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Exploration of the Sea

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# *REPORT OF THE ARCTIC FISHERIES WORKING GROUP*

Copenhagen, 22 September - 2 October 1986



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## 1 PARTICIPANTS

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| A. Hylen | Norway |
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| B.W. Jones | UK (England) |
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Dr E.D. Anderson, ICES Statistician, also assisted in the meeting.

## 2 INTRODUCTION

### 2.1 Terms of Reference

At the 73rd Statutory Meeting of ICES in 1985, it was decided (C.Res.1985/2:3:19) that the Arctic Fisheries Working Group (Chairman: Mr T. Jakobsen) will meet at ICES headquarters from 22 September - 2 October 1986 to assess the status of and provide catch options for 1987 for the stocks of cod, haddock, saithe, redfish and Greenland halibut in Sub-areas I and II inside safe biological limits.

### 2.2 Failure to Meet the Terms of Reference

Data from major fisheries of North-East Arctic cod and haddock, Sebastes mentella, and Greenland halibut were not available at the meeting of the Working Group.[1] The Working Group, therefore, concluded that there was no reliable basis for an assessment of these stocks. For Sebastes marinus, the data base as a whole is of poor quality and although a VPA was made, no prediction was attempted. Thus, a full assessment was carried out only for the North-East Arctic saithe and a limited assessment was made for S. marinus. For the other stocks, only some updated tables with corresponding sections of text are presented. A more detailed description of the deficiencies in the data base and the reason for not making an assessment is given at the end of each stock section.

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[1] Shortly after the meeting, it was discovered that data sufficient for completing the assessment of cod, haddock, and Sebastes mentella had been mailed to the Working Group chairman personally but did not arrive until after he had left for the meeting. In view of information received at the meeting, the Working Group did not consider this possibility.

## 3 NORTH-EAST ARCTIC COD

### 3.1 Status of the Fisheries

#### 3.1.1 Landings prior to 1986 (Tables 3.1-3.3)

Final reports of landings in 1984 amounted to 277,651 t and were virtually unchanged from the provisional figures used in last year's assessment. Landings provisionally reported for 1985 were 302,819 t which was well in excess of the agreed TAC of 220,000 t, but was below the figure of 326,000 t, which was used last year by the Working Group for calculating catch options for 1986. Landings from Sub-area I have decreased from 723,489 t in 1974 to 54,317 t in 1984, but in 1985, this trend was reversed and the 114,512 t reported were just over twice the 1984 value. Landings from Divisions IIa and IIb in 1985 fell by 15% and 24%, respectively, compared with 1984 (Table 3.1).

Table 3.3 gives landings by country, and the main changes from 1984 to 1985 have been a 10% decline in Norwegian landings and an increase of 180% in landings by the USSR. The increase in landings by the USSR is also reflected in the much higher catches by trawlers in Sub-area I (Table 3.2).

#### 3.1.2 Expected landings in 1986 (Agreed TAC of 400,000 t)

Tables 3.1 and 3.2 give the landings expected in 1986 based on reports of landings in the first half of the year. These estimates are for the catches of all countries except the USSR for which no data were provided. If the USSR landings in 1986 were equal to the national quota (150,000 t), the total catch for all areas combined would be expected to be about 420,000 t. The main contribution to the increased level of landings is expected to come from the recruitment to the fishery of the abundant 1983 year class.

#### 3.1.3 Effort and catch per unit effort

Catch-per-unit-effort data for each area separately are given in Table 3.4, and data for the Vestfjord fishery at Lofoten are given in Table 3.5.

### 3.2 Catch in Numbers at Age

The age compositions for 1984 were changed in accordance with revised figures for landings and complete age distributions for Norwegian landings. Age compositions for the USSR, Spain and the Federal Republic of Germany were the same as those presented at the 1985 meeting. Catch in numbers at age for other countries was determined by combining catches and age compositions as was done at the 1985 meeting.

For 1985, the data available for calculating catch in numbers were:

a) landings by areas from each country for the whole year, and

b) age compositions from the catches by the Federal Republic of Germany, Norway, Spain, and the Faroes. Catch in numbers at age for other countries (except the USSR) was determined by combining catches and age compositions as follows:

| Area | Country | Age composition |
|---|---|---|
| Sub-area I | Other countries except the Faroes | Norwegian trawler age composition |
| Division IIa | All other countries | Norwegian trawler age composition |
| Division IIb | Portugal | Spanish age composition |
| | All other countries | Federal Republic age composition |

For the Faroe Islands catch in Sub-area I, the USSR age composition was intended to be used. However, lacking USSR age compositions for 1985, no total age composition could be calculated.

For 1986, age compositions were provided by Norway for all components in its fishery for the first half year. The Federal Republic of Germany provided age and length compositions for its fishery in January-April in Division IIa. No attempts were made to calculate a total age composition for the expected landings in 1986.

### 3.3 Survey Results

Survey results which have become available since the 1985 Working Group meeting were:

1) the joint Norwegian-USSR 0-group survey in August-September 1986 (Anon.,1986),

2) the Barents Sea acoustic and bottom trawl surveys in January-March 1986 (Hylen et al., 1986),

3) the spawning ground acoustic surveys in March 1986 (Raknes and Sunnanå, 1986), and

4) the Svalbard bottom trawl survey in September 1985 (Godø and Nedreaas, 1986).

### 3.3.1 O-group surveys (Table 3.6)

The abundance index for the 1986 year class is smaller than any of those from the period 1983-1985, but larger than those from the period 1976-1982.

### 3.3.2 Bottom trawl surveys (Tables 3.7-3.8)

A decline in the total abundance index was observed from 1984 to 1985 in the Norwegian bottom trawl survey in the Barents Sea. This reduction was caused by a drop in the abundance indices for the 1982 and 1983 year classes, which is not in conformity with the tendency observed for the preceding year classes. It is believed that this is caused by a change in the vertical distribution of the fish, which led to significantly lower bottom trawl indices for the youngest age groups in 1985.

In 1986, the total abundance index was nearly doubled from 1985. This was caused by higher abundance indices for the 1982, 1983, and 1984 year classes.

The total abundance index in the Norwegian bottom trawl survey in the Svalbard region has been steadily increasing since 1983. From 1984 to 1985, it more than doubled. A large part of the increase was due to contributions from the 1981-1984 year classes. In general, there may have been an overall increase in availability of cod resulting in higher indices in 1985 compared with earlier years. There is, however, no known reason for such an increase (Godø and Nedreaas, 1986).

### 3.3.3 Acoustic surveys

Details of the acoustic surveys are given in the respective survey reports. Before 1985, the acoustic estimates were made on the basis of the total echo abundance which was split between cod and haddock on the basis of samples from bottom and midwater trawls combined. In 1985 and 1986, however, estimates were also made using midwater trawl samples for the pelagic echo abundance and bottom trawl samples for the echo abundance in the bottom layer. The latter method is considered the more reliable (Hylen et al., 1986).

The acoustic abundance estimates from the 1985 and 1986 surveys supported the findings from earlier years indicating a vast improvement in the recruitment to the stock, while the number of older fish was considerably reduced as compared with previous years.

### 3.3.4 Evaluation of the surveys

In 1986, an overall increase in the abundance indices for the 1982-1984 year classes of cod and an overall decline for all age groups of haddock was observed in the bottom trawl survey. This may have been caused by a shift in the vertical distribution of cod relative to haddock. This is in conformity with the observations made in the acoustic survey (Tables 3.9 and 4.7), in

which the echo abundance estimates of cod and haddock combined were unchanged from 1985 to 1986, both in total echo abundance and in the bottom layer (Hylen et al., 1986).

Hylen and Nakken (1982, 1983, 1984,1985) have evaluated the Norwegian survey results for 1985 and previous years. They were particularly concerned with the high acoustic estimate of the 1981 year class in 1985. According to all previous observations, this year class should be relatively weak (Tables 3.6-3.9). The higher estimates could be due to inadequate sampling, wrong ageing, or incorrect establishing and/or application of age/length keys. No correction was made for the 1981 year class in the 1985 survey. The results for the 1985 and previous surveys are given in Table 3.9 together with the evaluation of the 1986 surveys (Hylen, unpublished). The estimate of the 1982 year class in 1983 is much lower than in 1985, while it has increased from 1985 to 1986 for the 1983 and 1984 year classes. The relative increases are comparable to those observed for the preceding year classes over the first 3-5 years of life.

## 3.4 Recruitment (Tables 3.6-3.8)

A summary of the information available from the surveys for the 1982-1986 year classes is given below:

| Year class | Age | Survey: O-group (index) | Survey: Acoustic (millions) | Survey: Bottom trawl: Norway (millions): Barents Sea | Survey: Bottom trawl: Norway (millions): Svalbard | Survey: Bottom trawl: USSR (no./hr) |
|---|---|---|---|---|---|---|
| 1982 | 0 | 0.6 | - | - | - | - |
| | 1 | ↓ | - | 45 | 15 | 4 |
| | 2 | ↓ | 506 | 127 | 43 | 10 |
| | 3 | (400)[1] | 817 | 90 | 74 | 9 |
| 1983 | 0 | 1.7 | - | - | - | - |
| | 1 | ↓ | 2,382 | 355 | 52 | 6 |
| | 2 | ↓ | 1,534 | 169 | 133 | 9 |
| | 3 | (1,100)[1] | 1,717 | 356 | - | - |
| 1984 | 0 | 1.6 | - | - | - | - |
| | 1 | ↓ | 118 | 7 | 27 | 1 |
| | 2 | ↓ | 361 | 93 | - | - |
| | 3 | (1,000)[1] | - | - | - | - |
| 1985 | 0 | 2.5 | - | - | - | - |
| | 1 | ↓ | 435 | 83 | - | 6 |
| | 2 | ↓ | - | - | - | - |
| | 3 | (1,600)[1] | - | - | - | - |
| 1986 | 0 | 1.4 | - | - | - | - |
| | 1 | ↓ | - | - | - | - |
| | 2 | ↓ | - | - | - | - |
| | 3 | (900)[1] | - | - | - | - |

[1] Estimated from the regression equation (Anon., 1986b): year-class strength at age 3 (millions) = 38.02 + 633.85 x O-group survey index.

The 1982 year class appears to be the largest in a number of years. The estimate first used in the assessment of this stock was 400 million at age 3 based on the O-group survey. This estimate was revised last year on the basis of the acoustic survey (results now revised) to 800 million. The estimate from bottom trawl surveys, however, is lower than this value. Landings of cod from Sub-area I almost doubled in 1985 compared with 1984 and, although there may have been some increase in fishing effort, it is probable that the recruitment of the 1982 year class to the fishery has made a substantial contribution to the landings. In the absence of complete age composition data for the landings, this contribution is impossible to evaluate and no attempt will be made to revise the estimate of year-class strength before the age compositions of the landings are available. However, it appears possible that the estimate of 800 million may be a bit optimistic.

The 1983 year class appeared to be very abundant in both the O-group survey and the acoustic surveys but, in absolute terms, less abundant in the trawl surveys. In relative terms, however, it could be more than double the size of the 1982 year class.

The 1984 year class, as estimated from the 0-group survey, appeared to be almost equal in abundance to the 1983 year class, but the evidence presently available from acoustic and trawl surveys suggests a lower abundance, perhaps about equal in size to the 1982 year class.

The 1985 year class was estimated as equal to the largest ever recorded in the series of 0-group surveys. Data from other surveys are rather limited at present but those available do not indicate such a large year class.

For the 1986 year class, the only estimate at present is from the 0-group survey which indicates it to be another abundant year class.

### 3.5 Assessment

The USSR increased its catches in Sub-area I from 8,839 t in 1984 to 55,742 t in 1985, accounting for 18% of the total catches of North-East Arctic cod. There was no information about the distribution of the USSR fishery in Sub-area I in 1985, and in the absence of USSR data, no age composition was available which could be assumed to be representative of the USSR catches. To make an assessment, it would, therefore, be necessary to construct an age composition for the USSR catches. However, the size of the 1982 and 1983 year classes is crucial for the assessment, and the evidence from the surveys is to some extent conflicting. Data from the USSR fishery in 1985 and 1986 are, therefore, needed as an aid to estimate the year-class strength. In addition, information on changes in fishing effort by USSR vessels is essential to be able to estimate mortality rates on the recruiting year classes.

The Working Group concluded that, in the absence of the USSR data, an assessment would give little significant new information about the stock situation and that the likelihood of making serious errors would be high.

## 4 NORTH-EAST ARCTIC HADDOCK

### 4.1 Status of the Fisheries

#### 4.1.1 Landings prior to 1986 (Tables 4.1-4.3)

The final figure for landings in 1984 was 17,318 t which was effectively unchanged from the preliminary data used in last year's assessment and was the lowest value recorded for this stock. Provisional figures for 1985 show an increase in landings to 41,471 t which is below the agreed TAC of 50,000 t but well in excess of the expected catch (23,000 t) when last year's assessment was made. Landings in Sub-area I increased from 4,000 t in 1984 to 30,142 t in 1985, but in Division IIa, the declining trend in landings continued in 1985 and the 11,206 t reported were 2,041 t below the 1984 level. Landings reported from Division IIb remained at a very low level (Table 4.1).

Landings by country are given in Table 4.3. Norwegian landings increased by 2,500 t in 1985, and landings by the USSR increased from 1,103 t in 1984 to 22,690 t in 1985. This latter increase is also reflected in the landings of trawlers in Sub-area I (Table 4.2)

### 4.1.2 Expected landings in 1986 (Agreed TAC of 100,000 t)

Expected catches for 1986 are given in Tables 4.1 and 4.2 for all countries except the USSR, for which no data were provided. These estimates were based on landings reported for the first half of the year. If the landings for the USSR were equal to the national quota (45,000 t), total landings in 1986 would be expected to be about 88,000 t which is more than double the level of 1985.

### 4.1.3 Effort and catch per unit effort

Catch-per-unit-effort data are given in Table 4.4. These data are now available only for the Norwegian trawl fisheries.

## 4.2 Catch in Numbers at Age

Age compositions for 1984 were revised in accordance with the final landings figures and the complete age distributions for Norwegian landings.

For 1985, the data available for calculating catch in numbers were:

a) landings by area for each country for the whole year, and

b) age compositions from catches of the Federal Republic of Germany and Norway.

In Sub-area I and Division IIa, the catch in numbers at age for the landings of other countries (except the USSR) was determined by using the age composition from Norwegian trawl catches. In Division IIb, an age composition from Norwegian trawlers in Sub-area I was used. Due to the lack of USSR age compositions, representing 55% of the total landings and 75% of the Sub-area I landings, a total age composition was not calculated.

For 1986, only Norway provided age compositions for catches in the first half of the year.

## 4.3 Survey Results (Tables 4.5-4.7)

The survey results used are from the same surveys as for cod (see Section 3.3).

### 4.3.1 0-group survey (Table 4.5)

The last five years have all shown high abundance indices for haddock. The 1983 and 1984 figures indicate strong year classes

and the 1982, 1985, and 1986 figures indicate average year classes.

### 4.3.2 Bottom trawl surveys (Table 4.6)

The figures from the Norwegian bottom trawl survey (Table 4.6) indicate that the 1983 year class is strong. The 1984 year class is, in contradiction with the 0-group index, showing up weaker than the 1982 year class, but somewhat stronger than the 1985 year class. The survey, therefore, indicates the 1984 year class to be about average.

Of the year classes prior to 1982, only the 1981 year class contributed significantly to the abundance, indicating that all year classes prior to 1982 in the table are small compared to the year classes in 1982 and later.

### 4.3.3 Acoustic surveys (Table 4.7)

The figures for the 1985 survey given in Table 4.7 are revised figures taken from the survey report from 1986 (Hylen et al., 1986). The earlier figures are as previously presented, and the figures from 1986 are from the survey report of 1986.

The figures show that the 1983 year class is about twice the size of the 1982 year class, and the 1984 and 1985 year classes are somewhat less than half the size of the 1982 year class.

Concerning the year classes prior to 1982 in Table 4.7, there is evidence that the 1975, 1976, and 1977 year classes were of average size. The other year classes are contributing very little to the abundance.

### 4.3.4 Evaluation of the surveys

The overall impression from the bottom trawl survey in 1986 is of a decline in the abundance of haddock of all age groups compared to 1985. This decline is not reflected in the acoustic survey in 1986. In this survey, the same level is maintained in 1986 as in 1985, except for the 1981 year class (see Section 3.3.4 for further discussion).

