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ANNUAL MEETING - JUNE 1962HADDOCK OBSERVATIONS IN THE SOUTH OFTHE GREAT NEWFOUNDLANDBANK

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Before 1960 there were small amounts of haddock in catches of the Soviet trawlers in the north-western Atlantic, but from July to November 1960 a special haddock fishing was carried on in the south-east of the Great Newfoundland Bank (see figure one). Dense concentrations of haddock were observed in the limited area at depths 45-80 m., where the near-bottom temperature varied from 24° to 30° C. Topography of the bottom in the fishing area is flat, the bottom consists of sand, gravel and molluscan shells. The catches include haddock from 28 cm to 60 cm, but specimens between 36-39 cm prevailed. The average length of haddock was 37.4 cm. There were no visible changes in size composition during the whole period of fishing. Age determination by otoliths x/ showed that fisheries were based on the 1955 year-class: in July it made up 670% and in October-November - 626%. The 1956 year-class was the next most numerous and made up 211-227% whereas the 1954 year-class made up 110-142%. Haddock older than 7 was poorly represented and haddock younger than four was absent in catches.

The analyses showed that the gonads of 42,5% of haddock in the fall catches were on the third stage of maturity. It should be noticed that the number of mature haddock increased with age (see table I).

x/

Our determination of haddock age should be made more exact. Supposing that one annual ring corresponding to group I is not visible we conditionally increased the age of haddock by one year.

Table I.
Numbers of Mature and Immature Haddock
in October–November of 1960
(in %).

| Age | 4 | 5 | 6 | 7 | 8 |
|---------------------------------------|------|------|------|-----|------|
| Number of immature haddock in percent | 75.6 | 59.7 | 39.3 | - | 57.5 |
| Number of mature haddock in percent | 24.4 | 40.3 | 60.7 | 100 | 42.5 |
| Total number of specimens | 46 | 125 | 28 | 1 | 200 |

Late in April 1961 haddock fishery was begun in the south-west of the Great Newfoundland Bank (the area of the continental slope) and continued to the end of June when haddock began its migrations to the south-east of the Bank where (as in previous year) it was successfully fished by the Soviet trawlers. The size composition of haddock in May was the same as fall catches of 1961 (Figure 2): the average length was 38.0 cm and specimens of 36–39 cm in length were predominant. But in July when probably post-spawners migrated to the fishing ground (see table 3), the size and age composition of haddock became different - specimens from 38 to 43 cm prevailed; the average length was 41,5 cm (see table 2 and figure 2).

Table 3.
Length composition of haddock of various
year - classes in 1960–61 (in cm)

| Date Area | Year-class Sex | Year-class | | | | | P |
|-----------|----------------|------------|------|------|------|------|-----|
| | | 1957 | 1956 | 1955 | 1954 | 1953 | |
| VII-1960 | ♂♂ | - | 35.4 | 37.9 | 41.3 | 49.5 | 114 |
| 3 N | o o + + | - | 36.3 | 38.1 | 41.2 | - | 186 |
| X-XI-60 | o o | - | 34.4 | 37.5 | 41.3 | 45.0 | 114 |
| 3 N | ♀♀ | - | 35.2 | 38.9 | 39.8 | - | 84 |
| V-1961 | o o | 34.1 | 37.6 | 39.4 | 40.7 | 46.8 | 207 |
| 3 N | ♀♀ | 34.8 | 38.1 | 40.1 | 42.9 | 47.0 | 288 |
| VII-1961 | o o | 38.0 | 38.7 | 40.5 | 43.1 | 48.0 | 31 |
| 3 N | ♀♀ | - | 38.5 | 40.9 | 43.5 | 48.6 | 147 |

The mature haddock spawning in May-June on the south-western slope of the Great Newfoundland Bank over the depths of 100-160 m under the near - bottom temperature of 2,5° to 3.0°. Single spawning specimens were observed in the south-east of the Bank in July (see table 3).

Table 3.

