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# Abundance of Young Cod on the Labrador-Newfoundland Shelf in March-June 1979

by

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## Introduction

In March - June 1979 investigations on the assessment of cod abundance of successive year classes were continued during the cruise of the FRV "Suloy" on the Labrador-Newfoundland shelf.

As in previous years, hour trawlings by a bottom trawl with the fine-meshed netting inserted into the bag were made on stations located at standard positions. All the cod caught were measured, fishes up to 40 cm long at an age of 1-3 years were considered to be young. The number of the young in an average catch per trawling hour was taken as an index of relative abundance of cod year classes.

## Distribution

In spring and in early summer 1979 young cod appeared everywhere mainly at depths up to 300-350 m (Table 1). Owing to the two surveys conducted on the Flemish Cap Bank we managed to observe some changes in distribution of the young from March/April through June: in March/April there was a relatively even distribution of them at depths from 130 to 300 m, in June more dense concentrations were registered at 130-250 m depths.

The average catch of the young per hour trawling on the Flemish Cap Bank was 22 specimens in April and 118 specimens in June.

A great difference in catches according to the results of two surveys is explained evidently by peculiarities of behaviour of the young during their feeding on different food objects, by their

daily vertical migrations and also by an unequal number of trawlings made in the day- and night-time in March/April compared to June. So, when the young fed on shrimp (43% of all the dissected stomachs contained shrimp), on young redfish (24%), on Calanoidae and Oicopleura (24%), their concentrations were more mobile and less dense than in June. In June the young ate actively Hyperiidae (96%) and have almost stopped feeding on redfish. (The similar phenomenon of concentration of the young feeding on Hyperiidae is also observed usually on the south-eastern slope of the Grand Bank southward of 44°N).

Both in April and in June the young kept to the ground in the day-time and migrated to water masses at night. During the April survey the number of day- and night-time trawlings (at depths up to 300 m) was approximately equal, during the June survey the number of day-time trawlings was three times as high as that of night-time trawlings and two times higher than that made in April (Table 2).

## Assessment of abundance

As usual, in the northern part of the shelf (Divisions 2J, 3K, 3L) the three- and four-year-old fishes of the 1976 and 1975 year classes over 30 cm in length made up the bulk of catches of the young in the Labrador cod stock (Fig.1).

In Divisions 3N and 3O where cod of the South Newfoundland stock dwell the curves of the length frequency differed: in Division 3N there prevailed larger young fishes 32 to 40 cm long (at an age of 3-4 years) and 24 to 28 cm long (two-year-olds of the 1977 year class); in Division 3O 55% of the fishes caught were 8 to 16 cm long (yearlings of the 1978 year class).

In the Flemish Cap cod stock (Division 3M) the two-year-old specimens of the 1977 year class mainly 24 to 29 cm long in April and 27 to 31 cm long in June were the most numerous. The increment in length of this year class fishes was on the average 2.34 cm for two months.

The abundance of cod of each considered year class is deter-

mined in their first year and refined in their second and third years of life. Catches of three-year-old fishes were the most representative for the assessment of the Labrador cod year classes strength and catches of two-year-olds - for the South Newfoundland and Flemish Cap stocks.

In Table 3 indices of relative abundance of cod of the 1976, 1977 and 1978 year classes are given in comparison with the abundance of preceding year classes (at the same age) and with the long-term mean. Comparing data on catches of the young with the long-term mean one may say that over a period of three surveys cod abundance of the 1976 year class was low in all Divisions surveyed. Canadian ichthyologists have drawn the same conclusion after conducting surveys on the Flemish Cap Bank in 1978 and 1979 (Wells, 1979).

To judge by the catches of two-year-old fishes the cod abundance of the 1977 year class somewhat exceeds the long-term mean only on the Flemish Cap Bank (51 spec. against a norm of 45 spec.). This year class was similar in size to the 1974 year class. In the South Newfoundland cod stock the 1977 year class was poor (the mean catch was 7.9 spec. against a norm of 44.3 spec.).