The very high estimates of the 1982 and 1983 year classes at age 3 in the acoustic survey exceed the highest observed in the VPA, which is about 1,000 million individuals for the 1969 year class, and may indicate that haddock is overestimated in the survey. This is confirmed by information on trawl selectivity (Engås and Godø, 1986) and on factors for conversion of echo abundance to numbers (Sunnanå, pers. comm.). This knowledge is not yet incorporated into the calculation of the acoustic survey results, but will tend to transfer abundance from haddock to cod and reduce the overall level of older fish. The overall level of young fish may be kept, but there will be a lower abundance of young haddock.

## 4.4 Recruitment (Tables 4.5-4.7)

A summary of the information available from surveys for the 1982-1986 year classes is given below:

| | | Survey | | | |
|---|---|---|---|---|---|
| | | | | Bottom trawl | |
| Year class | Age | O-group (index) | Acoustic (millions) | Norway (millions) | USSR (No./hr) |
| 1982 | 0 | 0.38 | - | - | - |
| | 1 | - | - | 315 | 23 |
| | 2 | - | 1,002 | 356 | 59 |
| | 3 | - | 1,007 | 380 | 63 |
| 1983 | 0 | 0.62 | - | - | - |
| | 1 | - | 2,147 | 663 | 40 |
| | 2 | - | 1,724 | 616 | 79 |
| | 3 | - | 2,034 | 314 | - |
| 1984 | 0 | 0.78 | - | - | - |
| | 1 | - | 470 | 168 | 1 |
| | 2 | - | 352 | 135 | - |
| | 3 | - | - | - | - |
| 1985 | 0 | 0.27 | - | - | - |
| | 1 | - | 236 | 78 | - |
| | 2 | - | - | - | - |
| | 3 | - | - | - | - |
| 1986 | 0 | 0.39 | - | - | - |

As for cod, the indications for recruitment are encouraging in that the 1982-1986 year classes appear to be of average or above-average abundance. The acoustic surveys and Norwegian trawl surveys both give total stock size estimates. As for cod, the estimates from these two surveys differ in magnitude, but the data set for haddock is rather more consistent than that for cod in terms of year-class strength on a relative scale.

The 1982 year-class strength was estimated to be 300 million at age 3 at the 1985 meeting of the Working Group. It is certainly the largest year class for several years. Landings from Sub-area I increased from 4,000 t in 1984 to 30,000 t in 1985, and the 1982 year class must have contributed substantially to this increase. However, until full age composition data for the 1985 landings are available, this contribution cannot be quantified and no revision of the 1982 year-class strength will be made until the full data are available.

For the 1983 year class, the majority of the estimates indicate that it is larger than the 1982 year class, perhaps by a factor of about 1.7.

The 1984 year class was estimated in the 0-group survey to be the largest ever recorded by that survey. However, such high abundance is not supported by the acoustic and trawl survey results which indicate an abundance equivalent to about half of the 1982 year class.

For the 1985 year class, the limited information currently available suggests a year-class strength of approximately one fourth of the 1982 year class.

The 1986 year class is estimated by the 0-group survey to be equal in abundance to the 1982 year class.

### 4.5 Assessment

An assessment of the North-East Arctic haddock was not attempted for the same reasons as for the North-East Arctic cod (see Section 3.5). However, the USSR haddock catches in Sub-area I represent a higher proportion (54%) of the total catches in 1985 than the USSR cod catches.

## 5 NORTH-EAST ARCTIC SAITHE (SUB-AREAS I AND II)

### 5.1 Status of the Fisheries

#### 5.1.1 Landings prior to 1986 (Table 5.1, Figure 5.2A)

Revised landings reported to Bulletin Statistique for 1984 were 158,786 t which is close to the average for the preceding five years. Preliminary figures indicate that landings in 1985 fell sharply to only 102,693 t. In the last five years, over 95% of the catch has been taken by Norway.

#### 5.1.2 Expected landings in 1986

Landings reported by Norway for the first six months of 1986 were 32,000 t. In preceding years, about 50% of the annual catch was taken in the first half of the year. Landings for the whole of 1986 by all countries are, therefore, expected to be about 70,000 t.

#### 5.1.3 Effort and catch per unit effort

Catch, effort, and catch per unit effort for Norwegian stern trawlers in the size class 250-500 GRT are given in Table 5.2. This vessel class is the most important one in the Norwegian trawl fisheries for saithe. These data are given for the northern and southern regions of Division IIa separately as there is a directed fishery for saithe in the southern part and a mixed fishery mainly with cod in the northern part. Taking 1980-1983 as a reference period, fishing effort in 1984 increased in both regions by about 18%. In 1985, fishing effort declined to about 86% of that in the reference period.

## 5.2 Catch in Numbers at Age (Table 5.4)

Age compositions of landings were available for Norway and the Federal Republic of Germany. Data for 1984 were revised and new data were added for 1985. Age compositions of other countries were assumed to be the same as for the Federal Republic of Germany.

## 5.3 Weight at Age (Table 5.5)

A constant set of catch weight-at-age data is used for all years in the period 1960-1979. Subsequently, annual estimates of weight at age are used. Data for 1984 have been revised and new data added for 1985. Weight at age in the stock is taken to be the same as weight at age in the catch. The weight-at-age data used in the catch predictions and in the yield-per-recruit calculations were average values for the period 1981-1985 (Table 5.8).

## 5.4 Age at Maturity

No maturity ogive is available for this stock of saithe. As in previous assessments, fish of age 6 and older are assumed to be mature for calculation of spawning stock biomass.

## 5.5 Survey Results

Up to the present time, no recruitment indices from surveys have been available that could be used as input for the assessments. Neither have there been any estimates of stock biomass from acoustic surveys. However, in 1985, an initial saithe 0-group survey was undertaken by Norway. The survey was made in May and covered an area off the Norwegian coast from approximately $65^0$N to $70^0$N. The results were very encouraging but indicated that the area surveyed would need to be extended south to fully cover the distribution of 0-group saithe. In 1986, a second survey was carried out with the southern limit of the survey extended to about $58^0$N. Only a few saithe were recorded south of $61^0$N. It is too early to say whether abundance indices from these surveys will provide reliable estimates of annual recruitment to the fishery, but the results so far look very promising.

## 5.6 Recruitment

As indicated above, no estimates of the strength of the recruiting year classes are available for this stock.

## 5.7 Fishing Mortalities - VPA

An initial trial VPA confirmed the observation made last year that both the exploitation pattern and the overall level of fishing mortality had remained stable during the period 1980-1983. It was also clear that there had been significant changes in the fishery in 1984 - in particular a substantial increase in fishing mortality on age groups 3 and 4. To estimate VPA input values of

F for 1985, there was a need to decide on the level of fishing mortality and also on the exploitation pattern. In addition, there was a problem of estimating the size of the 1983 year class, which would influence the choice of input F on age group 2.

Table 5.2 gives recent trends in catches and effort for the dominant class of Norwegian trawlers fishing for saithe. Landings for different gear categories are plotted in Figure 5.1. Compared to a reference period 1980-1983, fishing effort by Norwegian trawlers increased by about 18% in 1984 and then declined to about 14% below the reference period in 1985. Fishing effort data for purse seiners are less easy to quantify, but it has been estimated that saithe fishing by these vessels has declined in 1984 and 1985 to reach about 70% of the 1982-1983 level in 1985. Combining these estimates and allowing for the fact that purse seiners catch fish mainly in the age range 2-6, it was decided that the level of fishing mortality in 1985 was likely to be about 25% below the 1980-1983 level for age groups 3-6 and 10% below for the older age groups.

From the trial VPA, estimates of F were split into F due to fishing by purse seiners and F due to fishing by Norwegian trawlers. It became clear from this that the high level of F on age groups 3 and 4 in 1984 was due to high catches of these age groups by trawlers. This is illustrated in Table 5.3 (based on the final VPA run). There is no indication that the increased fishing by trawlers on age groups 3 and 4 was repeated in 1985 as the proportions of these age groups taken by trawlers and purse seiners has reverted to normal levels. As a result of these considerations it was decided to use an exploitation pattern for 1985 based on the average for 1980-1983 with some slight smoothing.

For the trial VPA, the input F for age group 2 in 1985 was based on an average value, and the calculated number in the stock indicated a very low abundance for the 1983 year class, well below the minimum value in the historic series. Examination of the catch data indicated that catches by trawlers of 2-year-olds were much higher than in the preceding four years. The purse seiners, which normally account for a high proportion of the 2-year-olds caught, had very low catches in 1985. Reports from along the Norwegian coast indicated that this year class was relatively abundant as 0-group in the coastal zone. The average size for the 2-year-old fish in 1985 was below average, and it is possible that slower growth has reduced their availability to capture. It is also possible that inadequate age sampling for some sectors of the fishery has contributed to an underestimate. On balance, the Group considers that the 1983 year-class strength is more likely to be close to the average level rather than being extremely poor.

In summary, VPA input F values for 1984 have been derived as follows:

Age group 2: F = 0.014 to give a year-class strength close to a recent average level.

Age groups 3-5: Average for the period 1980-1983 reduced by 25%.

Age groups 6-14: Average for the period 1980-1983 reduced by 10% (with some smoothing).

In addition, there have been some amendments to the VPA input F values on the oldest age groups for recent years to make them more consistent with back-calculated values for younger age groups.

The resultant F-at-age array from the VPA for the last ten years is given in Table 5.6, and the corresponding estimates of stock numbers and biomass in Table 5.7.

## 5.8 Projection of Stock Biomass and Catch (Figure 5.2D)

Yield- and spawning stock biomass-per-recruit curves have been calculated using the same exploitation pattern and weight-at-age data as are used for the prediction (see below). $F_{0.1}$ and $F_{max}$ are 0.18 and 0.31, respectively (Figure 5.2C).

Input data for catch projections are given in Table 5.8. Stock size in 1986 is taken from the VPA. In the absence of information on the strengths of recruiting year classes, a value of 200 million, based on a recent average, was used for the 1984 and later year classes. The exploitation pattern was the same as that used for the 1985 input for the VPA with the exception that the F on age 2 for the prediction was set at 0.07, which was derived from the 1980-1983 average reduced by 25% to allow for the reduction in fishing effort. Weight at age in the catch and in the stock were averages for the period 1981-1985.

As indicated in Section 5.1.2, landings in 1986 are expected to be about 70,000 t. This implies a reduction of about 50% in the level of fishing mortality in 1986 compared to 1985, and in the catch prediction, $\bar{F}$ for that year has been set to 0.19. For 1987, projections have been made for a range of values of fishing mortality:

| 1986 | | | | 1987 | | | | 1988 | |
|---|---|---|---|---|---|---|---|---|---|
| Stock biom. (1+) | SSB | $\bar{F}_{(3-8)}$ | Catch | Management option | Stock biom. (1+) | SSB | $\bar{F}_{(3-8)}$ | Catch | Stock biom. (1+) | SSB |
| 588 | 157 | 0.19 | 70 | $F_{0.1}$ | 681 | 171 | 0.18 | 87 | 764 | 292 |
| | | | | $F_{86}$ | | | 0.19 | 89 | 754 | 291 |
| | | | | $1.2F_{86}$ | | | 0.22 | 105 | 734 | 279 |
| | | | | $F_{max}$ | | | 0.31 | 137 | 700 | 257 |
| | | | | $2F_{86}$ | | | 0.37 | 163 | 661 | 239 |

Weight in '000 t.

Figure 5.2A shows how fishing mortality increased during the 1970s and was maintained at a high level until 1984. Spawning stock biomass (Figure 5.2B) declined sharply from almost 600,000 t in 1970 to less than 200,000 t in 1981. Since then, it has remained at about this low level. If the estimated level of fishing mortality in 1986 is maintained, a recovery in spawning stock biomass is to be expected. Amendments to the VPA input F values on the oldest age groups for some recent years resulted in some changes to the spawning stock biomass estimates from those given in last year's report.

## 6 REDFISH IN SUB-AREAS I AND II

### 6.1 Status of the Fisheries

#### 6.1.1 Landings prior to 1986 (Tables 6.1-6.5)

The redfish landings in Sub-areas I and II have decreased from 131,749 t in 1982 to a provisional catch figure of 89,702 t in 1985 (Table 6.1). This decrease is mainly caused by a decrease in the USSR fishery, especially in Division IIb.

In Sub-area I, the total catch decreased from 4,651 t in 1983 to 2,027 t in 1984 (Table 6.2). The catch in 1985 increased to 3,031 t. In Division IIa, the total catch decreased from 100,163 t in 1983, the highest catch since 1977, to 85,438 t in 1985, which is 95% of the total redfish catch in 1985 (Table 6.3). In Division IIb, there has been a strong decline in the catches in recent years from 49,883 t in 1982 to 1,233 t in 1985 (Table 6.4).

National landings statistics of redfish do not distinguish between the species. The Working Group has, therefore, split the catch into Sebastes mentella and Sebastes marinus on an area basis. The procedure was almost the same as used previously by the Working Group on Redfish and Greenland Halibut in Region 1 (Anon., 1984). In Sub-area I, all of the USSR catches and 40% of the Norwegian catches in 1984 and 1985 were assumed to be S. mentella. The percentage for Norway was based on surveys on the main fishing grounds. All catches taken by other countries were assumed to be S. marinus. In Division IIa, the entire catch of the German Democratic Republic, 95% of the USSR catches, and

76.6% of the Portuguese catches were recorded as S. mentella, while all catches taken by other countries were assumed to be S. marinus. All catches taken in Division IIb were recorded as S. mentella.

The total landings of S. marinus increased from 16,366 t in 1982 to 28,114 t in 1984, and declined to 27,236 t in 1985 (Table 6.5). The increase since 1982 was due to USSR redfish catches in 1983 in Division IIa (5% S. marinus) and the Norwegian fishery for S. marinus in 1984 and 1985 in Division IIa and Sub-area I. The total landings of S. mentella decreased from 115,383 t in 1982 to 62,466 t in 1985 (Table 6.5). This decrease was mainly due to the USSR fishery in Division IIb. The agreed TAC for S. marinus in 1984 of 17,000 t was overfished by more than 11,000 t (65%), while the catch of S. mentella was almost at the recommended TAC level, which was 20,000 t below the agreed TAC.

The recommended TACs for S. marinus and S. mentella in 1985 were 15,000 t and 85,000 t, respectively, which also became the agreed TACs. The provisional catch figure for S. marinus in 1985 shows that the TAC was overfished by more than 12,000 t (80%). For S. mentella, the provisional catch in 1985 was 22,534 t below the TAC.

### 6.1.2 Expected landings in 1986

Only catch data from Norway for the first half of 1986 and from the Faroe Islands up to 1 September (29 t) were available. In 1985, 59% of the Norwegian redfish catches were taken during the first half of the year. Assuming the same seasonal pattern in the fishing in 1986, the expected Norwegian landings in 1986 will be about 22,000 t, of which about 20,000 t are expected to be S. marinus, giving a slight increase compared to 1985.

### 6.1.3 Effort and catch per unit effort (Table 6.6)

Catch-per-hour-trawling data were available for the USSR S. mentella fishery for the period 1965-1983 for side trawlers (RT) and for 1980-1983 for stern trawlers (PST) (Table 6.6). From these data, the total effort was derived. For 1984 and 1985, the Working Group has not received any effort data or catch-per-unit-effort data from the USSR.

For the German Democratic Republic S. mentella fishery, catch-per-unit-effort data for the category "freezer trawlers" were available for 1981-1985 (Table 6.6). The catch per day decreased from 17.12 t in 1983 to 9.89 t in 1985, but the German Democratic Republic fishery accounts for only 3.2-5.8% of the total catch of S. mentella in Sub-areas I and II.

No data on effort and catch per unit effort were available for S. marinus.

## 6.2 Catch in Numbers at Age

For 1982 and 1983, the catch in numbers per age group for both S. marinus and S. mentella were adjusted to the revised total catch figures.

For 1984 and 1985, age distributions of the S. marinus catches in Division IIa were only available from the Federal Republic of Germany. This accounts for 12% and 11%, respectively, of the landings from Sub-areas I and II in 1984 and 1985.

The total age compositions were calculated by applying the Federal Republic of Germany age composition from Division IIa to the total S. marinus catch in Sub-areas I and II (Table 6.7).

Age compositions of S. mentella for 1984 and 1985 were only available from the German Democratic Republic and account for only 5-6% of the total landings.

## 6.3 Survey Results

Since 1981, a stratified random bottom trawl survey has been carried out by Norway during the winter in the Barents Sea. Due to problems in distinguishing the redfish species, only the results from 1986 can be taken as fully reliable. However, the total redfish biomass increased by 37% from 1985 to 1986, but there was a decrease in numbers of 19%.

