NOT TO BE CITED WITHOUT PRIOR
REFERENCE TO THE AUTHOR(S)

Northwest Atlantic Fisheries Organization

Serial No. N2190

NAFO SCR DOC.93/13

SCIENTIFIC COUNCIL MEETING - JUNE 1993

On By-Catches of Cod During Surveys on Redfish in NAFO Divisions 3L, 3N and 3O in 1988-91

by

P. I. Savvatimsky and S. A. Kuzmin
Polar Research Institute of Marine Fisheries and Oceanography (PINRO)
6 Knipovich Street, 183763, Murmansk, Russia

ABSTRACT

By-catches of cod were analysed by Russian bottom trawl surveys on redfish. The largest by-catches riched 90% in catches, which did not exceed 200 kg per 0.5 trawling hour. When redfish catches were more than 200 kg, by-catches of cod did not exceed 8-10%. In the 0-400 m layer, mean by-catches of cod constituted: in Div. 3L - 30.6%, Div. 3N - 11.5% and Div. 3O - 9.3%, respectively. At lower depths, there were practically no by-catches, that justified on the absence of mixed concentrations of cod and redfish. The conclusion, that directed fishery on redfish can hardly influence the commercial catches of cod, is made.

INTRODUCTION

Due to data of Russian trawl surveys, the abundance and biomass of cod in Divs. 3L, 3N and 3O have been decreased steadily for some years. In Div. 3L, biomass of cod reduced from 383 thou. t in 1984 to 167 thou.t in 1991. In Divs. 3N and 3O, cod biomass has sufficiently been changed by years. Results of trawl surveys have shown the reduction of the biomass in these Divisions from 458 thou.t in 1985 to 58 thou.t in 1990. In 1991, the biomass constituted 142 thou.t (Kuzmin, 1992). Concerning trawl acoustic survey in the area of the Grand Bank of Newfoundland, it was not conducted by Russia in 1992. According to data of the Canadian trawl acoustic surveys, the biomass of cod in Divs. 3N and 3O was minimal for the whole period from 1982 (Rep. of Sci. Coun., 1992).

Some countries, including Russia, conduct regular fishery on redfish by bottom trawls in the above mentioned Divisions at sites, located mainly beyond the 200-mile fishing zone. In connection with this, a question on cod quantity, to be withdrawn as a by-catch during the directed fishery on redfish, arises. The goal of the paper is to determine the volume of by-catches of cod taken by a bottom trawl at various depths.

MATERIAL AMD METHODS

The basis of the paper is materials of trawl acoustic surveys on demersal fish species conducted by PINRO on the Grand Bank of Newfoundland in spring 1988-1991. Because of the lack of data for analysis, materials were in some cases summerized for the period of 4 years. Survey methods were presented in previous papers (Bulatova and Chumakov, 1986; Mamylov, 1988; Kuzmin, 1992).

Only catches with redfish, taken by bottom trawl, were chosen. The relative number of cod in catches from 100-m ranges is expressed in weight percent of total catch. Catches were distributed by squares (by 10' latitudes and 20' longitudes) in order to determine the distribution of redfish catches and by-catches of cod in Divs. 3L, 3N and 3O.

RESULTS AND DISCUSSION

Trawl surveys have shown in all Divisions, that while catches of cod were the largest ones and reached sometimes 90%, the catches of redfish were minimal - down to 100 kg (Figs. 1-3). In Divs. 3L and 3N, by-catches of cod were not registered in catches of redfish of more than 500 kg (Figs. 1 and 2); in Divs. 3O, by-catches of cod of less than 10% were in large catches of redfish (Fig.3).

In order to study the distribution of redfish by depths, the survey materials for 1988-1991 were summerized. In Divs. 3L and 3N, the majority of catches was to 100 kg and distributed mainly between 200 and 700 m depths; and in Div. 3O - between 100 and 700 m depths. Catches of more than 100 kg were taken from 300-500 m interval (Fig.4).