Maturity stages of haddock
in 1961 (in percent)

| Date | Area | Sex | Maturity state | Resting | Developing | Post-spawning | P |
|--------------|------|------------|----------------|---------|------------|---------------|----------|
| | | | II | III | IV IV-V | V VI VI-VII | |
| Late in May | | o o | 5.5 | - | - | 22.5 43.5 | 28.5 165 |
| 30 | | o o + + | 4.9 | - | 31.6 27.6 | 4.9 0.9 | 30.1 224 |
| Late in June | | o o | 16.7 | - | - | 2.4 4.8 | 76.1 42 |
| 30 | | o o + + | 20.6 | - | 36.1 | 17.2 - | 26.0 58 |
| Late in July | | o o | 9.0 | - | - | 3.0 55.0 | 33.0 33 |
| 3 N | | ♀ ♀ | 13.2 | - | 4.7 2.0 | 1.3 17.0 | 61.8 151 |

The data given in table 3 show that testes of the males caught during the third ten-day period were developing (stage V of maturity) or already post-spawning (stages VI and VI-VII). The main bulk of females had not yet spawned (stages IV and IV-V). Even late in June the main part of females caught has not yet spawned. At the end of July after haddock migrations to the fishing grounds of the south-east of the Great Newfoundland Bank the catches were represented as follows: 3.0 males had developing testes, 6.7% of females were pre-spawners and 1.3% of females had mature eggs.

It should be noted that the sex ratio in the catches varies: females prevail in spring and in summer, with males being predominant in autumn. In May 1961 the sex ratio on the spawning ground was 0.7 : 1.0 and it was 0.2 : 1.0 on the feeding ground in July. In July 1960 the sex ratio was 0.6 : 1.0 and in October-November it was 1.3 : 1.0.

Food species were identified by the frequency of their occurrence in haddock stomachs (in percent), and the average degree of stomach fullness indicated the intensity of feeding (see table 4).

Visual observations showed that late in May 1961 haddock fed with average intensity and the composition of food was as follows: Euphausiacea and Amphipoda - 80%, Ophiuræ - 5%, Mollusca - 5%, Mallotus villosus - 5%, Ammodytes hexapterus - 5%.

In summer beginning from July after haddock had migrated to the south-eastern Newfoundland Bank the intensity of feeding increased. In this period haddock fed mainly on spawning capelin (alive or dead), or on their eggs. In July stomachs of 57.0 specimens were quite full whereas in May such fish made up only 4.7%, in June fish with full stomachs did not occur.

Capelin was first observed to spawn in early July, fish accounted for 80% of weight in the food of capelin, eggs - for 20%. In this period the by-catch of capelin in the haddock fishery amounted to 5 tons per haul, which testifies to highly dense concentrations of capelin.

In late July, after capelin had completed spawning, eggs comprised 60% of the stomach content, whereas the importance of fish decreased.

The fact that considerable numbers of dead capelin were found in trawls (they usually die after spawning) indicates that they were the main food item for haddock.

Another spawning run of capelin took place in early August, the stomachs of haddock were full of fish. Later the role of capelin eggs in the food of haddock increased again.

No observations on haddock feeding behaviour were carried on in autumn 1961. In October-November 1960 fish was of secondary importance in the food of haddock.

Mollusca and Amphipoda were predominant species (80% at an average), Brachiura, Polychaeta, Ophiura, Sagitta occurred more seldom; the young stages of *A. hexapterus* were also found.

Thus *Mallotus villosus* is the main food-item of haddock in the southern Great Newfoundland Bank, that is why their abundance and distribution is of great importance for haddock stocks.

In July 1961 the length range of spawning capelin varied between 13 - 18,5 with a mean length at 16.3 cm. The weight changed from 14 to 50 gr., the mean weight being 36 gr. Males were strongly predominant in the catches, for instance in the sample of 500 specimens only 9 females were found.

Table 4.

The intensity of feeding in haddock
in May-June 1961

| Month Area | Stomach fullness | | | | | P |
|---------------|--|------|------|------|------|-----|
| | (percentage of the number of fish stomachs examined) | | | | | |
| | 0 | 1 | 2 | 3 | 4 | |
| May 30 | 32.8 | 36.8 | 15.2 | 10.5 | 4.7 | 400 |
| June 30 | 31.0 | 28.0 | 15.0 | 26.0 | - | 100 |
| July 30 | 1.1 | 8.1 | 11.4 | 22.3 | 57.1 | 184 |

As for the abundance of haddock stocks, one can come to the conclusion that fishing and natural mortality in the rich 1955 year-class and the moderate 1954 and 1956 year-classes as well as the presence of unsuccessful 1957-1960 year-classes (Templeman 1961) will result in a sharp decrease in the abundance of haddock stock in 1962, 63.

Templeman W. - Canadian Research Report, ICNAF.
Annual Meeting, Document No. 10, 1961.

Signs to Figures

Figure 1. Haddock fishing area in 1960-1961.

Figure 2. Age and size composition of haddock in 1961 catches.

