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Abundance and Biomass of Cod on the Grand Bank (Divisions 3NO)  
and Flemish Cap (Division 3M)

by

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**Abstract.**

The results of trawl survey on the assessment of cod abundance on the Flemish Cap (3M) and southern slopes of the Grand Newfoundland Bank (3NO) in 1980 are considered in the paper.

Trawl survey data with regard for the catchability coefficient of an accident-free trawl and distribution of fish by areas showed that in 1980 the abundance and biomass of cod increased on the southern slopes of the Grand Newfoundland Bank and decreased on the Flemish Cap.

In 1980 the abundance of cod on the southern slopes of the Grand Newfoundland Bank was  $137.1 \times 10^6$  specimens and the biomass- 135.9 thou.t, what is by  $24.9 \times 10^6$  specimens and 39 thou.t respectively higher than in 1979.

The abundance of cod on the Flemish Cap in 1980 decreased almost by a factor 2 and the biomass by 18.8 thou.t as compared to 1979.

**Materials and methods**

The present survey was a continuation of previous assessments of the cod abundance and biomass in the southern part of the Grand Newfoundland Bank (3NO) and on the Flemish Cap (3M).

As previous papers (Chekhova, Chumakov & Postolaky, 1978) the present one deals with results of a total trawl survey. In 1980 it was performed by MB - 422 "N.Kononov".

As for the dimensions and main engine power "N.Konenov" is almost similar to FRV "Perseus - III" and MB - 2645 "Suloy", which participated in the trawl survey of 1979.

The methods of trawl survey on the assessment of cod abundance and biomass ( and other demersal fishes) and catch processing were discussed earlier in previous papers (Postolaky, 1972; Chekhova, 1973, 1975).

In 1980 the trawl survey was conducted on the Grand Newfoundland Bank from 8.May to 1.June and on the Flemish Cap from 24.July to 1.August.

As in previous years accident-free trawlings were made with standard bottom trawl according to a standard grid. The duration and speed of trawling were the same as in previous years.

To assess the abundance and biomass of cod from results of accident-free trawlings the catchability coefficient of an accident-free <sup>bottom</sup> trawl, experimentally determined by Chumakov A.K. and Serebrov L.I.(1978), was used.

The total number of fish per hour trawling in the area fished was estimated on the basis of cod number in a catch (n) and catchability coefficient (K). Then a specific abundance (Q) in specimens per square mile was calculated.

A specific biomass was determined on a mean weight of one specimen in the trawl catch (P) and specific abundance ( $W=Q \cdot P$ ).

The methods of calculation of the absolute abundance and biomass were described in detail in previous papers (Chekhova, Chumakov & Postolaky, 1978; Chumakov, 1979).

#### Results of investigations

Cod on the southern slopes of the Grand Newfoundland Bank (3N0). During the 1980 survey cod inhabited mainly the depths of 100m to 300m in Div.3N, and up to 200m in Div.30. Cod <sup>up to</sup> 39 cm in length constituted 59.2% of their abundance in Div.3N, specimens with the length of 21cm to 29cm were the most abundant (Fig.1)., fish of the abundant 1977 year class predominated (Table 1).

Cod at the age of 4 to 6 years are expected to make up the bulk of trawl catches of commercial ships in 1981.

Table 2 shows an increase of the abundance and biomass of the south Newfoundland cod stock in 1980 after a 1978-1979 period of some decrease. The mean length and weight of a cod specimen also increased in 1980.

In 1980 areas with the specific cod density from 10 to 50 t per square mile increased (Fig.2). The area with the specific density from 0.1 to 1 t somewhat decreased.

Table 3 shows the distribution of cod by zones with different density on the southern slopes of the Grand Newfoundland Bank.

In 1980 the total abundance and biomass of cod of the south Newfoundland stock increased considerably as compared to 1978-79, and made up  $137.1 \times 10^6$  specimens and 135.9 thou.t respectively.

The given results of the 1980 trawl survey on cod abundance and biomass in Divs.3NO show that it is possible to increase the total allowable catch of cod in 1981.

Cod on the Flemish Cap. Cod 33 to 47 cm long, the peak of length frequency being 39-41 cm (these fish belong to the abundant 1976 year class), were the most significant in catches during the 1980 trawl survey (Fig.3). It should be noted that our estimation of the 1976 year class differs from that given by R.Wells (1980a), he considers this year class to be less abundant than the 1977 year class.

