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Estimates of discards from the spanish trawler fleets in the sub-area VII.

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The assessment of fishery interactions in I.C.E.S sub-areas VII and VIII was untill now realized using only landing data, or applying discard data from some fleets with known discards. So the 1988's report of this working group pointed out that " for all species there is a serious shortage of information on discards. The consequence of assumption on discarding practises are major in evaluation of technical measures, and to improve the analyses more discard data are essential".

Taking into account these recommandations a study of the spanish trawlers discards is conducted by the fisheries laboratory of Vigo (N/W Spain). Since 1988 two observers monthly ship on spanish trawlers.

The objective is to determine the length composition of discards of target species (megrim, monk, hake and nephrops) and those of a few by-catches species (blue whitting, mackerel and horse-mackerel).

Sampling design.

The target population is made up of all the hauls of the trawler fleets. The sampling unit is the haul. The characteristic studied is the number of fishes discarded by length class (centimeter) in the haul, for each species.

According with its structure, the target population is stratified by port (Vigo, A Coruña) and quarter. Two phases of clusters are considered into each stratum :

- cluster of "trip".

- cluster of "haul" belonging to a cluster "trip".

The sampling design consist, in a random sample of some hauls of various trips into each of the four annual strata. A part of the discard is randomly selected from the total in each sample haul. In this sample all individuals of the target species are measured.

In order to estimate the total number of fishes discarded for length classes, the method of the mean by element population is used (COCHRAN 1977). The estimate of the mean number of discards by haul is then multiplied by the number of elements in the target population (number of hauls in the stratum "port-quarter").

Fitting technique of discard ogives.

To fit discarding ogives from length distributions of discards and landings we used the software "TRILOG" written by B.MESNIL (IFREMER NANTES). This program use a simplex algorithm and does not require a log-transformation. This method is not sensitive to the range of length classes extending outside the interval where actual selection takes place, and gives excellent fit in most cases, particularly when discards length composition is not plurimodal (Anonymous 1988).

Results.

Results presented here are only global ones. Intermediary results, discards in stratum "port-quarter", reveal that Vigo trawler fleet works most of time in divisions VIIj and VIIh, while A Coruña's one works essentially in divisions VIIc and VIIk.

Skippers from Vigo look for megrim in the southern part of the I.C.E.S sub-area VII, on the superior part on the continental shelf, at dephs between 150m and 200m. Skippers from A Coruña look preferently for nephrops and hake in the northern part of the I.C.E.S sub-area VII, at depths between 300m and 500m.

Tables (1) and (2) include the percentage of spanish fleets discards by length class, estimated by the sampling, and fitted by the software, for each specie for 1988.

Table (3) contains, the parameters of the logistic curves and their position characteristics, estimated by the fitting model for each specie.

Figures (1), (2) and (3) illustrate the curves obtained from the sampling data and from the fitted data, for each specie.

The analysis of the curves allow the classification of the species studied in two categories :

- species whose discard ogives have strong slope : megrim (L. whiffiagonis) and monks (L. piscatorius and L. budegassa). Slope values are respectly 0.82, 1.03 and 0.69.

- species whose discard ogives have a weak slope : hake (M. merluccius) and nephrops (N. norvegicus). Slope value is 0.34 for each specie.

Discard ogives comparison reveals that studied fish species have a L50 very similar ($\sim$ 20 cm).

Discussion.

Three factors influence the form of discard ogives :

- the vulnerability of the species. It is the result of the "in situ" interaction, between the fishes and the trawls. It is directly related with the shape of the fish and the mesh of the trawl.

- the market conditions. The interest for small length fishes, or for a specie, influence strongly their sorting out by the fishermen.

- the sampling design. If the sample is not a fully random, a bias is introduced and the proportion of smallest indivuals in the discards may be over or under evaluate. Moreover, when sample rate of trip in a stratum "port - quarter" is weak, results would be very affected by the the skippers strategy.

Discard ogive slopes show a strong correlation with the the shape of the fish. Megrim and the monks are the species with the widest body. The difference noted between the two monks comes from the market influence, as L. budegassa individuals are more appreciated.

The weak slopes of hake and nephrops discard ogives is due both to the high vulnerability of these species and the high market interest for them.

