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By-catches in fisheries for Pandalus borealis from the
northern part of the Norwegian Deeps in 1965 - 1972.

by

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1. Introduction

This contribution gives some information on the composition and magnitude of the by-catches in the fisheries for the deep sea prawn (Pandalus borealis) in the northern part of the Norwegian Deeps (ICES area 4 A). The data used were brought forward both by investing catch-statistics covering the period 1965 - 1972, and subsampling commercial by-catches landed throughout a year.

Only catch-data from prawn-trawling west of Sotra, Hordaland, were regarded. Statistical data were used to calculate catch per unit off effort (kg/10 hours) both for fish used for human consumption, and for the part of the by-catches used for industrial reduction. A total of 1051 fishingdays throughout 8 years were examined.

To learn the composition of the "industrial" part of the by-catches, subsampling from commercial prawn-trawlers fishing in the actual area were accomplished. From May 1971 to July 1972, 42 catches spread on 27 days were sampled.

2. Results

The calculated figures for the total by-catch per 10 hours a year, show that none of the years (1965 - 1972) are deviating from the mean (1 256.5 kg) by more than 16 per cent. Regarding the two groups

"consumption" and "reduction" separately, the deviations from the means reach 25 - 26 per cent (Table 1, a).

The monthly means for 10 hours fishing (Table 1, b) show that fish for consumption amounts well over 500 kg in the winter months, while only about 200 kg in the summer. Fish for reduction purposes, however, show two peaks, one in the winter and one in April-May, both reaching 1 200 - 1 300 kg.

Fish for consumption broken down to species show that in the 1960's Squalus acanthias by far was the dominating species in the annual 10 h. catches, but was passed over by Molva dypterygia in the seventies. While 10 h. fishing gave about 190 kg in 1965, only 96 kg was gained in 1972. M. dypterygia increased from 56 kg to 103 kg respectively (Table 2).

Of the other consumption species both Raja sp., Gadus morhua, Brosme brosme and Lophius piscatorius give about 20 kg per 10 hours fishing annually, while Merluccius merluccius and Molva molva each reaches about 30 kg. Sebastes marinus gave in 1966 41 kg per 19 h., but only 2 kg in 1969. Pollachius pollachius, P. virens and Hippoglossus hippoglossus are all of minor importance in these catches. One should note, however, the increased catches of P. virens in 1970 and onward (Table 2).

The weight-composition of the by-catches of fish for consumption throughout a year, is shown in Table 3. In the three first months of the year this part of the by-catches is dominated by the S. acanthias, which also contributes with at least one fourth until June. In April and May, the

share of M. merluccius reaches about 42 and 28 per cent respectively. From July until Oktober M. dyperygia by far is the most dominant species with more than forty per cent. Then for the two last months S. acanthias again tops the list with two thirds of the "consumption" by-catches (Table 3).

Table 4 gives the composition in number per species of the samples taken from the commercial by-catches for reduction purposes. The monthly distribution by weight in these samples is shown in Table 5. In May, these by-catches are by far dominated by Micromesistius poutassou (85%). Already in June the situation have changed. Now Argentina sp. make up for 50 per cent, while M. poutassou is reduced to nearly 40 per cent. These two species together with Sebastes viviparus, which in August comes up to fairly twenty per cent, are the dominating species up to and including October. As there were no fishing in the area examined in November and Desember in 1971, there are no samples from these months. The first four months in 1972 are characterized by great changes in the composition of these by-catches from month to month. Only S. viviparus are among the dominating species throughout this period. Argentina sp., which in January amounts to 30 per cent, will for the next three months not exceed 9 per cent. In February and April Etmopterus spinax and M. poutassou together with S. viviparus together make up for about 60 per cent, while in March S. viviparus and M. dyperygia both reach about 35 per cent, while E. spinax and M. poutassou are not present at all. In may and July 1972, the composition of these by-catches look very much the same as in 1971, however, M. poutassou not so dominant now as in 1971. A mean of all the sampled months shows that M. poutassou contributes with 29 per cent of these by-catches, while Argertina sp. and S. viviparus stand for about 25 and 17 per cent respectively (Table 5).

3. Comments

Comperable data to those here reported, are given by SMIDT (1970, Table 6), in his co-ordination of data concerning Pandalus fisheries in the ICES area. In July 1969, M. poutassou and Argentina sp. are the dominating species also in the Coral- and Viking-bank area together with T. esmarkii. The abundance here of this last species is obvious a result of the different depths examined, 218 - 254 m in the Coral- and Viking-banks compared to 280 - 310 m in the area taken into consideration in this paper.

