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On By-catch of Cod in Research Redfish Catch on the Flemish Cap Bank in 1988-1991

by

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ABSTRACT

By-catch of cod in redfish catch by bottom and mid-water trawl is studied on the basis of materials from trawl surveys. Largest by-catches, to 70%, occurred in redfish bottom catches, which did not exceed 100 kg per 0.5 hour haul. In catches over 100 kg the by-catch of cod did not exceed 8-9%. Largest by-catches of cod occurred in waters above 300 m, while biggest redfish catches - deeper than 300 m (down to 700 m). No by-catch of cod was observed in mid-water trawl catches. It has been concluded, that a directed redfish fishery could hardly have any essential effect on commercial catch of cod.

INTRODUCTION

Soviet trawl-acoustic surveys have shown, that numbers and biomass of cod on the Flemish Cap in recent years have been continuously decreasing. As indicated by trawl surveys the biomass of cod decreased from 135.4 thou.t in 1977 to 3.92 thou.t in 1990; in 1991 it constituted 6.74 thou.t (Kuzmin SCR Doc. 92).

Fishing for cod was banned from 1988 to 1990, because of low level of the spawning stock. A number of countries, including the USSR, have regular redfish fisheries with bottom and mid-water trawls in this area in summer season. In connection with the above, a question arises on how large a by-catch of cod could be in directed redfish fishery. It is known that in this area the by-catches of cod taken by Portuguese trawlers in less than 400 m depth made up on the average 14.7% and over 400 m - 8.5% (Godinho et al., 1991). A goal of the present paper is to estimate a by-catch of cod in bottom and midwater-trawl catches from different depth intervals on the Flemish Cap.

MATERIAL AND METHODS

Data from trawl-acoustic surveys, conducted on the Flemish Cap in spring season of 1988-1991 have been used as basic materials.

Survey techniques have been described before in Bulatova and Chumakov (1986), Mamylov (1988), Kuzmin (1991).

Only those bottom catches were selected, that contained redfish. Relative amount of cod in bottom catches from 100 m depth intervals was shown as per cent of the total catch weight. During surveying occasional tows with midwater commercial trawl were completed to verify acoustic findings. Of these catches only those were selected, which contained redfish. The duration of mid-water tows was different, therefore catches were converted to one hour haul.

RESULTS

Trawl survey conducted on the Flemish Cap in 1988 showed, that largest by-catch of cod (to 70%) occurred in redfish catch below 100 kg per 30 min. haul by bottom research trawl. In redfish catch more than 100 kg no by-catch of cod was in fact observed (Fig.1).

The 1989 survey showed that a by-catch of cod was the largest in redfish catch below 200 kg, whereas in catches more than 200 kg a by-catch of cod did not exceed 8-9%.

The 1990 and 1991 surveys provided evidence identical to that from the 1988 and 1989 surveys.

To study the distribution of redfish materials for 1988, 1989 and 1990 were combined. The majority of catches did not exceed 100 kg and were taken predominantly from 301-700 m depth. Catches above 100 kg prevailed from 300-500 m (Fig.2).

Redfish catches for 1988-1991 were distributed by 100 m depth intervals. By-catch of cod was found in redfish catch from 101-500 m (no by-catch of cod occurred deeper than 500 m). Largest by-catches were observed in redfish catches from 201-300 m, where redfish were scarce (Fig.3).

Table 1 and Fig.4, where mean by-catch of cod by depth is shown, also indicate that largest by-catches were from 201-300 m, while no cod by-catches occurred from deeper than 500 m (Table 2).

On occasional occurrences in small redfish catches by-catch of cod reached 70% and more (Fig.1), however, on the average small catches of redfish contained about 12% of cod as a by-catch, catches of 250-300 kg included almost no cod, while its by-catch increased to 8% in catches of redfish of 550-650 kg (Fig.4).

By-catch of cod in redfish catch occurred regularly over all slopes, except deepwater areas and the top of the Flemish Cap Bank (Fig.5).

The fisheries are commonly conducted on concentrations of large redfish. As indicated by trawl surveys large fish (30-40 cm) are distributed between 400 and 700 m (Fig.6), from where a by-catch of cod is very low. Largest cod occurred in by-catch from 200 to 400 m depth (Fig.6).

