

Northwest Atlantic



Fisheries Organization

Serial No. N2673

NAFO SCR Doc. 96/7

SCIENTIFIC COUNCIL MEETING - JUNE 1996

Estimation of Cod Stock in Div. 3M by Data of 1995 Trawl Survey

by

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Abstract

Estimations of cod abundance and biomass are given by results of a trawl survey carried out from 20 to 29 of May, 1995. Data on length and age composition, as well as on cod distribution are presented.

Due to trawl survey data, cod biomass on the Flemish Cap constituted 8.3 thou. t, whereas cod abundance - 17.9 mill. spec.

Introduction

Results presented in the paper were obtained on the basis of data from research cruises being carried out annually by the Polar Research Institute in the North-West Atlantic. The main goal of research is to obtain data for estimation of stock status of main commercial fish species, one of which is cod.

Cod population of Flemish Cap is an isolated one and differs genetically from cod dwelling within the neighbouring area of the Grand Bank of Newfoundland (Cross and Payne, 1976). Isolation of the stock is also proved by results of fish tagging (Konstantinov, 1970), as well as by absence of *Pyramicocephalus phocorum* parasite on the liver (Postolaky, 1978) and by a stable for many years mean number of vertebrae, equal to 54.5 - 54.8 (Lear et al., 1980).

In spite of a moratorium decreed from 1989 to 1990, cod stock on the Flemish Cap is at the low level. Estimations of abundance and biomass of cod stock for 1995 compared with those for 1991-1993 are analyzed. In 1994, no trawl surveys were carried out on the Flemish Cap.

Materials and methods

The trawl survey was carried out by a random stratified method (Doubleday, 1981; Bulatova and Chumakov, 1986). Trawlings were done by a bottom trawl with small meshed insertion (12 mm mesh size) in a codend. The duration of trawlings was 30 minutes at the vessel's speed of 3.5 knots. To describe year-to-year fluctuations in the stock abundance, the results of 1995 survey were compared with historical data of trawl and trawl-acoustic surveys (Kuzmin, 1992; Kiseleva and Vaskov, 1993).

Results

During the survey (May, 20-29), the area of 10.555 m² was investigated; but cod were only distributed in 11 strata of 7.202 mile² square (Table 1, Fig.1). No sufficient concentrations of cod were revealed. Cod distributed mainly in the central part of the bank, where catches did not exceed 50 kg per 0.5 hr trawling. The densest concentrations were revealed at 200-300 m depths,

strata No. 5 and 9 (Fig. 1). Maximum catch was taken at 216 m depth and constituted 244 kg. General distribution of cod on the Flemish Cap corresponded to their recent years distribution excluding areas of their dense concentrations (Fig. 1). The densest concentrations of cod were occurred along the southern slope (mean catch per stratum was upto 200 specimens) in April-May, 1991; in the central and north-western part of the bank (mean catch per stratum - upto 100 specimens) in April, 1992; in the northern and south-eastern parts of the bank (mean catch per stratum - upto 300 specimens) in June-July, 1993; and in the south-central (stratum 5) and southern parts of the bank in May, 1995, where mean catch per stratum constituted upto 300 and 200 spec., correspondingly. Figs. 2 and 3 presents cod length and age composition in catches on the Flemish Cap in the period of 1991-1995.

In 1995, cod with 21 to 102 cm length and 27-29 and 45-47 cm mode (Fig. 2) occurred in valid trawl catches. Cod at the age of 2-4 from 1993-1991 year classes, correspondingly, predominated in catches (Fig. 3). 1991 year class of cod, predominated in Russian surveys of 1993 and Spanish surveys of 1994 (Vazques et al., 1995), was also predominated one in 1995 (Fig. 3). Immature fish constituted more than 50 % of catches, whereas prespawning and spawning fish (both males and females) constituted 25.7 %. In 1995, a portion of mature specimens in catches has increased to compare with preceding years (Table 2), and the earlier maturation of cod at the age of 4 was registered. The least length of mature males was equal to 33 cm, whereas that of females - 39 cm.

In accordance with 1995 trawl survey on the Flemish Cap, cod abundance constituted 17.9 mill. spec. and biomass - 8.3 thou. t (Table 1). In spite of the fact that cod abundance and biomass in 1995 were slightly higher than in 1991 and 1992 but lower than in 1993, the stock is in general lower than long-term mean level (Table 3).

Conclusions

Flemish Cap cod stock is still at the low level, and its abundance constitutes 17.9 mill. spec. and biomass - 8.3 thou. t.

