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Age Structure of Roughhead Grenadier (*Macrourus berglax*) on Flemish Cap, 1996

by

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The estimated biomass and the age structure of roughhead grenadier (*Macrourus berglax*) of the Flemish Cap are presented in this paper. This results are compared with those of previous years.

### Introduction

The importance of the Roughhead grenadier has been increasing due to the fact to be the main species in the by-catch in the Greenland halibut fishery (Alpoim *et al.*, 1997). Since 1988 EU has conducted a random-stratified bottom trawl survey in the Flemish Cap, till 730m depth in June-July. The results for the roughhead grenadier in the 1996 survey are presented in this paper and compared with the results of the 1994 and 1995 surveys (Casas, 1994; Sainza, 1996). The estimated biomass, length composition and age composition are presented taking nevertheless into account that roughhead grenadier distribution goes to depths near the 2000 m (Cardenas *et al.*, 1996).

### Material and methods

The biomass of the roughhead grenadier on Flemish Cap was estimated by the swept area method based on the bottom trawl survey carried out by the EU in June-July 1989-1996 on Flemish Cap till the 730 m depth contour (Vazquez, 1997).

The length measurement was to the anal-fin length, in 0.5cm intervals by sex, according with the NAFO sampling recommendations.

The otoliths were collected on board during the survey, broken through the nucleus and read by transmitted light.

### Results

The estimated biomass of roughhead grenadier increased from 1989 (1024 tons) to 1993 (3757 tons). Since 1993 the biomass have been decreasing, being in 1996 at the level of 1619 ton (Table 1).

The 1996 length composition show a dominance of 13-20 cm length classes. Outside this range the only evident length class is the 5cm length class (Table 2, Fig 1).

In table 3 is presented the age-length key by sex.

The age composition presents a range of ages between 2 and 16 years old. The most abundant year class is the 1990 one (6 years old in 1996). This year class was also the most important in 1995 age composition (Table 4, Fig.1). The 1994 year class (2 years old in 1996) corresponds to the 5cm modal length group and seems to be also a strong year class.

All this results must be taken with care due to the small proportion of the roughhead grenadier distribution area covered by the survey.

In Table 5 and Fig.2 are presented the mean anal fin length at age for the period 1994-1996. The results obtained for each year are very similar.

**References**

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Table 1: Biomass swept area method estimates in Flemish Cap, 1989 - 1996.

| Year | Biomass (tons) |
|------|----------------|
| 1989 | 1024           |
| 1990 | 1014           |
| 1991 | 1587           |
| 1992 | 1878           |
| 1993 | 3757           |
| 1994 | 2350           |
| 1995 | 1855           |
| 1996 | 1619           |

Table 2: Flemish Cap anal-fin length frequency of roughhead grenadier (x1000), 1994-96

| Length | 1994 | 1995 | 1996 | Length |
|--------|------|------|------|--------|
| 3      |      |      | 7    | 3      |
| 4      |      | 37   | 59   | 4      |
| 5      | 47   | 45   | 215  | 5      |
| 6      | 31   | 46   | 63   | 6      |
| 7      | 65   | 60   | 31   | 7      |
| 8      | 169  | 72   | 56   | 8      |
| 9      | 98   | 139  | 46   | 9      |
| 10     | 231  | 342  | 113  | 10     |
| 11     | 196  | 295  | 116  | 11     |
| 12     | 117  | 527  | 160  | 12     |
| 13     | 100  | 271  | 255  | 13     |
| 14     | 255  | 131  | 308  | 14     |
| 15     | 236  | 185  | 212  | 15     |
| 16     | 213  | 275  | 308  | 16     |
| 17     | 426  | 332  | 244  | 17     |
| 18     | 469  | 412  | 244  | 18     |
| 19     | 440  | 433  | 308  | 19     |
| 20     | 248  | 280  | 270  | 20     |
| 21     | 166  | 151  | 114  | 21     |
| 22     | 101  | 73   | 101  | 22     |
| 23     | 71   | 16   | 31   | 23     |
| 24     | 73   | 26   | 46   | 24     |
| 25     | 72   | 26   | 21   | 25     |
| 26     | 43   | 19   | 29   | 26     |
| 27     | 24   | 28   | 21   | 27     |
| 28     | 8    | 13   | 8    | 28     |
| 29     | 46   |      |      | 29     |
| 30     | 19   | 9    | 8    | 30     |
| 31     | 31   | 6    | 7    | 31     |
| 32     | 11   | 7    | 14   | 32     |
| 33     |      |      |      | 33     |
| 34     |      |      |      | 34     |
| 35     |      |      |      | 35     |
| 36     | 11   |      |      | 36     |
| Total  | 4017 | 4256 | 3415 |        |

