C.M.1987/Assess:2

International Council for the
Exploration of the Sea

REPORT OF THE NORTH-WESTERN WORKING GROUP

Copenhagen, 3 - 11 September 1986

*General Secretary
ICES
Palægade 2-4
DK-1261 Copenhagen K
DENMARK

T A B L E O F C O N T E N T S

1 INTRODUCTION

1.1 Participants

J. Boje	Denmark
H.-P. Cornus	Federal Republic of Germany
L. Haumann	Denmark
V. Helgason	Iceland
K. Hoydal (Chairman)	Faroe Islands
A. Kristiansen	Faroe Islands
J. Lahn-Johannessen	Norway
K. Lehmann	Denmark
J. Magnùsson	Iceland
A. Nicolajsen	Faroe Islands
K. Nygaard	Denmark
J. Reinert	Faroe Islands
S.A. Schopka	Iceland

Because of an overlap with the NAFO Annual Meeting, the Chairman had to leave on Sunday 7 September. Dr S. A. Schopka agreed to chair the rest of the meeting. The ICES Statistician, Dr E. D. Anderson, assisted the meeting in various ways.

1.2 Terms of Reference

At the 73rd Council Meeting (C.Res.1985/23:3:17), it was decided that a North-Western Working Group should be established, with Mr K. Hoydal as Chairman, and meet at ICES headquarters from 3-11 September 1986 to:

a) review the fisheries and management issues for the demersal stocks in Faroese (Division Vb) and Icelandic (Division Va) waters in order to identify and prioritize necessary conservation actions, and define the most appropriate assessment procedures to be used;

b) assess the status and provide catch options for 1987 and 1988 for the saithe, cod and haddock stocks in Faroese waters and the saithe stocks in Icelandic waters inside safe biological limits;

c) assess the status of and provide catch options for 1987 and 1988 for redfish and Greenland halibut in Sub-areas V and XIV within safe biological limits.

In a letter, the Chairman of ACFM, Mr Ø. Ulltang requested the Group to "describe the distribution of the stocks of blue ling, ling, and tusk" and, if possible, assess the state of these stocks. Mr Ulltang further requested the Group to comment on how these assessments should be organized within the ICES system in the future.

1.3 Timing of the Meeting and Participation

The Group considered the timing of the meeting. It was felt that this Group would not necessarily have to meet every year, and a meeting every second year was found appropriate. In deciding the meeting dates in 1988, the Council should be aware of the possible conflict with other meetings.

The Group noted with regret that French participation was not possible. French colleagues had made much material on the blue ling fishery available to the Group. USSR participation was also missed and it was noted that progress in the assessment of the major fisheries for "oceanic-type" S. mentella will be greatly impeded if the countries mainly responsible for this fishery do not participate or make data available.

1.4 Management Considerations

The Group has been asked to "review the fisheries and management issues for the demersal stocks in Faroese and Icelandic waters". The Group has understood this to be a request to indicate whether anything is to be gained by regrouping the assessments hitherto undertaken by ICES and further to investigate whether specific management schemes in these areas call for types of assessment procedures other than the management in, for example, the North Sea, where ICES is requested to produce catch options for each single stock from which the management authorities can select quota levels.

The Group, in addition to Faroese and Icelandic waters, deals with East Greenland waters. On a purely biological basis, there are reasons to treat Sub-areas V and XIV as one region. The redfish and Greenland halibut are assessed on this basis. There is also a natural biological connection southwards into ICES Subarea VI and further south in deeper waters along and above the plateau edges and slopes to the deep sea and to the west. Again, there is a strong biological link from East Greenland to West Greenland with respect to the cod stocks. There are biological reasons which suggest that the cod in the Icelandic, East Greenland and southern part of the West Greenland area should be assessed as a whole. At present, given the size of the stocks in the Greenland and Icelandic areas, the reasons for changing the present system do not seem very convincing. The Group felt that, for purely biological reasons, there was no strong reason to change the now-established assessment system within ICES.

Management systems in the Icelandic and Faroese waters have distinct similarities. For a number of stocks (cod, saithe, and haddock) the management authorities in the Faroes and Iceland, respectively, are "single proprietors". Both systems have put a major emphasis on "additional conservation measures" such as large mesh sizes, closures to protect nursery areas, real-time closures of areas where catch levels of young fish reach unacceptable levels, etc. Both areas face rather severe over-capacity problems in their demersal fleets, and this led to an introduction of a boat quota system in Iceland in 1984 for the most exploited demersal species such as cod, haddock, saithe, redfish, and Greenland halibut. In 1985, the quota system was prolonged

further, but all vessels involved in demersal fishing were given the choice between a catch quota (by weight) and an effort quota (a specified number of days spent at sea). Effort quotas were set at about 80% of the normal fishing times based on the 1981-1983 period for each size and category of vessel. Where vessels have chosen effort regulation, there is only an upper limit on each vessel's cod catch. The Faroese authorities, at the moment, are preparing legislation aimed at limiting the amount of cod, haddock, and saithe by fixing the percentage in the catch of these species. In essence, this is to force the larger trawlers and longliners to fish in deeper waters exploiting species such as redfish, blue ling, and tusk-ling, respectively. A 15-20% reduction in the fishing effort for cod, saithe, and haddock has been predicted to result from these regulations. In addition, the area closures will probably be extended. Concerning the East Greenland area, it is very difficult to see it in isolation from the West Greenland area. It will suffice here to state that the management system is very similar to that operating in the North Sea, and there are requests for the same types of catch options.

1.5 Methodological Considerations

The stocks dealt with by the Working Group fall into three distinct groups:

1) Saithe, cod, haddock, and Greenland halibut
   For these stocks, detailed age-structured assessments are available and sampling is adequate. Effort or other detailed fisheries data can be used to check VPA-type assessments, thus making it possible to agree on one run of the VPA which is in fair agreement with other data.

2) Sebastes sp.
   Sampling is not adequate for some countries and areas. There are problems in estimating a number of the age-structured data. The slow growth of these species causes problems with the growth data. The assessments are covering a huge area and averaging over very different areas and fleets is thus necessary, causing further problems. For these reasons, the Redfish and Greenland Halibut Working Group at its meeting in 1984 refrained from running a VPA on Sebastes mentella. Again, at the present meeting, the Group was unable to make an analytical assessment of this stock (Section 2.6).

3) Blue ling, ling and tusk
   Analytical assessments of these species have not been attempted hitherto by ICES. Biological data available on these species are presented or referred to in Section 9. The Group has been informed by French colleagues that they have attempted a VPA-type assessment on blue ling (Alain Laurec, pers. comm.).

   Taking into account the resources available for assessment in the various national laboratories and the large number of high priority stocks to be dealt with, the Group felt that it would be unrealistic to expect that detailed age-structured data bases, as usually requested in ICES, would be forthcoming, and alternative and less data-demanding methods should be

considered. Status quo estimates have been calculated for tusk and ling in the Faroe Area to exemplify this (Figures 1.1. and 1.2), and especially for these two fisheries of a generally stable and traditional nature, they seem to make some sense. Analysis of catch and effort data should also be considered.

The Group has, in its VPA assessments, used the new option in the ICES assessment package for running a separable VPA directly forward into a conventional VPA. The Group felt that the separable VPA gave estimates of the exploitation pattern and terminal fishing mortalities to start the VPA which best fit the age-structured data. In each case, the residual table was closely inspected to see if there were any serious problems in the number-at-age data and the resulting separable fishing mortalities were also closely inspected. Where possible, the level of the input fishing mortality was selected according to other information, but it has to be admitted that, in some cases, the choice of the final VPA was based more on not being in contradiction with the available evidence than on a strict statistical model.

2 REDFISH IN SUB-AREAS V-XIV

2.1 Landings and Trends in the Fisheries

The total catch from the Irminger Sea redfish stock complex decreased from 225,000 tonnes (t) in 1983 to 207,000 t in 1984 and 172,000 t in 1985, i.e., a 27% decline in the total catch from 1983 to 1985. The catches based on the stock of oceanic-type S. mentella remained about 60,000 t in 1982 and 1983, increased to about 70,000 t in 1984, but decreased to about 49,000 t in 1985.

The total catch of redfish, excluding catch figures from the "oceanic" fishery, decreased from 165,000 t in 1983 to 137,000 t and 123,000 t in 1984 and 1985, respectively.

The catches in Division Va decreased by about 15,000 t in 1984 and about 7,000 t in 1985. In Sub-area XIV, the catches decreased by about 17,000 t in 1984 and about 3,000 t in 1985, whereas in Division Vb, the catches increased by about 5,000 t in 1984 and about 6,000 t in 1985.

In Division Va (Iceland) (Table 2.1), the Icelandic fleet decreased its fishing effort in 1984 and 1985 compared to 1983, while the catch per unit effort remained relatively stable during these years. This resulted in a decline in the Icelandic catch from 122,749 t in 1983 to 108,270 t in 1984 and 91,381 t in 1985. This decline in fishing effort was mainly due to a better state of the cod stock and thus higher catch quotas for cod. Preliminary catch figures for the Icelandic fishery for January-May 1986 were about 38,000 t which is practically the same figure as for that period in 1985.

In Division Vb (Faroes) (Table 2.2), the catches increased greatly from 9,366 t in 1983 to 13,932 t in 1984 and 19,700 t in 1985, mainly due to an increase in the Faroese catches from 4,640 t in 1983 to 8,770 t in 1984 and to 12,500 t in 1985. The catches

by other nations also increased slightly: 160 t and 750 t by the Federal Republic of Germany in 1984 and 1985, respectively, and 120 t in 1984 and 530 t in 1985 by France. The USSR reported a catch of 142 t in 1984, but had not fished in Division Vb prior to that and increased their catch by 726 t in 1986. Up to August 1986, the Faroese redfish catches had doubled compared to the same period in 1985. Also, the redfish catches taken by the Federal Republic of Germany at the Faroes increased some in 1986.

In Sub-area XIV (East Greenland) (Table 2.3), the total catch (excluding the oceanic-type S. mentella) decreased by 16,700 t in 1984 and by 2,700 t in 1985. In 1984, the catches were almost exclusively taken by the Federal Republic of Germany fleet, whereas in 1985, about half of the catch was taken by that fleet, but the other half by the Japanese fleet (reported by Greenland). The sharp reduction in the catch by the Federal Republic of Germany (from about 30,800 t in 1983 to 5,900 t in 1985) is partly due to a reduction in the number of vessels participating in the fishery, but mainly due to reduced availability of redfish in the area, S. marinus in particular, which were exceptionally scarce in the catches in 1985.

During the first seven months of 1986, the catches of the Federal Republic of Germany recovered somewhat, but the proportion of species is not known.

The fishery on the oceanic-type S. mentella stock took place outside the 200-nm zone in Sub-areas XIV and XII. The catches amounted to 60,234 t in 1983, 69,528 t in 1984, and 48,546 t in 1985. These catches are not included in the present assessments (see Section 10).

2.2 Effort Data

Revised effort data for the Icelandic fisheries were available for the period 1977-1985 (Table 2.4). From 1979 to 1983, there has been an increase in effort in the international S. marinus fishery with a maximum of 110,500 hours in 1983.

International effort has decreased since 1983 mainly due to a shift from redfish to cod in the Icelandic area. Also, a decrease in the Federal Republic of Germany distant-water fleet may be of some importance.

The CPUE in Division Va was stable from 1979 to 1982 at a level of about 1,150 kg/h. In 1983, the CPUE declined to 962 kg/h and has since remained stable at that level.

As an intergovernmental agreement between the Faroese Home Government and the EEC, vessels of the Community fishing in the Faroese economic zone are to report daily on their catches and on the composition of these catches to the Coast Guard officials. From these reports, it is possible to calculate the fishing effort, the percentage of redfish in the catches, and the catch per unit effort (Table 2.5). Since there was no agreement in most of 1981, there are few reports for that year.

The redfish caught in this fishery are supposed to be Sebastes mentella.

From the monthly data on the percentage of redfish in the total catch, it is evident that we are dealing with a fishery directed at the species in concern. There is a slight upward trend in the effort from 3,758 fishing days in 1980 to 5,285 fishing days in 1985, but no pronounced trend in the CPUE in the last three years (1983-1985).

2.3 Research Vessel Surveys

Considerable data exist on redfish from diverse research vessel surveys. Some of these data were available to the Working Group but others have not been worked out yet. Therefore, the data available were not considered by the Working Group at this meeting.

For 1984 and 1985, 0-group surveys were carried out in the Irminger Sea, at East Greenland south of 63°N, and around Iceland. Since the surveys in these two years did not cover as extensive an area in the Irminger Sea and at East Greenland as in the previous years, the index figures are not directly comparable to those from the previous years. A comparison of the index figures from the areas covered in 1984 and 1985 with corresponding areas from the previous years indicates an increase in the number of 0-group redfish.

The year-to-year fluctuations in the abundance of 0-group redfish, as estimated in the surveys, are shown in Table 2.6.

The analysis of redfish fry by species showed that the 0-group redfish in 1984 were almost exclusively S. mentella, but this species is usually dominant in the northernmost part of the survey area. In 1985, about 68% were S. marinus.

2.4 The Species Split in the Redfish Landings

In Division Va (Table 2.7), the Icelandic catch was allocated to S. marinus and S. mentella in the proportions of 77.4% and 22.6% in 1984 and 73.0% and 27.0% in 1985, based on observations of the landings. The catches of Belgium, the Faroes, and Norway were, in accordance with the nature of their fisheries, allocated to S. marinus in both years (1984 and 1985).

In Division Vb (Table 2.8), the Federal Republic of Germany catch was S. mentella in both years according to observations of the landings. The Faroese catches were allocated to S. marinus and S. mentella in the proportions of 66.0% and 34.0%, respectively, in both years. These figures are based on observations of the landings in 1983, but there have not been any major changes in the nature of the fishery since then. The French catches were allocated to S. marinus and S. mentella in both years as in 1983, i.e., 75.5% and 24.5%, respectively, since no new data were available. The catches of Norway were allocated to S. marinus in both years. The USSR catches were reported only as S. mentella.

In Sub-area XIV (Table 2.9), the catch of the Federal Republic of Germany was allocated in the same proportions as observed in the landings. In 1984, 35.3% were S. marinus and 64.7% S. mentella and in 1985, the figures were 17.9% and 82.1%, respectively. The Greenland catch in 1985 was allocated to S. marinus and S. mentella in the same proportions as the catch of the Federal Republic of Germany in that year, since the Japanese fleet (from which the reported catch of Greenland is derived) was observed to operate in the same areas as the Federal Republic of Germany fleet. The catches of Norway and Greenland in 1984 and the Faroese catch in 1985 were allocated to S. marinus.

2.5 Sebastes marinus

2.5.1 Age composition of the catches (Table 2.10)

For 1984 and 1985, age-length keys, numbers at length, and numbers at age were available from Iceland for Division Va and from the Federal Republic of Germany for Sub-area XIV. Age composition data for Division Vb were not available.

Division Va
The catches of Belgium, Faroes and Norway were broken down by Icelandic catches in 1984 and 1985.

Division Vb
Icelandic data were used to split the catches of Faroes, Norway, and France.

Sub-area XIV
Federal Republic of Germany data were used to calculate the catch in numbers of Norway and Greenland in 1984 and of the Faroes and Greenland in 1985.

Inspecting mean length-at-age data from 1985, a comparison of Icelandic data and Federal Republic of Germany data showed an increasing discrepancy which might only be explained by problems in age reading. The Group felt that there might be other reasons: relatively small sampling of Federal Republic of Germany catches, different sampling area (Iceland in Division Va and Federal Republic of Germany in Sub-area XIV), and that observations on maturity data from Sub-area XIV showed practically no maturity even for the older fish.

2.5.2 Weight at age

For 1984 and 1985, only Icelandic weight-at-age data were available. As the Icelandic catch dominates the total landings, these data were used to split the catches and as input values to the VPA (Table 2.11). Values for missing ages were taken from appropriate regressions.

The SOP check showed a deviation of 0.5% for 1984 catches and 0.2% for 1985 catches.

2.5.3 Maturity at age

Icelandic data on maturity at length by sexes were presented for 1984 and 1985. Maturity at age was calculated using mean length at age from Icelandic age-length keys by averaging the maturity of males and females. It should be noted that the maturity ogive for males and females is not the same. A trend is clearly seen which shows a shifting of maturity to higher ages compared to the data used in the 1983 assessment (Table 2.12).

Although this strong trend was recognized, the input maturity-at-age values used in the VPA were not changed, because then a comparison of the spawning stock development in former years would not be possible. The Group stated that, if the trend remains in the next two years, a revision has to be done.

2.5.4 Assessment and predictions

2.5.4.1 Estimates of fishing mortality

The estimation of fishing mortality has been carried out in two steps as follows:

1) A catch curve over the years 1977-1985 was calculated for ages 11 to 30 (Figure 2.1). From age 15 onwards, fish were fully recruited. This part of the curve could be clearly divided into two sections: first, from age 15 to age 24 and second, from age 24 to age 30. The second section shows a steady linear decline, whereas the first section is more scattered and has less slope, i.e., no continuous mortality within these ages, even some recruitment. The slope of the second part was calculated as 0.63, which is the sum of fishing and natural mortality. Since natural mortality (M) for redfish is assumed to be 0.1, fishing mortality (F) was determined as 0.53. This value was used as the terminal F at age 24 to start a separable VPA (Table 2.13). The results from the separable VPA gave an average fishing mortality of 0.15 for ages 14 to 23 in 1985.

2) Revised catch-per-unit-effort data from the Icelandic fishery were used to calculate total effort on S. marinus using only the total international catch of S. marinus (Table 2.4) in Sub-areas V and XIV. A calculated regression of fishing mortality (ages 14-23) against total international effort for the years 1977-1984 showed a high correlation ($r = 0.83$) and indicated an F of 0.19 in 1985.

The 1985 fishing pattern from the separable VPA which gave $\bar{F}_{(14-23)} = 0.15$ was increased to $\bar{F}_{(14-23)} = 0.19$ and these values were used as corresponding input F values for the conventional VPA. CPUE values for Icelandic trawlers were plotted against biomass estimates from that run for ages 14-23 (Figure 2.2). Also, $\bar{F}_{(14-23)}$ values were plotted against total effort (Figure 2.3). In both cases, the relationship is highly correlated and the Group agreed to use the results from this VPA (Table 2.14).

Fishing mortality at ages 14-23 declined from a maximum in 1982 (0.31) to 0.19 in 1985 which follows the trend in effort and catches.

2.5.4.2 Spawning stock biomass and recruitment

Spawning stock biomass declined from the 1967 value of about 520,000 t to the 1977 value of about 350,000 t (Figure 2.4B, Table 2.15). It then increased to about 470,000 t in 1981 and has then been decreasing to a level of 410,000 t in 1985. In view of the change in the maturity pattern (Table 2.12), the spawning stock in 1985 has to be assumed to be smaller than this amount.

Recruitment increased from 104 million in 1967 to about 309 million in 1979 and decreased to 210 million in 1980, with an average of 193 million for the period which was used in the catch projection.

2.5.4.3 Yield per recruit

A yield-per-recruit (age 11)) curve was calculated based on the mean weight at age from 1983 to 1985 including new 1984 and 1985 values and with the oldest age group as a plus-group (Figure 2.4C). The reference points of $F_{0.1}$ and F_{max} are 0.034 and 1.17, respectively.

2.5.4.4 Catch predictions

Basic input data are displayed in Table 2.16 assuming an average recruitment of 193 million fish at age 11 for the period of projection.

The results of the catch projections are given in Table 2.17 with an estimated catch of 83,000 t in 1986.

2.6 Sebastes mentella

2.6.1 Age compositions of the catches (Table 2.18)

For 1984 and 1985, age-length keys, numbers at length, and numbers at age were available from Iceland for Division Va and from the Federal Republic of Germany for Division Vb and Sub-area XIV.

Division Va
Only Icelandic catches were taken in 1984 and 1985.

Division Vb
Catches of the Faroe Islands, France, and USSR were split using Federal Republic of Germany catch data in 1984 and 1985. Difficulties arose with the 1984 Icelandic weight-at-age data as the SOP check failed. Mean weights at age from the 1984 assessment

were used, therefore, with numbers at age from the Federal Republic of Germany data to split the remaining catches. The SOP check was acceptable with a 10% discrepancy.

Sub-area XIV
In 1984, only Federal Republic of Germany catches were taken. Their catch data were used to split the Greenland catches in 1985.

2.6.2 Weight at age

Comparison of the nominal catches in 1984 and 1985 with the calculated catch using new mean weights at age from the Icelandic data (Table 2.19), which were slightly higher than in the previous assessment except for the oldest age groups (SOP check), resulted in deviations of +3.7% in 1984 and +1.8% in 1985.

2.6.3 Maturity

The maturity ogive showed some tendency towards maturity at a somewhat lower age in 1984 and 1985 than in previous years (Table 2.20).

2.6.4 Estimates of fishing mortality

A catch curve was calculated for the years 1977-1985 (Figure 2.5). The curve is highly variable between ages 12 and 23, with a negative average F value. Therefore, it was impossible to perform an analytical assessment of this stock.

3 GREENLAND HALIBUT IN SUB-AREAS V-XIV

3.1 Landings and Trends in the Fisheries

The total annual catch figures for Divisions Va and Vb, Sub-area XIV, and Sub-areas V and XIV combined are presented for the years 1976-1985 (Tables 3.1-3.4). During this period, the total catch ranged from 6,044 t (1976) to 34,024 t (1984). Most of the catches were taken by Icelandic vessels, 92% in 1983, 88% in 1984, and 97% in 1985. Only a minor part of the catches was taken by long-liners, the major part being taken by otter trawl. The tables show that the catches have been stable for the last six years, except for 1981.

3.2 Effort Data

Estimates of CPUE each year directed towards Greenland halibut for a part of the Icelandic trawler fleet are available from 1976 to 1985. In the first years, these estimates are based on rather sparse data, but from 1980, the data become more and more extensive each year. As an example, it can be mentioned that the CPUE estimate for 1977 is based on 1,316 trawl hauls in which Greenland halibut exceeded 80% of the catch by weight compared to 3,033 hauls in 1985.

3.3 Catch at Age

The catch in numbers was updated for 1983 according to final catches. Catch at age for 1984 and 1985 was estimated using the Icelandic catch-at-age estimates raised proportionally to the final catch each year. The Icelandic catch is around 90% of the total catch and no age composition data or age-length relationships were available from other nations for the years 1984 and 1985 (Table 3.5).

3.4 Weight at Age

The mean weights are presented in Table 3.6. These estimates are derived from the Icelandic data for 1984 and 1985. The average weights at age from the years 1982-1985 were used for the catch predictions.

3.5 Maturity at Age

The maturity at age was estimated using Icelandic data (Table 3.7). The maturity at age for the catch prediction was estimated using the mean values for the years 1982-1985 (Table 3.12).

3.6 Assessment and Predictions

3.6.1 Estimates of fishing mortalities

As in previous years, the natural mortality was assumed to be 0.15. The Group tried to use effort data derived from Icelandic CPUE estimates to estimate fishing mortality for age groups 8-13. The results were not encouraging and, therefore, it was decided not to use the method (Table 3.8). The CPUE estimates from Iceland clearly need to be thoroughly analysed before they can be of any use, as far as Greenland halibut is concerned.

A catch curve was, therefore, calculated in order to estimate fishing mortality which could be used as input in a VPA analysis (Figure 3.1). The results from a catch curve derived from the catch in the years 1980-1985 gave an F of 0.5 for ages 10 and older. A separable VPA (Table 3.9) was repeated with different starting F values at age 9, with output from this used to start a conventional VPA, until the analysis gave a mean F of about 0.5 for ages 10-17 in the years 1980-1985 (Table 3.10).

3.6.2 Spawning stock biomass and recruitment

Total stock biomass (5+) increased slowly from 130,000 t in 1975 to 200,000 t in 1980. From 1980 to 1983, it remained at a relatively constant level (Table 3.11).

The spawning stock biomass increased from 55,000 t in 1975 to 83,000 t in 1980, but has since decreased to about 61,000 t in 1985 (Table 3.11, Figure 3.2B).

For the catch projections, the stock of 5-year-olds in 1984-1986 was set at the mean of the years 1975-1982 (Table 3.12).

3.6.3 Yield per recruit

The yield- and spawning-stock-per-recruit (age 5) curves are shown in Figure 3.2C. The yield-per-recruit curve has an $F_{0.1}$ level at 0.17 and a maximum at F = 1.10.

3.6.4 Catch projections

Catch projections were made for 1987 and 1988 using the parameters given in Table 3.12. For the catch projection, it was assumed that the F pattern in 1986 will be equal to the 1980-1985 average. This will give a catch in 1986 of about 28,000 t. The various alternatives for projected catches in 1987 are given in Table 3.13.

4 ICELANDIC SAITHE

4.1 Landings and Trends in the Fisheries

Landings of saithe from Icelandic grounds (Division Va) are given in Table 4.1 and Figure 4.1A. Since 1977, landings have been fluctuating without a trend between 50,000 and 70,000 t. In 1985, the total landings amounted to about 56,000 t, of which 98% was taken by Iceland. Preliminary catch figures for the period January-May 1986 amounting to 29,000 t show an increase of 7,000 t compared to the same period in 1985.

4.2 Effort Data

Effort data for Icelandic trawlers are available since 1977. As the trawler fishery is, to some extent, a mixed fishery for different demersal species, it was necessary to analyze these effort data in order to define a criterium on effort directed towards saithe. The effort data were treated in such a way that catch per unit effort was only derived from those hauls in which the proportion of saithe in the catch exceeded 70% of the total catch.

As preliminary data for the period January-May 1986 were also available, the CPUE values for the same period in previous years were calculated to make direct comparison possible (Table 4.2). The total effort of trawlers directed towards saithe was derived from these CPUE data.

4.3 Catch at Age

Only minor changes were made to the age composition data for 1984 to account for the revised total landings of that year. For 1985, age composition data were available for landings by Iceland, which represented more than 98% of the total landings. These data were used to calculate the catch at age of the total landings used as input for the VPA (Table 4.3).

4.4 Weight at Age

Weight-at-age data were available for the Icelandic catch in 1985 (Table 4.4). For the predictions, the average catch weight-at-age data for the years 1983-1985 were used for both catch and stock biomass calculations (Table 4.9).

4.5 Maturity at Age

Maturity-at-age data were available for the Icelandic catches in 1985 (Table 4.5). The average maturity-at-age data for the years 1983-1985 were used for the spawning biomass projections (Table 4.9).

4.6 Assessment and Predictions

4.6.1 Estimates of fishing mortality

The exploitation pattern for 1985 was derived from a separable VPA. The analysis was performed for the period 1970-1985 by using a terminal F = 0.36 for the age group 7 and a terminal S of 1.0. The terminal input F was chosen from the last assessment on this stock. The selection pattern and the table of log catch ratio residuals are shown in Table 4.6. As the exploitation pattern for the fully-recruited age groups is fairly stable, it was decided to use constant input F values for these age groups. For the younger age groups, the input F values for the conventional VPA were based on the exploitation pattern as determined by the separable VPA.

The Icelandic saithe fishery can generally be divided into two components: a gillnet fishery during the winter season and a trawl fishery throughout the year. The gillnet fishery, which accounts for 1/3 of the total saithe catches, exploits mainly the spawning saithe, whereas the trawl fishery is more directed towards the age groups 5-8. This fishery accounts for about 60% of the total annual landings.

From a trial VPA with an input F = 0.36 for the fully-recruited age groups, no clear relationship between effort of Icelandic trawlers directed to saithe and $\bar{F}_{(4-9)}$ could be found. On the other hand, there was a high correlation (r = 0.94) between CPUE and biomass of the age groups 5-8 which are mainly exploited by the trawlers. As the regression did not pass through the origin,

it was decided to tune the VPA until the regression line between biomass and CPUE approximately intercepted the origin.

By using an input of F = 0.45 for the fully-recruited age groups, a fairly good correlation could be derived (r = 0.94) (Figure 4.2). This VPA was adopted and the calculated F values for earlier years from the VPA are given in Table 4.7 and the trend in $\bar{F}_{(4-9)}$ is plotted in Figure 4.1A. A plot of $\bar{F}_{(4-9)}$ derived from this VPA versus effort (Figure 4.3) showed some positive correlation, but it is more difficult to expect a clear relationship between effort for one component of a fishery and the fishing mortality of the total fisheries than for CPUE and stock biomass.

4.6.2 Spawning stock biomass and recruitment

Spawning stock biomasses are shown in Figure 4.1B and Table 4.8. After a decline from 1970-1980, the spawning stock biomass increased to about 190,000 t in 1983-1984. In 1985, the estimated spawning stock biomass was 147,000 t, similiar to the level in the mid-1960s.

Estimates of recruitment at age 3 are plotted in Figure 4.1B. Recruitment has fluctuated in recent years without any clear trend. Information so far available indicates that the 1982 year class is a poor one. No information is available on the strength of the year classes recruiting to the fishery except for the 1983 year class where there is some preliminary indication that it is at least of average size. For the catch projections, the 1982 year class was assumed to be equal to the average for 1970-1983 (35 million) and the 1983-1985 year classes were set at the same value as the 1961-1982 average (47 million).

4.6.3 Yield per recruit

The yield- and spawning-stock-biomass-per-recruit (age 3) curves shown in Figure 4.1C have been calculated using the exploitation pattern and weight-at-age data given in Table 4.9. Compared to the present fishing mortality, $\bar{F}_{(4-9)} = 0.45$, the reference values for F_{max} and $F_{0.1}$ are 0.56 and 0.15, respectively.

4.6.4 Catch prediction

The input data for the catch projections are shown in Table 4.9. The projections are based on the 1985 exploitation pattern. The national catch quota on saithe in 1986 is 70,000 t. Due to an increased cod quota, it is not likely that the quota on saithe will be taken. It is more likely that fishing effort on saithe in 1986 will be equal to that in 1985. Options for 1987 and 1988 are based on this assumption, and the results are given in Table 4.10 and Figure 4.1D.

5 TRENDS IN THE DEMERSAL FISHERIES IN THE FAROE AREA

ACFM concluded, on the basis of the 1984 assessment (Anon., 1985), that "there is no doubt that the effort" has increased since 1977, especially by virtue of the increased number of single boat and pair trawlers. In addition, technical improvements and improved knowledge of the grounds by new skippers are assumed to have increased the fishing power of the trawling fleets. Despite difficulties in splitting the effort between the three species (cod, haddock, and saithe), it is evident that a major build-up of overall fishing effort, especially in the trawl fisheries, has taken place in the demersal fisheries at the Faroes.

Because of problems in connection with a change in the computerization of logbook data, no effort estimates from logbook data for 1984 and 1985 for the larger vessels (trawlers with more than 400 HP and other vessels above 100 GRT) were available to the Working Group.

Tables 5.1-5.3 give the catch composition for the fleets mainly exploiting cod, haddock, and saithe for the years 1981-1985. The number of vessels participating in the fisheries for the larger boats are available and have been used to crudely estimate the effort in the fisheries. A comparison of the three tables illustrates the opportunistic behaviour of some of the trawl fleets changing between cod and saithe according to catch rates. The tables for cod and haddock indicate a rather stable pattern but with declining catch rates in most fleets. The demersal fleet has now stabilized at a high level so dramatic increases in the general effort level should not be expected. In 1985, there was a big increase in the activity of the open boats leading to a sharp increase in the catch of cod taken by this group (Figure 5.1). The very good 1982 year class of cod had a very restricted coastal distribution inside the 12-mile-trawl free zone around the Islands and this resulted in very good catch rates for the open boats. In 1986, this pattern has changed and the activity of the open boats has returned to normal levels.

There were no effort data available to the Group for the small long-liners for 1985 and it was, therefore, not possible to repeat last year's calibration for the VPAs for cod and haddock based on these data.

6 FAROE SAITHE

6.1 Landings and Trends in the Fisheries

Preliminary reports on the catches in 1985 indicate a catch of 45,705 t from the whole Faroe area (Division Vb). This is a decline of 8,960 t compared to 1984 (Table 6.1). The 1980 year class made up more than a third of the total catch in weight. The catches taken by the single trawlers decreased by 10,430 t while the pair trawlers increased their catches by 2,400 t. Landings in 1986 show a further decline compared to the same period in 1985 (Figure 6.1)

6.2 Research Vessel Surveys

Surveys on 0-group fish in the Faroe area have been carried out on an annual basis since 1972. In former years, both England and France participated but since 1980, only Faroese vessels have covered the area. The surveys are carried out from about 20 June to 15 July. The main species caught are cod, haddock, Norway pout, and sandeel. The results have not yet been used directly in the assessment of the fish stocks at the Faroes.

In 1982, the Fisheries Laboratory at the Faroes started a series of stratified bottom trawl surveys inside the 500-meter depth contour in the Faroe area. These surveys have been carried out every year in February-March. The surveys are designed and timed to coincide with the main spawning period for saithe, cod, and haddock. The results have so far not been worked up for assessment purposes, but it is expected that this will be done before the next meeting of the Group.

6.3 Catch at Age

Catch at age was provided only for the Faroese landings (Table 6.2). The French and Federal Republic of Germany catches were distributed according to the age composition of the catches by the Faroese trawlers larger than 1,000 HP. In the absence of adequate sampling of the Faroes gillnet fishery and long-liners, the Norwegian and the UK landings, respectively, were distributed using the overall Faroese age composition.

6.4 Weight at Age in the Catch

Weight-at-age data in the catch were available for the Faroese fishery (Table 6.3). They gave an SOP discrepancy of 6% which the Group accepted. In the predictions, the average weight at age for the period 1983-1985 was used.

6.5 Assessment and Predictions

6.5.1 Estimates of fishing mortality

The exploitation pattern for 1985 and input F values for the conventional VPA were derived from a separable VPA. Terminal F = 0.55 for age group 5 was based on last year's assessment (Table 6.4). This VPA was adopted and the calculated F values for each year are given in Table 6.5 and the trend in $\bar{F}_{(4-8)}$ is plotted in Figure 6.2A.

6.5.2 Spawning stock biomass and recruitment

The spawning stock biomass estimates are given in Table 6.6 and shown graphically in Figure 6.2B. The estimated numbers of recruits at age 1 for the years 1960-1982 are also plotted in Figure 6.2B. The year classes from 1983 and onwards have been as-

sumed to be at the average level for the period 1960-1982 of 34 million recruits (age 1).

The results of the VPA show a declining trend in the proportion of older fish, although the spawning stock biomass has increased because of the strong 1980 year class. The 1980 year class is estimated to be of the same size as the good year classes in the late 1960s. Preliminary catches for 1986 demonstrate the declining trend in catches (Figure 6.1), and age samples from the first half of 1986 support the conclusion that, to a great extent, the catches are based on the 1980 year class.

There is no evidence in the age distributions suggesting that the year classes after 1980 are above average, but there are several reports of very large numbers of 0-group saithe in 1984 and 1-group saithe in 1985 in the littoral and coastal zones.

6.5.3 Yield per recruit

Curves of yield and spawning stock biomass per recruit (age 1) are plotted in Figure 6.2C using data from Table 6.7. The estimated fishing mortality in 1985 of $\bar{F}_{(4-8)} = 0.56$ is larger than $F_{max} = 0.41$ and much larger than $F_{0.1} = 0.19$.

6.5.4 Catch predictions

Input data for the predictions are given in Table 6.7. Catch options for 1987 and 1988 are given in Table 6.8. The calculations are based on the assumption that the level of fishing mortality in 1986 is unchanged from 1985 [$\bar{F}_{(4-8)} = 0.56$]. The exploitation pattern used is calculated as the mean exploitation pattern in 1981-1983. The reason for doing this is that the stock in 1984 and 1985 was dominated by the strong 1980 year class with a relatively high fishing mortality on this year class.

Maintaining the same fishing mortality in 1986-1988 as in 1985, $\bar{F}_{(4-8)} = 0.56$, the landings are predicted to be 35,000 t in 1986, 32,000 t in 1987, and 32,000 t in 1988. These predicted landings are far below the catches in recent years.

