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REPORT OF THE ICES ADVISORY COMMITTEE ON FISHERY MANAGEMENT, 1981

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REPORT OF ACFM TO THE 20th ANNUAL MEETING OF NEAFC

INTRODUCTION

At the two Dialogue Meetings between representatives of the management authorities and ICES scientists, clearer ideas emerged as to how the advice on fish stock management should be given in order to improve the usefulness of this advice to the management bodies.

The Biological Basis of the Management

Ideally, the biological basis of the management advice should contain a full description of the present state of exploitation of each stock and an assessment of its general productive capacity. This is, however, not always possible in practice, although the methods necessary for this task are available to the scientific community.

The limiting factor is the amount and quality of the data available for assessment work. Reliable catch data are absolutely essential for any meaningful assessment. As has already been pointed out during the Dialogue Meeting, there was a deterioration in the reliability and adequacy of catch statistics over a wide area in recent years. If management want reliable, accurate scientific advice, they must take the necessary steps to ensure that the statistical data base is complete and accurate. Basic assessments of the state of a stock are usually carried out by the relevant ICES Working Groups, but the responsibility for the validity and precision of the assessments, within the constraints imposed by the data available, lies with ACFM. Consequently, the assessments are not approved by ICES before they have been scrutinized by ACFM.

Advice on Fishery Management

The next step in the procedure, the development of advice for fish stock management, should not be entirely the responsibility of ACFM. Ideally, managerial authorities would define their objectives for the different stocks or fisheries and ACFM would thereafter evaluate the biological consequences of these management strategies and define the biological constraints for the attainment of these objectives. Without clear objectives at hand from the managerial bodies, ICES has had to develop certain management objectives which are mainly based on purely biological considerations. These are $F_{0.1}$ and F_{max} , which define a certain level of fishing mortality associated with the optimal use of the growth potential of fish for the existing pattern of exploitation (a full description of these reference points is given in ICES Coop.Res.Rep., No.56).

The pattern of exploitation, i.e., the age of fish at which they are first exposed to fishing and the rate of increase in fishing mortality with age is a very important element in fish stock management. In general (with moderate levels of exploitation), if the age of first recruitment to the fishery is high compared to the total lifespan of a species, the number of year classes which make an appreciable contribution to the catch increases, the stock situation stabilizes and is more resistant to fishing pressure. Fluctuations in yields and catch rates, due to fluctuations in year class strengths, are moderate and the probability of recruitment failure due to a low spawning stock size is very low. A side effect of an optimised exploitation pattern is that prediction of yields can be given with more confidence since the predicted catches depend only to a small extent on recruiting year classes, the strength of which is difficult to assess with sufficient

reliability at the time when the assessment is made. These remarks mainly apply to the long-lived species. Short-lived species, such as North Sea sprat and Norway pout, do not react in the same way (see also Section D.6).

Situations in which an improvement of the exploitation pattern is obviously advisable are indicated in the ACFM report. Such an improvement can be achieved by increases in mesh sizes, and by avoiding the capture of small fish through the closure of nursery areas and by introducing minimum landing sizes. It should be kept in mind that without a suitable combination of measures, an increase in the minimum landing size might simply increase the rate of discarding instead of improving the exploitation pattern.

Since the present level of fishing is far beyond F_{max} or $F_{0.1}$ in many fish stocks in the NE-Atlantic, it is obvious that the immediate application of F_{max} or $F_{0.1}$ as management objectives would require a drastic and rapid cutback (i.e., spread over only one year) in yield from these stocks. In these cases, ACFM has, in addition, calculated the consequences of gradual reduction towards a more optimal situation. This stepwise reduction is also recommended because we at present are not able to fully assess the impact on the ecosystems from major changes in the abundance of several of the main fish stocks in the system.

Types of Advice in This Year's Report

In the light of the discussion during the Dialogue Meetings, ACFM has this year adopted the following principles for presentation of its advice in consideration of the repeated requests of managerial authorities to present options within safe biological limits.

In the present report, stocks are grouped into the following categories for the purpose of providing management advice:

1. Stocks which are depleted or suffering from recruitment failure. In these cases, ACFM shall not calculate options but shall recommend a single figure.
2. Stocks which are fished at levels largely in excess of the levels indicated by biological reference points. In these cases, ACFM shall give options inside safe biological limits, and shall recommend one of these options, according to the general principles of aiming at more stable levels.
3. Stocks which are fished at levels not very different from the biological reference points. In these cases, ACFM shall give options inside safe biological limits, but shall not recommend any particular one of these. It shall only indicate a preference, which is in line with the general principles mentioned above.
4. Stocks where at present it is not possible to carry out any analytical assessment with an acceptable reliability. In these cases, ACFM shall indicate precautionary TACs to reduce the danger of excessive effort being exerted on these stocks.
5. In cases where fisheries on a stock are not subject to TAC regulation, there may be a danger of catches taken from stocks of the same species in adjacent areas being misreported as having been taken in areas of unregulated fisheries. To reduce the risk of this happening, ACFM, on occasion at the request of management bodies, has advised the implementation of TACs, and their levels on this basis. As in the majority of

cases, the data on these stocks are inadequate for analytical assessment, they too will generally be recommended as precautionary TACs based on historical catch levels.

The summary tables will be footnoted to indicate which type of TAC has been advised.

Last year, ACFM, responding to the explicit request, added to its Report Figures which showed the effects of various changes in fishing mortality on yield and spawning stock biomass in the year for which the advice is given and for the following year respectively. These Figures may serve as additional information if managers want to consider options other than those given in the text of the ACFM Report. However, these graphs should not be considered in isolation, since they provide information for one year only and do not give any information on medium or long-term prospects. Different options have to be evaluated against the historic development of yields, fishing mortalities and spawning stock biomass, as well as in the light of the comments on the options given by ACFM concerning the medium and long-term prospects.

If managers so wish, ACFM would be ready to add to these Figures tables and figures indicating the short, medium and long-term consequences of certain fishing mortality levels. In order not to end up with an endless number of figures, it would be necessary in this case to select a restricted number of mortality levels. Figures showing past trends in fishing mortality, spawning stock sizes and yield (which are at present only in the Working Group reports) can also be included.

The TAC as a Regulatory Instrument

At the Dialogue Meetings, criticism has been expressed of the TAC regulatory instrument. Side effects of this seem to have been misreporting of catch data, and a general deterioration of the data base. Probably every restrictive system will cause the same problems, and as long as the fishing effort (number of vessels) is not adjusted to the biological capacity of the stocks, every managerial approach will have to be restrictive with consequential problems in the short term.

It has to be remembered that a TAC is designed to control the proportion of the stock that is removed, or the fishing mortality rate. A TAC is only one of several indirect methods of controlling the fishing mortality. A more direct and thus a more efficient method is to control the effective fishing effort directly. This is entirely possible for some species/stocks if more extensive data on the harvesting abilities of the fleets are collected and analysed by the Working Groups. ACFM has this year urged the Working Groups to collect data on fishing fleets and effort, and it is hoped that this will have some effect on the next year's round of Working Groups.

For some species, their behaviour (such as, for example, schooling on specific spawning locations) allows a reduced amount of fishing effort to maintain high fishing mortality. In addition, in some fisheries there are many different vessels of various sizes and efficiencies, and this may make it impossible in the near future to calculate meaningful conversion factors for the fleet components. In these situations, the control of fishing effort is thus not appropriate for controlling fishing mortality.

Other Points at the Dialogue Meetings

The point has been made at the Dialogue Meetings that the ACFM Report is written in a very technical language, making it difficult for non-scientists to pick out the main points of interest to management. However, ACFM feels that it would be very difficult to avoid ambiguities in the description of the rather complex assessments without using the proper scientific language.

Other Points of Clarification

Finally, to clarify a point which seems to have caused confusion in some cases, it should be noted that the TACs calculated by ACFM do not discriminate between gears and types of fishing. Every tonne removed from the stock irrespective of area, gear, or if it is taken in a directed or undirected fishery, has to be counted against the TAC.

It should also be noted that with the new timetable of ICES with one ACFM meeting in July and the other in November, three Working Groups do not meet until later in the year. These are: North Sea Flatfish Working Group; Arctic Fisheries Working Group; Atlanto-Scandian Herring and Capelin Working Group, dealing with the capelin stocks.

Advice for the stocks covered by these Working Groups will be provided in November 1981.

A. REVIEW OF NOMINAL CATCHES IN NEAFC AREA, 1970-79

1. A general review of fish catches in the Convention Area from 1970 to 1979 is given in Tables 1-3. The tables, which are based on annual nominal catch data reported by national statistical offices for publication in ICES "Bulletin Statistique" (and which may not necessarily be in agreement with figures used by Assessment Working Groups), show for each NEAFC region:

- (i) the nominal catch of all species combined;
- (ii) the catch in the main fishing areas of:
 - (a) pelagic species (such as herring, sprat, mackerel, horse mackerel and capelin);
 - (b) demersal species (comprising gadiforms - codfishes; demersal percomorphs - redfishes, gurnards, sandeels, etc.; pleuronectiforms - flatfishes);
 - (c) each of the main species within the pelagic and demersal fish groups.

Freshwater and anadromous species, invertebrates, seaweeds and catches by non-member countries of ICES are not included in these tables.

2. The main changes in the fish catches in each Region for the years under review are summarised below. A chart showing the Regions, Sub-areas and Divisions referred to is found at the end of this report. It should be noted, however, that the boundaries of the Regions, Sub-areas and Divisions were drawn for statistical purposes, and the grouping of catches into these spatial units does not necessarily accord with the distributional pattern of the individual stocks.

A combined table of recent catches, as estimated by ICES Working Groups using biostatistical data for assessment purposes (which do not necessarily correspond to the officially reported nominal catch data), and recommended TACs by areas and/or stocks is given on pages 92-95 (Table 4).

Region 1 (Table 1)

3. Having reached the record level of 6 301 000 tonnes in 1977, the total production of all species combined dropped by 880 000 tonnes (or 14%) to 5 421 000 tonnes in 1978. Some recovery, however, occurred in 1979, when the total equalled 5 613 000 tonnes. This figure, in addition to the sum of total catches of pelagic and demersal species in Sub-areas I, II, V and XIV, includes 13 000 tonnes of cartilaginous species and 18 000 tonnes of unsorted and unidentified fish, as well as the 17 000 tonnes of total catch from Sub-area XII, which was dominated by Cod, Redfishes and Roundnose Grenadier.

4. In Sub-areas I and II the 1979 total catch of 3 527 000 tonnes of pelagic and demersal species combined accounted for half of the 1979 increase in the total catch from the Region compared to 1978, though it was still about 1 000 000 tonnes short of the record 1977 level of 4 553 000 tonnes.