The present study is a first approach to the estimate of the spanish discards. The whole fleet could not be sampled, as Cantabrian trawlers have not be taken into account. Moreover, various bias introduced by the sampling technique and the estimate of the number of hauls in each stratum "port -quarter", might be important. So this has to be considered when using these data.

REFERENCES.

ANONYMOUS (1988).- Report of the working group on fisheries units in sub-areas VII an VIII. Nantes France. 22-28 Juin 1988.
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COCHRAN W.G (1977).- Samplings technics.
3rd. Edition. Wiley J. and sons. New York. 413p.

Length (cm)	L. whiffiagonis		M. merluccius		L. piscatorius		L. budegassa	
	Observed	Fitted	Observed	Fitted	Observed	Fitted	Observed	Fitted
15.5	97.55	100.00	100.00	100.00	100.00	100.00	100.00	100.00
16.5	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
17.5	96.96	94.64	88.42	76.29	100.00	100.00	100.00	100.00
18.5	92.50	88.56	83.52	69.53	81.85	86.38	100.00	100.00
19.5	81.84	77.25	50.77	61.81	93.69	69.34	100.00	100.00
20.5	58.66	59.83	42.85	53.44	44.97	44.66	26.41	38.87
21.5	40.95	39.51	35.42	44.86	22.57	22.35	21.72	22.63
22.5	21.23	22.27	34.23	36.59	5.17	9.31	22.45	12.79
23.5	10.20	11.16	18.04	29.04	0.00	0.00	7.05	6.86
24.5	4.56	5.22	24.79	22.49	0.00	0.00	2.92	3.56
25.5	2.40	2.36	25.16	17.06	1.66	0.00	0.19	1.82
26.5	1.04	1.05	12.57	12.73	2.15	0.00	0.17	0.92
27.5	0.61	0.46	11.52	9.37	0.00	0.00	0.36	0.46
28.5	0.43	0.18	6.58	6.83	0.00	0.00	0.31	0.23
29.5	0.27	0.09	4.86	4.94	0.00	0.00	0.00	0.00
30.5	0.09	0.04	4.36	3.56	0.00	0.00	0.00	0.00
31.5	0.13	0.07	1.96	2.55	0.00	0.00	0.00	0.00
32.5	0.00	0.00	0.37	1.82	0.00	0.00	0.00	0.00
33.5	0.02	0.00	0.52	1.30	0.00	0.00	0.00	0.00
34.5	0.00	0.00	0.12	0.92	0.00	0.00	0.00	0.00
35.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table (1) : Observed and fitted values (in %) by length class (cm) of the spanish discards for 1988 in the sub-area VII.

Length (mm)	N. norvegicus	
	Observed	Fitted
15.5	100.00	100.00
16.5	100.00	100.00
17.5	100.00	100.00
18.5	100.00	100.00
19.5	78.73	100.00
20.5	100.00	100.00
21.5	86.09	69.33
22.5	66.86	61.67
23.5	89.35	53.38
24.5	90.97	44.90
25.5	43.64	36.71
26.5	39.81	29.22
27.5	28.86	22.71
28.5	14.63	17.29
29.5	12.60	12.95
30.5	7.71	9.58
31.5	3.80	7.01
32.5	4.48	5.09
33.5	3.09	3.68
34.5	1.55	2.65
35.5	0.63	1.90
36.5	0.88	1.36
37.5	0.59	0.97
38.5	0.64	0.69
39.5	0.22	0.49
40.5	0.45	0.35
41.5	0.50	0.25
42.5	0.15	0.18
43.5	0.27	0.13
44.5	0.94	0.09
45.5	0.58	0.06
46.5	0.06	0.05
47.5	0.00	0.00
48.5	0.00	0.00
49.5	0.00	0.00
50.5	0.00	0.00