Largest by-catches of cod were observed in catches, which contained redfish with the average size of 10-25 cm (Fig.7), and the by-catches were dominated by small cod, 20-40 cm in size (Fig. 7).

In research redfish catch by mid-water trawl no cod were found, the by-catch was composed of medusa and low numbers of small pelagic fish (Table 3). No by-catch of cod was either reported from commercial ships fishing for redfish with mid-water trawl.

Thus, directed bottom and midwater redfish fisheries on the Flemish Cap Bank, supported by concentrations of this species, could hardly have any essential impact on the commercial catch of cod.

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Table 1

Mean by-catch of cod in redfish catch and redfish catch by depth as shown by 1988 - 1991 surveys data.

Depth, m	Number of catch	Mean cod by-catch, %	Standard error	Mean catch of redfish, kg	Standard error
101-200	7	7.87	2.076	1.91	1.035
201-300	103	24.82	2.478	42.72	14.693
301-400	95	9.70	1.511	109.72	22.710
401-500	76	3.04	1.455	86.42	14.755
501-600	33	0.02	0.026	113.53	36.093
601-700	44	0.00	0.000	57.39	9.89

Table 2

Distribution of Soviet fisheries effort (days fished) during redfish fishery by depths on the Flemish Cap Bank, %.

Depth, m	Years				Mean 1988-1991
	1988	1989	1990	1991	
101-200	0.4	0.3	0.1	3.3	1.0
201-300	1.4	2.1	3.1	4.8	2.9
301-400	21.7	6.3	34.4	42.3	26.2
401-500	44.8	26.6	30.9	30.8	33.3
501-600	27.3	53.8	23.0	15.1	29.8
601-700	4.4	11.0	8.5	3.9	7.0
101-700	100.0	100.1	100.0	100.2	100.2

Table 3

Description of research catches by mid-water trawl
in Div. 3M based on data from 1987-1990 surveys

Year	Date	Position		Depth, m	Mean depth, m	Redfish: catch, t/h	By-catch
		Lat.,N	Long.,W				
1987	25.06	46°32'	45°43'	326	300	16.1	Medusa
	"-	49 29	44 52	357	210	0.43	Medusa, myctophidae
	"-	46 28	45 27	347	290	0.273	Medusa
	26.06	46 35	45 46	332	275	0.186	"-
	04.07	48 03	44 29	530	485	0.358	"-
	"-	48 01	44 39	400	350	3.158	Medusa, myctophidae
	"-	48 04	45 35	430	340	0.34	"-
	07.07	47 19	45 46	230	210	0.12	Medusa, squid
1988	17.06	47 07	46 19	325	315	9.281	Medusa
	17.06	46 53	46 21	340	205	2.647	Squid
	"-	46 52	46 15	316	289	8.333	-
	18.06	46 35	45 48	408	358	10.0	-
	19.06	46 56	46 28	369	319	4.5	Medusa, noto- skopel
	20.06	46 33	45 33	310	260	1.587	Medusa
	"-	46 28	45 36	400	350	6.0	-
	"-	46 27	45 32	402	350	12.632	-
	21.06	46 28	45 35	360	310	15.0	-
	"-	46 28	45 36	405	355	5.455	-
	22.06	46 27	45 38	400	350	2.0	-
	"-	46 26	45 40	400	350	7.5	-
1990	04.07	47 20	46 05	372	350	0.101	Medusa
	05.07	47 22	46 07	424	410	0.9	"-
	07.07	46 39	44 19	500	320	0.06	"-
	08.07	47 54	45 44	432	420	0.03	"-
	09.07	47 18	46 13	430	405	10.0	-
	10.07	46 27	45 32	409	380	8.0	-