The total catch of Pelagic Species decreased further to 1 843 000 tonnes. This resulted from reduced Capelin catches, which affected the total catch from these Sub-areas. Having reached a peak of 2 940 000 tonnes in 1977, catches of this species dropped to 1 829 000 tonnes in 1979. Herring catches were reduced to 4 000 tonnes in 1979, from 12 000 tonnes in 1978. The 10 000 tonnes of "Other Pelagic Species" were predominated by Mackerel, followed by Sprat.

The declining trend of recent years in total catches of Demersal Species was arrested in 1979 with the catch of 1 684 000 tonnes. This, however, was achieved due to a further sharp increase in the "Other Demersal Species" category, where Blue Whiting predominated accounting for 90% of the total catch of 775 000 tonnes. Catches of Cod continued to decline, and at 485 000 tonnes were the lowest in the 1970's. Catches of Haddock, though still far below the average, increased to 110 000 tonnes from the 1978 level of 97 000 tonnes. Catches of Polar Cod, which were high in the early 1970's (e.g. 348 000 tonnes in 1971), became literally negligible in 1979. Catches of Saithe increased to 164 000 tonnes in 1979, or by 10 000 tonnes from the 1978 level, but were still the second lowest during the period under consideration. Catches of Redfishes continued to decline after the record levels had been achieved in 1975-1976, but at 113 000 tonnes were still well above the pre-1975 average level. Flatfish catches of 37 000 tonnes were the lowest in the 1970's; as recently, most of the catch (47%) consisted of Greenland Halibut.

5. In Sub-area V the total catch of pelagic and demersal species combined continued to increase and at 1 808 000 tonnes reached the record level in 1979.

These increases of recent years were mainly due to Capelin catches, which grew from about 187 000 tonnes in 1970-1971 to 868 000 tonnes in 1979. The total catches of Pelagic Species were predetermined by this trend, since there were virtually no other commercially important pelagic species, except Herring, catches of which were also growing gradually since 1972 and reached 45 000 tonnes in 1979.

The total catch of Demersal Species of 895 000 tonnes in 1979 was, together with that of 1971, the second highest in the 1970s, though the leading species' composition was somewhat different than in 1971. Cod catches, at 397 000 tonnes, started to recover in 1979 from the lowest 1978 level of 363 000 tonnes, although were still more than 100 000 tonnes short of the record 1970 level. The 68 000 tonnes of Haddock caught in 1979 were 5 000 tonnes higher than in 1978 and

slightly above the average level. Saithe catches, at 91 000 tonnes, slightly recovered from the lowest 1978 level of 78 000 tonnes, though still remained far below the average level of the 1970's. After a sharp drop to 45 000 tonnes in 1978, catches of Redfishes increased to 77 000 tonnes in 1979, which was slightly above the average level. Catches of Flatfish were also restored, to the 1977 level of 26 000 tonnes. As before, Greenland Halibut dominated the catches (66% of the total). Catches of "Other Demersal Species", which started to increase markedly in 1976, dropped slightly in 1979, to 236 000 tonnes from 257 000 tonnes in 1978. As before, Blue Whiting was clearly preponderant in the catches (71% of the total or 169 000 tonnes).

6. In Sub-area XIV the total catches of all species combined increased to a record level of 230 000 tonnes, which is five times higher than the average 1970-1975 level. The increase was accounted for by Capelin catches, which made up 83% of the total, having reached 192 000 tonnes from a zero level in 1975. After an explosive development in the Redfish fishery in 1976, when 114 000 tonnes were caught, the 1979 catch amounted only to 16 000 tonnes (14 000 tonnes in 1977 and 19 000 tonnes in 1978). Cod catches decreased further to 4 000 tonnes, followed by 3 000 tonnes of Catfishes.

Region 2 (Table 2)

7. The total catch of all species combined, of 3 910 000 tonnes, was the lowest in the 1970's. The average 1977-1979 catches were only 78% of the record 1975-1976 catches. The 1979 figure, in addition to the sum of total catches of pelagic and demersal species in Sub-areas IV, VI, VII and Division IIIa, includes 69 000 tonnes of cartilaginous species and 62 000 tonnes of unsorted and unidentified fish.

8. In Sub-area IV and Division IIIa, which is the leading fishing area in the Region, the 1979 total catch of pelagic and demersal species combined was also the lowest in the 1970's, or 210 000 tonnes lower than in 1978 (949 000 tonnes lower than the record 1974 level).

This resulted from the trend in both total Pelagic and Demersal Species, the former accounting for only 717 000 tonnes of the total. As was the case since 1975, Sprat, at 478 000 tonnes, continued to be the leading species in the catches, although at the level of only 63% of the peak catch in 1975. The stringently regulated Herring fishery yielded only 79 000 tonnes, or 9% of the 1970 catch. Mackerel catches, which were also severely regulated, remained practically at last year's level, with 155 000 tonnes. Horse Mackerel catches, at 2 000 tonnes, decreased even further, and catches of "Other Pelagic Species" amounted to 3 000 tonnes, as in 1978.

The 1979 total catch of 1 973 000 tonnes of Demersal Species declined further, by 181 000 tonnes from the 1977 level, although it still was nearly 90% of the average in the 1970's. Cod catches, at 263 000 tonnes, decreased by 43 000 tonnes from the higher 1977 level, though they were still only 3% below the average. Catches of Haddock, at 91 000 tonnes, were the lowest in the 1970's and 582 000 tonnes below the record 1970 level. Whiting catches of 159 000 tonnes were 3% below the average. Catches of Norway Pout recovered slightly from the low 1978 catch of 347 000 tonnes, but were still 443 000 tonnes below the all-time record level of 833 000 tonnes in 1974. Catches of Sandeels, on the other hand, declined to 637 000 tonnes from the record 1978 level of 810 000 tonnes, but were still 27% above the average. Saithe catches of 115 000 tonnes, decreased by 25 000 tonnes from the 1978 level and became the lowest in the 1970's. Plaice catches increased by 8 000 tonnes from the 1978 level, to 132 000 tonnes in 1979. Sole catches were at a very low level of 12 000 tonnes

in 1979. Catches of "Other Flatfish Species" of 33 000 tonnes were the highest in the 1970's; the major part of the catch consisting, as before, of Dab, Lemon Sole and Turbot, in the order listed. The marked increase in catches of "Other Demersal Species", which started in 1977, continued in 1979 with catches reaching 141 000 tonnes. Most of the increase was due to a rapid development of the Blue Whiting fishery which yielded 94 000 tonnes in 1979, or 66% of the total in this category, in comparison with 2 000 tonnes reported in 1976.

9. In Sub-areas VI and VII the total 1979 catch of pelagic and demersal species combined increased further by 304 000 tonnes over the low 1977 level and was 13% above the average.

The total catch of Pelagic Species has also increased further to 667 000 tonnes in 1979, or by 197 000 tonnes from the low 1977 level. Most of the increase was due to the record Mackerel catches, which at 528 000 tonnes were 40 000 tonnes higher than in 1978 and 8 times higher than in 1970. Strictly regulated Herring catches amounted to only 45 000 tonnes in 1979. Sprat catches returned to the 1976-77 level after the record catch of 32 000 tonnes in 1978. Horse Mackerel catches recovered a little to 51 000 tonnes in 1979 after the lowest catches in 1977-78, but were still 130 000 tonnes below the record 1976 catch. Catches of "Other Pelagic Species" raised to 22 000 tonnes in 1979, with Pilchard accounting for 80% of the total.

The total catch of Demersal Species, of 422 000 tonnes in 1979, continued to recover after a drop to 315 000 tonnes in 1977. This was mainly caused by a record catch of 266 000 tonnes of "Other Demersal Species", where Blue Whiting was a leading species (130 000 tonnes, or 49% of the total), followed by Saithe, Norway Pout and Monk. Cod catches increased to 38 000 tonnes in 1979 and became the second highest figure in the 1970's. Haddock catches continued to decline and, at 20 000 tonnes, were the lowest on record. Whiting catches of 46 000 tonnes returned to the 1974 and 1977 level. Hake catches remained at a low level, though with 20 000 tonnes in 1979 there was an increase of 3 000 tonnes over the 1977-78 level. Flatfish catches, of 32 000 tonnes in 1979, were 3 000 tonnes below the average level of the 1970's, with Plaice and Megrin making up, as before, more than half of the total; catches of Sole accounted for 18% of the total.

Region 3 (Table 3)

10. The total production of all species combined was at the lowest level of 597 000 tonnes in 1979, 126 000 tonnes below the 1977 level and 18% below the average level. This figure, in addition to the sum of total catches of pelagic and demersal species in Sub-areas VIII, IX and X, includes 7 000 tonnes of cartilaginous species and 60 000 tonnes, or 10% of the total, of unsorted and unidentified fish.

Total catches of Pelagic Species, with 383 000 tonnes in 1979, followed the trend in the total production referred to above. Catches of Horse Mackerel declined further to 91 000 tonnes in 1979 from 191 000 tonnes in 1977 and became 37% lower than the average figure. At 28 000 tonnes in 1979 the decline in Mackerel catches seems to have been arrested; this figure does not include 7 000 tonnes of Chub (=Spanish) Mackerel catches, which were included in pre-1977 figures. Having increased to 162 000 tonnes in 1978 from the low 1977 level, catches of Pilchard decreased to 145 000 tonnes in 1979 and became 6% lower than the average figure. Catches of "Other Pelagic Species" decreased further from 136 000 tonnes in 1978 to 119 000 tonnes in 1979, but still remained slightly above the average level; Anchovy, Albacore and Chub Mackerel were the leading single species items in the catch.

The 1979 total catch of Demersal Species, at 147 000 tonnes, was 20 000 tonnes below the 1978 level, although Hake catches recovered from the lowest 1978 level of 29 000 tonnes having reached 42 000 tonnes in 1979. This, however, was counterbalanced by a decrease in catches of "Other Demersal Species" from 138 000 tonnes in 1978 to 105 000 tonnes in 1979. There was, again, a change in the leading species' composition within this category: shares of Megrin and Blue Whiting shrunk to insignificant levels, whereas Monk and Seabreams accounted for 15% and 13% of the total in 1979.

The decrease in total catches of pelagic and demersal species combined from 608 000 tonnes in 1978 to 530 000 tonnes in 1979 followed, in general, the trend in total catches of Pelagic Species.

B. REGION 1 FISHERIES

B.1 Cod Stocks off East Greenland

11. The Working Group on Cod Stocks off East Greenland met at ICES headquarters from 3-10 March 1981 to:

- (1) evaluate and collate data necessary to assess the state of the stock including migrations and sources of progeny;
- (2) provide advice on a TAC for this stock in 1982;
- (3) assess the short-term losses and long-term gains which would result from an increase in mesh size up to 140 mm.

