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Norwegian capelin fishery and capelin investigations in Newfoundland waters in 1977

by

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1. Introduction

The Norwegian fishery for capelin in the ICNAF area in 1977 was conducted by the factory ship "Norglobal" and 9 purse seiners. One of the purse seiners, M/S "Nortreff", was chartered during periods of the fishing season to catch capelin for tagging and carry out investigations on capelin distribution.

2. The Fishery

M/S "Nortreff" searched for capelin over the Grand Banks during the period 30 May - 9 June, but only small concentrations were found. "Norglobal" and the first purse seiners arrived at the traditional fishing area on Southeast Shoal (Fig. 1) 9 June, and the first catches were taken 11 June. Most of the catches were taken during the period 18 June - 3 July. Good concentrations of spawning capelin were found during this period. As in 1976 the fishery suddenly stopped 3 July when the capelin seemed to disappear. A sample taken 3 July consisted of mostly spent capelin.

The total Norwegian catch in 1977 was 21499 tons, i.e. approximately at the level of 1976 (23183 tons). All catches were taken by purse seine.

The change in maturity during the season is seen from Table 1. In the week 6-12 June 36 % of the capelin were in the spawning stage and 64% in an immediate prespawning stage. In the next

week 55% were in the spawning stage, and some postspawners were also found. In the next two weeks only capelin in the spawning and postspawning stages were present. This is a much more rapid change in the maturity stage composition of the stock than in 1976.

Age and length composition in the catches in June is given by sex in Fig. 2. The majority of the capelin were 4 years old, from the 1973 year class. The fish seem to have been slightly larger in 1977 than in 1976.

3. Tagging experiment

As in 1976 (Sangolt and Ulltang, 1977) a tagging experiment was conducted in order to get a direct estimate of the size of the spawning stock of capelin at Southeast Shoal. Canadian scientists participated in the planning of the experiment. Altogether 800 female capelin and 1400 males were tagged with internal stainless steel tags 12 and 14 June, i.e. at the start of the fishing season. As in 1976, the time interval between tagging and recapture was too short to expect that the tagged capelin got properly mixed with the untagged ones, and in a situation where the fishing fleet is concentrated in a small area this could seriously influence any stock size estimate from the recaptures.

The tags were recovered by magnets on board "Norglobal" where all the Norwegian catch was delivered. During the winter fishery for capelin in the Barents Sea in 1977, five tests for estimating magnet efficiency were conducted on board "Norglobal", giving efficiency estimates of 33%, 51%, 69%, 77% and 66% respectively, indicating that the efficiency was improved to a level of about 60-70% during the season. Only one test was carried out during the fishing season on Grand Banks. This test gave an efficiency of 48%.

Data on tag releases and recoveries are given in Table 2. 126 tags from males and 43 tags from females were recovered. Dommasnes (1978) estimated ^{maximum} tagging survival for Barents Sea capelin to be 0.89 for males and 0.51 for females. Applying these survivals, one should expect a ratio of 3.05 between recaptured males and females on Southeast Shoal in 1977. The observed ratio is 2.93, indicating that at least the ratio between tagging survival of males and females estimated in the Barents Sea is valid also for the tagging experiments conducted in Newfoundland waters.

Applying a tagging survival of 0.89 for males and a magnet efficiency of 50%, the tag recoveries from the tagged males give a simple Petersen stock size estimate of 106 000 tons. Because of the expected incomplete mixing discussed above, this estimate will most likely include only a part of the spawning stock, i.e. the stock present in the area where the tagging and fishing were conducted.

4. Discussion

The tagging experiments conducted both in 1976 and 1977 were partially unsuccessful because one was not able to find capelin to tag before the short fishing season started. This probably resulted in an incomplete mixing of the tagged capelin in the spawning population. Simple Petersen stock size estimates indicate an increase in the quantity of capelin present in the area where the tagging and fishing were conducted from 63 000 tons in 1976 to 106 000 tons in 1977. It is not possible to estimate the total spawning stock. The estimated relative increase from 1976 to 1977 in the quantity present should be regarded as only an indication. Particularly differences in the degree of mixing of the tags in the population between 1976 and 1977 could lead to errors also in the relative figures. Some increase in the quantity present in the area from 1976 to 1977 is, however, in agreement with the experience from the fishery during 1976 and 1977. During the peak of the 1977 season, the catch was limited by the production capacity of "Norglobal" and not by the availability of capelin.

In 1977 the fleet left the area as soon as the capelin apparently disappeared, in contradiction to 1976 when intensive search was made after the fishery stopped without being able to find any concentrations.

The rapid change in the maturity stage composition in 1977 indicates that the spawning season may have been shorter than the previous years. One should therefore take into account the possibility that the larger quantity of capelin in the area indicated for 1977 as compared to 1976 does not result from a larger spawning stock, but only from a compression of the spawning season.

REFERENCE

DOMMASNES, A. 1978. Survival of tagged Barents Sea capelin (Mallotus villosus, Müller) and estimates of the 1973, 1974 and 1975 spawning stocks from tag returns. FiskDir.Skr.Ser.HavUnders.,16: 339-358.

