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Norwegian capelin fishery and capelin investigations in Newfoundland waters in 1976

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1. Introduction

The Norwegian fishery for capelin in the ICNAF area in 1976 was conducted by the factory ship "Norglobal" and 8 purse seiners. In addition one Icelandic vessel delivered its catch to "Norglobal". One of the purse seiners, M/S "Trønderbas", was chartered during periods of the fishing season for catching capelin for tagging and carry out investigations on capelin distribution.

2. The Fishery

The first vessels arrived at the fishing area on Southeast Shoal of Grand Banks (Fig. 1). 24 May, but fishable concentrations of capelin were not found before 12 June.

Most of the catches were taken during the period 20 June - 3 July. After 3 July the fleet was not able to find concentrations of capelin despite intensive search. An area further north (Fig. 1) was also investigated. Some immature capelin were observed, but not in fishable concentrations. The total Norwegian catch in 1976 was only 23 183 tons compared to 37 478 tons in 1975. Nearly all the catches were taken by purse seine. In Table 1 is shown sex composition and distribution of maturity stages during the different weeks.

All the caught capelin were mature. Most of the capelin in the catch were spawning (maturing stage 4) both when the fishery started 12 June and when it stopped 3 July. This is in contradiction with previous years when mostly prespawning capelin were caught at the beginning of the season while postspawners dominated at the end of the season. The spawning probably started earlier in 1976 than in previous years. The reason for the sudden stop in the fishery was probably an unusual low abundance of spawning capelin on Southeast Shoal.

In Figure 2 is shown age and length composition of the catches of males and females. 3 years old capelin dominated strongly, both among males and females, and there were rather few 4 years old capelin in the catches in contrast to observations made in previous years.

Water temperatures during the spawning season are shown in Figure 3. Bottom temperatures were higher than observed in previous years.

3. Tagging experiment

A tagging experiment was planned in order to investigate the possibility of getting a direct estimate of the size of the spawning stock of capelin at Southeast Shoal and also to get information on the migration and distribution of spawning capelin. The original plan was to start the tagging from M/S "Trønderbas" on the spawning migrating capelin before the fishing started. However, due to delayed departure from Norway, the vessel did not arrive Grand Banks before 12 June, and the first capelin were not tagged before 17 June, i. e. after the fishing had started. Due to the resultant short time interval between tagging and recapture it is doubtful whether 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 invalidate any stock size estimate from the recaptures.

The capelin were tagged with internal stainless steel tags (for a more detailed description of the tags and the tagging method, see Dommasnes, 1977). The tags were recovered by magnets on board "Norglobal" where all the Norwegian catch was delivered. Due to several circumstances only two experiments for estimating the magnet efficiency were conducted. These gave efficiency of 61 % and 43 % respectively. This was lower than expected, and with only two tests there is large uncertainty about what the true value was.

DOMMASNES (1977) estimated tagging survival for capelin to be 0.89 for males and 0.51 for females. Because of the estimated low survival for females, it was decided to tag mainly males. Altogether 600 capelin, 500 males and 100 females, were tagged, and 100 tags were recovered on board "Norglobal" (Table 2).

Due to the reasons explained above it is not possible to estimate with any confidence the spawning stock on Southeast Shoal in 1976 from the tagging experiment. Very rough calculations indicate, however, that most of the spawning stock must have been caught. This is in accordance with the experience from the fishery.

It is planned to carry out a new tagging experiment in 1977.

4. Discussion

The abundance of spawning capelin on Southeast Shoal seemed to be at a rather low level in 1976 compared to previous years. According to Norwegian age samples the contribution of 4 year old capelin to the spawning stock was lower than normal. This year class (1972 year class)

contributed significantly to the spawning stock on Southeast Shoal in 1975 (SANGOLT and ULLTANG, 1975). The low abundance of the 1972 year class in 1976 compared to 1975 may have several possible explanations:

- (i) most of the year class spawned as 3 years old (Possibly combined with the year class being a week one)
- (ii) the year class was heavily exploited in other capelin fisheries between the spawning season in 1975 and 1976
- (iii) the year class spawned elsewhere in 1976.

The authors are not in a position to judge the likelihood of the various explanations because the Norwegian age samples only cover the spawning population on Southeast Shoal.