B.1.1 Migrations in Greenland-Iceland waters and larval drift

12. Tagging experiments carried out at Greenland and Iceland show that mature cod at West Greenland migrate to East Greenland and sometimes to Iceland. Tagging experiments at East Greenland also show that mature cod from that area migrate to Iceland. On the other hand, immature cod seem not to emigrate from East Greenland to Iceland, but in some years immature cod migrate from East Greenland to the West Greenland stock. Tagging experiments at Iceland show that migration of cod from Icelandic to Greenland waters occurs very seldom and could be ignored in stock assessments. Migrations from East Greenland waters to Iceland can therefore be regarded as a one-way migration. However, the fact that East Greenland does receive immigrants from West Greenland complicates the calculation of emigration rate to Iceland.

From the results of extensive Danish tagging experiments carried out in Greenland waters in the period 1946-65 the ICES North Western Working Group came to the conclusion at its meeting in 1970 that the actual overall net proportion of mature cod emigrating from East Greenland and the southern part of West Greenland (NAFO Div. IE-IF) was about 25% per year, corresponding to a coefficient of emigration (E) of 0.29. Results of experiments in 1972-78, available for the present meeting, did not allow the Working Group to make any revision to the findings of the 1970 meeting, since the scale of material in these experiments was very small. For the emigration from the West Greenland stocks the Working Group adopted the values in recent years' assessments by ICNAF/NAFO of West Greenland cod, i.e. an overall emigration coefficient of $E = 0.05$.

However, the Working Group stresses the need for keeping these parameters under constant and critical review, since it is most likely that the migration rate differs considerably between years and year classes.

13. From egg and larval surveys cod eggs have been found in an almost continuous belt from Iceland to East Greenland, along the East Greenland coast, round Cape Farewell and over the banks at West Greenland. From 0-group surveys carried out in the East Greenland-Iceland area since 1970 it becomes quite evident that the drift of 0-group cod from the Iceland spawning grounds to the different nursery areas at Iceland varies from year to year. The same applies to the drift of 0-group cod from Iceland with the currents to East Greenland waters. In some years no larval drifts to the Greenland area seem to have taken place, while in the other years there were some, and in some years, like 1963 and 1973, considerable numbers drifted to East Greenland waters.

The 1963 and 1973 year classes have been very important to the fisheries both off West and East Greenland. Tagging results have shown, that when these two year classes became mature, large numbers of fish from West and East Greenland waters appeared in the spawning area off the southwest coast of Iceland.

B.1.2 Recent trends in the fishery

14. The fishery for cod at East Greenland can be divided into two components: an inshore and coastal fishing for cod mainly carried out by hand- and longlines from small boats (<50 GRT) and a trawl fishery mainly carried out by trawlers larger than 1 000 GRT on the offshore banks and along the slope of the Greenland Shelf from the Dohrn Bank southwards to Cape Farewell. This trawl fishery, which prior to 1977 accounted for about 90% of the landings, is to a great extent a mixed fishery on cod and redfish. Due to that the Working Group was unable to derive any figures for fishing effort on cod. In addition, non-reporting of unauthorised fishing in recent years would make any estimate of fishing effort very unreliable.

15. Recent catches and recommended TACs, in thousand tonnes:

1974	1975	1976	1977	1978	1979	1980	1982
Actual catch	Actual catch	Actual catch	Actual catch	Actual catch	Actual catch	Actual catch	Rec. TAC
7	6	13	18 ¹⁾	26 ¹⁾	34 ¹⁾	12 ^{1) 2)}	6

- 1) Including estimates of unreported catches made by the Working Group.
- 2) Including 2 000 tonnes of estimated discards.

Landings of cod from Sub-area XIV declined from 32 000 tonnes in 1971 to 6 000 tonnes in 1975 (Table 5). Officially reported catches continued to be low, but there has been additional unauthorised fishing since 1977, catches of which have not been officially reported to ICES. The total estimated catches, on the other hand, show an increase to a peak value of 34 000 tonnes in 1979. A more effective control of fishing activity in 1980 seems to have decreased the effort and catches compared to those estimated for the period 1977-79.

B.1.3 Status of the stock

16. The Working Group used a VPA model for assessments which corrects for migration. Since no data on effort were available, the Group had very little additional information to guide it in its choice of input F values for 1980, and, therefore, the values used in a conventional VPA analysis used by Horsted et al. (1980) were adopted.

Results of VPA showed that when the abundant 1961, 1962 and 1963 year classes passed out of this fishery about 1973, fishing mortality became reduced as the fishery became less attractive. However, with the recruitment of the 1972 and 1973 year classes in 1976 fishing increased and fishing mortality reached a high level again.

Spawning stock biomass (ages 7 and older) reached its lowest recorded level in 1978 of only 20 000 tonnes, but the recruitment of the 1972 and 1973 year classes to the spawning stock in 1979 and 1980 has resulted in a temporary improvement. However, the subsequent year classes all appear to be of below the average abundance. Changes in the total stock biomass (ages 3 and older) have shown similar trends to those in the spawning stock biomass. According to the VPA result the 1980 total stock biomass estimate is 77 000 tonnes.

In 1980 a survey to estimate the groundfish biomass in East Greenland waters was carried out by the Federal Republic of Germany. On the basis of this survey the biomass of cod was estimated to be 92 000 tonnes with an 80% confidence interval of 61 000 - 123 000 tonnes.

B.1.4 Total allowable catch

17. Since there is no clear indication of what the catch in 1981 is likely to be, the Working Group prepared catch predictions for 1982 for an assumed value of the 1981 catch of 12 000 tonnes.

The present (1980) fishing mortality value is $\bar{F}_{6-10} = 0.27$, which is below $F_{0.1} = 0.4$. However, at present, probably the most important consideration in relation to management options is the maintenance of a viable spawning stock. In addition to a possible dependence on the spawning stock, recruitment at Greenland appears to be very dependent on environmental temperature.

Under the assumption of a catch of 12 000 tonnes in 1981, the spawning stock biomass continues to decline from 1981 to 1982. In subsequent years a downward trend in the spawning stock biomass is expected, unless there is an improvement in the recruitment. Higher levels of fishing mortality would result in a spawning stock of even lower size. Therefore, there is a need to restrict fishing to prevent the spawning stock biomass from any further decline in order to ensure a reasonable probability of good recruitment when environmental conditions are favourable. The catch of around 10 000 tonnes in 1982 at $F_{0.1}$ would decrease the spawning stock biomass further below the level estimated for 1982, whereas at a catch of 6 000 tonnes (with the corresponding F of 0.24) the spawning stock biomass is expected to increase slightly above the 1982 level at the beginning of 1983.

The ACFM, therefore, recommends a TAC of 6 000 tonnes in 1982.

Catches in 1982 and the resulting spawning stock biomasses in 1983 at varying levels of F in 1982 are shown in Figure 1.

18. The predicted catches for 1982 refer to total removals from the stock, i.e. catches in directed fisheries, by-catches in fisheries for other species and discards. In 1980 and 1981 considerable discarding of large fish took place due to by-catch restrictions in the redfish fishery. If management is aiming at a certain level of fishing mortality, provisions have to be made to solve the discarding problem in order to achieve the management objective.

B.1.5 Mesh change assessment

19. The effects of a change from 120 mm minimum mesh size in the trawl cod end to both 140 mm and 155 mm were calculated. No selection experiments have taken place in East Greenland but a selection factor of 3.4 from experiments in NAFO Div. 1D was adopted.

The results indicate that there will be very little long-term change in yield by increasing the minimum mesh size up to 155 mm at any likely levels of fishing mortality. The present exploitation pattern is determined more by availability than by selection. The short-term losses in yield are also negligible. The long-term improvement in spawning stock biomass will be about 6% for a 140 mm mesh size and 10% for a 155 mm mesh size.

B.2 Prawn (*Pandalus borealis*) at East Greenland

20. Recent catches, in tonnes:

1978	1979	1980
363	1 285	7 720 ^{x)}

x) Preliminary

Prawns have been observed on several occasions in the Dohrn Bank area through the years. In 1978 an Icelandic vessel started a fishery on the Icelandic side of the 200 mile limit between Greenland and Iceland. In 1980 a large-scale international fishery took place on the Greenland side of the limit during the period from March to July, resulting in a yield of several thousand tonnes. During the summer months the fishery virtually stopped due to very low catch rates, but later there was some recovery of it in September-October.

The main area in the spring season was on Dohrn Bank transected by 30°W longitude and 66°N latitude. In the autumn the center of distribution had shifted northwards to an area transected by 66°45'N and 28°30'W. Icelandic research trawling and Greenland and Danish exploratory trawling indicated that prawn were present outside the main areas, but in very low concentrations. Catch rates by various countries in 1980 are given in the text table below, in kilogrammes per hour:

Month	Denmark and Greenland	Faroe Islands	France	Iceland	Norway
March	-	1 015	-	-	900
April	734	641	-	-	691
May	401	373	-	-	378
June	117	195	-	108	101
July	-	-	69 ¹⁾	84	-
August	19	-	-	109	227 ¹⁾
September	212	-	-	125	114
October	125	-	-	99	-

1) Based on low catch figures.

From sampling it is clear that the main fishery in March-May 1980 was exploiting berried females of a very large size. Generally, a difference of 5 mm is found in modes between both females and males and transitionals in East Greenland samples and comparable West Greenland samples.

21. The only biomass estimate produced, based on catch rate data for the main March-July season for one of the fleets in 1980, was not found to be representative of the true stock size. This biomass estimate gave a figure of 23 000 tonnes of fishable biomass in the Dohrn Bank area during the main season. In West Greenland the prawn fishery has been managed by TACs since 1976. These are calculated from assessments of the total fishable biomass. The TAC is calculated as the proportion that can be allowed taken under the constraint that the virgin spawning biomass in the area should not be reduced by more than 50%. At present, with no firm assessment of the total fishable biomass, it is not possible to indicate what the TAC for East Greenland would be, calculated by the same method.

To improve this situation it is necessary to obtain catch rate data for the whole year supplemented by trawl surveys or other types of surveys. Fishery has taken place again at East Greenland in the spring of 1981, but catch and catch rate data will not be available until later this year.

22. Considering the very limited information available and the uncertainty about the size of this stock, ACFM agreed that a cautious approach should be taken in the exploitation of this resource.

At the beginning of December 1981 a more specific advice on the current state of this stock can be expected from the Scientific Council of NAFO. ACFM would be in a position to consider it at its next meeting in 1982.