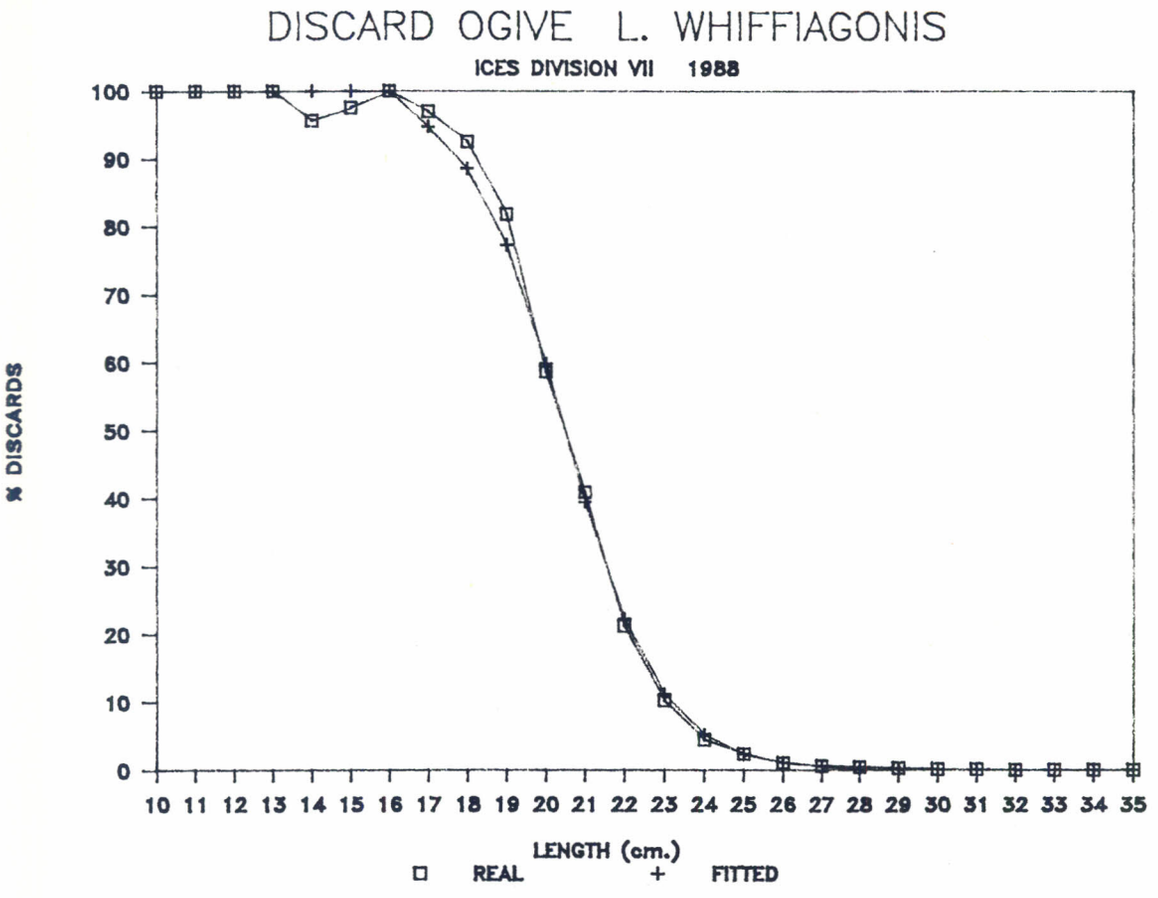
Table (2) : Observed and fitted values (in %) by length class (cm) of spanish discards of Nephrops norvegicus for 1988 in the sub-area VII.

	(1)		(2)	
	a	b	L50	L75-25
L. whiffiagonis	0.82	-17.29	20.98 *	2.67 *
M. merluccius	0.34	- 7.18	20.90 *	6.39 *
L. piscatorius	1.03	-20.92	20.29 *	2.13 *
L. budegassa	0.69	-13.60	19.72 *	3.18 *
N. norvegicus	0.34	- 8.13	23.90 **	6.46 **

(1) : logistic curve parameters (a = slope. b = intercept origin)
(2) : position characteristics of the discard ogives.

* centimeters. ** millimeters.

Table (3) : Logistic curve parameters and position characteristics of the discard ogives estimated from the fitting model.



