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Distribution and Abundance of Cod on the Flemish Cap, January 1980

by

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Introduction

Sampling from the commercial cod fishery on the Flemish Cap has not been adequate for much of the period since 1963 (Wells, Res. Doc. this meeting). Information from research vessel surveys has therefore been of particular value in supplementing the data from the commercial fishery and in providing an independent source for the evaluation of changes in the cod stock (Cherkova et al (1978), Wells (1979)).

Results of the survey completed in January, 1980 by the Canadian R.V. Gadus Atlantica are presented here.

Materials and Methods

Fishing stations were selected at random according to the stratification scheme in Wells (1977). One hundred and thirty successful half-hour tows were made with the standard Engels net having a 1 1/8 inch liner in the cod-end (Fig. 1). Depths fished ranged from 128M to 688 M. Fishing was conducted in the period January 6-21, 1980. Positions were recorded from satellite navigation.

All fish species taken in each tow were weighed and counted either in total or by means of a sufficiently large sample so that the totals could be estimated with confidence.

All cod caught were measured at sea and nearly all cod were also examined for sex and maturity. About 130 cod were frozen whole for detailed examination at the laboratory. A total of 568 age determinations from otoliths were made at the laboratory, including about 15 available at the time from the frozen sample.

Abundance and biomass estimates were made following the usual expansion by area method.

Results

The number of successful tows in each stratum and depth zone, and the numbers and weights caught per tow are shown in Table 1. Abundance and biomass estimates by stratum and depth zone are shown in Table 2. It is clear that within practical limits, the sampling intensity was uniform over all areas of the bank surveyed. Almost all cod were in depths of 200 fathoms or shoaler, and in general were most abundant in the southern part of the bank. The average weight of cod tended to increase with depth.

The length frequency of the total estimated numbers in the stock and the length frequencies of the major year-classes present are shown in Fig. 2. The 1977 year-class at age 3 accounts for about 60% of the total, while the 1973 year-class makes up about 12%. The 1974 and 1975 year-classes do not appear to be strong. The 1976 year-class appears to be weak. As 2-year-olds, the 1978 year-class comprises about 3% of the total. No other year-classes were present in significant numbers. In Table 3, the number of cod at each age is shown together with the average length-at-age. An average weight-at-age was derived from frozen cod samples collected on the Flemish Cap in the winter of 1979 by applying the relationship

$$\log (\text{whole weight}) = 3.171 \log (\text{fork length}) - 5.342$$

to the length frequency at each age. The calculated total weight estimated by multiplying the numbers-at-age by the average weights was about 33,900 tons, reasonably close to the estimate of 35,700 tons given in Table 2. Almost 40% of the biomass is attributable to the 1973 year-class.

### Conclusions

1. Mean estimates of abundance and biomass of cod on the Flemish Cap in Winter 1980 were 32.7 million individuals and 35.7 thousand tons.
2. Most cod at this time were in depths of 200 fathoms and shoaler in the Southern part of the Bank.
3. The most abundant year-class in the estimates was that of 1977.
4. The year-class making up about 40% of the biomass was that of 1973.

### References

- CHEKHOVA, V.A., A.K. CHUMAKOV, and A.I. POSTOLAKY. MS 1978. Preliminary assessment of abundance and biomass of cod on Flemish Cap based on data from trawl surveys in 1972-77. ICNAF Res. Doc. 78/VI/27.
- WELLS, R. MS 1977. Stratification scheme used and age composition of cod catches taken on Flemish Cap, 2-15 February 1977 by A. T. Cameron. ICNAF Res. Doc. 77/VI/29.
- WELLS, R. MS 1979. Observations on the distribution, abundance, growth, mortality, and sex and maturity of cod from the Flemish Cap. ICNAF Res. Doc. 79/VI/63.

Table 1. Number of tows per stratum and by depth zone completed on the Flemish Cap, for, 1980 by R.V. Gadus Atlantica. Sampling intensity=number of tows per 350 square nautical miles. The average number and weight of cod taken in each tow is also given.