Since 1981, a stratified random bottom trawl survey has also been carried out by Norway in September in the Svalbard and Bear Island regions. For the same reasons as in the Barents Sea survey, reliable data for S. marinus and S. mentella separately do not exist before 1984. For both species, there was a decrease in the number and biomass indices from 1984 to 1985.

These surveys are expected to cover the most important young fish areas. A time-series presentation of the survey results for both species less than 20 cm may, therefore, give valuable and reliable indications of this part of the stocks.

The German Democratic Republic has carried out a bottom trawl survey during the summer in the Svalbard and Bear Island regions every year since 1981, with the exception of 1985. The input effort in these surveys (24-30 tows each year) may be too low to give reliable indications about changes in the stocks.

Each year the international 0-group survey seems to cover satisfactorily the distribution area of redfish. Nevertheless, the use of these indices is limited due to the fact that the redfish species have not been separated.

## 6.4 Recruitment (Table 6.8)

In the international 0-group survey which started in the Barents Sea in 1965, only the 1967 and 1968 year classes have been estimated as very poor. The recruitment indices have been highest in

the most recent years with the 1979-1986 year classes being the most abundant ever observed in the 0-group survey.

### 6.5 Assessment of Sebastes marinus

No effort data were available on which to base the terminal F. However, a separable VPA was run and this indicated a fairly constant fishing pattern in 1979-1984. In 1985, there seems, however, to have been a change in the fishing pattern towards younger ages. All catch-at-age data for 1984 and 1985 are based upon the age distribution of the Federal Republic of Germany catches, but there is no evidence that such a change has occurred in the fishing patterns of other countries. In a trial VPA, the average pattern for 1979-1984 was assumed to be valid also for the fishery in 1985, and runs were made until the input Fs in 1985 were equal to the average values for 1979-1984.

#### 6.5.1 Fishing mortalities and stock size

Estimates of fishing mortality from VPA are given in Table 6.9. Estimates of stock size in numbers from VPA, total stock biomass, and spawning stock biomass are given in Table 6.10. The results show a continuous increase in the total biomass from 276,000 t in 1978 to 480,000 t in 1985. The spawning stock biomass has also increased from about 180,000 t in 1978-1981 to 280,000 t in 1985.

The recruitment shows an increasing trend. However, trial VPAs assuming changes in the fishing pattern and in the level of fishing mortality, show that both the trend in and the level of recruitment are extremely sensitive to the input, e.g., a change of the fishing pattern in 1985 can easily reverse the trend in recruitment. With the generally low values of F in the VPA, there will be little convergence in back calculation towards true values. As a result of uncertainties about the exploitation pattern and the overall level of fishing mortality and with no information on recruiting year-class strengths, no catch predictions were made.

### 6.6 Assessment of Sebastes mentella

For 1984 and 1985, age and length compositions of S. mentella were available only from the German Democratic Republic, accounting for 5-6% of the landings. The Working Group concluded that this was not a sufficient basis for an assessment.

## 7 GREENLAND HALIBUT IN SUB-AREAS I AND II

### 7.1 Status of the Fisheries

#### 7.1.1 Landings prior to 1986 (Tables 7.1 - 7.4)

Nominal catch by country for Sub-areas I and II is given in Table 7.1. The nominal catches in Sub-area I and Divisions IIa and IIb are given separately in Tables 7.2 - 7.4. The total catches in 1984 and 1985 were 21,883 and 19,745 t, respectively, compared to

the recommended TACs of 17,000 t and 20,000 t, respectively. The fishery in 1984 was distributed by nations and areas roughly as in previous years. In Division IIb, there was a reduction in the USSR catch from 9,641 t in 1984 to 3,221 t in 1985, while the German Democratic Republic catches nearly doubled.

### 7.1.2 Expected catch in 1986

Preliminary catch figures for 1986 are reported only from Norway. These catches show an increasing tendency and indicate a Norwegian catch for 1986 of 7,300 t, compared to 5,482 t in 1986. Large variations in the USSR fishery during the last years, and the fact that most of the catches normally are taken during the second part of the year, make it impossible to make a reliable prognosis of total catches in 1986.

### 7.1.3 Effort and catch per unit effort

The USSR catch-per-unit-effort data were not available at this meeting. The time series on CPUE was updated with the Norwegian observations from 1983, 1984, and 1985. The data were analyzed with the statistical package GLIM (NAG), as described in the previous report of the Working Group on Redfish and Greenland Halibut in Region 1 (Anon., 1984), and the results are presented in Table 7.5. The revised figure for 1983 is slightly reduced, and the CPUE increased during 1984 and 1985.

## 7.2 Catch in Numbers at Age

The USSR catch made up 70% and 52% of the total catch in 1984 and 1985, respectively. No catch-at-age data were available from these catches. The German Democratic Republic did not supply data for their catch in 1984 (10% of the total catch). The Norwegian data, being also rather limited, were from age samples from gill-net and longline catches. No significant difference between the age compositions from the two gears was found, and the pooled samples were applied to the entire Norwegian fishery (except trawl). The catch in numbers at age from previous years was adjusted according to revised catch figures. Total age distributions for 1984 and 1985 were not calculated because of the lack of sampling data from the USSR.

## 7.3 Survey Results

Norway has conducted yearly stratified random trawl surveys in the Barents Sea and the Svalbard area since 1981 (Godø and Nedreaas, 1986; Hylen et al., 1986). The Svalbard survey covers the main nursery area of Greenland halibut in Sub-areas I and II. The two surveys do not cover the total area of distribution of the stock. Also the Svalbard surveys do not cover depths exceeding 600 m which (probably) are an important area for adult Greenland halibut. It is, however, believed that the survey results may give valuable information on the immature part of the stock. Special attention should be paid to the possibility of using the Svalbard survey results as recruitment indices. Total

abundance indices and indices of fish less than 20 cm are given in Table 7.6. These results indicate an increasing stock size in the period 1981-1985.

## 7.4 Recruitment

Fish less than 20 cm in the survey are almost exclusively age 1. The indices in Table 7.6 of fish less than 20 cm may, therefore, possibly serve as an early recruitment index. A relatively high recruitment in 1983 and a substantial drop in recruitment in the last two years is indicated. Norway is requested to supply age distributed indices from the Svalbard survey. These data would make it possible to study the abundance of a year class at ages 1-3, i.e., before it is fully recruited to the commercial trawl fishery.

## 7.5 Assessment

For 1984 and 1985, no age or length compositions of Greenland halibut were available from the USSR fishery, which accounted for 70% and 52%, respectively, of the total landings. The German Democratic Republic provided age data for 1985 but not for 1984. The Working Group concluded that the deficiencies in the data base were much too large to allow any reliable assessment to be made.

## 8 REFERENCES

Anon. 1984. Report of the Working Group on Redfish and Greenland Halibut in Region 1. ICES, Doc. C.M.1984/Assess:6.

Anon. 1986a. Preliminary report of the international 0-group survey in the Barents Sea and adjacent waters in August-September 1986. ICES, Doc. C.M.1986/G:78.

Anon. 1986b. Report of the Arctic Fisheries Working Group. ICES, Doc. C.M.1986/Assess:4.

Engås, A., and Godø, O.R. 1986. Preliminary results of investigations on escapement of fish under the fishing line of a Norwegian sampling trawl. ICES, Doc. C.M.1986/B:30.

Godø, O.R., and Nedreaas, K. 1986. Preliminary report of the Norwegian groundfish survey at Bear Island and West-Spitzbergen in the autumn 1985. ICES, Doc. C.M.1986/G:81.

Hylen, A., and Nakken, O. 1982. Stock size of North-east Arctic cod estimated from acoustic survey data 1982. ICES, Doc. C.M. 1982/G:61.

Hylen, A., and Nakken, O. 1983. Stock size of North-east Arctic cod estimated from survey data 1982/1983. ICES, Doc. C.M.1983/G:57.

Hylen, A., and Nakken, O. 1984. Stock size of North-east Arctic cod, estimates from survey data 1983/1984. ICES, Doc. C.M.1984/G:45.

Hylen, A., and Nakken, O. 1985. Stock size of North-east Arctic cod, estimates from survey data 1984/1985. ICES, Doc. C.M.1985/G:67.

Hylen, A., Jakobsen, T., Nakken, O, Nedreaas, K., and Sunnanå, K. 1986. Preliminary report of the Norwegian investigations on young cod and haddock in the Barents Sea. ICES, Doc. C.M.1986/G:76.

Raknes, A., and Sunnanå, K. 1986. Acoustic estimates of spawning cod off Lofoten in 1986. ICES, Doc. C.M.1986/G:79.

Table 3.1 North-East Arctic COD.
Total nominal catch (t) by fishing areas (Norwegian coastal cod not included). (As officially reported to ICES.)

| Year | Sub-area I | Division IIa | Division IIb | Total catch |
|---|---|---|---|---|
| 1960 | 357,327 | 115,116 | 91,599 | 622,042 |
| 1961 | 409,694 | 153,019 | 220,508 | 783,221 |
| 1962 | 548,621 | 139,848 | 220,797 | 909,266 |
| 1963 | 547,469 | 117,100 | 111,768 | 776,337 |
| 1964 | 206,883 | 104,698 | 126,114 | 437,695 |
| 1965 | 241,489 | 100,011 | 103,430 | 444,983 |
| 1966 | 292,253 | 134,805 | 56,653 | 483,711 |
| 1967 | 322,798 | 128,747 | 121,060 | 572,605 |
| 1968 | 642,452 | 162,472 | 269,254 | 1,074,084 |
| 1969 | 679,373 | 255,599 | 262,254 | 1,197,226 |
| 1970 | 603,855 | 243,835 | 85,556 | 933,246 |
| 1971 | 312,505 | 319,623 | 56,920 | 689,048 |
| 1972 | 197,015 | 335,257 | 32,982 | 565,254 |
| 1973 | 492,716 | 211,762 | 88,207 | 792,685 |
| 1974 | 723,489 | 124,214 | 254,730 | 1,102,433 |
| 1975 | 561,701 | 120,276 | 147,400 | 829,377 |
| 1976 | 526,685 | 237,245 | 103,533 | 867,463 |
| 1977 | 538,231 | 257,073 | 109,997 | 905,301 |
| 1978 | 418,265 | 263,157 | 17,293 | 698,715 |
| 1979 | 195,166 | 235,449 | 9,923 | 440,538 |
| 1980 | 168,671 | 199,313 | 12,450 | 380,434 |
| 1981 | 137,033 | 245,167 | 16,837 | 399,037 |
| 1982 | 96,576 | 236,125 | 31,029 | 363,730 |
| 1983 | 64,803 | 200,279 | 24,910 | 289,992 |
| 1984 | 54,317 | 197,573 | 25,761 | 277,651 |
| 1985[1] | 114,512 | 168,793 | 19,514 | 302,819 |

[1] Provisional figures.

Expected catches

| | | | | |
|---|---|---|---|---|
| 1986[2] | 92,000 | 150,000 | 27,000 | 269,000 |

[2] USSR catches not included. The USSR quota for all areas combined is 150,000 t.

Table 3.2 North-East Arctic COD.
Total nominal catch ('000 t) by trawl and other gear for each area.

| Year | Sub-area I | | Division IIa | | Division IIb |
|---|---|---|---|---|---|
| | Trawl | Others | Trawl | Others | Trawl |
| 1967 | 238.0 | 84.8 | 38.7 | 90.0 | 121.1 |
| 1968 | 588.1 | 54.4 | 44.2 | 118.3 | 269.2 |
| 1969 | 633.5 | 45.9 | 119.7 | 135.9 | 262.3 |
| 1970 | 524.5 | 79.4 | 90.5 | 153.3 | 85.6 |
| 1971 | 253.1 | 59.4 | 74.5 | 245.1 | 56.9 |
| 1972 | 158.1 | 38.9 | 49.9 | 285.4 | 33.0 |
| 1973 | 459.0 | 33.7 | 39.4 | 172.4 | 88.2 |
| 1974 | 677.0 | 46.5 | 41.0 | 83.2 | 254.7 |
| 1975 | 526.3 | 35.4 | 33.7 | 86.6 | 147.4 |
| 1976 | 466.5 | 60.2 | 112.3 | 124.9 | 103.5 |
| 1977 | 471.5 | 66.7 | 100.9 | 156.2 | 110.0 |
| 1978 | 360.4 | 57.9 | 117.0 | 146.2 | 17.3 |
| 1979 | 161.5 | 33.7 | 114.9 | 120.5 | 8.1 |
| 1980 | 133.3 | 35.4 | 83.7 | 115.6 | 12.5 |
| 1981 | 91.5 | 45.1 | 77.2 | 167.9 | 17.2 |
| 1982 | 44.8 | 51.8 | 65.1 | 171.0 | 21.0 |
| 1983 | 36.6 | 28.2 | 56.6 | 143.7 | 24.9 |
| 1984 | 24.5 | 29.8 | 46.9 | 150.7 | 25.6 |
| 1985[1] | 74.2 | 40.3 | 56.6 | 112.2 | 19.2 |

[1] Provisional.

Expected catches

| | | | | | |
|---|---|---|---|---|---|
| 1986[2] | 40.0 | 52.0 | 60.0 | 90.0 | 27.0 |

[2] USSR catches not included. The USSR quota for all areas combined is 150,000 t.

Table 3.3 North-East Arctic COD.
Nominal catch (t) by countries (Norwegian coastal cod not included) (Sub-area I and Divisions IIa and IIb combined). (As officially reported to ICES.)

| Year | Faroe Islands | France | German Dem.Rep. | Germany, Fed.Rep. | Norway | Poland | United Kingdom | USSR | Others | Total all countries |
|---|---|---|---|---|---|---|---|---|---|---|
| 1960 | 3,306 | 22,321 | - | 9,472 | 231,997 | 20 | 141,175 | 213,400 | 351 | 622,042 |
| 1961 | 3,934 | 13,755 | 3,921 | 8,129 | 268,377 | - | 158,113 | 325,780 | 1,212 | 783,221 |
| 1962 | 3,109 | 20,482 | 1,532 | 6,503 | 225,615 | - | 175,020 | 476,760 | 245 | 909,266 |
| 1963 | - | 18,318 | 129 | 4,223 | 205,056 | 108 | 129,779 | 417,964 | - | 775,577 |
| 1964 | - | 8,634 | 297 | 3,202 | 149,878 | - | 94,549 | 180,550 | 585 | 437,695 |
| 1965 | - | 526 | 91 | 3,670 | 197,085 | - | 89,962 | 152,780 | 816 | 444,930 |
| 1966 | - | 2,967 | 228 | 4,284 | 203,792 | - | 103,012 | 169,300 | 121 | 483,704 |
| 1967 | - | 664 | 45 | 3,632 | 218,910 | - | 87,008 | 262,340 | 6 | 572,605 |
| 1968 | - | - | 225 | 1,073 | 255,611 | - | 140,387 | 676,758 | - | 1,074,084 |
| 1969 | 29,374 | - | 5,907 | 5,543 | 305,241 | 7,856 | 231,066 | 612,215 | 133 | 1,197,226 |
| 1970 | 26,265 | 44,245 | 12,413 | 9,451 | 377,606 | 5,153 | 181,481 | 276,632 | - | 933,246 |
| 1971 | 5,877 | 34,772 | 4,998 | 9,726 | 407,044 | 1,512 | 80,102 | 144,802 | 215 | 689,048 |
| 1972 | 1,393 | 8,915 | 1,300 | 3,405 | 394,181 | 892 | 58,382 | 96,653 | 166 | 565,287 |
| 1973 | 1,916 | 17,028 | 4,684 | 16,751 | 285,184 | 843 | 78,808 | 387,196 | 276 | 792,686 |
| 1974 | 5,717 | 46,028 | 4,860 | 78,507 | 287,276 | 9,898 | 90,894 | 540,801 | 38,453 | 1,102,434 |
| 1975 | 11,309 | 28,734 | 9,981 | 30,037 | 277,099 | 7,435 | 101,843 | 343,580 | 19,368 | 829,377 |
| 1976 | 11,511 | 20,941 | 8,946 | 24,369 | 344,502 | 6,986 | 89,061 | 343,057 | 18,090 | 867,463 |
| 1977 | 9,167 | 15,414 | 3,463 | 12,763 | 388,982 | 1,084 | 86,781 | 369,876 | 17,771 | 905,301 |
| 1978 | 9,092 | 9,394 | 3,029 | 5,434 | 363,088 | 566 | 35,449 | 267,138 | 5,525 | 698,715 |
| 1979 | 6,320 | 3,046 | 547 | 2,513 | 294,821 | 15 | 17,991 | 105,846 | 9,439 | 440,538 |
| 1980 | 9,981 | 1,705 | 233 | 1,921 | 232,242 | 3 | 10,366 | 115,194 | 8,789 | 380,434 |
| | | | | | | Spain | | | | |
| 1981 | 12,825 | 3,106 | 298 | 2,228 | 277,818 | 14,500 | 5,262 | 83,000 | - | 399,037 |
| 1982 | 11,998 | 761 | 302 | 1,717 | 287,525 | 14,515 | 6,601 | 40,311 | - | 363,730 |
| 1983 | 11,106 | 126 | 473 | 1,243 | 234,000 | 14,229 | 5,840 | 22,975 | - | 289,992 |
| 1984 | 10,674 | 11 | 686 | 1,010 | 230,743 | 8,608 | 3,663 | 22,256 | - | 277,651 |
| 1985[1] | 12,770 | 10 | 1,019 | 4,395 | 208,365 | 7,846 | 3,335 | 62,489 | 2,590 | 302,819 |

[1] Provisional figures.