Table 4 shows the age composition of cod. Mean catches of cod are given in Table 5 (kg and specimens per hour trawling). As it is seen from the table, relative indices of the abundance and biomass of the Flemish Cap cod in 1980 decreased as compared to 1979.

Cod distribution with different specific density is given in Table 6 and Fig.4.

It is seen from Table 6 that the total abundance and biomass of cod decreased considerably in 1980 in comparison with 1979, they amounted to  $32.2 \times 10^6$  specimens and 48.4 thou.t respectively.

It is to be noted that our estimate of the absolute abundance and that given by R.Wells (1980b)\* coincided.

In 1981 the total cod biomass on the Flemish Cap is expected to increase slightly due to the abundant 1976 year class, which specimens will reach the length of about 48-50 cm, and the 1977 year class of average abundance.

Judging by the said, it follows that the TAC in 1981 can be maintained at the 1980 level.

\* According to R.Wells the total abundance of the Flemish Cap cod in January 1980 was 32.744 thou.specimens.

#### References

- Chekhova V.A., 1973. The trawling survey of groundfish in the Newfoundland area. Annu.Meet.int.Comm.Northw.Atlant.Fish. 1973, Res.Doc. No.40.
- Chekhova V.A., 1975. Trawl survey of Newfoundland area in 1974. Annu.Meet.int.Comm.Northw.Atlant.Fish., Res.Doc. 75/85.
- Chekhova V.A., Chumakov A.K., Postolaky A.I., 1978. Preliminary assessment of abundance and biomass of cod on Flemish Cap based on data from trawl surveys in 1972-1977. Annu.Meet. ICNAF, Res.Doc. 78/VI/27. Serial No. 5188, 14 pp.
- Chekhova V.A., Chumakov A.K., Postolaky A.I., 1980. Cod abundance and biomass in Divisions 3NO and 3M according to data from groundfish trawl surveys during 1977-1979. February 1980. NAFO SCR Doc.80/II/41.
- Chumakov A.K., Serebrov L.I., 1978. The determination of the catchability coefficient of bottom trawl for cod and Greenland halibut. Annu.Meet.ICNAF, Res.Doc.78/VI/24, Serial No.5185, 8 pp.
- Chumakov A.K., 1979. Abundance and biomass of Greenland halibut in ICNAF Divisions 2J and 3K in November/December 1978. Annu.Meet.ICNAF, Res.Doc, 79/VI/103, Serial No.5468, 16 pp.
- Postolaky A.I., 1972. Preliminary results of quantitative analysis of commercial fish in Subarea 3 in 1971. Annu.Meet.ICNAF Res.Doc.72/106, Serial No.2832.

Wells R. MS 1980a. Distribution and abundance of cod on the Flemish Cap, January 1980. NAFO SCR Doc. 80/II/27.

Wells R. MS 1980b. Estimation of total mortality of cod on the Flemish Cap in 1978 and 1979 from Canadian research vessel survey data, February 1980. NAFO SCR Doc. 80/II/26.

Table 1.

Age composition of cod on the south-eastern slope of the Grand Newfoundland Bank (%) in 1978-1980.

Year	A G E , years								
	1	2	3	4	5	6	7	8	Older than 8
1978	-	1,0	23,8	54,8	16,9	2,3	1,2	-	-
1979	2,9	13,5	24,6	31,9	19,6	4,6	2,2	0,7	-
1980	0,1	12,1	33,6	19,3	13,8	14,4	4,2	1,0	1,5

Table 2.

Mean number of specimens and mean catch (kg) of cod per trawling hour according to data from total trawl survey in Divisions 3NO.

Year	3N		3O	
	specimens	kg	specimens	kg
1978	181	122	43	23
1979	103	83	22	33
1980	124	100	34	58

Table 3.

Distribution of cod by zones with different density  
in Divs. 3NO according to data from trawl survey in  
1978-1980.

Year	Quantitative indices	Density zone					Total
		I	II	III	IV	V	
1978	Area, sq.mile	157	1967	28669	2258	981	34032
	Abundance, specimens $\times 10^6$	47,6	47,5	14,5	3,1	0,2	112,9
	Biomass, thou.t	30,1	33,2	11,9	1,2	0,0	76,4
1979	Area, sq.mile	49	857	18240	14128	758	34032
	Abundance, spec. $\times 10^6$	9,2	16,1	76,1	10,4	0,4	112,2
	Biomass, thou.t	6,0	21,9	62,1	6,9	0,0	96,9
1980	Area, sq.mile	25	1794	22063	6225	3925	34032
	Abundance, spec. $\times 10^6$	1,0	41,4	90,5	3,5	0,7	137,1
	Biomass, thou.t	1,3	36,1	95,6	3,0	-	135,9

Table 4.