In Div. 3L, the largest catches of redfish were taken during trawlings at 601-700 m depth, in Div. 3N - at 401-600 m depth and in Div. 3O - at 101-300 m depth (Table 1). Small redfish (10-30 cm long) were mainly distributed in the shallow waters (Fig.5).

By-catches of cod in catches of redfish from three Divisions differed in the range of 301-400 m and reached 48% in Div. 3L, 15% - in 3N and 16% - in 3O (Table 2). However, it should be noted that relatively high by-catches of cod (which constituted in average 30.6% in Divs. 3L, 11.5% - in 3N and 9.3% - in 3O) were found in catches of redfish of less than 400 kg (Table 3). There were practically no by-catches of cod in catches of redfish.

Small cod predominated at high depths, and their sizes increased with depths (Fig. 6).

By-catches of cod in catches of redfish were distributed equally by all slopes in three Divisions (Figs. 7-9). Catch distribution by squares proves the feature revealed earlier: the largest by-catches of cod were in small catches of redfish; and, vice versa, high catches of redfish did not contain by-catches. It justifies on the absence of mixed concentrations of cod and redfish.

We conducted previously the similar investigations on Flemish Cap and had got the same results (Savvatimsky and Kuzmin, 1992). When catches of redfish were higher than 100 kg, by-catches of cod did not exceed 8-9%. By-catches of cod were high at depths not lower than 300 m. Due to data of Portuguese researchers (Godinho et al., 1991), by-catches of cod constituted in average 14.7% on this bank at depths less than 400 m and 8.5% - deeper than 400 m.

Thus, both on Flemish Cap and in Divs. 3L, 3N and 3O, the directed bottom fishery of redfish can hardly influence the commercial withdrawal of cod.

REFERENCES

BULATOVA, A. Yu., A. K. CHUMAKOV. 1986. USSR Trawl Surveys in NAFO Subarea 0, 2, 3. NAFO SCR Doc., No. 86/66, Serial No. N1183, 13 p.

GODINHO, L., R. ALPOIM, M. CARNEIRO and A. M. AVILA de MELO. Portuguese Research Report for 1990. NAFO SCS Doc., No. 91/15, Serial No. N1926, 51 p.

MAMYLOV, V. S. 1988. Experimental trawl-acoustic surveys in NAFO Subarea 3 from March to July 1987. NAFO SCR Doc., No. 88/24, Serial No. N1460, 27 p.

KUZMIN, S. A. 1992. Stock Assessment of Cod From NAFO Subarea 3 by the Data From 1991 Trawl-Acoustic Survey. NAFO SCR Doc., No. 92/13, Serial No. N2055, 11 p.

Report of Scientific Council, June 1992 Meeting. NAFO SCS Doc. 92/23, Serial No. N2139.

SAVVATIMSKY, P. I., S. A. KUZMIN. 1992. On By-catch of Cod in Research Redfish Catch on Flemish Cap Bank in 1988-1991. NAFO SCR Doc. 92/11, Serial No. N2053, 12p.

Table 1 Mean redfish catch by depth on Grand bank as shown by 1985-1991 surveys data.

Depth, m	3L		3N		3O	
	Number of catch	Mean catch, kg	Number of catch	Mean catch, kg	Number of catch	Mean catch, kg
> 101	-	-	2	0.2	3	4.0
101-200	-	-	4	5.5	28	435.3
201-300	46	2.4	46	36.3	49	266.5
301-400	55	9.7	41	84.2	33	115.1
401-500	33	64.9	26	106.1	13	96.6
501-600	20	24.1	18	122.8	21	105.8
601-700	20	101.2	22	30.1	10	15.6
701-800	2	82.4	1	32.0	3	13.7

Table 2 Mean by-catch of cod by depth on Grand bank as shown by 1988-1991 surveys data.

Depth, m	3L		3N		3O	
	Number of catch	Mean by-catch, %	Number of catch	Mean by-catch, %	Number of catch	Mean by-catch, %
> 101	-	-	2	0.0	3	7.7
101-200	-	-	4	2.5	28	7.6
201-300	46	42.3	46	14.0	49	10.7
301-400	55	48.2	41	15.5	33	16.8
401-500	33	20.9	26	17.2	13	8.5
501-600	20	2.0	18	1.2	21	1.4
601-700	20	0.1	22	0.5	10	0.3
701-800	2	0.0	1	0.0	3	0.0

Table 3 Mean by-catch of cod in redfish catch of different size on Grand bank as shown by 1986-1991 surveys data.