Table 3: Anal fin length-age key by sex of roughhead grenadier in Flemish Cap, 1996

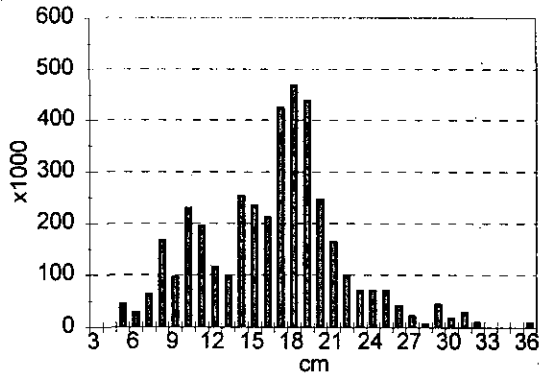
**Females**

| Length<br>(cm) | Age class |    |    |    |    |    |    |    |    |    |    |    |    |    |    |   | total |
|----------------|-----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|-------|
|                | 2         | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 |   |       |
| 5              | 3         |    |    |    |    |    |    |    |    |    |    |    |    |    |    |   | 3     |
| 6              |           | 2  |    |    |    |    |    |    |    |    |    |    |    |    |    |   | 2     |
| 7              |           | 5  |    |    |    |    |    |    |    |    |    |    |    |    |    |   | 5     |
| 8              |           | 5  |    |    |    |    |    |    |    |    |    |    |    |    |    |   | 5     |
| 9              |           |    | 2  |    |    |    |    |    |    |    |    |    |    |    |    |   | 2     |
| 10             |           |    | 5  |    |    |    |    |    |    |    |    |    |    |    |    |   | 5     |
| 11             |           |    | 4  | 4  |    |    |    |    |    |    |    |    |    |    |    |   | 8     |
| 12             |           |    |    | 8  | 1  |    |    |    |    |    |    |    |    |    |    |   | 9     |
| 13             |           |    |    | 6  | 4  | 1  |    |    |    |    |    |    |    |    |    |   | 11    |
| 14             |           |    |    | 3  | 9  |    | 1  |    |    |    |    |    |    |    |    |   | 13    |
| 15             |           |    |    |    | 7  | 1  |    |    |    |    |    |    |    |    |    |   | 10    |
| 16             |           |    |    |    | 3  | 11 | 2  |    |    |    |    |    |    |    |    |   | 16    |
| 17             |           |    |    |    |    | 5  | 6  | 1  |    |    |    |    |    |    |    |   | 12    |
| 18             |           |    |    |    |    | 1  | 2  | 2  | 1  |    |    |    |    |    |    |   | 6     |
| 19             |           |    |    |    |    |    | 4  | 2  | 2  | 2  |    |    |    |    |    |   | 10    |
| 20             |           |    |    |    |    |    |    | 4  | 5  | 2  |    |    |    |    |    |   | 11    |
| 21             |           |    |    |    |    |    |    | 2  | 2  | 2  |    |    |    |    |    |   | 6     |
| 22             |           |    |    |    |    |    |    |    | 4  | 3  | 1  | 1  |    |    |    |   | 9     |
| 23             |           |    |    |    |    |    |    |    | 1  | 3  |    |    |    |    |    |   | 4     |
| 24             |           |    |    |    |    |    |    |    | 1  |    | 3  | 1  | 1  |    |    |   | 6     |
| 25             |           |    |    |    |    |    |    |    |    |    | 1  |    | 1  |    |    |   | 2     |
| 26             |           |    |    |    |    |    |    |    | 1  | 1  | 2  | 1  |    |    |    |   | 5     |
| 27             |           |    |    |    |    |    |    |    |    |    |    | 1  | 2  | 1  |    |   | 4     |
| 28             |           |    |    |    |    |    |    |    |    |    |    |    | 1  |    |    |   | 1     |
| 29             |           |    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |       |
| 30             |           |    |    |    |    |    |    |    |    |    |    | 1  |    |    |    |   | 1     |
| 31             |           |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 1 | 1     |
| 32             |           |    |    |    |    |    |    |    |    |    |    |    | 1  |    |    | 1 | 2     |
| total          | 3         | 12 | 11 | 21 | 24 | 20 | 16 | 11 | 17 | 13 | 7  | 5  | 6  | 1  | 2  |   | 169   |