B.3 Redfish in Region 1

23. The Working Group on Redfish and Greenland Halibut in Region 1 met at ICES headquarters from 11-19 March 1981 to:

- (i) assess TACs for 1982 for redfish and Greenland halibut;
- (ii) estimate effective mesh sizes in use for redfish;
- (iii) estimate the short-term losses and long-term gains resulting from an increase in mesh size in Sub-area XIV (to 140 mm) for all species of significant importance in that area;

- (iv) advise on the effectiveness of closed areas for the protection of spawning and nursery grounds of redfish in Sub-area XIV;
- (v) evaluate biological relationships between Greenland halibut and redfish stocks at East and West Greenland.

NAFO scientists have been invited to take part in the evaluation mentioned above.

B.3.1 Selection of a suitable measure of fishing mortality

24. The problem of selecting a suitable measure of fishing mortality was considered. This fishing mortality should be a single figure and applicable to all stages of assessment, e.g., VPA, yield per recruit analysis and catch prediction.

For this purpose, it was decided to use the unweighted mean F for age groups which are contributing most to the catches as such reference fishing mortality. The age ranges selected for the calculation of unweighted average fishing mortalities are given below:

<u>Stock</u>	<u>Sub-area</u>	<u>Range of age groups</u>
<u>S. marinus</u>	I + II	13-24
<u>S. mentella</u>	I + II	8-19
<u>S. marinus</u>	V + XIV	14-23
<u>S. mentella</u>	V + XIV	14-23
Greenland halibut	I + II	7-11
Greenland halibut	V + XIV	8-13

Therefore, it should be kept in mind that fishing mortalities given in this report are not directly comparable with reference Fs in last year's assessments.

B.3.2 Redfish in Sub-areas I and II

25. Recent catches and recommended TACs, in thousand tonnes:

	1977		1978		1979		1980		1981	1982
	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch ¹⁾	Rec. TAC	TAC ²⁾	
Golden redfish (<u>S. marinus</u>)	40	20	32	22	26	19	23	19	14	
Beaked redfish (<u>S. mentella</u>)	146	130	93	135	87	81	78	70	70	
Total	186	150	125	157	113	100	101	89	84	

1) Preliminary.

2) Catch level preferred by ACFM.

Total catches of redfish in the North-East Arctic region decreased continuously from 186 000 tonnes in 1977 to 113 000 tonnes in 1979 (Tables 6 and 7). The preliminary catch figure for 1980 of 101 000 tonnes shows a further reduction in total redfish catches.

The total catch in Sub-area I decreased from 2 500 tonnes in 1979 to 1 700 tonnes in 1980. In contrast to the previous two years, an increase in catches was observed in Division IIa from 66 000 tonnes in 1979 to 73 000 tonnes in 1980. A reduction of catch from 45 000 tonnes to 27 000 tonnes was observed in Division IIb.

B.3.2.1 Sebastes marinus

26. Since no data were available on effort or survey results, the terminal fishing mortality in the VPA was estimated from the development of catches in recent years and a catch curve, which was also used in the previous assessment.

According to the VPA the average fishing mortality was low in the period 1965-73. Since 1974 F increased over the previous level, obviously as a result of higher catches. The average fishing mortality for 1980 was estimated as 0.14, which is between $F_{0.1} = 0.09$ and $F_{max} = 0.24$. Both the total stock biomass and the spawning stock biomass decreased steadily since 1974, whereas in the preceding period the stock biomass seems to have been relatively stable.

27. Catch predictions were based on the assumption that the 1981 TAC for S. marinus of 19 000 tonnes will be taken. This catch level is generating a fishing mortality of about 0.12 in 1981. Catches for 1982 and both total stock and spawning stock biomasses for 1983 have been calculated for different levels of F in 1982 (Figure 2). The selected results of the calculations are given in the text table below:

1981				Management option for 1982	1982				1983	
Stock biom. (≥ 12)	Spawning stock biom. (≥ 15)	\bar{F} (13-24)	Catch		Stock biom. (≥ 12)	Spawning stock biom. (≥ 15)	\bar{F} (13-24)	Catch	Stock biom. (≥ 12)	Spawning stock biom. (≥ 15)
188	149	.119	19.0	$F_{0.1}$	194	133	.09	14.4	207	124
				$F_{82} = F_{80}$			.138	21.5	200	118
				$F_{82} = F_{81}$			.119	19	203	120

Weight in thousand tonnes.

Under all options of fishing mortality considered for 1982 the spawning stock biomass is expected to decrease from 1982 to 1983. A reduction of the fishing mortality in 1982 to the $F_{0.1}$ level of 0.09 would result in a catch of about 14 000 tonnes. Under this option the expected decrease in the spawning stock biomass from 1982 to 1983 is only marginal and the total stock biomass will increase slightly.

ACFM, therefore, considers a catch of 14 000 tonnes as the preferred level for a TAC in 1982.

B.3.2.2 Sebastes mentella

28. The terminal fishing mortality was estimated on the basis of total effort values, which were calculated from catch per unit effort figures both from the USSR and the German Democratic Republic fisheries.

The results from the VPA show that the average fishing mortality was low in the period 1965-74, but increased by a factor of about 6 in the 1975-77 period. Following the trend in the total effort the mean fishing mortality decreased again from 1978. F in 1980 was estimated as 0.20. For comparison, the $F_{0.1}$ and F_{max} values are 0.10 and 0.21, respectively.

The total biomass increased steadily from 1965 to 1975, when the highest level on record was observed. After 1975, the total biomass declined again, obviously as a result of the high catches taken in 1975-77. Since 1978 total biomass remained fairly stable and a slightly increasing trend is indicated. A similar trend was observed in the spawning stock biomass over the same period 1965-80.

29. For catch predictions it was assumed that the recommended TAC of 70 000 tonnes will be taken in 1981. The 1981 TAC would be achieved by an average fishing mortality of 0.16, which corresponds also to that estimated in last year's assessment.

Based on this assumption, several management strategies have been considered. The results of catch predictions are shown in Figure 3 and, for selected reference fishing mortalities in 1982, are also given in the text table below.

1981				Management option for 1982	1982				1983	
Stock biom. (≥ 6)	Spawning stock biom. (≥ 15)	$\bar{F}(8-19)$	Catch		Stock biom. (≥ 6)	Spawning stock biom. (≥ 15)	$\bar{F}(8-19)$	Catch	Stock biom. (≥ 6)	Spawning stock biom. (≥ 15)
690	87	.16	70	$F_{0.1}$	726	93	.10	50	785	113
				F_{max}			.21	100	730	99
				$\bar{F}_{82} = \bar{F}_{80}$			.20	97	733	100
				$\bar{F}_{82} = \bar{F}_{81}$			.16	76	757	106
				TAC 70 000 t			.14	70	765	107

Weight in thousand tonnes.

On the basis of an $F_{0.1}$ of 0.10, the estimated catch for 1982 would be 50 000 tonnes.

The next three options imply a continuation of or an increase in the level of fishing mortality in 1982 compared to 1981.

The last option in the text table considers the continuation of a TAC level of 70 000 tonnes in 1982. The F in 1982 would be reduced to a level of 0.14, which is in line with the general objective of bringing the fishing mortality towards lower levels.

Furthermore, under this stable TAC level of 70 000 tonnes in 1982, both the total stock biomass and spawning stock biomass are expected to increase in 1983 over the 1977-82 level.

ACFM, therefore, considers a catch of 70 000 tonnes as the preferred level of TAC in 1982.

B.3.2.3 Enforcement of redfish TACs in Sub-areas I and II

30. ACFM considered the note on enforcement of redfish TACs made in previous reports. It was agreed to reiterate the recommendation given in paragraph 30 of the report of June 1978 (Coop.Res.Rep., No.85).

B.3.3 Redfish in Sub-areas V and XIV

31. Recent catches and recommended TACs, in thousand tonnes:

	1977		1978		1979		1980		1981	1982
	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch ¹⁾	Rec. TAC	Rec. TAC	TAC
Golden redfish (<u>S. marinus</u>)	53	90 ²⁾	48	58	75	58	88	60	60 ³⁾	
Beaked redfish (<u>S. mentella</u>)	31		18	12	23	7	26	25	12 ⁴⁾	
Total	84	90	66	70	98	65	114	85	72	

- 1) Preliminary.
- 2) Precautionary TAC for total redfish.
- 3) Catch level preferred by ACFM.
- 4) Recommended TAC.

A further increase in total catches of redfish from the Irminger Sea stock complex was recorded in 1980. Preliminary catch figures in 1980 were 114 000 tonnes compared to 98 000 tonnes in 1979 (Tables 8-11).

In Division Va the total catch went up from 65 000 tonnes in 1979 to 71 000 tonnes in 1980 as a result of increased effort. In Division Vb catches decreased from 13 000 tonnes to 10 000 tonnes due to quota restrictions.

In Sub-area XIV the total catch increased significantly from 21 000 tonnes in 1979 to 33 000 tonnes in 1980.

B.3.3.1 State of stocks

32. As in previous years, no data were available on effort, catch per unit effort and survey results, which could give fishing mortality estimates for 1980. Therefore, only qualitative information on changes in fishing effort and area distribution could be considered and evaluated in comparison with earlier situations.

B.3.3.2 Sebastes marinus

33. Terminal fishing mortality in 1980 in the VPA was estimated from the ratio of catch in 1977 and 1978 to the 1980 catch, assuming that the total recruited biomass was fairly stable during this period.

It follows from the VPA that the average fishing mortality increased in 1979 and 1980 over the previous level as a result of the high catches in these years. For 1980 the average F was estimated as 0.25, which corresponds to the top level of the yield per recruit curve. No changes have been made in weight at age data and in the exploitation pattern compared to last year's assessment.

The level of the total recruited biomass in the present assessment is somewhat higher compared to the estimate in the 1980 report due to good recruitment and shows an increasing trend since 1973. However, these figures should be considered with caution since they may be influenced by the terminal F values in the VPA. The estimated spawning stock biomass, however, is lower compared to the previous assessment, indicating that fishing mortality might have been underestimated in that assessment.

34. The total catch in 1981 of S. marinus from the Irminger Sea stock complex was assumed to be in the same order of magnitude as in 1980, possibly slightly higher. In the absence of effective management measures for 1981 limiting the catches in Sub-areas V and XIV, it is to be expected that the increasing trend in effort observed in 1979 will continue. On this basis a catch figure of 90 000 tonnes in 1981, associated with an average F of 0.24, was applied to the catch predictions (Figure 4). Several management strategies have been considered for 1982. The results of the selected options are given in the following text table.