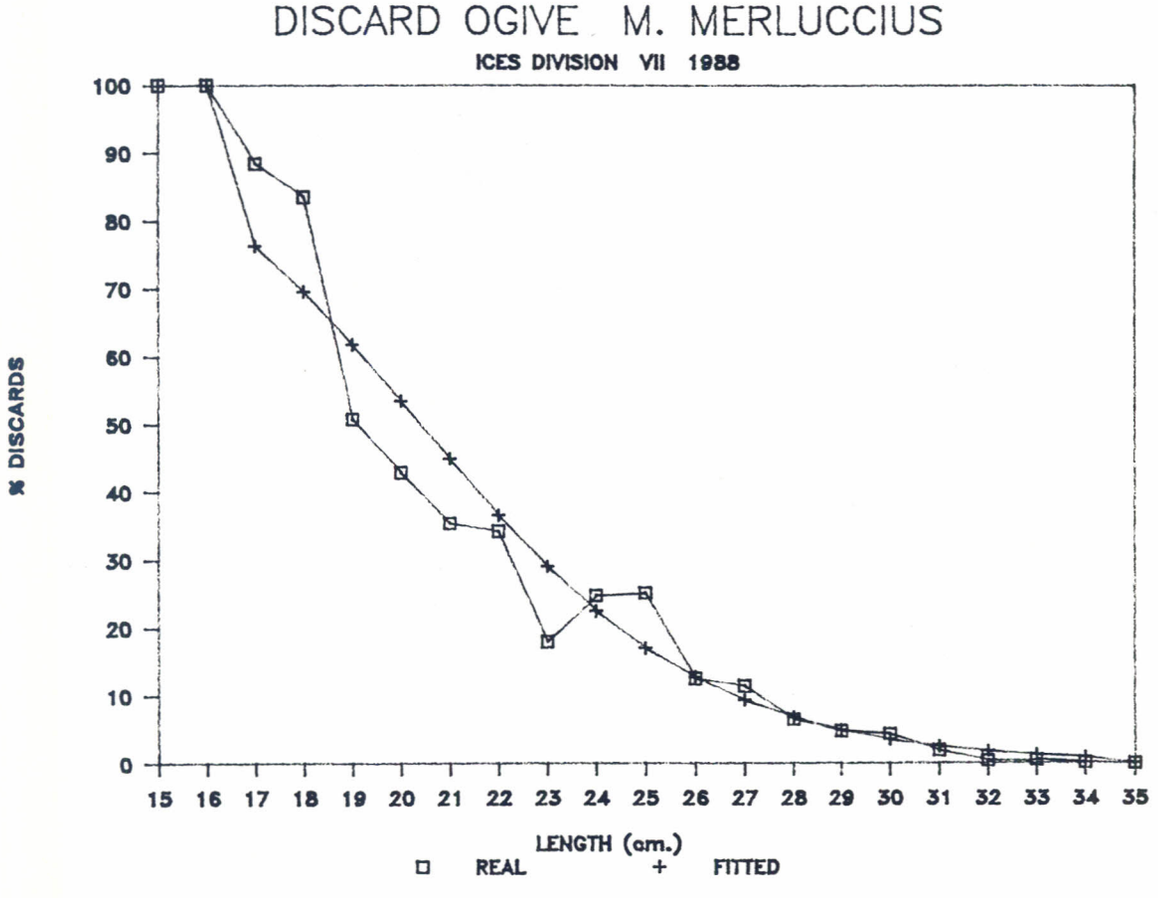