7 FAROE COD

7.1 Landings and Trends in the Fisheries (Tables 7.1 and 7.2)

Preliminary catch figures indicate a total catch in 1985 of 41,138 t from the Faroe Plateau stock (Table 7.1). This is an increase of 4,159 t (11%) compared to 1984. Landings by non-Faroese vessels were only 0.3% of the total catch. The Faroese fishery was similar to that in previous years with some exceptions. Open boats fishing with hand-lines increased their catches from 235 t in 1984 to 5,960 t in 1985, while the quantity taken by single trawlers less than 1,000 HP decreased from 4,900 t in 1984 to 2,800 tonnes in 1985. Preliminary landings from the Faroes in 1986 compared to those in the same period in 1985 show a similar trend (Figure 7.1).

7.2 Catch at Age

Catch at age in number was provided for the Faroe fishery (Table 7.3). The catch in numbers from the Federal Republic of Germany and French catches were calculated using the age composition of the Faroese trawlers larger than 1,000 HP. Age compositions from the Faroese long-liners larger than 100 GRT were used to calculate the catch in numbers for the Norwegian landings.

7.3 Weight at Age in the Catch

Data on weight at age in the catches were provided by the Faroes (Table 7.4). They gave an SOP discrepancy of 5% which was accepted by the Group. In the predictions, the average weight-at-age data for the period 1982-1985 were used (Table 7.8).

7.4 Assessment and Predictions

7.4.1 Estimation of fishing mortality

Table 5.2 shows a major change in the activity of the open boats. This is even more clearly indicated in Figure 5.1 showing the age distribution by fleet categories.

For the other fleets, a constant effort was assumed and this is reflected in the VPA chosen as a basis for the assessment on the state of the stock. The exploitation pattern was estimated from the separable VPA (Table 7.5) and the input fishing mortalities in general, but in the final VPA, the change in 1985 had to be reflected by increasing the fishing mortalities on the 3- and 4-year-olds, whereas the fishing mortalities for the older age groups were assumed constant (Table 7.6)

7.4.2 Spawning stock biomass and recruitment

Estimates of the spawning biomass (ages 4+) are given in Table 7.7 and shown graphically in Figure 7.2B.

It is obvious from the data that the 1980 and 1981 year classes are above average and that the 1982 year class seems to be even better than these two. The younger age groups are completely dominating the stock (Table 7.7).

7.4.3 Yield per recruit

The yield- and spawning-stock-biomass-per-recruit (age 1) curves shown in Figure 7.2C were calculated using the same exploitation pattern as used in the predictions.

The estimated fishing mortality in 1985 of $\bar{F}_{(3-8)} = 0.57$ is higher than the calculated F_{max} (0.42) and $F_{0.1}$ (0.19).

7.4.4 Catch predictions

In the catch predictions, the long-term average recruitment for 1960-1982 of 23 million at age 1 was used for the 1984-1988 year classes. The input data are given in Table 7.8. The predictions were made on the assumption that the average fishing mortality in 1986 is the same as in 1985. However, the exploitation pattern was changed. In 1985, the fishing mortality on the 3-year-olds was relativly high due partly to an increased inshore fishery. This fishery was not as pronounced in 1986 which had led to a decrease in fishing mortality on age group 3. To cope with this, the fishing pressure on ages 4-6 was increased correspondingly. If the fishing mortality is maintained at this level the predicted catch will be 37,000 t in 1986, 31,000 t in 1987, and 29,000 t in 1988 (Table 7.9).

7.5 Faroe Bank Cod

The landings of cod from the Faroe Bank are presented in Table 7.2. No attempt was made to assess this stock.

8 FAROE HADDOCK

The haddock on the Faroe Plateau and the Faroe Bank (Division Vb) were assessed as one stock unit.

8.1 Landings and Trends in the Fisheries (Tables 8.1 and 8.2)

Total landings in Sub-divisions Vb1 (Faroe Plateau) and Vb2 (Faroe Bank) of 15,860 t in 1985 represented an increase of 3,482 t (22%) from 1984 (12,378 t) and resemble the situation in 1974 and 1979 when the total catches amounted to 14,773 and 14,944 t, respectively. Landings from the Faroes in 1986 compared to landings in the same period in 1985 show similar trends (Figure 7.1).

8.2 Catch at Age

For the Faroese landings, catch-at-age data were only provided from the Faroe Plateau. Age composition data for 1984 were reviewed to account for minor revisions to the total landings that year. The catches at Faroe Bank were split using the age distribution from the Faroe Plateau. Catch in numbers for the UK and Norwegian catches were calculated using the age distribution for the Faroese long-liners over 100 GRT (Table 8.3).

8.3 Weight at Age in the Catch

Weight-at-age data were available for the Faroese fishery (Table 8.4). The SOP discrepancy of 5% was accepted by the Group. In the predictions, the average weight-at-age data for the period 1982-1985 were used.

8.4 Assessment and Predictions

8.4.1 Estimation of fishing mortality

No effort data were available for haddock. As stated in Section 5.1, the fishery on haddock has shown a fairly stable situation during the most recent years. The input values for the VPA were taken from a separable VPA where the initial input value at age 5 was chosen to be the same as at age 5 in last year's assessment (0.36) (Table 8.5). As there were no effort data available, the Group accepted the results of the separable VPA as input for the conventional VPA (Table 8.6).

8.4.2 Spawning stock biomass and recruitment

The spawning stock biomass (ages 3 and older) estimates for 1961-1982 are shown in Figure 8.1B and Table 8.7. Fairly good recruitment in 1973-1975 followed by poor recruitment in 1977-1979 has resulted in a decreasing trend in the spawning stock during the last ten years. The estimated spawning stock in 1982 is at the same level as in the 1960s. The 1982 year class seems to be at the average level of the 1966-1980 period of 37 million recruits at age 1. The estimated numbers of recruits at age 1 are given in Figure 8.1B.

8.4.3 Yield per recruit

The exploitation pattern for 1985 derived from the separable VPA and the mean weight at age for the years 1982-1985 were used to calculate yield per recruit (age 1). The present level of $F_{(3-8)} = 0.39$ is higher than $F_{0.1} = 0.2$.

8.4.4 Catch predictions

In the catch predictions, the average level of recruits at age 1 for the years 1966-1980 (37 million) was used for the 1984-1988 year classes. The exploitation pattern used was that estimated for 1985. The input data for the prediction are given in Table 8.8 and the results in Table 8.9 and in Figure 8.1C. If fishing mortality is maintained at the 1985 level, $\bar{F}_{(3-8)} = 0.39$, landings of 16,000 t are predicted for 1986, 17,000 t for 1987 and 18,000 t for 1988.

9 BLUE LING, LING, AND TUSK IN SUB-AREAS V-XIV

9.1 Landings and Trends in the Fisheries

Historical records of nominal landings broken down by species, division (sub-divisions in Division Vb), and countries are presented in Tables 9.1-9.14. Prior to 1966, the figures dating back to 1952 are presented in the earlier reports of the Working Group on Fish Stocks at the Faroes. The total annual landings by species are shown in Figure 9.1 for Sub-areas V, VI, and XIV com-

bined. Total annual landings of the three species combined have fluctuated between 38,000 and 70,000 t and averaged 55,800 t. In general, the annual landings have been above average since 1973.

From Figure 9.1, it can be seen that annual landings of blue ling increased rapidly from a level of 4,000-7,000 t in the period 1966-1972 to at least 16,000 t in 1973 and to 22,000 t in 1974. The figures for 1973-1975 are preliminary minimum estimates indicating the sharp increase due to the development of a directed trawl fishery for blue ling. Since then, the annual landings have remained at a comparatively high level. The landings of ling have fluctuated between 17,000 and an estimated 38,000 t (1973). It is assumed that at least the figures for 1973-1975 are overestimates. The long-term trend, therefore, is more likely to reflect a decrease over the period 1968-1981, followed by comparatively high landings in recent years. The landings of tusk have varied between 9,000 and 19,000 t with a long-term increasing trend.

The annual landings by division and species are shown in Figures 9.2-9.6. The sequences of annual landings reveal considerable differences between the divisions with respect to the magnitude of landings, the relative contribution by species, and long-term and recent trends. On average, about 61% of the landings are from Sub-area V, 38% from Sub-area VI, and only 1% from Sub-area XIV.

Fishing in Icelandic waters (Division Va) for blue ling, ling, and tusk was previously conducted by nine countries but has, in recent years, been reduced to four. Icelandic and Faroese vessels land the bulk of the catches. The total annual landings ranged from 18,000 to 27,000 t up to 1972. In the period 1973-1979, however, the landings decreased to a level of 12,000 to 15,000 t, but reached a higher level later on. Landings in 1984 and 1985 may again indicate a decreasing trend. Figure 9.2 shows that ling used to be the predominant species caught but the landings dropped from 14,000-15,000 t in the peak period 1968-1971 to a recent level of less than 5,000 t, thus demonstrating a decreasing trend. Whereas the landings of tusk have fluctuated between 5,000 and 8,000 t, indicating no particular trend, the landings of blue ling suddenly increased from a level of less than 4,000 t over the period ending in 1979 to 8,500 t in 1980 and 1981. Since then, however, a decreasing trend has been observed. Most of the tusk landings originate as by-catch from the Icelandic long-line fishery for cod, while the sudden drop in the ling landings may be associated with restrictions imposed on the foreign fishery. The peak landings of blue ling in 1980 and 1981 were mainly due to a directed trawl fishery on aggregated spawning fish.

In Faroese waters (Division Vb), fishing is carried out by vessels from about nine countries. Total annual landings have fluctuated between 8,000 and 25,000 t without any particular trend. In recent years, blue ling has mainly been landed by Faroese and Federal Republic of Germany trawlers, while ling and tusk were landed mainly by Faroese trawlers and long-liners and Norwegian long-liners. Annual landings of blue ling have fluctuated between 1,000 and 13,000 t with an obvious positive trend ending in 1976. Since then, there has apparently been no clear trend, even though the landings have remained at a higher level than in the earlier period. The major landings come from directed trawl fisheries.

From the waters to the west of Scotland (Division VIa), at most ten countries have reported landings in a single year. The total annual landings have fluctuated between 9,000 and 33,000 t without any particular trend. Since 1976 blue ling has mainly been caught by French trawlers in a directed fishery whereas ling and tusk have been taken mainly in directed fisheries by Faroese long-liners and trawlers and Norwegian long-liners. It should be noted, however, that prior to 1976, the landing figures of ling are overestimated due to the inclusion of blue ling and do not represent realistic trends for either species. From 1976 onwards, the annual landings of both blue ling and ling have fluctuated in a way that indicates a possible decreasing trend for blue ling and a possible increasing trend for ling. The landings of tusk have been at a comparatively low level averaging about 1,350 t and come mainly from by-catch in the long-line fishery for ling.

From the Rockall waters (Division VIb), at most six countries have reported landings in a single year. The total annual landing figures range from 500 to 12,000 t, with a maximum in 1980 decreasing to a level of 7,000-8,000 t in the period 1981-1984. As blue ling has been partly included in the ling landings and partly transferred to Division VIa up to 1975, no realistic trend for the two species can be observed in the preceding period. Since 1977, a directed trawl fishery has been developed particularly by France and the Federal Republic of Germany yielding peak landings in 1980 of 9,000 t. An increasing trend in the ling landings is observed in recent years, whereas a similar trend in tusk landings ceased in 1983.

In East Greenland waters (Sub-area XIV), the total annual landings have been very low. Increased landings in recent years are due to a directed trawl fishery for blue ling.

9.2 The Long-Line Fisheries in Sub-areas V-XIV

Long-line fisheries are carried out by the Faroes, Iceland, and Norway.

Vessels less than 100 GRT conduct long-line fisheries in comparatively shallow waters off Iceland and the Faroes, either seasonally or throughout the year. The fishing effort is mainly directed towards cod, haddock, and tusk.

Over the last decades, however, a highly specialized long-line fishery has been developed by Faroese and Norwegian vessels above 100 GRT. These vessels conduct fishing throughout the year and, to a large extent, in distant waters. Records available from the Norwegian fleet in 1983 indicate a range in tonnage of 78-374 GRT and an average of 200 GRT. From a total of 54 vessels which had landed about half of the total catches, 41 had fished in Division VIa, 25 in Division IIa, 12 in Division VIb, and 10 in Division Va. The vessels made from 1 to 5 trips (average of 2) each usually lasting for more than a month. Several vessels were fishing in two and even three different divisions (Vb, VIa, and VIb) during a single trip. Fishing depth varied between 90 and 655 metres in Faroese waters, between 100 and 800 metres along the west coast of Scotland, and between 135 and 635 metres on

Rockall. Actual fishing depth may have varied from trip to trip and throughout the year. The autoline system, which has developed since the early 1970s, has greatly improved the fishing effort. In 1983, the number of hooks set per fishing day averaged 17,500 in Division Vb, 21,500 in Division VIa, and 27,500 in Division VIa. Between one half and three fourths of the landings consisted of ling, whereas tusk made up from one fourth to one third of the landings. The total catch per 1,000 hooks was highest during the first quarter of the year in all divisions and tended to decrease later on. The highest CPUE values were achieved in Faroese waters, 216 kg per 1,000 hooks. The crew members were 11-12 fishermen per vessel.

9.3 Data Available for Future Assessment Work

The members attending the present Working Group meeting found it most appropriate to initiate the foundation of a data base by establishing an ad hoc compilation of publications containing information on biology, catch, and effort concerning blue ling, ling, and tusk. The references are presented in Sections 9.6.1 and 9.6.2. Unpublished data from personal communications were also compiled.

A total of 30 publications on blue ling was available to the Working Group. They dealt mainly with recent investigations made in Divisions Va (12) and Vb (9), and Sub-areas VI (5) and XIV (8). The number of publications referring to a specific division or sub-area is given in brackets. The information was obtained from research vessel surveys as well as from commercial fisheries and contains data on vital biological parameters such as length, age, and growth by sex. Due to time limitations, no effort was made at this stage to compile and analyze the data, but it is expected that the available information will prove very useful for future assessment purposes.

Publications on ling amount to five from Division Va presenting length distributions, three from Division Vb giving age-length data from a single year and catch/effort data, one from Division VIa, and one from Division Vb, both presenting catch/effort data. Despite the commercial importance of this species, the knowledge of biology and the fishery seems to be rather poor. However, an analysis of the Norwegian long-line fishery, based on logbooks from commercial vessels, is in progress.

Publications on tusk amount to six from Division Va giving data on length and age, three from Division Vb presenting age-length data from a single year and catch/effort data, one from Division VIa, and one from Division VIb, both presenting catch/effort data. The comments on ling are relevant to tusk as well.

9.4 Distribution of Blue Ling, Ling, and Tusk in Sub-areas V-XIV

Reference is made to the Appendix of Anon. (1976b) which describes the life history of, and the fishery for, each species within the NEAFC area. The recent development of directed trawl fisheries for blue ling in Sub-areas V, VI, and XIV has greatly improved the knowledge of the biology of the species in these

waters. Information derived from research vessel surveys, commercial landings, samples taken on board commercial vessels, and the geographical distribution of catches may also shed more light upon the geographical and vertical distribution of the stock(s) of blue ling. The Working Group, however, was not in a position to evaluate this subject further.

9.5 Data Requirements for Future Assessment Work

The Working Group was satisfied with the conditions for establishing a data base for blue ling, but expressed the hope, however, that the existing information might be compiled in a way suitable for assessment purposes.

Published data on ling and tusk are rather limited and any attempt to work up, compile, and bring forth existing material from the various national laboratories would be highly appreciated.

For assessment purposes, data on landings, catch and weight at age, effort, maturity ogives, and recruitment are requested. Future work in this field should be given high priority.

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9.6.1 Blue ling and ling

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10 OCEANIC-TYPE MENTELLA

10.1 Results from a Faroese Survey in 1986

In May 1986, the Fishery Laboratory in Thorshavn carried out a survey in the Irminger Sea outside the 200-nm zone with the R/V "Magnus Heinason". The cruising area extending from 59^0N - $63^0$30'N and 28^0W - 33^0W was investigated with echo sounders, and 28 hauls were made with a pelagic trawl (blue whiting trawl - mesh size 40 mm). The catches were analyzed but the sampled material has not been completely worked up yet, although some of the results are presented here.

These results are very similar to those of the Icelandic experiments in the 1970s (Magnusson, 1977 and 1983).

The redfish seemed to be distributed over the whole area, with by far the largest concentrations in a rather small area about 61^0 - $61^0$30'N, 30^0 - $31^0$30'W, but only in the first part of the period. After 22 May, the redfish seemed to spread out. As regards the vertical distribution, the redfish were found in all trawl depths from 130 m to 600 m. There was a tendency towards larger catches in the deeper layers; the mean lengths of the fish increased with depth, and the typical coloration of the oceanic-type of mentella seemed to change gradually with depth resembling the other "mentella" in the deepest layers.

The females were more abundant in the catches than the males, with 66.6% females and 34.4% males, respectively; in the average, this ratio varied somewhat. Most of the females were in maturity stage IV and the males in stage II which, together with some information from the fishing vessels in the area on the concentrations of the redfish, might indicate peak spawning in late

April. The females were larger than the males, on average 39.4 cm and 37.8 cm, respectively.

The fish were heavily infested with Sphyrion lumpi. The part of the infested fish varied between 12% and 30% with a mean of about 19%. These figures did not seem to vary with depth, but were higher for the females.

10.2 Some Notes on the Fishery in the Irminger Sea

In the Irminger Sea, a commercial fishery has been carried out by USSR vessels since 1982 (see Section 2.1). The fishing season starts in April and lasts for about 4 months. In May 1986, the fishing fleet totalled 60 USSR, 5 Bulgarian, and 2 German Democratic Republic factory trawlers. The fishing area was rather distinct up to about 21 May (see Section 10.1), but after that, the fishing fleet spread out over the whole area because of insufficient catches.

The catches by the R/V "Magnus Heinason" cannot be used as a direct measure of the abundance because of insufficient fishing power. The catches varied from about 70 kg/hour to about 660 kg/hour. According to the information from fishing captains, their catches were about 5 times bigger at the same place and the fishery changes a lot during the season. In April, the CPUE was 8-10 t/hour and in mid-May it was about 2-3 t/hour.

10.3 Additional Information on the Relationship between Oceanic-Type Mentella and the Other Mentellas

As suggested in Section 10.1, there might be some connection between the oceanic-type mentella and the other mentellas. As the Irminger Sea is a common spawning area for redfish, this observation seems reasonable. Nevertheless, there are differences in the size at maturity of the fish, larvae sizes, etc. (Magnusson et al., 1977), so the oceanic-type is regarded as a separate stock. In spite of this, there might at least be some physical mixing of the mentella stocks in the Irminger Sea.

10.4 Future Requirements

USSR larvae investigations in 1982 estimated the spawning stock of pelagic mentella in the Irminger Sea to be 2.6-3.6 million t; in 1983, the estimate was 3.2-4.5 million t (Noskov et al., 1984 and 1986).

However, no time series is available at present and data for 1984 and later are missing. Additional data from the fishery must be made available to make an assessment of the stock. The Working Group also stresses further investigations on the relationship between mentella stocks in the Irminger Sea.

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Table 2.1 Nominal catch of REDFISH (in tonnes) by countries in Division Va (Iceland). (As reported officially to ICES.)

Country	1974	1975	1976	1977	1978	1979
Belgium	2,114	1,945	1,522	1,395	1,549	1,385
Faroe Islands	254	82	211	292	242	629
German Dep.Rep.	11	-	-	-	-	-
Germany, Fed.Rep.	36,398	33,602	32,948	31,632	-	-
Iceland	27,799	32,659	34,028	28,119	33,318	62,253
Norway	15	22	31	87	93	43
Poland	18	-	-	-	-	-
UK	2,519	2,424	1,124	+	-	-
USSR	-	-	-	-	-	-
Total	69,129	70,734	69,864	61,525	35,202	64,310

Country	1980	1981	1982	1983	1984	1985[1]
Belgium	1,381	924	283	389	291	400
Faroe Islands	1,055	1,212	1,046	1,357	686	195
German Dep.Rep.	-	-	-	-	-	-
Germany, Fed.Rep.	-	-	-	-	-	-
Iceland	69,780	93,349	115,051	122,749	108,270	91,381
Norway	33	32	11	32	12	5
Poland	-	-	-	-	-	-
UK	-	-	-	-	-	-
USSR	-	-	-	-	-	-
Total	72,249	95,517	116,391	124,527	109,259	91,981

[1] Provisional data.

Table 2.2 Nominal catch of REDFISH (in tonnes) by countries in Division Vb (Faroe Islands). (As reported officially to ICES.)

Country	1974	1975	1976	1977	1978	1979
Faroe Islands	28	9	33	54	1,525	5,693
France	300	800	-	1,368	448	862
German Dep.Rep.	1	1	-	-	-	-
Germany, Fed.Rep.	7,328	7,628	5,255	5,854	7,767	6,108
Iceland	-	-	-	-	-	-
Netherlands	-	105	-	-	+	-
Norway	10	7	17	10	9	11
UK	98	41	59	116	57	+
USSR	-	-	-	-	-	-
Total	7,765	8,591	5,364	7,402	9,806	12,674

Country	1980	1981	1982	1983	1984	1985[1]
Faroe Islands	5,509	3,232	3,999	4,642	8,770	12,486
France	627	59	204	439	559	1,088
German Dep.Rep.	-	-	-	-	-	-
Germany, Fed.Rep.	3,891	3,841	5,230[2]	4,300	4,460	5,206
Iceland	-	-	1	-	-	-
Netherlands	-	-	-	-	-	-
Norway	12	13	7	3	1	5
UK	-	-	-	-	-	-
USSR	-	-	-	-	142	868
Total	10,039	7,145	9,441	9,366	13,932	19,653

[1] Provisional data.
[2] Including 570 t from Sub-area VI.

Table 2.3 Nominal catch of REDFISH (in tonnes) by countries in Sub-area XIV (East Greenland). (As reported officially to ICES.)

Country	1974	1975	1976	1977	1978	1979
Canada	-	-	420	-	-	-
Greenland	-	-	129	1	3	-
Faroe Islands	43	1	3	19	-	-
France	-	-	-	-	-	490
German Dep.Rep.	1,275	4,490	-	-	-	-
Germany, Fed.Rep.	2,632	4,979	4,403	13,347	20,711[2]	20,428[2]
Iceland	9,777	5,632	7,410	81	151	-
Norway	-	63	5	112	2	-
Poland	6	276	-	-	-	-
UK	127	56	286	622	13	-
USSR	118	9,830	101,000	251	-	-
Total	13,978	25,329	113,656	14,433	20,880	20,918

Country	1980	1981	1982	1983	1984	1985[1]
Canada	-	-	-	-	-	-
Greenland	-	1	+	1	10	5,519[4]
Faroe Islands	-	18	-	27	-	30
France	-	-	-	-	-	-
German Dem.Rep.	-	-	-	155[3]	989[3]	5,438[2,3]
Germany, Fed.Rep.	32,520[2]	42,980[2]	42,815[2]	30,815[2]	14,141	5,896
Iceland	89	-	17[3]	-	-	+
Norway	-	-	-	-	15	-
Poland	-	-	581[3]	-	239[2,3]	135[2,3]
UK	-	-	-[2,3]	-[2,3]	-	-
USSR	-	-	59,914[3]	60,079[2,3]	68,300[2,3]	42,973[2,3]
Total	32,609	42,999	103,323	91,077	83,694	59,991
Total used in the Assessments			42,815	30,843	14,166	11,445

[1] Provisional data.

[2] Catches updated for Sub-area XII included.

[3] Catches from the oceanic stock not included in the assessments.

[4] Fished by the Japanese fleet.

Table 2.4 Total international effort values for S. marinus in ICES Sub-areas V and XIV estimated from the total international catch of S. marinus by using the Icelandic CPUE values from that part of the fishery in which 70% or more of the catches were redfish (S. marinus + S. mentella).

Year	Icelandic CPUE (kg/h)	Total international catch S. marinus (t)	Total international effort S. marinus (hr)
1977	835	52,752	63,176
1978	956	47,791	49,991
1979	1,147	75,056	65,437
1980	1,164	88,085	75,674
1981	1,177	101,285	86,054
1982	1,144	123,165	107,662
1983	962	106,317	110,517
1984	959	96,023	100,128
1985	981	78,460	79,980

Table 2.5 Monthly catches of REDFISH, Sebastes mentella, effort and percentage of total catches and CPUE in 1980-1986 in Division Vb (Faroes).

Month	1980			1981			1982			1983		
	Redfish tonnes (CPUE)	% of total catch	Fishing days	Redfish tonnes (CPUE)	% of total catch	Fishing days	Redfish tonnes (CPUE)	% of total catch	Fishing days	Redfish tonnes (CPUE)	% of total catch	Fishing days
Jan	60 (2.85)	67	21				-	-	-	-	-	-
Feb	246 (3.84)	80	64				116 (10.55)	72	11	505 (7.77)	88	65
Mar	529 (5.29)	94	100				359 (9.70)	92	37	994 (8.43)	96	118
Apr	344 (5.13)	86	67				921 (11.51)	94	80	1,176 (12.38)	89	95
May	384 (5.19)	83	74				566 (10.11)	95	56	668 (10.27)	92	65
Jun	524 (4.72)	84	111	No agreement between EEC and the Faroes			-	-	-	-	-	-
Jul	231 (5.63)	80	41				-	-	-	-	-	-
Aug	85 (4.47)	91	19				-	-	-	-	-	-
Sep	264 (4.98)	80	53				422 (10.29)	79	41	110 (7.33)	88	15
Oct	459 (5.67)	85	81				680 (10.79)	90	63	463 (7.12)	89	65
Nov	339 (6.65)	90	51	34 (0.92)	2	37	651 (8.68)	88	75	304 (8.94)	87	34
Dec	293 (6.10)	91	48	6 (1.00)	8	6	359 (8.35)	94	43	5 (2.50)	100	2
Total	3,758 (6.07)		619	40 (0.93)		43	4,074 (10.03)		406	4,225 (9.20)		459

(cont'd)

Table 2.5 (cont'd)

Month	1984			1985			1986		
	Redfish tonnes (CPUE)	% of total catch	Fishing days	Redfish tonnes (CPUE)	% of total catch	Fishing days	Redfish tonnes (CPUE)	% of total catch	Fishing days
Jan	301 (7.92)	73	38	715 (11.35)	88	63	177 (11.80)	97	15
Feb	590 (8.08)	93	73	623 (7.08)	80	88	722 (9.38)	96	77
Mar	1,611 (10.33)	94	156	723 (9.27)	97	78	963 (7.64)	96	126
Apr	745 (8.98)	95	83	970 (11.55)	97	84	1,032 (7.88)	96	131
May	394 (8.57)	89	46	647 (11.76)	67	55	874 (10.05)	96	87
Jun	48 (4.80)	72	10	-	-	-	-	-	-
Jul	-	-	-	-	-	-	-	-	-
Aug	-	-	-	32 (5.33)	86	6	-	-	-
Sep	275 (8.33)	83	33	-	-	-	-	-	-
Oct	278 (5.05)	91	55	848 (8.74)	93	97	-	-	-
Nov	344 (7.64)	92	45	633 (6.73)	92	94	-	-	-
Dec	-	-	-	94 (5.53)	93	17	-	-	-
Total	4,586 (8.51)		539	5,285 (9.08)		582	3,768 (8.64)		436

Table 2.6 Number of O-group REDFISH x 10^{-6}/nautical mile^2 from the Icelandic O-group survey.

Year	Number
1970	8.6
1971	12.6
1972	31.1
1973	74.0
1974	23.6
1975	12.6
1976	5.8
1977	13.0
1978	6.5
1979	1.3
1980	3.0
1981	9.0
1982	2.7
1983	0.7
1984	4.3[1]
1985	22.6[1]

[1] Reduced area.

Table 2.7 Nominal catch of REDFISH ('000 tonnes) in Division Va by countries. Separation into the species components according to the method used by the Redfish Working Group.

Year		Belgium	Faroe Islands	German Dem.Rep.	Germany, Fed.Rep.	Iceland	Norway	Poland	UK	Total
1974	Total	2.1	0.3	+	36.4	27.8	+	+	2.5	69.1
	S.mar.	2.1	0.3		4.3	27.0			2.5	36.2
	S.ment.	-	-		32.1	0.8			-	32.9
1975	Total	1.9	0.1	-	33.6	32.7	+	-	2.4	70.7
	S.mar.	1.9	0.1		4.3	31.3			2.4	40.0
	S.ment.	-	-		29.6	1.4			-	30.7
1976	Total	1.5	0.2	-	32.9	34.0	+	-	1.1	69.7
	S.mar.	1.5	0.2		4.3	33.3			1.1	40.4
	S.ment.	-	-		28.6	0.7			-	29.3
1977	Total	1.4	0.3	-	31.6	28.1	0.1	-	-	61.5
	S.mar.	1.4	0.3		9.2	27.5	0.1			38.5
	S.ment.	-	-		22.4	0.6	-			23.0
1978	Total	1.5	0.2	-	-	33.3	0.1	-	-	35.1
	S.mar.	1.5	0.2			29.4	0.1			31.2
	S.ment.	-	-			3.9	-			3.9
1979	Total	1.4	0.6	-	-	62.3	0.1	-	-	64.4
	S.mar.	1.4	0.6			54.6	0.1			56.7
	S.ment.	-	-			7.7	-			7.7
1980	Total	1.4	1.1	-	-	69.8	+	-	-	72.3
	S.mar.	1.4	1.1			59.6				62.1
	S.ment.	-	-			10.2				10.2
1981	Total	0.9	1.2	-	-	93.4	+	-	-	95.5
	S.mar.	0.9	1.2			73.7				75.8
	S.ment.	-	-			19.7				19.7
1982	Total	0.3	1.0	-	-	115.1	+	-	-	116.4
	S.mar.	0.3	1.0			96.6	+			97.9
	S.ment.	-	-			18.5				18.5
1983	Total	0.4	1.4	-	-	122.7	+	-	-	124.5
	S.mar.	0.4	1.4			85.6				87.4
	S.ment.	-	-			37.1				37.1
1984	Total	0.3	0.7	-	-	108.3	+	-	-	109.3
	S.mar.	0.3	0.7			83.8	+			84.8
	S.ment.	-	-			24.5				24.5
1985	Total[1]	0.4	0.2	-	-	91.4	+	-	-	92.1
	S.mar.	0.4	0.2			66.7	+			67.3
	S.ment.	-	-			24.8	-			24.8

[1] Preliminary.

Table 2.8 Nominal catch of REDFISH ('000 tonnes) in Division Vb by countries. Separation into the species components according to the method used by the Redfish Working Group.

Year		Faroe Islands	France	German Dem.Rep.	Germany, Fed.Rep.	Netherlands	Norway	UK	USSR	Total
1974	Total	+	0.3	+	7.3	-	-	0.1	-	7.7
	S.mar.		0.3		-			0.1		0.4
	S.ment.		-		7.3			-		7.3
1975	Total	+	0.8	+	7.6	0.1	+	+	-	8.5
	S.mar.		0.8		-	0.1				0.9
	S.ment.		-		7.6	-				7.6
1976	Total	+	-	-	5.3	-	+	0.1	-	5.4
	S.mar.				-			0.1		0.1
	S.ment.				5.3			-		5.3
1977	Total	0.1	1.4	-	5.9	-	+	0.1	-	7.5
	S.mar.	0.1	0.6		-			0.1		0.8
	S.ment.	-	0.8		5.9			-		6.7
1978	Total	1.5	0.4	-	7.8	-	+	0.1	-	9.8
	S.mar.	1.5	0.4		-			0.1		2.0
	S.ment.	-	-		7.8			-		6.7
1979	Total	5.7	0.9	-	6.1	-	+	-	-	12.7
	S.mar.	4.8	-		-					4.8
	S.ment.	0.9	0.9		6.1					7.9
1980	Total	5.5	0.6	-	3.9	-	+	-	-	10.0
	S.mar.	4.9	-		-		+			4.9
	S.ment.	0.6	0.6		3.9		-			5.1
1981	Total	3.2	+	-	3.9	-	+	-	-	7.1
	S.mar.	2.5	-		-		+			2.5
	S.ment.	0.7	+		3.9		-			4.6
1982	Total	4.0	0.2	-	5.2	-	+	-	-	9.4
	S.mar.	1.7	0.1		-		+			1.8
	S.ment.	2.3	+		5.2		-			7.5
1983	Total	4.7	0.4	-	4.3	-	-	-	-	9.4
	S.mar.	3.1	0.3		-					3.4
	S.ment.	1.6	0.1		4.3					6.0
1984	Total	8.8	0.5	-	4.5	-	+	-	0.1	13.9
	S.mar.	5.8	0.4		-				-	6.2
	S.ment.	3.0	0.1		4.5				0.1	7.7
1985	Total[1]	12.5	1.1	-	5.2	-	+	-	0.9	19.7
	S.mar.	8.2	0.8		-				-	9.0
	S.ment.	4.3	0.3		5.2				0.9	10.7

[1] Preliminary.

Table 2.9 Nominal catch of REDFISH ('000 tonnes) in Sub-area XIV by countries. Separation into the species components according to the method used by the Redfish Working Group.

Year		Canada	Denmark (G)	Faroe Islands	German Dem.Rep.	Germany, Fed.Rep.	Ice-land	Norway	Poland	UK	USSR	Green-land	Total
1974	Total	-	-	+	1.3	2.6	9.8	-	+	0.1	0.1	-	13.9
	S.mar.				1.3	2.6	9.8			0.1	0.1		13.9
	S.ment.				-	-	-			-	-		-
1975	Total	-	-	+	4.5	5.0	5.6	0.1	0.3	0.1	9.8	-	25.4
	S.mar.				4.5	5.0	5.6	0.1	0.3	0.1	5.4		21.0
	S.ment.				-	-	-	-	-	-	4.4		1
1976	Total	0.4	0.1	+	-	4.4	7.4	+	-	0.3	101.0	-	113.6
	S.mar.	0.4	0.1			4.4	7.4			0.3	41.3		53.9
	S.ment.	-	-			-	-			-	59.7		59.7
1977	Total	-	+	+	-	13.3	0.1	0.1	-	0.6	0.3	-	14.4
	S.mar.					13.3	0.1	0.1		0.6	0.3		14.4
	S.ment.					-	-	-		-	-		-
1978	Total	-	+	-	-	20.7	0.2	+	-	+	-	-	20.9
	S.mar.					15.3	0.2						15.5
	S.ment.					5.4	-						5.4
1979	Total	-	-	+	-	21.1	-	-	-	-	-	-	21.1
	S.mar.					15.8							15.8
	S.ment.					5.3							5.3
1980	Total	-	-	-	-	32.5	0.1	-	-	-	-	-	32.6
	S.mar.					22.1	0.1						22.2
	S.ment.					10.4	-						10.4
1981	Total	-	-	+	-	43.0	-	-	-	-	-	-	43.0
	S.mar.					23.6							23.6
	S.ment.					19.4							19.4
1982	Total	-	+	-	-	42.8	+	-	0.6[2]	-	59.9[2]	-	103.3[2]
	S.mar.					23.5			-		-		23.5
	S.ment.					19.3			0.6		59.9[2]		79.8[2]
1983	Total			+	0.1[2]	30.8					60.0[2]	-	[2]
	S.mar.	-	-		-	15.6	-	-	-	-	-		
	S.ment.				0.1	15.2					60.0[2]		75.2[2]
1984	Total	-	-	-	1.0[2]	14.1	+	-	0.2[2]	-	68.3[2]	+	83.6[2]
	S.mar.				-	5.0			-		-		5.0
	S.ment.				1.0	9.1			0.2		68.3		78.6[2]
1985	Total[1]	-	-	+	5.4[2]	5.9	+	-	0.1[2]	-	43.0[2]	5.5	59.9[2]
	S.mar.				-	1.1			-		-	1.0	2.1
	S.ment.				5.4	4.8			0.1		43.0	4.5	57.8[2]

[1] Preliminary.

