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Estimation of Total Mortality of Cod on the Flemish Cap in 1978 and 1979  
from Canadian Research Vessel Survey Data

by

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Introduction

The determination of the total instantaneous mortality for the last few years has been difficult in the case of cod on the Flemish Cap - partly due to rather inadequate sampling data from the commercial fishery and also through the lack of adequate and current effort estimates. In fact, the Assessments Subcommittee at its spring, 1979 meeting, was unable to come to a unanimous conclusion on this point.

Estimates of  $Z$  can be made from research vessel survey results and estimates for 1978 and 1979 are presented here from surveys conducted by the Canadian research vessel Gadus Atlantica in 1978, 1979 and 1980.

Materials and Methods

Descriptions of the cruises involved and the methods used are given in Wells (1979) and Wells (1980, this meeting). Results of a survey in 1977 are not included as the research vessel used, the A.T. Cameron, is a side trawler of presumably much less fishing power than the Gadus Atlantica, and the results are presumably biased.

Results

Estimates of the abundance by age of cod taken on the Flemish Cap in the January-February period 1978, 1979 and 1980 are shown in Table 1, and in addition the estimated  $Z$  values for various age groups. In 1978 age groups of age 5 and older were subjected to an average  $Z$  of about 1.9, while in 1979 the  $Z$  on the corresponding age group was about 0.7. The average  $Z$  for the 2-year period was about 1.3 per year. By applying the mortality rates and abundance estimates of Table 1, estimates of the implied removals by the fishery can be calculated as in Table 2 for ages 4 and older. Total removals are estimated at about 53 and 7 million fish respectively in 1978 and 1979. Use of the average length-at-age figures given by Wells (1979) for 1978 and 1979 and applying the length-weight relationship  $\log \text{whole weight} = 3.171 \log \text{fork length} - 5.342$ , the catch weights in 1978 and 1979 are estimated at 58 and 10 thousand tons respectively.

These figures are not in accordance with the 1978 reported catch nor with the 1979 preliminary catch reported. The average catch derived here for the two years, that is, about 34,000 tons each year, may be a more reasonable estimate.

Conclusions

1. Total mortality on age groups 5 and older was estimated to be about 1.9 in 1978 and 0.7 in 1979.
2. Removals by the fishery are estimated from the survey information to have been 58 and 10 thousand tons in 1978 and 1979 or a total of about 68 thousand tons for the two years combined.

References

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

Table 1. Estimates of abundance and total mortality of cod on the Flemish Cap from Canadian research vessel surveys in 1978-80.

AGE	NUMBERS(000's)			Z ESTIMATES	
	1978	1979	1980	1978	1979
1	-	-	-	-	-
2	95	4675	1035	-2.42	-1.43
3	4755	1067	19435	-0.165	-0.82
4	15539	5610	2422	1.05	0.66
5	45671	5437	2896	1.92	0.69
6	12139	6703	2718	1.96	0.52
7	476	1713	3993	1.48	2.23
8	181	108	184	1.19	1.46
9	65	55	25	1.18	2.22
10	154	20	6	1.64	-
11	71	30	-	1.96	0.92
12	18	10	12	-1.06	0.51
13	32	52	6	0.10	
14	37	29	-		
15+	12	101	12		
TOTAL:	79245	25612	32744		

AGE GROUP	ABUNDANCE			Z ESTIMATES	
	1978	1979	1980	1978	1979
4+	74395	19868		1.65	0.70
5+	58856	14258	9852	1.90	0.72
6+		8823	6956		0.73
7+			4238		

Table 2. Implied removals by the fishery from survey results from Table 1 and assuming  $M=0.2$

AGE	Removals (000's)		AVERAGE LENGTH	
	1978	1979	1978	1979
4	8177	1889	35.15	40.62
5	34915	1924	48.39	45.65
6	9365	1673	58.34	56.04
7	318	1392	77.71	65.00
8	105	72	87.30	86.29
9	37	45	94.43	95.00
10	109	-	95.95	-
11	55	14	101.20	104.00
12		2		112.00
13				
TOTAL	53081	7011		
Weight (tons)	58820	9925		

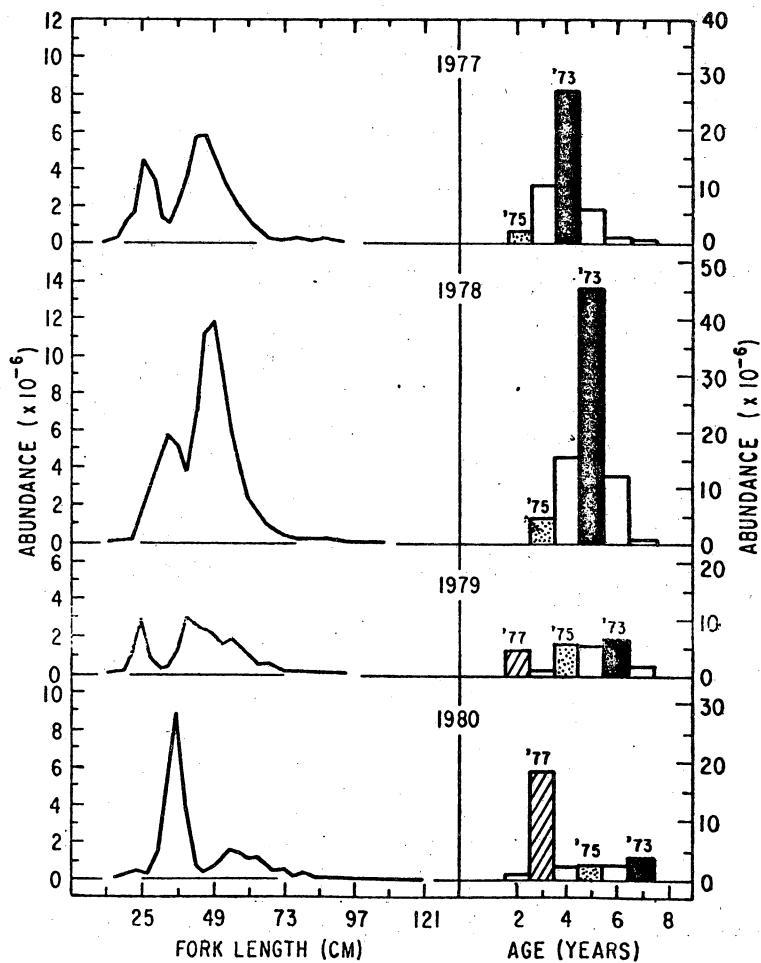


Fig. 1. Age and length distribution of cod on Flemish Cap 1977-80 from research vessel cruises.