Age composition of cod on the Flemish Cap (%)  
in catches of research vessels in 1977-1980.

Year and month	Age, years													n
	I	2	3	4	5	6	7	8	9	10	11	12	13	
1977, April	0,4	9,4	22,4	27,0	33,4	4,8	1,0	0,4	0,6	0,4	0,2	-	-	500
1978, July	-	0,7	14,7	36,4	40,6	6,3	1,0	-	-	0,3	-	-	-	300
1979*, March	0,6	11,3	20,6	8,2	13,4	26,3	15,1	3,7	0,4	0,1	0,1	0,1	0,1	2188
1980*, May	0,5	5,8	25,1	44,1	6,1	3,1	6,9	4,9	1,9	1,2	0,2	0,1	0,1	956

\* Age samples recalculated with regard to length composition of catches from accident-free trawlings

Table 5.

Mean catch of cod ( in kg and specimens per hour trawling) on the Flemish Cap according to data of total trawl survey in 1977-1980.

Year	Specimens	kg
1977	489	448
1978	95	79
1979	122	108
1980	31	42

Table 6.

Distribution of cod by areas with different density on the Flemish Cap according to data of total trawl survey in 1978-1980.

Year	Quantitative indices	Density area					Total
		I	II	III	IV	V	
1978	Area, sq.mile	-	1173	7221	538	-	8932
	Abundance, spec.x 10 <sup>6</sup>	-	48,6	28,0	39,1	-	79,7
	Biomass, thou.t	-	37	37	1	-	75
1979	Area, sq.mile	33,5	1643,0	6733,0	371,5	218,0	8999,6
	Abundance, spec.x 10 <sup>6</sup>	2,0	38,2	27,0	0,0	-	67,4
	Biomass, thou.t	1,9	42,3	22,9	0,1	-	67,2
1980	Area, sq.mile	-	909	8246	1161	234	10550
	Abundance, spec.x 10 <sup>6</sup>	-	8,9	23,1	0,2	0,02	32,2
	Biomass, thou.t	-	14,9	27,1	6,4	0,006	48,4

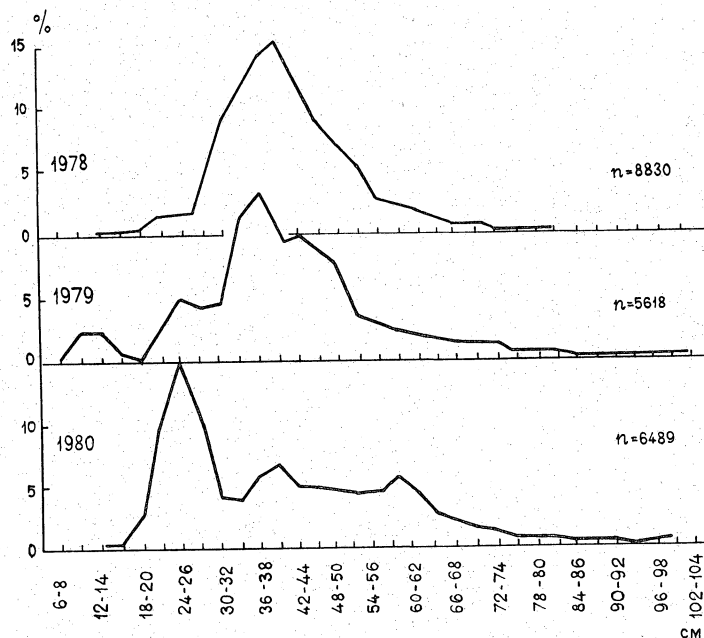


Fig.1 Age composition of cod on southern slopes of the Grand Newfoundland Bank (3NO) according to trawl survey data.