[2] Catches of the oceanic stock not included in the assessment.

Table 2.10 SUM OF PRODUCTS CHECK.

SEBASTES MARINUS IN FISHING AREAS V AND XIV
CATEGORY: TOTAL

CATCH IN NUMBERS UNIT: thousands

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
11	3229	556	1059	1049	1725	2284	2136	2449	3544	2200
12	19819	3539	5957	2607	7506	9562	8299	7088	8841	6278
13	19604	5393	5607	2639	9258	8422	9968	11251	9505	4892
14	15776	7820	3023	6192	14052	10515	14054	11603	12346	6524
15	8839	5327	6451	6260	13617	15916	17380	14267	10558	8846
16	9195	5898	5702	10174	13521	10299	14551	13055	12378	8654
17	5780	2592	2183	9134	4620	11042	11159	11782	11806	10527
18	5440	5108	3173	10300	9586	9019	15234	15530	11562	9874
19	5596	3512	2959	5635	3503	7807	10356	12076	9055	9241
20	1844	1213	3186	4777	2123	5145	13947	9553	8701	7956
21	3552	3755	3401	5072	5516	9010	9751	5709	6512	5925
22	3539	2484	1511	3216	2297	4113	5090	5235	3337	3822
23	4348	3525	1746	3912	1943	2825	4796	4016	3696	2529
24	3817	2832	1474	2368	2395	3762	2751	2143	2550	2504
25	1751	1170	827	2212	1430	1929	992	1594	808	1227
26	1263	798	611	2125	750	1079	449	541	277	286
27	587	364	378	1272	461	518	209	287	22	113
28	429	271	156	747	249	136	17	28	3	47
29	173	112	99	452	33	41	1	1	0	0
30+	73	69	37	263	68	7	76	81	0	0
TOTAL	120572	55939	54585	81200	101491	113229	141098	126067	114741	91254

Table 2.11 SUM OF PRODUCTS CHECK

SEBASTES MARINUS IN FISHING AREAS V AND XIV
CATEGORY: TOTAL

MEAN WEIGHT AT AGE IN THE CATCH UNIT: Kilogram

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
11	.486	.486	.486	.486	.486	.486	.587	.587	.599	.420
12	.536	.536	.536	.536	.536	.536	.424	.424	.487	.439
13	.591	.591	.591	.591	.591	.591	.533	.533	.521	.540
14	.652	.652	.652	.652	.652	.652	.601	.601	.604	.609
15	.720	.720	.720	.720	.720	.720	.654	.654	.661	.663
16	.794	.794	.794	.794	.794	.794	.714	.714	.718	.721
17	.876	.876	.876	.876	.876	.876	.760	.760	.788	.783
18	.966	.966	.966	.966	.966	.966	.857	.857	.872	.847
19	1.066	1.066	1.066	1.066	1.066	1.066	.938	.938	.981	.957
20	1.176	1.176	1.176	1.176	1.176	1.176	1.025	1.025	1.020	1.011
21	1.297	1.297	1.297	1.297	1.297	1.297	1.147	1.147	1.164	1.109
22	1.431	1.431	1.431	1.431	1.431	1.431	1.296	1.296	1.393	1.253
23	1.579	1.579	1.579	1.579	1.579	1.579	1.473	1.473	1.550	1.421
24	1.742	1.742	1.742	1.742	1.742	1.742	1.647	1.647	1.816	1.652
25	1.922	1.922	1.922	1.922	1.922	1.922	1.905	1.905	2.063	1.939
26	2.120	2.120	2.120	2.120	2.120	2.120	2.313	2.313	2.306	2.156
27	2.339	2.339	2.339	2.339	2.339	2.339	2.810	2.810	3.145	2.938
28	2.580	2.580	2.580	2.580	2.580	2.580	3.629	3.629	3.333	3.719
29	2.846	2.846	2.846	2.846	2.846	2.846	4.000	4.000	.000	.000
30+	3.905	3.905	3.905	3.905	3.905	3.905	5.631	5.631	.000	.000

Table 2.12 *Sebastes marinus* in Division Va, maturity at age.

Age	1983	1984	1985
7	-	-	-
8	-	-	-
9	-	-	-
10	-	-	-
11	-	0.005	0.050
12	0.06	0.055	0.021
13	0.13	0.054	0.083
14	0.26	0.162	0.161
15	0.44	0.284	0.293
16	0.65	0.471	0.474
17	0.84	0.655	0.616
18	0.90	0.801	0.715
19	0.93	0.888	0.806
20	0.97	0.905	0.849
21	1.00	0.955	0.911
22	1.00	0.975	0.939
23	1.00	0.928	0.934
24	1.00	0.978	0.932
25	1.00	1.000	0.946
26	1.00	1.000	0.949
27	1.00	1.000	0.975
28	1.00	1.000	1.000
29	1.00	1.000	1.000
30	1.00	1.000	1.000

Fig. 2.13 Input parameters and log catch ratio residuals from separable VPA.

Title : SEBASTES MARINUS IN FISHING AREAS V AND XIV
At 13.24.33 24 SEPTEMBER 1986
from 77 to 85 on ages 11 to 27
with Terminal F of .528 on age 24 and Terminal S of 1.000

Initial sum of squared residuals was 119.591 and
final sum of squared residuals is 32.235 after 118 iterations

Matrix of Residuals

Years / Ages	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85		WTS
11/12	-1.221	1.078	-.651	-.060	.259	.124	-.076	.547	.000	.302
12/13	-.585	1.474	-1.245	.241	.234	-.257	-.359	.499	.000	.262
13/14	-.331	.820	-1.405	.446	-.067	.065	.013	.459	.000	.316
14/15	.058	.955	-1.112	.224	-.317	-.011	-.007	.210	.000	.367
15/16	-.317	.135	-.901	.820	.200	.194	-.085	-.046	.000	.432
16/17	.511	-.110	.426	.200	-.204	-.146	-.362	-.314	.000	.634
17/18	-.138	-.578	.203	-.065	.154	-.082	.186	.319	.000	.748
18/19	.124	-.165	.289	.234	-.243	-.109	.102	-.232	.000	1.000
19/20	-.191	.057	.777	.231	-.566	-.142	.015	-.180	.000	.543
20/21	-.935	.314	.012	-.955	-.306	.995	.442	.433	.000	.307
21/22	.140	.108	.178	-.080	.022	.302	-.336	-.336	.000	.904
22/23	.214	-.306	.595	.014	-.111	.041	-.390	.145	.000	.810
23/24	.475	.119	.129	-.703	-.232	.297	-.008	-.076	.000	.593
24/25	.561	-.310	-.232	-.196	.670	-.254	-.048	-.192	.000	.547
25/26	-.087	-.920	.255	-.223	.685	-.444	.557	.178	.000	.400
26/27	-.284	-.971	.415	-.401	.600	-.885	1.854	-.328	.000	.229
	.000	.000	.000	.000	.000	.000	.000	.000	.000	
WTS	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		

Fishing Mortalities (F)

	77	78	79	80	81	82	83	84	85
F-values	.4544	.3515	.6380	.5707	.7365	.8602	.8005	.6615	.5280

Selection-at-age (S)

	11	12	13	14	15	16	17
S-values	.0102	.0464	.0604	.0950	.1239	.1457	.1363

	18	19	20	21	22	23	24	25	26	27
S-values	.2421	.2504	.2990	.5541	.4514	.7027	1.0000	1.1209	1.2324	1.0000

Table 2.14 VIRTUAL POPULATION ANALYSIS

SEBASTES MARINUS IN FISHING AREAS V AND XIV

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

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1977-82
11	.002	.005	.004	.009	.012	.014	.017	.018	.008	.008
12	.016	.026	.013	.028	.055	.049	.054	.072	.038	.031
13	.033	.029	.014	.051	.037	.067	.078	.086	.047	.038
14	.063	.057	.036	.080	.067	.072	.093	.104	.071	.062
15	.054	.061	.052	.130	.110	.142	.087	.103	.091	.091
16	.079	.067	.116	.136	.088	.125	.131	.091	.104	.102
17	.045	.034	.132	.063	.141	.117	.127	.151	.094	.089
18	.128	.069	.200	.178	.152	.262	.212	.156	.163	.165
19	.127	.092	.151	.142	.193	.233	.303	.165	.165	.156
20	.063	.146	.188	.070	.170	.542	.313	.331	.192	.197
21	.236	.226	.370	.305	.417	.488	.394	.312	.350	.340
22	.246	.126	.308	.224	.349	.391	.262	.374	.281	.274
23	.398	.244	.482	.276	.417	.767	.538	.475	.431	.451
24	.453	.274	.534	.544	1.126	.809	.842	.618	.607	.623
25	.255	.205	.736	.635	1.022	.937	1.187	.894	.679	.632
26	.432	.183	1.025	.524	1.332	.615	2.592	.697	.748	.685
27	.425	.333	.618	.562	.745	.913	.913	.827	.607	.599
28+	.425	.333	.618	.562	.745	.913	.913	.827	.607	.599
(14-23)U	.144	.112	.203	.160	.210	.314	.246	.226	.194	

Table 2.15 VIRTUAL POPULATION ANALYSIS

SEBASTES MARINUS IN FISHING AREAS V AND XIV

STOCK SIZE IN NUMBERS UNIT: thousands

BIOMASS TOTALS UNIT: tonnes

ALL VALUES ARE GIVEN FOR 1 JANUARY

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
11	269577	242451	308585	210510	205270	157605	149537	198987	291504	0
12	235228	243395	218391	278222	188658	181755	140576	132979	176872	261483
13	174045	209479	214570	195129	244800	161617	156571	120462	111923	154073
14	135259	152352	184157	191451	167780	213499	136765	130981	99968	96622
15	107211	114956	130228	160746	159880	142014	179827	112726	106788	84255
16	81470	91946	97886	111886	127767	129546	111518	149158	91988	88221
17	57687	68113	77778	78906	88397	105823	103416	88527	123203	75012
18	44569	49924	59551	61701	67007	69498	85153	82383	68891	101477
19	30844	35476	42158	44107	46728	52065	48412	62309	63754	52960
20	20731	24573	29288	32794	34626	34870	37302	32351	47781	48913
21	13756	17606	19209	21966	24656	26446	18550	24693	21022	35682
22	11946	13410	12702	12004	14644	16487	14695	11193	16357	13404
23	10606	8452	10698	8445	8682	9351	10094	10228	6965	11174
24	8142	6448	5991	5975	5797	5179	3930	5332	5754	4095
25	5459	4685	4436	3179	3140	1701	2088	1532	2601	2837
26	2381	3829	3454	1923	1524	1022	603	576	567	1194
27	1101	1399	2885	1122	1030	364	500	41	260	243
28+	1367	1080	3316	851	366	167	192	6	108	181
TOTAL NO	1216380	1289571	1425282	1420718	1391753	1309009	1199527	1164464	1236106	
SPS NO	372416	411353	462956	489874	519716	533699	515582	501648	486378	
TOT.BIOM	782569	839837	954684	944863	950643	843684	784471	777660	800708	
SPS BIOM	349833	380736	435144	443521	474016	436356	422402	425704	412517	

Table 2.16

List of input variables for the ICES prediction program.

SEBASTES MARINUS IN AREA V AND XIV
The reference F is the mean F for the age group range from 14 to 23

The number of recruits per year is as follows:

Year	Recruitment
1986	193000.0
1987	193000.0
1988	193000.0
1989	193000.0

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
11	193000.0	.01	.10	.00	.402	.402
12	168122.0	.04	.10	.06	.467	.467
13	140287.0	.05	.10	.15	.531	.531
14	96622.0	.07	.10	.26	.605	.605
15	84255.0	.09	.10	.44	.659	.659
16	88221.0	.10	.10	.69	.718	.718
17	75012.0	.09	.10	.84	.777	.777
18	101477.0	.16	.10	.90	.859	.859
19	52960.0	.16	.10	.95	.952	.952
20	48913.0	.19	.10	.97	1.019	1.019
21	35682.0	.35	.10	1.00	1.140	1.140
22	13404.0	.28	.10	1.00	1.314	1.314
23	11174.0	.43	.10	1.00	1.475	1.475
24	4095.0	.61	.10	1.00	1.705	1.705
25	2337.0	.68	.10	1.00	1.958	1.958
26	1194.0	.75	.10	1.00	2.258	2.258
27	243.0	.61	.10	1.00	2.964	2.964
28	181.0	.61	.10	1.00	3.560	3.560

Table 2.17 Management options for 1987 and 1988 for Sebastes marinus in Sub-areas V + XIV.

1986				Management option for 1987 and 1988	1987				1988			1989	
Stock biom. (11+)	SSB	$\bar{F}_{(14-23)}$	Catch (11+)		Stock biom. (11+)	SSB	$\bar{F}_{(14-23)}$	Catch (11+)	Stock biom. (11+)	SSB	Catch (11+)	Stock biom. (11+)	SSB
745	412	0.19	83	$F_{0.1}$	743	401	0.03	16	812	452	19	879	507
				$F_{87} = F_{85}$			0.19	83	740	391	84	738	383
				$F_{87} = 0.8\ F_{85}$			0.15	68	756	404	71	767	409
				$F_{87} = 1.2\ F_{85}$			0.23	98	725	378	94	711	361
				F_{max}			1.16	322	490	192	168	398	119

Weights in '000 t.

Table 2.18 VIRTUAL POPULATION ANALYSIS

SEBASTES MENTELLA IN FISHING AREAS V AND XIV

CATCH IN NUMBERS UNIT: thousands

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
9	3202	2	321	186	74	3202	64	539	90	20
10	2948	2	656	485	394	5226	181	1197	180	171
11	6533	3	908	647	1359	5651	582	1223	409	341
12	22608	142	1521	1517	7256	10626	3118	5217	3510	1433
13	21121	362	664	1373	5989	5031	3132	7216	2821	1382
14	14107	1438	816	2622	3811	3045	3579	5516	3519	2049
15	5547	1334	1206	2726	3685	6513	4796	9353	6254	4444
16	4431	3411	1577	1980	2422	4812	5835	5181	5489	5222
17	2619	2897	882	1035	1344	1873	3131	2828	2777	3428
18	2841	3722	1581	1565	1405	2856	3652	5427	4453	3675
19	2229	3454	1371	2022	1256	2445	4425	3278	4493	4446
20	541	802	1089	915	1252	1539	4671	4637	4753	4763
21	3625	4884	1688	3133	3398	3003	6140	6193	4434	4736
22	1192	1314	1264	1937	2070	2215	3447	3920	2437	3377
23	4050	3958	2070	1741	2024	2162	4321	4175	2614	3389
24	2403	2172	1388	1449	1419	2151	2415	2546	1192	2707
25	1232	1089	823	842	590	1238	975	2095	589	1390
26	1061	928	506	297	225	472	97	1255	135	439
27	544	480	104	54	121	110	132	289	30	238
28+	331	377	0	0	0	272	0	45	96	72
TOTAL	103165	32771	20435	26526	40094	64442	54691	72130	50075	47722

Table 2.19 VIRTUAL POPULATION ANALYSIS

SEBASTES MENTELLA IN FISHING AREAS V AND XIV

MEAN WEIGHT AT AGE OF THE STOCK UNIT: kilogram

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
9	.260	.260	.260	.260	.260	.260	.260	.260	.380	.346
10	.292	.292	.292	.292	.292	.292	.292	.292	.411	.382
11	.327	.327	.327	.327	.327	.327	.327	.327	.442	.414
12	.367	.367	.367	.367	.367	.367	.367	.367	.529	.486
13	.410	.410	.410	.410	.410	.410	.410	.410	.551	.539
14	.461	.461	.461	.461	.461	.461	.461	.461	.623	.610
15	.516	.516	.516	.516	.516	.516	.516	.516	.660	.662
16	.578	.578	.578	.578	.578	.578	.578	.578	.691	.711
17	.648	.648	.648	.648	.648	.648	.648	.648	.735	.732
18	.726	.726	.726	.726	.726	.726	.726	.726	.803	.845
19	.813	.813	.813	.813	.813	.813	.813	.813	.886	.915
20	.912	.912	.912	.912	.912	.912	.912	.912	.997	.983
21	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.081	1.082
22	1.145	1.145	1.145	1.145	1.145	1.145	1.145	1.145	1.242	1.206
23	1.284	1.284	1.284	1.284	1.284	1.284	1.284	1.284	1.387	1.353
24	1.438	1.438	1.438	1.438	1.438	1.438	1.438	1.438	1.614	1.470
25	1.614	1.614	1.614	1.614	1.614	1.614	1.614	1.614	1.610	1.614
26	1.809	1.809	1.809	1.809	1.809	1.809	1.809	1.809	1.821	1.730
27	2.028	2.028	2.028	2.028	2.028	2.028	2.028	2.028	2.028	1.833
28+	2.028	2.028	2.028	2.028	2.028	2.028	2.028	2.028	1.772	1.872

Table 2.20 Sebastes mentella in Division Va, maturity at age.

Age	1984	1985
7	-	-
8	-	-
9	-	-
10	-	-
11	-	-
12	0.008	0.013
13	0.017	0.021
14	0.055	0.042
15	0.132	0.050
16	0.245	0.217
17	0.405	0.438
18	0.474	0.516
19	0.561	0.577
20	0.615	0.647
21	0.736	0.799
22	0.875	0.895
23	0.979	0.971
24	1.000	0.976
25	1.000	0.996
26	1.000	1.000
27	1.000	1.000
28	1.000	1.000
29	1.000	1.000
30	1.000	1.000

Table 3.1 GREENLAND HALIBUT. Nominal catches (tonnes) in Sub-areas V and XIV, 1976-1985 (as reported to ICES).

Country	1976	1977	1978	1979	1980
Faroe Islands	375	1,251	258	150	1,042
France	-	-	12	70	51
Germany, Fed.Rep.	2,219	5,207	2,726	6,461	2,318
Greenland	1	1	6	-	-
Iceland	1,688	10,090	11,319	16,934	27,838
Norway	7	7[1]	19	1	3
UK (Engl.& Wales)	1,680	19	9	-	-
USSR	74	-	-	-	-
Total	6,044	16,575	14,349	23,616	31,252

Country	1981	1982	1983	1984	1985[2]
Faroe Islands	767	1,532	1,145	2,502	1,012
France	8	27	236	489	-
Germany, Fed.Rep.	3,007	2,581	1,140	936	991
Greenland	+	1	5	15	81
Iceland	15,455	28,300	28,359	30,080	29,195
Norway	2	+	2	2	3
UK (Engl.& Wales)	-	-	-	-	-
USSR	-	-	-	-	-
Total	19,239	32,441	30,887	34,024	32,055

[1] From national statistics.

[2] Provisional data.

Table 3.2 GREENLAND HALIBUT. Nominal catches (tonnes) in Division Vb (as reported to ICES).

Country	1976	1977	1978	1979	1980
Faroe Islands	2	304	2	108	951
France	-	-	12	66	51
Germany, Fed.Rep.	309	341	570	234	172
Norway	7	5[1]	3	1	3
UK (Engl.& Wales)	6	8	8	-	-
Total	324	658	1,177	566	1,032

Country	1981	1982	1983	1984	1985[2]
Faroe Islands	442	863	1,112	2,456	1,012
France	8	27	236	489	673
Germany, Fed.Rep.	114	142	86	118	355
Norway	2	+	2	2	2
UK (Engl.& Wales)	-	-	-	-	-
Total	1,190	1,032	1,436	3,065	2,042

[1] From national statistics.

[2] Provisional data.

Table 3.3 GREENLAND HALIBUT. Nominal catches (tonnes) in Division Va (as reported officially to ICES).

Country	1976	1977	1978	1979	1980
Faroe Islands	373	947	256	42	91
Germany, Fed.Rep.	1,719	4,642	-	-	-
Iceland	1,686	10,090	11,319	16,934	27,836
Norway	-	+	13	+	-
UK (Engl.& Wales)	1,669	-	-	-	-
Total	3,778	15,679	11,588	16,976	27,927

Country	1981	1982	1983	1984	1985[1]
Faroe Islands	325	669	33	46	-
Germany, Fed.Rep.	-	-	-	-	-
Iceland	15,455	28,300	28,359	30,078	29,195
Norway	+	-	+	+	1
UK (Engl.& Wales)	-	-	-	-	-
Total	15,780	32,441	28,392	30,124	29,196

[1] Preliminary data.

Table 3.4 GREENLAND HALIBUT. Nominal catches (tonnes) in Sub-area XIV (as reported to ICES).

Country	1976	1977	1978	1979	1980
France	-	-	-	4	-
Germany, Fed.Rep.	191	224	2,156	6,227	2,146
Greenland	1	1	6	-	-
Iceland	2	-	-	-	2
Norway	-	2[1]	3	-	-
UK (Engl.& Wales)	5	11	1	-	-
USSR	74	-	-	-	-
Total	273	16,575	2,166	6,731	2,148

Country	1981	1982	1983	1984	1985[2]
France	-	-	-	-	-
Germany, Fed.Rep.	2,893	2,439	1,054	818	636
Greenland	+	1	5	15	81
Iceland	-	-	1	2	36
Norway	-	-	-	+	-
UK (Engl.& Wales)	-	-	-	-	-
USSR	-	-	-	-	-
Total	2,893	2,440	1,060	835	753

[1] From national statistics.

[2] Provisional data.

Table 3.5 VIRTUAL POPULATION ANALYSIS

GREENLAND HALIBUT IN FISHING AREAS V AND XIV

CATCH IN NUMBERS UNIT: thousands

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
5	120	43	0	23	29	47	26	8	10	83	128
6	800	296	34	91	197	502	158	300	240	275	451
7	1775	584	671	347	1605	1536	580	1140	1611	886	1038
8	1782	621	1727	1037	2253	2630	1160	2451	2651	2126	2349
9	1259	431	2289	1214	3090	3126	1430	2646	3060	3547	3535
10	926	240	834	848	1693	2324	1764	2456	2443	2783	2817
11	464	121	420	567	880	1739	1299	1803	1693	1814	1489
12	459	86	423	312	394	849	664	963	978	1127	640
13	279	37	174	232	246	578	435	609	424	584	434
14	193	32	120	218	189	306	252	331	174	361	141
15	137	14	28	114	147	143	176	195	37	91	37
16	39	6	86	112	101	82	114	82	17	13	25
17	2	1	41	64	15	29	179	39	15	4	16
18+	44	2	14	28	9	5	28	11	15	3	6
TOTAL	8279	2514	6861	5207	10848	13896	8265	13034	13368	13697	13104

Table 3.6 VIRTUAL POPULATION ANALYSIS

GREENLAND HALIBUT IN FISHING AREAS V AND XIV

MEAN WEIGHT AT AGE OF THE STOCK UNIT: kilogram

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
5	.968	1.157	1.157	.968	.911	1.125	1.071	1.010	.934	.942	.995
6	1.199	1.585	1.046	1.199	.942	1.283	1.257	1.368	1.338	1.275	1.230
7	1.423	1.768	1.429	1.423	1.278	1.487	1.440	1.618	1.577	1.592	1.630
8	1.854	2.180	1.794	1.854	1.676	1.756	1.660	1.905	1.848	1.817	1.951
9	2.256	2.570	2.228	2.256	2.072	2.053	1.967	2.187	2.159	2.240	2.367
10	2.607	3.018	2.687	2.607	2.533	2.279	2.258	2.516	2.434	2.461	2.637
11	3.081	3.730	3.017	3.081	2.723	2.498	2.515	2.761	2.603	2.835	2.829
12	3.591	4.052	3.914	3.591	3.297	3.059	2.950	3.129	3.054	3.262	3.353
13	4.604	4.815	4.040	4.604	3.985	3.783	3.450	3.785	3.784	3.962	4.006
14	4.695	5.348	4.714	4.695	4.668	4.587	4.033	4.475	4.446	4.936	4.792
15	5.151	5.752	5.401	5.151	4.792	5.139	4.652	4.985	4.751	5.230	5.231
16	5.893	6.227	5.054	5.893	5.229	5.633	4.714	5.610	6.209	6.968	6.325
17	6.511	8.484	6.258	6.511	5.739	6.655	6.245	6.632	6.400	7.515	7.379
18+	7.814	9.000	7.000	8.538	6.574	7.814	7.281	7.728	6.571	7.731	7.731

Table 3.7 VIRTUAL POPULATION ANALYSIS

GREENLAND HALIBUT IN FISHING AREAS V AND XIV

PROPORTIONS OF MATURITY

UNIT:

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
5	.000	.000	.000	.000	.000	.000	.000	.000	.037	.000	.000
6	.030	.030	.030	.030	.030	.030	.030	.047	.075	.030	.060
7	.100	.100	.100	.100	.100	.100	.100	.200	.153	.190	.310
8	.350	.350	.350	.350	.350	.350	.350	.326	.280	.320	.270
9	.770	.770	.770	.770	.770	.770	.770	.503	.581	.420	.290
10	.960	.960	.960	.960	.960	.960	.960	.702	.605	.640	.560
11	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.852	.854	.750	.720
12	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.943	.984	.930	.860
13	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.990
14	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
15	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
16	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
17	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
18+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table 3.8 GREENLAND HALIBUT. Effort and catch per unit effort for Icelandic trawlers.

Year	CPUE (t/hr)	Total catch (t)	Total effort (hr)
1977	1.009	16,578	16,430
1978	1.218	14,349	11,781
1979	1.592	23,616	14,834
1980	2.218	31,252	14,090
1981	2.017	19,239	9,538
1982	2.501	32,441	12,971
1983	1.189	30,887	25,977
1984	1.099	34,013	30,949
1985	1.218	32,055	26,317

Table 3.9 Greenland HALIBUT.

Input parameters and log catch ratio residuals from separable VPA.

Sub-areas V, XIV.

```
NATURAL MORTALITY =    .150
       TERMINAL F =    .300
       TERMINAL S =   1.800

       REFERENCE AGE (FOR UNIT SELECTION) IS  9

       NO. OF ITERATIONS CHOSEN IS   30
       MINIMUM DIFFERENCE BETWEEN ITERATIONS IS 10**-5

    ITERATION    SSQ
        1      39.2955
       30       7.2050

 APPROX. COEFF. VARIATION OF CATCH DATA =  29.3 %


YEAR   1978   1979   1980   1981   1982   1983   1984   1985
F(I)  .1412  .2120  .3061  .2121  .3643  .3140  .3830  .3000
S(J)  .2041  .5278 1.0000 1.3854 1.7464 1.7709 2.1226 2.4068 1.8000

LOG CATCH RATIO RESIDUALS

         78/79 79/80 80/81 81/82 82/83 83/84 84/85

 7/ 8  -.733  .573  .628 -.215 -.310  .591 -.556       -.001
 8/ 9  -.336  .325  .546 -.025 -.130  .130 -.511       -.001
 9/10   .037  .518  .081 -.170 -.289  .057 -.256       -.001
10/11   .175  .019 -.103  .153 -.219  .039 -.065       -.001
11/12   .329 -.181 -.005  .211 -.274 -.136  .053       -.001
12/13   .334 -.483 -.168  .108  .049  .078  .081       -.001
13/14   .192 -.451 -.149  .155  .514 -.439  .378       -.001
14/15   .001 -.323 -.834 -.218  .859 -.321  .855       -.001

       -.001 -.002 -.002 -.001 -.001  .000  .000       -.007
```

Table 3.10 VIRTUAL POPULATION ANALYSIS

GREENLAND HALIBUT IN FISHING AREAS V AND XIV

FISHING MORTALITY COEFFICIENT UNIT: Year-1 NATURAL MORTALITY COEFFICIENT = .15

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
5	.005	.002	.000	.001	.001	.002	.001	.000	.000	.001	.001
6	.048	.015	.002	.004	.010	.024	.007	.012	.013	.013	.009
7	.150	.043	.041	.020	.093	.096	.035	.057	.081	.058	.061
8	.259	.068	.162	.079	.164	.204	.092	.177	.174	.139	.202
9	.324	.087	.358	.155	.334	.359	.155	.294	.350	.348	.339
10	.325	.089	.228	.205	.316	.424	.308	.404	.456	.531	.484
11	.142	.060	.209	.226	.320	.582	.420	.556	.508	.688	.571
12	.377	.033	.290	.223	.228	.549	.433	.596	.631	.715	.522
13	.604	.044	.083	.241	.260	.572	.571	.853	.540	.935	.031
14	.287	.118	.185	.135	.299	.559	.496	1.127	.595	1.215	.573
15	.269	.029	.136	.254	.120	.365	.692	.857	.320	.680	.336
16	.669	.016	.231	1.105	.354	.087	.523	.777	.149	.167	.374
17	.269	.029	.136	.254	.381	.153	.260	.320	.289	.045	.301
18+	.269	.029	.136	.254	.381	.153	.260	.320	.289	.045	.301
(8-15)U	.338	.064	.222	.188	.271	.445	.330	.480	.440	.559	.458
(10-17)U	.368	.052	.187	.330	.285	.411	.465	.686	.456	.622	.474

Table 3.11 VIRTUAL POPULATION ANALYSIS

GREENLAND HALIBUT IN FISHING AREAS V AND XIV

STOCK SIZE IN NUMBERS UNIT: thousands

BIOMASS TOTALS UNIT: tonnes

ALL VALUES ARE GIVEN FOR 1 JANUARY

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
5	24503	25631	26430	24745	26916	29939	30337	23231	25833	63061	137907	0
6	18369	20979	22021	22749	21277	23140	25725	26087	19988	22225	54200	118579
7	15698	15069	17782	18922	19496	18130	19452	21995	22175	16981	18875	46233
8	8390	10148	12429	14684	15965	15294	14185	16205	17876	17595	15795	15284
9	4834	5575	8159	9100	11678	11657	10732	11134	11681	12934	13177	9702
10	3496	3041	4599	4910	6710	7199	7148	7914	7159	7229	7859	8081
11	3838	2154	2395	3016	3442	4212	4054	4524	4547	3893	3660	4169
12	1567	2874	1742	1673	2071	2151	2025	2291	2234	2354	1684	1780
13	658	925	2394	1109	1152	1419	1069	1131	1086	1023	991	860
14	830	510	762	1900	740	764	689	520	415	545	546	454
15	622	536	237	545	1433	462	376	361	145	197	139	168
16	85	409	448	178	364	1098	266	162	152	91	86	86
17	9	38	347	306	51	220	869	124	64	98	66	51
18+	200	75	118	134	30	38	156	35	64	73	25	58
TOTAL NO	81149	87764	99665	103971	111325	115723	117062	115715	113379	148300	252809	
SPS NO	19783	20221	25758	28296	32893	34111	32292	30430	27611	27830	26776	
TOT.BIOM	130629	167595	165173	175028	189596	193755	185690	199942	189672	221932	337053	
SPS BIOM	54995	63665	70233	77454	79626	83395	75819	72924	62741	66516	61300	

Table 3.12

List of input variables for the ICES prediction program.

GREENLAND HALIBUT
The reference F is the mean F for the age group range from 8 to 13

The number of recruits per year is as follows:

Year	Recruitment
1986	26000.0
1987	26000.0
1988	26000.0
1989	26000.0

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
5	26000.0	.00	.15	.01	.983	.983
6	22378.0	.01	.15	.07	1.303	1.303
7	19070.0	.06	.15	.21	1.404	1.404
8	15458.0	.17	.15	.30	1.880	1.880
9	9702.0	.31	.15	.40	2.238	2.238
10	8081.0	.44	.15	.63	2.512	2.512
11	4169.0	.56	.15	.70	2.757	2.757
12	1780.0	.58	.15	.93	3.196	3.196
13	860.0	.69	.15	1.00	3.884	3.884
14	454.0	.77	.15	1.00	4.662	4.662
15	168.0	.55	.15	1.00	5.049	5.049
16	86.0	.37	.15	1.00	6.278	6.278
17	51.0	.24	.15	1.00	6.982	6.982
18+	58.0	.24	.15	1.00	7.440	7.440

Table 3.13 Management options for 1987 and 1988 for GREENLAND HALIBUT in Sub-areas V + XIV.

1986				Management option for 1987 and 1988	1987				1988			1989	
Stock biom. (5+)	SSB	$\bar{F}_{(8-13)}$	Catch (5+)		Stock biom. (5+)	SSB	$\bar{F}_{(8-13)}$	Catch (5+)	Stock biom. (5+)	SSB	Catch (5+)	Stock biom. (5+)	SSB
177	59	0.46	28	$F_{0.1}$	177	58	0.17	12	195	71	14	210	82
				$F_{87} = F_{85}$			0.46	28	177	58	28	177	59
				$F_{87} = 0.8\ F_{85}$			0.37	23	183	62	25	186	65
				$F_{87} = 1.2\ F_{85}$			0.55	33	173	55	31	170	53
				F_{max}			1.10	54	150	41	38	141	34

Weights in '000 t.

Table 4.1 Nominal catch (tonnes) of SAITHE in Division Va, 1974-1985. (Data for 1974-1984 from Bulletin Statistique.)

Country	1974	1975	1976	1977	1978	1979
Belgium	2,371	1,638	1,615	1,448	1,092	980
Faroe Islands	1,712	1,366	3,267	3,013	4,250	5,457
France	94	32	51	-	-	-
Germany, Fed.Rep.	18,627	13,820	13,785	10,575	-	-
Iceland	65,169	61,430	56,811	46,973	44,327	57,066
Norway	-	6	5	4	3	1
UK (Engl.& Wales)	8,845	8,643	6,024	13	-	-
UK (Scotland)	731	1,021	443	-	-	-
Total	97,549	87,956	82,001	62,026	49,672	63,504

Country	1980	1981	1982	1983	1984	1985[1]
Belgium	980	532	203	224	269	158
Faroe Islands	4,930	3,545	3,582	2,138	2,044	728
France	-	-	23	-	-	-
Germany, Fed.Rep	-	-	-	-	-	-
Iceland	52,436	54,921	65,124	55,904	60,406	55,135
Norway	1	3	1	+	-	+
UK (Engl.& Wales)	-	-	-	-	-	-
UK (Scotland)	-	-	-	-	-	-
Total	58,347	59,001	68,933	58,299	62,819	56,050

[1] Preliminary.

Table 4.2 Icelandic SAITHE. Calculation of effort during 1977-1985.