Catch of redfish, kg	3L		3N		3O	
	Number of catch	Mean by-catch, %	Number of catch	Mean by-catch, %	Number of catch	Mean by-catch, %
0- 400	173	30.58	153	11.46	144	9.31
401- 800	1	0.00	4	0.83	8	2.48
801-1200	1	0.00	2	1.50	2	0.53
1201-1600	1	0.00	1	2.00	1	0.04
1601-2000	-	-	-	-	-	-
2001-2400	-	-	-	-	2	0.54
2401-2800	-	-	-	-	-	-
2801-3200	-	-	-	-	1	6.09
3201-3600	-	-	-	-	-	-
3601-4000	-	-	-	-	-	-
4001-4400	-	-	-	-	1	0.03

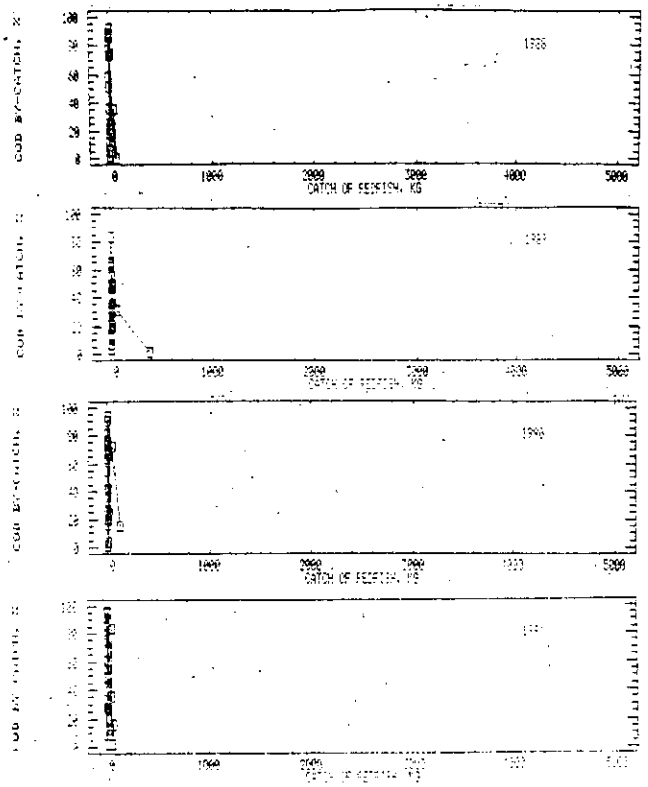

Fig. 1 By-catch of cod in redfish catches based on survey data for 1988, 1989, 1990, 1991 in Subdivision 3L.