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Table 1 . Sex composition and distribution of maturity stages

Date	Females %	Males %	Maturity stages (%) ¹⁾			Number sampled
			5	6	7	
6-12 June	49.3	50.7	64	36		150
13-19 June	56.0	44.0	43	55	2	200
20-26 June	53.0	47.0		82	18	100
27 June- 3 July	10.0	90.0		66	34	100

1) Stage 5 is prespawners, stage 6 is spawning capelin and stage 7 is postspawners.

Table 2. Tagging Experiment on Capelin, Grand Banks 1977

Releases			Recaptures, number									
Date	Position	Series No.	Sex	Number	11.6.- 18.6.	19.6.- 21.6.	22.6.- 24.6.	25.6.- 30.6.	1.7.- 3.7.	Total		
June 12.	N44°30' W50°08'	46001-46100	Male	100	2	4	3	5	3	17		
"	"	46101-46200	Female	100	-	-	6	-	1	7		
"	"	46201-46300	Male	100	2	2	2	2	-	8		
"	"	46301-46400	Female	100	1	-	2	-	1	4		
"	N44°36' W50°14'	46401-46500	Male	100	3	-	1	-	-	4		
"	"	46501-46600	Female	100	-	4	-	-	-	4		
"	"	46601-46700	Male	100	3	2	-	2	2	9		
"	"	46701-46800	Female	100	-	1	2	-	-	3		
"	"	46801-46900	Male	100	2	4	1	2	1	10		
"	"	46901-47000	Female	100	3	4	2	1	-	10		
"	"	47001-47100	Male	100	4	3	-	2	2	11		
"	"	47101-47350	Male	250	6	5	8	5	3	27		
June 14.	N44°33' W50°04'	47351-47450	Male	100	2	2	-	2	-	6		
"	"	47451-47550	Male	100	1	-	-	2	-	3		
"	"	47551-47700	Male	150	6	5	6	1	3	21		
"	"	47701-47800	Female	100	1	1	3	-	-	5		
"	"	47801-47900	Female	100	-	1	3	-	-	4		
"	"	47901-48000	Female	100	3	1	2	-	-	6		
"	"	48001-48200	Male	200	5	-	3	1	1	10		
Total				2200	44	39	44	25	17	169		
Produced capelin in tons					4.000	3.000	4.000	6.000	4.500	21.500		
Magnet test 16.6. tagged				100	35	6	3	1	3	48		