Year	CPUE Jan-May (t/hr trawling)	Total landings by trawlers	Total trawler effort (hrs)
1977	0.97	25,089	25,865
1978	1.05	25,027	23,835
1979	1.21	37,104	30,664
1980	1,29	33,256	25,780
1981	1.67	31,059	18,598
1982	1.46	30,448	20,855
1983	1.29	27,706	21,478
1984	1.06	30,924	29,174
1985	1.08	34,796	32,219
1986	1.10	-	-

Table 4.3 VIRTUAL POPULATION ANALYSIS

ICELANDIC SAITHE

CATCH IN NUMBERS UNIT: thousands

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
3	526	329	59	548	480	135	257	486	40	135	188
4	2997	3234	2099	1145	3764	2303	1550	1221	1469	492	2932
5	2479	3045	2858	2435	1991	4634	4310	2526	1344	826	3401
6	1829	2530	1801	1556	3616	2551	5464	4817	2411	1537	1746
7	3496	2154	1036	1275	1566	2419	1504	4361	4366	2456	1547
8	2994	2367	1068	961	718	1612	1470	1375	2407	3367	1469
9	1434	1530	1528	537	292	482	589	1119	460	982	1388
10	710	1064	958	575	669	245	192	343	346	318	501
11	325	295	538	476	589	132	67	65	71	249	149
12	176	191	166	479	439	102	175	37	56	227	82
13	100	94	71	139	150	59	130	38	11	137	71
14	56	68	12	91	72	29	136	37	24	172	75
15+	61	18	49	55	0	23	72	75	42	167	232
TOTAL	17163	16919	12243	10072	14396	14726	15916	16500	13027	11065	13579

Table 4.4 VIRTUAL POPULATION ANALYSIS

ICELANDIC SAITHE

MEAN WEIGHT AT AGE OF THE STOCK UNIT: kilogram

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
3	1.120	1.120	1.120	1.120	1.120	1.445	1.477	1.477	1.865	1.540	1.548
4	1.760	1.760	1.760	1.760	1.760	1.895	2.004	2.004	2.229	2.367	2.092
5	2.730	2.730	2.730	2.730	2.730	2.682	2.574	2.574	3.151	3.319	2.860
6	4.290	4.290	4.290	4.290	4.290	3.871	3.457	3.457	4.199	4.450	3.669
7	5.540	5.540	5.540	5.540	5.540	5.324	4.431	4.431	4.115	5.460	4.632
8	7.270	7.270	7.270	7.270	7.270	6.143	6.156	6.156	5.960	5.194	6.076
9	8.420	8.420	8.420	8.420	8.420	6.848	6.820	6.820	7.509	7.526	5.512
10	9.410	9.410	9.410	9.410	9.410	8.227	8.047	8.047	8.815	8.580	8.300
11	10.000	10.000	10.000	10.000	10.000	9.062	9.409	9.409	9.557	9.315	9.651
12	10.560	10.560	10.560	10.560	10.560	9.299	9.205	9.205	9.557	10.123	10.463
13	11.870	11.870	11.870	11.870	11.870	10.502	9.439	9.439	10.235	10.875	12.764
14	13.120	13.120	13.120	13.120	13.120	11.373	10.146	10.146	9.578	11.223	11.493
15+	14.000	14.000	14.000	14.000	13.120	11.672	10.756	10.756	11.256	13.268	11.974

Table 4.5 VIRTUAL POPULATION ANALYSIS

ICELANDIC SAITHE

PROPORTIONS OF MATURITY

UNIT:

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
3	.000	.000	.000	.000	.000	.000	.000	.000	.030	.080	.020
4	.000	.000	.000	.000	.000	.000	.060	.090	.270	.150	.250
5	.000	.000	.000	.000	.000	.000	.270	.360	.600	.520	.350
6	1.000	1.000	1.000	1.000	1.000	1.000	.630	.560	.550	.830	.580
7	1.000	1.000	1.000	1.000	1.000	1.000	.810	.980	.850	.950	.760
8	1.000	1.000	1.000	1.000	1.000	1.000	.970	.980	.980	.650	.900
9	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.980	1.000	.760
10	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.970	1.000	.970
11	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
12	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
13	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
14	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
15+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table 4.6 Input parameters and log catch ratio residuals from separable VPA.

```
Title : ICELANDIC SAITHE
At 17.07.21  04 SEPTEMBER 1986
from   70 to   85 on ages  3 to 14
with Terminal F of  .360 on age  7 and Terminal S of 1.000

Initial sum of squared residuals was   178.792 and
  final sum of squared residuals is     45.946 after  70 iterations

Matrix of Residuals
```

Years	70/71	71/72	72/73	73/74	74/75
Ages					
3/ 4	.015	-.151	.800	-.902	1.098
4/ 5	.091	-.545	-.062	-.184	.606
5/ 6	.044	.023	-.195	.244	.210
6/ 7	-.004	.053	-.226	.215	-.381
7/ 8	.094	.058	-.127	.080	-.318
8/ 9	-.102	-.116	-.233	-.346	.068
9/10	.250	.250	.080	-.234	-.063
10/11	-.271	-.156	.156	-.283	-.009
11/12	-.340	.273	-.229	.289	.144
12/13	.077	.432	.404	.560	-.534
13/14	.211	-.351	.626	1.050	-.358
	.000	.000	.000	.000	-.001
WTS	1.000	1.000	1.000	1.000	1.000

(cont'd)

Table 4.6 (cont'd)

Years	75/76	76/77	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85		WTS
Ages												
3/ 4	.282	-.098	-.982	.312	.254	-.417	.397	.532	-.149	-.932	-.001	.399
4/ 5	.412	.214	.182	.024	-.049	-.259	-.187	-.099	1.298	-1.441	-.001	.426
5/ 6	.076	.291	.626	-.139	-.412	-.115	-.124	-.255	.291	-.570	.000	.816
6/ 7	-.311	.420	.140	.018	.001	.353	-.013	-.414	.200	-.053	.000	1.000
7/ 8	.062	.052	-.291	.430	-.604	.159	-.312	-.067	.334	.451	.000	.848
8/ 9	.018	-.547	.001	.730	-.508	.346	-.451	.111	.667	.361	.000	.631
9/10	-.237	-.393	.410	-.564	-.609	.379	-.063	.313	.255	.265	.000	.735
10/11	.079	-.456	-.141	-.632	.564	.484	.206	.430	-.054	.082	.000	.735
11/12	.120	-.163	.202	-.255	1.090	-.709	.104	-.164	-1.176	.815	.000	.455
12/13	-.111	-.087	-.609	.069	1.115	-1.000	.705	.116	-1.676	.539	.000	.349
13/14	-.014	1.529	-.700	.456	.988	-1.258	.770	-.300	-2.767	.338	.000	.240
	-.001	-.001	.000	.000	.000	.000	.000	.000	.000	.000	-.005	
WTS	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		

Fishing Mortalities (F)

	70	71	72	73	74	75
F-values	.5829	.5650	.5509	.5064	.4068	.3885

	76	77	78	79	80	81	82	83	84	85
F-values	.4290	.3528	.3233	.4096	.3399	.3447	.3260	.2216	.3134	.3600

Selection-at-age (S)

	3	4
S-values	.0254	.2414

	5	6	7	8	9	10	11	12	13	14
S-values	.4736	.7372	1.0000	1.2567	1.1898	1.2685	1.0047	1.1366	.9143	1.0000

Table 4.7 VIRTUAL POPULATION ANALYSIS

ICELANDIC SAITHE

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

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1979-83
3	.02	.01	.00	.01	.01	.01	.02	.03	.00	.00	.01	.01
4	.18	.17	.09	.07	.10	.06	.08	.10	.13	.02	.09	.09
5	.19	.28	.22	.14	.17	.18	.15	.18	.15	.10	.18	.16
6	.20	.30	.27	.18	.33	.33	.33	.25	.26	.26	.30	.30
7	.34	.38	.19	.31	.28	.38	.33	.49	.37	.45	.45	.37
8	.36	.40	.32	.27	.29	.51	.42	.57	.55	.54	.45	.47
9	.37	.31	.49	.27	.12	.33	.36	.66	.38	.46	.45	.37
10	.43	.52	.33	.34	.63	.14	.21	.36	.43	.49	.45	.36
11	.30	.31	.54	.27	.72	.24	.05	.10	.12	.64	.45	.25
12	.69	.28	.29	.61	.49	.25	.57	.04	.07	.67	.45	.28
13	.35	1.02	.16	.43	.79	.10	.59	.23	.01	.44	.45	.34
14	.38	.45	.33	.32	.41	.34	.34	.33	.22	.31	.45	.33
15+	.38	.43	.33	.32	.41	.34	.34	.33	.22	.31	.45	.33
(4- 9)U	.27	.31	.26	.21	.21	.30	.28	.37	.31	.30	.32	

Table 4.8 VIRTUAL POPULATION ANALYSIS. ICELANDIC SAITHE.

STOCK SIZE IN NUMBERS UNIT: thousands

BIOMASS TOTALS UNIT: tonnes

ALL VALUES ARE GIVEN FOR 1 JANUARY

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
3	28495	33135	23049	51682	54942	27617	17614	17345	34588	45988	20843	0
4	19800	22855	26831	18818	41819	44549	22489	14189	13762	28282	37530	16895
5	15947	13512	15799	20074	14374	30844	34395	17014	10516	9943	22711	28082
6	11206	10824	8325	10363	14241	9975	21080	24277	11655	7399	7396	15531
7	13440	7528	6588	5196	7083	8411	5875	12350	15543	7374	4675	4486
8	10943	7863	4229	4461	3108	4391	4715	3459	6204	8805	3835	2441
9	5091	6270	4314	2505	2788	1900	2151	2541	1601	2925	4195	2002
10	2245	2880	3759	2163	1567	2019	1122	1232	1081	898	1514	2190
11	1394	1201	1405	2217	1254	684	1432	746	701	575	450	790
12	386	849	718	669	1387	501	442	1112	552	510	248	235
13	370	159	524	439	298	697	318	205	677	420	215	129
14	125	213	47	365	235	110	518	144	134	708	221	112
15+	212	56	191	220	0	88	274	295	254	688	701	481
TOTAL NO	109652	107346	95779	119169	143095	131786	112426	94908	97447	114513	104533	
SPS NO	45410	37844	30100	28595	31960	23776	59505	42764	41879	38684	35534	
TOT.BIOM	403379	365880	321962	335215	369326	367408	339994	308842	324278	351550	304120	
SPS BIOM	295082	251658	205794	189409	194950	160445	174204	190871	193180	190034	146546	

	1975-84
3	35446
4	25339
5	18242
6	12934
7	8939
8	5818
9	3208
10	1897
11	1161
12	713
13	451
14	260
15+	226

Table 4.9

List of input variables for the ICES prediction program.

SAITHE-ICELAND
The reference F is the mean F for the age group range from 4 to 9

The number of recruits per year is as follows:

Year	Recruitment
1986	47000.0
1987	47000.0
1988	47000.0
1989	47000.0

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
3	47000.0	.01	.20	.04	1.651	1.651
4	28370.0	.09	.20	.22	2.229	2.229
5	28082.0	.18	.20	.49	3.110	3.110
6	15531.0	.30	.20	.65	4.106	4.106
7	4486.0	.45	.20	.85	4.736	4.736
8	2441.0	.45	.20	.84	5.733	5.733
9	2002.0	.45	.20	.91	6.849	6.849
10	2190.0	.45	.20	.98	8.565	8.565
11	790.0	.45	.20	1.00	9.441	9.441
12	235.0	.45	.20	1.00	10.048	10.048
13	129.0	.45	.20	1.00	11.291	11.291
14	112.0	.45	.20	1.00	10.765	10.765
15+	481.0	.45	.20	1.00	12.166	12.166

Table 4.10 Management options for 1987 and 1988 for ICELANDIC SAITHE in Division Va.

1986				Management option for 1987 and 1988	1987				1988			1989	
Stock biom. (3+)	SSB	$\bar{F}_{(4-9)}$	Catch (3+)		Stock biom. (3+)	SSB	$\bar{F}_{(4-9)}$	Catch (3+)	Stock biom. (3+)	SSB	Catch (3+)	Stock biom. (3+)	SSB
378	181	0.32	62	$F_{0.1}$	404	193	0.15	35	461	234	43	511	272
				$F_{87} = F_{85}$			0.32	68	425	205	72	443	217
				$F_{87} = 0.8\ F_{85}$			0.26	56	438	216	69	466	236
				$F_{87} = 1.2\ F_{85}$			0.38	79	413	196	80	423	200
				F_{max}			0.57	108	381	171	96	374	162

Weights in '000 t.

Table 5.1 SAITHE in Division Vb (Faroe Plateau) in 1981-1985. Catches (tonnes), effort (no. of vessels) and CPUE (t/vessel).

Category	1981			1982			1983		
	Catch (t)	Effort (vessels)	Cpue (t/v)	Catch (t)	Effort (vessels)	Cpue (t/v)	Catch (t)	Effort (vessels)	Cpue (t/v)
Open boats	62	-	-	88	-	-	8	-	-
Long-liners (< 100 GRT)	105	-	-	24	-	-	19	-	-
Long-liners (>100 GRT)	42	-	-	20	16	1	28	20	1
Trawlers (4-1000 HP)	7,375	15	492	3,760	8	470	6,981	8	873
Trawlers (>1000 HP)	11,750	-	-	8,850	14	632	11,870	17	698
Pair trawlers (4-1000 HP)	4,346	13	334	5,527	19	291	6,435	22	293
Pair trawlers (>1000 HP)	3,435	9	382	4,961	9	551	8,450	11	768
Others	2,567	-	-	7,578	-	-	5,172	-	-
Total	29,682			30,808			38,963		

Category	1984			1985		
	Catch (t)	Effort (vessels)	Cpue (t/v)	Catch (t)	Effort (vessels)	Cpue (t/v)
Open boats	75	-	-	94	-	-
Long-liners (< 100 GRT)	27	-	-	22	-	-
Long-liners (>100 GRT)	19	18	1	44	16	3
Trawlers (4-1000 HP)	9,820	7	1,403	3,186	6	531
Trawlers (>1000 HP)	17,759	21	846	13,963	21	665
Pair trawlers (4-1000 HP)	8,556	23	372	11,203	28	400
Pair trawlers (>1000 HP)	11,259	14	804	11,015	14	787
Others	6,829	-	-	4,664	-	-
Total	54,344			44,191		

Table 5.2 COD in Division Vb1 (Faroe area) in 1981-1985. Catches (tonnes), effort (no. of vessels) and CPUE (t/vessel).

Category	1981			1982			1983		
	Catch (t)	Effort (vessels)	Cpue (t/v)	Catch (t)	Effort (vessels)	Cpue (t/v)	Catch (t)	Effort (vessels)	Cpue (t/v)
Open boats	3,092	-	-	1,864	-	-	99	-	-
Long-liners (< 100 GRT)	8,247	-	-	6,016	-	-	3,975	-	-
Long-liners (>100 GRT)	3,078	-	-	1,440	16	90	2,987	20	149
Trawlers (4-1000 HP)	3,023	15	202	3,807	8	476	4,639	8	580
Trawlers (>1000 HP)	2,353	-	-	2,027	14	145	4,791	17	282
Pair trawlers (4-1000 HP)	837	13	64	1,405	19	74	5,358	22	244
Pair trawlers (>1000 HP)	522	9	58	989	9	110	3,550	11	323
Others	1,464	-	-	3,839	-	-	12,517	-	-
Total	22,616			21,387			37,916		

Category	1984			1985		
	Catch (t)	Effort (vessels)	Cpue (t/v)	Catch (t)	Effort (vessels)	Cpue (t/v)
Open boats	235	-	-	5,960	-	-
Long-liners (< 100 GRT)	6,884	-	-	8,351	-	-
Long-liners (>100 GRT)	2,825	18	157	2,562	16	160
Trawlers (4-1000 HP)	4,908	7	701	2,838	6	473
Trawlers (>1000 HP)	4,392	21	209	4,300	21	205
Pair trawlers (4-1000 HP)	4,454	23	194	4,754	28	170
Pair trawlers (>1000 HP)	2,131	14	152	1,994	14	142
Others	11,085	-	-	10,250	-	-
Total	36,914			41,009		

Table 5.3 HADDOCK in Division Vb (Faroe area) in 1981-1985. Catches (tonnes), effort (no. of vessels) and CPUE (t/vessel).

Category	1981			1982			1983		
	Catch (t)	Effort (vessels)	Cpue (t/v)	Catch (t)	Effort (vessels)	Cpue (t/v)	Catch (t)	Effort (vessels)	Cpue (t/v)
Open boats	511	-	-	313	-	-	233	-	-
Long-liners (< 100 GRT)	5,127	-	-	2,946	-	-	3,319	-	-
Long-liners (>100 GRT)	1,272	-	-	902	16	56	1,250	20	63
Trawlers (4-1000 HP)	1,836	15	122	1,729	8	216	1,272	8	159
Trawlers (>1000 HP)	1,323	-	-	1,068	14	76	748	17	44
Pair trawlers (4-1000 HP)	626	13	48	1,149	19	60	2,662	22	121
Pair trawlers (>1000 HP)	295	9	33	774	9	86	1,198	11	109
Others	1,004	-	-	2,991	-	-	2,183	-	-
Total	11,994			11,872			12,865		

Category	1984			1985		
	Catch (t)	Effort (vessels)	Cpue (t/v)	Catch (t)	Effort (vessels)	Cpue (t/v)
Open boats	235	-	-	944	-	-
Long-liners (< 100 GRT)	3,579	-	-	4,771	-	-
Long-liners (>100 GRT)	1,406	18	78	1,547	16	97
Trawlers (4-1000 HP)	906	7	129	678	6	113
Trawlers (>1000 HP)	886	21	42	904	21	43
Pair trawlers (4-1000 HP)	1,917	23	83	1,927	28	69
Pair trawlers (>1000 HP)	637	14	46	686	14	49
Others	2,777	-	-	4,359	-	-
Total	12,343			15,816		

Table 6.1 Nominal catch (t) of SAITHE in Division Vb, 1976-1985. (Data for 1976-1984 from Bulletin Statistique).

Country	1976	1977	1978	1979	1980
Belgium	6	-	-	-	-
Faroe Islands	2,560	5,153	15,892	22,003	23,810
France	15,367	17,038	8,128	2,974	1,110
German Dem.Rep.	-	-	-	-	-
Germany, Fed.Rep.	2,605	3,806	1,088	581	197
Netherlands	232	58	-	-	-
Norway	2,232	1,279	1,124	1,137	62
Poland	1,007	-	-	-	-
Spain	117	-	-	-	-
UK (England & Wales)	3,063	2,613	557	190	13
UK (Scotland)	5,860	5,608	1,349	361	38
USSR	16	-	-	-	-
Total	33,065	34,835	28,138	27,246	25,230

Country	1981	1982	1983	1984	1985[1]
Belgium	-	-	-	-	-
Faroe Islands	29,682	30,808	38,963	54,344	44,191
France	258	130	180	243	865
German Dem.Rep.	-	-	-	-	-
Germany, Fed.Rep.	20	19	28	73	31
Netherlands	-	-	-	-	-
Norway	134	15	5	5	222
Poland	-	-	-	-	-
Spain	-	-	-	-	-
UK (England & Wales)	-	-	-	-	-
UK (Scotland)	9	1	-	-	396
USSR	-	-	-	-	-
Total	30,103	30,973	39,176	54,665	45,705

[1] Preliminary.

Table 6.2

FAROE SAITHE
CATEGORY: TOTAL

CATCH IN NUMBERS UNIT: thousands

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
1	1	0	0	0	0	0	0	0	0	0
2	148	124	20	1	424	0	221	0	0	78
3	3178	1609	611	287	996	411	387	2483	368	1254
4	3217	2937	1743	935	877	1804	4076	1103	11067	4089
5	1720	2034	1736	1341	720	769	994	5052	2559	5720
6	1250	1288	548	1033	673	932	1114	1343	4093	1211
7	877	767	373	584	726	908	380	575	875	1945
8	641	708	479	414	284	734	417	339	273	280
9	468	498	466	247	212	343	296	273	161	105
10	223	338	473	473	171	192	105	98	52	39
11	141	272	407	368	196	92	38	98	65	27
12	96	129	211	206	156	128	56	99	59	73
13	60	80	146	136	261	176	49	25	18	42
14	54	57	95	98	133	310	110	127	25	8
15+	77	64	83	251	236	407	687	289	151	158
TOTAL	12151	10905	7391	6372	6065	7206	8980	11904	19566	15029

Table 6.3

FAROE SAITHE
CATEGORY: TOTAL

MEAN WEIGHT AT AGE IN THE CATCH UNIT: kilogram

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
2	.653	.817	.448	.000	.000	.450	.850	.000	.000	1.075
3	1.088	1.223	1.493	1.220	1.230	1.310	1.337	1.208	1.451	1.401
4	1.676	1.641	2.324	1.880	2.210	2.130	1.851	2.029	1.953	2.032
5	2.878	2.660	3.068	2.620	3.320	3.000	2.951	2.965	2.470	2.965
6	3.081	3.790	3.746	3.400	4.280	3.810	3.577	4.143	3.850	3.596
7	4.287	4.239	4.913	4.180	5.160	4.750	4.947	4.724	5.177	5.336
8	4.352	5.597	4.368	4.950	6.420	5.250	6.243	5.901	6.347	7.202
9	4.790	5.350	5.276	5.690	6.870	5.950	7.232	6.811	7.825	6.966
10	5.912	5.912	5.832	6.380	7.090	6.430	7.239	7.051	6.746	9.862
11	6.619	6.837	6.053	7.020	7.930	7.000	8.346	7.248	8.636	10.670
12	6.619	6.727	6.706	7.620	8.070	7.470	8.345	8.292	8.467	10.461
13	7.311	6.948	7.686	8.150	8.590	8.140	8.956	9.478	8.556	10.202
14	7.806	8.424	7.219	8.640	9.790	8.550	9.584	10.893	11.127	9.644
15+	10.000	10.000	10.000	10.000	10.340	10.100	10.330	10.340	10.748	13.232

Table 6.4 Input parameters and log catch ratio residuals from separable VPA.

Title: FAROE SAITHE. At 12.28.07 10 September 1986 from 60 to 85 on ages 1 to 14 with Terminal F of .550 on age 5 and Terminal S of 1.000

Initial sum of squared residuals was 1771.385 and
final sum of squared residuals is 636.913 after 120 iterations.

Matric of Residuals

Years	60/61	61/62	62/63	63/64	64/65	65/66	66/67	67/68	68/69	69/70	70/71	71/72	72/73	73/74	74/75
Ages															
1/ 2	-5.286	-.720	-4.224	.151	-4.433	-4.067	-5.118	-2.435	-3.549	-6.685	-3.782	-4.563	-7.416	-1.340	-1.472
2/ 3	2.714	1.513	.966	1.152	.693	1.415	.487	1.529	1.510	-.569	1.239	2.213	.263	1.836	-.150
3/ 4	1.747	-.276	1.484	-.174	.668	.306	.026	-.466	-.180	-1.114	-.425	1.846	-.306	-.077	.479
4/ 5	-.576	-.292	.827	-1.160	.353	-.257	-.016	-.405	.086	.176	-.130	.952	-1.556	.175	-.148
5/ 6	-.500	-.107	.478	-.553	.394	-.198	-.022	-.143	-.141	.016	-.110	1.113	-.798	.341	.186
6/ 7	-.009	.163	.181	-.378	.037	-.136	-.197	-.098	-.028	-.078	-.075	-.122	-.099	.205	.530
7/ 8	-.112	.303	.313	-.118	.169	-.032	-.029	.115	-.097	-.123	-.022	-.175	.155	.214	.006
8/ 9	-.145	-.191	-.312	.053	.161	-.002	-.003	.145	.103	.080	.141	-.487	.235	-.083	.090
9/10	-.111	-.192	-.258	.053	-.308	.047	-.146	.023	.016	.309	-.037	-.562	.271	-.261	-.037
10/11	-.165	-.049	.154	.388	-.204	-.073	.193	.231	.089	.481	.215	-.410	.616	.003	-.095
11/12	-.569	.346	-.799	.152	-.253	.274	.273	.116	-.042	.427	-.105	.091	.629	-.071	-.119
12/13	.569	.310	-1.000	.984	-.461	.282	.121	-.078	.252	.006	.410	.728	.817	-.117	-.229
13/14	2.784	-1.118	.513	.701	.349	.704	1.067	-.142	.337	.406	.341	.407	-.253	-1.199	-.493
	.001	.001	.001	.001	.001	.001	.001	.001	.000	.000	.000	.000	.000	.000	.000
WTS	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

(cont'd)

Table 6.4 (cont'd)

Years Ages	75/76	76/77	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85		WTS
1/ 2	-5.046	-2.298	-2.959	.177	-5.959	2.724	-5.329	2.664	2.478	-4.130	-72.616	.073
2/ 3	-.134	.567	1.176	.245	-4.082	3.172	-5.473	.649	-5.335	-6.521	.856	.081
3/ 4	.101	.887	.543	.335	-.450	.373	-1.692	-.186	-.849	-1.744	.856	.232
4/ 5	.561	.613	.491	.360	.261	.419	.497	-.069	-.861	.557	.856	.345
5/ 6	.702	.145	.973	.313	.383	-.283	-.798	-.489	-.244	.198	.856	.425
6/ 7	.278	.239	.794	-.375	-.061	-.432	.356	.359	-.148	.150	.856	.757
7/ 8	-.045	-.053	.008	-.434	.289	-.162	.218	-.206	.149	.526	.856	1.000
8/ 9	-.105	-.008	-.038	.339	.245	-.333	.355	.110	.156	.349	.856	.975
9/10	-.251	.039	-.431	-.364	-.083	-.070	.605	.768	1.046	.789	.856	.523
10/11	-.218	-.458	-.641	-.071	.458	.479	.232	-.239	-.170	.059	.856	.656
11/12	.267	-.077	-.107	.452	.528	.373	.036	-.342	.008	-.635	.856	.577
12/13	-.014	-.304	-.808	-.110	-.888	-.485	.183	.276	.897	-.483	.856	.384
13/14	-.288	-.140	-.557	.147	-.328	-.237	.005	-1.173	-.483	.319	.856	.255
	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-62.344	
WTS	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		

Fishing Mortalities (F)

	60	61	62	63	64	65				
F-values	.1172	.0761	.0839	.1108	.1455	.1803				
	66	67	68	69	70	71	72	73	74	75
F-values	.1955	.1678	.1519	.2237	.2014	.1543	.3257	.3012	.2441	.1971
	76	77	78	79	80	81	82	83	84	85
F-values	.1749	.2028	.1959	.2179	.2223	.3159	.3155	.4225	.4699	.5500

Selection-at-age (S)

	1	2	3	4						
S-values	.0010	.0129	.2680	.6936						
	5	6	7	8	9	10	11	12	13	14
S-values	1.0000	1.1112	1.1253	1.1204	1.1227	1.0929	1.0897	1.2061	.9568	1.0000

Table 6.5

FAROE SAITHE

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

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2	.01	.01	.00	.00	.01	.00	.01	.00	.00	.01
3	.20	.15	.09	.04	.10	.01	.04	.07	.02	.15
4	.35	.29	.24	.19	.17	.26	.19	.15	.51	.38
5	.31	.40	.28	.30	.22	.22	.22	.37	.55	.55
6	.32	.40	.18	.26	.24	.50	.55	.52	.59	.61
7	.17	.33	.19	.29	.30	.59	.39	.62	.78	.62
8	.14	.20	.35	.34	.22	.57	.59	.71	.68	.62
9	.09	.16	.19	.31	.29	.45	.47	1.02	.92	.62
10	.09	.08	.22	.30	.36	.46	.24	.28	.54	.60
11	.10	.15	.14	.27	.20	.34	.40	.36	.30	.60
12	.10	.13	.17	.10	.17	.19	.36	1.08	.39	.66
13	.15	.12	.21	.15	.17	.30	.10	.27	.58	.53
14	.17	.20	.20	.22	.22	.32	.32	.42	.47	.55
15+	.17	.20	.20	.22	.22	.32	.32	.42	.47	.55
(4- 8)U	.26	.32	.25	.28	.23	.42	.39	.47	.62	.56

Table 6.6

FAROE 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	11896	11972	17523	49166	16463	59341	26445	14781	10562	0	0
2	15600	9739	9801	14346	40254	13479	48584	21651	12102	8648	0
3	19164	12639	7861	8007	11745	32574	11035	39578	17727	9908	7010
4	11850	12829	8898	5885	6296	8718	26298	8686	30163	14181	6982
5	7119	6813	7865	5717	3973	4365	5515	17861	6117	14783	7940
6	5046	4283	3753	4877	3475	2609	2882	3621	10087	2897	6983
7	6306	3008	2351	2579	3064	2240	1301	1362	1761	4597	1289
8	5276	4373	1774	1589	1586	1856	1021	724	601	662	2025
9	6106	3742	2943	1022	929	1043	862	463	290	248	291
10	2863	4577	2615	1990	615	570	547	441	137	94	109
11	1571	2143	3442	1715	1204	550	295	353	273	65	42
12	1089	1159	1509	2452	1073	809	204	162	201	165	29
13	483	805	853	1046	1821	738	547	117	45	112	70
14	370	341	587	550	733	1256	446	404	73	21	54
15+	528	383	513	1409	1502	1649	2787	919	441	408	203
TOTAL NO	95268	78806	72266	102349	94539	131597	128769	111122	90581	56789	
SPS NO	36757	31628	28182	24945	19781	17485	16407	26426	20027	24052	
TOT.BIOM	212410	197877	171789	147636	147670	162495	196415	169269	164343	147362	
SPS BIOM	161511	153412	134981	126803	119309	95188	91687	103836	80067	95369	

Table 6.7

List of input variables for the ICES prediction program.

PREDICTION FAROE SAITHE
The reference F is the mean F for the age group range from 4 to 8

The number of recruits per year is as follows:

Year	Recruitment
1986	22564.0
1987	22564.0
1988	22564.0
1989	22564.0

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
3	22564.0	.05	.20	.00	1.347	1.347
4	6982.0	.26	.20	.00	2.005	2.005
5	7940.0	.36	.20	1.00	2.800	2.800
6	6983.0	.68	.20	1.00	3.863	3.863
7	1239.0	.68	.20	1.00	5.079	5.079
8	2025.0	.80	.20	1.00	6.483	6.483
9	291.0	.83	.20	1.00	7.201	7.201
10	109.0	.42	.20	1.00	7.886	7.886
11	42.0	.48	.20	1.00	8.851	8.851
12	29.0	.69	.20	1.00	9.073	9.073
13	70.0	.30	.20	1.00	9.412	9.412
14	54.0	.45	.20	1.00	10.555	10.555
15+	203.0	.45	.20	1.00	11.440	11.440

Table 6.8 Management options for 1987 and 1988 for SAITHE in the Faroe area (Divison Vb).

1986				Management option for 1987 and 1988	1987				1988			1989	
Stock biom. (3+)	SSB	$\bar{F}_{(4-8)}$	Catch (3+)		Stock biom. (3+)	SSB	$\bar{F}_{(4-8)}$	Catch (3+)	Stock biom. (3+)	SSB	Catch (3+)	Stock biom. (3+)	SSB
120	76	0.56	35	$F_{0.1}$	123	57	0.19	13	152	85	16	180	113
				$F_{87} = F_{85}$			0.56	32	129	64	32	138	72
				$F_{87} = 0.8\ F_{85}$			0.44	27	135	69	29	148	82
				$F_{87} = 1.2\ F_{85}$			0.67	37	124	58	34	129	64
				F_{max}			0.41	25	137	71	27	152	86

Weights in '000 t.

Table 7.1 Faroe Plateau COD. Nominal catches by countries 1974-1985 (t). (Data for 1974-1984 from Bulletin Statistique.)

Year	Faroe Islands	France	Germany Fed.Rep.	Norway	Poland	UK England	UK Scotland	Others	Total
1974	12,541	567[1]	292	446	320	2,879	7,516	20	24,581
1975	22,608	1,531	408	1,353	432	2,538	7,815	90	36,775
1976	28,502	1,535	247	1,282	496	2,179	5,491	67	39,799
1977	28,177	1,450[1]	332[3]	864	-	811	3,291	2	34,927
1978	24,076	213[1]	71[3]	245	-	518	1,460	2	26,585
1979	21,774	117[1]	23[3]	274	-	263	661	-	23,112
1980	19,966	40[1]	-[3]	127	-	13	367	-	20,513
1981	22,616	47	-[3]	240	-	-	60	-	22,963
1982	21,387	10	-	90	-	-	2	-	21,489
1983	37,916	13	128	76	-	-	-[4]	-	38,133
1984	36,914[2]	34[2]	9	22[2]	-	-	-[4]	-	36,979
1985	41,009[2]	76[2]	5	48[2]	-	-	-[4]	-	41,138

[1] Sub-division Vb_2 included.

[2] Preliminary.

[3] Working Group Data.

[4] Included in Sub-division Vb_2.

Table 7.2 Faroe Bank COD. Nominal catches by countries, 1974-1985 (t). (Data for 1974-1984 from Bulletin Statistique.)

Year	Faroe Islands	France	Germany Fed.Rep.	Norway	Poland	UK England	UK Scotland	Others	Total
1974	696	-[1]	-	-	-	829	503	40	2,068
1975	378	81	50	-	-	749	804	55	2,117
1976	457	72	+	1	-	877	912	11	2,330
1977	851	219[1]	-	99	-	9	780	-	1.958
1978	4,194	-[1]	-	183	-	2	1,071	-	5,450
1979	1,273	-[1]	-	33	-	-	677	-	1,983
1980	724	-[1]	-	54	-	85	340	-	1,203
1981	975	-	-	120	-	-	134	-	1,229
1982	2,184	-	-	16	-	-	152[3]	-	2,352
1983	2,284	-	-	17	-	-	66[3]	-	2,367
1984	2,189[2]	-	-	11[2]	-	-	16[3]	-	2,216
1985	2,990[2]	-	-	24[2]	-	-	20[3]	-	3,034

[1] Catches included in Sub-division Vb_1.

[2] Preliminary.

[3] Catches including Sub-division Vb_1.

Table 7.3 SUM OF PRODUCTS CHECK

COD IN THE FAROE PLATEAU

CATCH IN NUMBERS UNIT: thousands

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
1	18	31	160	19	41	16	5	80	37	0
2	1497	425	555	575	1129	646	1139	2149	4396	1038
3	4158	3282	1219	1732	2263	4137	1965	5771	5234	9877
4	3799	6844	2643	1673	1461	1981	3073	2760	3487	3955
5	1380	3718	3216	1001	895	947	1286	2746	1461	1739
6	1427	788	1041	1906	807	582	471	1204	912	802
7	617	1160	268	493	852	487	314	510	514	908
8	273	239	201	134	339	527	169	157	82	321
9	120	134	66	87	42	123	254	104	54	68
10+	186	9	56	38	18	55	122	102	66	83
TOTAL	15475	16630	9425	8258	7827	9501	8798	15583	16023	18791

Table 7.4 SUM OF PRODUCTS CHECK

COD IN THE FAROE PLATEAU
CATEGORY: TOTAL

MEAN WEIGHT AT AGE IN THE CATCH UNIT: kilogram

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
1	.380	.380	.394	.495	.430	.750	.715	.690	.743	.743
2	1.060	.680	1.112	.897	.927	1.080	1.280	1.338	1.195	.935
3	1.890	1.170	1.585	1.682	1.432	1.470	1.415	1.950	1.888	1.658
4	2.920	1.871	2.140	2.211	2.220	2.180	2.138	2.403	2.980	2.626
5	4.070	2.667	3.125	3.052	3.105	3.210	3.107	3.107	3.679	3.400
6	5.300	3.588	4.363	3.642	3.539	3.700	4.012	4.110	4.470	3.752
7	6.580	4.768	5.927	4.719	4.392	4.240	5.442	5.020	5.488	4.220
8	7.850	5.918	6.348	7.272	6.100	4.430	5.563	5.601	6.466	4.739
9	9.030	5.448	8.715	8.568	7.603	6.690	5.216	8.013	6.628	6.511
10+	10.270	6.003	12.299	13.042	9.668	10.000	6.707	8.031	10.981	10.981

Table 7.5 Input parameters and log catch ratio residuals from separable VPA.
Title: COD in the Faroe Plateau.
At 09.15.13 06 September 1986 from 61 to 85 on ages 1 to 9
with Terminal F of .480 on age 4 and Terminal S of 1.000.

Initial sum of squared residuals was 391.498 and
final sum of squared residuals is 44.977 after 64 iterations.

