

## APPENDIX 5

### Data on *Nephrops* Discards in Spanish Trawl Fisheries

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#### Introduction

*Nephrops*, along with hake, megrim and anglerfish are the most profitable species of the Spanish mixed bottom fisheries in the North and Northwest of Spain (ICES VIIIc and IXa) and South and West of Ireland (ICES VIIc,j,k,h). *Nephrops* is caught exclusively by the trawl fleets. Only small catches using traps are reported in the Cantabrian Sea. *Nephrops* catches are seasonal, with peaks during the 2<sup>nd</sup> and 3<sup>rd</sup> quarters of the year. More details on these *Nephrops* fisheries are given in the ICES (1999).

The lack of information on discards of bottom species has been commented on by the ACFM, nevertheless the amount of *Nephrops* discards by Spanish fleets in the fisheries of ICES Sub-area VII and Divisions VIIIc and IXa was considered negligible. The Spanish sampling programme on discards of bottom species, financed by the EU, was carried out in 1994, 1997 and 1999. This paper present the results on *Nephrops* discards from the trawl fleet in these areas. This information is the only field data available to corroborate the low level of *Nephrops* discarding practises in the Spanish fisheries.

#### Material and Methods

Table 1 shows details of the Spanish sampling programme on discards in the mixed bottom trawl fisheries of Galicia, Cantabrian and ICES Sub-area VII. On each sampling trip, the observer recorded the *Nephrops* number at the length discarded and retained (landed). These data were transformed to biomass using the length/weight relationship.

Because of the small number of *Nephrops* discarded, data correspond to males and females combined (Pérez et al, 1999; Trujillo et al, 1997).

Various methods of raising trip results to estimate discarding by the fleet are currently in use (ICES, 2000). Some of these might cause the estimations to be biased or inaccurate (Pérez et al, 1999). In our case, raising by means of the landing method was applied to raise *Nephrops* discard sampling to the total discard fleet. In this method, discard is raised in relation to landings by the observed vessels and landings by the whole fleet. The method assumes that all vessels have an equal chance of being sampled.

To determine the percentage of retained catch per length class, the proportion of retained catch per length of the total fleet in relation to total catch was used. The data were adjusted by linear regression of a logistic distribution.

#### Results and Discussion

Total discard by area (in weight and numbers) and the percentage of discard estimated in relation to total catch (retained catch plus discard) are shown in Table 2. *Nephrops* discard ranged 4.9-7.3 % by weight in Sub-area VII in 1994 and 1999 respectively, while they are low in the N and NW Spain (min 0.0% – max 3.8%) during the three years sampled.

Length compositions of *Nephrops* discards (Figure 1) show that individuals of the whole range of sizes are discarded. There is not a clear pattern of discarding related to sizes. They are more associated with soft, broken specimens or market procedures than with technical management measures such as minimum landing size. Minimum landing size is 20 mm CL in Region 3 (North and West Galicia, and the Cantabrian are included in Region 3) and 25 mm in Sub-area VII.

Figures of the estimated curves of retention (Figure 2) provide the theoretical behaviour of the discarding practises although they do not explain their causes. In North Galicia and Sub-area VII the discards vary considerably from year to year.

There are only three years of discard estimates available for this species. In the past, the discard rates have been unknown, and the use of the values obtained in the years sampled to correct the time series of catches would cause substantial bias. In particular, the effects of the variability of recruitment, and changes in fisheries policy and market may alter the discard rates (Pérez et al, 1996). These aspects could be the factors that result in the different estimates of discard proportion obtained in the years sampled. Differences are observed in North Galicia, probably due to the small quantity of discard produced in this area, particularly in 1999. In this year, discards are almost non-existent in West Galicia. In Sub-area VII major differences were observed in the length composition of the two years sampled. From preliminary length composition of landings in 1999, catches of juveniles *Nephrops* (<25 mm CL) were low and the discarding practises would have been directed at more abundant or lower length classes in these catches.

## References

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**Table 1.** Discard sampling level of Spanish trawlers per ICES areas and years.

	VIIc,j,k, h		VIIIc (N Galicia+Cantabrian)			IXa (West Galicia)		
	*Year 1994	1999	1994	1997	1999	1994	1997	1999
f. h.	3894	999	1608	1465	542	802	797	408
Hauls	730	230	301	298	118	220	188	90
Ships	15	7	14	25	31	18	22	16
Fishing Days	301	83	109	105	75	67	59	34
Trips	18	7	33	64	46	37	36	21
Harbour	3	3	6	6	6	3	3	3

\*Year 1994 From Pérez et al 1996

\*Year 1997 From Pérez et al 1999

**Table 2.** Estimates of *Nephrops* discards by Spanish trawlers in the bottom fisheries of the Subarea VII and N and NW of Spain

	Year	Tonnes		Number (x1000)		(% Discard/Tot Catch)	
		Retained	Discarded	Retained	Discarded	Weight	Number
Sub-area VII	1994	959	49.3	19305	1902	4.9	9.0
	1999	502	39.4	9338	1538	7.3	14.1
Cantabrian Sea	1994	142	2.6	1922	95	1.8	4.7
	1997	97	0.5	1167	14	0.5	1.2
	1999	124	0.0	3022	0	0.0	0.0
North Galicia	1994	246	1.5	6622	62	0.6	0.9
	1997	219	5.5	5967	281	2.4	4.5
	1999	40	0.2	487	15	0.4	2.9
West Galicia	1994	426	14.0	11471	711	3.2	5.8
	1997	427	16.8	10819	737	3.8	6.4
	1999	240	0.2	5242	32	0.1	0.6

Figure 1. Length composition (% of annual discard in number -N- by length class) of *Nephrops* discards per area.