1981				Management option for 1982	1982				1983	
Stock biom. (≥ 9)	Spawning stock biom. (≥ 16)	$\bar{F}(14-23)$	Catch		Stock biom. (≥ 9)	Spawning stock biom. (≥ 16)	$\bar{F}(14-23)$	Catch	Stock biom. (≥ 9)	Spawning stock biom. (≥ 16)
1 017	291	.244	90	$F_{0.1}$	996	293	.10	40	1 025	332
				$\bar{F}_{82} = 0.8 \times \bar{F}_{80}$			.20	78	985	305
				$\bar{F}_{82} = \bar{F}_{80} \approx \bar{F}_{81}$			.25	94	970	292
				TAC 82 TAC 81 ¹⁾			.15	60	1 005	315

Weight in thousand tonnes. 1) ACFM recommendation.

Under no option is the spawning stock biomass expected to decrease below the level estimated for the beginning of 1981, which is about 15% above the 1980 level. But only the options associated with $F_{0.1}$ and with a TAC level as recommended by ACFM for 1981 would result in a noticeable increase in the spawning stock biomass. For the consideration of management measures it should also be kept in mind that long-term maintenance of the present high catch level associated with high and probably increasing fishing mortalities would result in a decline in the spawning stock biomass.

Long-term catch levels are about 60 000 tonnes to 65 000 tonnes for $F_{0.1}$ assuming average recruitment. A catch of 60 000 tonnes in 1982 would be associated with an F value where the yield per recruit curve approaches the top level.

On this basis, ACFM considers a catch of 60 000 tonnes as the preferred level for a TAC in 1982.

B.3.3.3 Sebastes mentella

35. Terminal fishing mortality in 1980 in the VPA was estimated from qualitative information on changes in fishing effort and the development of catches in recent years.

The estimated F of 0.26 for 1980 is of the same order as that in 1979 and somewhat below the fishing mortality in 1976 and 1977, when the highest values were observed. The yield per recruit curve for this stock has a maximum at $F_{max} = 0.18$, therefore the average F for 1980 is beyond F_{max} . The $F_{0.1}$ value corresponds to 0.09.

The downward trend in the spawning stock biomass and total stock biomass which has been shown in the previous assessments, continued in 1980.

36. The estimated catch level of 25 000 tonnes of S. mentella in 1981 is at the same level as that of 1980 and corresponds to the TAC recommended by ACFM. The assumed catch figure for 1981 is generating a fishing mortality of 0.28, which is above the level in 1980. Catch predictions for 1982 have been made using different values of fishing mortality (Figure 5).

The results of the selected options are summarized in the text table below:

1981				Management option for 1982	1982				1983	
Stock biom. (≥ 9)	Spawning stock biom. (≥ 16)	\bar{F} (14-23)	Catch		Stock biom. (≥ 9)	Spawning stock biom. (≥ 16)	\bar{F} (14-23)	Catch	Stock biom. (≥ 9)	Spawn. stock biom. (≥ 16)
181	55	.282	25	$F_{0.1}$	173	58	.09	8.4	182	77
				F_{max}			.18	16.0	174	72
				$\bar{F}_{82} = \frac{F_{max} + F_{0.1}}{2}$			.13	12	178	75

Weight in thousand tonnes.

It can be seen that total recruited biomass is expected to decrease by the beginning of 1983 below the level estimated for 1981, except for the option of $F_{0.1}$.

One should also keep in mind that the long-term yield estimated from average recruitment is about 15 000 tonnes and 17 000 tonnes for $F_{0.1}$ and F_{max} , respectively. Therefore, it seems clear that compared to present catch levels expectations on future yields have to be reduced.

ACFM must also point out that the assessment and the recommended TAC for 1981 of 25 000 tonnes given in last year's report were too optimistic.

The management strategy for this stock should be to stop the downward trend in stock biomass and to reduce the fishing mortality stepwise towards $F_{0.1}$.

ACFM, therefore, considers that fishing mortality in 1982 should at least be reduced to F_{max} and preferably below this value and recommends the TAC of 12 000 tonnes for this stock in 1982.

B.3.4 Mesh assessment on redfish

37. There were no data for redfish in Sub-areas I and II at the present time that would significantly change the estimation of the effective mesh sizes done last year. The same applies to the estimated consequences of an increase in the minimum mesh size for this area.

38. Possibilities of doing a similar assessment for redfish in Sub-areas V and XIV were considered. A trial assessment on the basis of the length distribution of the total S. marinus catches from 1965-76 was made. However, with the data and the time available, one was not able to parameterize the model of the present situation in such a way as to obtain reasonably consistent results. A consistent parameterization is necessary before an assessment of the short- and long-term effects of an increase in the legal minimum mesh size can be done.

A continuation of the mesh assessment will be carried out at the earliest opportunity.

B.3.5 Advice on the effectiveness of closed areas for the protection of nursery grounds of redfish in Sub-area XIV

39. ACFM was asked to "advise on the effectiveness of closed areas for the protection of spawning and nursery grounds of redfish in Sub-area XIV". However, only very little "spawning" of redfish takes place in Sub-area XIV and, therefore, ACFM is not recommending any measures to be taken to protect the "spawning" grounds in this Sub-area.

40. On the other hand, the East Greenland Shelf region serves as a very important and extensive nursery ground for redfish of both species. In 1979 and 1980 special surveys were conducted by Iceland and the Federal Republic of Germany in order to obtain a better knowledge of the extension of the nursery grounds for redfish in the East Greenland Shelf region. The results from these cruises were used for the revision of the closed areas proposed in 1977.

The criterion for small redfish has been selected as 32 cm, which is the 50% retention length in the catches with the present mesh size. Fish of

this size are about 11-12 years old. Maturity is not reached until at about 38 cm in length or at an age of about 16-18 years. Furthermore, fish of this size (32 cm) and smaller are not accepted by the industry, at least by some of the nations engaged in the fishery on these stocks.

At present two areas are closed to fishing for redfish off East Greenland.

Only on two stations within the closed areas did the mean length exceed 32 cm. On the other hand, on a number of stations outside the closed areas the mean length was less than 32 cm. This was, e.g., the case in the area situated between the closed areas. Since redfish in this area are caught by bottom trawl exclusively, the term "fishing for redfish" has to be defined as "all bottom trawl fishing" for enforcement purposes.

41. Considering this and also the fact that the catches in the closed areas and in between these areas consisted almost exclusively of redfish, ACFM recommends that all fishing with bottom trawl should be prohibited in an area as defined below (see also Figure 8):

From the coast of Greenland at 67°N to

67°	30°30'W to
65°40'N	30°30'W to
65°40'N	31°50'W to
65°30'N	33°10'W to
65°10'N	34°00'W to
65°00'N	35°05'W to
64°20'N	35°35'W to
64°20'N	36°00'W to
63°50'N	36°50'W to
63°15'N	39°30'W to
63°45'N	39°30'W to the coast of Greenland at 63°45'N.

B.3.6 Biological relationships between redfish and Greenland halibut stocks at East and West Greenland

Stock relationships of redfish

42. In last year's ACFM report in dealing with the feasibility of assessing these stocks as a single unit the biological relationships were outlined so far as known. Very little additional data on the subject were available at the 1981 meeting, except for the Icelandic 0-group survey in the Irminger Sea and the young redfish and bottom trawl surveys at East Greenland in 1979 and 1980.

The analysis of the 0-group data and the young redfish surveys shows that S. marinus dominate in the southern part of the East Greenland Shelf. This might indicate that S. marinus at West Greenland are of the same origin as S. marinus at East Greenland. For S. mentella this is less likely. There was no further information available to the Working Group on the migration of redfish between these areas.

43. The Working Group is of the opinion that there is a relationship between East and West Greenland, at least for some of the stocks. But the knowledge on the matter is very limited, and there is a need for special research on this subject.

Stock relationships of Greenland halibut

44. The question of stock relationships of Greenland halibut between East and West Greenland was evaluated already last year and it was felt that these stocks are probably not linked.

No new data on this subject were available to the Working Group at the 1981 meeting.

45. The Federal Republic of Germany research vessel surveys were carried out in 1980 in these areas and further surveys are planned for 1981 by the Federal Republic of Germany.

It was suggested by the Working Group that all survey results should be made available in order to facilitate a new evaluation of the situation.

B.4 Greenland Halibut in Region 1

46. The terms of reference of the Working Group on Redfish and Greenland Halibut in Region 1, and the selection of a suitable measure of fishing mortality were described in paragraphs 23 and 24 above.

B.4.1 Greenland halibut in Sub-areas I and II

47. Recent catches and recommended TACs, in thousand tonnes:

1977	1978		1979		1980		1981	1982
Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch ¹⁾	Rec. TAC	TAC
29	40	25	25	17	14	13	12	12 ²⁾

1) Preliminary.

2) Catch level preferred by ACFM.

Total catches of Greenland halibut in Sub-areas I and II decreased steadily from 29 000 tonnes in 1977 to 17 000 tonnes in 1979 (Table 12). The preliminary figure of the total catch in 1980 was about 13 000 tonnes, i.e. 6% below the TAC of 14 000 tonnes.

The reduction in catch from 1979 to 1980 was reported for Sub-area I and Division IIa, whereas a small increase in Division IIb was observed.

B.4.1.1 State of the stock

48. The terminal fishing mortality in 1980 in the VPA was estimated from linear regressions of catch per unit effort on stock biomass and fishing mortality on total effort. Total international effort was calculated from a new calibrated catch per unit effort index. This index, which combines the available cpue data from USSR, German Democratic Republic and Norway, showed some increase since 1978.

For 1980, the average fishing mortality was estimated to be 0.16, following the trend in effort. For the present exploitation pattern, the $F_{0.1}$ and F_{max} values are 0.12 and 0.26, respectively. Biomass of the total stock and of the spawning stock decreased continuously from 1970 to 1978. Since 1978 this declining trend was arrested.

B.4.1.2 Total allowable catch

49. Catch predictions were made for 1982 using various levels of fishing mortality (Figure 6). It was assumed that the TAC of 12 000 tonnes in 1981 will be taken. This catch level would be achieved by an average fishing mortality of 0.14. Results of the catch predictions for 1982 for selected options are given in the following text table.

1981				Management option for 1982	1982				1983	
Stock biom. (≥ 4)	Spawning stock biom. (≥ 9)	\bar{F} (7-11)	Catch		Stock biom. (≥ 4)	Spawn. stock biom. (≥ 9)	\bar{F} (7-11)	Catch	Stock biom. (≥ 4)	Spawn. stock biom. (≥ 9)
125	48	.141	12.0	$F_{0.1}$	134	54	.12	11.6	143	59
				$\bar{F}_{82} = \bar{F}_{80}$			.16	15.1	139	56
				$\bar{F}_{82} = \bar{F}_{81}$			.141	13.4	141	58

Weight in thousand tonnes.