Matrix of Residuals

Years / Ages	61/62	62/63	63/64	64/65
1/ 2	1.281	.880	2.006	.740
2/ 3	.717	.580	.856	.231
3/ 4	.253	.162	.154	-.057
4/ 5	-.403	-.182	.032	-.011
5/ 6	-.243	.102	-.201	-.096
6/ 7	-.205	-.211	-.308	.117
7/ 8	.001	-.666	-.202	.241
8/ 9	.019	-.078	-.909	-.651
	.000	.000	.001	.001
WTS	1.000	1.000	1.000	1.000

Years / Ages	65/66	66/67	67/68	68/69	69/70	70/71	71/72	72/73	73/74	74/75
1/ 2	.473	-.703	.266	-.478	.651	.470	.234	-.028	.395	.742
2/ 3	.478	.042	.058	.090	.190	.131	-.564	-.439	.214	.076
3/ 4	.143	-.030	-.097	-.091	-.059	.250	-.212	-.321	.466	-.351
4/ 5	.085	-.210	-.460	.191	.000	.185	-.060	-.117	.218	-.257
5/ 6	.136	-.091	-.176	.182	-.097	-.318	-.276	.061	-.212	-.048
6/ 7	-.148	.081	.078	-.004	-.184	-.113	.349	.775	-.635	.425
7/ 8	-.616	.280	.279	.004	-.249	.006	.401	.302	.013	.398
8/ 9	-.574	.562	1.019	-.603	.470	-.197	.760	-.377	-.213	-.192
	.002	.002	.002	.002	.003	.003	.003	.002	.001	.001
WTS	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

(cont'd)

Table 7.5 (cont'd)

Years	75/76	76/77	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85		WTS
Ages												
1/ 2	.059	-.176	-.527	1.433	-1.399	.015	-1.591	-2.747	-1.599	-.391	.007	.165
2/ 3	.353	.210	-.669	-.382	-.637	-.481	-.390	-.307	-.482	.130	.005	.405
3/ 4	.349	-.407	-.312	-.438	.029	.079	.147	.077	.030	-.301	.005	.714
4/ 5	.138	-.153	-.046	.131	.238	.134	.036	.267	-.190	.441	.004	.808
5/ 6	-.009	.240	.320	.018	.163	-.003	.168	.078	.113	.193	.004	1.000
6/ 7	-.213	-.161	.077	.203	.269	.035	.050	-.116	.297	-.455	.004	.587
7/ 8	-.661	.338	.489	-.104	-.439	-.266	.237	.425	.519	-.724	.004	.444
8/ 9	-.224	.168	.092	.090	.395	.339	-.044	.284	.308	-.439	.004	.376
	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.038	
WTS	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		

Fishing Mortalities (F)

	61	62	63	64	65
F-values	.6813	.5991	.4856	.4105	.3958

	66	67	68	69	70	71	72	73	74	75
F-values	.3435	.3380	.3477	.3657	.2693	.2619	.2403	.2485	.2422	.3166

	76	77	78	79	80	81	82	83	84	85
F-values	.3390	.4447	.3069	.3014	.2878	.2999	.2829	.5205	.3804	.4800

Selection-at-age (S)

	1	2	3	4	5	6	7	8	9
S-values	.0119	.2314	.7031	1.0000	1.1964	1.3126	1.4367	1.2087	1.0000

Table 7.6 VIRTUAL POPULATION ANALYSIS

COD IN THE FAROE PLATEAU

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	.09	.05	.06	.04	.05	.05	.06	.09	.13	.11
3	.16	.30	.19	.26	.22	.27	.21	.45	.35	.48
4	.35	.44	.42	.42	.36	.31	.33	.49	.54	.48
5	.53	.70	.39	.48	.42	.42	.33	.54	.53	.57
6	.48	.66	.42	.42	.48	.54	.38	.60	.35	.63
7	.65	.93	.50	.36	.32	.60	.64	.93	.30	.69
8	.47	.58	.40	.50	.46	.35	.43	.78	.36	.58
9	.54	.44	.31	.30	.29	.30	.28	.52	.38	.58
10+	.34	.44	.31	.30	.29	.30	.28	.52	.38	.58
(3- 8)U	.44	.60	.39	.41	.38	.41	.39	.63	.40	.57

Table 7.7 VIRTUAL POPULATION ANALYSIS

COD IN THE FAROE PLATEAU

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	12260	13294	19717	30466	18291	27664	52155	48308	13445	0	0
2	18727	10021	10856	15999	24926	14939	22635	26322	39479	10974	0
3	30158	13982	7821	8387	12579	19389	11648	17504	19612	28360	8049
4	14050	20945	8498	5306	5509	8262	12154	7767	9157	11356	14368
5	5675	8091	11011	4586	2843	3055	4984	7189	3886	4575	5753
6	4099	1773	3504	6129	2320	1525	1655	2925	3428	1874	2026
7	1401	2077	747	1772	3308	1176	727	916	1518	1987	817
8	798	596	669	372	1008	1961	528	315	296	797	816
9	453	409	274	367	184	521	1152	280	118	169	365
10+	710	27	233	160	79	233	544	275	229	206	172
TOTAL NO	86336	71214	65131	75543	70848	78705	88141	111802	90967	60098	
SPS NO	25191	33919	24736	18691	15052	16714	21704	19668	18432	20764	
TOT.BIOM	185149	167930	111610	107753	100652	118270	132897	166526	163542	124204	
SPS BIOM	104641	125829	80937	64275	51007	52887	64476	63843	69548	67251	

Table 7.8

List of input variables for the ICES prediction program.

FAROE COD PRED. NO 1
The reference F is the mean F for the age group range from 5 to 8

The number of recruits per year is as follows:

Year	Recruitment
1986	23000.0
1987	23000.0
1988	23000.0
1989	23000.0

Data are printed in the following units:

Number of fish:	tnousands
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	23000.0	.00	.20	.00	.723	.723
2	18831.0	.11	.20	.00	1.179	1.179
3	8049.0	.30	.20	.00	1.727	1.727
4	14363.0	.58	.20	1.00	2.537	2.537
5	5755.0	.63	.20	1.00	3.323	3.323
6	2026.0	.65	.20	1.00	4.086	4.086
7	817.0	.69	.20	1.00	5.043	5.043
8	816.0	.58	.20	1.00	5.592	5.592
9	565.0	.58	.20	1.00	6.592	6.592
10+	172.0	.48	.20	1.00	9.175	9.175

Table 7.9 Management options for 1987 and 1988 for Faroe Plateau COD (Sub-division Vb_1).

1986				Management option for 1987 and 1988	1987				1988			1989	
Stock biom. (1+)	SSB	$\bar{F}_{(3-8)}$	Catch		Stock biom. (1+)	SSB	$\bar{F}_{(3-8)}$	Catch	Stock biom. (1+)	SSB	Catch	Stock biom. (1+)	SSB
129	77	0.57	37	$F_{0.1}$	118	56	0.19	12	136	72	15	152	87
				$F_{87} = F_{85}$			0.57	31	114	52	29	112	50
				$F_{87} = 0.8\ F_{85}$			0.46	26	120	57	26	122	58
				$F_{87} = 1.2\ F_{85}$			0.69	36	109	47	31	105	43
				F_{max}			0.42	24	122	59	25	125	62

Weights in '000 t.

Table 8.1 Faroe Plateau HADDOCK. Nominal catches by countries, 1974-1985 (t). (Data for 1974-1984 from Bulletin Statistique.)

Year	Faroe Islands	France	Germany Fed.Rep.	Norway	Poland	UK England	UK Scotland	Others	Total
1974	4,538	1,461[1]	70	5	685	1,044	5,572	30	13,405
1975	8,625	2,173	120	56	544	1,505	4,896	383	18,302
1976	12,670	2,472	22	20	448	1,551	6,671	181	24,035
1977	19,806	623	49	46	5	707	3,278	26	24,540
1978	15,539	71[1]	8	91	-	48	367	-	16,124
1979	11,259	50[1]	2	39	-	35	212	-	11,597
1980	13,633	31[1]	4	9	-	6	434	6	14,123
1981	10,891	113	+	20	-	-	85	-	11,109
1982	10,319	2	1	12	-	-	1[3]	-	10,335
1983	11,898	2	+	12	-	-	-[3]	-	11,912
1984	11,418	20	+	10	-	-	-[3]	-	11,448
1985	14,325[2]	-	+	21[2]	-	-	-[3]	-	14,346

[1] Catches including Sub-division Vb_2.

[2] Preliminary.

[3] Catches included in Sub-division Vb_2.

Table 8.2 Faroe Bank HADDOCK. Nominal catches by countries, 1974-1985 (t). (Data for 1974-1984 from Bulletin Statistique.)

Year	Faroe Islands	France	Germany Fed.Rep.	Norway	Poland	UK England	UK Scotland	Others	Total
1974	273	-[1]	-	-	-	573	500	22	1,368
1975	132	125	53	-	-	921	1,182	-	2,413
1976	44	70	+	-	-	733	1,329	-	2,176
1977	273	77	-	11	-	4	650	-	1,015
1978	2,643	-[1]	-	39	-	-	394	-	3,076
1979	716	-[1]	-	-	-	-	105	-	821
1980	690	-[1]	-	8	-	152	43	-	893
1981	1,103	-	-	7	-	-	14	-	1,124
1982	1,553	-	-	1	-	-	48[3]	-	1,602
1983	967	-	-	2	-	-	13[3]	-	982
1984	925	-	-	5	-	-	+[3]	-	930
1985	1,491[2]	-	-	3[2]	-	-	20[3]	-	1,514

[1] Catches included in Sub-division Vb_1.

[2] Preliminary.

[3] Catches including Sub-division Vb_1.

Table 8.3 VIRTUAL POPULATION ANALYSIS

HADDOCK IN THE FAROE REGION

CATCH IN NUMBERS UNIT: thousands

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
1	58	0	0	1	0	0	0	0	25	0
2	4396	255	32	1	143	74	539	441	1195	1032
3	7858	4039	1022	1161	58	455	934	1969	1561	4768
4	6798	5168	4248	1754	3724	202	784	383	2462	2300
5	1251	4918	4054	3341	2583	2586	298	422	147	1300
6	1139	2128	1841	1850	2496	1354	2182	93	254	177
7	298	946	717	772	1568	1559	973	1444	42	95
8	720	443	655	212	660	608	1166	740	861	64
9	258	731	243	155	99	177	1283	947	388	527
10+	318	855	312	74	86	36	214	795	968	1020
TOTAL	23124	19483	13104	9321	11417	7051	8373	7234	7883	11283

Table 8.4 VIRTUAL POPULATION ANALYSIS

HADDOCK IN THE FAROE REGION

MEAN WEIGHT AT AGE OF THE STOCK UNIT: kilogram

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
1	.300	.000	.000	.000	.000	.000	.000	.000	.359	.359
2	.470	.311	.357	.357	.643	.452	.700	.700	.681	.528
3	.730	.633	.790	.672	.713	.725	.896	.896	1.011	.859
4	1.130	1.044	1.035	.894	.941	.957	1.150	1.150	1.255	1.391
5	1.550	1.426	1.398	1.156	1.157	1.237	1.444	1.444	1.812	1.777
6	1.970	1.852	1.870	1.590	1.493	1.651	1.498	1.498	2.061	2.326
7	2.410	2.241	2.350	2.070	1.739	2.053	1.829	1.829	2.059	2.440
8	2.760	2.205	2.597	2.525	2.095	2.406	1.887	1.887	2.137	2.401
9	3.070	2.570	3.014	2.696	2.465	2.725	1.961	1.961	2.368	2.552
10+	3.550	2.591	2.920	3.519	3.310	3.250	2.856	2.856	2.686	2.686

Table 8.5 Input parameters and log catch ratio residuals from separable VPA.

Title: HADDOCK in the Faroe region at 21.19.45 09 September 1986
from 61 to 85 on ages 1 to 9 with Terminal F of .360 on age 5 and Terminal S of 1.000

Initial sum of squared residuals was 774.540 and
final sum of squared residuals is 151.431 after 58 iterations.

Matrix of Residuals

Years Ages	61/62	62/63	63/64	64/65						
1/ 2	1.872	1.278	1.897	.722						
2/ 3	.518	1.079	1.273	.420						
3/ 4	.121	.307	.195	.177						
4/ 5	-.028	-.087	-.104	.232						
5/ 6	-.378	-.400	-.435	.022						
6/ 7	-.376	-.432	-.465	-.202						
7/ 8	.100	.034	-.011	-1.563						
8/ 9	.029	-.021	.035	.431						
	.004	.005	.006	.007						
WTS	1.000	1.000	1.000	1.000						
Years Ages	65/66	66/67	67/68	68/69	69/70	70/71	71/72	72/73	73/74	74/75
1/ 2	.673	1.103	-.219	.390	1.053	1.511	1.367	-.369	1.484	.123
2/ 3	.060	.042	.130	.977	.204	.085	-.686	-1.440	.726	.349
3/ 4	-.412	-.126	-.155	-.092	-.171	-.154	-.164	.924	.222	-.055
4/ 5	-.228	.067	.002	.059	.166	-.027	-.197	-.309	-.039	.192
5/ 6	-.487	-.156	-.254	-.384	-.623	-.376	.397	.497	.138	-.130
6/ 7	-.518	-.281	-.019	-.242	-.500	-.180	-.051	-.510	-.251	.290
7/ 8	.270	.242	.334	.205	.286	.721	.674	.696	-.468	-.256
8/ 9	2.013	-.007	.224	-.139	.518	-.247	-.391	-.044	-.551	-.900
	.009	.002	-.002	-.009	-.016	-.025	-.035	-.042	-.041	-.026
WTS	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

(cont'd)

Table 8.5 (cont'd)

Years / Ages	75/76	76/77	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85		WTS
1/ 2	.493	2.241	-1.798	1.648	-.282	-2.465	-3.764	-4.301	-5.277	.575	-.046	.092
2/ 3	1.185	1.301	-.342	-2.559	-2.312	-.049	-.682	-.190	-.137	-.088	-.039	.189
3/ 4	.356	.579	-.058	-.554	-.470	-1.111	.213	.860	-.231	-.236	-.055	.428
4/ 5	.237	.005	-.244	-.250	-.164	.016	-.116	.072	.436	.277	-.033	1.000
5/ 6	.002	-.712	.035	.435	.651	.454	.570	.746	.197	-.422	-.053	.417
6/ 7	-.322	.054	.748	.530	.531	.260	.718	-.030	.379	.637	-.032	.461
7/ 8	-1.044	-.766	-.137	.685	.331	.559	.483	-.581	-.111	-.897	-.052	.315
8/ 9	-.625	-.596	-.149	.660	.727	.701	-.741	-.631	-.167	-.162	-.033	.300
	-.004	.014	.022	.020	.011	.003	-.002	-.004	-.003	-.001	-.283	
WTS	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		

Fishing Mortalities (F)

F-values	61 .6649	62 .7460	63 .7825	64 .5568	65 .5672					
F-values	66 .5109	67 .4009	68 .4461	69 .5319	70 .4581	71 .4301	72 .3777	73 .3279	74 .1859	75 .1123
F-values	76 .1182	77 .1201	78 .1024	79 .0855	80 .1487	81 .1515	82 .3087	83 .3011	84 .2999	85 .3600

Selection-at-age (S)

S-values	1 .0020	2 .1532	3 .6517	4 1.0149	5 1.0000	6 1.1398	7 1.3331	8 1.2960	9 1.0000

Table 8.6 VIRTUAL POPULATION ANALYSIS

HADDOCK IN THE FAROE REGION

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

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1976-85
1	.001	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000
2	.092	.011	.001	.001	.038	.023	.038	.033	.042	.055	.033
3	.193	.114	.057	.048	.040	.164	.449	.190	.157	.235	.165
4	.373	.188	.169	.130	.213	.191	.467	.335	.384	.365	.281
5	.201	.508	.220	.194	.286	.225	.475	.496	.207	.360	.317
6	.194	.614	.361	.148	.218	.239	.301	.265	.570	.410	.332
7	.068	.233	.430	.252	.180	.205	.270	.333	.183	.480	.264
8	.087	.136	.242	.217	.356	.098	.233	.340	.340	.467	.252
9	.118	.120	.102	.086	.149	.151	.309	.301	.300	.360	.200
10+	.118	.120	.102	.086	.149	.151	.309	.301	.300	.360	.200
(3- 8)U	.186	.299	.247	.165	.216	.187	.366	.326	.307	.386	
(1-10)U	.144	.204	.169	.116	.163	.145	.285	.259	.248	.309	

Table 8.7 VIRTUAL POPULATION ANALYSIS

HADDOCK IN THE FAROE REGION

STOCK SIZE IN NUMBERS UNIT: thousands

BIOMASS TOTALS UNIT: tonnes

ALL VALUES, EXCEPT THOSE REFERRING TO THE SPAWNING STOCK ARE GIVEN FOR 1 JANUARY; THE SPAWNING STOCK DATA REFLECT THE STOCK SITUATION AT SPAWNING TIME, WHEREBY THE FOLLOWING VALUES ARE USED: PROPORTION OF ANNUAL F BEFORE SPAWNING: .330
PROPORTION OF ANNUAL M BEFORE SPAWNING: .330

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1976-85
1	30923	40811	2420	5133	4319	19371	18186	38937	25992	0	0	18609
2	53185	25283	33413	1981	4202	3536	15859	14889	31879	21258	0	20749
3	49193	41217	20470	27328	1621	3311	2826	12498	11792	25021	16473	19528
4	23974	33200	30104	15837	21326	1275	2501	1478	8459	8248	16195	14620
5	7563	13525	22528	20820	11385	14108	862	1181	866	4716	4688	9755
6	7394	5065	6668	14796	14038	6999	9224	439	589	577	2694	6579
7	5042	4984	2244	3806	10447	9247	4512	5590	276	273	313	4642
8	9487	3859	3229	1194	2422	7141	6167	2819	3280	188	138	3979
9	2552	7118	2760	2072	787	1390	5298	4000	1643	1912	96	2953
10+	3146	8326	3544	989	684	283	884	3358	4100	3700	3206	2901
TOTAL NO	194459	183388	127380	93957	71230	66660	66121	85189	88876	65893		
SPS NO	94547	102621	80932	77959	54574	38424	27073	26826	26528	37946		
TOT.BIOM	181845	156824	135547	100786	85500	75097	64146	58661	78843	69809		
SPS BIOM	129079	129627	108646	89390	72051	64735	44948	40993	40667	49384		

Table 8.8

List of input variables for the ICES prediction program.

HADDOCK IN THE FAROE AREA
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	37000.0
1987	37000.0
1988	37000.0
1989	37000.0

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	37000.0	.00	.20	.00	.339	.339
2	30295.0	.05	.20	.00	.595	.595
3	16427.0	.24	.20	1.00	.877	.877
4	16225.0	.37	.20	1.00	1.201	1.201
5	4683.0	.36	.20	1.00	1.588	1.588
6	2694.0	.41	.20	1.00	1.886	1.886
7	515.0	.48	.20	1.00	2.095	2.095
8	138.0	.47	.20	1.00	2.171	2.171
9	96.0	.36	.20	1.00	2.350	2.350
10+	3206.0	.36	.20	1.00	2.817	2.817

Table 8.9 Management options for 1987 and 1988 for Faroe area HADDOCK (Division Vb).

1986				Management option for 1987 and 1988	1987				1988			1989	
Stock biom. (1+)	SSB	$\bar{F}_{(3-8)}$	Catch (2+)		Stock biom. (1+)	SSB	$\bar{F}_{(3-8)}$	Catch (2+)	Stock biom. (1+)	SSB	Catch (2+)	Stock biom. (1+)	SSB
87	57	0.39	16	$F_{0.1}$	93	62	0.23	10	104	73	13	113	82
				$F_{87} = F_{85}$			0.39	17	97	66	18	100	69
				$F_{87} = 0.8\ F_{85}$			0.31	14	100	70	16	106	75
				$F_{87} = 1.2\ F_{85}$			0.46	19	94	63	20	95	64
				F_{max}			0.63	25	88	57	23	86	55

Weights in '000 t.

Table 9.1 Nominal catch (tonnes) of Blue Ling in Division Va, 1966-1985. (Data from Bulletin Statistique.)

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Faroe Islands	-	-	-	-	-	10	-	74	34	69
Germany, Fed.Rep.	3,411	2,651	2,531	2,043	2,061	3,041	2,271	1,678	1,959	1,418
Iceland	134	191	199	339	394	705	586	548	331	434
Norway	-	-	-	56	102	22	2	6	140	366
UK (England & Wales)	-	-	-	-	-	-	57	61	32	89
Total	3,545	2,842	2,730	2,438	2,557	3,778	2,916	2,367	2,496	2,376

Country	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985[1]
Faroe Islands	29	39	38	85	183	220	224	1,195	353	54
Germany, Fed.Rep.	1,222	1,253	-	-	-	-	-	-	-	-
Iceland	624	700	1,237	2,019	8,133	7,952	5,945	5,117	3,122[1]	1,407
Norway	135	317	156	98	229	64	402	31	8[1]	-
UK (England & Wales	28	8	-	-	-	-	-	-	-	-
Total	2,038	2,317	1,431	2,202	8,399	8,401	6,233	6,714	3,506	1,461

[1] Preliminary.

Table 9.2 Nominal catch (tonnes) of Ling in Division Va, 1966-1985. (Data from Bulletin Statistique.)

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Belgium	1,519	1,284	1,364	1,370	1,977	1,989	1,159	1,080	681	736
Faroe Islands	132	60	38	16	134	672	561	984	890	732
France	-	24	-	-	20	375	-	-	-	23
Germany, Fed.Rep.	1,259	1,337	1,612	1,533	1,499	1,196	610	586	486	375
Iceland	4,559	7,531	8,697	8,677	8,345	8,867	6,085	3,564	3,868	3,748
Netherlands	+	-	-	-	-	-	-	-	-	-
Norway	1,030	1,170	1,929	1,904	1,247	883	619	418	318	522
UK (England & Wales)	1,179	1,579	784	571	1,019	1,362	1,110	819	511	541
UK (Scotland)	191	167	93	67	121	47	33	10	21	21
USSR	163	-	9	-	-	-	-	-	-	-
Total	10,032	13,152	14,526	14,139	14,362	15,391	10,177	7,461	6,775	6,698

Country	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985[1]
Belgium	431	442	541	508	445	196	116	128	103	59
Faroe Islands	498	613	534	536	607	489	524	644	450	367
France	-	-	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	404	254	-	-	-	-	-	-	-	-
Iceland	4,538	3,433	3,439	3,759	3,149	3,348	3,733	4,256	3,304	2,980
Norway	502	506	484	399	423	415	612	115	21	17
UK (England & Wales)	259	-	-	-	-	-	-	-	+	+
UK (Scotland)	9	-	-	-	-	-	-	-	-	-
Total	6,641	5,248	4,998	5,202	4,624	4,448	4,985	5,143	3,878	3,423

[1] Preliminary.

Table 9.3 Nominal catch (tonnes) of Tusk (Cusk) in Division Va, 1966-1985. (Data from Bulletin Statistique.)

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Belgium	61	73	75	57	71	83	-	-	-	-
Faroe Islands	286	374	66	29	190	1,644	1,648	3,363	3,172	2,445
Germany, Fed.Rep.	765	754	690	712	761	691	558	576	375	384
Iceland	2,107	2,699	4,604	4,075	4,357	3,793	2,815	2,366	1,857	1,673
Netherlands	+	-	-	+	-	-	-	-	-	-
Norway	801	770	914	1,201	1,288	1,526	959	911	893	975
UK (England & Wales)	352	300	228	118	256	341	468	387	224	244
UK (Scotland)	203	162	55	26	64	34	12	4	6	10
Total	4,575	5,132	6,632	6,218	6,987	8,112	6,460	7,607	6,527	5,731

Country	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985[1]
Faroe Islands	2,397	2,818	2,168	2,050	2,873	2,624	2,410	4,046	2,008	1,755
Germany, Fed.Rep.	334	212	-	-	-	-	-	-	-	-
Iceland	2,935	3,122	3,352	3,558	3,089	2,827	2,804	3,469	3,430	3,068
Norway	1,352	1,796	812	845	928	1,025	666	772	254	111
UK (England & Wales)	92	-	-	-	-	-	-	-	-	+
UK (Scotland)	2	-	-	-	-	-	-	-	-	-
Total	7,112	7,948	6,332	6,453	6,890	6,476	5,880	8,287	5,692	4,938

[1] Preliminary.

Table 9.4 Nominal catch (tonnes) of Blue Ling in Division Vb, 1966-1985. (Data from Bulletin Statistique.) From 1975, broken down into Sub-divisions Vb_1 and Vb_2.

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974
Faroe Islands	-	-	-	-	-	-	-	51	43
France	839	-	-	-	-	-	-	-	390
Germany, Fed.Rep.	-	1,006	1,838	303	348	1,367	2,730	3,009	1,808
Norway	430	238	823	798	2,718	557	1,203	4,003	1,554
UK (England & Wales)	-	-	-	-	-	-	+	4	3
Total	1,269	1,244	2,661	1,101	3,066	1,924	3,933	7,067	3,798

BLUE LING Vb_1

Country	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985[1]
Faroe Islands	17	42	23	423	1,072	1,187	1,481	2,761	3,933	6,453	4,451[2]
France	-	10,475[2]	6,977[2]	3,369[2]	2,683[2]	2,427[2]	371	843	668	515	1,972
Germany, Fed.Rep.	1,528	896	870	744	691	5,905	2,867	2,538	222	214	217
Norway	2,492	1,482	858	237	331	304	167	121	256	105	131
UK (England & Wales)	1	+	4	35	-	-	-	-	-	-	-
UK (Scotland)	-	-	-	-	-	1	-	-	-	-	-
Total	4,038	12,895	8,732	4,808	4,777	9,824	4,886	6,263	5,079	7,287	6,771

[1] Preliminary.
[2] Includes Sub-division Vb_2.

BLUE LING Vb_2

Country	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985[1]
Faroe Islands	1[2]	6[2]	+[2]	7[2]	14[2]	36	48	128	463	757	-[2]
France	-	-	-	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	-	+	-	-	-	-	-	-	1	-	+
Norway	-	37	86	83	87	159	93	66	182	50	72
UK (England & Wales)	+	+	-	-	-	-	-	-	-	-	-
UK (Scotland)	-	-	-	-	-	1	-	-	-	-	-
Total	1	43	86	90	101	196	141	194	646	807	72

[1] Preliminary.
[2] Included in Sub-division Vb_1.

Table 9.5 Nominal catch (tonnes) of Ling in Division Vb, 1966-1985. (Data from Bulletin Statistique.) From 1975, broken down into Sub-divisions Vb_1 and Vb_2.

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974
Faroe Islands	416	736	1,209	486	699	752	1,572	1,428	1,004
France	1,827	23	177	195	578	728	866	398	296
German, Dem.Rep.	-	-	-	-	-	-	-	-	9
German, Fed.Rep.	39	59	82	49	29	54	74	170	131
Netherlands	-	-	-	-	-	1	-	-	-
Norway	2,115	3,203	3,340	1,952	1,737	2,898	3,958	3,638	2,395
Poland	-	-	-	-	-	-	-	11	4
Spain	-	-	-	-	-	-	71	-	-
UK (Engl.& Wales)	276	172	152	225	164	152	146	268	305
UK (Scotland)	496	664	679	602	883	879	772	850	575
Total	5,169	4,857	5,639	3,509	4,090	5,464	7,459	6,763	4,719

LING Vb_1

Country	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985[1]
Belgium	-	+	-	-	-	-	-	-	-	-	-
Faroe Islands	1,148	1,423[2]	1,568[2]	1,549[2]	1,919[2]	1,734	1,274	2,099	2,365	2,666	3,151[3]
France	2,626[2]	1,070[2]	780[2]	625[2]	304[2]	49	13	16	155	11	8
German, Dem.Rep.	1[2]	-	-	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	92	59	72	27	18	12	1	3	5	6[1]	3
Netherlands	13	2	1	-	-	-	-	-	-	-[1]	-
Norway	2,297	2,878	2,162	1,745	2,716	1,538	1,135	2,495	1,580	935	1,286
Poland	2	-	-	-	-	-	-	-	-	-	-
UK (Engl.& Wales)	157	142	60[2]	26[2]	23[2]	1	-	-	-[3]	-[3]	-[3]
UK (Scotland)	235	324	413[2]	220[2]	279[2]	90	4	-	-[3]	-[3]	-[3]
Total	6,571	5,898	5,056	4,192	5,259	3,424	2,427	4,613	4,105	3,618	4,448

[1] Preliminary.
[2] Includes Sub-division Vb_2.
[3] Included in Sub-division Vb_2.

LING Vb_2

Country	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985[1]
Faroe Islands	133[2]	77[2]	107[2]	394[2]	205[2]	87[2]	126	271	140	155	-[2]
France	-[2]	-[2]	-[2]	-[2]	-[2]	-[2]	-	-	-	-	-
German, Dem.Rep.	-	-	-	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	2	2	-	-	-	-	-	-	-	-	-
Norway	-	238	398	1,208	734	873	1,641	1,119	1,166	631	579
UK (Engl.& Wales)	74	78	3[2]	2[2]	-[2]	5	-	-	-	-	-
UK (Scotland)	264	255	-[2]	-[2]	-[2]	121	24	94	48[3]	4[3]	1[3]
Total	473	650	508	1,604	939	1,086	1,791	1,484	1,354	790	580

[1] Preliminary.
[2] Included in Sub-division Vb_1.
[3] Includes Sub-division Vb_1.

Table 9.6 Nominal catch (tonnes) of Tusk (Cusk) in Division Vb, 1966-1985. (Data from Bulletin Statistique.) From 1975, broken down into Sub-divisions Vb_1 and Vb_2.

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974
Faroe Islands	1,488	2,070	2,798	1,454	1,028	1,489	1,918	3,402	1,541
Germany, Fed.Rep.	76	116	106	36	19	51	133	137	137
Netherlands	-	-	-	-	-	-	-	-	-
Norway	1,221	2,729	2,096	1,302	1,475	1,872	2,421	3,066	1,841
UK (Engl.& Wales)	21	18	23	16	11	13	16	36	22
UK (Scotland)	482	432	549	412	515	419	386	531	403
[illegible] 1	3,288	5,365	5,572	3,220	3,048	3,844	4,874	7,172	3,944

TUSK Vb_1

Country	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985[1]
Faroe Islands	2,025	2,433	3,003	2,043[2]	3,652	4,629	2,028	4,056	3,416	4,355	5,323
France	-	-	-	25[2]	34	24	14	14	15	25	..
Germany, Fed.Rep.	154	69	68	39	36	23	7	12	11	16[1]	10
Netherlands	4	1	-	-	-	-	-	-	-	-	-
Norway	1,848	2,763	1,526	1,230	1,943	1,713	1,472	1,432	1,074	897	1,091
UK (Engl.& Wales)	25	19	12	3[2]	1[2]	+	-	-	-[3]	-[3]	-[3]
UK (Scotland)	191	302	381[2]	222[2]	252[2]	145	-	-	-[3]	-[3]	-[3]
Total	4,247	5,587	4,990	3,562	5,918	6,534	3,521	5,514	4,516	5,293	6,424

[1] Preliminary.
[2] Includes Sub-division Vb_2.
[3] Included in Sub-division Vb_2.

TUSK Vb_2

Country	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985[1]
Faroe Islands	141	115	59	454[2]	225[2]	88[2]	38	92	34	39	-[2]
France	-	-	-	-[2]	-[2]	-[2]	-	-	-	-	-
Germany, Fed.Rep.	+	1	-	-	-	-	-	-	-	-	+
Norway	-	105	261	731	422	975	1,276	660	861	640	773
[illegible] Engl.& Wales)	11	10	+	-	-	+	-	-	-	-	-
[illegible] Scotland)	153	194	-	-	-	213	15	125	73[3]	2[3]	+[3]
Total	305	425	320	1,185	647	1,276	1,329	877	968	681	773

[1] Preliminary.
[2] Included in Sub-division Vb_1.
[3] Includes Sub-division Vb_1.

Table 9.7 Nominal catch (tonnes) of Blue Ling in Sub-area VI, 1966-1985. (Data from Bulletin Statistique.) From 1975, broken down into Divisions VIa and VIb.

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974
Faroe Islands	-	-	-	-	-	-	-	-	33
Germany, Fed.Rep.	-	37	-	6	-	-	-	-	1,218
Norway	20	35	126	112	176	15	14	25	371
UK (Engl.& Wales)	-	-	-	-	-	-	+	+	164
Total	20	72	126	118	176	15	14	25	1,786

BLUE LING VIa

Country	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985[1]
France	-	5,462	7,940	5,495	3,064	2,124	3,338	3,430	5,233	3,653	-
Germany, Fed.Rep.	2,941	818	470	2,498	993	773	335	79	11	183	5
Norway	20	10	16	19	2	10	11	16	118	45	89
UK (Engl.& Wales)	8	1	556	21	279	-	-	99	13	5	2
UK (Scotland)	-	-	-	-	-	-	1	+	-	-	-
Total	2,969	6,291	8,982	8,033	4,338	2,907	3,685	3,624	5,373	3,886	96

[1] Preliminary.

BLUE LING VIb

Country	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985[1]
Faroe Islands	1	13	6	3	4	-	-	-	-	133	67[2]
France	-	-	36	58	652	3,827	534	263	243	3,281	-
Germany, Fed.Rep.	-	-	-	-	187	5,526	3,944	554	38	-	31
Norway	37	6	7	8	28	8	5	13	50	43	44
UK (Engl.& Wales)	-	1	+	0	-	-	-	-	-	-	+
UK (Scotland)	-	-	-	-	-	+	-	1	2	-	-
Total	38	20	49	69	871	9,361	4,483	831	333	3,457	142

[1] Preliminary.

[2] Includes Division VIa.

Table 9.8 Nominal catch (tonnes) of Ling in Division VIa, 1966-1985. (Data from Bulletin Statistique.)

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974
Belgium	4	3	5	2	2	8	12	73	11
Faroe Islands	-	-	-	-	-	-	-	47	-
France	351	827	3,079	2,572	1,974	319	3,041	21,502	18,870
Germany, Fed.Rep.	-	3	5	9	1	2	5	-	2
Netherlands	-	-	+	-	-	-	4	-	1
Norway	5,968	8,925	9,602	3,745	4,674	3,866	5,089	4,530	6,113
Poland	-	-	-	-	-	-	-	17	-
Spain	-	-	-	-	-	-	2,211	2,058	2,918
Sweden	668	1,783	2,371	1,760	1,241	1,088	1,160	893	739
UK (Engl.& Wales)	797	654	574	323	228	99	130	64	58
UK (Scotland)	186	254	273	248	208	121	146	186	199
Total	7,974	12,449	15,909	8,659	8,325	5,503	11,798	29,370	28,911

LING VIa

Country	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985[1]
Belgium	2	6	-	-	-	-	-	4	-	1	4
Denmark	-	6	-	-	-	44[2]	-	1	-	-	-
Faroe Islands	19	21	2	1	4	-	-	20	-	-	-
France	8,859	3,485	2,627	3,176	2,990	3,092	3,820	5,049	5,362	5,757	-
German, Dem.Rep.	-	4	-	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	2	4	2	7	5	1	-	-	-	14	8
Ireland	-	-	165	39	40	34	44	34	62	49[1]	-
Netherlands	1	3	1	1	-	-	-	-	-	-	-
Norway	3,345	5,036	3,566	5,937[2]	2,778[2]	2,932	2,150	4,499	5,943	4,667	4,777
Spain	3,124	2,111	422[2]	793[2]	566[2]	-	-	461	604	720	388
Sweden	-	170[2]	-	-	-	3	-	3	-	-	-
UK (Engl.& Wales)	62	74	122	227	73	85	123	201	78	101	72
UK (N.Ireland)	-	-	-	-	-	-	-	-	+	+	-
UK (Scotland)	202	244	190	286	234	207	379	188	236	341	509
Total	15,616	11,164	7,097	10,467	6,690	6,398	6,516	10,460	12,285	11,650	5,758

[1] Preliminary.

[2] Includes Division VIb.

Table 9.9 Nominal catch (tonnes) of Tusk (Cusk) in Division VIa, 1966-1985. (Data from Bulletin Statistique.)

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974
Belgium	-	-	-	-	-	+	-	-	-
Faroe Islands	-	-	-	-	-	-	-	34	-
Germany, Fed.Rep.	-	-	-	2	7	+	+	+	6
Norway	1,238	1,553	2,073	783	1,319	1,204	647	852	2,860
Sweden	47	-	-	-	-	-	-	-	-
UK (Engl.& Wales)	65	55	37	22	20	12	20	12	3
UK (Scotland)	2	1	40	4	1	1	1	1	1
Total	1,352	1,609	2,150	811	1,347	1,217	668	899	2,870

TUSK VIa

Country	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985[1]
Denmark	-	-	-	-	-	1[2]	-	+	-	-	-
Faroe Islands	-	-	-	-	3	-	-	-	-	-	-
France	-	-	-	344	296	241	322	355	418	514	-
Germany, Fed.Rep.	14	11	4	-	3	4	1	-	-	1	1
Netherlands	-	1	-	-	-	-	-	-	-	1[1]	-
Norway	621	811	914	996	460	652	802	1,052	1,733	1,305	1,608
Spain	-	-	-	-	-	-	-	414	250	-	-
Sweden	-	-	-	-	-	-	-	2	-	-	-
UK (Engl.& Wales)	3	6	19	6	4	+	1	7	1	5	+
UK (Scotland)	1	3	3	5	8	14	94	+	2	1	1
Total	639	832	940	1,352	774	912	1,220	1,830	2,404	1,826	1,610

[1] Preliminary.