The basis of cod catches was 1991-1993 year-classes. 1991 year class predominated in catches.

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Table 1. Results from the trawl survey for cod in Div 3M, 1995.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/1 valid tow fish	Mean catch/1 tow kg	Abundance, '000	Biomass, tons
501	128-146	342	3	3,3	0,6	84,4	14,9
502	147-188	838	3	19,3	10,0	1200,1	618,3
503	185-256	628	3	38,0	28,3	1767,7	1315,7
504	"	348	3	1,7	1,8	42,9	49,5
505	"	703	3	231,7	81,5	12063,8	4242,3
506	"	496	3	28,3	10,0	1040,9	366,3
507	256-366	822	3	-	-	-	-
508	"	646	3	1,0	0,7	47,3	31,2
509	"	314	3	62,0	58,9	1442,1	1369,7
510	"	951	3	0,3	1,4	23,5	96,8
511	"	806	4	1,0	0,9	59,7	54,5
512	367-549	670	3	0,3	0,2	16,5	9,2
513	"	249	3	2,7	3,6	49,2	66,4
514	"	602	3	-	-	-	-
515	"	666	3	-	-	-	-
516	550-731	634	3	-	-	-	-
517	"	216	3	1,7	1,7	26,7	27,5
518	"	210	3	-	-	-	-
519	"	414	3	-	-	-	-
Area estimated							
total		10555	58	22,9	10,6	17865,3	8262,2
Area except empty strata							
		7207					

Table 2. Number of mature and immature fish in catch per trawling from the data of 1987-1995 trawl surveys on the Flemish Cap Bank

Year	No. of immature fish, spec.	No. of mature fish, spec.	No. of mature fish, %	Total, spec.
1987	56,28	2,32	4,0	58,60
1988	42,13	0,77	1,8	42,90
1989	100,64	4,08	3,9	104,72
1990	6,20	1,20	16,3	7,40
1991	12,62	3,00	19,2	15,62
1992	14,40	1,20	7,7	15,60
1993	23,37	5,23	18,3	28,60
1994	-	-	-	-
1995	11,93	10,97	47,9	22,90

Table 3. Estimates provided by the trawl-acoustic survey for cod in Div. 3M for 1987-1995.

Year	Trawl survey		Acoustic survey		Total	
	Numbers, fish 10^{-6}	Biomass, thou.t	Numbers, fish 10^{-6}	Biomass, thou.t	Numbers, fish 10^{-6}	Biomass, thou.t
1987	36,8	10,2	40,2	9,3	77,0	21,6
1988	26,7	7,7	123,8	26,8	150,5	34,2
1989	70,4	36,5	88,7	41,8	159,1	78,3
1990	4,3	3,9	14,7	11,3	19,0	15,2
1991	10,5	6,7	2,4	1,5	12,9	8,2
1992	8,7	2,4	-	-	8,7	2,4
1993	22,4	8,9	1,0	0,8	23,4	9,7
1994	-	-	-	-	-	-
1995	17,9	8,3	-	-	17,9	8,3