Table 3.4 North-East Arctic COD. Catch per unit effort.

| Year | Sub-area I | | | Division IIb | | | Division IIa | | |
|---|---|---|---|---|---|---|---|---|---|
| | Norway[2] | UK[3] | USSR[4] | Norway[2] | UK[3] | USSR[4] | Norway[2] | UK[3] | Norway[5] |
| 1960 | - | 0.075 | 0.42 | - | 0.105 | 0.31 | - | 0.067 | 3.0 |
| 1961 | - | 0.079 | 0.38 | - | 0.129 | 0.44 | - | 0.058 | 3.7 |
| 1962 | - | 0.092 | 0.59 | - | 0.133 | 0.74 | - | 0.066 | 4.0 |
| 1963 | - | 0.085 | 0.60 | - | 0.098 | 0.55 | - | 0.066 | 3.1 |
| 1964 | - | 0.056 | 0.37 | - | 0.092 | 0.39 | - | 0.070 | 4.8 |
| 1965 | - | 0.066 | 0.39 | - | 0.109 | 0.49 | - | 0.066 | 2.9 |
| 1966 | - | 0.074 | 0.42 | - | 0.078 | 0.19 | - | 0.067 | 4.0 |
| 1967 | - | 0.081 | 0.53 | - | 0.106 | 0.87 | - | 0.052 | 3.5 |
| 1968 | - | 0.110 | 1.09 | - | 0.173 | 1.21 | - | 0.056 | 5.1 |
| 1969 | - | 0.113 | 1.00 | - | 0.135 | 1.17 | - | 0.094 | 5.9 |
| 1970 | - | 0.100 | 0.80 | - | 0.100 | 0.80 | - | 0.066 | 6.4 |
| 1971 | - | 0.056 | 0.43 | - | 0.071 | 0.16 | - | 0.062 | 10.6 |
| 1972 | 0.90 | 0.047 | 0.34 | 0.59 | 0.051 | 0.18 | 1.08 | 0.055 | 11.5 |
| 1973 | 1.05 | 0.057 | 0.56 | 0.43 | 0.054 | 0.57 | 0.71 | 0.043 | 6.8 |
| 1974 | 1.75 | 0.079 | 0.90 | 1.94 | 0.106 | 0.77 | 1.19 | 0.028 | 3.4 |
| 1975 | 1.82 | 0.077 | 0.85 | 1.67 | 0.100 | 0.43 | 1.36 | 0.033 | 3.4 |
| 1976 | 1.69 | 0.060 | 0.66 | 1.20 | 0.081 | 0.30 | 1.69 | 0.035 | 3.8 |
| 1977 | 1.54 | 0.052 | 0.50 | 0.91 | 0.056 | 0.25 | 1.16 | 0.044 | 5.0 |
| 1978 | 1.37 | 0.062 | 0.37 | 0.56 | 0.044 | 0.08 | 1.12 | 0.037 | 7.1 |
| 1979 | 0.85 | 0.046 | 0.36 | 0.62 | - | 0.06 | 1.06 | 0.042 | 6.4 |
| 1980 | 1.47 | - | 0.36 | 0.41 | - Spain[6] | 0.16 | 1.27 | USSR | 5.0 |
| 1981 | 1.42 | - | 0.41 | (0.96) | - | 0.07 | 1.02 | 0.35 | 6.2 |
| 1982 | 1.30 | - | 0.35 | - | 0.86 | 0.26 | 1.01 | 0.34 | 6.4 |
| 1983 | 1.58 | - | 0.31 | (1.31) | 0.90 | 0.36 | 1.05 | 0.38 | 7.6 |
| 1984 | 1.40 | - | 0.45 | 1.20 | 0.78 | 0.35 | 0.73 | 0.27 | 7.0 |
| 1985[1] | 1.59 | - | - | 1.56 | 1.37 | - | 0.91 | - | 5.1 |

[1] Preliminary figures.

[2] Norwegian data - t per 1,000 t/hrs fishing.

[3] United Kingdom data - t per 100 t/hrs fishing.

[4] USSR data - t per hr fishing.

[5] Norwegian data - t per gill net boat week in Lofoten.

[6] Spanish Data - t per hr fishing.

Table 3.5 North-East Arctic COD.
Catch per unit effort in the Lofoten fishery (gutted weight with head off).

| Year | Norwegian vessels | | |
|---|---|---|---|
| | Catch [kg per man per day worked in the Lofoten fishery (Division IIa)] | | |
| | Gillnet | Longline | Handline |
| 1960 | 77.8 | 148.3 | 56.7 |
| 1961 | 101.5 | 141.1 | 75.5 |
| 1962 | 94.9 | 134.4 | 57.8 |
| 1963 | 80.8 | 116.3 | 56.2 |
| 1964 | 104.5 | 62.1 | 51.5 |
| 1965 | 81.8 | 78.3 | 68.4 |
| 1966 | 121.8 | 131.9 | 72.6 |
| 1967 | 107.9 | 245.4 | 120.7 |
| 1968 | 158.0 | 184.6 | 61.5 |
| 1969 | 170.6 | 200.4 | 142.8 |
| 1970 | 180.3 | 304.3 | 127.6 |
| 1971 | 334.3 | 510.7 | 192.7 |
| 1972 | 318.7 | 400.1 | 110.2 |
| 1973 | 189.7 | 366.5 | 112.1 |
| 1974 | 96.3 | 146.4 | 63.9 |
| 1975 | 122.0 | 188.3 | 96.1 |
| 1976 | 131.4 | 258.4 | 134.8 |
| 1977 | 173.2 | 279.6 | 143.5 |
| 1978 | 237.6 | 381.7 | 134.6 |
| 1979 | 201.3 | 306.0 | 125.1 |
| 1980 | 169.9 | 207.8 | 100.9 |
| 1981 | 217.0 | 327.9 | 109.6 |
| 1982 | 199.1 | 753.4 | 252.0 |
| 1983 | 308.0 | 348.8 | 134.0 |
| 1984 | 301.0 | 208.4 | 95.6 |
| 1985 | 204.7 | 178.3 | 75.6 |
| 1986 | 173.7 | 198.0 | 61.9 |

Table 3.6 North-East Arctic COD. Year-class strength.

| Year class | USSR survey No. at age 3 per hour trawling | | | USSR assessment | O-group survey index (logarithmic) | Virtual population[1] |
|---|---|---|---|---|---|---|
| | Sub-area I | Division IIb | Mean | | All areas | No. at age 3 ($\times 10^{-6}$) M=0.2 |
| 1957 | 12 | 16 | 13 | - Average | - | 791 |
| 1958 | 16 | 24 | 19 | + Average | - | 919 |
| 1959 | 18 | 14 | 16 | + Average | - | 731 |
| 1960 | 9 | 19 | 13 | Poor | - | 474 |
| 1961 | 2 | 2 | 2 | Poor | - | 339 |
| 1962 | 7 | 4 | 6 | Poor | - | 778 |
| 1963 | 21 | 120 | 76 | Rich | - | 1,584 |
| 1964 | 49 | 45 | 46 | Rich | - | 1,293 |
| 1965 | <1 | <1 | <1 | Very poor | + | 170 |
| 1966 | 2 | <1 | 1 | Very poor | 0.02 | 112 |
| 1967 | 1 | <1 | 1 | Very poor | 0.04 | 197 |
| 1968 | 7 | 1 | 5 | Poor | 0.02 | 405 |
| 1969 | 11 | 6 | 9 | Poor | 0.25 | 1,016 |
| 1970 | 74 | 86 | 76 | Rich | 2.51 | 1,819 |
| 1971 | 37 | 24 | 32 | Average | 0.77 | 524 |
| 1972 | 53 | 17 | 40 | Average | 0.52 | 622 |
| 1973 | 74 | 5 | 46 | Rich | 1.48 | 615 |
| 1974 | 6 | 1 | 4 | Poor | 0.29 | 350 |
| 1975 | 93 | 4 | 62 | Rich | 0.90 | 654 |
| 1976 | 4 | <1 | 3 | Poor | 0.13 | 214 |
| 1977 | 2 | 1 | 1 | Poor | 0.49 | 150 |
| 1978 | 1 | 3 | 2 | Poor | 0.22 | 168 |
| 1979 | <1 | 8 | 3 | Poor | 0.40 | 133 |
| 1980 | 1 | 8 | 4 | Poor | 0.13 | 96 |
| 1981 | 4 | 4 | 4 | Poor | 0.10 | 144 |
| 1982 | 8 | 10 | 9 | Average | 0.59 | - |
| 1983 | - | - | - | - | 1.69 | - |
| 1984 | - | - | - | - | 1.55 | - |
| 1985 | - | - | - | - | 2.46 | - |
| 1986 | - | - | - | - | 1.37 | - |

[1] Figures from the previous Working Group assessment.

Table 3.7 North-East Arctic COD.
Results from the Norwegian bottom trawl survey in the Barents Sea. Index of number of fish in each year class.

| Year | Year class | | | | | | | | | | | | Total[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1985 | 1984 | 1983 | 1982 | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | |
| 1981 | - | - | - | - | - | 0.7 | 11.0 | 8.6 | 16.9 | 34.1 | 37.9 | 4.8 | 115.3 |
| 1982 | - | - | - | - | 0.1 | 0.9 | 16.1 | 20.4 | 21.4 | 16.0 | 15.8 | 1.4 | 92.3 |
| 1983 | - | - | - | 44.6 | 5.9 | 10.8 | 28.0 | 31.9 | 14.3 | 4.7 | 3.0 | 0.6 | 143.8 |
| 1984 | - | - | 355.3 | 126.6 | 60.2 | 19.2 | 15.6 | 9.4 | 3.0 | 0.4 | 0.2 | - | 589.9 |
| 1985 | - | 7.3 | 168.9 | 90.3 | 78.1 | 15.7 | 6.3 | 2.5 | 0.2 | + | 0.1 | - | 369.4 |
| 1986 | 82.5 | 93.0 | 356.0 | 119.0 | 62.6 | 8.3 | 2.1 | 0.3 | 0.1 | 0.1 | - | - | 724.0 |

[1] Includes year classes older than the 1974 year class.

Table 3.8 North-East Arctic COD.
Results from the Norwegian bottom trawl survey in the Svalbard area. Index of number of fish in each year class.

| Year | Year class | | | | | | | | | | | | Total[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1984 | 1983 | 1982 | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | |
| 1981 | - | - | - | - | 0.1 | 22.2 | 9.0 | 5.5 | 1.6 | 6.1 | 3.8 | 0.7 | 49.8 |
| 1982 | - | - | - | 1.5 | 4.0 | 22.3 | 9.6 | 2.8 | 1.9 | 2.9 | 0.4 | 0.1 | 45.6 |
| 1983 | - | - | 14.6 | 5.1 | 6.2 | 9.5 | 3.0 | 2.5 | 1.3 | 1.6 | 0.4 | 0.2 | 44.4 |
| 1984 | - | 52.2 | 42.7 | 5.6 | 4.2 | 5.3 | 2.2 | 0.5 | 0.5 | 0.4 | 0.2 | - | 113.8 |
| 1985 | 27.0 | 131.1 | 74.3 | 27.9 | 6.5 | 7.7 | 1.4 | 1.4 | 0.1 | 0.3 | - | - | 279.7 |

[1] Includes year classes older than the 1973 year class.

Table 3.9 North-East Arctic COD.
Stock numbers in millions at 1 January.

| Year | Year class | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1985 | 1984 | 1983 | 1982 | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 |
| 1982[1] | - | - | - | - | 1 | 4 | 81 | 105 | 103 | 95 | 154 | 23 | 12 |
| 1983[1] | - | - | - | - | 27 | 29 | 81 | 99 | 58 | 43 | 50 | 13 | 5 |
| 1984[1] | - | - | 2,382 | 506 | 121 | 58 | 59 | 54 | 30 | 19 | 12 | 4 | - |
| 1985[2] | - | 118 | 1,534 | 817 | 631 | 100 | 51 | 38 | 8 | 6 | 2 | - | - |
| 1986[2] | 435 | 361 | 1,717 | 462 | 271 | 56 | 18 | 5 | 2 | 2 | - | - | - |

[1] From Hylen and Nakken (1982, 1983, 1984, 1985).

[2] Estimates by Hylen (unpublished).

Table 4.1 North-East Arctic HADDOCK.
Total nominal catch (t) by fishing areas (Norwegian coastal haddock not included). (As officially reported to ICES.)

| Year | Sub-area I | Division IIa | Division IIb | Total |
|---|---|---|---|---|
| 1960 | 125,657 | 27,925 | 1,854 | 155,434 |
| 1961 | 165,165 | 25,642 | 2,427 | 193,234 |
| 1962 | 160,972 | 25,189 | 1,727 | 187,888 |
| 1963 | 124,774 | 21,031 | 939 | 146,744 |
| 1964 | 79,056 | 18,735 | 1,109 | 98,900 |
| 1965 | 98,505 | 18,640 | 939 | 118,079 |
| 1966 | 124,115 | 34,892 | 1,614 | 160,621 |
| 1967 | 108,066 | 27,980 | 440 | 136,486 |
| 1968 | 140,970 | 40,031 | 725 | 181,726 |
| 1969 | 88,960 | 40,208 | 1,341 | 130,509 |
| 1970 | 59,493 | 26,611 | 497 | 86,601 |
| 1971 | 56,300 | 21,567 | 435 | 78,302 |
| 1972 | 221,183 | 41,979 | 2,155 | 265,317 |
| 1973 | 283,728 | 23,348 | 2,989 | 320,065 |
| 1974 | 159,037 | 47,033 | 5,068 | 221,138 |
| 1975 | 121,686 | 44,330 | 9,726 | 175,742 |
| 1976 | 94,065 | 37,566 | 5,649 | 137,279 |
| 1977 | 72,159 | 28,452 | 9,547 | 110,158 |
| 1978 | 63,965 | 30,478 | 979 | 95,422 |
| 1979 | 63,841 | 39,167 | 615 | 103,623 |
| 1980 | 54,205 | 33,616 | 68 | 87,889 |
| 1981 | 36,834 | 39,864 | 455 | 77,153 |
| 1982 | 17,948 | 29,005 | 2 | 46,955 |
| 1983 | 7,550 | 13,872 | 185 | 21,607 |
| 1984 | 4,000 | 13,247 | 71 | 17,318 |
| 1985[1] | 30,142 | 11,206 | 123 | 41,471 |

[1] Provisional figures.

| | | Expected catches | | |
|---|---|---|---|---|
| 1986[2] | 20,000 | 22,000 | 1,000 | 43,000 |

[2] USSR catches not included. The USSR quota for all areas combined is 45,000 t.

Table 4.2 North-East Arctic HADDOCK.
Total nominal catch ('000 t) by trawl and other gear for each area.

| Year | Sub-area I | | Division IIa | | Division IIb |
|---|---|---|---|---|---|
| | Trawl | Others | Trawl | Others | Trawl |
| 1967 | 73.8 | 34.3 | 20.5 | 7.5 | 0.4 |
| 1968 | 98.1 | 42.9 | 31.4 | 8.6 | 0.7 |
| 1969 | 41.3 | 47.7 | 33.1 | 7.1 | 1.3 |
| 1970 | 36.7 | 22.8 | 20.2 | 6.4 | 0.5 |
| 1971 | 27.3 | 29.0 | 15.0 | 6.6 | 0.4 |
| 1972 | 193.4 | 27.8 | 34.4 | 7.6 | 2.2 |
| 1973 | 241.2 | 42.5 | 13.9 | 9.4 | 13.0 |
| 1974 | 133.1 | 25.9 | 39.9 | 7.1 | 15.1 |
| 1975 | 103.5 | 18.2 | 34.6 | 9.7 | 9.7 |
| 1976 | 77.7 | 16.4 | 28.1 | 9.5 | 5.6 |
| 1977 | 57.6 | 14.6 | 19.9 | 8.6 | 9.5 |
| 1978 | 53.9 | 10.1 | 15.7 | 14.8 | 1.0 |
| 1979 | 47.8 | 16.0 | 20.3 | 18.9 | 0.6 |
| 1980 | 30.5 | 23.7 | 14.8 | 18.9 | 0.1 |
| 1981 | 19.0 | 17.9 | 21.8 | 18.7 | 0.5 |
| 1982 | 9.0 | 8.9 | 18.5 | 10.5 | - |
| 1983 | 3.7 | 3.8 | 7.6 | 6.3 | 0.2 |
| 1984 | 1.6 | 2.4 | 6.4 | 6.9 | 0.1 |
| 1985[1] | 24.1 | 6.1 | 4.9 | 6.3 | 0.1 |

[1] Provisional.