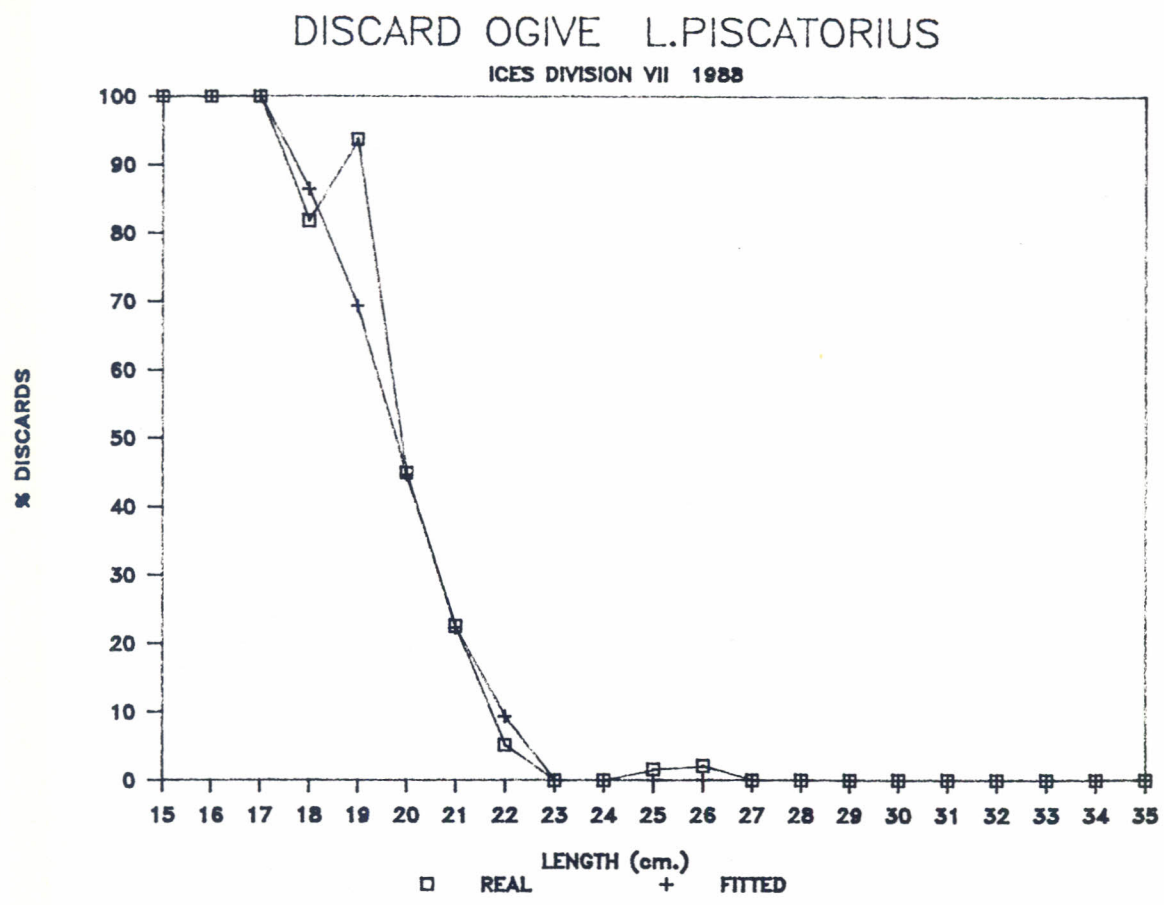