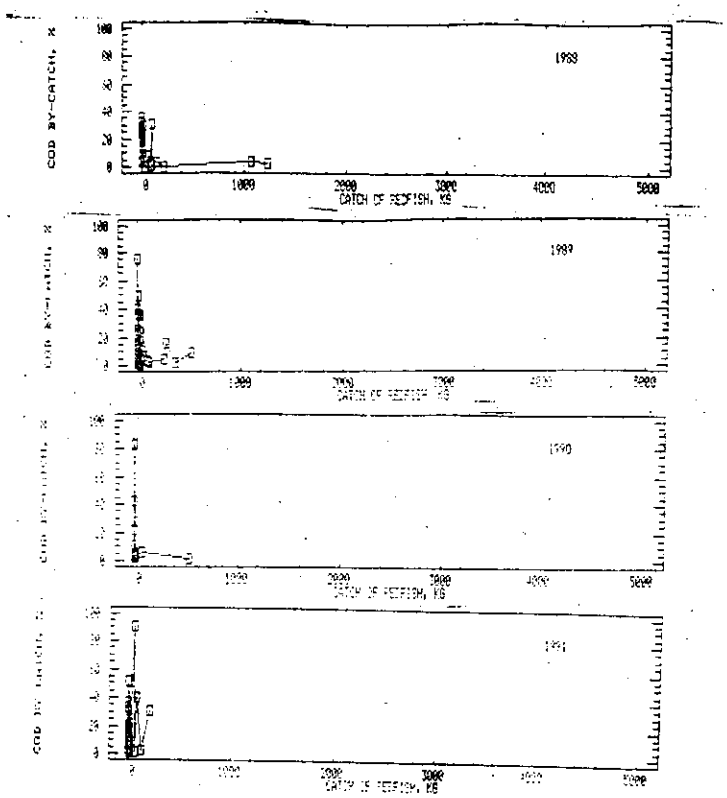

Fig. 2 By-catch of cod in redfish catches based on survey data for 1988, 1989, 1990, 1991 in Subdivision 3N.

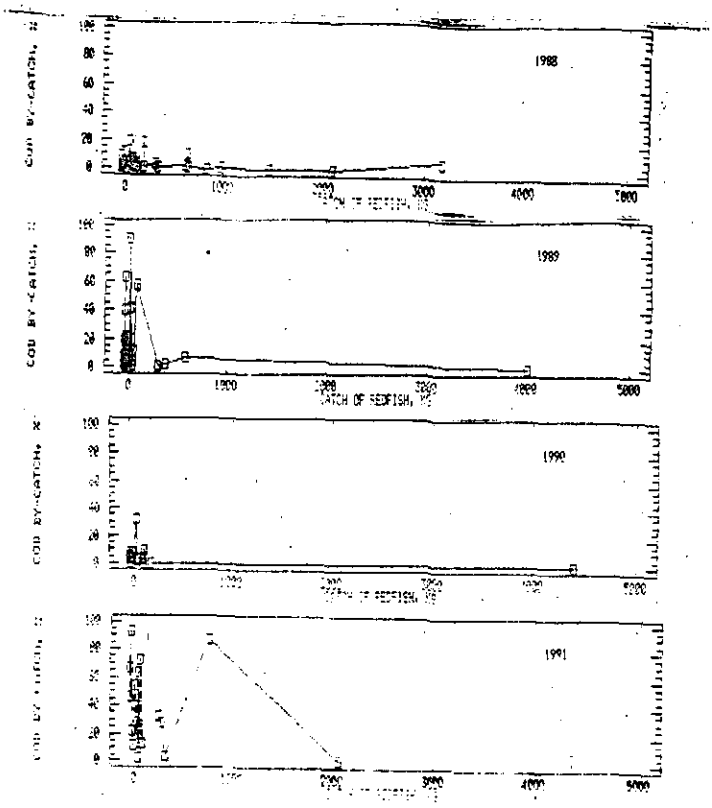

Fig. 3 By-catch of cod in redfish catches based on survey data for 1988, 1989, 1990, 1991 in Subdivision 3O.