Expected catches

| | | | | | |
|---|---|---|---|---|---|
| 1986[2] | 6.0 | 14.0 | 11.0 | 11.0 | 1.0 |

[2] USSR catches not included. The USSR quota for all areas combined is 45,000 t.

Table 4.3 North-East Arctic HADDOCK.
Nominal catch (t) by countries (Norwegian coastal haddock not included) (Sub-area I and Divisions IIa and IIb combined). (As officially reported to ICES.)

| Year | Faroe Islands | France | German Dem.Rep. | Germany, Fed.Rep. | Norway | Poland | United Kingdom | USSR | Others | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| 1960 | 172 | - | - | 5,597 | 46,263 | - | 45,469 | 57,025 | 125 | 155,651 |
| 1961 | 285 | 220 | - | 6,304 | 60,862 | - | 39,650 | 85,345 | 558 | 193,234 |
| 1962 | 83 | 409 | - | 2,895 | 54,567 | - | 37,486 | 91,910 | 58 | 187,438 |
| 1963 | 17 | 363 | - | 2,554 | 59,955 | - | 19,809 | 63,526 | - | 146,224 |
| 1964 | - | 208 | - | 1,482 | 38,695 | - | 14,653 | 43,870 | 250 | 99,158 |
| 1965 | - | 226 | - | 1,568 | 60,447 | - | 14,345 | 41,750 | 242 | 118,578 |
| 1966 | - | 1,072 | 11 | 2,098 | 82,090 | - | 27,723 | 48,710 | 74 | 161,778 |
| 1967 | - | 1,208 | 3 | 1,705 | 51,954 | - | 24,158 | 57,346 | 23 | 136,397 |
| 1968 | - | - | - | 1,867 | 64,076 | - | 40,129 | 75,654 | - | 101,726 |
| 1969 | 2 | - | 309 | 1,490 | 67,549 | - | 37,234 | 24,211 | 25 | 130,820 |
| 1970 | 541 | - | 656 | 2,119 | 37,716 | - | 20,423 | 26,802 | - | 87,257 |
| 1971 | 81 | - | 16 | 896 | 45,715 | 43 | 16,373 | 15,778 | 3 | 78,905 |
| 1972 | 137 | - | 829 | 1,433 | 46,700 | 1,433 | 17,166 | 196,224 | 2,231 | 266,153 |
| 1973 | 1,212 | 3,214 | 22 | 9,534 | 86,767 | 34 | 32,408 | 186,534 | 2,501 | 322,626 |
| 1974 | 925 | 3,601 | 454 | 23,409 | 66,164 | 3,045 | 37,663 | 78,548 | 7,348 | 221,157 |
| 1975 | 299 | 5,191 | 437 | 15,930 | 55,966 | 1,080 | 28,677 | 65,015 | 3,163 | 175,758 |
| 1976 | 536 | 4,459 | 348 | 16,660 | 49,492 | 986 | 16,940 | 42,485 | 5,358 | 137,265 |
| 1977 | 213 | 1,510 | 144 | 4,798 | 40,118 | - | 10,878 | 52,210 | 287 | 110,158 |
| 1978 | 466 | 1,411 | 369 | 1,521 | 39,955 | 1 | 5,766 | 45,895 | 38 | 95,422 |
| 1979 | 343 | 1,198 | 10 | 1,948 | 66,849 | 2 | 6,454 | 26,365 | 454 | 103,623 |
| 1980 | 497 | 226 | 15 | 1,365 | 61,886 | - | 2,948 | 20,706 | 246 | 87,889 |
| 1981 | 381 | 414 | 22 | 2,398 | 58,856 | Spain | 1,682 | 13,400 | - | 77,153 |
| 1982 | 496 | 53 | - | 1,258 | 41,421 | - | 827 | 2,900 | - | 46,955 |
| 1983 | 428 | - | 1 | 729 | 19,371 | 139 | 259 | 680 | - | 21,607 |
| 1984 | 297 | 15 | 4 | 400 | 15,186 | 37 | 276 | 1,103 | - | 17,318 |
| 1985[1] | 442 | 5 | 20 | 395 | 17,659 | 77 | 153 | 22,690 | 30 | 41,471 |

[1] Provisional figures.

Table 4.4 North-East Arctic HADDOCK. Catch per unit effort.

| Year | Sub-area I | | Division IIb | | Division IIa | |
|---|---|---|---|---|---|---|
| | Norway[2] | UK[3] | Norway[2] | UK[3] | Norway[2] | UK[3] |
| 1960 | - | 33 | - | 2.8 | - | 34 |
| 1961 | - | 29 | - | 3.3 | - | 36 |
| 1962 | - | 23 | - | 2.5 | - | 42 |
| 1963 | - | 13 | - | 0.9 | - | 33 |
| 1964 | - | 18 | - | 1.6 | - | 18 |
| 1965 | - | 18 | - | 2.0 | - | 18 |
| 1966 | - | 17 | - | 2.8 | - | 34 |
| 1967 | - | 18 | - | 2.4 | - | 25 |
| 1968 | - | 19 | - | 1.0 | - | 50 |
| 1969 | - | 13 | - | 2.0 | - | 42 |
| 1970 | - | 7 | - | 1.0 | - | 31 |
| 1971 | - | 8 | - | 3.0 | - | 25 |
| 1972 | 0.06 | 14 | 0.02 | 23.0 | 0.09 | 18 |
| 1973 | 0.35 | 22 | 0.18 | 20.0 | 0.39 | 20 |
| 1974 | 0.27 | 20 | 0.09 | 15.0 | 0.51 | 74 |
| 1975 | 0.26 | 15 | 0.06 | 4.0 | 0.44 | 60 |
| 1976 | 0.27 | 10 | + | 3.0 | 0.24 | 38 |
| 1977 | 0.11 | 4 | + | 0.2 | 0.14 | 16 |
| 1978 | 0.13 | 5 | + | 4.0 | 0.14 | 15 |
| 1979 | 0.36 | - | 0.07 | - | 0.18 | - |
| 1980 | 0.45 | - | + | - | 0.22 | - |
| 1981 | 0.64 | - | - | - | 0.37 | - |
| 1982 | 0.51 | - | - | - | 0.38 | - |
| 1983 | 0.27 | - | 0.04 | - | 0.17 | - |
| 1984 | 0.13 | - | 0.01 | - | 0.12 | - |
| 1985[1] | 0.20 | - | + | - | 0.11 | - |

[1] Preliminary figures.
[2] Norwegian data - t per 1,000 t/hrs fishing.
[3] United Kingdom data - t per 100 t/hrs fishing.

Table 4.5 North-East Arctic HADDOCK. Year-class strength.

| Year class | USSR Survey No.per hour trawling | | | O-group survey index (logarithmic) | Virtual population[1] |
|---|---|---|---|---|---|
| | Age 1 | Age 2 | Age 3 | All areas | No. at age 3 (x $10^{-6}$) |
| 1957 | 38 | 9 | 14 | - | 242 |
| 1958 | 2 | 4 | 5 | - | 109 |
| 1959 | 7 | 14 | 33 | - | 241 |
| 1960 | 30 | 40 | 72 | - | 274 |
| 1961 | 32 | 50 | 34 | - | 320 |
| 1962 | 5 | 3 | 4 | - | 100 |
| 1963 | 16 | 9 | 12 | - | 243 |
| 1964 | 11 | 12 | 15 | - | 291 |
| 1965 | <1 | <1 | <1 | 0.01 | 20 |
| 1966 | <1 | <1 | <1 | 0.01 | 17 |
| 1967 | 3 | 13 | 8 | 0.08 | 164 |
| 1968 | <1 | <1 | 3 | + | 97 |
| 1969 | 31 | 69 | 120 | 0.29 | 1,025 |
| 1970 | 10 | 33 | 31 | 0.64 | 270 |
| 1971 | 3 | 3 | 9 | 0.26 | 54 |
| 1972 | 2 | 9 | 3 | 0.16 | 49 |
| 1973 | 13 | 8 | 5 | 0.26 | 56 |
| 1974 | 15 | 35 | 14 | 0.51 | 115 |
| 1975 | 163 | 96 | 59 | 0.60 | 175 |
| 1976 | 6 | 13 | 4 | 0.38 | 156 |
| 1977 | 1 | 1 | <1 | 0.33 | 23 |
| 1978 | <1 | <1 | <1 | 0.12 | 7 |
| 1979 | <1 | <1 | <1 | 0.20 | 11 |
| 1980 | <1 | <1 | - | 0.15 | 9 |
| 1981 | <1 | (<1) | 8 | 0.03 | 10 |
| 1982 | 23 | 59 | 63 | 0.38 | - |
| 1983 | 40 | 79 | - | 0.62 | - |
| 1984 | 1 | - | - | 0.78 | - |
| 1985 | - | - | - | 0.27 | - |
| 1986 | - | - | - | 0.39 | - |

[1] Figures from the previous Working Group assessment.

Table 4.6 North-East Arctic HADDOCK.
Results from the Norwegian bottom trawl survey in the Barents Sea in February. Index of number of fish in each year class.

| Year | Year class | | | | | | | | | | | | Total[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1985 | 1984 | 1983 | 1982 | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | |
| 1981 | - | - | - | - | | 0.3 | 4.8 | 2.3 | 9.5 | 2.0 | 6.1 | 0.5 | 25.7 |
| 1982 | - | - | - | - | 0.5 | 0.0 | 1.8 | 2.1 | 2.2 | 5.5 | 2.7 | 0.2 | 15.9 |
| 1983 | - | - | - | 314.5 | 5.7 | 4.1 | 3.8 | 1.9 | 2.3 | 3.9 | 1.6 | - | 379.0 |
| 1984 | - | - | 663.2 | 355.8 | 15.2 | 1.6 | 0.7 | 0.2 | 0.3 | 0.4 | 1.8 | - | 1,037.4 |
| 1985 | - | 167.8 | 616.2 | 380.2 | 7.2 | 0.4 | 0.2 | 0.3 | 0.3 | - | - | - | 1,172.6 |
| 1986 | 77.9 | 135.0 | 314.0 | 123.0 | 0.4 | 0.1 | 0.1 | 0.2 | - | - | - | - | 651.5 |

[1] Includes year classes older than the 1974 year class.

Table 4.7 North-East Arctic HADDOCK.
Results from the Norwegian acoustic survey in the Barents Sea. Stock numbers in millions.

| Year | Year class | | | | | | | | | | | | Total[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1985 | 1984 | 1983 | 1982 | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | |
| 1981 | - | - | - | - | - | 2 | 25 | 14 | 66 | 160 | 50 | 2 | 320 |
| 1982 | - | - | - | - | 3 | 4 | 7 | 10 | 12 | 29 | 14 | 1 | 80 |
| 1983 | - | - | - | - | 10 | 7 | 9 | 5 | 4 | 10 | 5 | - | 50 |
| 1984 | - | - | 2,148 | 1,002 | 53 | 15 | 7 | 2 | 2 | 2 | - | - | 3,231 |
| 1985 | - | 470 | 1,724 | 1,007 | 48 | 2 | 2 | 1 | 3 | + | - | - | 3,254 |
| 1986 | 236 | 352 | 2,034 | 1,133 | 4 | 4 | 4 | 2 | + | 1 | - | - | 3,770 |

[1] Includes year classes older than the 1974 year class.

Table 5.1 North-East Arctic SAITHE.
Nominal catch (tonnes) by countries in Sub-area I and Divisions IIa and IIb combined. (As officially reported to ICES.)

| Country | 1976 | 1977 | 1978 | 1979 | 1980 |
|---|---|---|---|---|---|
| Belgium | 1 | - | - | - | - |
| Faroe Islands | 20 | 270 | 809 | 1,117 | 532 |
| France | 5,609 | 5,658 | 4,345 | 2,601 | 1,016 |
| German Dem.Rep. | 10,266 | 7,164 | 6,484 | 2,435 | - |
| Germany, Fed.Rep. | 49,056 | 19,985 | 18,190 | 14,823 | 12,511 |
| Netherlands | 64 | - | - | - | - |
| Norway | 131,675 | 139,705 | 121,069 | 141,346 | 128,878 |
| Poland | 3,164 | 1 | 35 | - | - |
| Portugal | 7,233 | 783 | 203 | - | - |
| Spain | 21,661 | 1,327 | 121 | 685 | 780 |
| Sweden | - | - | - | - | - |
| UK (Engl.& Wales) | 4,651 | 6,853 | 2,790 | 1,170 | 794 |
| UK (Scotland) | 73 | 82 | 37 | - | - |
| USSR | 9,013 | 989 | 381 | 3 | 43 |
| Total | 242,486 | 182,817 | 154,464 | 164,180 | 144,554 |

| Country | 1981 | 1982 | 1983 | 1984 | 1985[1] |
|---|---|---|---|---|---|
| Belgium | - | - | - | - | - |
| Faroe Islands | 236 | 339 | 539 | 503 | 490 |
| France | 194 | 82 | 418 | 431 | 85 |
| German Dem.Rep. | - | - | - | 6 | 11 |
| Germany, Fed.Rep. | 8,413 | 7,224 | 4,933 | 4,532 | 1,837 |
| Netherlands | - | - | - | - | - |
| Norway | 166,139 | 159,643 | 149,556 | 152,818 | 100,002 |
| Poland | - | - | - | - | - |
| Portugal | - | - | - | - | 15 |
| Spain | - | - | 33 | - | - |
| Sweden | - | - | - | - | - |
| UK (Engl.& Wales) | 395 | 731 | 1,251 | 335 | 202 |
| UK (Scotland) | - | 1 | - | - | - |
| USSR | 121 | 14 | 206 | 161 | 51 |
| Total | 175,498 | 168,034 | 156,936 | 158,786 | 102,693 |

[1] Provisional figures.

Table 5.2 North-East Arctic SAITHE.
Catch, effort, and catch per unit effort for Norwegian stern trawlers (250-500 GRT) fishing in northern and southern regions of Division IIa.

| Year | Northern IIa | | | Southern IIa | | |
|---|---|---|---|---|---|---|
| | Catch (t) | Effort (hrs x $10^{-3}$) | CPUE (t per '000 hrs) | Catch (t) | Effort (hrs x $10^{-3}$) | CPUE (t per '000 hrs) |
| 1978 | 9,099 | 103 | 89 | 365 | 1 | 624 |
| 1979 | 9,357 | 123 | 76 | 1,172 | 2 | 627 |
| 1980 | 7,761 | 57 | 136 | 11,004 | 16 | 668 |
| 1981 | 14,070 | 69 | 203 | 19,789 | 23 | 861 |
| 1982 | 22,438 | 80 | 282 | 10,750 | 15 | 699 |
| 1983 | 27,283 | 73 | 374 | 11,708 | 11 | 1,046 |
| 1984 | 29,890 | 82 | 364 | 17,789 | 19 | 955 |
| 1985 | 17,043 | 62 | 277 | 9,179 | 14 | 657 |

Table 5.3 North-East Arctic SAITHE.
Fishing mortalities on age groups 2-6 in 1980-1985 for fishing by purse seiners and Norwegian trawlers. (Based on final VPA.)

| Age | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|---|
| | | | Purse seiners | | | |
| 2 | 0.04 | 0.08 | 0.13 | 0.08 | 0.04 | 0.01 |
| 3 | 0.29 | 0.31 | 0.31 | 0.17 | 0.34 | 0.19 |
| 4 | 0.20 | 0.15 | 0.39 | 0.20 | 0.11 | 0.10 |
| 5 | 0.21 | 0.06 | 0.02 | 0.23 | 0.09 | 0.09 |
| 6 | 0.11 | 0.02 | 0.01 | 0.07 | 0.06 | 0.03 |
| $\bar{F}_{(3-5)}$ | 0.23 | 0.17 | 0.24 | 0.20 | 0.18 | 0.13 |
| | | | Norwegian trawlers | | | |
| 2 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| 3 | 0.13 | 0.02 | 0.02 | 0.04 | 0.23 | 0.05 |
| 4 | 0.13 | 0.29 | 0.09 | 0.21 | 0.71 | 0.19 |
| 5 | 0.11 | 0.30 | 0.63 | 0.29 | 0.29 | 0.26 |
| 6 | 0.20 | 0.26 | 0.29 | 0.33 | 0.29 | 0.30 |
| $\bar{F}_{(3-6)}$ | 0.14 | 0.22 | 0.26 | 0.22 | 0.38 | 0.20 |

Table 5.4 VIRTUAL POPULATION ANALYSIS.