Cod at an age of 1 year of the 1978 year class were only caught in appreciable quantity in Division 3O where their catch made up 5.3 spec. against the long-term mean norm of 6.9 specimens for this Division. It is possible that this year class was rich in the South Newfoundland cod stock but it was poor on the Flemish Cap Bank where the mean catch of yearlings was equal to 3.4 spec. against a norm of 30.7 spec.

Comparing abundance indices of a number of year classes (catches of three-year-old fishes in Divisions 2J, 3K, 3L) one may say that none of the strong year classes appeared in the Labrador cod stock after 1973-1974 and that in 1980-1981 (and perhaps in 1982) the commercial stock will be recruited poorly.

On the Grand Bank the commercial fleet will fish in 1980 five- and six-year-old fishes of the 1975 and 1974 year classes rich in size but already caught partially by the fisheries (Bishop, Wells,

1979). Specimens of the poor 1977 and 1976 year classes which will reach the fishing length in 1981 and 1982 will recruit slightly to the commercial stock of Newfoundland cod.

On the Flemish Cap Bank six-year-old fishes of the 1974 year class, close to average in size, four- and five-year-old specimens of the poor 1975 and 1976 year classes will make up the bulk of commercial catches in 1980. Some improvement of the cod fishery situation is possible in 1981 when specimens of the 1977 year class, in size somewhat higher than average, will reach the fishing length.

## Conclusions

1. Cod abundance of the 1978 year class (in their first year of life) is close to the long-term mean in the South Newfoundland stock and below the long-term mean - for the Flemish Cap Bank.

2. Cod of the 1977 year class exceeds in size the long-term mean on the Flemish Cap Bank. For the South Newfoundland and preliminarily for the Labrador stock this year class should be regarded as poor.

3. The 1976 year class is poor for all cod stocks.

## References

Bishop C.A. & R.Wells, 1979. Status of the cod stocks in Divisions 3NO. ICNAF Res.Doc. 79/VI/67, serial No.5409.

Wells R., 1979. Observations on the distribution, abundance, growth, mortality and sex, and maturity of cod from Flemish Cap. ICNAF Res.Doc. 79/VI/63, serial No.5404.

Table 1. Number of trawlings (numerator) and mean number of young cod per hour trawling (denominator) by Divisions and depending on depths.

| Division | Month | Total | Depth, m | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 50–100 | 100–150 | 150–200 | 200–250 | 250–300 | 300–350 | 350–400 | > 400 |
| 2J | V | 38 / 6,6 | – | – | 9 / 0,2 | 8 / 0,8 | 7 / 17,6 | 3 / 27,7 | 2 / 0 | 9 / 3,6 |
| 3K | V | 53 / 7,0 | – | – | – | 12 / 16,2 | 13 / 8,4 | 20 / 2,2 | 3 / 6,0 | 5 / 0,4 |
| 3L | IV–V | 61 / 22,0 | 11 / 3,3 | 5 / 4,8 | 14 / 20,0 | 10 / 77,8 | 7 / 26,6 | 4 / 14,5 | 2 / 0 | 8 / 0 |
| 3O | IV | 44 / 10,0 | 19 / 16,1 | 8 / 16,8 | 8 / 1,0 | 3 / 0,3 | 3 / 0,3 | 1 / 0 | – | 2 / 0 |
| 3M | III–IV | 32 / 22,0 | – | 2 / 44,5 | 3 / 27,0 | 5 / 21,2 | 6 / 69,0 | 3 / 0,7 | 3 / 1,0 | 10 / 0,1 |
| 3M | VI | 34 / 118,0 | – | 2 / 114,5 | 5 / 375,8 | 8 / 232,8 | 5 / 5,0 | 4 / 0 | 2 / 0 | 8 / 0,1 |
| 3N | IV | 47 / 52,2 | 19 / 4,7 | 5 / 26,0 | 8 / 234,5 | 4 / 28,8 | 4 / 6,0 | 1 / 0 | 4 / 37,2 | 2 / 0 |

Table 2. Number of trawlings at depths up to 300 m (numerator) and mean number of young cod (denominator) in the day- and night-time catches in April–June on the Flemish Cap Bank.