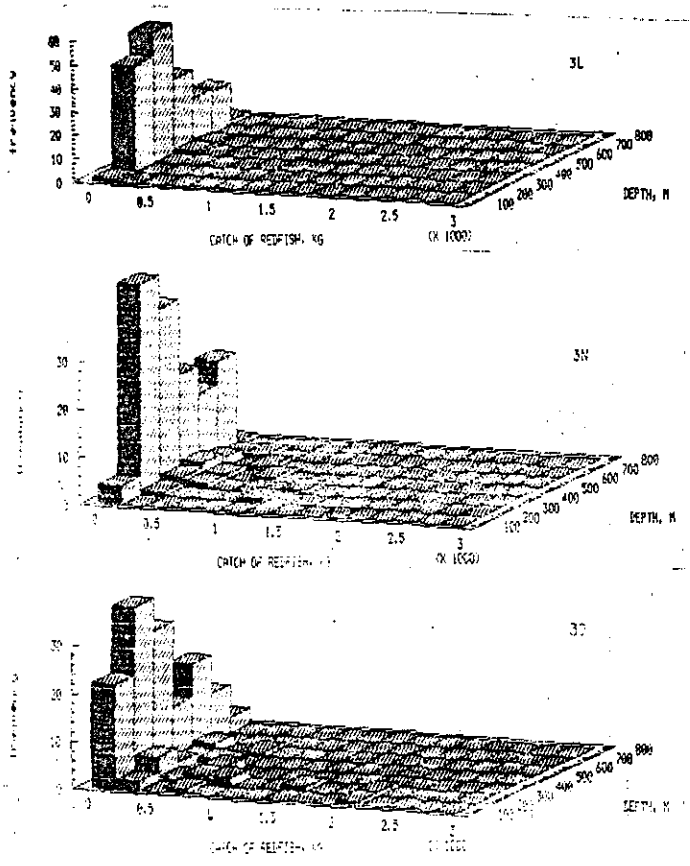

Fig. 4 Distribution of redfish catch by depth on Grand Bank during research surveys in 1988-1991.

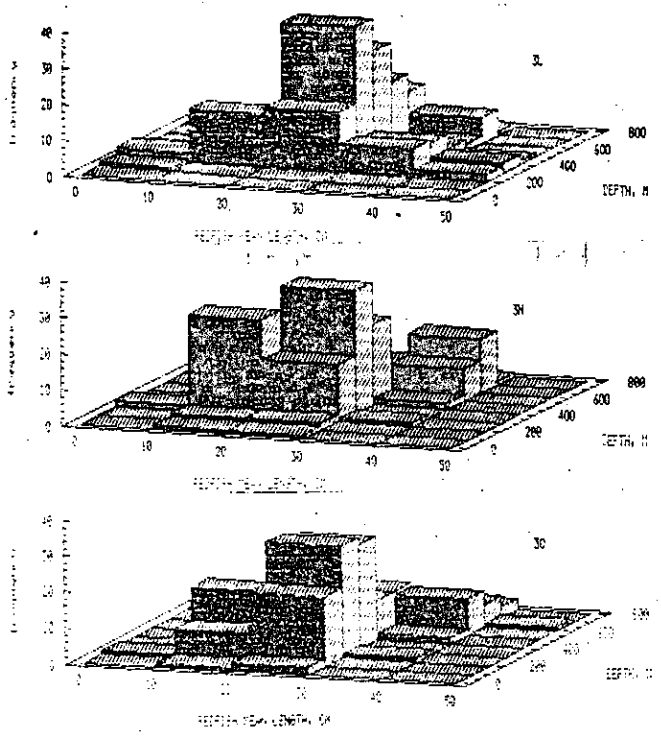

Fig. 5 Mean length of redfish in redfish catches at various depths on Grand bank, by the 1988-1991 surveys data.