NORTH-EAST ARCTIC SAITHE

CATCH IN NUMBERS UNIT: thousands

| | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 52 | 121 | 1711 | 907 | 486 | 127 | 137 | 484 | 24 | 0 |
| 2 | 54151 | 31662 | 45758 | 28334 | 18226 | 10467 | 17225 | 11638 | 14624 | 1961 |
| 3 | 125030 | 99049 | 48969 | 61963 | 40796 | 83954 | 34733 | 17244 | 41466 | 49412 |
| 4 | 30576 | 54317 | 27685 | 23528 | 36644 | 21822 | 65052 | 23768 | 33253 | 12130 |
| 5 | 7947 | 10140 | 12476 | 14122 | 9211 | 21528 | 13060 | 32700 | 12064 | 7155 |
| 6 | 3712 | 2062 | 4534 | 4400 | 6579 | 3619 | 8212 | 3226 | 11204 | 5135 |
| 7 | 3435 | 4332 | 1468 | 2901 | 3200 | 2550 | 1054 | 3008 | 1135 | 3660 |
| 8 | 3212 | 1456 | 1848 | 963 | 1358 | 2008 | 1251 | 1177 | 1772 | 765 |
| 9 | 2679 | 1606 | 958 | 1356 | 147 | 369 | 461 | 760 | 560 | 858 |
| 10 | 1724 | 963 | 976 | 438 | 730 | 279 | 265 | 247 | 357 | 130 |
| 11 | 1091 | 463 | 655 | 305 | 411 | 252 | 120 | 204 | 387 | 265 |
| 12 | 852 | 244 | 681 | 281 | 454 | 89 | 112 | 123 | 150 | 230 |
| 13 | 439 | 211 | 284 | 168 | 257 | 144 | 76 | 161 | 117 | 54 |
| 14 | 140 | 58 | 231 | 222 | 239 | 95 | 97 | 94 | 170 | 120 |
| 15+ | 308 | 158 | 299 | 216 | 268 | 49 | 43 | 178 | 73 | 6 |
| TOTAL | 240398 | 186842 | 148515 | 139904 | 118736 | 147352 | 141896 | 95012 | 117556 | 81881 |

Table 5.5 VIRTUAL POPULATION ANALYSIS.

NORTH-EAST ARCTIC SAITHE

MEAN WEIGHT AT AGE OF THE STOCK UNIT: kilogram

| | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .250 | .250 | .250 | .250 | .130 | .290 | .360 | .180 | .180 | .180 |
| 2 | .340 | .340 | .340 | .340 | .450 | .450 | .510 | .600 | .530 | .380 |
| 3 | .710 | .710 | .710 | .710 | .790 | .730 | .770 | 1.050 | .710 | .750 |
| 4 | 1.110 | 1.110 | 1.110 | 1.110 | 1.270 | 1.400 | 1.120 | 1.330 | 1.260 | 1.360 |
| 5 | 1.630 | 1.630 | 1.630 | 1.630 | 2.030 | 2.050 | 2.020 | 1.860 | 2.020 | 2.090 |
| 6 | 2.330 | 2.330 | 2.330 | 2.330 | 2.550 | 2.760 | 2.610 | 2.800 | 2.700 | 2.650 |
| 7 | 3.160 | 3.160 | 3.160 | 3.160 | 3.290 | 3.300 | 3.270 | 4.000 | 3.880 | 3.280 |
| 8 | 4.050 | 4.050 | 4.050 | 4.050 | 4.340 | 4.380 | 3.910 | 4.180 | 4.470 | 3.970 |
| 9 | 4.870 | 4.870 | 4.870 | 4.870 | 5.150 | 5.950 | 4.690 | 5.330 | 5.360 | 4.530 |
| 10 | 5.630 | 5.630 | 5.630 | 5.630 | 5.750 | 6.390 | 5.630 | 5.680 | 6.060 | 5.540 |
| 11 | 6.440 | 6.440 | 6.440 | 6.440 | 6.110 | 6.610 | 7.180 | 7.310 | 6.280 | 6.830 |
| 12 | 7.110 | 7.110 | 7.110 | 7.110 | 5.940 | 6.880 | 7.210 | 8.080 | 6.890 | 8.760 |
| 13 | 7.820 | 7.820 | 7.820 | 7.820 | 6.640 | 6.750 | 7.000 | 8.540 | 8.200 | 6.060 |
| 14 | 8.920 | 8.920 | 8.920 | 8.920 | 7.730 | 7.150 | 8.030 | 8.570 | 9.140 | 9.660 |
| 15+ | 9.500 | 9.500 | 9.500 | 9.500 | 9.470 | 7.660 | 9.440 | 10.370 | 6.470 | 13.460 |

Table 5.6 VIRTUAL POPULATION ANALYSIS.

NORTH-EAST ARCTIC SAITHE

FISHING MORTALITY COEFFICIENT UNIT: Year-1 NATURAL MORTALITY COEFFICIENT = .20

| | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00 | .00 | .01 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 2 | .21 | .22 | .19 | .21 | .05 | .08 | .15 | .11 | .06 | .014 |
| 3 | .85 | .75 | .60 | .42 | .51 | .38 | .38 | .23 | .65 | .30 |
| 4 | .66 | .60 | .49 | .66 | .47 | .57 | .57 | .49 | .91 | .40 |
| 5 | .47 | .48 | .45 | .50 | .59 | .56 | .82 | .63 | .50 | .50 |
| 6 | .40 | .21 | .41 | .28 | .44 | .49 | .44 | .48 | .46 | .41 |
| 7 | .39 | .36 | .23 | .50 | .34 | .31 | .26 | .28 | .31 | .27 |
| 8 | .39 | .29 | .25 | .24 | .45 | .37 | .25 | .51 | .27 | .36 |
| 9 | .47 | .34 | .30 | .30 | .05 | .21 | .14 | .24 | .49 | .20 |
| 10 | .36 | .31 | .35 | .23 | .26 | .13 | .23 | .10 | .27 | .20 |
| 11 | .39 | .16 | .36 | .18 | .34 | .13 | .08 | .28 | .22 | .20 |
| 12 | .47 | .14 | .36 | .26 | .44 | .12 | .08 | .10 | .34 | .20 |
| 13 | 1.10 | .20 | .24 | .14 | .40 | .24 | .14 | .16 | .14 | .20 |
| 14 | .40 | .35 | .35 | .30 | .30 | .25 | .25 | .25 | .25 | .20 |
| 15+ | .40 | .35 | .35 | .30 | .30 | .25 | .25 | .25 | .25 | .20 |
| ( 3- 8)U | .53 | .45 | .41 | .45 | .47 | .45 | .45 | .44 | .52 | .37 |

Table 5.7 VIRTUAL POPULATION ANALYSIS.

NORTH-EAST ARCTIC SAITHE

STOCK SIZE IN NUMBERS UNIT: thousands

BIOMASS TOTALS UNIT: tonnes

ALL VALUES ARE GIVEN FOR 1 JANUARY

| | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 218805 | 357449 | 206615 | 461637 | 193689 | 161676 | 156809 | 332461 | 190068 | 0 | 0 |
| 2 | 308597 | 179095 | 292546 | 167617 | 377137 | 158140 | 132255 | 123261 | 271759 | 155593 | 0 |
| 3 | 238165 | 203916 | 113152 | 198311 | 111726 | 292324 | 120031 | 92761 | 94516 | 209311 | 125618 |
| 4 | 69155 | 85606 | 73580 | 52921 | 106778 | 54950 | 163970 | 67095 | 60428 | 40327 | 126947 |
| 5 | 25030 | 29298 | 37754 | 39528 | 22482 | 54578 | 25445 | 76033 | 33656 | 19898 | 22132 |
| 6 | 28944 | 11755 | 14899 | 19724 | 19710 | 10168 | 25418 | 9195 | 33018 | 16750 | 9881 |
| 7 | 11573 | 15879 | 7750 | 8730 | 12193 | 10416 | 5082 | 13446 | 4635 | 16990 | 9090 |
| 8 | 11019 | 6392 | 9111 | 5024 | 4057 | 7108 | 6237 | 3213 | 8504 | 2775 | 10619 |
| 9 | 7768 | 6138 | 3924 | 5797 | 3247 | 2122 | 4017 | 3981 | 1576 | 5205 | 1585 |
| 10 | 6217 | 3958 | 3585 | 2570 | 3527 | 2526 | 1405 | 2873 | 2575 | 780 | 3489 |
| 11 | 3703 | 3542 | 2376 | 2057 | 1546 | 2231 | 1816 | 914 | 2150 | 1638 | 529 |
| 12 | 2496 | 2053 | 2483 | 1557 | 1409 | 897 | 1600 | 1379 | 565 | 1395 | 1078 |
| 13 | 793 | 1280 | 1461 | 1421 | 858 | 747 | 654 | 1209 | 1018 | 328 | 935 |
| 14 | 465 | 215 | 858 | 940 | 1012 | 472 | 482 | 467 | 344 | 728 | 220 |
| 15+ | 1024 | 587 | 1111 | 915 | 1135 | 243 | 214 | 884 | 363 | 36 | 512 |
| TOTAL NO | 931753 | 905142 | 781181 | 967749 | 860506 | 758578 | 645434 | 734168 | 705437 | 471703 | |
| SPS NO | 74001 | 51778 | 47555 | 47735 | 48695 | 36930 | 46924 | 37557 | 55028 | 46584 | |
| TOT.BIOM | 725944 | 645962 | 581540 | 620930 | 661161 | 670591 | 620502 | 637484 | 593420 | 484016 | |
| SPS BIOM | 282922 | 210369 | 197785 | 184557 | 137076 | 153521 | 169131 | 172628 | 203934 | 171483 | |

Table 5.8

List of input variables for the ICES prediction program.

NORTH-EAST ARCTIC SAITHE
The reference F is the mean F for the age group range from 3 to 8

The number of recruits per year is as follows:

| Year | Recruitment |
|---|---|
| 1986 | 200000.0 |
| 1987 | 200000.0 |
| 1988 | 200000.0 |

Data are printed in the following units:

| | |
|---|---|
| Number of fish: | thousands |
| Weight by age group in the catch: | kilogram |
| Weight by age group in the stock: | kilogram |
| Stock biomass: | tonnes |
| Catch weight: | tonnes |

| age | stock size | fishing pattern | natural mortality | maturity ogive | weight in the catch | weight in the stock |
|---|---|---|---|---|---|---|
| 1 | 200000.0 | .00 | .20 | .00 | .202 | .202 |
| 2 | 164000.0 | .07 | .20 | .00 | .490 | .490 |
| 3 | 125618.0 | .30 | .20 | .00 | .802 | .802 |
| 4 | 126947.0 | .40 | .20 | .00 | 1.294 | 1.294 |
| 5 | 22132.0 | .50 | .20 | .00 | 2.008 | 2.008 |
| 6 | 9881.0 | .41 | .20 | 1.00 | 2.700 | 2.700 |
| 7 | 9090.0 | .27 | .20 | 1.00 | 3.546 | 3.546 |
| 8 | 10619.0 | .36 | .20 | 1.00 | 4.182 | 4.182 |
| 9 | 1585.0 | .20 | .20 | 1.00 | 5.172 | 5.172 |
| 10 | 3489.0 | .20 | .20 | 1.00 | 5.860 | 5.860 |
| 11 | 529.0 | .20 | .20 | 1.00 | 6.852 | 6.852 |
| 12 | 1078.0 | .20 | .20 | 1.00 | 7.684 | 7.684 |
| 13 | 935.0 | .20 | .20 | 1.00 | 7.310 | 7.310 |
| 14 | 220.0 | .20 | .20 | 1.00 | 8.506 | 8.506 |
| 15+ | 512.0 | .20 | .20 | 1.00 | 9.480 | 9.480 |

Table 6.1 REDFISH in Sub-areas I and II.
Nominal catch (t) by countries (Sub-area I, Divisions IIa and IIb combined). (As officially reported to ICES.)

| Country | 1976 | 1977 | 1978 | 1979 | 1980 |
|---|---|---|---|---|---|
| Belgium | 2 | 1 | - | - | - |
| Faroe Islands | 137 | 8 | 1 | - | - |
| France | - | 660 | 3,608 | 1,142 | 1,297 |
| German Dem.Rep. | 22,636 | 17,614 | 16,165 | 16,162 | 8,448 |
| Germany, Fed.Rep. | 7,894 | 7,231 | 11,483 | 11,913 | 7,992 |
| Netherlands | 127 | - | - | - | - |
| Norway | 7,305 | 7,381 | 7,802 | 9,025 | 8,472 |
| Poland | 4,137 | 175 | 2,957 | 261 | 87 |
| Portugal | 3,463 | 1,480 | 378 | 1,100 | 271 |
| Spain | 3,398 | - | - | 1,375 | 1,965 |
| UK | 4,961 | 6,330 | 3,390 | 1,756 | 1,307 |
| USSR | 263,546 | 144,993 | 78,092 | 70,451 | 72,802 |
| Total | 317,606 | 185,873 | 124,172[2] | 113,620[2] | 102,765[2] |

| Country | 1981 | 1982 | 1983 | 1984 | 1985[1] |
|---|---|---|---|---|---|
| Belgium | - | - | - | - | - |
| Faroe Islands | 206 | - | - | - | 45 |
| France | 537 | 841 | 798 | 2,970 | 1,182 |
| German Dem.Rep. | 4,614 | 4,463 | 3,394 | 4,168 | 3,260 |
| Germany, Fed.Rep. | 4,688 | 3,182 | 3,395 | 3,289 | 3,305 |
| Netherlands | - | - | - | - | - |
| Norway | 9,249 | 10,045 | 11,083 | 18,650 | 20,482 |
| Poland | 26 | - | - | - | - |
| Portugal | - | - | - | - | 1,280 |
| Spain | 930 | 72 | 222 | 25 | 38 |
| UK | 470 | 336 | 182 | 716 | 167 |
| USSR | 81,652 | 112,810 | 105,459 | 69,689 | 59,943 |
| Total | 102,372 | 131,749 | 124,533 | 99,507 | 89,702 |

[1] Provisional figures.

[2] The total figure used by the Working Group for assessments (including catches by non-members).

Table 6.2 REDFISH in Sub-areas I and II.
Nominal catch (t) by countries in Sub-area I. (As officially reported to ICES.)

| Country | 1976 | 1977 | 1978 | 1979 | 1980 |
|---|---|---|---|---|---|
| Belgium | 2 | 1 | - | - | - |
| France | - | 149 | 27 | 7 | 1 |
| German Dem.Rep. | 90 | - | - | - | - |
| Germany, Fed.Rep. | 635 | 786 | + | - | - |
| Norway | 739 | 1,181 | 1,333 | 1,374 | 736 |
| Poland | 47 | - | - | - | - |
| Portugal | 478 | 55 | 8 | - | 170 |
| Spain | 301 | - | - | - | - |
| UK | 1,392 | 1,686 | 959 | 462 | 295 |
| USSR | 12,411 | 13,154 | 2,575 | 639 | 33 |
| Total | 16,095 | 17,012 | 4,902 | 2,482 | 1,235 |

| Country | 1981 | 1982 | 1983 | 1984 | 1985[1] |
|---|---|---|---|---|---|
| Belgium | - | - | - | - | - |
| France | 16 | - | - | - | - |
| German Dem.Rep. | - | - | - | - | - |
| Germany, Fed.Rep. | 7 | 10 | - | 1 | 143 |
| Norway | 543 | 732 | 580 | 1,472 | 2,477 |
| Poland | - | - | - | - | - |
| Portugal | - | - | - | - | - |
| Spain | - | - | - | - | - |
| UK | 61 | 77 | 48 | 22 | 43 |
| USSR | 1,220 | 1,750 | 4,023 | 532 | 368 |
| Total | 1,847 | 2,569 | 4,651 | 2,027 | 3,031 |

[1] Provisional figures.