STRATUM	DEPTH RANGE FM	NUMBER OF TOWS	AREA OF STRATUM (sq. nautical miles)	SAMPLING INTENSITY	AVERAGE NUMBER PER TOW	AVERAGE WEIGHT PER TOW
1	70-80	4	341.8	4.1	72.25	89.25
2	80-100	11	837.9	4.6	50.64	60.23
3	100-140	8	627.8	4.5	18.25	23.13
4	100-140	4	347.8	4.0	76.00	26.50
5	100-140	8	703.4	4.0	273.37	175.44
6	100-140	6	496.1	4.2	45.67	40.08
7	140-200	10	821.8	4.3	14.80	19.10
8	140-200	8	646.1	4.3	12.25	6.76
9	140-200	4	314.3	4.5	13.25	34.00
10	140-200	12	951.3	4.4	72.00	174.42
11	140-200	10	806.1	4.3	18.40	15.65
12	200-300	8	670.4	4.2	3.25	8.63
13	200-300	3	248.6	4.2	1.33	2.83
14	200-300	7	602.0	4.1	2.00	6.86
15	200-300	8	665.7	4.2	7.50	11.81
16	300-400	8	634.1	4.4	0	0
17	300-400	3	215.7	4.9	0	0
18	300-400	3	209.7	5.0	0	0
19	300-400	5	413.9	4.2	0.20	0.60
TOTAL:		130	10554.5	4.3	40.07	44.68
STRATA						
1-2	70-100	15	1179.7	4.5	56.40	67.97
3-6	100-140	26	2175.1	4.2	111.96	74.42
7-11	140-200	44	3539.6	4.4	30.61	59.79
12-15	200-300	26	2186.7	4.2	4.00	8.46
16-19	300-400	19	1473.4	4.5	0.053	0.16
TOTAL:		130	10554.5	4.3	40.07	44.68

Table 2. Abundance and biomass estimates of cod on the Flemish Cap in January, 1980.

STRATUM	ABUNDANCE (000's)	BIOMASS (tons)	AVERAGE WEIGHT
1	1855	2291	1.24
2	3185	3789	1.19
3	860	1090	1.27
4	1985	692	0.349
5	14426	9285	0.642
6	1700	1492	0.878
7	913	1179	1.29
8	594	328	0.552
9	312	801	2.57
10	5140	12451	2.42
11	1113	947	0.851
12	163	434	2.66
13	25	53	2.12
14	90	310	3.44
15	375	591	1.58
16	0	0	-
17	0	0	-
18	0	0	-
19	6	19	3.17
<b>TOTAL</b>	<b>32742</b>	<b>35725</b>	<b>1.09</b>
<b>STRATA</b>			
1-2	5040	6080	1.21
3-6	18971	12532	0.661
7-11	8072	15706	1.95
12-15	653	1388	2.13
16-19	6	19	3.17
<b>TOTAL</b>	<b>32742</b>	<b>35725</b>	<b>1.09</b>

Table 3. Estimated numbers and average length-at-age of cod on the Flemish Cap, January 1980.

AGE	NUMBER (000s)	AVERAGE LENGTH	NUMBER OF SPECIMENS AGED	AVERAGE WEIGHT	TOTAL BIOMASS (tons)
2	1035	22.93	58	0.099	102
3	19435	36.19	123	0.407	7918
4	2422	40.19	40	0.590	1430
5	2896	54.52	71	1.497	4336
6	2718	59.25	63	1.955	5320
7	3993	68.92	187	3.258	13013
8	184	81.41	16	5.364	987
9	25	102.31	4	10.913	284
10	6	106.00	1	12.041	72
11	0	-	-	-	-
12	12	115.0	2	15.628	188
13	6	121.00	1	18.320	110
14	0	-	-	-	-
15	12	113.50	2	15.037	180
TOTAL	32744		568		33940