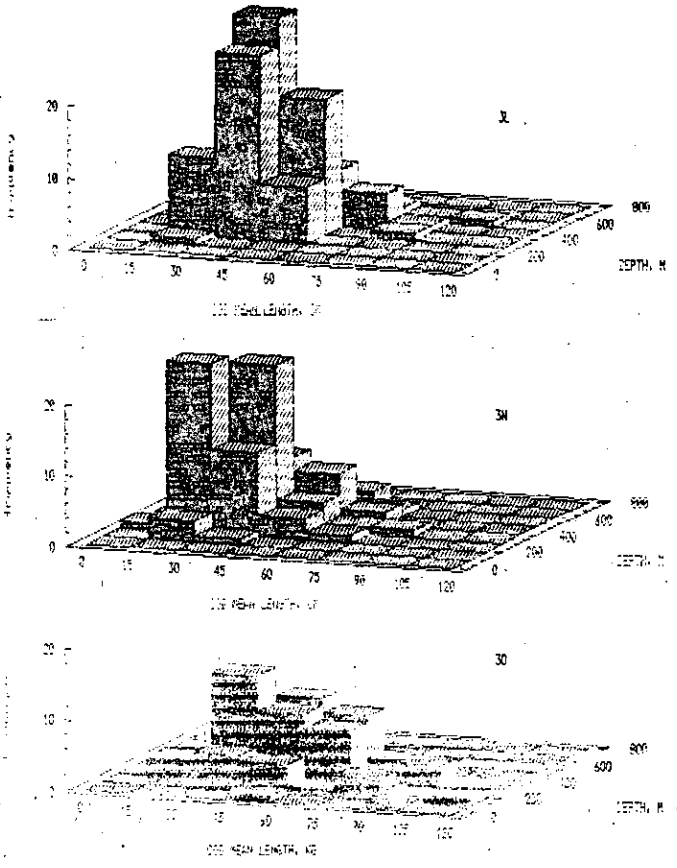

Fig. 6 Mean length of cod in redfish catches at various depths on Grand bank, by the 1988-1991 surveys data.

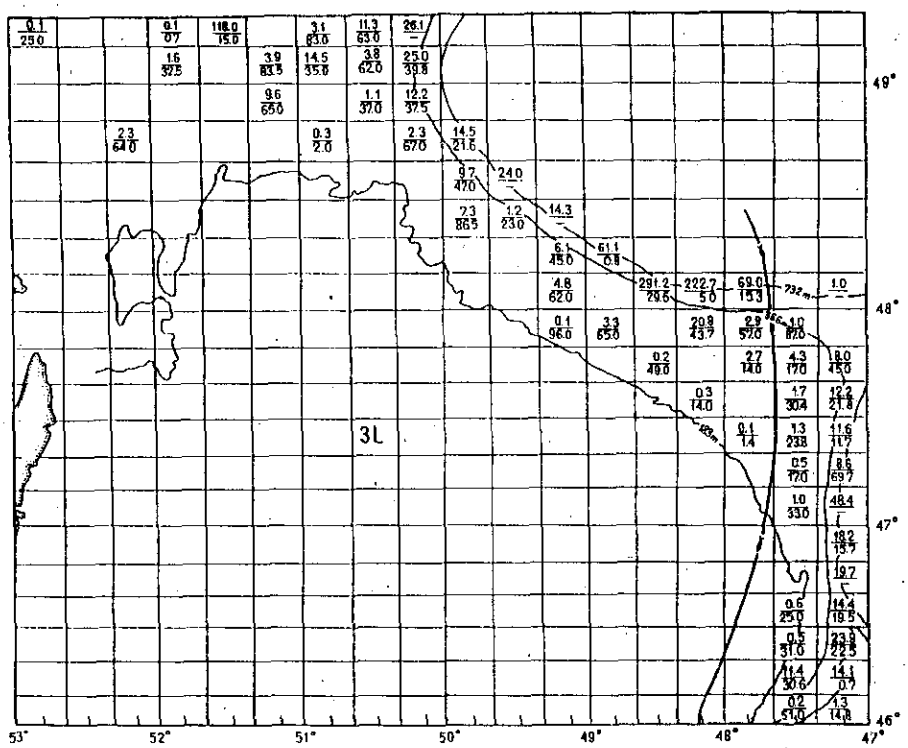

Fig. 7 Distribution of cod by-catch in Div. 3L during the surveys in 1988-1991. In numerator - mean redfish catch, kg and mean cod by-catch, % - in denominator.