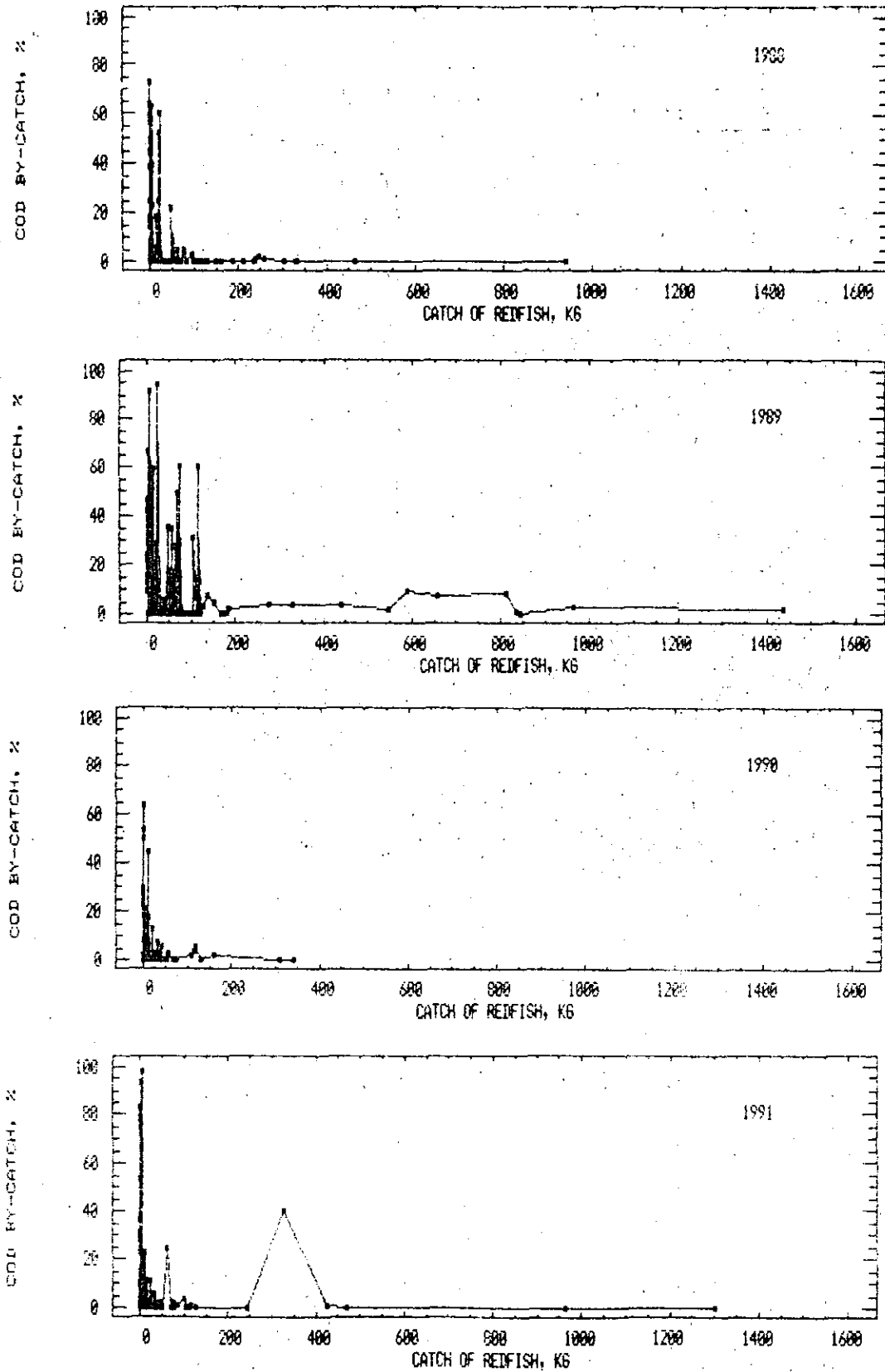


Fig. 1 By-catch of cod in redfish catches based on survey data for 1988, 1989, 1990, 1991.