[2] Includes Division VIb.

Table 9.10 Nominal catch (tonnes) of Ling in Division VIb, 1966-1985. (Data from Bulletin Statistique.)

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974
Faroe Islands	-	-	-	-	-	-	-	15	1,453
France	539	470	366	252	-	590	657	708	822
Norway	-	-	3	-	-	-	-	-	140
UK (Engl.& Wales)	-	-	-	22	34	24	14	10	-
UK (Scotland)	497	138	92	138	499	663	1,117	727	291
USSR	-	-	-	-	-	-	2	-	-
[illegible] [1]	1,036	608	461	412	533	1,277	1,790	1,460	2,706

LING VIB

Country	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985[1]
Belgium	-	1	-	-	-	-[2]	-	-	-	-	-
Denmark	-	-	-	-	-	-[2]	-	-	-	-	-
Faroe Islands	356	303	481	219	368	236	4	123	204	153	24
France	98	5	2	3	7	3	5	13	8	34	-
Germany, Fed.Rep.	-	-	-	-	-	-	+	-	-	-	-
Ireland	-	-	-	20	-	-	-	-	-	-	-
Norway	790	486	447[2]	781[2]	1,776[2]	1,096	1,083	1,711	2,315	2,345	1,876
Spain	-	-[2]	-[2]	-[2]	-[2]	620	590	1,911	1,889	986	2,381
Sweden	-	-	-	-	-	-	-	-	-	-	-
UK (Engl.& Wales)	+	33	56	49	39	+	8	4	26	28	49
UK (Scotland)	370	60	195	236	203	235	184	80	4	29	127
Total	1,614	888	1,181	1,308	2,393	2,190	1,874	3,842	4,446	3,575	4,457

[1] Preliminary.

[2] Included in Division VIa.

Table 9.11 Nominal catch (tonnes) of Tusk (Cusk) in Division VIb, 1966-1985. (Data from Bulletin Statistique.)

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974
Faroe Islands	-	-	-	-	-	-	-	2	470
Norway	-	-	62	-	-	-	-	-	16
UK (Engl.& Wales)	-	-	-	2	4	6	6	7	-
UK (Scotland)	124	52	65	136	168	227	448	298	158
Total	124	52	127	138	172	233	454	307	644

TUSK VIb

Country	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985[1]
Denmark	-	-	-	-	-	-[2]	-	-	-	-	-
Faroe Islands	192	214	318	80	282	196	1	159	188	53	48
France	-	-	-	-	5	-	1	3	3	4	-
Germany, Fed.Rep.	-	-	-	-	-	-	1	+	-	-	-
Norway	157	159	70	332	680	503	568	468	1,080	960	898
Spain	-	-	-	-	-	-	-	2,098	1,902	-	-
UK (Engl.& Wales)	-	5	6	5	30	-	+	-	3	+	6
UK (Scotland)	231	46	133	148	178	214	181	101	22	+	14
Total	580	424	527	565	1,175	913	752	2,829	3,198	1,017	966

[1] Preliminary.

[2] Included in Division VIa.

Table 9.12 Nominal catch (tonnes) of Blue Ling in Sub-area XIV, 1966-1985. (Data from Bulletin Statistique.)

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974
Germany, Fed.Rep.	176	106	76	35	33	15	65	50	90
Iceland	-	+	-	-	-	-	-	10	6
Norway	-	-	-	-	-	-	-	-	-
Poland	-	-	-	-	-	44	-	-	-
UK (Engl.& Wales)	-	-	-	-	-	-	+	+	+
Total	176	106	76	35	33	59	65	60	96

BLUE LING XIVb

Country	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985[1]
Faroe Islands	-	-	-	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	285[2]	65[2]	491[3]	933[2]	1,026[2]	746[2]	1,206[2]	1,946[2]	621[2]	537	-
Iceland	90[2]	21[2]	-	-	-	-	-	-	-	-	-
Norway	3[2]	-	-	4	-	-	-	-	-	-	-
UK (Engl.& Wales)	+[2]	13[2]	-[4]	-	-	-	-	-	-	-	-
Total	378	99	491	937	1,026	746	1,206	1,946	621	537	-

[1] Preliminary.

[2] Includes Division XIVa.

[3] Reported in Bull.Stat. in Division XIVa.

[4] 6 t in Division XIVa.

Table 9.13 Nominal catch (tonnes) of Ling in Sub-area XIV, 1966-1985. (Data from Bulletin Statistique.)

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974
Faroe Islands	-	-	-	-	-	-	-	1	66
German, Dem.Rep.	-	-	-	-	-	-	-	-	2
Germany, Fed.Rep.	16	39	99	71	34	17	16	15	+
Iceland	+	2	-	11	-	2	-	-	4
Norway	-	-	-	-	-	-	-	-	-
Poland	-	-	-	-	-	-	1	10	-
UK (Engl.& Wales)	-	1	-	-	-	+	1	6	5
USSR	-	-	-	-	27	-	-	-	-
Total	16	42	99	82	61	19	18	32	77

LING XIVb

Country	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985[1]
Faroe Islands	-[2]	-	6	-	-	-	13	-	-	-	-
German, Dem.Rep.	1[2]	-	-	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	5[2]	6[2]	5[3]	15[2]	952[2]	208[2]	298[2]	8[2]	1[2]	6	1
Iceland	2[2]	8[2]	-	-	-	-	-	-	-	-	-
Norway	1[2]	-[2]	1[4]	5	-	-	-	-	-	-	-
UK (Engl.& Wales)	3	4[2]	-	-	-	-	-	-	-	-	-
Total	12	18	12	20	952	208	311	8	1	6	1

[1] Preliminary.

[2] Includes Division XIVa.

[3] Reported in Bull. Stat. in Division XIVa.

[4] 11 t in Division XIVa.

Table 9.14 Nominal catch (tonnes) of Tusk (Cusk) in Sub-area XIV, 1966-1985. (Data from Bulletin Statistique.)

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974
Faroe Islands	-	-	-	-	-	-	-	16	259
Germany, Fed.Rep.	31	17	19	69	28	19	15	9	2
Iceland	1	21	269	174	55	71	24	-	15
Norway	-	-	-	-	-	-	-	-	-
UK (Engl.& Wales)	-	1	-	-	-	-	+	2	1
Total	32	39	288	243	83	90	39	27	277

TUSK XIVb

Country	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985[1]
Faroe Islands	29[2]	-	166[3]	-	-	-	110[2]	-	74[2]	-	-
Germany, Fed.Rep.	17[2]	5[2]	16[3]	47[2]	27[2]	13[2]	10[2]	10[2]	11[2]	5	4
Iceland	13[2]	89[2]	-	-	-	-	-	-	-	-	-
Norway	138[2]	47[2]	40[4]	38[2]	-	-	-	-	-	58	-
UK (Engl.& Wales)	+[2]	1[2]	-[4]	+[2]	-	-	-	-	-	-	-
Total	197	142	222	85	27	13	120	10	85	63	4

[1] Preliminary.

[2] Includes Division XIVa.

[3] Reported in Bull. Stat. in Division XIVa.

[4] 1 t in Division XIVa.

Figure 1.1

STATUS QUO ESTIMATES ** TUSK Vb '952–85

CATCH(n+1)= 1–F(CATCH(n)) + F(AVERAGE CATCH)
Catch(n+1)= 0.67(Catch(n)) + 0.33(4252)
Estimated Status Quo catch 1986=6239 1987=5591

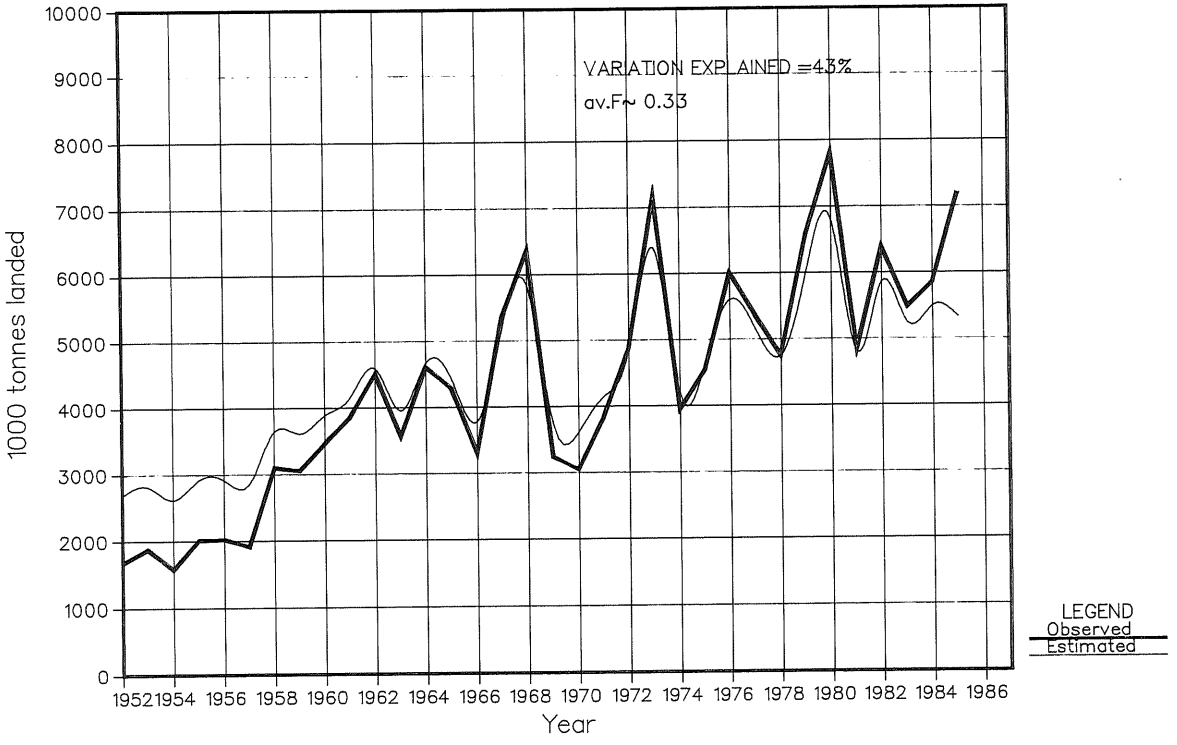


Figure 1.2

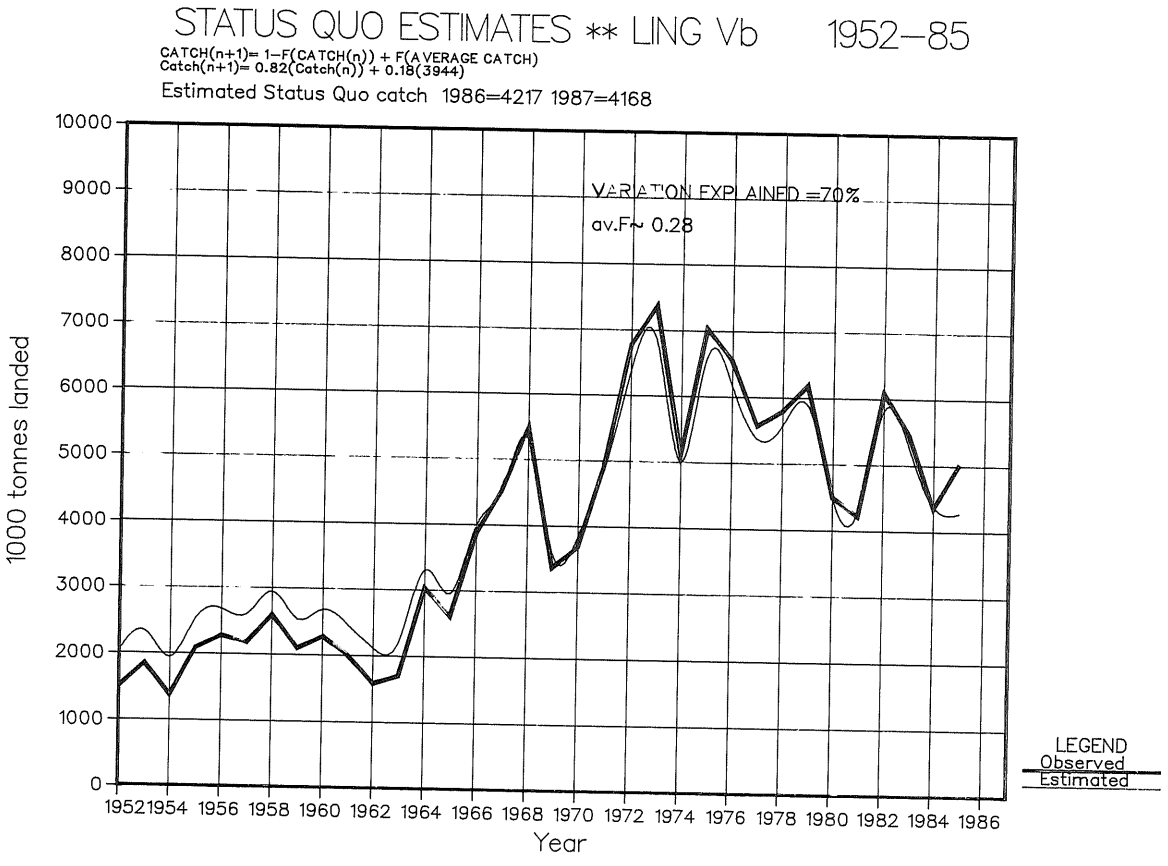
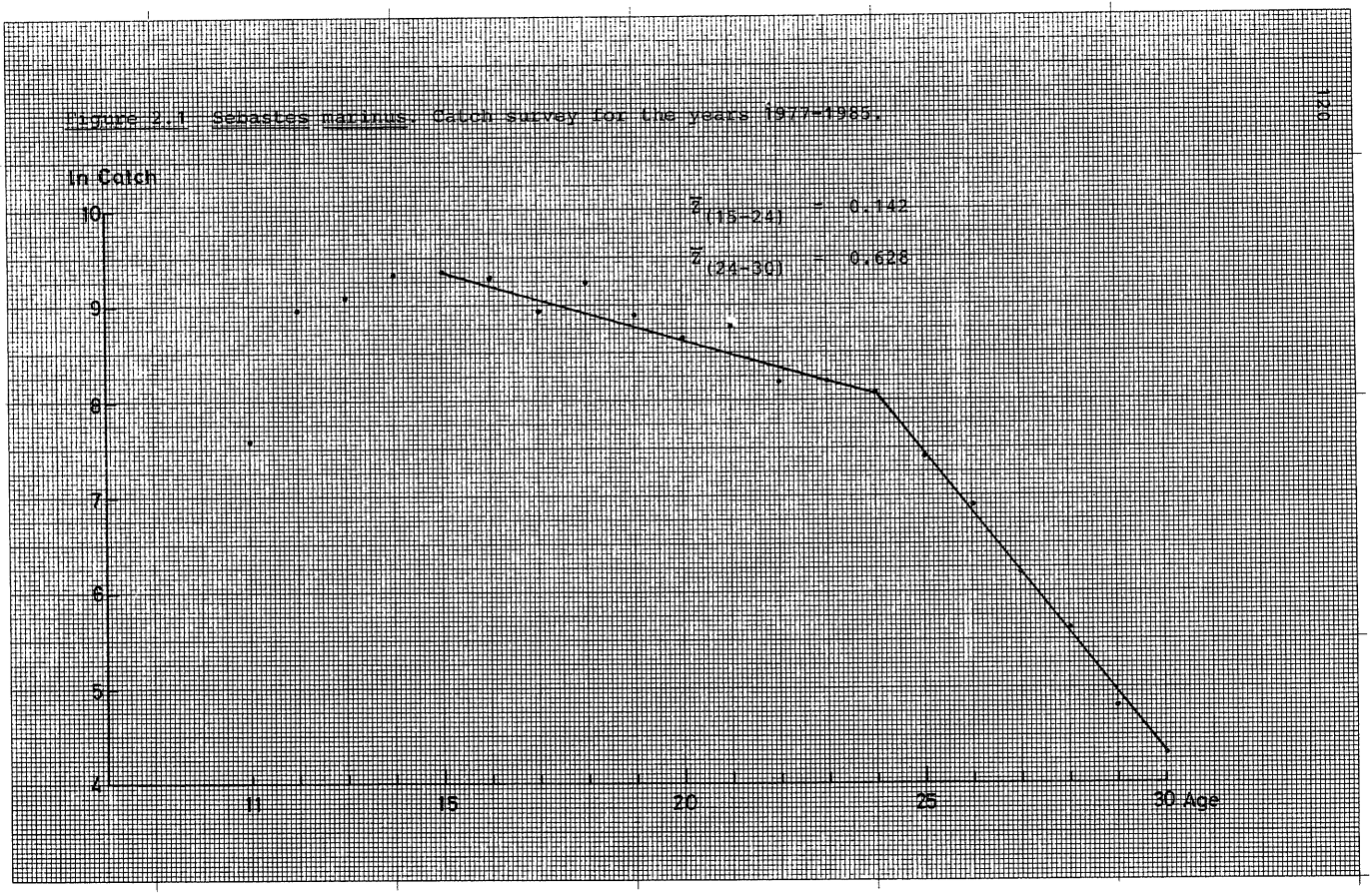

STATUS QUO ESTIMATES ** LING Vb 1952–85
CATCH(n+1)= 1–F(CATCH(n)) + F(AVERAGE CATCH)
Catch(n+1)= 0.82(Catch(n)) + 0.18(3944)
Estimated Status Quo catch 1986=4217 1987=4168
VARIATION EXPLAINED =70%
av.F~ 0.28
1000 tonnes landed
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
1952 1954 1956 1958 1960 1962 1964 1966 1968 1970 1972 1974 1976 1978 1980 1982 1984 1986
Year
LEGEND
Observed
Estimated

Figure 2.1 Sebastes marinus. Catch survey for the years 1977-1985.



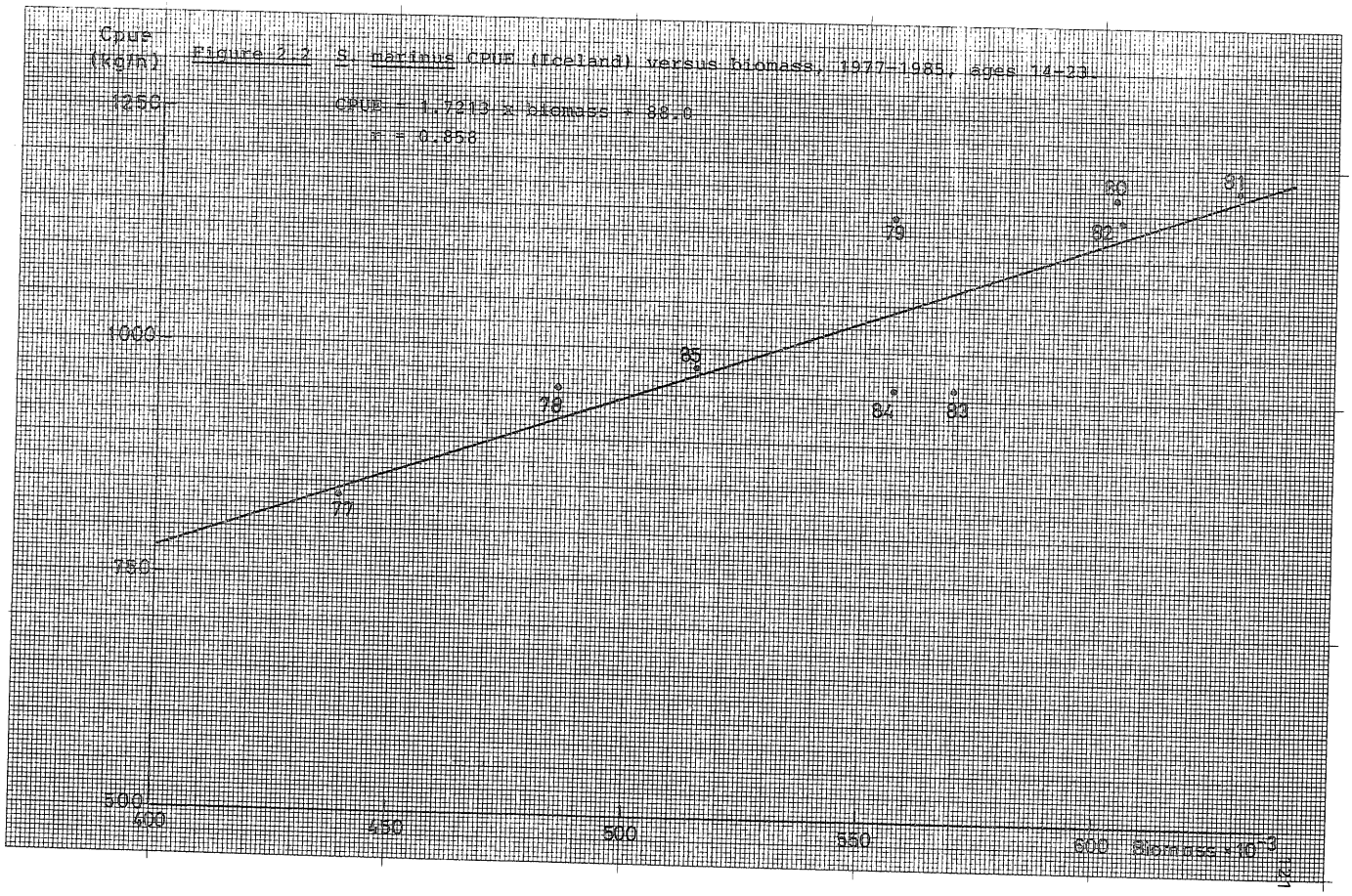

Cpue (kg/m)
Figure 2.2: S. marinus CPUE (Iceland) versus biomass, 1977-1985, ages 14-23.
CPUE = 1.7213 x biomass - 88.0
r = 0.858
1250
1000
750
500
400
450
500
550
600
Biomass x10^-3
77
78
79
80
81
82
83
84
85

Figure 2.3 Sebastes marinus

F plotted against total international effort (estimated from Icelandic CPUE)

F = -0.005 + 0.0025 x effort

r = 0.884

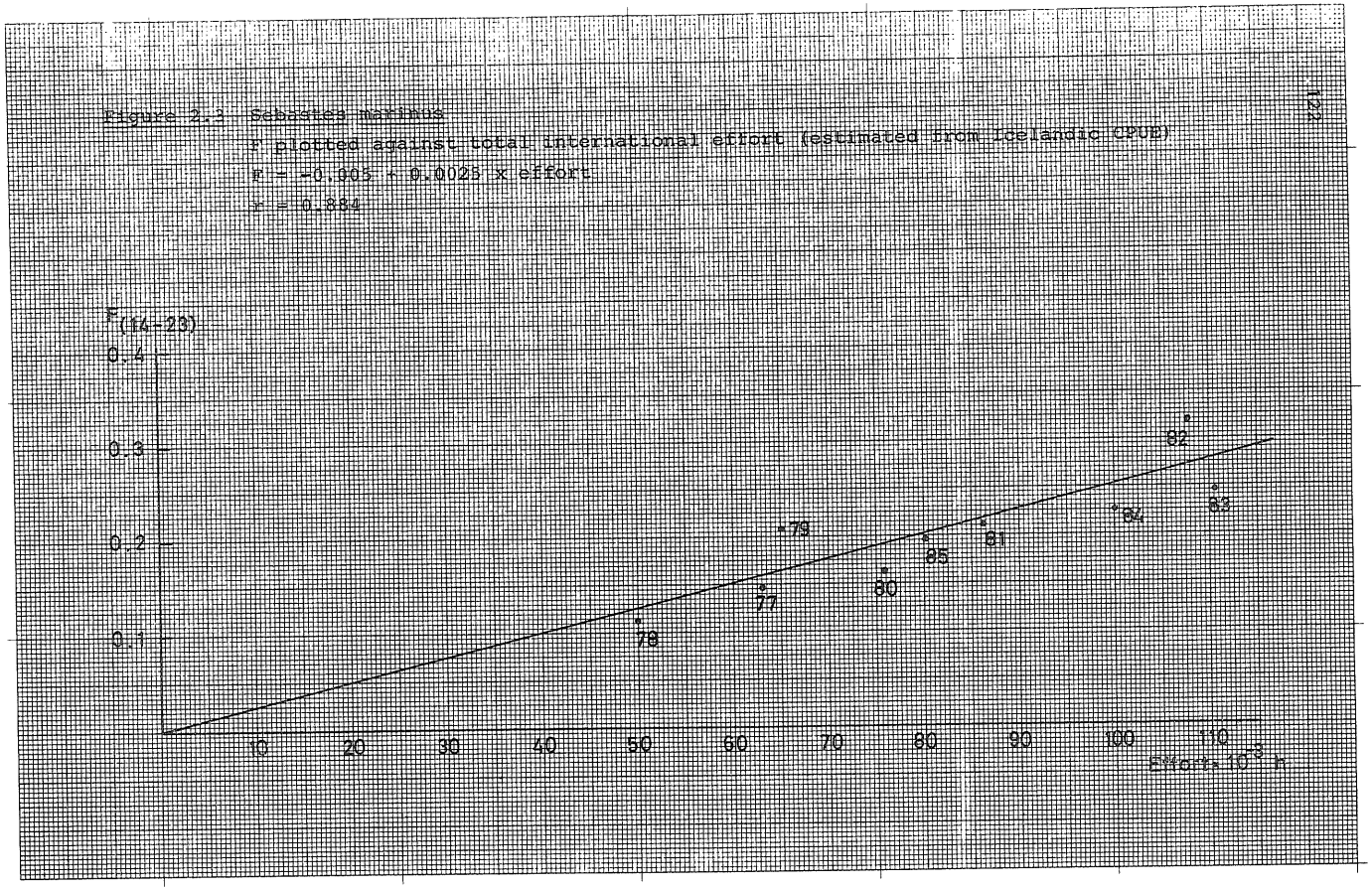


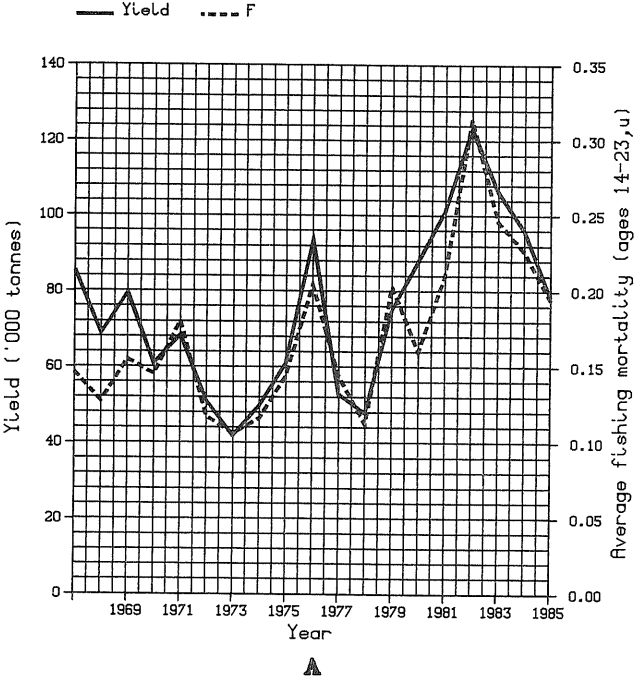
Figure 2.4

FISH STOCK SUMMARY

STOCK: Sebastes Marinus in V and XIV

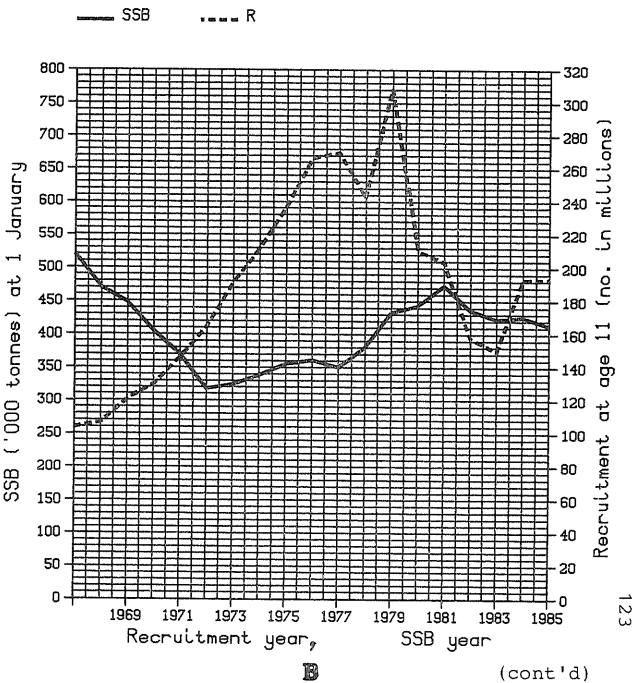
26-9-1986

Trends in yield and fishing mortality (F)



A

Trends in spawning stock biomass (SSB) and recruitment (R)



B

(cont'd)

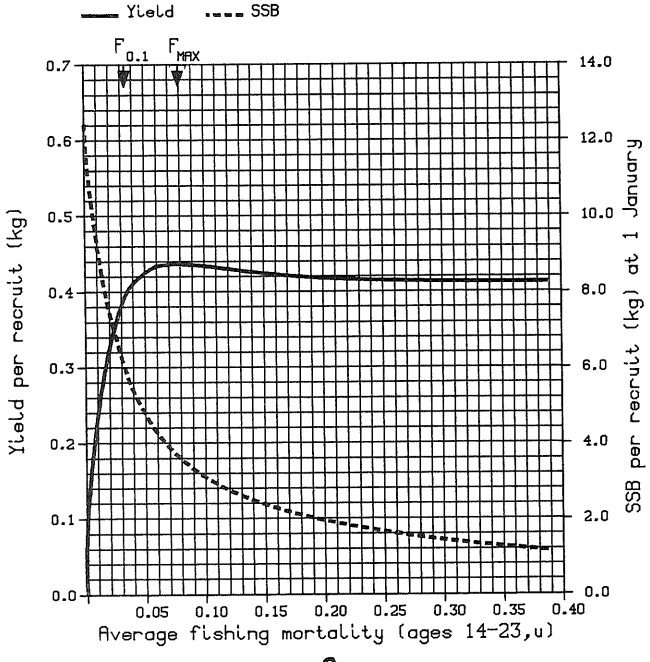
Figure 2.4 (cont'd)

FISH STOCK SUMMARY

STOCK: Sebastes Marinus in V and XIV

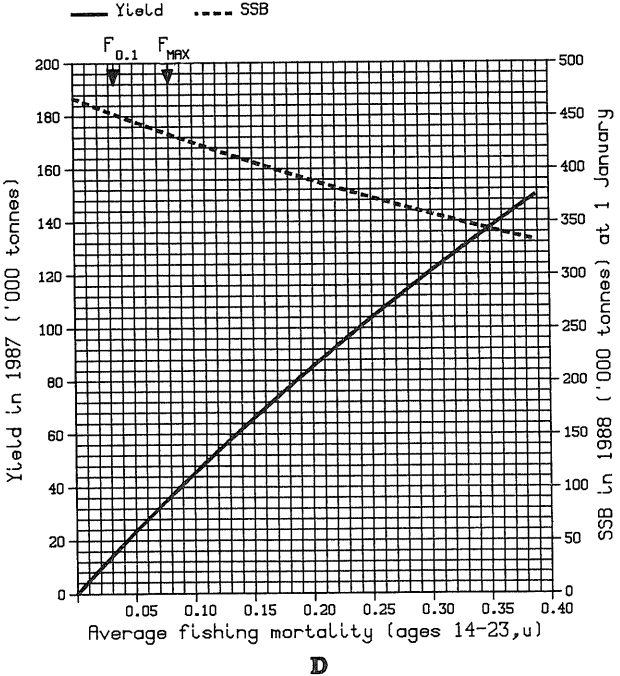
26-9-1986

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass



D

Figure 2.5 Sebastes mentella. Catch curve for 1977-1985.