Table 6.3 REDFISH in Sub-areas I and II. Nominal catch (t) by countries in Division IIa. (As officially reported to ICES.)

| Country | 1976 | 1977 | 1978 | 1979 | 1980 |
|---|---|---|---|---|---|
| Faroe Islands | 137 | 8 | 1 | - | - |
| France | - | 478 | 3,575 | 1,134 | 1,296 |
| German Dem.Rep. | 16,921 | 12,688 | 12,933 | 12,439 | 7,460 |
| Germany, Fed.Rep. | 6,722 | 4,764 | 11,482 | 11,913 | 7,992 |
| Netherlands | 127 | - | - | - | - |
| Norway | 6,515 | 6,050 | 6,369 | 7,637 | 7,734 |
| Poland | 217 | 47 | 2,477 | 261 | 78 |
| Portugal | 2,849 | 1,249 | 352 | 1,100 | 89 |
| Spain | 2,082 | - | - | 1,125 | 1,500 |
| UK | 2,919 | 4,064 | 2,067 | 1,195 | 967 |
| USSR | 20,307 | 94,639 | 31,783 | 29,519 | 46,762 |
| Total | 58,796 | 123,987 | 71,039 | 66,323 | 73,878 |

| Country | 1981 | 1982 | 1983 | 1984 | 1985[1] |
|---|---|---|---|---|---|
| Faroe Islands | 206 | - | - | - | 45 |
| France | 521 | 841 | 798 | 2,970 | 1,182 |
| German Dem.Rep. | 2,205 | 2,760 | 2,500 | 2,570 | 2,800 |
| Germany, Fed.Rep. | 4,681 | 3,172 | 3,395 | 3,288 | 2,972 |
| Netherlands | - | - | - | - | - |
| Norway | 8,704 | 9,140 | 10,500 | 17,111 | 17,992 |
| Poland | 26 | - | - | - | - |
| Portugal | - | - | - | - | 1,280 |
| Spain | 620 | - | - | - | - |
| UK | 409 | 259 | 134 | 672 | 120 |
| USSR | 56,130 | 63,125 | 82,836 | 63,342 | 59,047 |
| Total | 73,502 | 79,297 | 100,163 | 89,953 | 85,438 |

[1] Provisional figures.

Table 6.4 REDFISH in Sub-areas I and II.
Nominal catch (t) by countries in Division IIb. (As officially reported to ICES.)

| Country | 1976 | 1977 | 1978 | 1979 | 1980 |
|---|---|---|---|---|---|
| Faroe Islands | - | - | + | - | - |
| France | - | 33 | 6 | 1 | - |
| German Dem.Rep. | 5,625 | 4,926 | 3,232 | 3,723 | 988 |
| Germany, Fed.Rep. | 537 | 1,681 | 1 | - | - |
| Norway | 51 | 150 | 100 | 14 | 2 |
| Poland | 3,873 | 128 | 480 | - | 9 |
| Portugal | 136 | 176 | 18 | - | 12 |
| Spain | 1,015 | - | - | 250 | 465 |
| UK | 650 | 580 | 364 | 99 | 45 |
| USSR | 230,828 | 37,200 | 43,734 | 40,293 | 26,007 |
| Non-members | - | - | 296[2] | 435[2] | 124[2] |
| Total | 242,715 | 44,874 | 48,231 | 44,815 | 27,652 |

| Country | 1981 | 1982 | 1983 | 1984 | 1985[1] |
|---|---|---|---|---|---|
| Faroe Islands | - | - | - | - | - |
| France | - | - | - | - | - |
| German Dem.Rep. | 2,409 | 1,703 | 894 | 1,598 | 460 |
| Germany, Fed.Rep. | - | - | - | - | 190 |
| Norway | 2 | 173 | 3 | 67 | 13 |
| Poland | - | - | - | - | - |
| Portugal | - | - | - | - | - |
| Spain | 310 | 72 | 222 | 25 | 38 |
| UK | + | + | - | 22 | 4 |
| USSR | 24,302 | 47,935 | 18,600 | 5,815 | 528 |
| Total | 27,023 | 49,883 | 19,719 | 7,527 | 1,233 |

[1] Provisional figures.

[2] As reported to Norwegian authorities.

Table 6.5 REDFISH in Sub-areas I and II.
Nominal catch (t) of Sebastes marinus and Sebastes mentella in Sub-area I and Divisions IIa and IIb combined.

| Species | 1976 | 1977 | 1978 | 1979 | 1980 |
|---|---|---|---|---|---|
| S. marinus | 48,584 | 39,508 | 31,695 | 26,475 | 23,411 |
| S. mentella | 269,022 | 146,365 | 92,477 | 87,145 | 79,354 |
| Total | 317,606 | 185,873 | 124,172 | 113,620 | 102,765 |

| Species | 1981 | 1982 | 1983 | 1984 | 1985[1] |
|---|---|---|---|---|---|
| S. marinus | 20,826 | 16,366 | 19,260 | 28,114 | 27,236 |
| S. mentella | 81,546 | 115,383 | 105,273 | 71,393 | 62,466 |
| Total | 102,372 | 131,749 | 124,533 | 99,507 | 89,702 |

[1] *Provisional figures.*

Table 6.6 *Sebastes mentella* in Divisions IIa and IIb. Catch per unit effort and calculated total international effort.

| Year | USSR catch/hour trawling (t) | | German Dem.Rep. catch/day (t) freezer trawlers | Total effort (USSR units) | |
|---|---|---|---|---|---|
| | RT[1] | PST[2] | | RT[1] | PST[2] |
| 1965 | 0.38 | - | - | 41,216 | - |
| 1966 | 0.39 | - | - | 26,008 | - |
| 1967 | 0.37 | - | - | 16,862 | - |
| 1968 | 0.45 | - | - | 12,029 | - |
| 1969 | 0.48 | - | - | 14,242 | - |
| 1970 | 0.46 | - | - | 49,817 | - |
| 1971 | 0.38 | - | - | 118,587 | - |
| 1972 | 0.38 | - | - | 75,953 | - |
| 1973 | 0.45 | - | - | 85,289 | - |
| 1974 | 0.69 | - | - | 100,539 | - |
| 1975 | 0.95 | - | - | 251,653 | - |
| 1976 | 0.99 | - | - | 271,653 | - |
| 1977 | 0.77 | - | - | 190,084 | - |
| 1978 | 0.63 | - | - | 147,002 | - |
| 1979 | 0.56 | - | - | 155,616 | - |
| 1980 | 0.70 | 0.91 | - | 113,363 | 87,202 |
| 1981 | 0.63 | 0.95 | 8.71 | 129,438 | 85,338 |
| 1982 | 0.63 | 1.05 | 9.58 | 182,835 | 109,701 |
| 1983 | 0.80 | 1.09 | 17.12 | 123,776 | 90,845 |
| 1984 | - | - | 13.62 | - | - |
| 1985 | - | - | 9.89 | - | - |

[1] Side trawlers.

[2] Stern trawlers.

Table 6.7 SUM OF PRODUCTS CHECK.

SEBASTES MARINUS IN FISHING AREAS I AND IIA
CATEGORY: TOTAL

CATCH IN NUMBERS UNIT: thousands

| | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|---|---|---|
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 20 | 0 | 10 | 10 | 0 | 0 | 0 | 0 |
| 6 | 13 | 0 | 11 | 7 | 0 | 0 | 0 | 0 |
| 7 | 50 | 12 | 13 | 125 | 0 | 0 | 0 | 0 |
| 8 | 328 | 73 | 87 | 225 | 0 | 0 | 0 | 0 |
| 9 | 641 | 101 | 180 | 434 | 3 | 0 | 0 | 0 |
| 10 | 930 | 149 | 352 | 779 | 36 | 0 | 0 | 0 |
| 11 | 615 | 145 | 517 | 885 | 179 | 8 | 0 | 61 |
| 12 | 2003 | 725 | 768 | 1224 | 816 | 86 | 199 | 813 |
| 13 | 2788 | 914 | 571 | 952 | 814 | 249 | 101 | 932 |
| 14 | 5453 | 3422 | 2368 | 1704 | 1961 | 581 | 601 | 2491 |
| 15 | 6404 | 5276 | 3677 | 2502 | 2364 | 1358 | 1623 | 5284 |
| 16 | 5880 | 3554 | 3502 | 2485 | 2636 | 2186 | 1425 | 4896 |
| 17 | 2569 | 1726 | 1075 | 868 | 1333 | 831 | 701 | 2101 |
| 18 | 3669 | 2212 | 2341 | 2399 | 1989 | 2241 | 4572 | 4084 |
| 19 | 2719 | 2237 | 1364 | 1274 | 1174 | 1314 | 1624 | 2432 |
| 20 | 1558 | 1814 | 1330 | 1457 | 1509 | 1109 | 2124 | 1679 |
| 21 | 1716 | 2237 | 1829 | 1392 | 2121 | 1803 | 4551 | 2071 |
| 22 | 382 | 959 | 1040 | 734 | 927 | 864 | 1475 | 1079 |
| 23 | 491 | 946 | 1507 | 1007 | 715 | 643 | 2599 | 901 |
| 24 | 411 | 959 | 968 | 550 | 353 | 929 | 1651 | 930 |
| 25 | 241 | 673 | 519 | 407 | 129 | 656 | 825 | 149 |
| 26 | 175 | 630 | 385 | 275 | 48 | 924 | 702 | 148 |
| 27 | 155 | 541 | 341 | 41 | 18 | 330 | 225 | 0 |
| 28+ | 141 | 259 | 59 | 36 | 0 | 0 | 0 | 0 |
| TOTAL | 39312 | 27542 | 24790 | 21770 | 18925 | 16112 | 24998 | 30051 |

Table 6.8 REDFISH in Sub-areas I and II. Year-class strength.

| Year class | Dragesund (1971) | International 0-group survey abundance indices | USSR Young fish surveys[1] |
|---|---|---|---|
| 1961 | poor | - | poor |
| 1962 | very poor | - | poor |
| 1963 | poor | - | strong |
| 1964 | strong | - | strong |
| 1965 | strong | 159 | strong |
| 1966 | strong | 236 | strong |
| 1967 | average | 44 | average |
| 1968 | average | 21 | average |
| 1969 | very strong | 295 | very strong |
| 1970 | strong | 247 | strong |
| 1971 | average | 172 | strong |
| 1972 | average | 177 | average |
| 1973 | strong | 385 | poor |
| 1974 | - | 468 | poor |
| 1975 | - | 315 | poor |
| 1976 | - | 447 | poor |
| 1977 | - | 472 | - |
| 1978 | - | 460 | - |
| 1979 | - | 980 | - |
| 1980 | - | 651 | strong |
| 1981 | - | 861 | strong |
| 1982 | - | 694 | strong |
| 1983 | - | 851 | strong |
| 1984 | - | 732 | - |
| 1985 | - | 795 | - |
| 1986 | - | 702 | - |

[1] On the basis of the abundance of age group 0+ to 5 in the CPUE data of the surveys (published in "Annales Biologiques").

Table 6.9 VIRTUAL POPULATION ANALYSIS.

SEBASTES MARINUS IN FISHING AREAS I AND IIA

FISHING MORTALITY COEFFICIENT UNIT: Year-1 NATURAL MORTALITY COEFFICIENT = .10

| | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1979-84 |
|---|---|---|---|---|---|---|---|---|---|
| 12 | .017 | .017 | .023 | .057 | .055 | .017 | .051 | .089 | .050 |
| 13 | .049 | .009 | .016 | .032 | .028 | .019 | .022 | .178 | .021 |
| 14 | .101 | .071 | .026 | .053 | .076 | .023 | .053 | .921 | .050 |
| 15 | .103 | .073 | .091 | .031 | .087 | .062 | .074 | .746 | .070 |
| 16 | .157 | .069 | .094 | .074 | .058 | .097 | .078 | .295 | .075 |
| 17 | .077 | .057 | .024 | .027 | .046 | .013 | .037 | .141 | .034 |
| 18 | .139 | .079 | .092 | .062 | .073 | .092 | .086 | .277 | .081 |
| 19 | .195 | .152 | .058 | .060 | .035 | .057 | .081 | .054 | .074 |
| 20 | .092 | .175 | .114 | .073 | .072 | .058 | .110 | .101 | .097 |
| 21 | .110 | .169 | .236 | .150 | .130 | .121 | .195 | .134 | .167 |
| 22 | .110 | .074 | .099 | .126 | .127 | .064 | .124 | .058 | .102 |
| 23 | .107 | .383 | .144 | .119 | .156 | .110 | .250 | .093 | .193 |
| 24 | .096 | .280 | .746 | .065 | .050 | .277 | .397 | .119 | .303 |
| 25 | .047 | .200 | .215 | .724 | .017 | .111 | .570 | .050 | .274 |
| 26 | .150 | .150 | .150 | .150 | .150 | .150 | .150 | .095 | .150 |
| 27+ | .150 | .150 | .150 | .150 | .150 | .150 | .150 | .095 | .150 |
| (13-18)0 | .113 | .060 | .057 | .047 | .058 | .051 | .058 | .426 | |
| (19-24)0 | .118 | .205 | .233 | .099 | .095 | .111 | .193 | .093 | |

Table 6.10 VIRUTAL POPULATION ANALYSIS.

SEBASTES MARINUS IN FISHING AREAS I AND IIA

STOCK SIZE IN NUMBERS UNIT: thousands

BIOMASS TOTALS UNIT: tonnes

ALL VALUES ARE GIVEN FOR 1 JANUARY

| | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|---|---|---|
| 12 | 121927 | 43844 | 36252 | 35248 | 16086 | 5480 | 6837 | 10025 | 0 |
| 13 | 61168 | 108420 | 38964 | 32054 | 30730 | 13780 | 4876 | 5997 | 8299 |
| 14 | 59611 | 52697 | 97254 | 34732 | 28098 | 27032 | 12252 | 4316 | 4542 |
| 15 | 63588 | 48758 | 44431 | 85729 | 29807 | 23561 | 23907 | 10497 | 1555 |
| 16 | 42428 | 55977 | 41005 | 36709 | 75193 | 24724 | 20028 | 20090 | 4504 |
| 17 | 35388 | 32807 | 47273 | 33775 | 30854 | 65532 | 20295 | 16768 | 13534 |
| 18 | 22299 | 30484 | 28045 | 41754 | 29756 | 26651 | 58506 | 17697 | 13177 |
| 19 | 16092 | 16694 | 25481 | 23152 | 35501 | 25016 | 21986 | 48594 | 12139 |
| 20 | 13296 | 11980 | 12981 | 21760 | 19758 | 31006 | 21387 | 18350 | 41658 |
| 21 | 17307 | 15094 | 9117 | 10482 | 18305 | 16616 | 27002 | 17334 | 15009 |
| 22 | 3844 | 14030 | 11554 | 6514 | 8163 | 14548 | 13522 | 20112 | 13717 |
| 23 | 5068 | 3116 | 11783 | 9448 | 5197 | 6506 | 12343 | 10653 | 17172 |
| 24 | 4757 | 4119 | 1923 | 9231 | 7592 | 4023 | 5276 | 8702 | 8783 |
| 25 | 5499 | 3895 | 2818 | 825 | 7830 | 6534 | 2759 | 3209 | 6991 |
| 26 | 1319 | 4747 | 2886 | 2057 | 562 | 6962 | 5289 | 1715 | 2762 |
| 27+ | 2250 | 5877 | 2863 | 580 | 156 | 2486 | 1695 | 0 | 1411 |
| TOTAL NO | 486802 | 452539 | 414588 | 384050 | 343523 | 300458 | 257740 | 214060 | |
| SPS NO | 244096 | 247578 | 242139 | 262017 | 268413 | 254167 | 233794 | 193721 | |
| TOT.BIOM | 369741 | 364023 | 343016 | 355158 | 335520 | 315419 | 281175 | 236621 | |
| SPS BIOM | 229934 | 243029 | 233833 | 288276 | 285546 | 282846 | 264785 | 223832 | |

Table 7.1 GREENLAND HALIBUT in Sub-areas I and II. Nominal catch (t) by countries (Sub-area I, Divisions IIa and IIb combined). (As officially reported to ICES.)

| Country | 1976 | 1977 | 1978 | 1979 | 1980 |
|---|---|---|---|---|---|
| Faroe Islands | 2 | 21 | - | 3 | - |
| France | - | - | - | - | - |
| German Dem.Rep. | 8,955 | 8,176 | 4,611 | 3,488 | 2,080 |
| Germany, Fed.Rep. | 31 | 148 | 321 | 481 | 303 |
| Norway | 6,005 | 4,217 | 4,082 | 2,843 | 3,157 |
| Poland | 3,566 | 224 | 544 | 106 | - |
| UK (Engl.& Wales) | 935 | 1,059 | 407 | 59 | 26 |
| USSR | 16,580 | 15,045 | 14,651 | 10,311 | 7,670 |
| Others | - | - | 1 | 21 | 48 |
| Total | 36,074 | 28,890 | 24,617 | 17,312 | 13,284 |

| Country | 1981 | 1982 | 1983 | 1984 | 1985[1] |
|---|---|---|---|---|---|
| Faroe Islands | 8 | - | - | - | 21 |
| France | - | 8 | 67 | 138 | - |
| German Dem.Rep. | 1,358 | 1,153 | 1,913 | 2,089 | 3,807 |
| Germany, Fed.Rep. | 128 | 18 | 130 | 76 | 193 |
| Norway | 4,201 | 3,206 | 4,883 | 4,376 | 5,482 |
| Poland | - | - | - | - | - |
| UK (Engl.& Wales) | 9 | 10 | 2 | 23 | 5 |
| USSR | 9,276 | 12,394 | 15,152 | 15,181 | 10,237 |
| Others | 38 | - | - | - | - |
| Total | 15,018 | 16,789 | 22,147 | 21,883 | 19,745 |

[1] Provisional figures.

