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Contribution to the study of the Prawn (*Pandalus borealis* Krøyer) Fishery at Greenland

by

S. Fraga
Instituto Español de Oceanografia
Orillamar 47
Vigo, Spain

Introduction

During the 26th Annual Meeting of the International Commission for the Northwest Atlantic Fisheries it was agreed that the total allowable catch and quota allocation for shrimp in Subarea 1 for 1977 should be decided at a special meeting to be held at the Canary Islands (Spain) during November-December 1976.

The present paper intends to give new data on the Spanish fishery and to give new estimates of the stock using the "swept area" method, improving those given by Fuertes and Lopez Veiga (1976).

Materials and Methods

Sampling was carried out during October 1976 on board the stern trawler, *Farpesca IV*, of 471 GRT, using a semi-pelagic gear 33/31.8 m. type, with a 35 mm. mesh size (stretched) in the cod-end.

During 21 fishing days, 103 tows were carried out with a total of 186.7 hours trawled and 103,226 kg of prawn (*P. borealis*) caught. The average trawling speed was 3.5 knots. Sorting was carried out by means of mechanical aids, and once sorting was made 6,386 kg of small prawn was discarded representing 6.18% of the total catch. A total of 2,293 individuals were measured according to Rasmussen's (1953) method, and they were taken before sorting. Twelve different samples were taken from 12 different hauls, thus being a representative sample of the total catch. Furthermore, in order to properly estimate the length composition of the discarded prawn, 1,850 individuals of discards from 8 different hauls were measured. The length composition of the total catch, including discards, is given in Table 1 and Fig. 1. These results are consistent with those given by Fuertes and Lopez Veiga (1976).

Stock Estimate

A stock estimate has been made by means of the "swept area" method, using strictly the area where the fishing vessel was operating; this area is defined by the following geographical points:

67° 43' N	67° 43' N	67° 00' N	67° 00' N
57° 30' W	56° 17' W	56° 17' W	56° 45' W

which has an approximate extension of 3,000 km^2. This area is smaller but approximately coincident with area B described by Fuertes and Lopez Veiga (1976).

We have considered that the horizontal opening between the ends of the wings when trawling is about 20 m., thus obtaining a density of 4.3 metric tons per square kilometer for the area described above. With those values a stock estimate based on the "swept area" method gives 12,900 metric tons for the exploited part of the stock in this particular area. Fuertes and Lopez Veiga (1976) give a stock estimate for area B, for the exploited stock, of 18,230 metric tons assuming an average trawling time of 2 hours.

Spanish fishing fleet operates in the same area as the Faroese fleet does, and we believe that the density, calculated on the basis of a single boat, could be made extensive to the area described by Hoydal (1976) to the west of Store Hekefiskebanke with an extension of 3,700 km^2. Extrapolating we obtain an exploited stock size of 15,910 metric tons for that area.

Fuertes and Lopez Veiga (1976) point out three areas in which the Spanish fishery fleet mainly operates. New data confirm that the area marked as C is also an important fishing ground. The area, described by Carlsson and Smidt (1976) as IV, could include the area described in the present work plus area C of Fuertes and Lopez Veiga (1976). Assuming that the distribution is more or less uniform within this area, and, extrapolating, we obtain an exploited stock size of 34,400 metric tons.

Monthly Yield Variation in the Fishery

From catch and effort data of the Spanish fishing fleet for 1976, and using Meriel-Bussy (1968) index for yield:

$$R = \Sigma\, q_i \cdot \frac{100\ n}{\Sigma\, t_i \quad \Sigma\, p_i}$$

q = catches
n = number of vessels
t = time on grounds
p = HP in the engine

values of this index for the different months of 1976 are given in Table 2. Those values have been calculated for the vessels which were back from the fishing grounds up to the time of the elaboration of the present work. The index is expressed in metric tons/day fished × 100 HP. It can be appreciated that October has the lowest index values.

Discussion

As was pointed out by Hoydal (1976) the "swept area" method gives minimum estimates of the stock size. However, we should like to stress two additional facts; the escape through the wing meshes may be greater than the escape through the cod-end and some escape may occur under the footrope, since it is usually about 1 meter off the bottom.

The extrapolation of the density found in the area described above may not be accurate, but in any case it is evident that fishing activity does occur outside this area and within the area described by Carlsson and Smidt (1976) as area IV; also rough bottom occurs in the area IV, and a part of the shrimp population may not be available to the fishing gears. We believe that 34,400 metric tons is a minimum estimate of the size of the exploited population.

It has to be stressed that the present evaluation has been carried out during October, when the yield in the fishery is the lowest as shown in Table 2, due probably to the fact that a fishing mortality has already occured and a lower availability of the shrimp to the fishing gears due to the scarcity of hours of daylight in this month. Also the yield (Table 2) has been calculated from the landings, but discards during the summer months are bigger than during October due to the fact that the catches in those months are greater and the preference of the fishing industry in Spain is directed to the bigger sizes. Thus we consider that the figure of 34,400 tons is the estimate for this area and for the fishable stock estimate.

It has to be taken into account that in the present work, area A of Fuertes and Lopez Veiga (1976) has not been evaluated. Those authors estimate the exploited stock size in that area to be 8,130 metric tons (assuming an average trawling time of 2 hours). This would make a total of 42,400 metric tons for 1977 and for the exploited stock size for area A of Fuertes and Lopez Veiga (1976) and area IV of Carlsson and Smidt (1976) combined, assuming that the size of the fishable stock in area A of Fuertes and Lopez Veiga (1976) is the same for 1977 that it was in 1976.