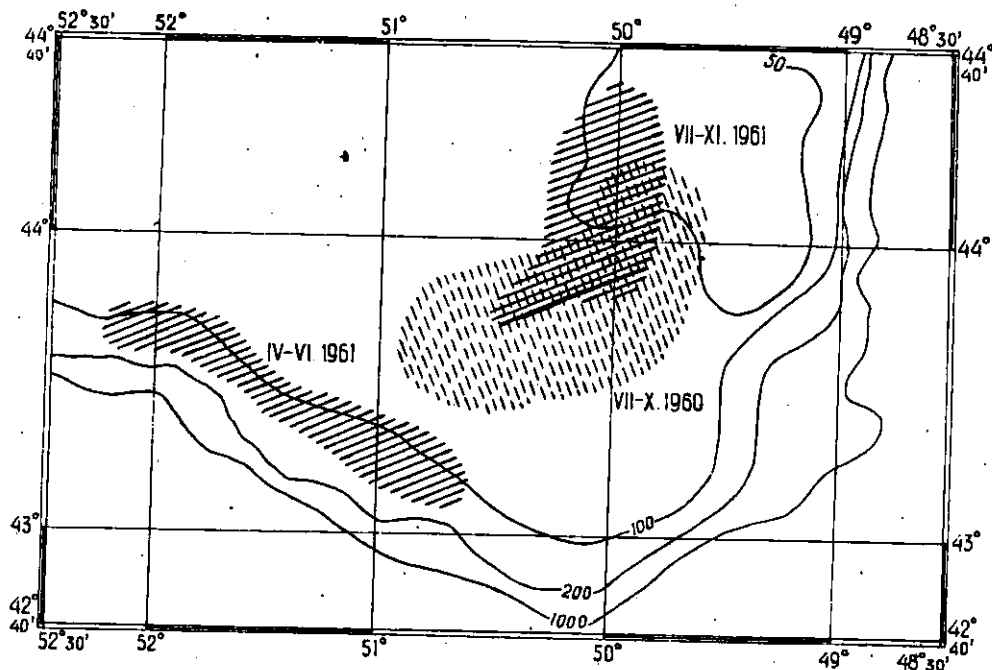


Fig. I. Haddock fishing areas in 1960-1961.

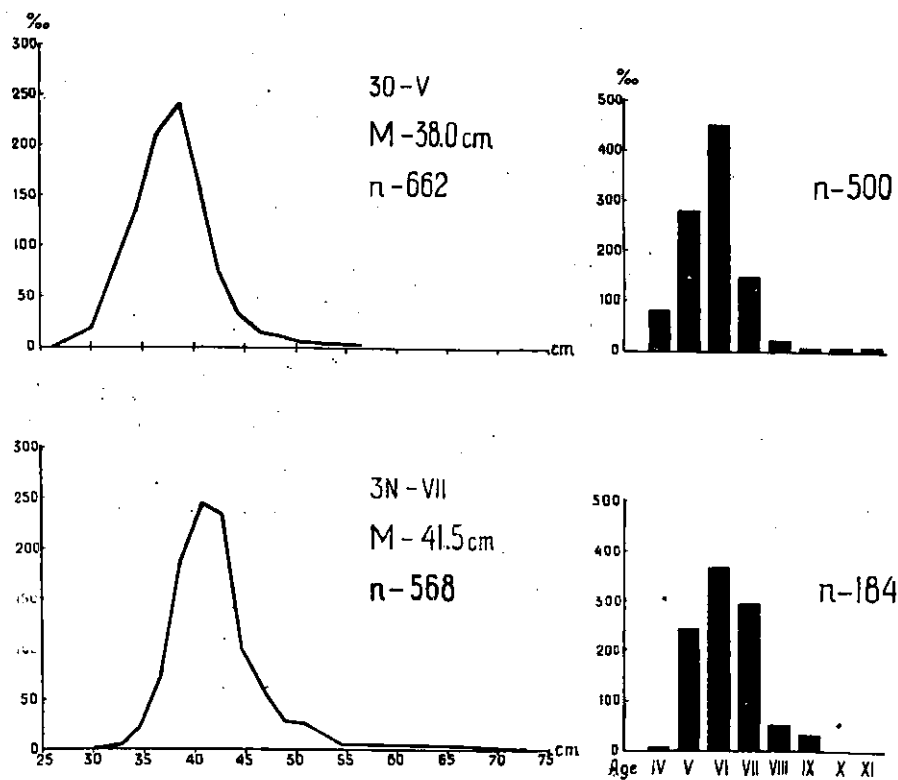


Fig. 2. Age and size composition of haddock in 1961 catches.