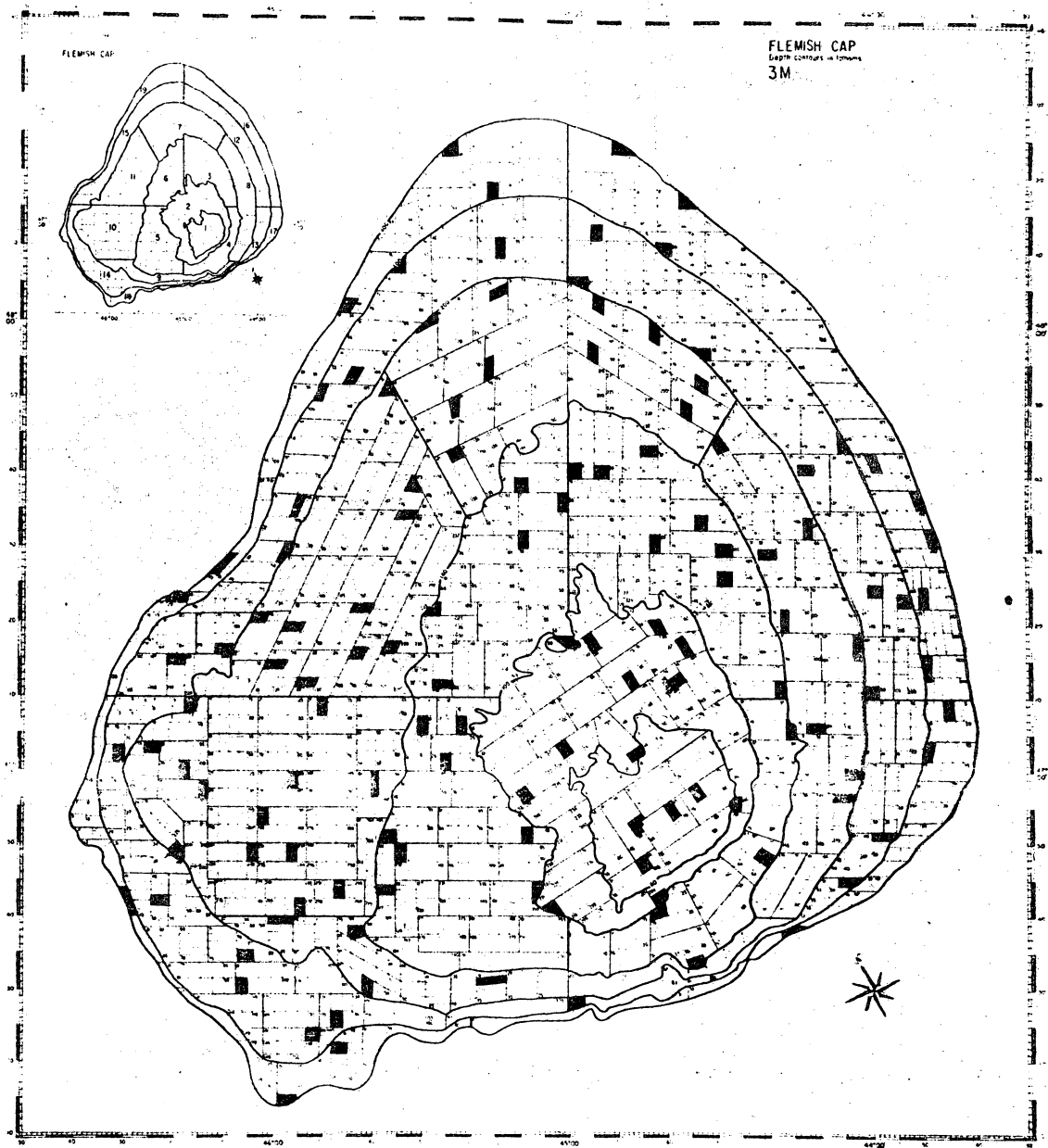


Fig. 1. Positions fished on the Flemish Cap by R.V. Gadus Atlantica in January, 1980.