For consideration of management objectives for 1982 it should be pointed out that a stable TAC of 12 000 tonnes would bring the fishing mortality to the $F_{0.1}$ level of 0.12. Under this catch level a further increase in the spawning stock biomass is expected in 1983.

ACFM, therefore, considers a catch of 12 000 tonnes as the preferred level for a TAC in 1982.

B.4.2 Greenland halibut in Sub-areas V and XIV

50. Recent catches and recommended TACs, in thousand tonnes:

1977	1978	1979		1980		1981	1982
Actual catch	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch ¹⁾	Rec. TAC	TAC
17	14	15	24	15	31	15	19 ²⁾

1) Preliminary.

2) Catch level preferred by ACFM.

A further increase in total catches in Sub-areas V and XIV was recorded in 1980. The preliminary catch figure in 1980 was 31 000 tonnes compared to 24 000 tonnes in 1979 (Table 13). Therefore, the total catch in 1980 was about twice the recommended TAC.

B.4.2.1 State of the stock

51. A VPA for the period 1975-80 was carried out to estimate the state of this stock. Since no data were available on effort, a terminal fishing mortality of 0.44 was estimated from a catch curve analysis, taking into account the development of catches in the most recent years. For the present exploitation pattern, $F_{0.1}$ equals 0.14, and there is no maximum on the yield per recruit curve within a reasonable range of fishing mortalities.

According to VPA estimates the total stock biomass and the spawning stock biomass increased from 1975 to 1978 and since then they remained fairly stable.

B.4.2.2 Total allowable catch

52. For the catch prediction it was assumed that the catch taken in 1981 will be equal to 30 000 tonnes. This catch level corresponds to an average fishing mortality of 0.45.

Predictions for catch in 1982 and stock biomass in 1983 for several options of F are given in the text table below (see also Figure 7).

1981				Management option for 1982	1982				1983	
Stock biom. (≥ 4)	Spawn. stock biom. (≥ 8.5)	\bar{F} (8-13)	Catch		Stock biom. (≥ 4)	Spawn. stock biom. (≥ 8.5)	\bar{F} (8-13)	Catch	Stock biom. (≥ 4)	Spawn. stock biom. (≥ 8.5)
201	67	.45	30	$F_{0.1}$	197	67	.14	11	213	84
				$\bar{F}_{82} = \bar{F}_{80} \times 0.6$			.26	19	204	77
				$\bar{F}_{82} = \bar{F}_{80} \times 0.8$			.35	25	199	72
				$\bar{F}_{82} = \bar{F}_{80}$			.44	30	193	67

Weight in thousand tonnes.

The management strategy for this stock should be to bring fishing mortality stepwise towards lower levels. As an appropriate step in this direction, ACFM, therefore, considers a catch of 19 000 tonnes as the preferred level for a TAC in 1982. This would correspond to fishing mortality of $\bar{F} = 0.26$ in 1982.

B.5 Atlanto-Scandian Herring

53. The Working Group on Atlanto-Scandian Herring and Capelin met at ICES headquarters from 12-14 May 1981 to assess the state of the Atlanto-Scandian herring.

B.5.1 Norwegian spring spawners

54. Recent catches and recommended TACs, and management put into practice are given below, in thousand tonne units:

1978		1979			1980			1981	
National quota	Reported catches	Recom. TAC	National quota	Reported catches ¹⁾	Recom. TAC	National quota	Reported catches ¹⁾	Rec. TAC	National quota
7.5	9.8	0	0	2.9	0	9.3	7.6	0	9.3

1) Unreported catches approximately 10 000 tonnes per year.

The officially reported catches of the Norwegian spring spawners have been very low in recent years as shown in the text table above. In addition to national quotas, in 1980 and 1981 set to 9 300 tonnes (10 000 hl), the fishermen are allowed to fish for herring for bait and their own consumption with gill nets throughout the year. These unreported catches have been estimated by the Working Group to be approximately 10 000 tonnes per year. Juvenile herring often make a considerable proportion of the sprat catches, but due to inadequate sampling of these catches, and the uncertainties of the estimates of unreported catches, the catch in number by age data could not be used for stock assessment purposes.

55. As in previous years, the Norwegian tagging project, and the age distribution obtained in the associated experimental fishery were used as a basis for the assessment of the stock. This project was started in 1975 and about 30 000 herring have since been tagged annually. The experimental fishing on the spawning grounds in 1980 recovered 78 tags, from just over 2 million herring which were effectively screened for tags. In the autumn of 1980 and the winter of 1981 the experimental fishing yielded 96 tags from about 2.1 million herring which were effectively screened for tags in that period.

The spawning stock has a northern and a southern component. In 1980, 66 tags were recovered from the northern component and 30 from the southern component, and in the winter 1980/81, 35 tags were recovered from the northern component while 41 were recovered from the southern component. These returns come from tagging experiments carried out in 1975-79 and were used to calculate the total annual mortality coefficient (Z) and the spawning stock abundance for both components. According to this assessment the total spawning stock, i.e. herring four years and older, was about 440 000 tonnes in 1981. It should be noted that according to this new assessment the spawning stock in 1980 is estimated to have been about 380 000 tonnes as compared to 320 000 tonnes in last year's assessment. It was further estimated that the northern component was 270 000 tonnes in 1981. The southern component was estimated to be 170 000 tonnes in 1981 and 130 000 tonnes in 1980, while in the previous assessments it was only estimated as 90 000 tonnes in 1980. The main

difference in these two assessments of the southern component is due to revised allocation of tag returns between the two components.

56. The two stock components have developed differently in recent years. The age distribution and the abundance estimates obtained from the tagging results clearly show that the recruitment to the northern component has been very poor and that the abundance of this stock component has been at the same level in recent years. Future prospects of the development in the southern component are, however, more promising. It has developed from a very low level of abundance in 1977 to about 170 000 tonnes in 1981. The present age composition shows that only 26% of this stock component consists of herring older than 6 years so that the recruitment to this part of the stock has been much better than that to the northern component.

57. It should be noted that prior to the collapse of the stock the spawning stock biomass was between 5-10 million tonnes. Although the present assessment shows a slight increase in stock size it should be stressed that the overall abundance of the stock as well as recruitment are still at very low levels compared to earlier periods.

It has been shown (Dragesund, Hamre and Ulltang, 1980) that the recruitment was drastically reduced at spawning stock sizes below 2.5 million tonnes. The ACFM reiterates its earlier recommendation that the long-term aim should be to rebuild the stock to at least this order of magnitude, and that a substantial increase in the spawning stock as well as a much higher level of recruitment must be confirmed before even a limited fishery can be recommended. When this does happen, care should be taken that such a fishery only generates a very low fishing mortality, less than $F_{0.1}$, and that it does not appreciably delay further rebuilding of the stock.

On this basis the ACFM repeats its advice of last year that there should be no directed herring fishery in 1981.

58. It should be noted that the present exploitation rate with total catch in the order of 20 000 tonnes (including unreported catches) and an additional unestimated quantity of herring caught as by-catch in the sprat fishery may have reduced the rate of recovery to a significant extent and that an even higher exploitation rate may completely stop any further rebuilding of the stock.

ACFM is concerned at the lack of information on these by-catches and stresses the need for an adequate sampling programme to be introduced and to identify areas in which herring by-catch is high and which could be closed. The current by-catch regulation allows a 50% herring by-catch in sprat fisheries, and ACFM considers that this should be reduced.

B.5.2 Faroese spring spawning herring

59. In 1980, as in 1978 and 1979, herring were occasionally reported as by-catch in the trawl fishery indicating that a small amount of herring is staying on the Faroe Plateau throughout the year. The few specimens investigated were all from the 1968 year class. In the Faroese 0-group survey in 1980, 618 0-group herring were caught compared to 98 in 1979 and 262 in 1978. As the surveys are aimed particularly at 0-group cod and haddock, the timing might not be adequate for 0-group herring and the indices should, therefore, be treated with great caution. The available age data further indicate that there has been no recruitment to the spawning stock in this area either in 1979 or 1980.

60. Results of these investigations in 1978-80 show this component to be at a very low level and the ACFM recommends that a directed fishery for this component should be prohibited.

B.5.3 Icelandic spring and summer spawners

61. No signs of recovery of the Icelandic spring spawning herring have been observed, and the fishery in 1979 was entirely based on Icelandic summer spawners. No fishery for spring spawners should take place at Iceland in 1981 or in 1982.

62. Recent landings and TACs, in thousand tonnes, are given below for Icelandic summer spawners:

1978		1979		1980			1981
TAC	Catches	TAC	Catches	Rec. TAC	National quota	Catches	Rec. TAC
35	37.1	35	45.1	45	50	53.3	40

63. The recovery of the Icelandic summer spawners has primarily been monitored by echo abundance surveys on the wintering grounds at southeast Iceland (Jakobsson, 1980). In December 1980 no wintering concentrations assembled in the traditional wintering areas at the southeast coast. Herring were located in the east coast fjords and consequently the main survey effort was transferred to the fjords. The results of the fjord survey were used to calculate the values of fishing mortalities during the 1980 fishing season. These values were then used to initiate a VPA. The present VPA gives somewhat lower stock estimates for the earlier years than those estimated in the VPA described in the 1980 report. This is due to higher F values for adult herring in 1980 which in turn result from a somewhat lower acoustic estimate of the adult stock in December 1980 than expected. It should be noted that herring were confined to narrow fjords in 1980 where acoustic surveying was much more difficult than at the eastern south coast where herring overwintered in previous years.

The samples used for the age distribution were taken by a capelin trawl. It is possible that large herring tend to avoid this gear to a larger extent than small herring. This would also contribute to a possible underestimate of the adult population and a corresponding overestimate of the immature herring.

During the most recent years, 1975-79, the adult F has increased from 0.08 to 0.23. In 1980 there appears to have been a further increase to 0.33. The adult stock biomass increased sharply in 1975 to about 120 000 tonnes. In 1978 there was a further increase to about 200 000 tonnes, and the adult stock biomass appears to have been on that level during the last three years. These increases were mainly due to the recruitment of 3 year classes of 1971, 1974 and 1975 which were of about average strength compared to the period 1954-63 of high and steady recruitment. The 1976 year class appears to be poor, while the 1977 and 1978 year classes are extremely strong but slow growing according to the most recent surveys.

64. The present level of stock abundance is well within the range of spawning stock biomass of 150 - 300 000 tonnes during the 1954-63 period of high and steady recruitment (Jakobsson, 1980). In last year's report the ACFM recommended that the advice on a TAC for 1981 should be based on the results of the echo abundance survey in 1980 and keeping the fishing mortality rate as close as possible to $F_{0.1}$ which for this stock is equal to 0.22 for the present exploitation pattern. ACFM recommends that this should be continued.