Figure (1) : Theorical and fitted discard ogives for Megrim and Hake.



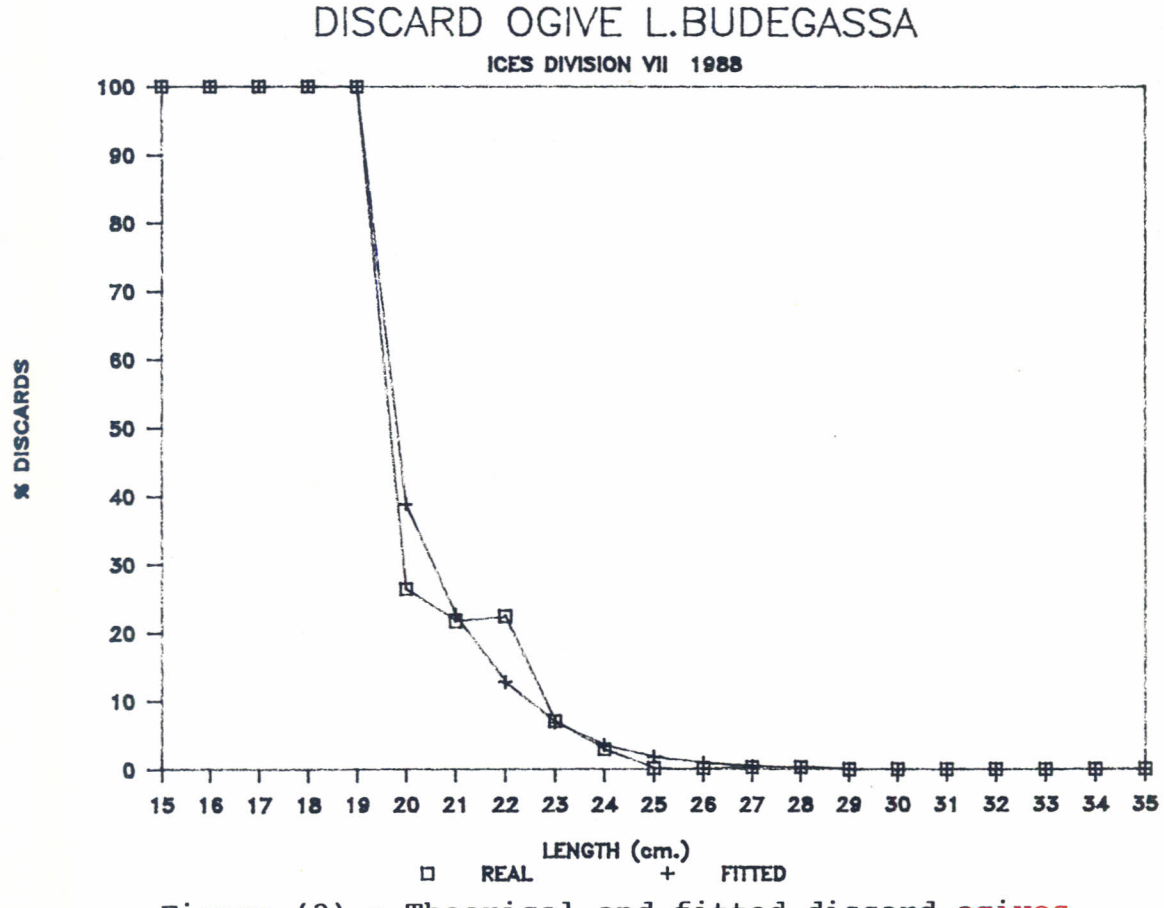


Figure (2) : Theorical and fitted discard ogives