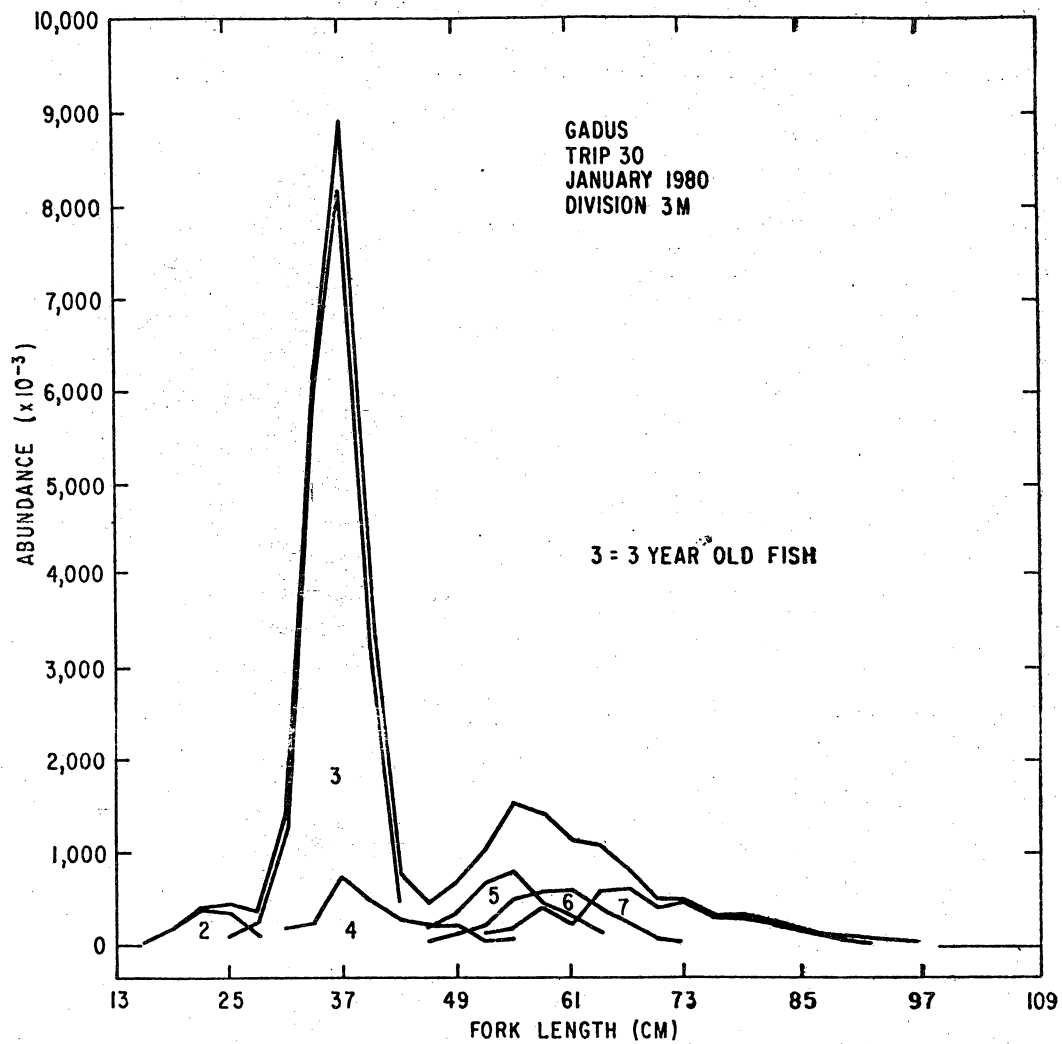


Fig. 2. Length frequency of cod on the Flemish Cap in January, 1980.