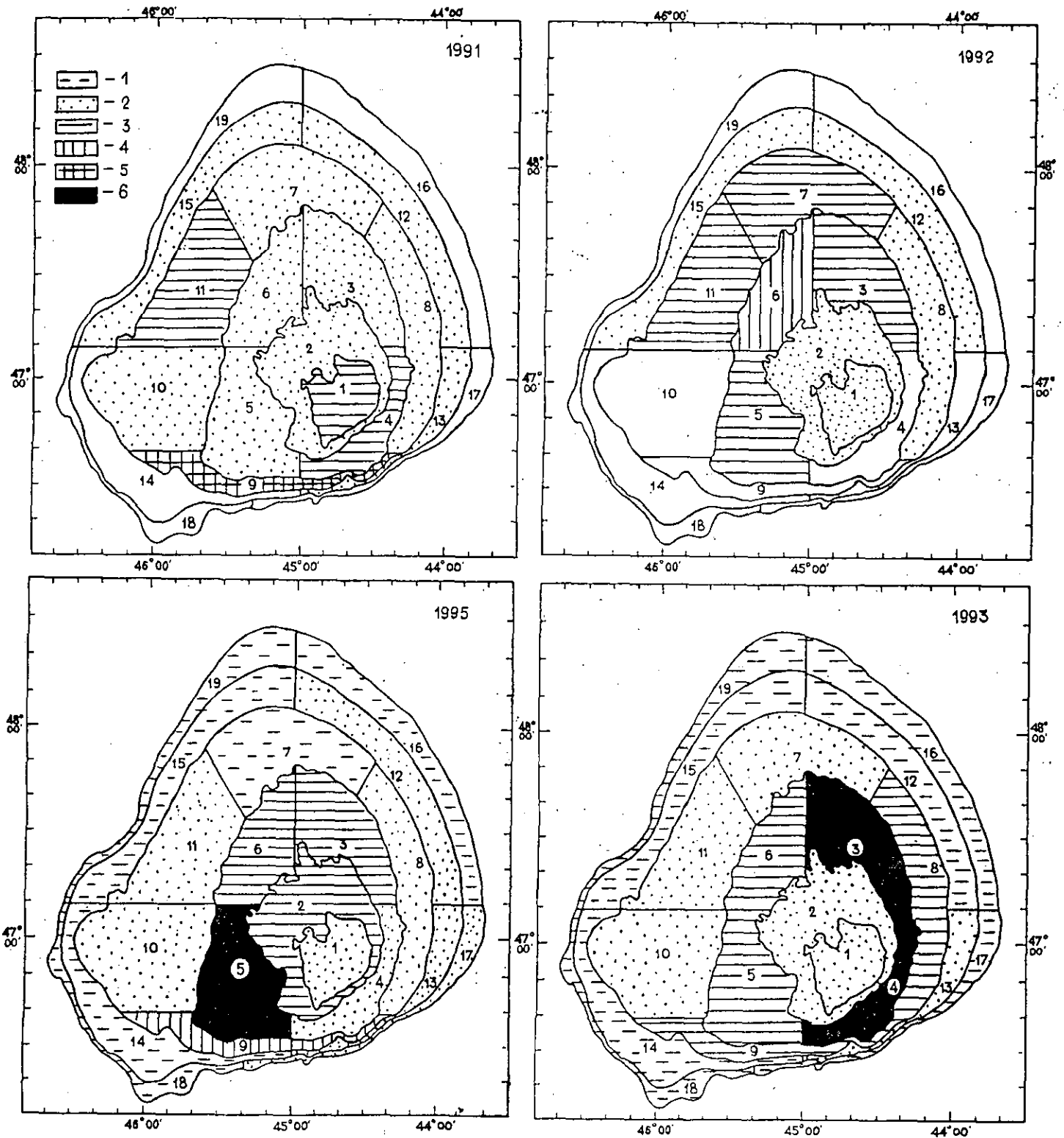


Fig. 1. Distribution of cod on the Flemish Cap due to data of spring surveys in 1991-1995.
Mean catch (specimens) per stratum:
1 - no cod; 2 - 1-10; 3 - 11-50; 4 - 51-100;
5 - 101-200; 6 - 201-300