Table 7.2 GREENLAND HALIBUT in Sub-areas I and II. Nominal catch (t) by countries in Sub-area I. (As officially reported to ICES.)

| Country | 1976 | 1977 | 1978 | 1979 | 1980 |
|---|---|---|---|---|---|
| Germany, Fed.Rep. | 2 | 1 | - | - | - |
| Norway | 1,203 | 1,371 | 1,148 | 727 | 490 |
| UK (Engl.& Wales) | 665 | 541 | 232 | 36 | 12 |
| USSR | 600 | 360 | 211 | 182 | 100 |
| Others | 9 | - | - | - | - |
| Total | 2,479 | 2,273 | 1,591 | 945 | 602 |

| Country | 1981 | 1982 | 1983 | 1984 | 1985[1] |
|---|---|---|---|---|---|
| Germany, Fed.Rep. | 19 | - | - | - | - |
| Norway | 641 | 505 | 490 | 593 | 548 |
| UK (Engl.& Wales) | 5 | 8 | 1 | 17 | 1 |
| USSR | 564 | 200 | 196 | 81 | 122 |
| Others | 1 | - | - | - | - |
| Total | 1,230 | 713 | 687 | 691 | 671 |

[1] Provisional figures.

Table 7.3 GREENLAND HALIBUT in Sub-areas I and II. Nominal catch (t) by countries in Division IIa. (As officially reported to ICES.)

| Country | 1976 | 1977 | 1978 | 1979 | 1980 |
|---|---|---|---|---|---|
| Faroe Islands | 2 | 21 | - | 3 | - |
| France | - | - | - | - | - |
| German Dem.Rep. | 354 | 1,641 | 1,398 | 787 | 570 |
| Germany, Fed.Rep. | 17 | 22 | 321 | 481 | 303 |
| Norway | 3,490 | 1,446 | 2,084 | 2,051 | 2,529 |
| Poland | 31 | 95 | 197 | 4 | - |
| UK (Engl.& Wales) | 48 | 211 | 82 | 11 | 9 |
| USSR | 43 | 6,960 | 8,809 | 6,929 | 2,014 |
| Others | - | - | 1 | 21 | 48 |
| Total | 3,985 | 10,396 | 12,892 | 10,287 | 5,473 |

| Country | 1981 | 1982 | 1983 | 1984 | 1985[1] |
|---|---|---|---|---|---|
| Faroe Islands | 8 | - | - | - | 21 |
| France | - | 8 | 67 | 138 | - |
| German Dem.Rep. | 18 | 73 | 14 | 189 | 82 |
| Germany, Fed.Rep. | 109 | 18 | 130 | 76 | 172 |
| Norway | 3,077 | 2,487 | 4,257 | 3,703 | 4,906 |
| Poland | - | - | - | - | - |
| UK (Engl.& Wales) | 4 | 2 | 1 | 1 | 2 |
| USSR | 2,031 | 2,459 | 5,031 | 5,459 | 6,894 |
| Others | 37 | - | - | - | - |
| Total | 5,284 | 5,047 | 9,500 | 9,566 | 12,077 |

[1] Provisional figures.

Table 7.4 GREENLAND HALIBUT in Sub-areas I and II. Nominal catch (t) by countries in Division IIb. (As officially reported to ICES.)

| Country | 1976 | 1977 | 1978 | 1979 | 1980 |
|---|---|---|---|---|---|
| German Dem.Rep. | 8,601 | 6,535 | 3,213 | 2,701 | 1,510 |
| Germany, Fed.Rep. | 12 | 125 | - | - | - |
| Norway | 1,312 | 1,400 | 850 | 65 | 138 |
| Poland | 3,526 | 129 | 347 | 102 | - |
| UK (Engl.& Wales) | 222 | 307 | 93 | 12 | 5 |
| USSR | 15,937 | 7,725 | 5,631 | 3,200 | 5,556 |
| Total | 29,610 | 16,221 | 10,134 | 6,080 | 7,209 |

| Country | 1981 | 1982 | 1983 | 1984 | 1985[1] |
|---|---|---|---|---|---|
| German Dem.Rep. | 1,340 | 1,080 | 1,899 | 1,900 | 3,725 |
| Germany, Fed.Rep. | - | - | - | - | 21 |
| Norway | 483 | 214 | 136 | 80 | 28 |
| Poland | - | - | - | - | - |
| UK (Engl.& Wales) | - | + | + | 5 | 2 |
| USSR | 6,681 | 9,735 | 9,925 | 9,641 | 3,221 |
| Total | 8,504 | 11,029 | 11,960 | 11,626 | 6,997 |

[1] Provisional figures.

Table 7.5 GREENLAND HALIBUT in Sub-areas I and II. Catch per unit effort and total effort.

| Year | USSR catch/hour trawling (t) | | Norway catch/hour trawling (t) | Average CPUE[4] | Total effort (in '000 hrs trawling) | CPUE 7+ |
|---|---|---|---|---|---|---|
| | RT[2] | PST[3] | | | | |
| 1965 | 0.80 | - | - | 0.80 | - | - |
| 1966 | 0.77 | - | - | 0.77 | - | - |
| 1967 | 0.70 | - | - | 0.70 | - | - |
| 1968 | 0.65 | - | - | 0.65 | - | - |
| 1969 | 0.53 | - | - | 0.53 | - | - |
| 1970 | 0.53 | - | - | 0.53 | 169 | 0.50 |
| 1971 | 0.46 | - | - | 0.46 | 172 | 0.43 |
| 1972 | 0.37 | - | - | 0.37 | 116 | 0.33 |
| 1973 | 0.37 | - | 0.41 | 0.39 | 77 | 0.38 |
| 1974 | 0.40 | - | 0.34 | 0.36 | 105 | 0.33 |
| 1975 | 0.39 | - | 0.40 | 0.40 | 95 | 0.38 |
| 1976 | 0.40 | - | 0.34 | 0.37 | 97 | 0.34 |
| 1977 | 0.27 | - | 0.34 | 0.31 | 93 | 0.26 |
| 1978 | 0.21 | - | 0.22 | 0.22 | 112 | 0.18 |
| 1979 | 0.23 | - | 0.27 | 0.25 | 69 | 0.18 |
| 1980 | 0.24 | 0.33 | 0.33 | 0.29 | 46 | 0.25 |
| 1981 | 0.30 | 0.36 | 0.35 | 0.33 | 45 | 0.24 |
| 1982 | 0.26 | 0.45 | 0.40 | 0.33 | 51 | 0.29 |
| 1983 | 0.26 | 0.40 | 0.35 | 0.31 | 72 | 0.26 |
| 1984 | - | - | 0.32 | - | - | - |
| 1985[1] | - | - | 0.37 | - | - | - |

[1] Provisional.

[2] Side trawlers.

[3] Stern trawlers.

[4] Arithmetic average of CPUE from USSR RT trawlers and Norwegian fresh fish trawlers.

Table 7.6 GREENLAND HALIBUT in Sub-areas I and II. Norwegian survey indices (numbers x $10^{-6}$) in the Svalbard area (Division IIb).

| Year | Total index | Index fish <20 cm |
|---|---|---|
| 1981 | 20.1 | 2.1 |
| 1982 | 26.0 | 0.7 |
| 1983 | 26.7 | 5.9 |
| 1984 | 36.6 | 3.2 |
| 1985 | 39.5 | 1.6 |

Figure 5.1 North-East Arctic SAITHE.
Landings by gear categories 1977-1985.

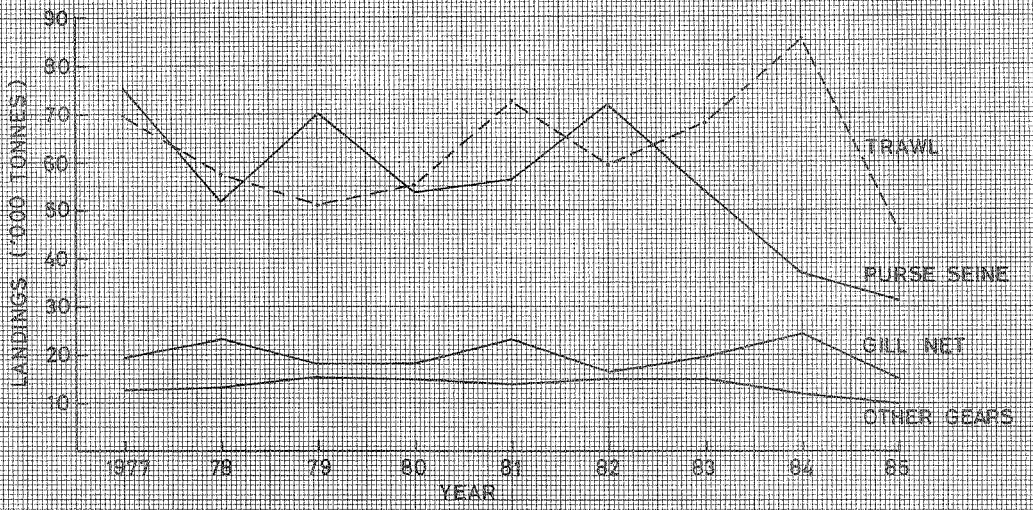
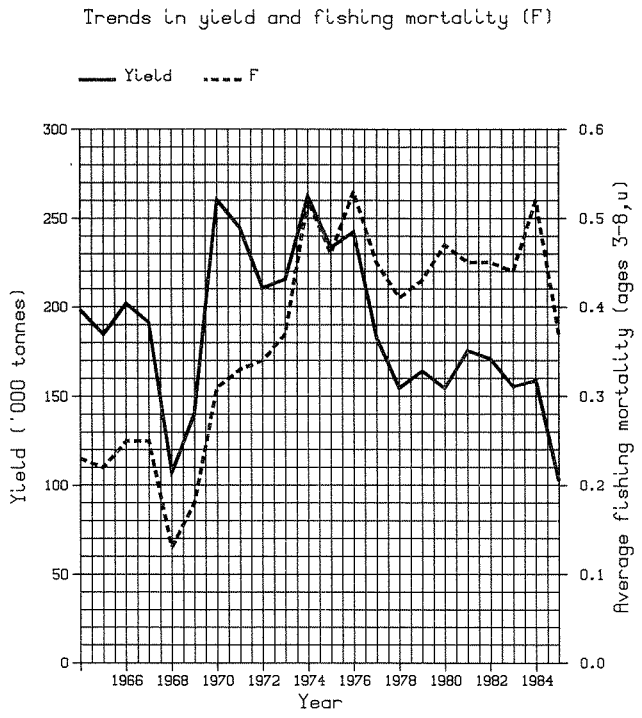


Figure 5.2

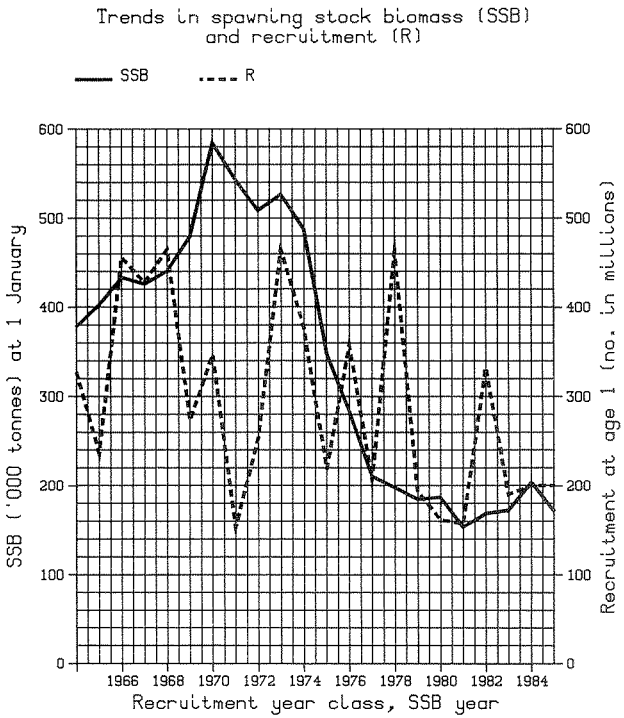
# FISH STOCK SUMMARY

## STOCK: NE Arctic Saithe

**26-9-1986**




A




B

(cont'd)

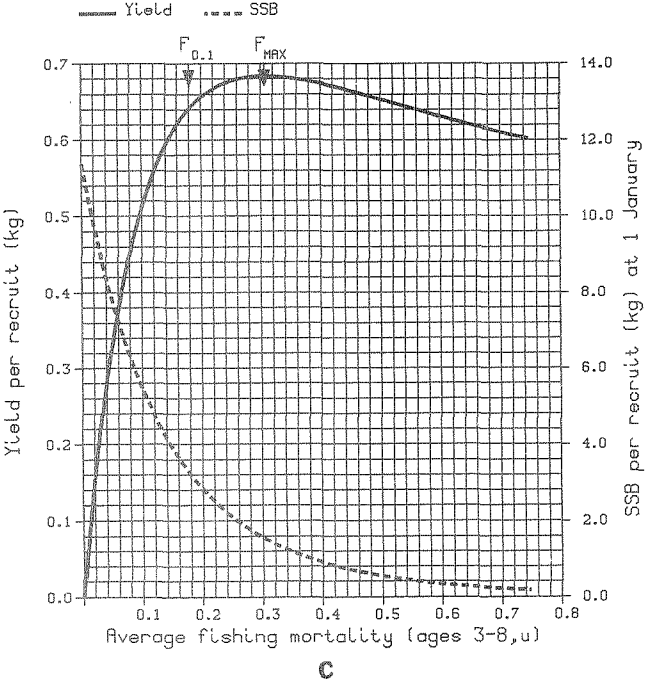
Figure 5.2 (cont'd)

# FISH STOCK SUMMARY

## STOCK: NE Arctic Saithe

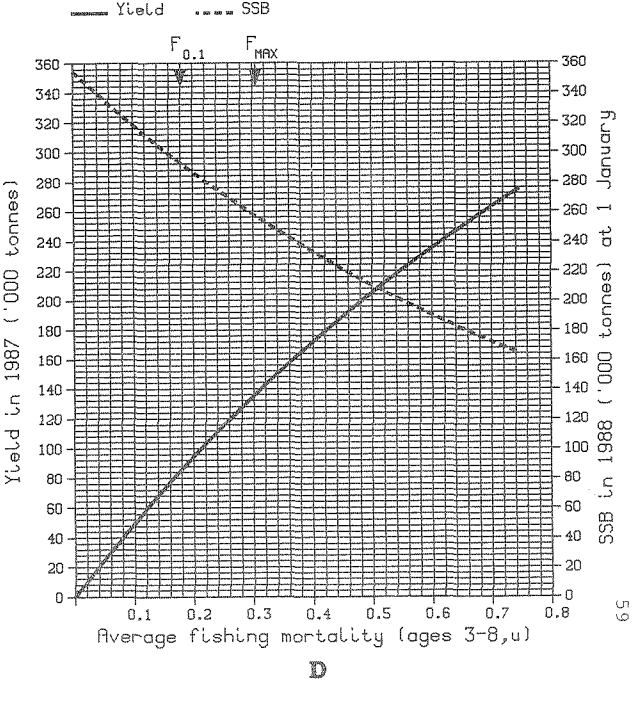
## 26-9-1986

Long-term yield and spawning stock biomass




C

Short-term yield and spawning stock biomass




D