On this basis ACFM recommends that the TAC for the Icelandic summer spawners for 1981 should be 40 000 tonnes.

C. SAITHE IN REGIONS 1 AND 2 AND FAROE COD AND HADDOCK

65. The Saithe (Coalfish) Working Group met at ICES headquarters 22-28 April 1981 to assess TACs for saithe stocks and for cod and haddock at Faroe in 1982, and to advise on appropriate mesh sizes for saithe for trawl gears in Sub-areas I and II and Sub-area IV.

66. Recent catches and recommended TACs, in thousand tonnes, are given in the text table below.

Species	Stock	1979		1980		1981	1982
		Rec. TAC	Actual catch	Rec. TAC	Actual catch*	Rec. TAC	TAC
Saithe	NE Arctic (Sub-areas I & II)	153	164	122	144	123	130**
Saithe	North Sea (Sub-area IV & Div. IIIa)	200	114	129	117	127	100**
Saithe	Iceland (Div. Va)	58	63	54	58	72	62**
Saithe	Faroe (Div. Vb)	31	27	34	26	29	29**
Saithe	W. of Scotland (Sub-area VI)	32	22	31	22	27	26***
Cod	Faroe Plateau (Division Vb ₁)	26	23	22	20	14	20**
Cod	Faroe Bank (Division Vb ₂)	2.0	2.0	3.3	1.2	2.0	2***
Haddock	Faroe (Division Vb)	20	12	20	13	15	14**

* Preliminary.

** Catch level preferred by ACFM.

*** Precautionary TAC.

STATE OF THE STOCKS AND CATCH PREDICTIONS

C.1 North-East Arctic Saithe (Tables 14 and 15)

67. In each of the most recent two years, the recommended TAC has been exceeded, and it is expected that the 1981 TAC of 123 000 tonnes will also be exceeded.

Fishing by non-coastal states in 1980 was restricted by quotas; landings by these countries were reduced by 7 700 tonnes (34%) from the 1979 level and made up only 11% of the total. Quotas have been further reduced for 1981. The Norwegian fishing will probably not be restricted by quotas, and there may be some increase in Norwegian trawl effort.

If the same level of fishing mortality is exerted as in 1980, the 1981 TAC is expected to be exceeded by 17 000 tonnes.

In its 1980 report, ACFM stressed the need to improve the exploitation pattern by reducing the landings of young saithe, mainly taken by purse seiners. From 1981, the minimum landing sizes have been increased in the Norwegian legislation to 35 cm (62°-65°N) and 40 cm (north of 65°N). From 1982, the minimum landing size will be 40 cm for the whole area. These measures are expected to improve the exploitation pattern and possibly decrease the effort by purse seiners. It is not possible to quantify the effects of such changes. The same level of F has been assumed for 1980 as in 1979. The exploitation pattern in 1980 was somewhat changed as a result of a temporary shift of purse seine effort towards northern Norway. This would have resulted in an improved exploitation pattern in that year.

68. The spawning stock biomass has been at a low level (about 300 000 tonnes) in recent years, but it is expected to be at a higher level in 1980-82 (about 340 000 tonnes). Assuming a catch of 140 000 tonnes in 1981, a number of options for TAC for 1982 are given below (see also Figure 9):

Management option for 1982	1982		1983
	\bar{F}_{5-10}	Catch ('000 t)	Spawning stock biomass (≥ 6) 1 January
$\bar{F}_{82} = \bar{F}_{80} = \bar{F}_{81}$	0.20	152	344
F_{max}	0.17	132	351
$F_{0.1}$	0.11	90	373

ACFM considers a catch of 130 000 tonnes as the preferred level for a TAC in 1982.

C.2 North Sea Saithe (including Skagerrak and Kattegat)

69. Landings increased by 3 000 tonnes to 117 000 tonnes in 1980 which is 12 000 tonnes below the recommended TAC. Reported industrial by-catches were 363 tonnes (Table 16). That the TAC was not taken can be ascribed chiefly to the fact that some non-coastal states clearly did not attempt to catch all of their quota.

The amount of available data on fishing effort on saithe in the North Sea is very unsatisfactory. French data for the years 1976-80 were used to calculate the total international effort and the resulting values indicate that there has been no substantial change in effort over the last three years. Using the same input F values as last year gave a trend which was in reasonable agreement with the available effort data.

70. The 1974-78 year classes have shown declining recruitment strengths; therefore, in making predictions for 1981 and later ACFM took the average level of these year classes (155×10^6 one year olds) rather than the long-term level used by the Working Group (236×10^6). This analysis indicates that if the same level of F is exerted in 1981 as in 1980 ($F = 0.35$), the expected catch would be 130 000 tonnes, with a spawning stock biomass of 238 000 tonnes at 1 January 1982. This continues the series of low spawning stock sizes of recent years. Continuing at the present level of F would be unlikely to improve the spawning stock in the near future unless recruitment is above average. This trend would be reversed in 1983 by setting the 1982 TAC at F_{max} (0.25). Therefore, and along the general principles aiming at stepwise reductions of fishing mortality levels, ACFM considers a catch of 100 000 tonnes as the preferred level for a TAC in 1982.

Catches in 1982 and the resulting spawning stock biomasses in 1983 at various level of F in 1982 are shown in Figure 10, and for selected options in the text table below:

1981			Management option for 1982	1982			1983
Spawning stock biom. (≥ 5)	\bar{F}_{5-10}	Catch		Spawning stock biom. (≥ 5)	\bar{F}_{5-10}	Catch	Spawning stock biom. (≥ 5)
233	.35	130	$F_{0.1}$	238	.13	40	350
			F_{max}		.25	96	300
			$\bar{F}_{82} = \bar{F}_{81} = \bar{F}_{80}$		.35	130	270

C.3 Icelandic Saithe

71. Landings in 1980 were 58 000 tonnes (Table 17). This is 5 000 tonnes less than in 1979 and 4 000 tonnes more than the recommended TAC.

The available information indicated that effort in 1980 was about the same as in 1979. The same input F values were, therefore, used for the VPA and gave a result which was in reasonable agreement with the assumed trend in effort. Predicted landings in 1981, using these F values, were 60 000 tonnes. This is 12 000 tonnes below the recommended TAC, but it seems unlikely that further fishing effort will be directed at saithe in 1981.

72. The spawning stock biomass is expected to continue at the relatively low level of recent years (165 000 tonnes), particularly

if the present level of F is maintained. The current level of fishing mortality (F_{5-10}) is 0.35 which is well below $F_{max} = 0.50$. This, however, is ill-defined because of the flat-top type of yield per recruit curve. Continuing at the 1981 level of fishing mortality would result in the catch of 62 000 tonnes in 1982 and the spawning stock biomass of 170 000 tonnes in 1983.

At $F_{0.1}$ (=0.15) the catch would be about 30 000 tonnes and the spawning stock biomass in 1983 would reach 200 000 tonnes. The predictions for 1982 are given in Figure 11 and for selected options in the text table below.

1981			Management options for 1982	1982			1983	
Stock biom. (≥ 2)	F_{5-10}	Catch		Stock biom. (≥ 2)	F_{5-10}	Catch	Stock biom. (≥ 2)	Spawning stock biom. (≥ 6)
320	.35	320	$F_{0.1}$	320	.15	28	350	200
			$\bar{F}_{82} = \bar{F}_{81} = \bar{F}_{80}$		.35	62	310	170

ACFM considers that fishing effort should not be increased and that, therefore, a catch of 62 000 tonnes should be the preferred level for a TAC in 1982.

C.4 Faroe Saithe

73. Landings in 1980 were 25 600 tonnes which is 1 700 tonnes less than in 1979 and 8 000 tonnes below the recommended TAC (Table 18). Effort by non-Faroese vessels was reduced in 1980 compared to 1979. In the Faroese fishery effort by small trawlers, which catch mostly 3-7 year old fish, was reduced by 55% which might have reduced the effort on the younger age groups to some extent. In 1980, however, a new fleet category (pair trawlers) entered the fishery; for the first time 2 year old saithe were caught in significant numbers. The net result appears to have been an increase in fishing mortality on young saithe, whereas for older saithe changes in fishing mortality would seem to have been small. The input F_s for 1980 were chosen on this basis.

74. The spawning stock biomass has been decreasing after 1975. This trend is likely to continue and the level in 1982-83 will approach the 1960 level, which is the lowest on record. The decline is closely linked with a reduced level of recruitment.

The 1978 year class, however, is estimated to be above average level, but for the predictions the year classes 1979 to 1981 have been assumed to be at a low level (Figure 12).

The present level of fishing mortality ($F = 0.32$) is between $F_{0.1}$ and F_{max} on a flat-topped yield curve. The text table below gives the resulting catches and spawning stock biomasses if the fishing mortality level is at $F_{0.1}$, F_{max} or the level in 1982.

1981				Management options for 1982	1982				1983	
Stock biom. (1-15)	Spawning stock biom. (≥ 5)	\bar{F}_{5-10}	Catch		Stock biom. (1-15)	Spawn. stock biom. (≥ 5)	\bar{F}_{5-10}	Catch	Stock biom. (1-15)	Spawn. stock biom. (≥ 5)
137	69	.32	25	$F_{0.1}$	114	63	.15	15	145	90
				$\bar{F}_{82} = \bar{F}_{81} = \bar{F}_{80}$			.32	29	133	82
				F_{max}			.40	35	126	76

ACFM considers that fishing effort should not be increased and that, therefore, a catch of 29 000 tonnes should be the preferred level for a TAC in 1982.

ACFM wishes to point out that the present shift towards fishing of younger age groups will depress total yields and catch rates in the medium and long term.

6.5 West of Scotland Saithe (including Rockall)

75. The spawning stock biomass has been relatively stable after 1970, but there is at present a decreasing trend and in 1982 it may reach the lowest level on record after 1969. Landings in 1980 were 22 000 tonnes, virtually the same as in 1979 and 900 tonnes below the recommended TAC (Table 19).

French data for 1979 have been revised and this gave considerable changes from the preliminary catch at age data used last year. French data on effort were used to calculate total effort. It appears that fishing effort in 1974-77 was about 1.4 x fishing effort in 1980.

Shortcomings in the catch at age data from this stock have repeatedly created problems for the assessment. Various short-term measures have been taken in previous meetings to compensate especially for sum of products discrepancies. It is intended that an extensive revision of the Scottish data shall be carried out before the next meeting. This will probably result in changes being made to the worked up data for the international fishery.

76. The average annual catch for the past 4 years is 26 000 tonnes. The expected catch in 1981 is of the same order. As a precautionary TAC this level might be taken for 1982 until an analytical reassessment is made with the revised data.