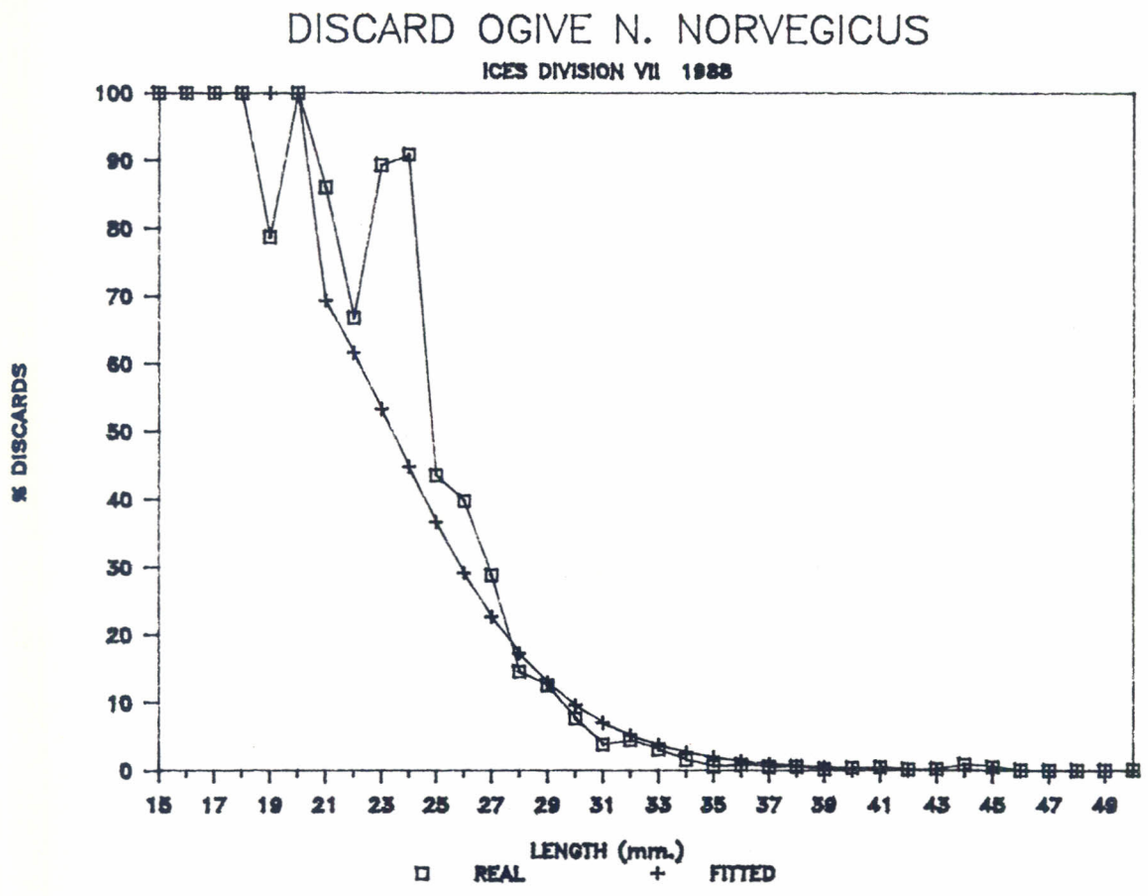
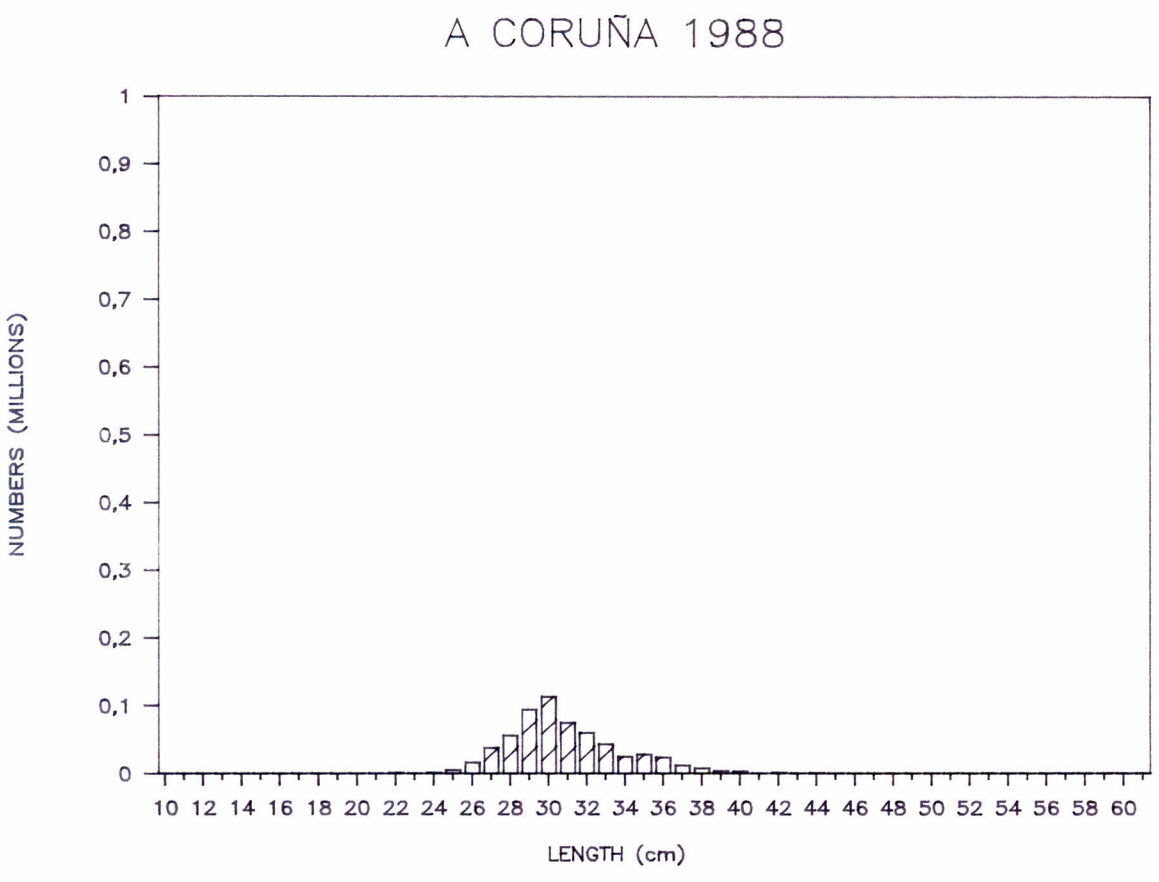


Figure (3) : Theorical and fitted discard ogives for Nephrops.