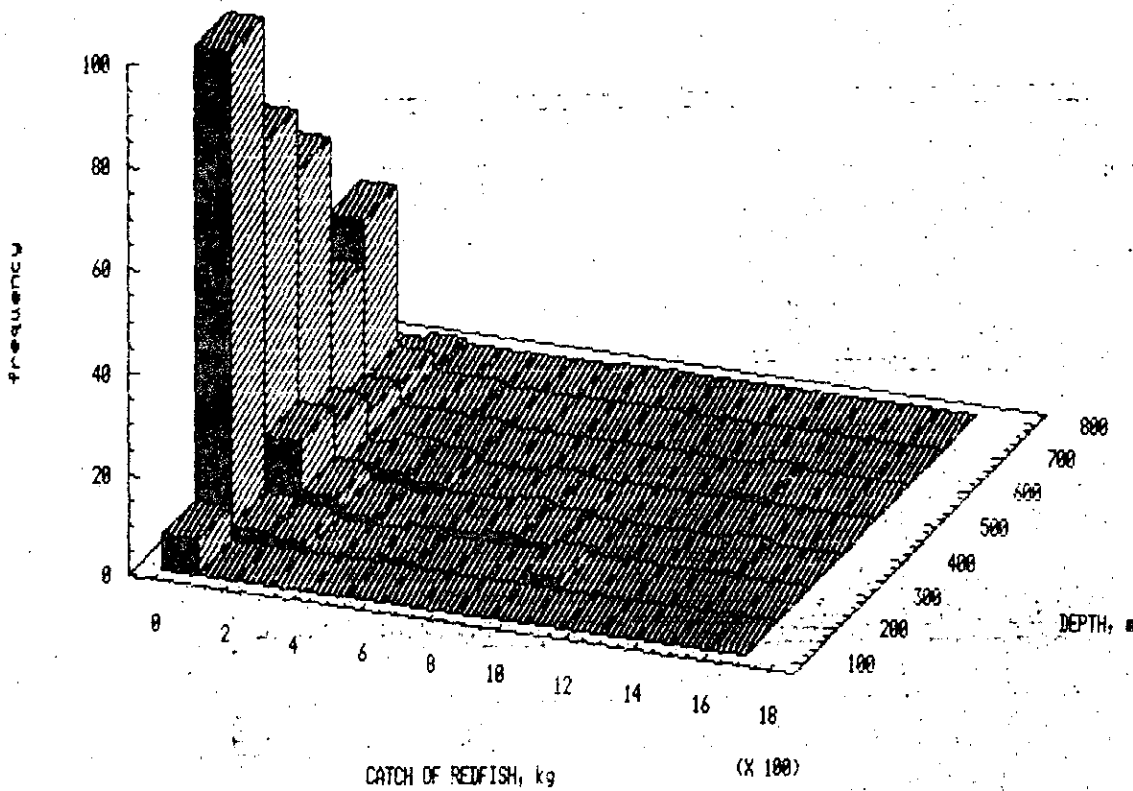


Fig. 2 Distribution of redfish catch by depth in Div. 3M during research surveys in 1988-1991.