In February and March, 1956, "Anton Dohrn" made a survey in the northern part of the North-Sea. RAHARDJO(1961) reports from that survey that the catches of M. molva were three times the catches of M. dyperygia, and that B. brosme did not occure in the 64 hauls executed. The different proportions between the two Lings, seems again to be explained by the different depths examined. M. molva was caught between 150 - 270 m while M. dyperygia between 200 - 310 m (RAHARDJO, op.cit.). The report on B. brosme, however, stands in contrast to what was found in the present paper (Table 3).

4. References

RAHARDJO-JOENES, G. 1961. Über die Biologie und fischereiliche Bedeutung der Lenfische (Molva molva L., M. byrkelange Walb.) und des Lumb (Brosmius brosme Asc.). Ber. dt. wiss. Kommn. Meeresforsch. (N. F.) 16 (2): 129 - 160.

SMIDT, E. (ed.) 1970. The Pandalus fisheries of the ICES area. Coun. Meet. int. Coun. Explor. Sea, 1970 (K 20) - 1970. [unclear]

Table 1. By-catches in kg per 10 hours fishing.

a) annually, b) monthly mean for the years 1965 - 1972

a)	Year:	1965	1966	1967	1968	1969	1970	1971	1972	Mean
	For consumption:	411	323	343	321	438	282	309	369	349.5
	For reduction:	893	872	893	875	788	892	1 149	894	907.0
	Total:	1 304	1 195	1 236	1 196	1 226	1 174	1 458	1 263	1 256.5

b)	Month:	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Mean
	For consumption:	523	311	475	302	268	219	186	246	287	253	564	560	349.5
	For reduction:	1 215	704	631	515	1 271	1 366	757	853	802	997	1 058	718	907.3
	Total:	1 738	1 015	1 106	817	1 539	1 585	943	1 099	1 089	1 250	1 622	1 278	1 256.8

Table 2. Annual by-catch of fish for consumption broken down to species (kg/10 h).

Species:	Year:										
	1965	1966	1967	1968	1969	1970	1971	1972			
Squalus acanthias	189	76	138	111	178	60	76	96			
Raja sp.	22	23	13	16	23	30	8	30			
Pollachius pollachius	-	-	-	-	2	-	3	-			
" virens	1	1	1	1	1	7	6	4			
Gadus morhua	6	10	20	16	14	10	35	20			
Brosme brosme	20	38	17	14	18	18	17	33			
Merluccius merluccius	18	28	26	36	61	25	39	19			
Molva molva	32	36	28	29	31	19	22	26			
" dypterygia	56	43	61	75	86	83	84	103			
Sebastes marinus	22	41	20	5	2	8	6	18			
Hippoglossus hippoglossus	2	2	2	1	2	1	1	1			
Lophius piscatorius	43	25	17	17	20	21	12	19			

Table 3. Monthly by-catch of fish for consumption broken down to species in per cent of weight.

Mean of the period 1965 - 1972.

<u>Species</u>	<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>	<u>V</u>	<u>VI</u>	<u>VII</u>	<u>VIII</u>	<u>IX</u>	<u>X</u>	<u>XI</u>	<u>XII</u>
Squalus acanthias	49.2	21.6	65.0	25.0	31.5	3.5	-	0.4	1.0	24.5	66.0	67.4
Raja sp.	6.6	14.1	3.2	5.1	6.6	9.2	7.9	7.2	5.5	4.3	1.9	2.1
Gadus morhua	3.8	14.1	1.5	1.6	1.8	2.6	3.7	5.6	3.5	3.5	3.4	0.9
Brosme brosme	2.8	7.8	5.1	7.9	7.7	12.2	9.9	12.0	9.3	5.1	1.7	2.1
Merluccius merluccius	6.8	12.5	12.7	42.4	27.8	11.4	1.0	0.4	0.3	-	0.2	0.5
Molva molva	4.8	6.6	1.9	3.2	5.1	11.4	16.8	17.7	18.0	9.7	8.3	7.6
M. dypterygia	13.0	5.6	6.5	3.8	10.3	30.6	45.0	42.6	48.8	42.4	12.9	13.2
Sebastes marinus	3.8	6.3	0.6	1.3	1.5	3.9	4.7	6.4	5.9	3.5	1.9	0.9
Lophius piscatorius	8.2	7.5	3.2	7.6	6.6	12.7	9.9	7.6	6.2	5.8	2.7	3.5
Others	1.0	3.9	0.4	2.2	1.1	2.6	1.1	-	1.4	1.2	1.0	1.9
Total	100.0	100.0	100.1	100.1	100.0	100.1	100.0	99.9	99.9	100.0	100.0	100.1