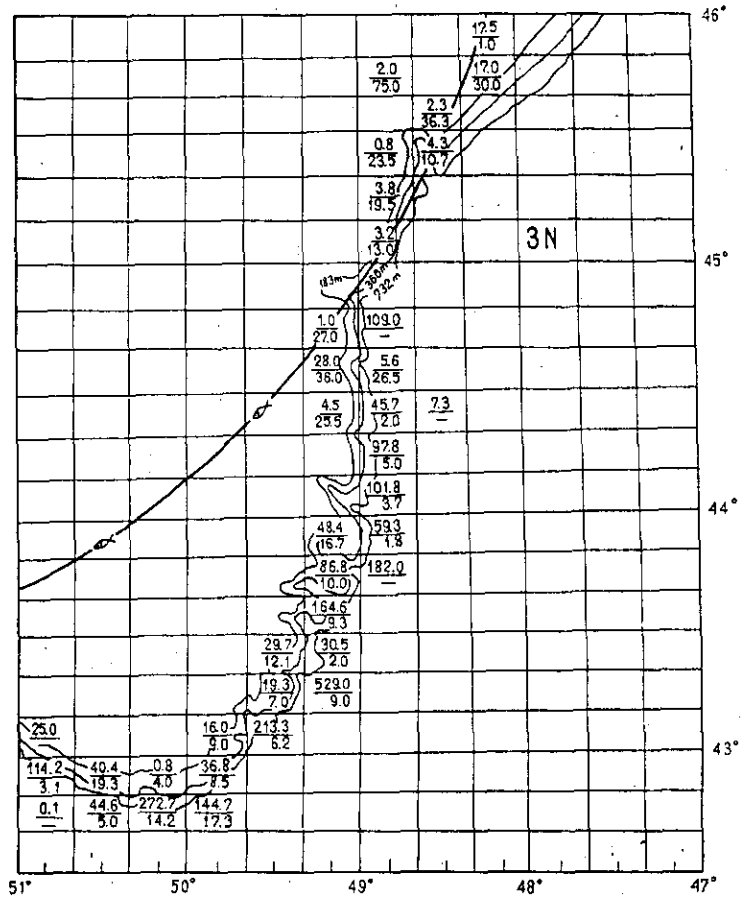

Fig. 8 Distribution of cod by-catch in Div. 3N during the surveys in 1988-1991. In numerator - mean redfish catch, kg and mean cod by-catch, % - in denominator.

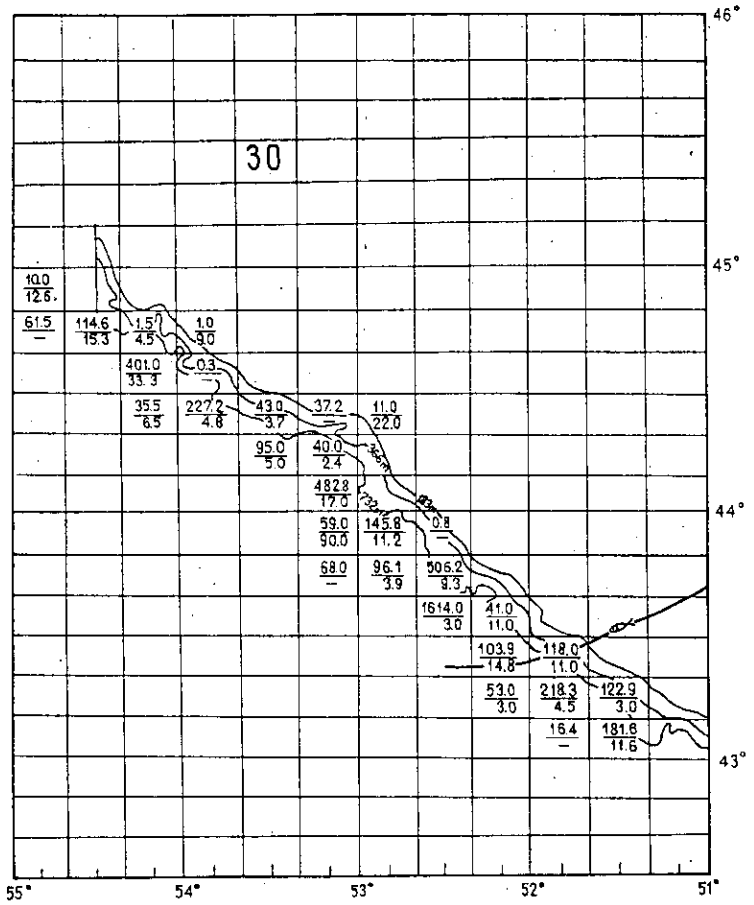

Fig. 9 Distribution of cod by-catch in Div. 30 during the surveys in 1988-1991. In numerator - mean redfish catch, kg and mean cod by-catch, % - in denominator.