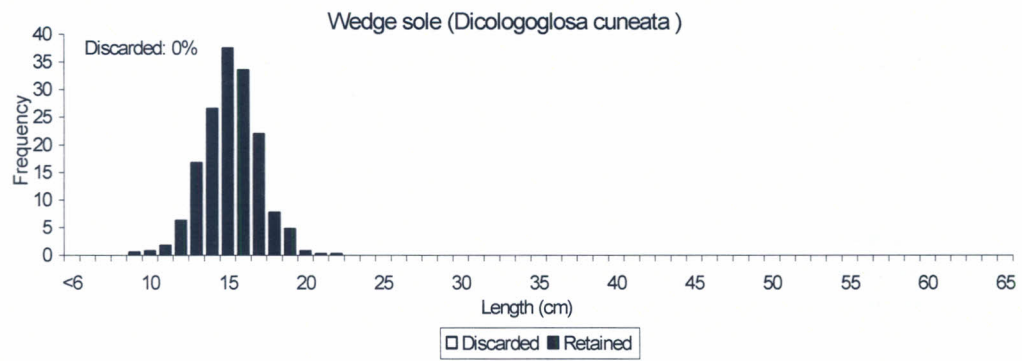
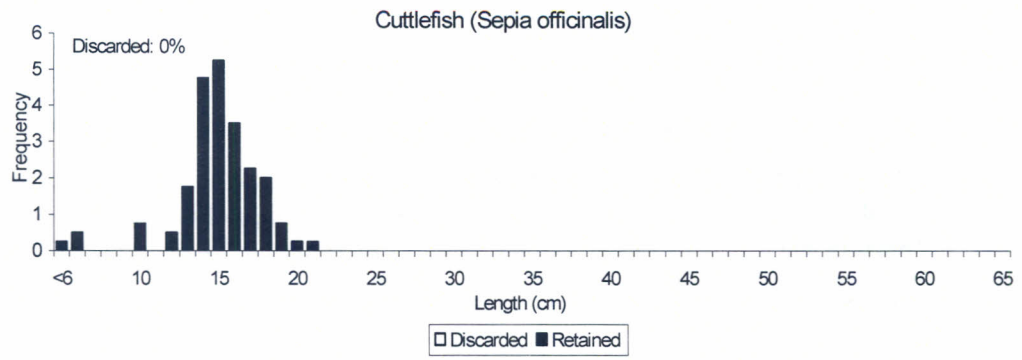
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NETS - MEAN WEIGHT (KG) BY TRIP						
	SPECIES	W DIS- CARDED	CV	W RETAINED	W TOTAL	% DISCARDED
Caramote prawn	<i>Melicertus kerathurus</i>	+	200	9	10	5.9
Cuttlefish	<i>Sepia officinalis</i>			11	11	0.0
Wedge sole	<i>Dicologoglosa cuneata</i> *			5	5	0.0
Sardine	<i>Sardina pilchardus</i>	1	117		1	100.0
Mantis shrimp	<i>Squilla mantis</i> *	1	200	+	1	64.4
Spanish mackerel	<i>Scomber japonicus</i>	1	110		1	100.0
Hake	<i>Merluccius merluccius</i>			+	+	0.0
Striped red mullet	<i>Mullus surmulletus</i>	+	200		+	100.0
Anchovy	<i>Engraulis encrasicolus</i>	+	200		+	100.0

+ Less than 0.5 kg per trip

* Species no included in Appendix XII of Commission Regulation

The following figures show the average length distributions per trip value (discarded and retained) of the most important commercial species of Trammel net fleet.

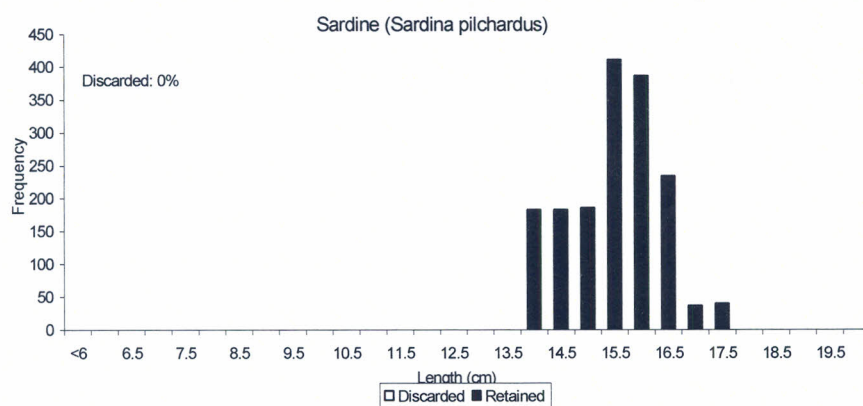
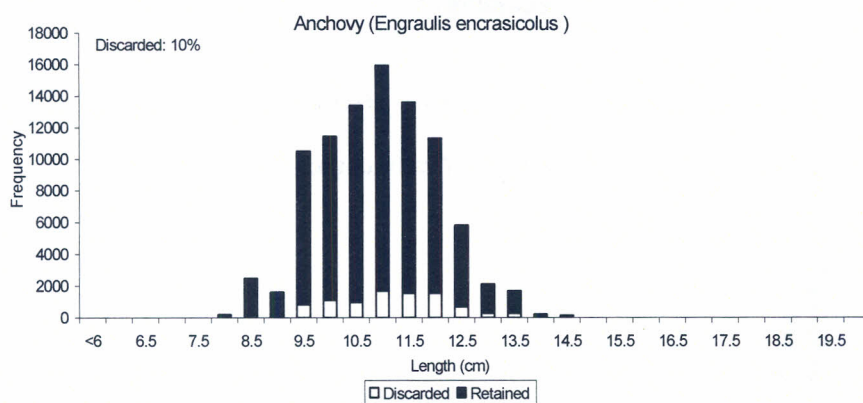