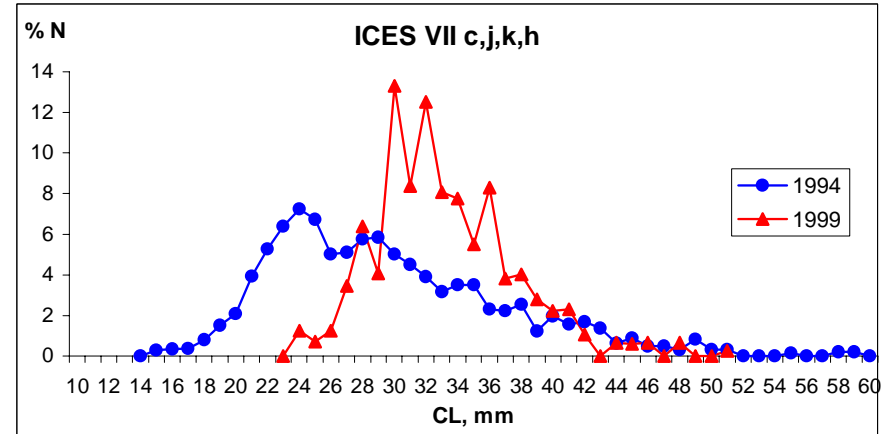
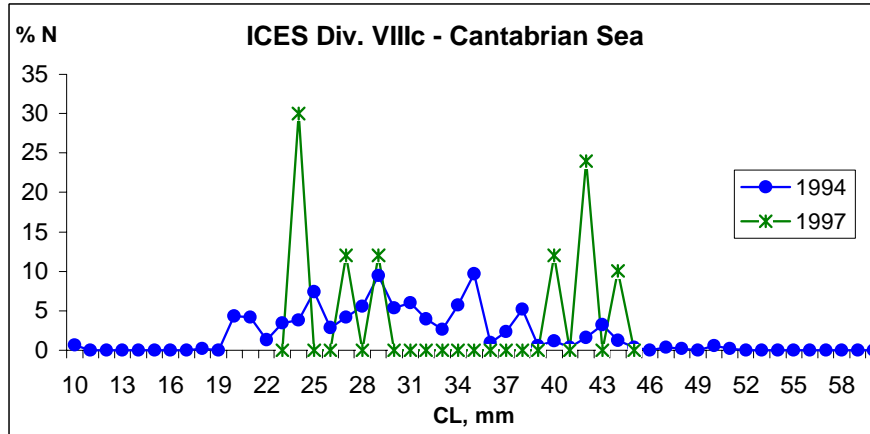
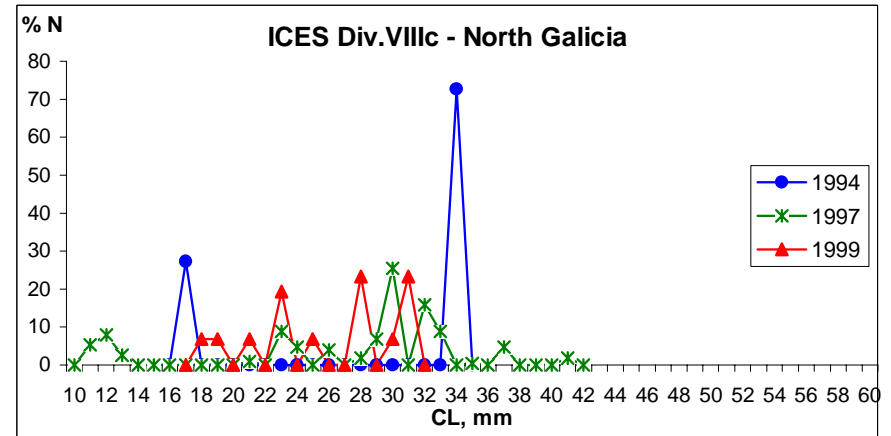
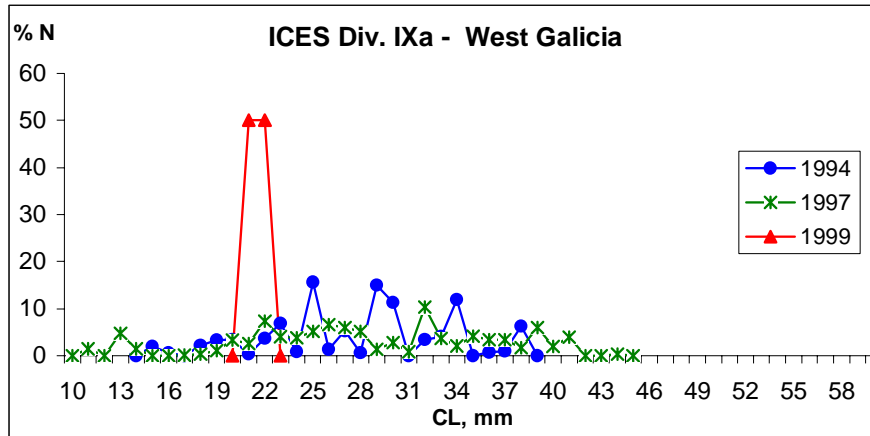


Figure 2. Observed and estimated values (points and lines, respectively) of the percentage of *Nephrops* retained by length class (CL, mm) in 1994, 1997 and 1999.