| Month | Time of a day, hrs | |
|---|---|---|
| | 8 00 – 20 00 | 20 00 – 8 00 |
| March/ April | 7 / 65,1 | 9 / 26,6 |
| June | 15 / 256,0 | 5 / 28,8 |

Table 3. Number of young cod of the 1958-1979 year-classes (at an age of 1-3 years) in the mean catch per hour trawling on the Newfoundland shelf.

| Year | 1 year | | | | | | 2 years | | | | | | 3 years | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2J | 3K | 3L | 3N | 3O | 3M | 2J | 3K | 3L | 3N | 3O | 3M | 2J | 3K | 3L | 3N | 3O | 3M |
| 1958 | | | | | | | | | | | | | | | | | | |
| 1959 | | | | | | | | | | | | | | 33,0 | 17,7 | 12,0 | 1,3 | |
| 1960 | | | | | | | | 8,5 | 3,4 | 5,0 | 0,0 | | | 16,1 | 10,9 | 2,9 | 2,4 | |
| 1961 | | 2,10 | 2,4 | 1,5 | 1,5 | | | 4,8 | 6,0 | 9,0 | 3,9 | | | 28,8 | 42,4 | 16,7 | 1,6 | 5,8 |
| 1962 | | 0,16 | 1,1 | 1,8 | 10,2 | | | 2,4 | 8,1 | 23,2 | 2,7 | 7,3 | | 22,1 | 56,2 | 26,0 | 2,7 | 28,6 |
| 1963 | | 0,63 | 3,1 | 1,3 | 0,8 | 0,2 | | 1,2 | 10,6 | 7,5 | 2,2 | 5,7 | | 51,4 | 44,1 | 41,5 | 1,5 | 14,3 |
| 1964 | | 0,07 | 1,8 | 57,1 | 37,3 | 0,07 | | 4,2 | 22,2 | 192,3 | 18,2 | 0,8 | | 10,8 | 67,6 | 102,8 | 59,5 | 13,6 |
| 1965 | | 0,14 | 0,7 | 0,09 | 0,4 | 2,8 | | 1,0 | 1,5 | 19,2 | 16,7 | 2,07 | | 27,1 | 16,8 | 31,8 | 27,4 | 8,8 |
| 1966 | | 0,00 | 0,2 | 2,4 | 20,6 | 0,07 | | 4,2 | 10,2 | 38,5 | 24,0 | 0,09 | | 37,5 | 60,6 | 52,9 | 47,2 | 13,3 |
| 1967 | | 0,23 | 0,2 | 0,2 | 2,3 | 0,0 | | 10,9 | 14,9 | 4,0 | 5,6 | 12,8 | | 48,4 | 36,0 | 44,3 | 19,7 | 20,2 |
| 1968 | | 0,71 | 1,3 | 8,1 | 24,4 | 10,1 | | 9,8 | 67,7 | 152,9 | 39,8 | 106,4 | | 46,1 | 118,2 | 127,3 | 31,8 | 58,1 |
| 1969 | | 0,70 | 3,7 | 3,8 | 5,5 | 0,43 | | 3,2 | 30,7 | 14,7 | 8,0 | 2,1 | | 18,5 | 60,2 | 36,6 | 17,1 | 1,7 |
| 1970 | | 0,08 | 1,4 | 8,8 | 1,9 | 0,08 | | 0,7 | 6,5 | 34,5 | 3,9 | 0,6 | | 8,1 | 8,1 | 29,0 | 14,2 | 1,2 |
| 1971 | | 0,00 | 0,04 | 5,5 | 2,2 | 22,4 | | 0,6 | 1,2 | 50,7 | 20,8 | 86,7 | | 3,6 | 11,5 | 80,7 | 11,5 | 3,2 |
| 1972 | | 0,00 | 0,2 | 6,4 | 3,1 | 3,4 | | 0,4 | 3,0 | 12,0 | 10,7 | 29,2 | | 8,3 | 6,8 | 34,4 | 8,9 | 21,7 |
| 1973 | | 0,06 | 0,5 | 1,1 | 3,4 | 302,7 | | 7,2 | 8,6 | 42,3 | 9,8 | 350,4 | | 40,8 | 23,9 | 91,7 | 9,3 | 567,6 |
| 1974 | | 0,12 | 1,8 | 2,3 | 3,9 | 133,1 | | 2,5 | 4,1 | 89,2 | 6,7 | 49,6 | | 10,1 | 58,0 | 201,3 | 20,9 | 57,4 |
| 1975 | | 0,00 | 0,05 | 10,0 | 0,7 | 4,6 | | 0,9 | 8,3 | 91,7 | 5,4 | 16,5 | 16,1 | 1,9 | 5,8 | 62,3 | 4,8 | 17,4 |
| 1976 | | 0,00 | 0,07 | 0,45 | 0,43 | 0,2 | 0,09 | 0,13 | 0,2 | 3,7 | 2,6 | 2,3 | 1,5 | 2,2 | 3,0 | 24,6 | 2,1 | 12,8 |
| 1977 | 0,00 | 0,00 | 0,02 | 0,1 | 1,0 | 8,0 | 0,00 | 0,07 | 0,2 | 7,91 | 0,36 | 51,4 | | | | | | |
| 1978 | 0,00 | 0,00 | 0,01 | 2,04 | 5,3 | 3,4 | | | | | | | | | | | | |
| Mean for 18 years | 0,00 | 0,28 | 1,03 | 6,27 | 6,94 | 30,72 | 0,04 | 3,48 | 11,52 | 44,35 | 10,07 | 45,24 | 8,8 | 23,0 | 35,9 | 56,57 | 15,77 | 52,85 |