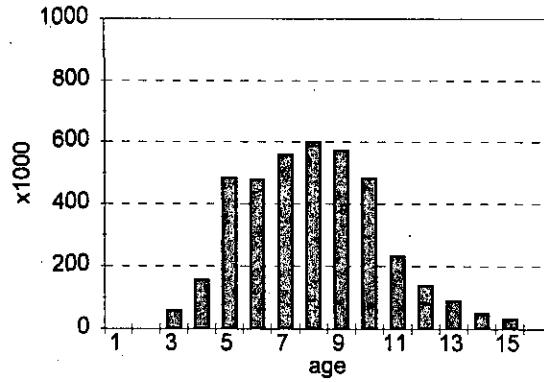
**Males**

| Length<br>(cm) | Age class |   |    |    |    |    |    |    |    |    |    |    |    |    |    |  | total |
|----------------|-----------|---|----|----|----|----|----|----|----|----|----|----|----|----|----|--|-------|
|                | 2         | 3 | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 |  |       |
| 4              | 3         |   |    |    |    |    |    |    |    |    |    |    |    |    |    |  | 3     |
| 5              | 1         |   |    |    |    |    |    |    |    |    |    |    |    |    |    |  | 1     |
| 6              | 2         | 2 |    |    |    |    |    |    |    |    |    |    |    |    |    |  | 4     |
| 7              |           |   |    |    |    |    |    |    |    |    |    |    |    |    |    |  |       |
| 8              |           | 3 | 1  |    |    |    |    |    |    |    |    |    |    |    |    |  | 4     |
| 9              |           | 1 | 3  |    |    |    |    |    |    |    |    |    |    |    |    |  | 4     |
| 10             |           |   | 8  |    |    |    |    |    |    |    |    |    |    |    |    |  | 8     |
| 11             |           |   | 2  | 1  | 1  |    |    |    |    |    |    |    |    |    |    |  | 4     |
| 12             |           |   |    | 7  | 4  |    |    |    |    |    |    |    |    |    |    |  | 11    |
| 13             |           |   |    | 8  | 10 |    |    |    |    |    |    |    |    |    |    |  | 18    |
| 14             |           |   |    | 3  | 20 | 2  |    |    |    |    |    |    |    |    |    |  | 25    |
| 15             |           |   |    |    | 5  | 9  | 1  |    |    |    |    |    |    |    |    |  | 15    |
| 16             |           |   |    |    | 4  | 5  | 8  | 2  |    |    |    |    |    |    |    |  | 19    |
| 17             |           |   |    |    |    | 5  | 6  | 3  | 1  |    |    |    |    |    |    |  | 15    |
| 18             |           |   |    |    |    |    | 9  | 5  | 7  | 4  |    |    |    |    |    |  | 25    |
| 19             |           |   |    |    |    |    | 2  | 5  | 9  | 9  | 1  |    |    |    |    |  | 26    |
| 20             |           |   |    |    |    |    |    | 3  | 5  | 11 | 4  | 1  |    |    |    |  | 24    |
| 21             |           |   |    |    |    |    |    | 2  | 1  | 3  | 3  | 1  |    |    |    |  | 10    |
| 22             |           |   |    |    |    |    |    |    | 2  | 2  | 1  |    |    |    |    |  | 5     |
| total          | 6         | 6 | 14 | 19 | 44 | 21 | 26 | 20 | 25 | 29 | 9  | 2  |    |    |    |  | 221   |