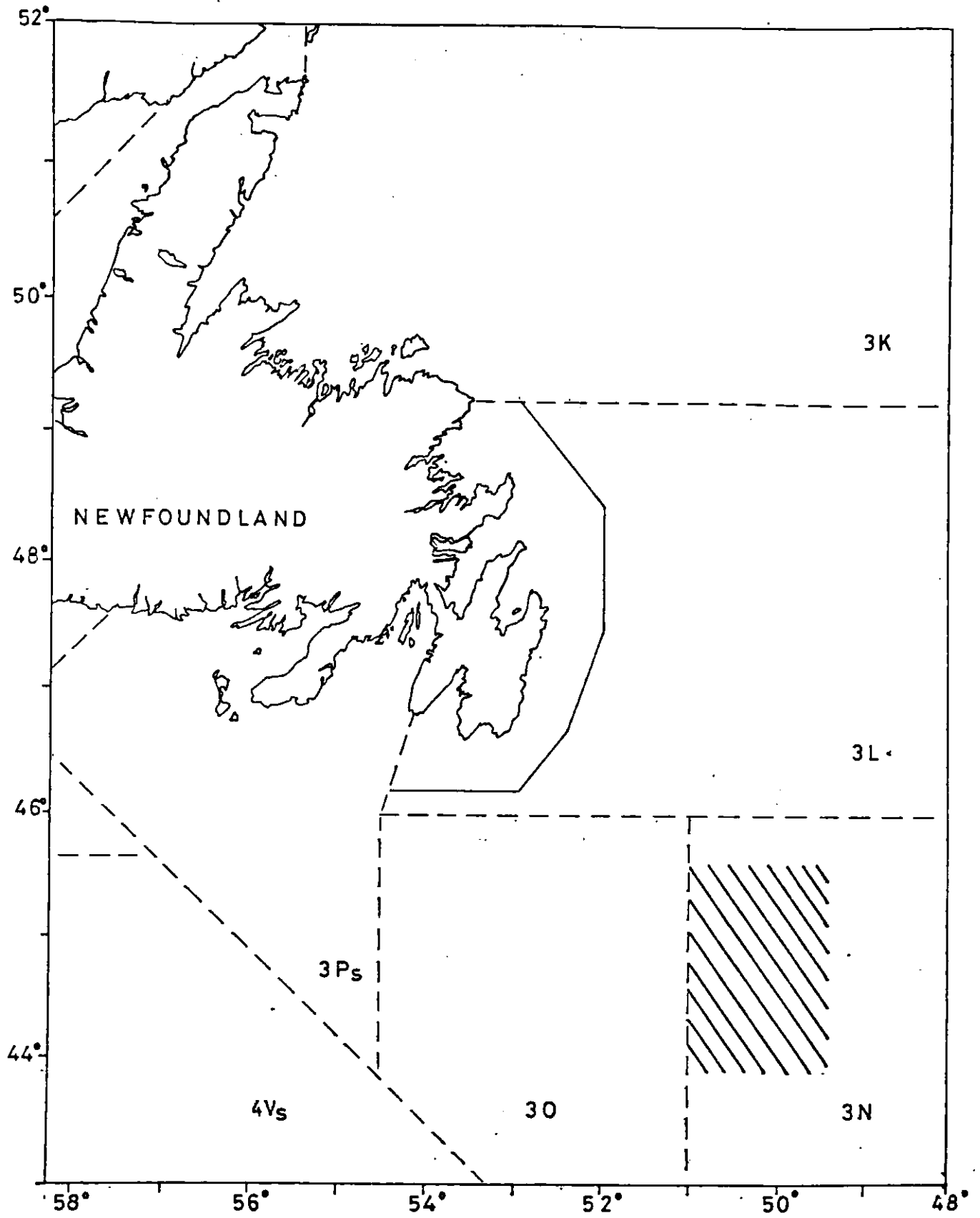


Fig. 1. Fishing area in 1977.

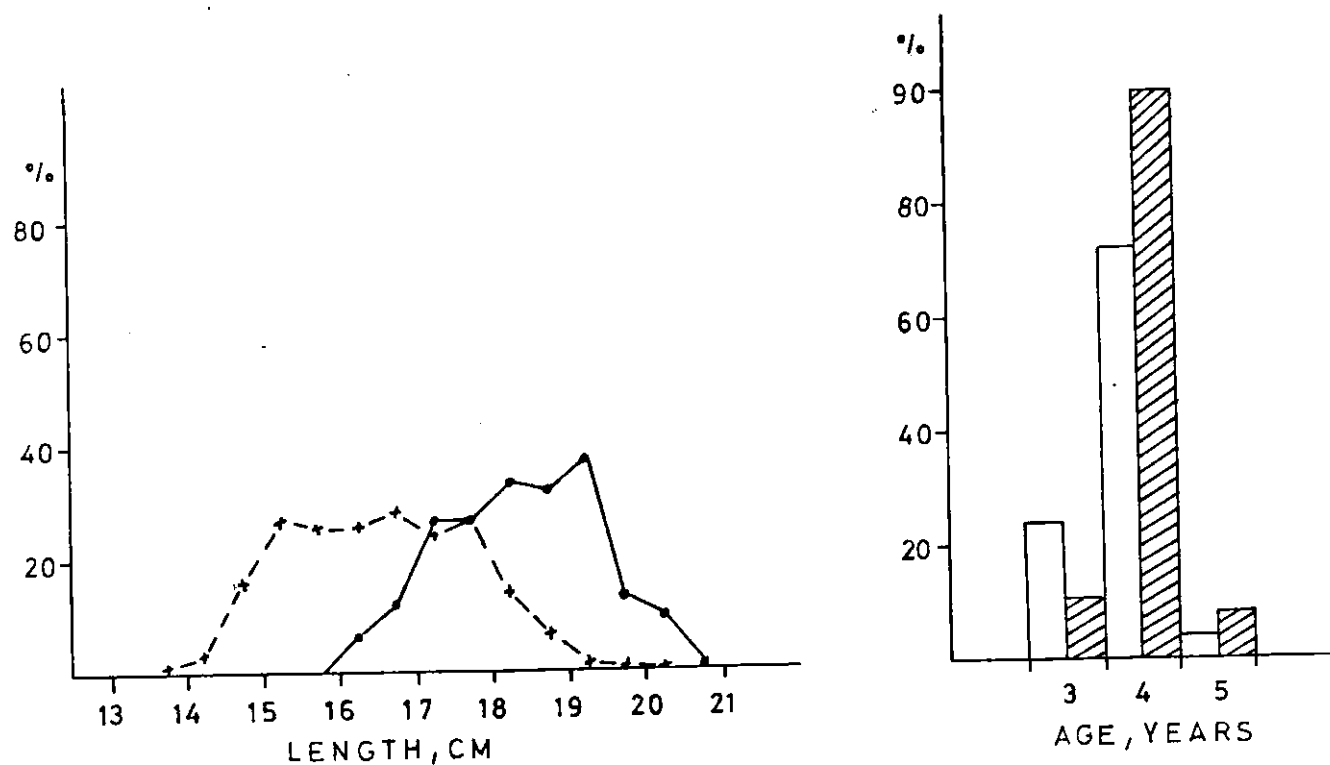


Fig. 2. Age and length distribution of capelin delivered to "Norglobal" in June 1977. Broken line or white column: females. Continuous line or shaded column: males.