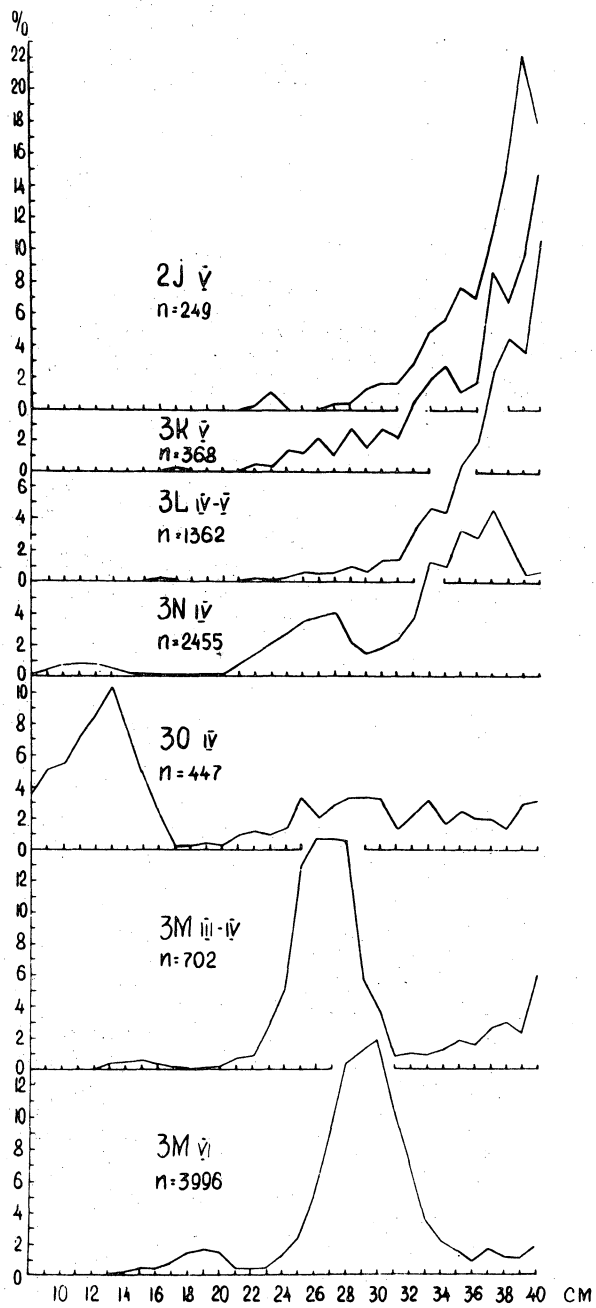


Fig. 1. Length composition of young cod in catches taken on the Labrador-Newfoundland shelf in March-June 1979.