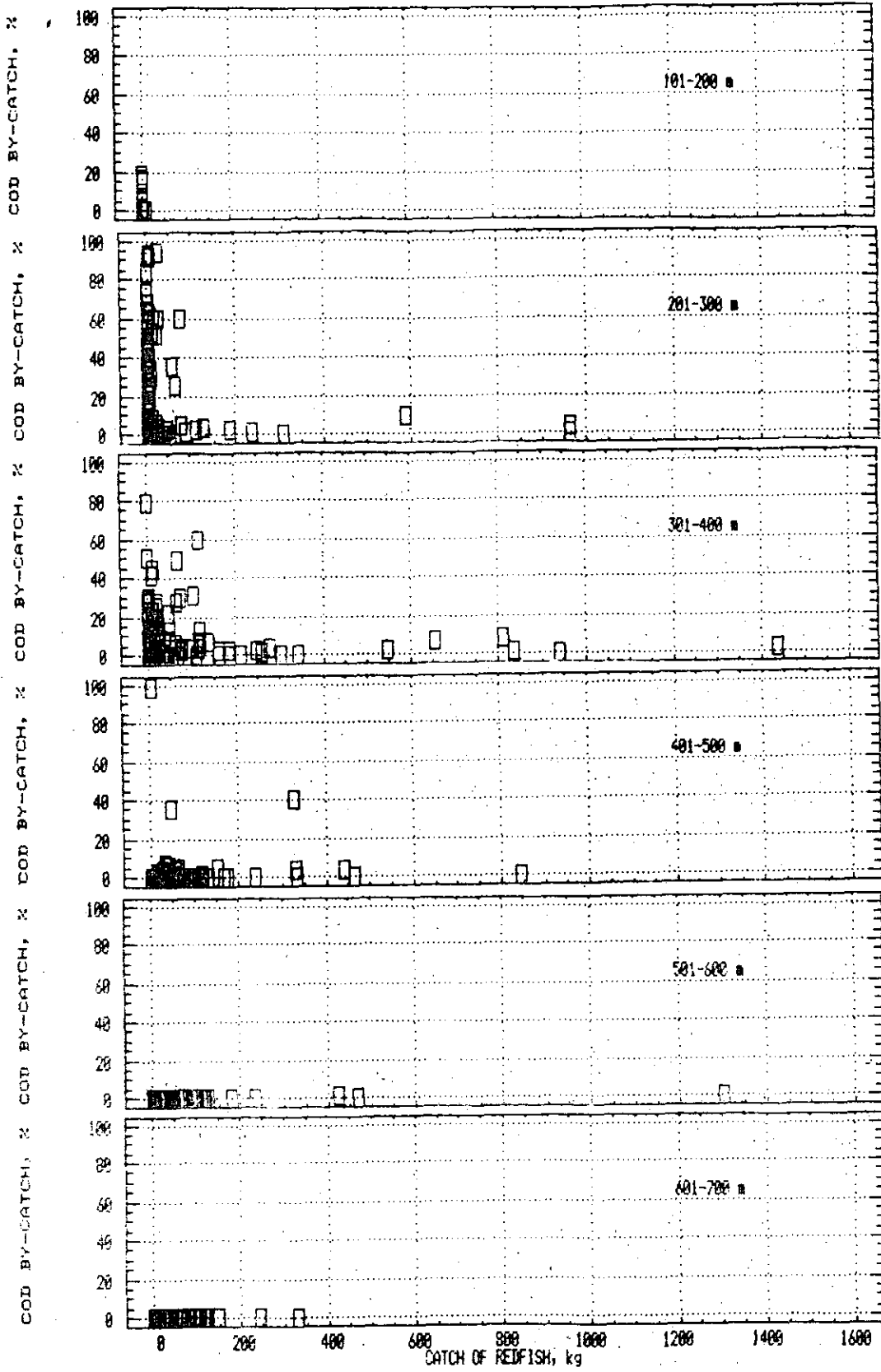


Fig.3 By-catch of cod in redfish catches by 1988-91 surveys data.