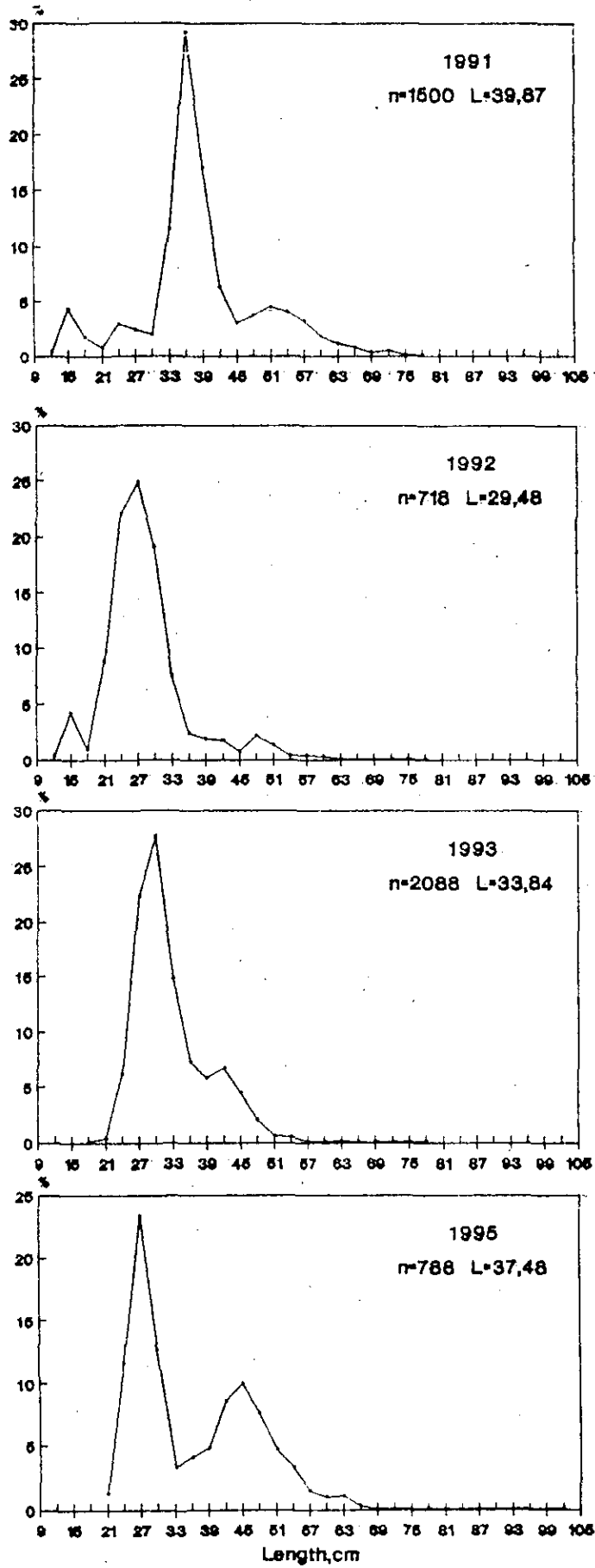


Fig. 2. Lenth composition of cod on the Flemish Cap, 1991-1995.

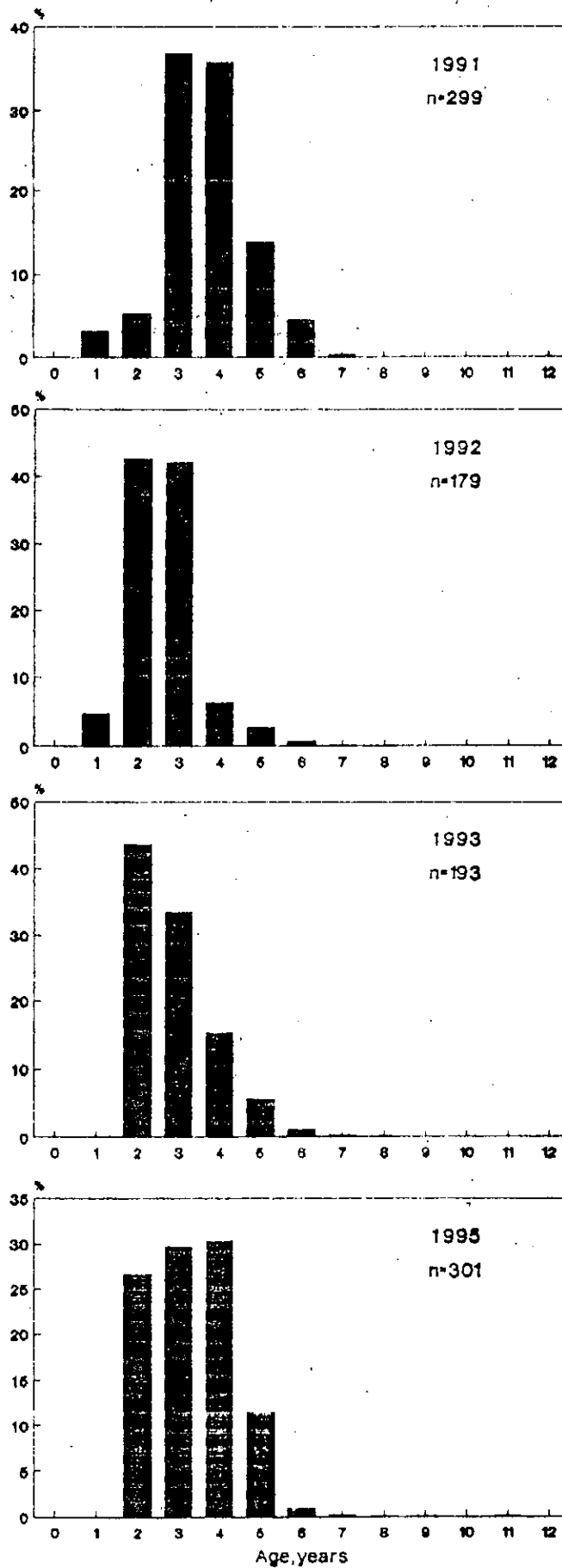


Fig. 3. Age composition of cod on the Flemish Cap, 1991-1995.