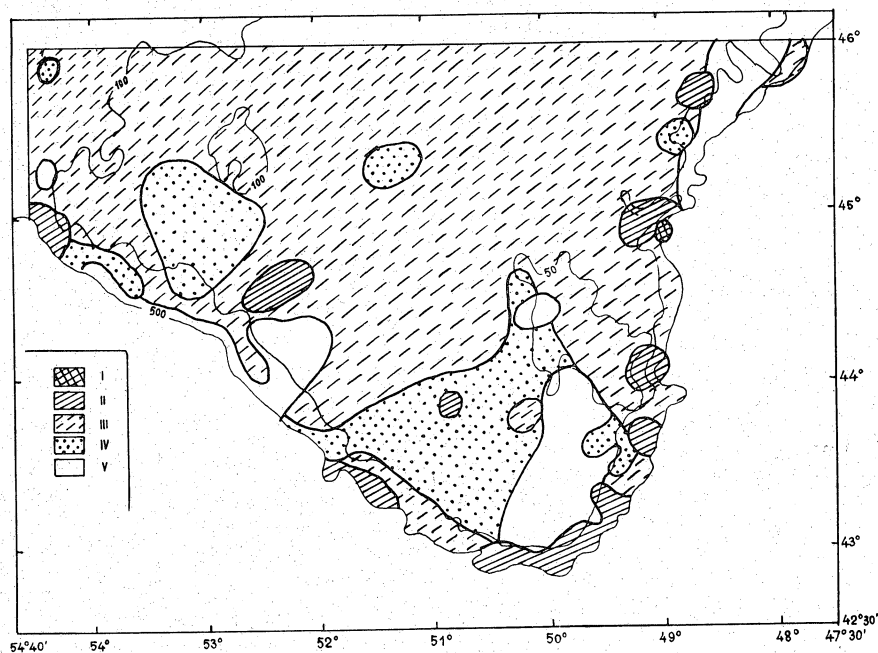


Fig.2 Zones of specific cod biomass ( in t per sq. mile) on the Grand Newfoundland Bank (3NO) according to 1980 trawl survey data ( I zone - over 50; II - from 10 to 50; III - from 1 to 10; IV - from 0.1 to 1; V - less than 0.1).



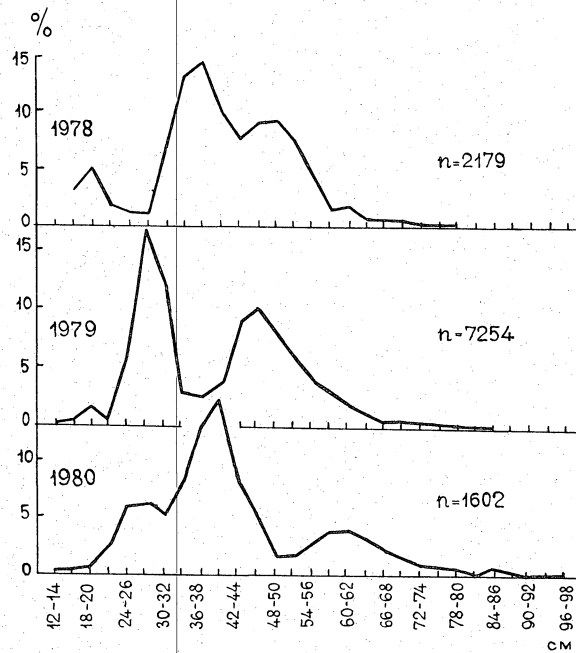


Fig.3 Length composition of cod on the Flemish Cap according to trawl survey data.

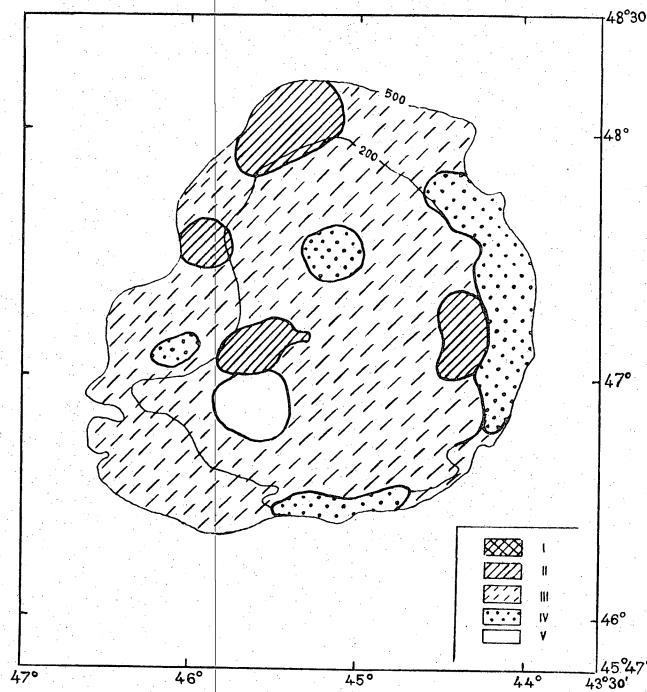


Fig.4 Zones of specific cod biomass on the Flemish Cap (3M) according to 1980 trawl survey data.