+ Less than 1 specimen per trip

SEINE - MEAN WEIGHT (KG) BY TRIP						
	SPECIES	W DISCARDED	CV	W RETAINED	W TOTAL	% DISCARDED
Anchovy	<i>Engraulis encrasicolus</i>	133	157.2	1116	1250	10.7
Spanish mackerel	<i>Scomber japonicus</i>	130	184.7	551	681	19.1
Mackerel	<i>Scomber scombrus</i>	+	379.5	14	14	2.3
Sardine	<i>Sardina pilchardus</i>			75	7	2.3
Other species		7		2	9	78.6
Horse mackerel	<i>Trachurus trachurus</i>	+	214.9		+	100.0
Argentines	<i>Argentina sphyraena</i>	+	244.9		+	100.0
Common octopus	<i>Octopus vulgaris</i>			+	+	
Common squid	<i>Loligo vulgaris</i>	+	47.0		+	100.0

+ Less than 0.5 kg per trip

In the following figures the average length distributions per trip value (discarded and retained) of the most important commercial species of Seine Fishing Activity are shown.



2.5 Conclusions

The results confirm that Fishing Activity definition was correct and accurate due to the differences observed in catch composition and discard behaviour. However, these results could differ according to the season the samples are carried out, due to the seasonal variation that presents abundance of the main target species in the study area.

The importance of discards must be analysed taking into account the total catch and number and not only the percentage. For instances, a single high percentage of discard could be misunderstood since the total catch (or number) discarded of that fleet could be quite small in comparison with another fleet with a low discard percentage and a greater discard in number or weight.

Spanish Baca Otter Trawl Mixed Fishing Activity in Gulf of Cadiz targets a high range of species of economic importance, including shrimps, hake, Sparidae, Octopus, Nephrops, spotted flounder or cuttlefish. However, there is substantial discarding of some of the economically important species such as hake, Nephrops or spotted flounder.

Spanish Net Fishery Activity in the Gulf of Cadiz targets a range of different species of economic importance, cuttlefish, different species of shrimps (especially caramote prawn) and wedge sole. Discarding in target economically important species is null (cuttlefish) or very low (shrimps). However there is substantial discarding with some of the less economically important species. Discard in number of caramote prawn was not estimated due to discarded specimen always being broken. Nevertheless, discard in weight shows the relatively low discard proportion of this species.

Spanish Seine in the Gulf of Cadiz targets anchovy in particular. However, it also catches Spanish mackerel and sardine. Spanish mackerel has a relatively high discard ratio. The other less economically important species such as horse mackerel, argentines or octopus have a significantly high discard rate.

The following tables show the species with discards greater than 20% of the total catch in number or greater than 10% of the catches in weight.

MEAN NUMBER BY TRIP					
BOTTOM OTTER TRAWL FISHING ACTIVITY					
	SPECIES	N DISCARDED	N RETAINED	N TOTAL	% DISCARDED
Hake	<i>Merluccius merluccius</i>	297	418	715	42
Spotted flounder	<i>Citharus linguatula</i> *	134	319	453	30
Anchovy	<i>Engraulis encrasicolus</i>	225	21	246	91
Horse mackerel	<i>Trachurus trachurus</i>	79	1	80	99
Mackerel	<i>Scomber scombrus</i>	60	2	61	97
Anglerfish	<i>Lophius piscatorius</i>	18	3	21	85
Spanish mackerel	<i>Scomber japonicus</i>	17	+	17	99
Portuguese shark	<i>Centroscymnus coelolepis</i>	12		12	100
Red mullet	<i>Mullus surmuletus</i>	2	11	12	13
Sardine	<i>Sardina pilchardus</i>	6		6	100
Lesser silvert smelt	<i>Argentina sphyraena</i>	1	3	4	25
Blue-mouth rockfish	<i>Helicolenus dactylopterus</i>	1	1	2	51
Spotted ray	<i>Raja montagui</i>	+	+	1	38
Cuckoo ray	<i>Raja naevus</i>	+		+	100

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