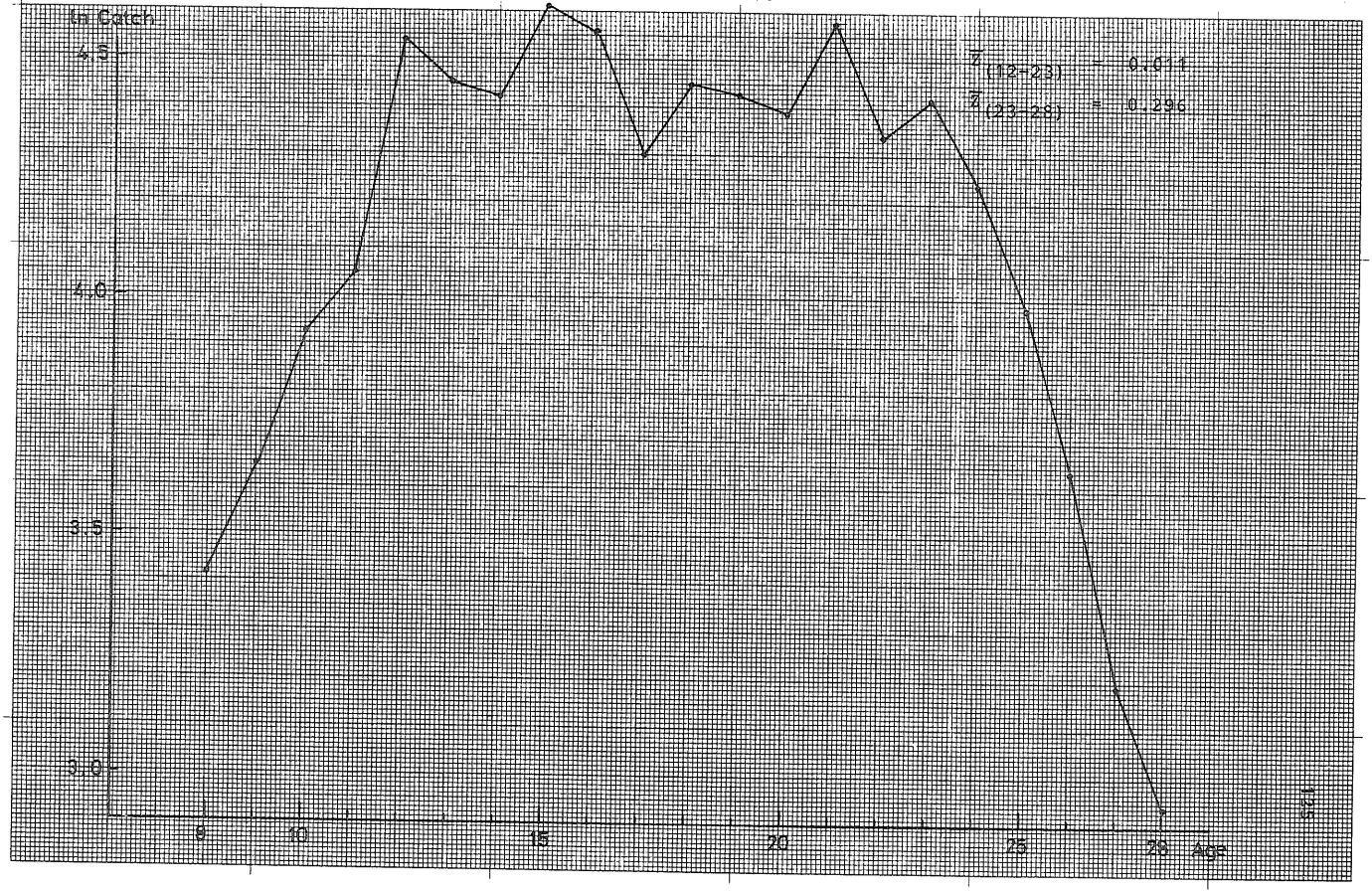


Figure 3.1 GREENLAND HALIBUT.
Log mean catch (1980-1985) against age.

a = 14.534
b = -0.651
r = 0.992

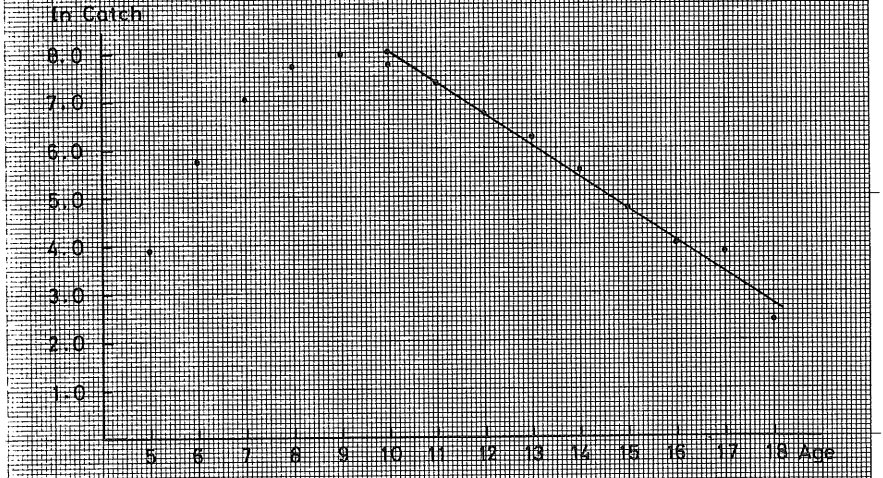


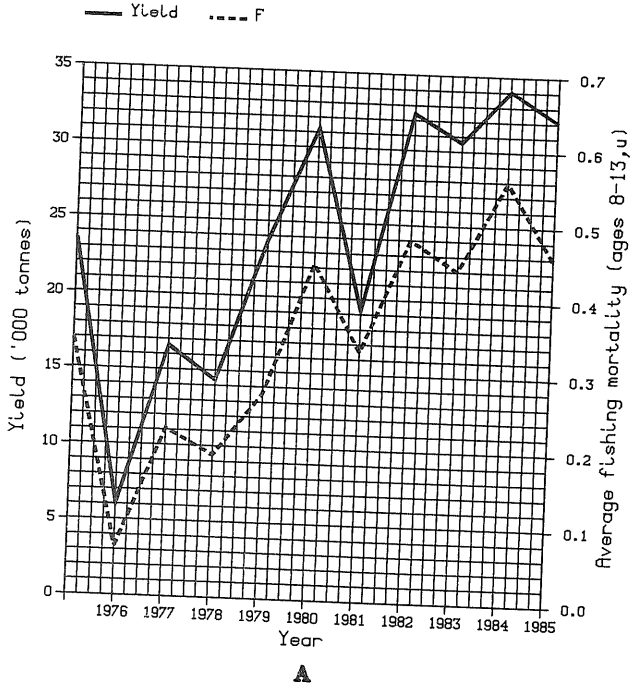
Figure 3.2

FISH STOCK SUMMARY

STOCK: Greenland Halibut (Sub-areas V and XIV)

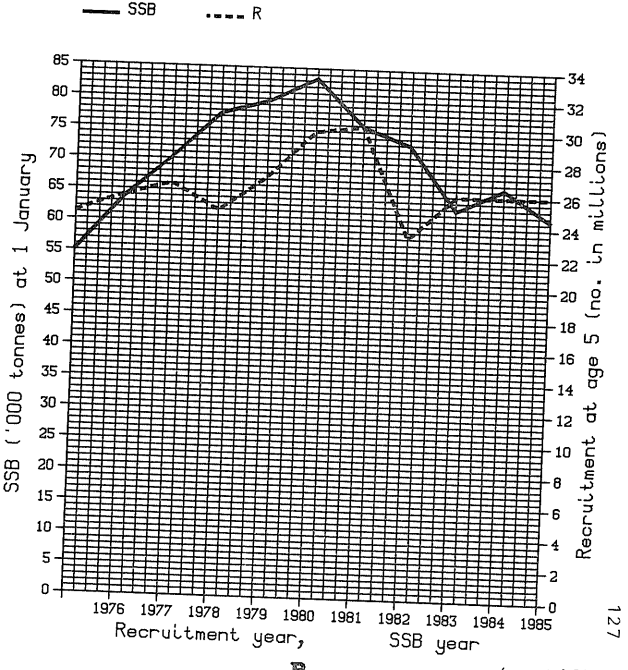
26-9-1986

Trends in yield and fishing mortality (F)



A

Trends in spawning stock biomass (SSB) and recruitment (R)



B

(cont'd)

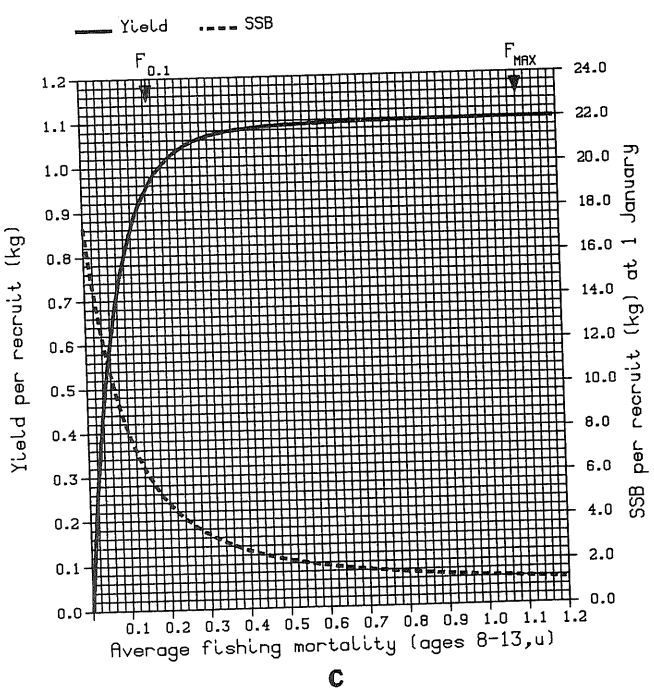
Figure 3.2 (cont'd)

FISH STOCK SUMMARY

STOCK: Greenland Halibut (Sub-areas V and XIV)

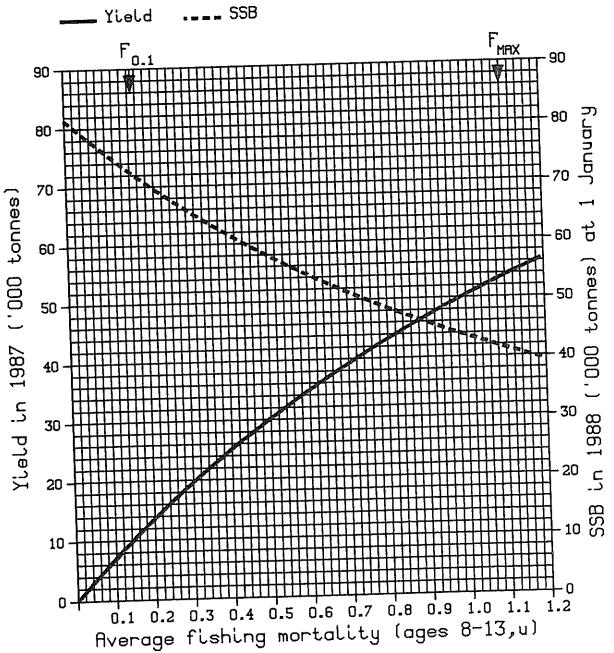
26-9-1986

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass



D

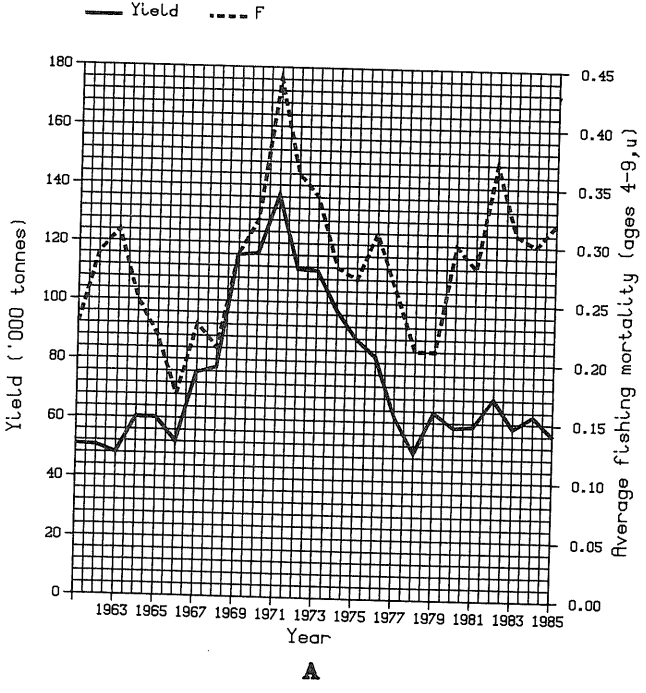
Figure 4.1

FISH STOCK SUMMARY

STOCK: Icelandic Saithe

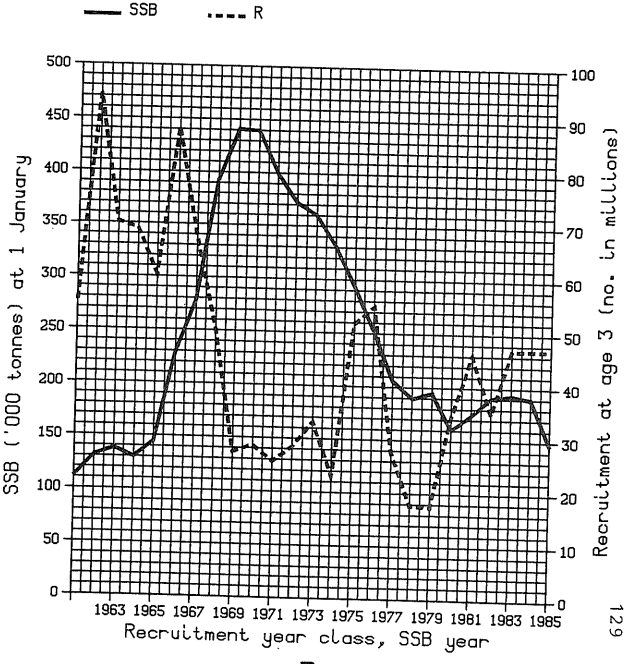
15-9-1986

Trends in yield and fishing mortality (F)



A

Trends in spawning stock biomass (SSB) and recruitment (R)



B

(cont'd)

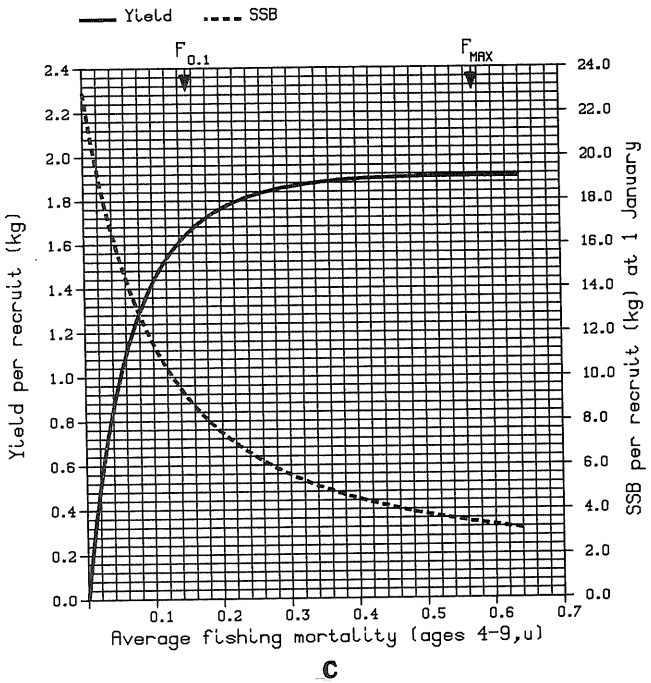
Figure 4.1 (cont'd)

FISH STOCK SUMMARY

STOCK: Icelandic Saithe

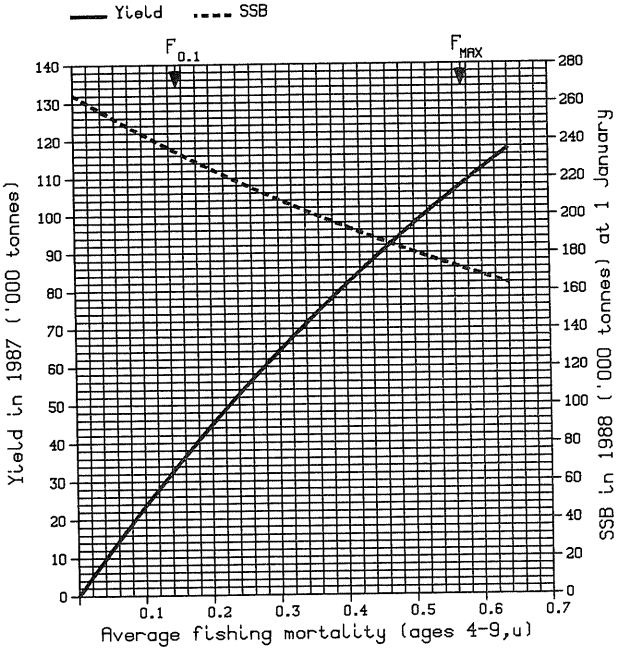
15-9-1986

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass



D

Figure 4.2 Icelandic Saithe
CPUE versus biomass (ages 5-8).

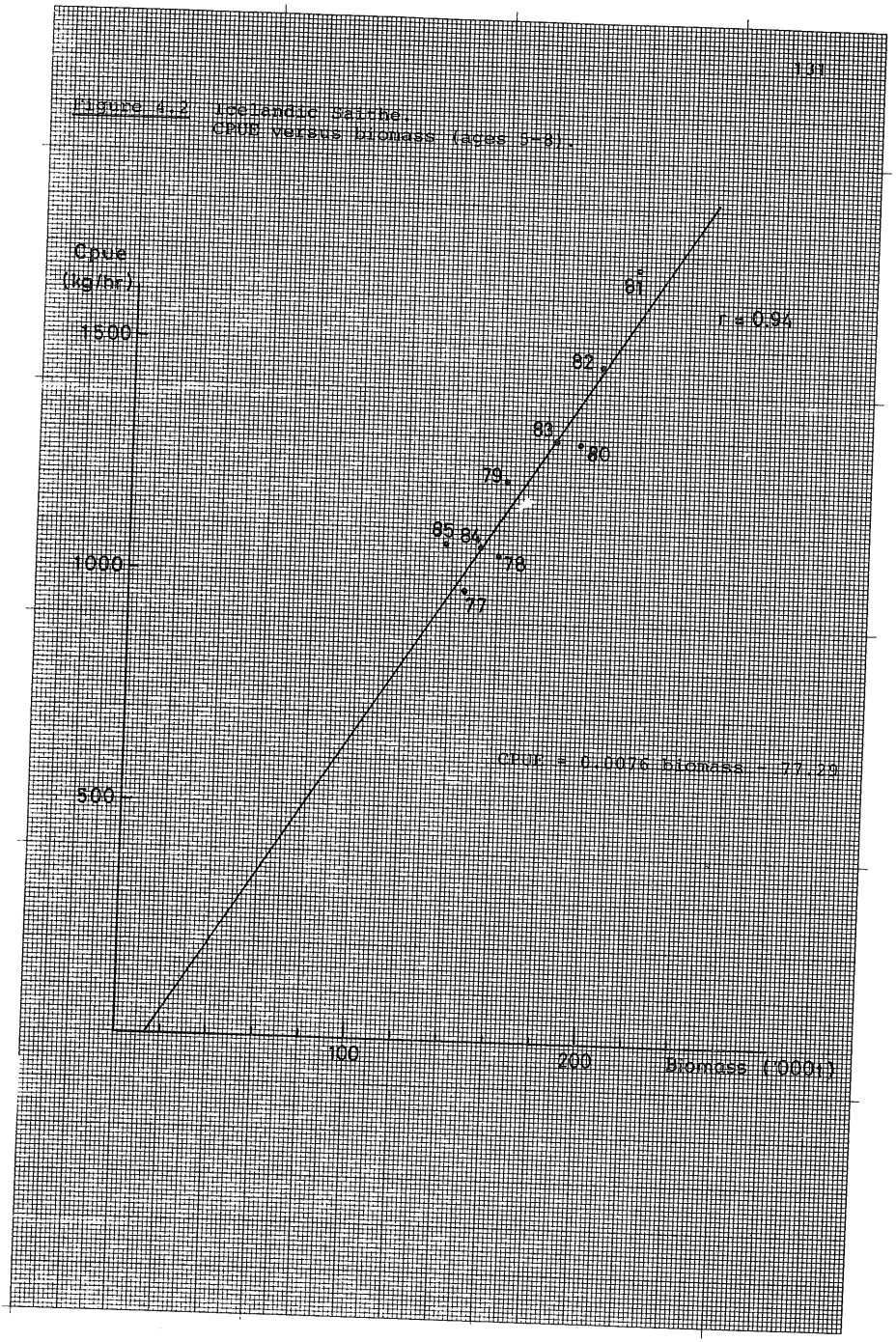


Figure 4.3 Icelandic Saithe.
$\bar{F}_{(4-9)}$ versus fishing effort.

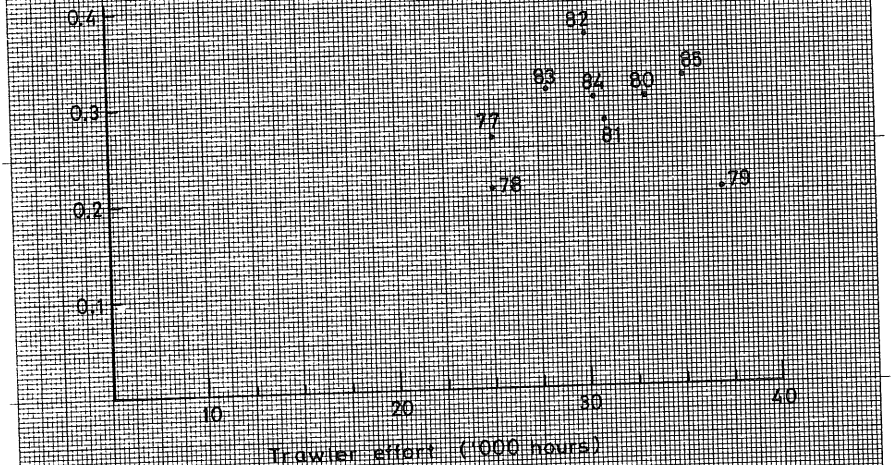
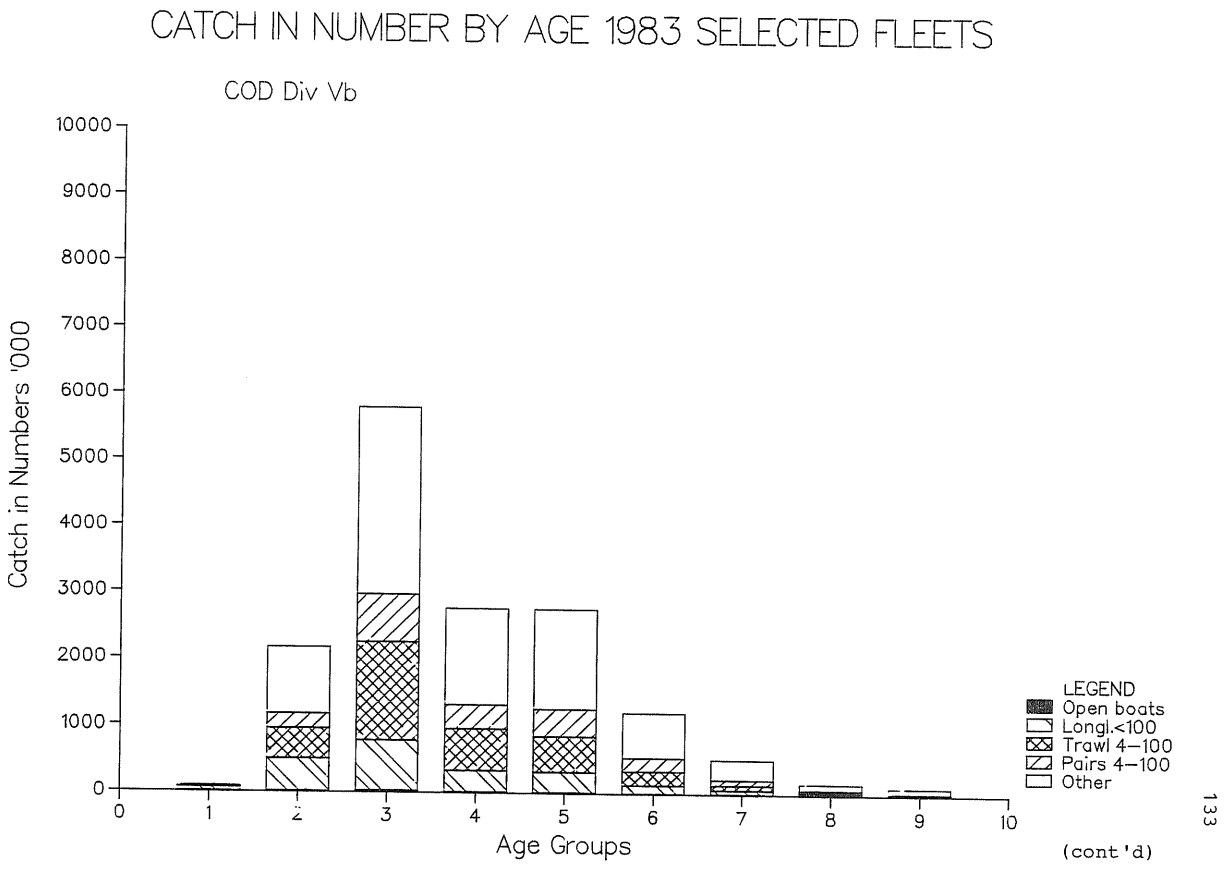


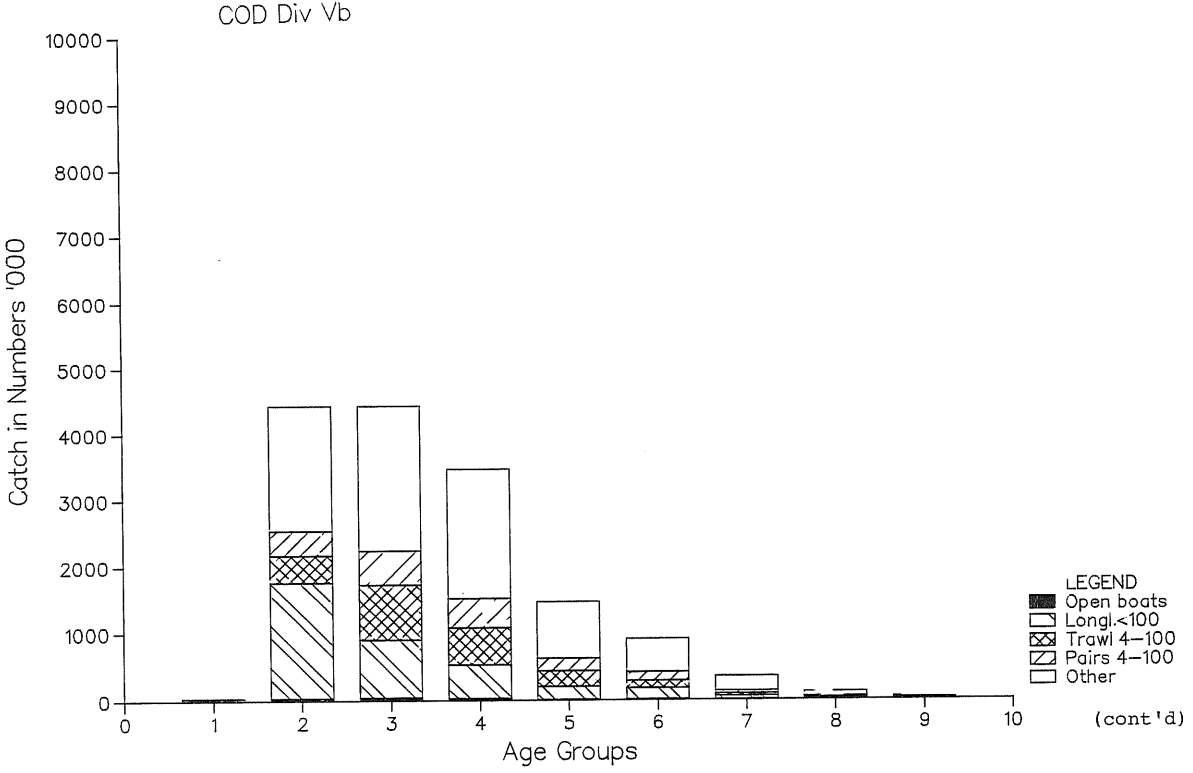
Figure 5.1



(cont'd)

Figure 5.1 (cont'd)

CATCH IN NUMBER BY AGE 1984 SELECTED FLEETS



(cont'd)

Figure 5.1 (cont'd)

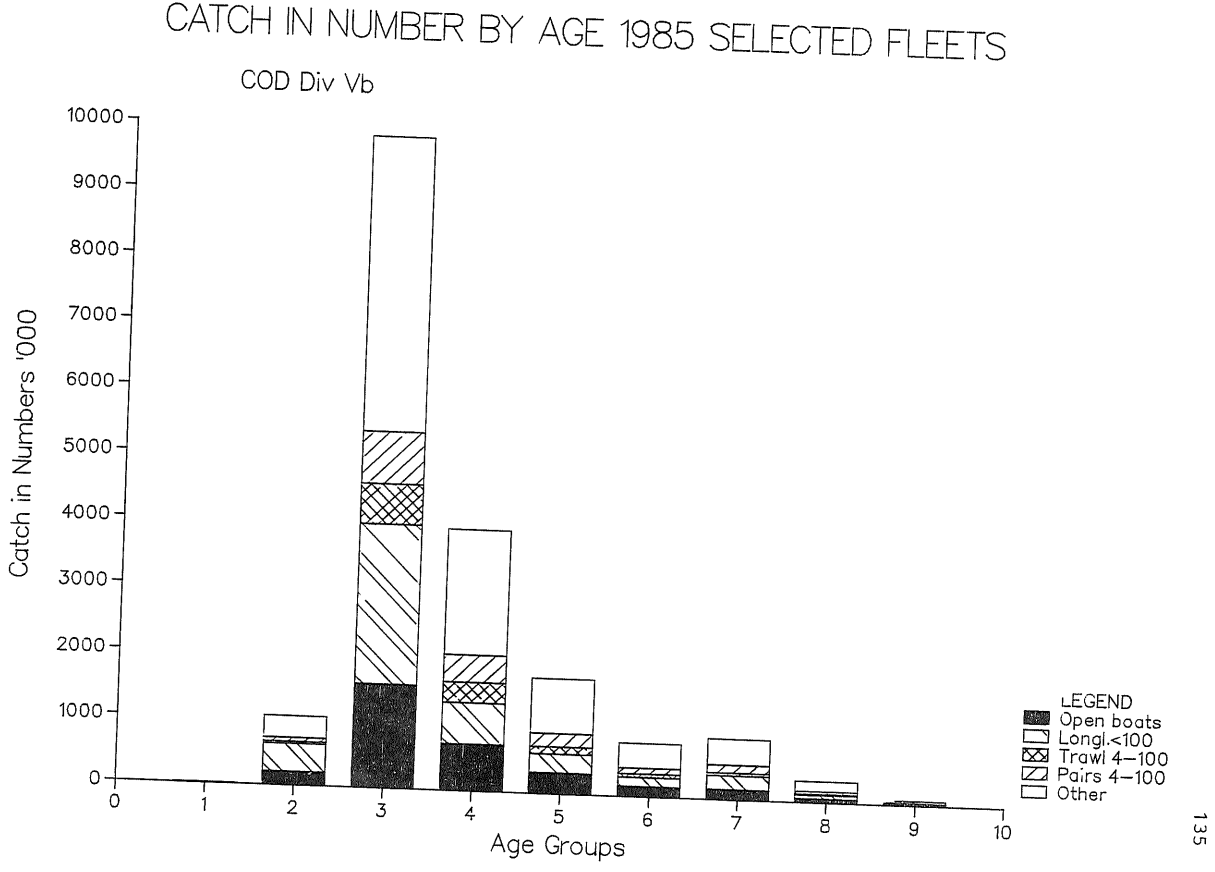


Figure 6.1

CUMULATIVE LANDINGS, 1985 & 1986 DIV. Vb

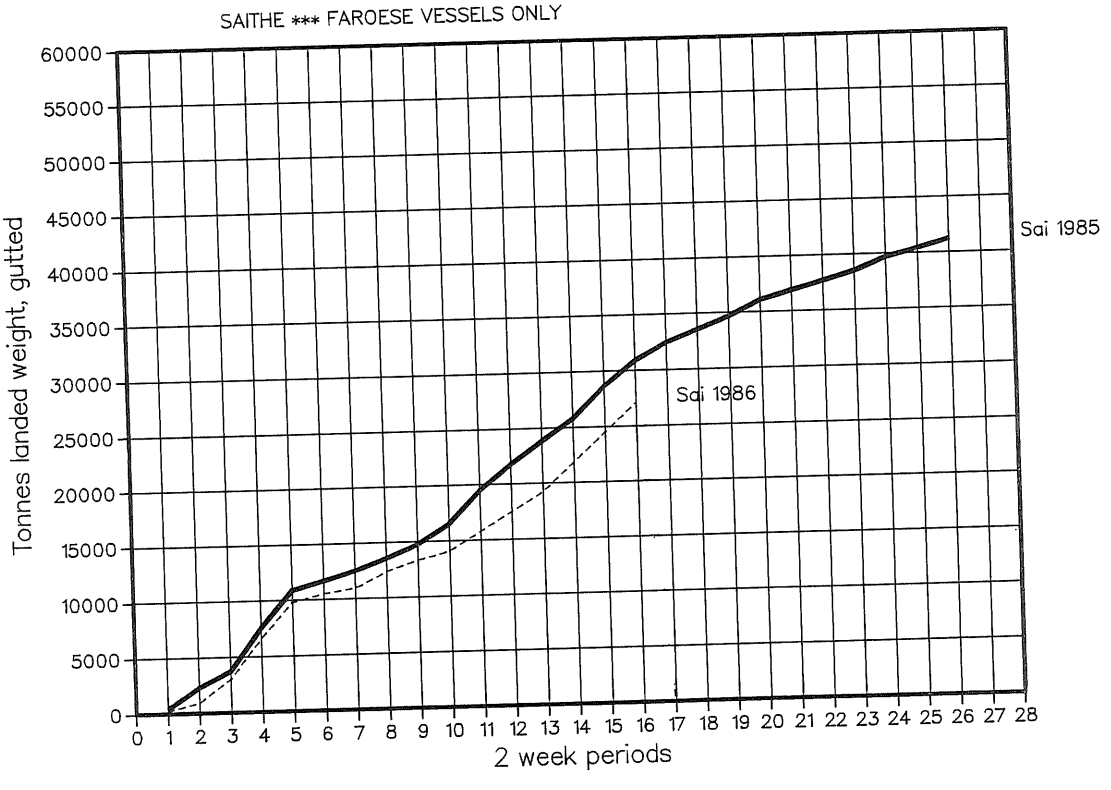


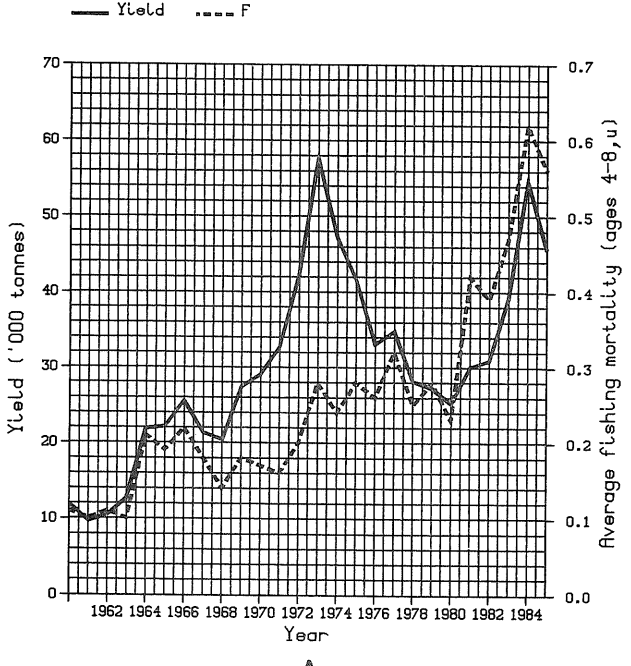
Figure 6.2

FISH STOCK SUMMARY

STOCK: Faroe Saithe

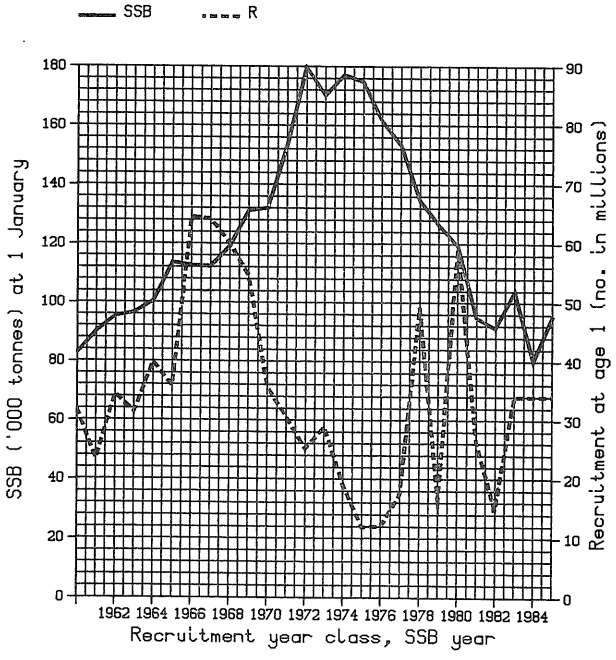
15-9-1986

Trends in yield and fishing mortality (F)



A

Trends in spawning stock biomass (SSB) and recruitment (R)



B

(cont'd)

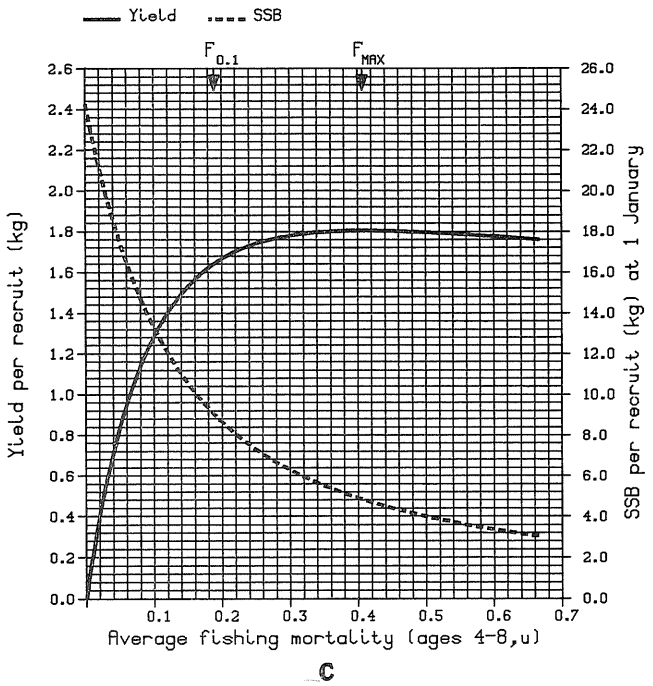
Figure 6.2 (cont'd)