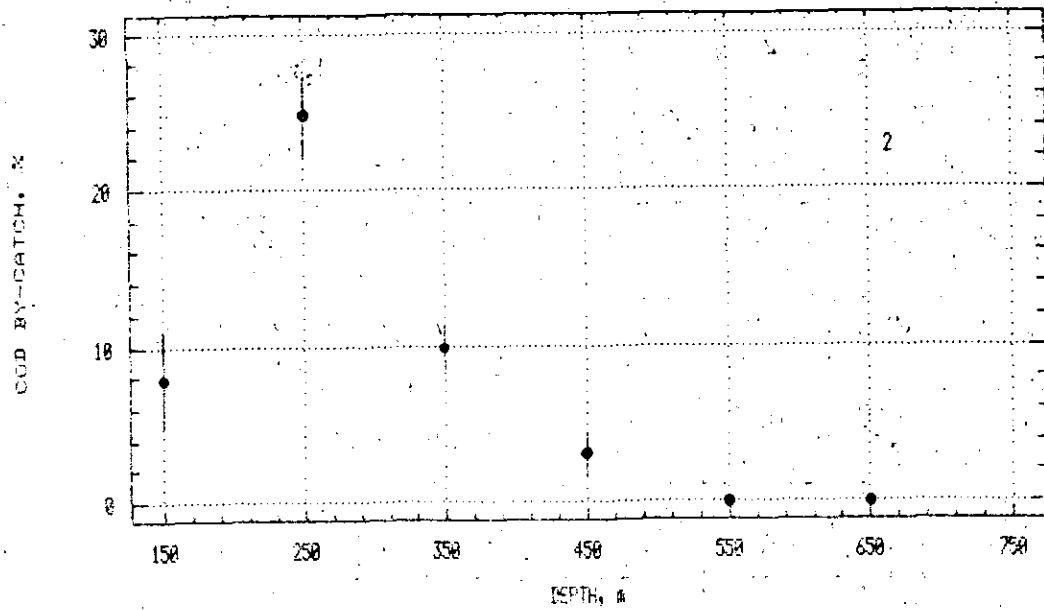
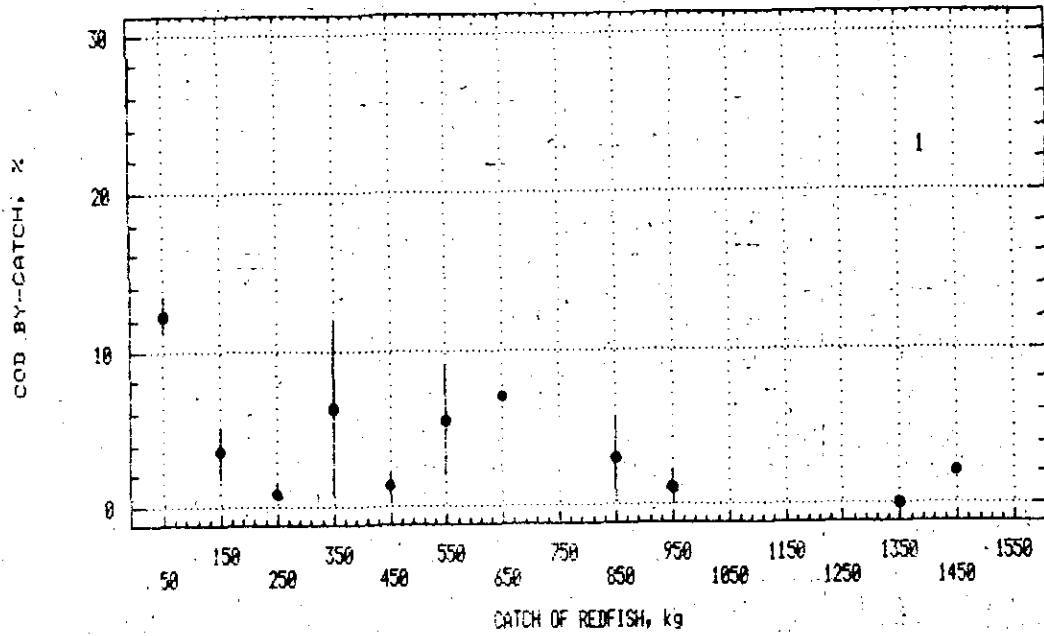