In 1976 there was observed more spawning capelin than usual at the south and east coast of Newfoundland (CARSHADDEN, personal communication). This could indicate that the low spawning stock on Southeast Shoal was caused by a change in spawning migrating pattern compared to previous years, i. e. that more of the capelin spawned along the coast instead of going to Southeast Shoal. It should, for comparison, be noted that ^{there} has been observed large year to year changes in the location of the spawning sites of the Barents Sea capelin. The relation between the various spawning components of capelin in the Newfoundland area should be investigated further, for example through well planned tagging experiments.

Concerning other possible explanations for the low abundance on Southeast Shoal in 1976, it should be noted that the fishery on spawning capelin in Div. 3LNOPs was at a rather low level in 1972, but increased to its present level in 1973. The low abundance of the 1972 year class on Southeast Shoal in 1976 can therefore hardly be explained by overexploitation of spawning capelin, i. e. an exploitation allowing to small quantities to spawn. If the low abundance of the year class in 1976 was caused by too high exploitation at the immature stages, this could imply that the capelin in the northern areas (Div. 2J-3K), where most of the immatures are caught, are recruiting the spawning stock at Southeast Shoal and therefore should not be regarded as a separate stock, contradictory to what previously has been suggested by various authors (see for example CAMPBELL and WINTERS, 1973 and WINTERS, 1974) and which has been the basis for the ICNAF quota regulations.

References

- CAMPBELL, J. S. and WINTERS, G. H. 1973. Some biological characteristics of capelin, (Mallotus villosus) in the Newfoundland area. Int. Comm. Northw. Atlant. Fish. Res. Doc. 73/90, Ser. No. 3048.
- DOMMASNES, A. 1977. 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., (in press).

SANGOLT, G. and ULLTANG, Ø. 1976. Norwegian capelin fishery and capelin investigations in Newfoundland and Labrador waters in 1975. Int. Comm. Northw. Atlant. Fish. Res. Doc. 76/VI/23, Ser. No. 3803.

WINTERS, G. H. 1974. Rationale for partition of capelin quota in Subareas 2 and 3. Int. Comm. Northw. Atlant. Fish. Res. Doc. 74/12, Ser. No. 3158.

Table 1. Sex composition and distribution of maturity stages

Date	Female %	Male %	Maturity stages (%) 1)			Number sampled
			3	4	5	
12 - 20 June	44.2	55.8	14.0	85.0	1.0	1003
21 - 27 June	39.1	60.9	3.4	95.9	0.7	932
28 June - 3 July	30.3	69.7	3.5	91.9	4.6	822

1) Stage 3 is prespawning, stage 4 is spawning capelin and stage 5 is postspawners.

Table 2. Tagging experiment. Number of released and recovered tags.

Date of release	Position	Number tagged		Number recovered
		female	male	
17 June	N 44°26' W50°04'	100		12
"	- " -		100	32
20 June	N 44°20' W 49°47'		200	28
"	- " -		100	13
28 June	N 44°25' W49°50'		100	15

Catch delivered to "Norglobal" after 17 June: 25 000 tons.