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Table 1. Length distribution of the prawn catches and discards.

Length (mm.)	Catches (%)	Discards (% total)	Discards (% by size)
13	0.00	0.001	100.00
14	0.04	0.01	13.90
15	0.09	0.02	26.48
16	0.25	0.09	36.55
17	0.72	0.24	33.62
18	1.37	0.41	30.01
19	2.20	0.31	14.09
20	4.64	0.55	11.85
21	6.31	0.50	7.89
22	9.15	0.52	5.66
23	7.56	0.31	4.08
24	6.99	0.19	2.76
25	10.45	0.54	5.13
26	14.04	0.65	4.60
27	17.15	0.74	4.32
28	11.68	0.55	4.74
29	5.79	0.16	2.70
30	1.38	0.04	2.72
31	0.18	0.00	0.00

Table 2. Monthly variations of prawn yields in 1976.

	APR	MAY	JUN	JUL	AUG	SEP	OCT
Catch (tons)	208.3	1,174.7	1,105.0	935.3	842.5	388.4	161.4
Tons/day	3.47	4.71	4.51	4.70	4.53	3.32	2.48
R	0.29	0.39	0.38	0.39	0.38	0.28	0.21

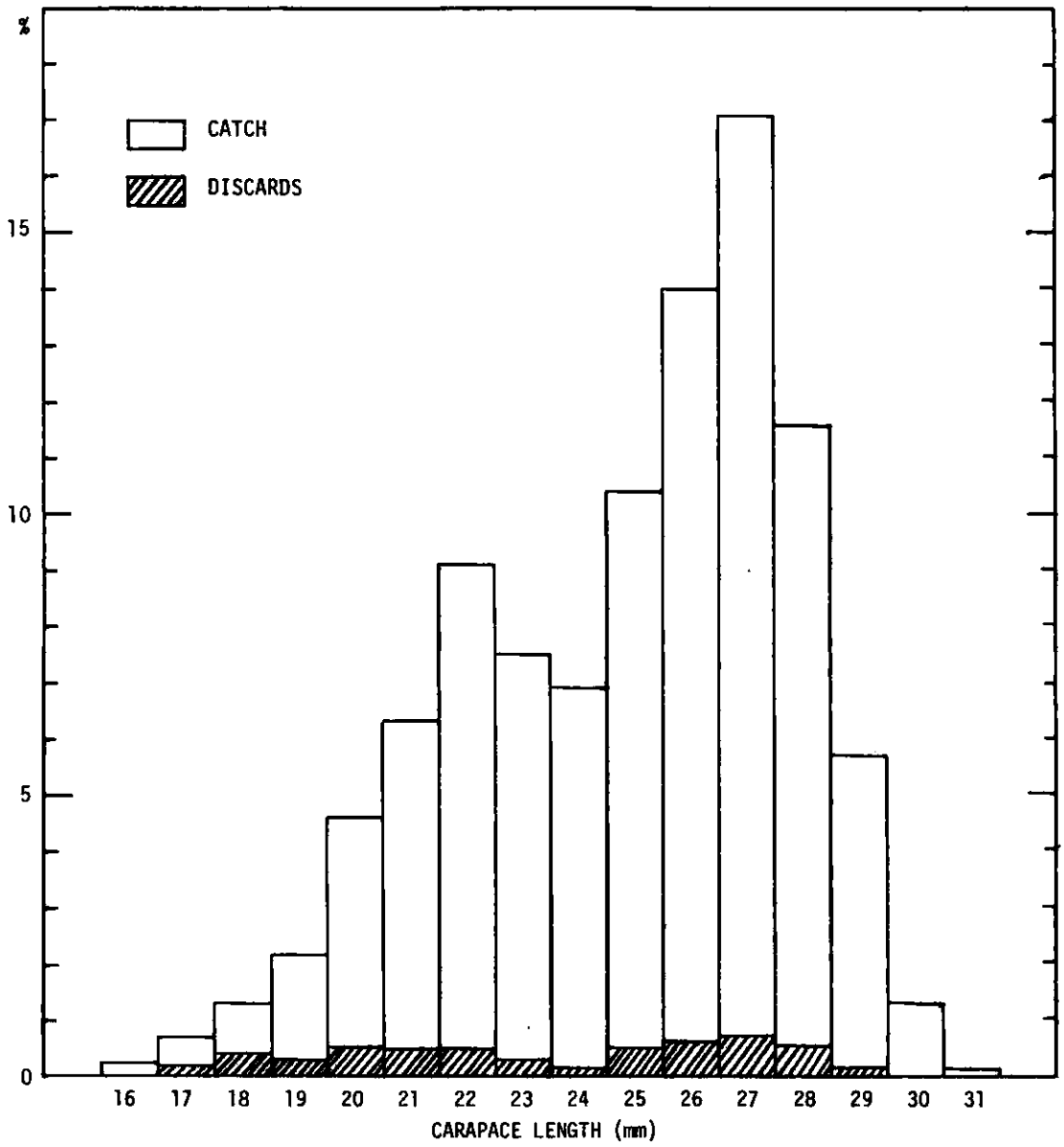

Fig. 1. Percentage length composition of prawn catch and discards, 1976.