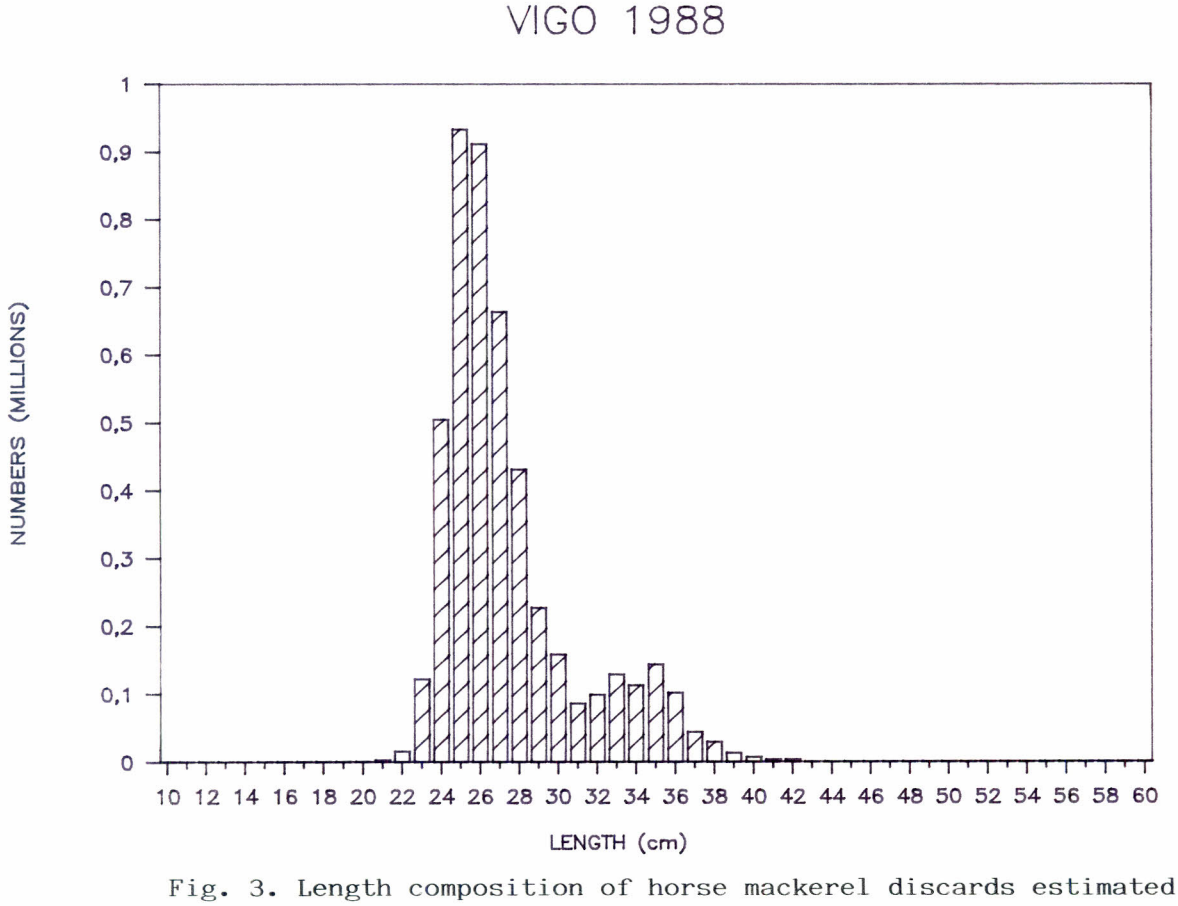


Fig. 3. Length composition of horse mackerel discards estimated for Spanish fishing trawlers in ICES Division VII in 1988.