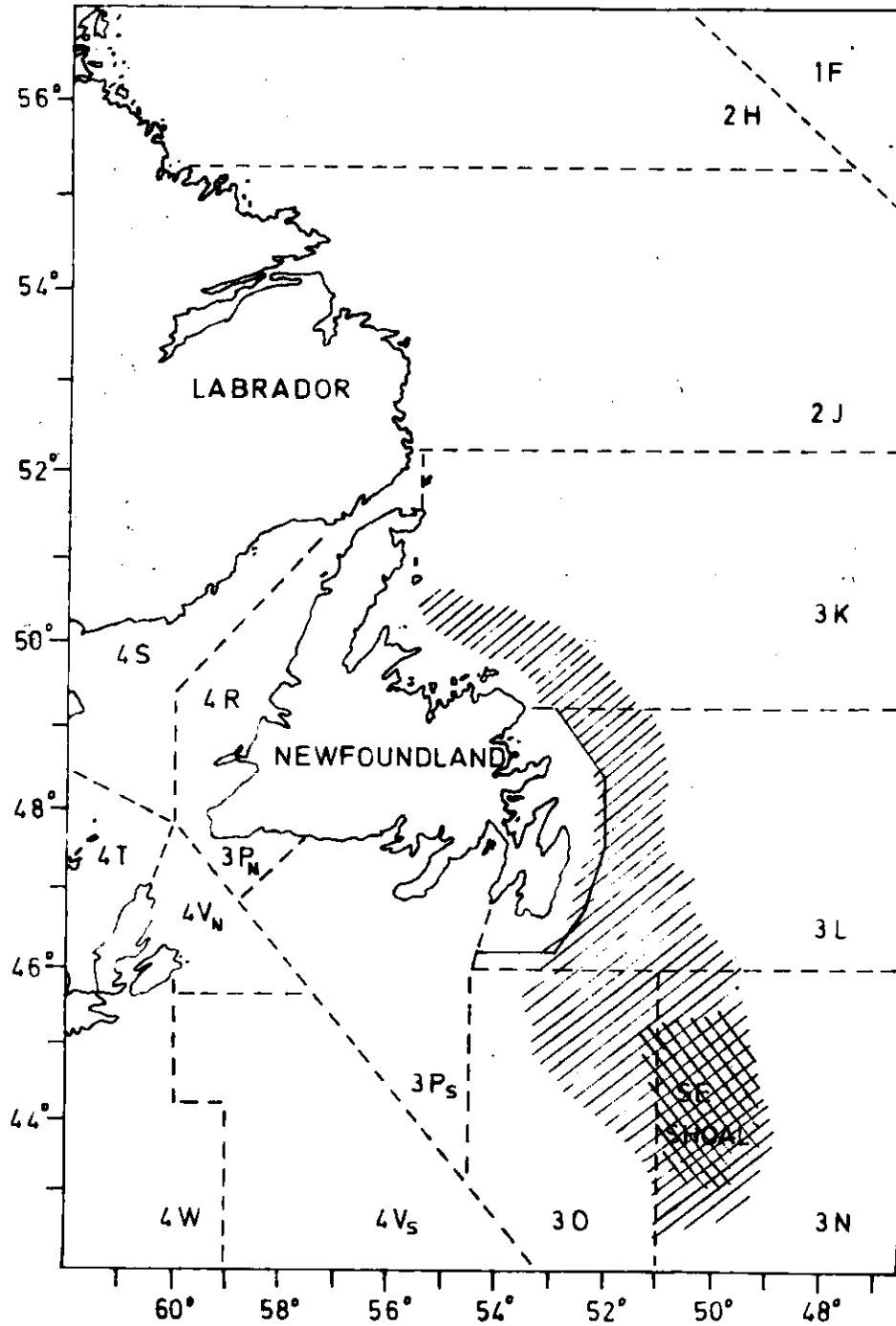


Fig. 1. Surveyed area and fishing area.