FISH STOCK SUMMARY

STOCK: Faroe Saithe

15-9-1986

Long-term yield and spawning stock biomass



Short-term yield and spawning stock biomass

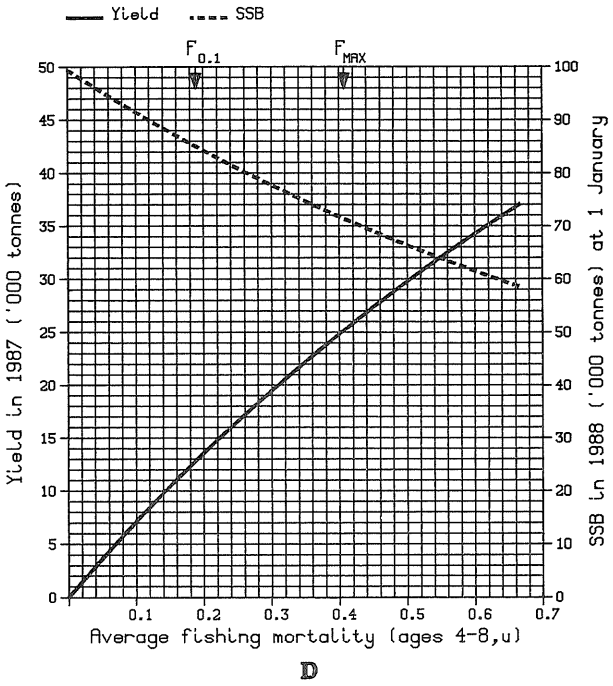


Figure 7.1

CUMULATIVE LANDINGS, 1985 & 1986 DIV. Vb

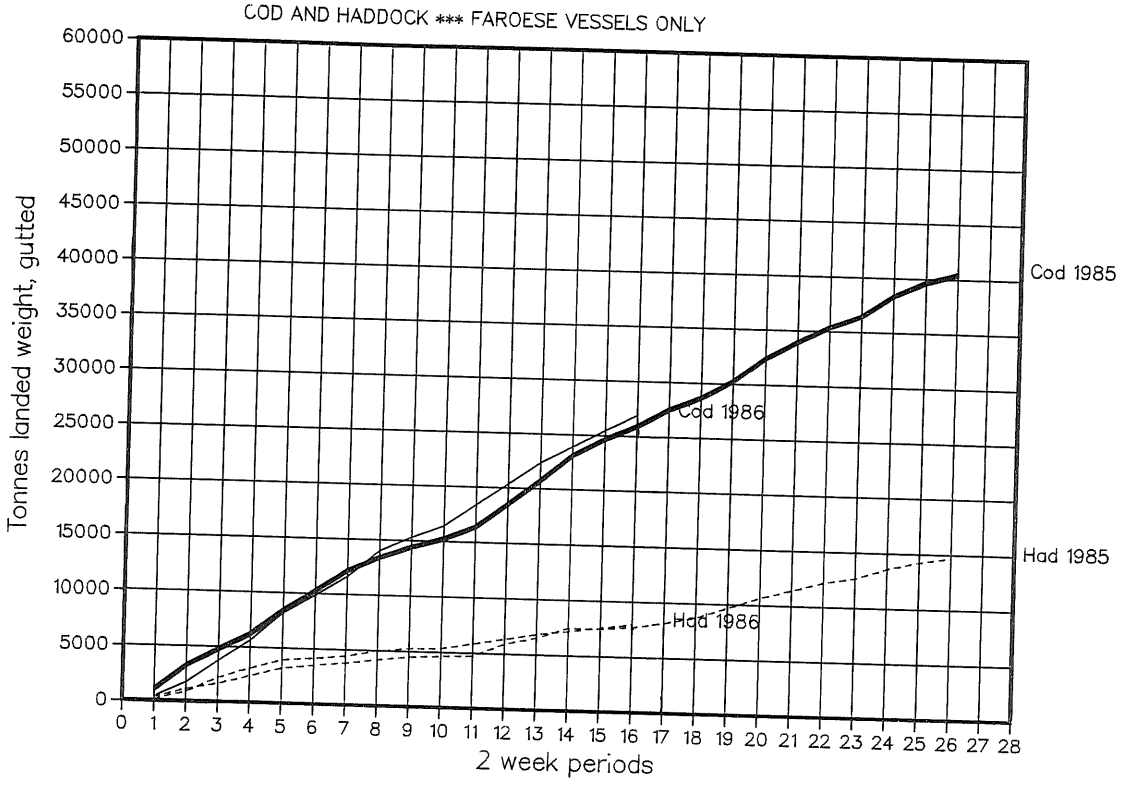


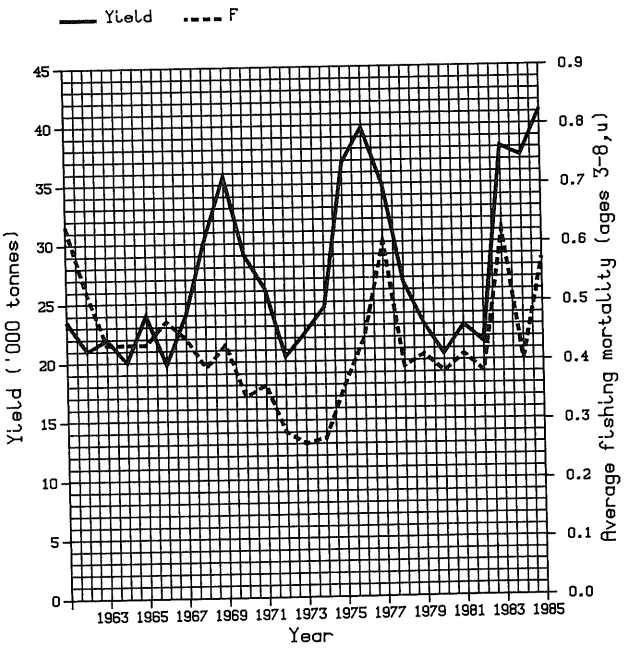
Figure 7.2

FISH STOCK SUMMARY

STOCK: Cod - Faroe Plateau

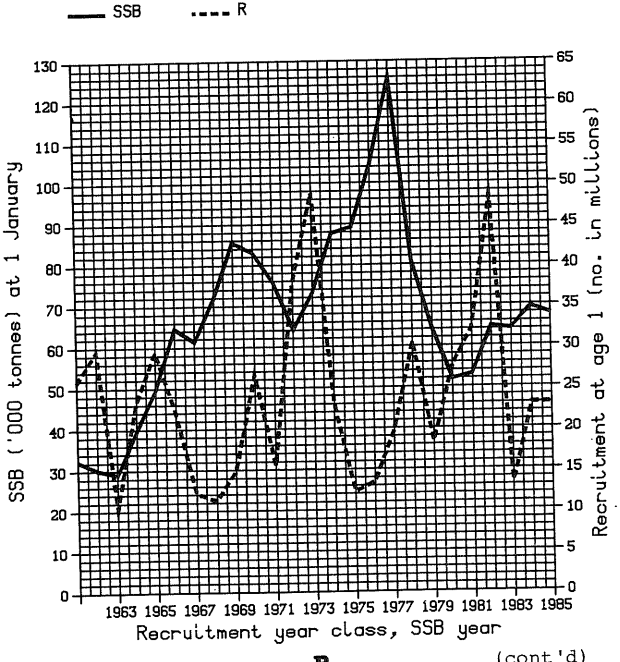
17-9-1986

Trends in yield and fishing mortality (F)



A

Trends in spawning stock biomass (SSB) and recruitment (R)



B

(cont'd)

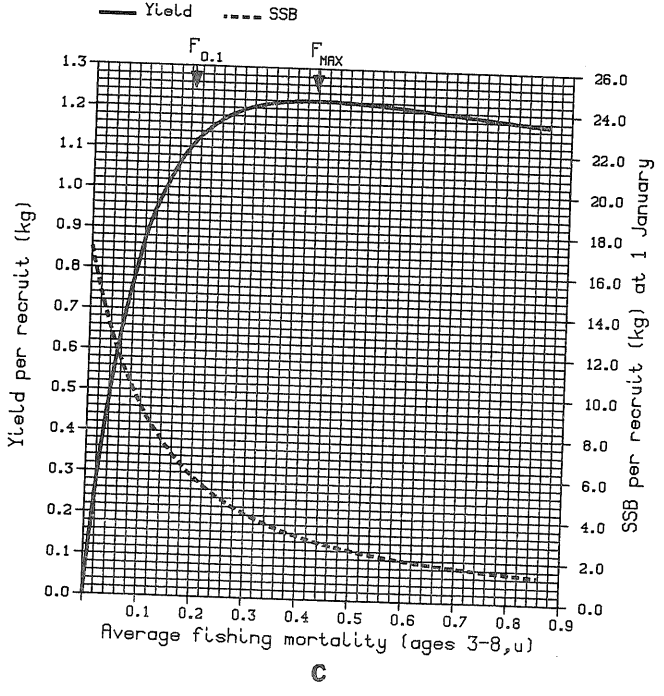
Figure 7.2 (cont'd)

FISH STOCK SUMMARY

STOCK: Cod - Faroe Plateau

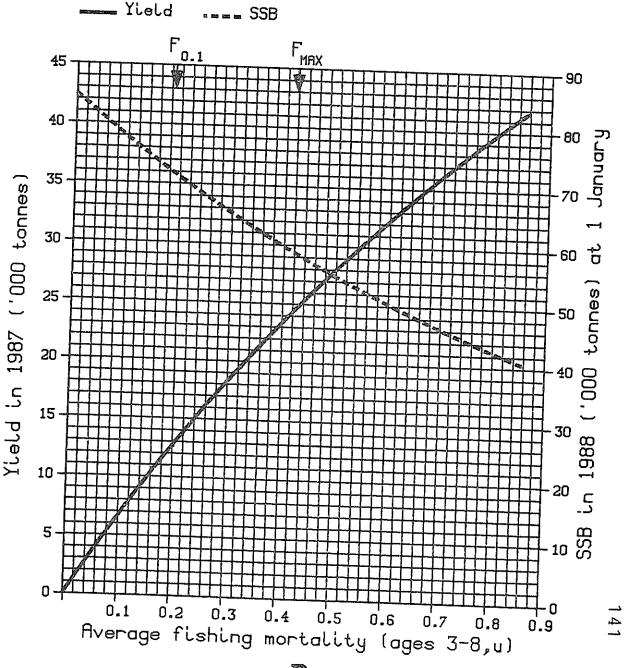
17-9-1986

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass



D

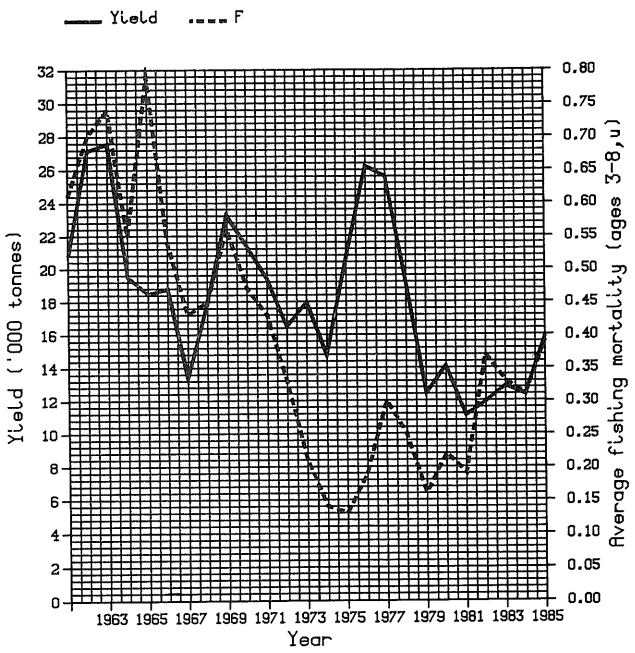
Figure 8.1

FISH STOCK SUMMARY

STOCK: Haddock - Faroe area

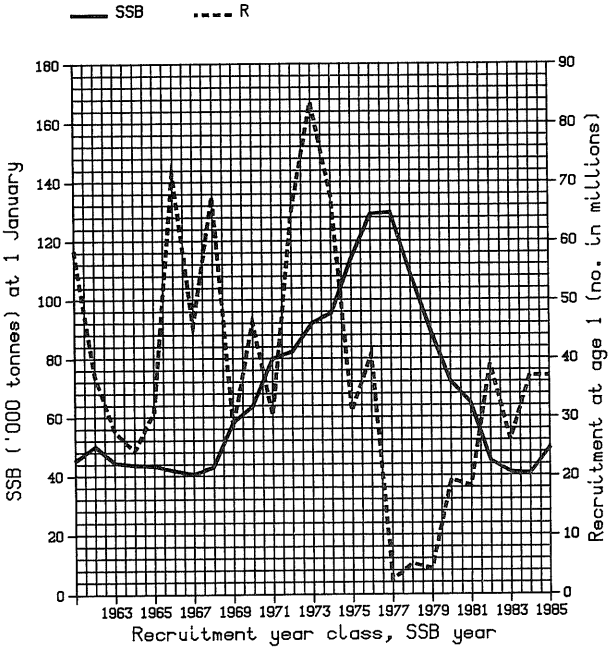
17-9-1986

Trends in yield and fishing mortality (F)



A

Trends in spawning stock biomass (SSB) and recruitment (R)



B

(cont'd)

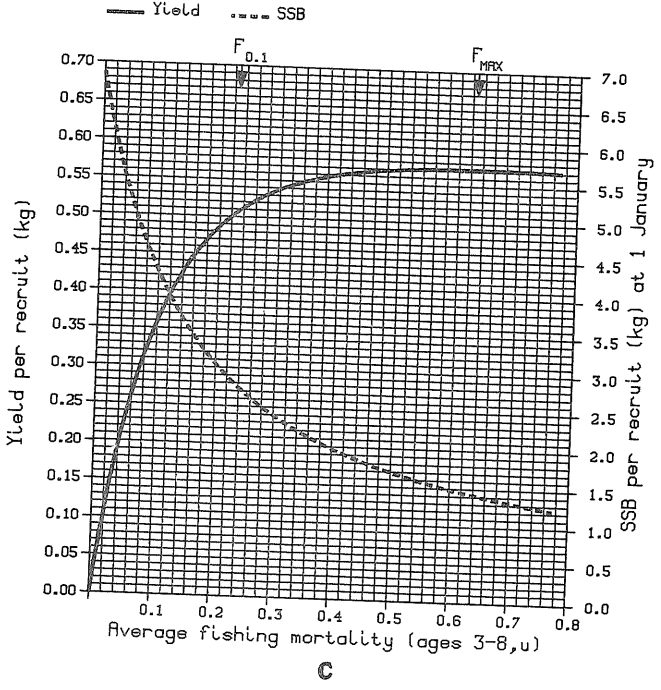
Figure 8.1 (cont'd)

FISH STOCK SUMMARY

STOCK: Haddock - Faroe area

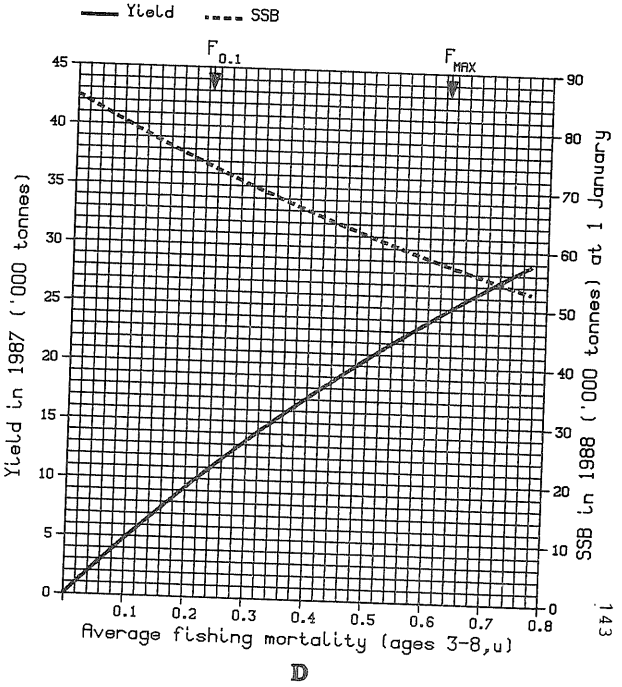
17-9-1986

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass



D

Figure 9.1 Annual landings of blue ling, ling, and tusk in Sub-areas V-XIV.

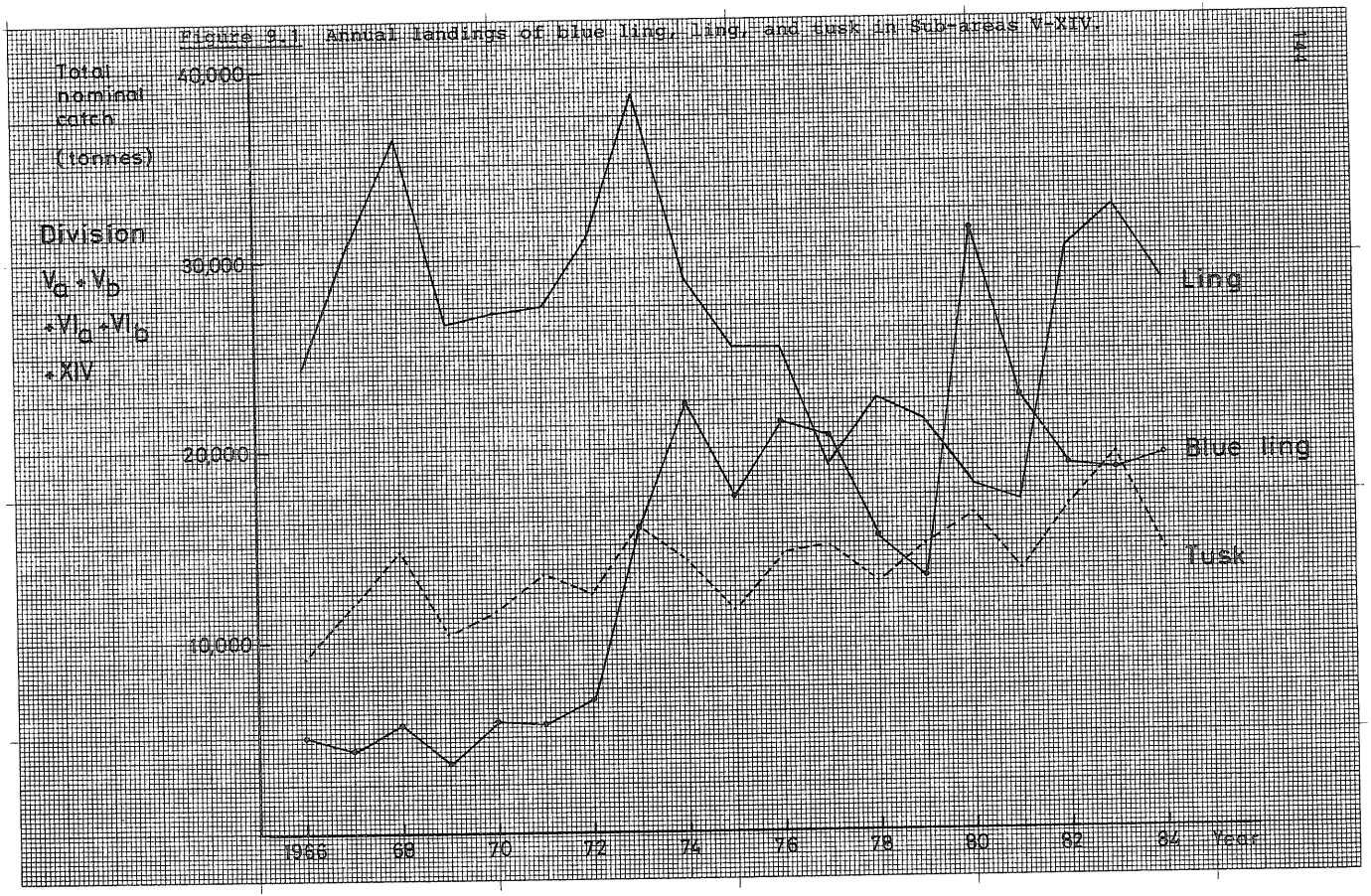


Figure 9.2 Annual landings of blue ling, ling, and tusk in Division Va.

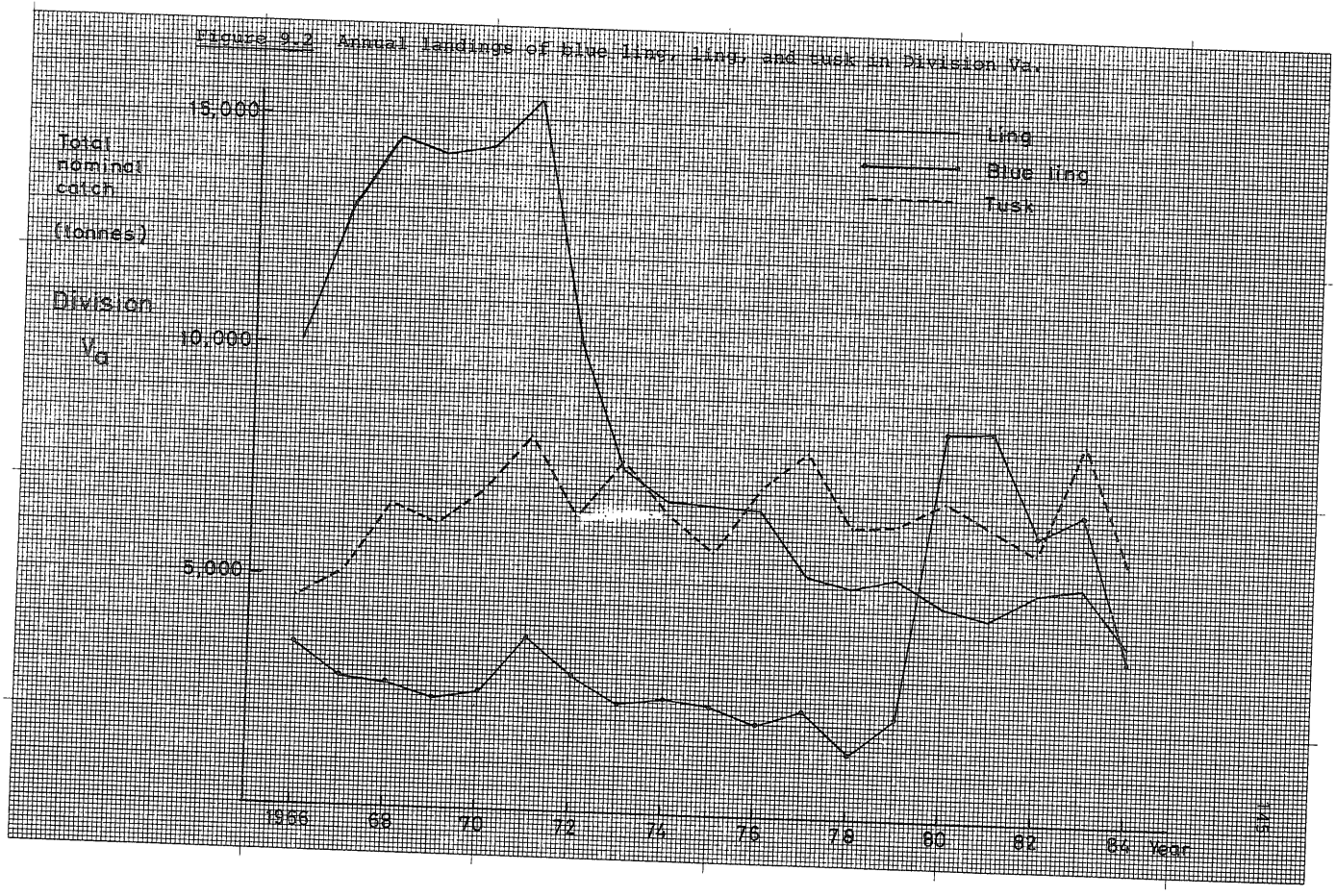


Figure 9.3 Annual landings of blue ling, ling, and tusk in Division Vb.

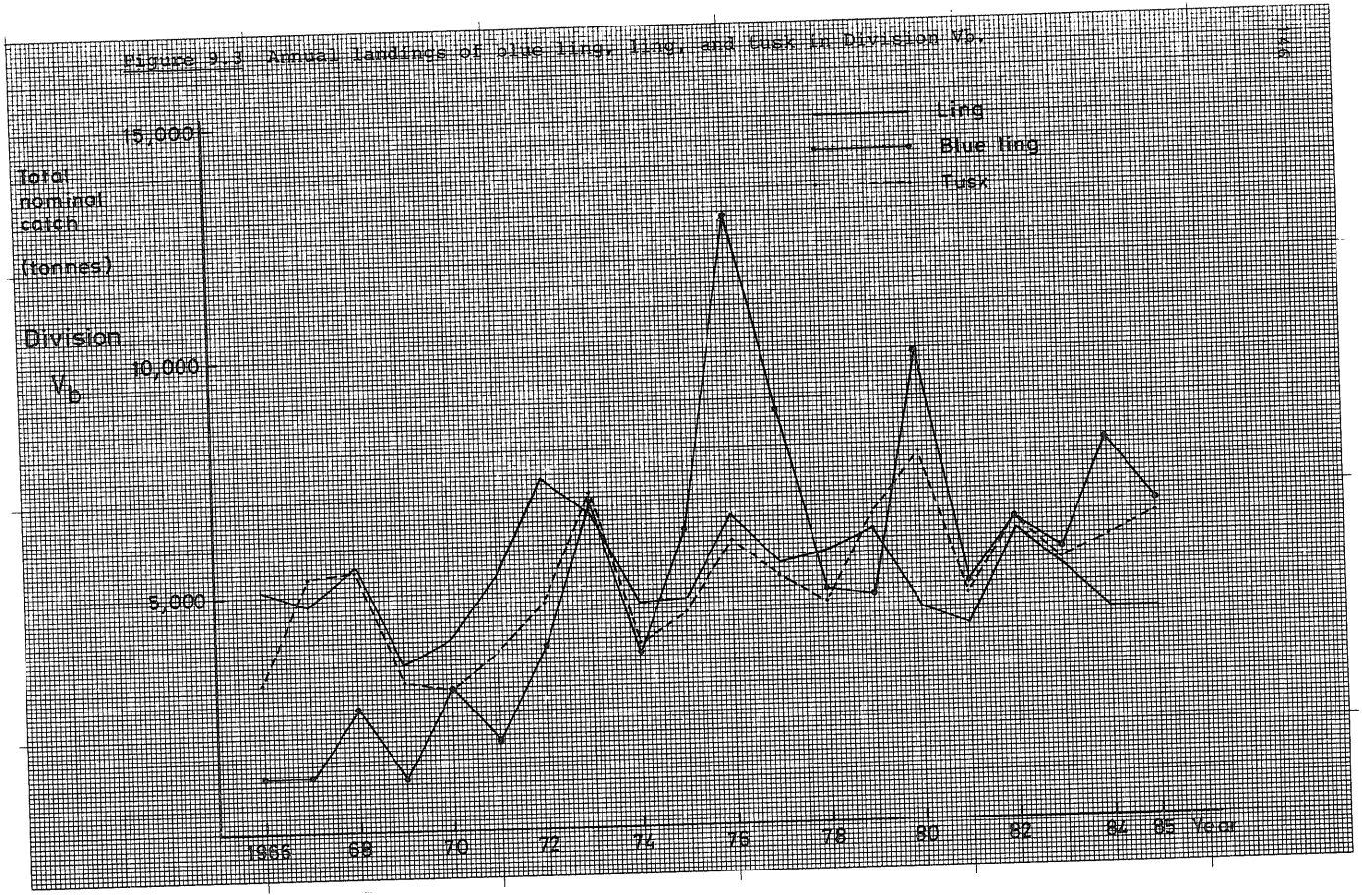


Figure 9.4 Annual landings of blue ling, ling, and tusk in Division VIa.

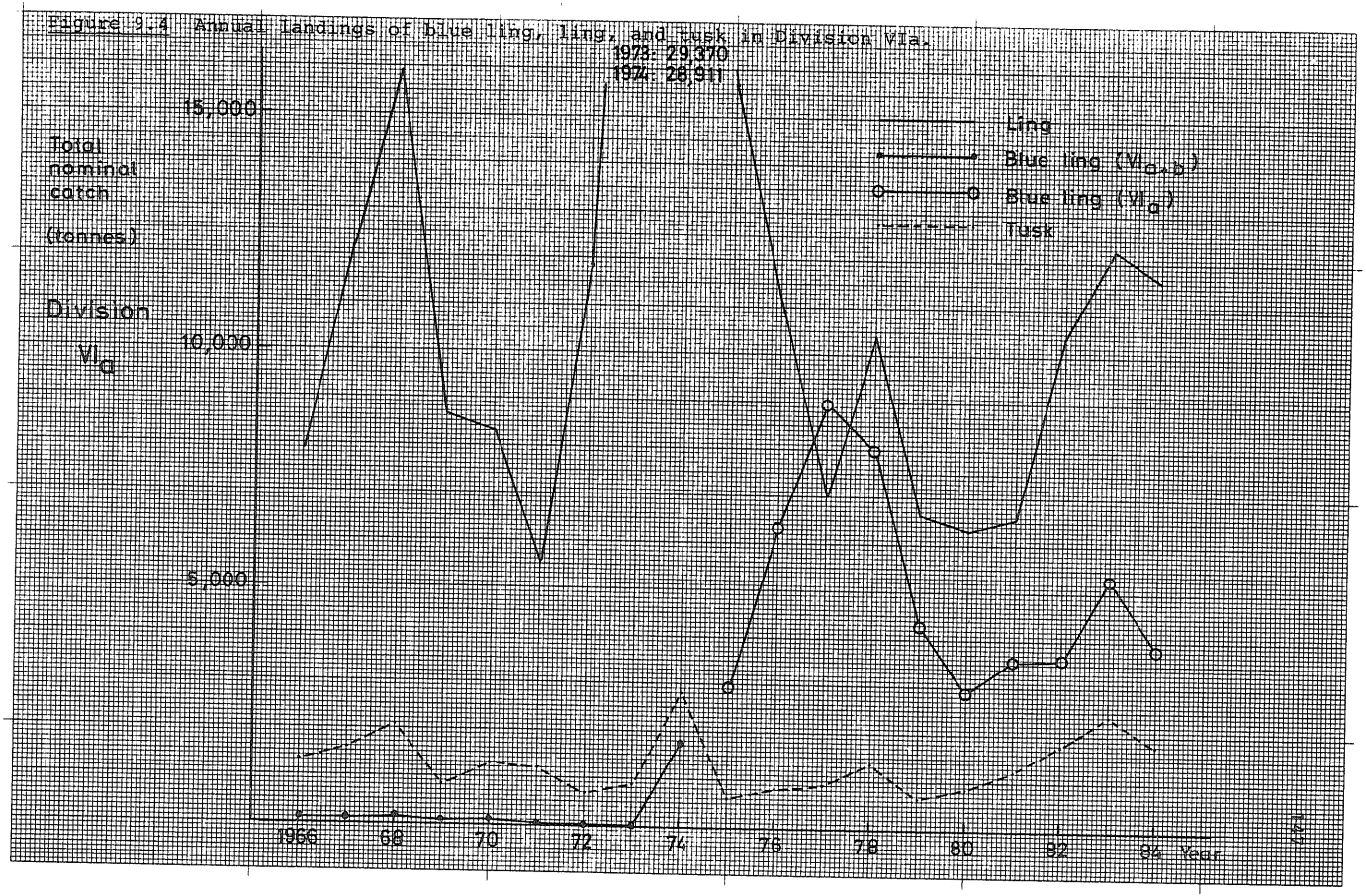


Figure 9.5 Annual landings of blue ling, ling, and tusk in Division VIb.

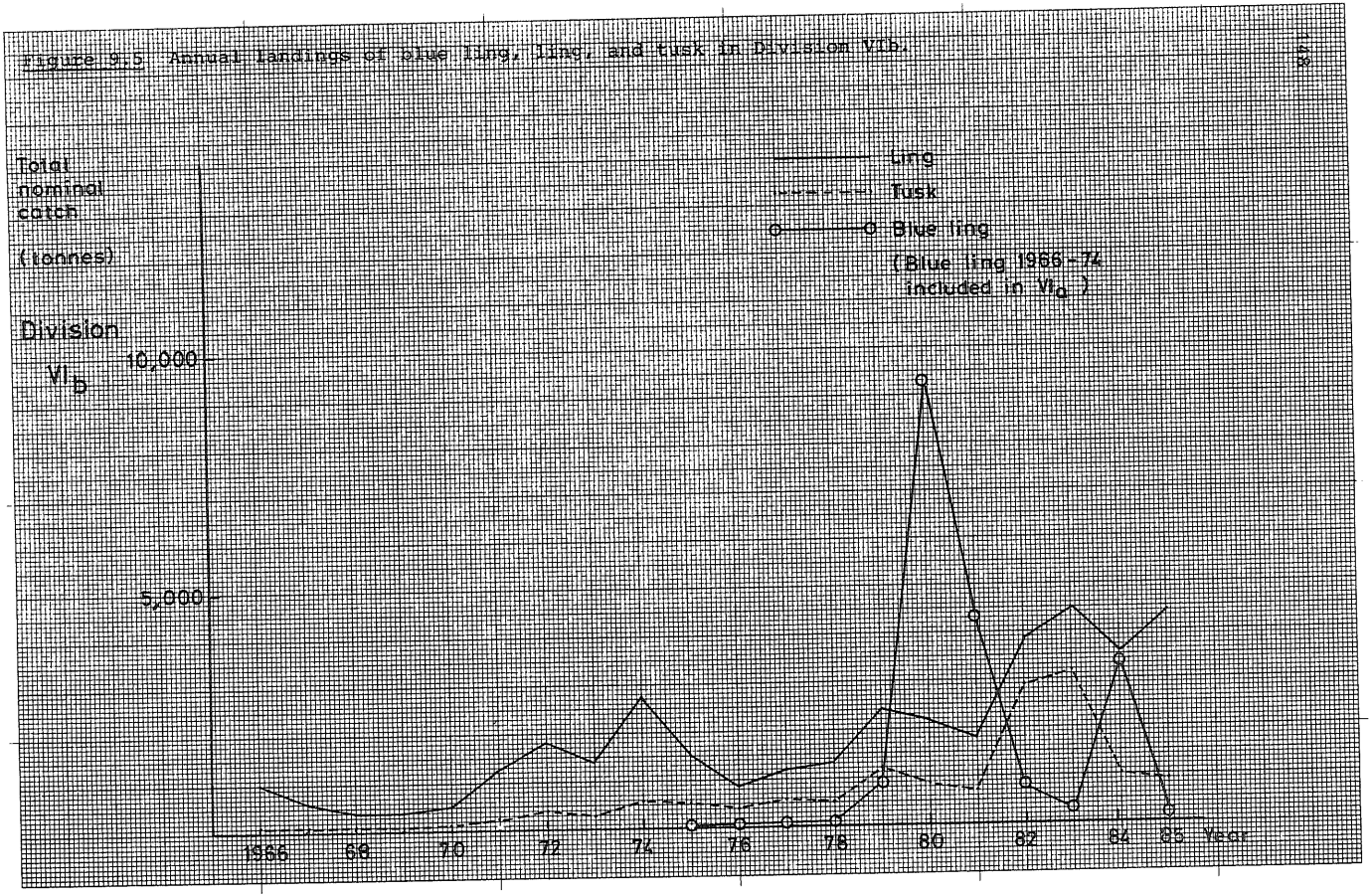


Figure 9.6 Annual landings of blue ling, ling, and tusk in Sub-area XIV.