Fig.4 Mean by-catch of cod in redfish catch of different size (1) and by depth (2) as shown by trawl surveys for 1988-1991. The vertical line is standard error.

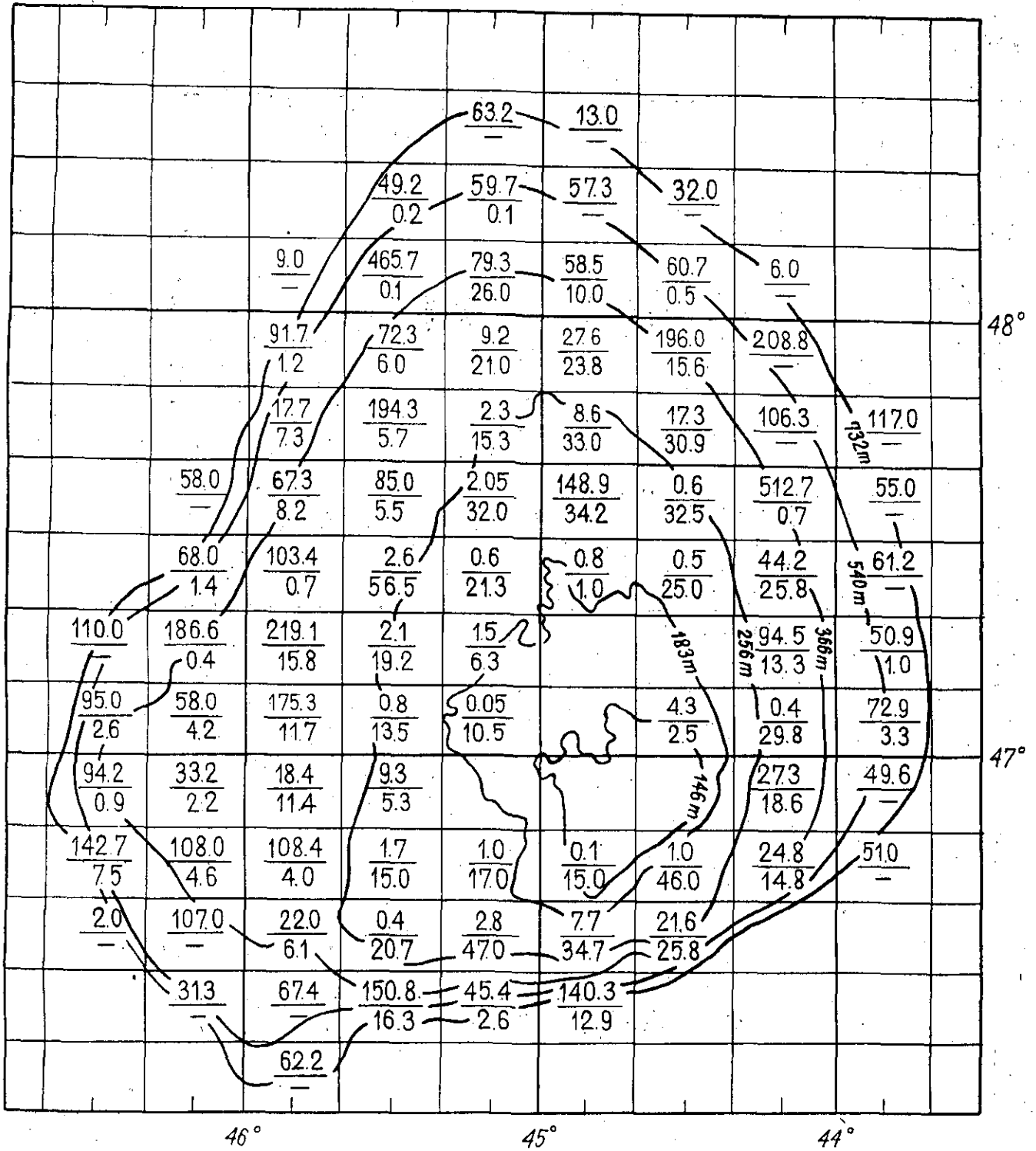


Fig. 5 Distribution of cod by-catch in Div. 3M during the surveys in 1988-1991. In numerator - mean redfish catch, kg and mean cod by-catch, % - in denominator.

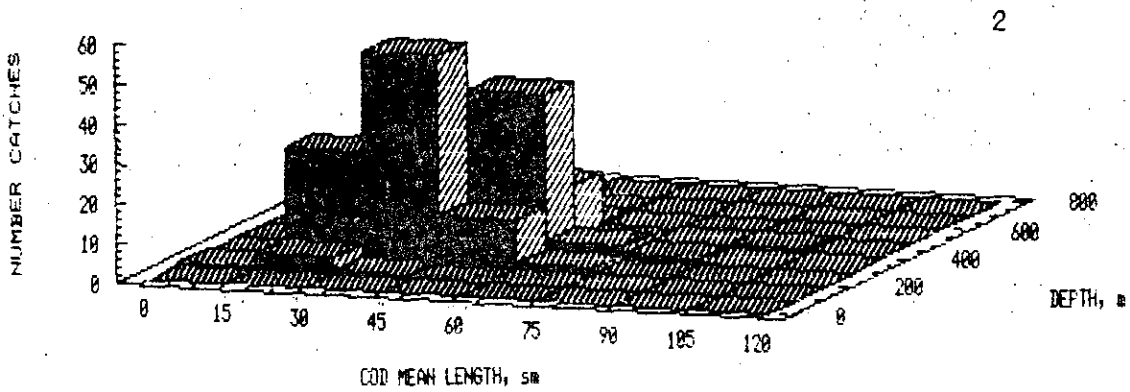
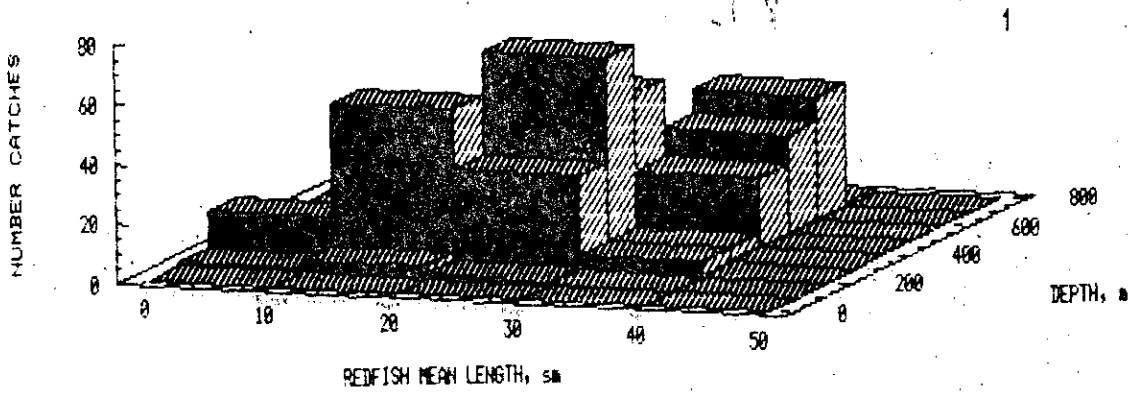