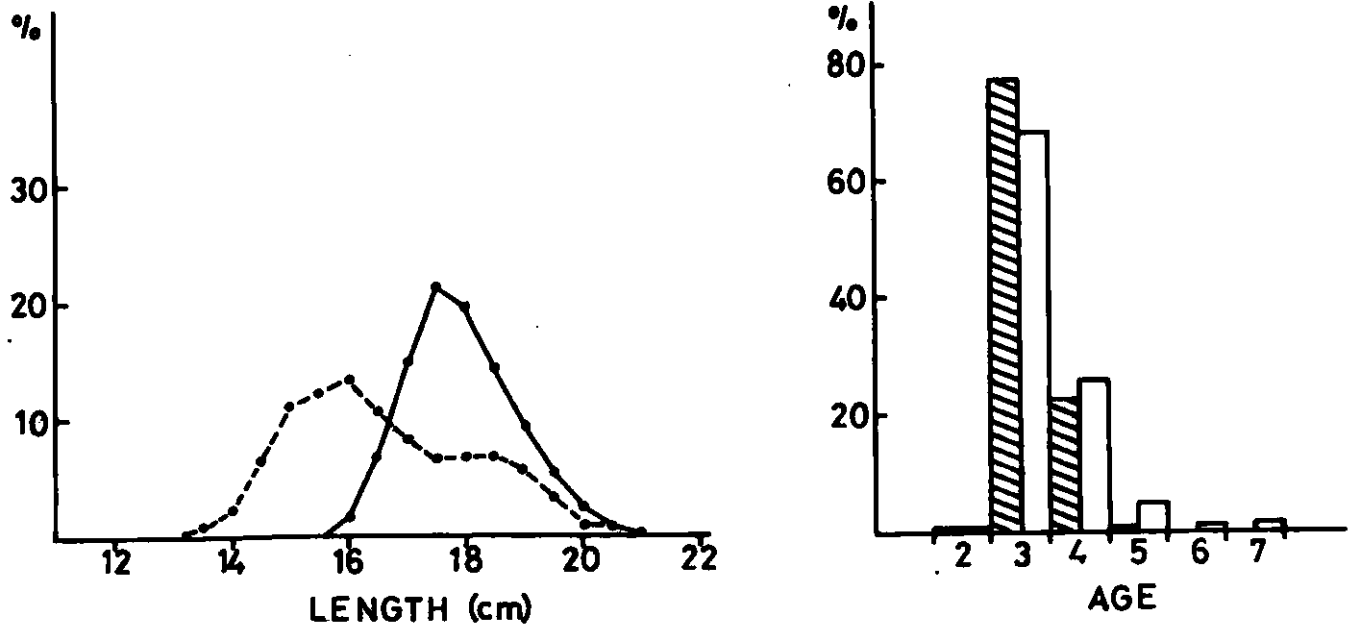


Fig. 2. Age and length distribution of capelin on Southeast Shoal of Grand Banks in June 1976. Broken line or white column: females. Whole line or shaded column: males.

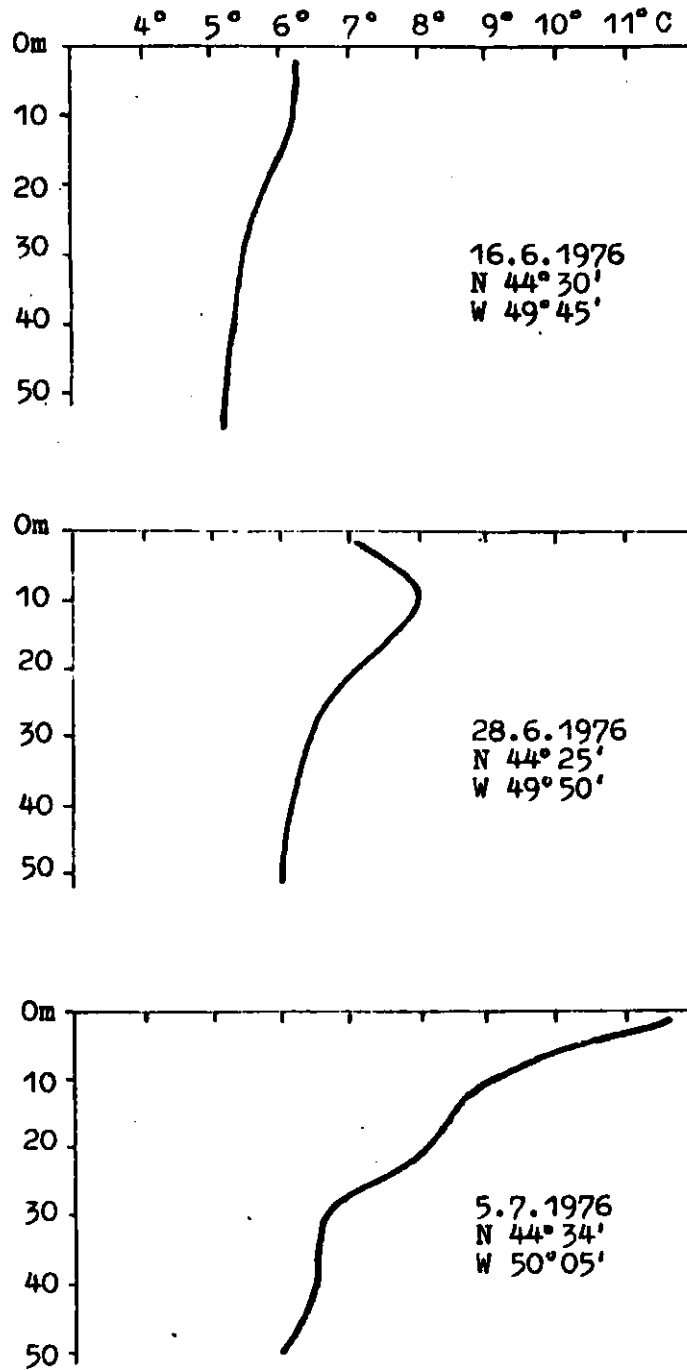


Fig. 3. Temperature at Southeast Shoal during the spawning season.