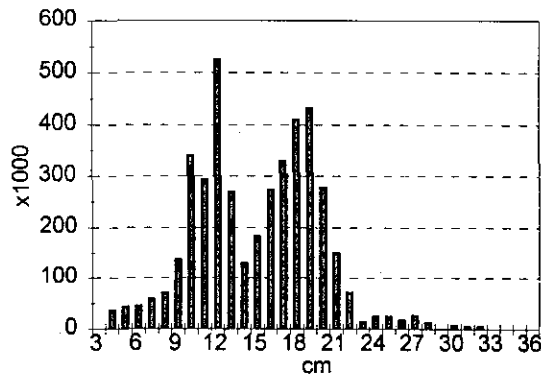




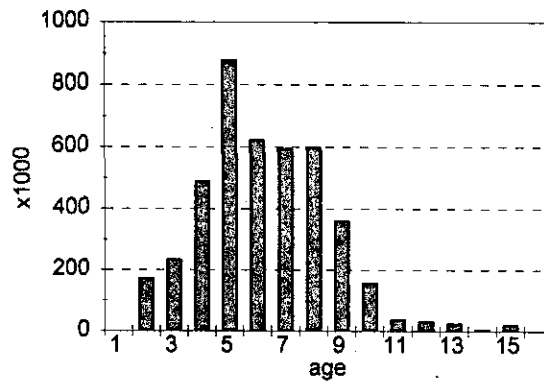
1994 length frequency



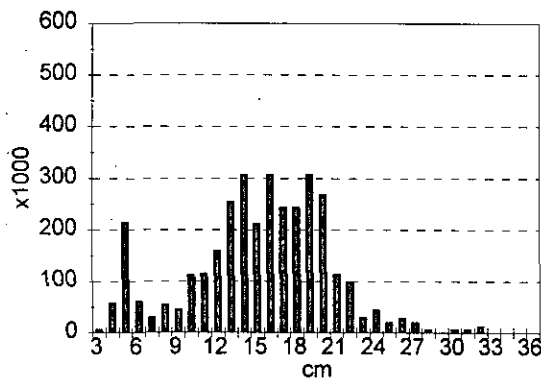
1994 age frequency



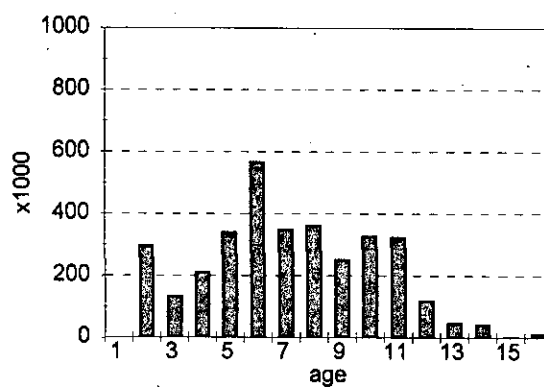
1995 length frequency



1995 age frequency

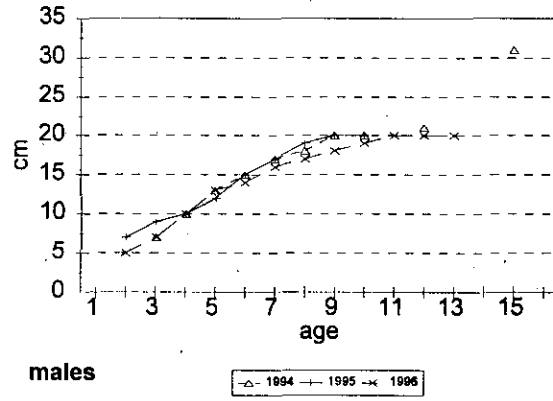


1996 length frequency

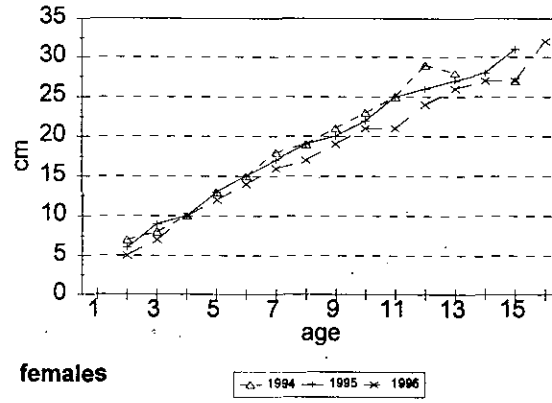


1996 age frequency

Fig. 1: Anal-fin length and age frequencies of roughhead grenadier in Flemish Cap, 1994-1996.



males



females

**Fig. 2: Mean anal-fin length (cm) at age of roughhead grenadier in Flemish Cap, 1994-96**