Fig. 6 Mean length of redfish (1) and cod (2) in redfish catches at various depths, by the 1988-1991 surveys data.

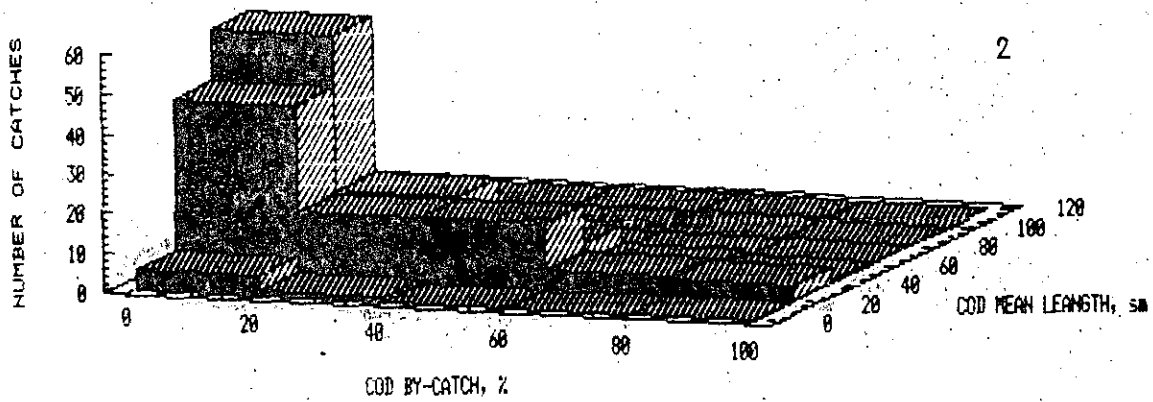
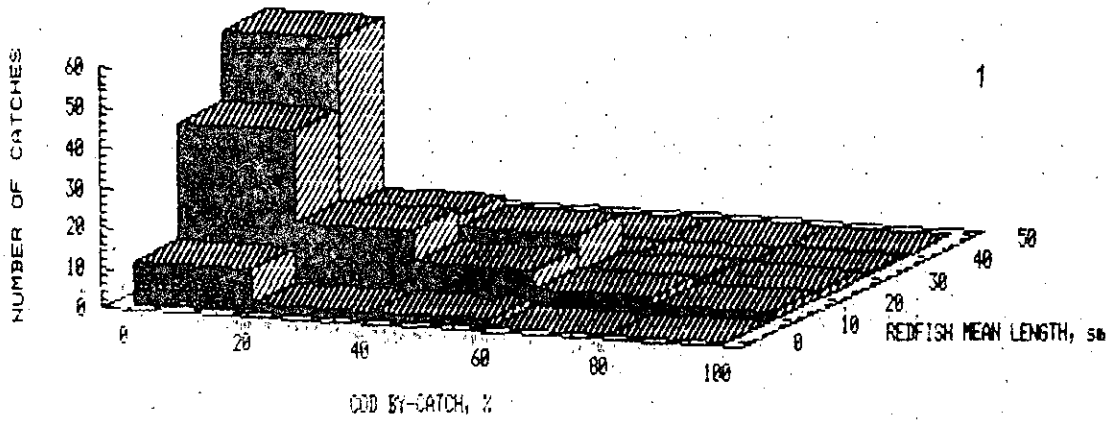


Fig.7 By-catch of cod in catches of redfish of various length (1) and by-catch of cod of various length (2) in redfish catches, by the 1988-1991 surveys data.