C.6 Faroe Plateau Cod (Division Vb₁)

77. Landings in 1979 were 23 100 tonnes and in 1980 20 300 tonnes, which is 1 700 tonnes less than the recommended TAC (Table 20).

The fishery is dominated by Faroese vessels and records of fishing effort by fleet category in the Faroese fishery indicate that there has been a small overall reduction in fishing effort from 1979 to 1980, and the input F values for the VPA were chosen to simulate this.

The estimate of recruitment of the 1978 year class was revised upwards as it appears from the catches to be an abundant one. As a result of this, and if the fishing mortality in 1981 is maintained at the 1980 level, landings of 23 000 tonnes are predicted which is greatly in excess of the recommended TAC of 14 000 tonnes. This TAC was based on a lower estimate of recruitment of the 1978 year class.

78. It is thought that fishing mortality in 1981 may be some 25% less than in 1980, resulting in a catch of about 18 000 tonnes. On this assumption, predictions for 1982 have been made (see Figure 13). The spawning stock biomass in 1977 was the biggest on record but has subsequently declined rapidly.

At the 1981 level of F a predicted catch in 1982 of 21 000 tonnes is expected. This level of mortality is below that at F_{max} (= 0.36). $F_{0.1}$ (ca. 0.20) would yield about 15 000 tonnes in 1982 and the expected spawning stock biomass would reach 100 000 tonnes, approaching the peak value of 1977.

1981			Management options for 1982	1982			1983
Spawn. stock biom. (≥ 4)	\bar{F}_{4-7}	Catch		Spawn. stock biom. (≥ 4)	\bar{F}_{4-7}	Catch	Spawn. stock biom. (≥ 4)
60	.27	18	$F_{0.1}$	88	.20	15	102
			$\bar{F}_{82} = \bar{F}_{81}$		.27	21	95
			F_{max}		.36	27	88

ACFM considers that fishing effort should not be increased and that, therefore, a catch of 21 000 tonnes should be the preferred level for a TAC in 1982.

C.7 Faroe Bank Cod

79. Landings were 2 000 tonnes in 1979 and 1 200 tonnes in 1980 (Table 21). The TAC recommended for 1980 was 3 300 tonnes and for 1981 the recommended TAC is 2 000 tonnes. Data were not adequate for an analytical assessment and the TAC for 1982 will again have to be based on historical catches. A precautionary TAC of 2 000 tonnes might be taken for 1982.

C.8 Faroe Haddock

80. Landings increased by 2 100 tonnes to 14 500 tonnes in 1980 which is 5 500 tonnes below the recommended TAC (Tables 22 and 23).

Data on effort from Faroese vessels indicate a small overall reduction in fishing effort from 1979 to 1980. For age groups 2 and 3 there has been

a significant reduction in fishing mortality after the minimum mesh size in trawls was increased in 1978. With this change in exploitation rate ACFM considered that the strength of the 1977 year class as represented in the catches led to an unrealistically low stock of 3 year olds in 1980. The stock size at 1 year old in 1978 was set at 8 200 000 fish, i.e. 20% of the average instead of 1 554 000 as calculated from VPA. The input F values finally used in the VPA were chosen to give a level of fishing mortality on older age groups approximately intermediate to the 1978 and 1979 levels.

81. Under the assumption that $\bar{F}_{81} = \bar{F}_{80}$ it is predicted that the catch would be about 13 000 tonnes. To take the 1981 TAC an increase in fishing mortality of about 28% would be needed.

The current level of F is 0.29 which would be expected to yield 14 000 tonnes in 1982, if maintained. The shape of the yield per recruit curve, being flat-topped, does not allow the identification of an F_{max} with any security. $F_{0.1}$ is about 0.15 and that level of F in 1982 would be associated with a yield of about 7 000 tonnes (Figure 14 and the text table below).

1981				Management option 1982	1982				1983	
Stock biom. (1-10)	Spawn. stock biom. (≥ 3)	\bar{F}_{4-7}	Catch		Stock biom. (1-10)	Sp. stock biom. (≥ 3)	\bar{F}_{4-7}	Catch	Stock biom. (1-10)	Spawn. stock biom. (≥ 3)
92	70	.29	13	$F_{0.1}$	99	77	.15	7	110	89
				$\bar{F}_{82} = \bar{F}_{81}$			.29	14	104	82

ACFM considers that fishing effort should not be increased and that, therefore, a catch of 14 000 tonnes is the preferred level for a TAC in 1982.

D. REGION 2 FISHERIES

D.1 Herring and Sprat Stocks

82. The Herring Assessment Working Group for the Area South of 62°N met at ICES headquarters from 27 April to 5 May 1981 to:

- (i) re-assess the herring stocks in Sub-areas IV and VII, Divisions IIIa and VIa, and sprat stocks in Sub-area IV,
- (ii) collate any new data available on herring by-catch in the sprat fisheries by small time and area sub-divisions,
- (iii) assess the effects of a 40 mm minimum mesh size for trawl gears for herring in Sub-area IV.

Assessment of sprat in Division IIIa has been made by the Working Group on Division IIIa Stocks.

D.1.1 Herring stocks

83. Recent nominal catches (Working Group data) and recommended TACs, in thousand tonnes:

Herring stocks	1979		1980		1981	1982
	Rec. TAC	Actual catch	Rec. TAC	Actual catch ¹⁾	Rec. TAC	TAC
North Sea (SA IV and Div.VIIId)	0	25	0	61	20 ²⁾ 5)	... ⁶⁾
Skagerrak & Kattegat (Div.IIIa)	-	74	50	84	53	... ⁷⁾
W. of Scotland (Div. VIa)	0	8	0	7	65 ²⁾	... ⁶⁾
Celtic Sea(<u>seasonal</u> regulation)	0	5	0	8	0	... ⁸⁾
Firth of Clyde	2	2	2	2.1	2	2.5 ³⁾
W. of Ireland (Div. VIIb,c)	7	15	7	24	7	7 ⁴⁾
SW of Ireland (Div. VIIj)	-	5	6	5	6	6 ⁴⁾
Irish Sea (Div. VIIa)	11	12	10	11	3.8 ²⁾	... ⁶⁾

- 1) Preliminary.
- 2) Revised.
- 3) Recommended TAC.
- 4) Precautionary TAC.
- 5) For the area south of 53°N in Divisions IVc and VIIId only and within the time period October 1981 to March 1982.
- 6) Final advice to be provided after the ACFM meeting in 1982.
- 7) Advice to be provided after the ACFM meeting in November 1981.
- 8) It was recommended that there should be no fishing in the 1981/82 season. Advice for the 1982/83 season to be provided after the ACFM meeting in 1982.

D.1.1.1 North Sea herring (Sub-area IV and Div. VIIId) (Table 24)

84. In previous reports, headings in the relevant text and tables indicated that Division VIIe was also included in assessments and recommendations for North Sea herring. However, real catches in Division VIIe have not been included either in the catch tables or in the assessments. Small populations of herring (Plymouth stock) exist in Division VIIe and are taken as by-catches in fisheries for other pelagic species, but these should not be taken into account for assessments of the Downs stocks (Div. IVc + VIIId).

85. From the time the ban on fishing for North Sea herring was introduced and through 1979 most of the catches were taken as by-catches in other fisheries, particularly the sprat fishery. However, in 1980 only about 11 000 tonnes of the total of 61 000 tonnes were taken as by-catches. The rest (50 000 tonnes) has been taken by illegal directed fishing for herring, and therefore has not been officially reported. On the basis of information supplied by the Working Group members, it was, however, possible to give an estimate of the total yield. Most of the illegal fishing took place in Div. IVc-VIIId, where about 40 000 tonnes were taken.

86. The results of the IYFS show that the recruitment to the North Sea stock as a whole continues to be low. Year class 1979 was estimated to be 1.35×10^9 as 1-ringers which means that it is of about the same strength as the 1978 year class and only about 20% of the long-term average.

From the high percentage of very small or opaque otolith nuclei among 1-ringed herring caught during IYFS in both 1980 and 1981, the low mean length of 1-ringed herring, the English 0-group observations along the East Anglian coast and in the Thames estuary, and the influx of pre-metamorphosis larvae into Dutch coastal waters, there are indications that both the 1978 and 1979 year classes to a high extent will recruit to the southern North Sea spawning stock (Downs herring).

The indices from the larval surveys carried out in the North Sea in autumn/winter 1980/81 gave the spawning stock biomass estimates of 200 000 tonnes in Division IVa, 14 000 tonnes in Division IVb and 142 000 tonnes in Divisions IVc-VIIId. However, great caution should be taken in placing too much reliance on the absolute values of these spawning stock estimates, particularly in Division IVa and Divisions IVc-VIIId.

In these Divisions the larval indices during the most recent 2-3 years have been outside (above) the range for which the regression equating larval index to the VPA spawning stock estimate is valid. In Division IVa the positive intercept of the regression line on the Y (spawning stock)-axis could mean that the slope is biased downwards and that, therefore, the spawning stock for high larval indices is underestimated.

If to take a look only on the time series of larval indices, they would clearly point to an appreciable increase in the spawning stock in Division IVa in 1978 compared to the low levels in 1973-77, but with no demonstrable subsequent increase. In Division IVb the indices would suggest that there has been no appreciable recovery of the spawning stock since the directed fishery was prohibited and might even suggest that the spawning stock declined to a further lower level in 1980. In Div. IVc-VIIId, the very rapid increase in larval abundance in this area in 1979/80 and 1980/81, to a level in the latter season considerably higher than has been seen in this area since 1951/52, must give some confidence to that there must have been a major increase in the spawning stock size.

87. Dr J Beddington, acting as a consultant to the EEC Commission, investigated by simulation techniques the effect of various harvesting strategies on the North Sea herring. His results were submitted in a report to the EEC Commission, entitled "Harvesting Strategies for North Sea Herring and the Effects of Random Variations in Recruitment". His study indicated a rapid growth of the herring stock in contrast to the very slow recovery observed during the period when the directed fishery has been prohibited. However, Beddington's results are to a very large extent determined by his assumed stock/recruitment relationship, and the estimated strength of the 1974-79 year classes from the IYFS together with estimated spawning stock biomasses from larval surveys strongly suggest that his predicted recruitment is heavily biased upwards at the present low spawning stock sizes.

88. At present no stock/recruitment relationship which is likely to predict realistic recruitment values can be defined. ACFM will again stress the need for having evidence from direct observations of a recovery of the spawning stock, and of improved recruitment, before the fishery is allowed.

ACFM has previously recommended that no fishery should be allowed on North Sea herring until the observed increases in spawning stock and recruitment are of an order that ensures that the rebuilding of the spawning stock to a level of 800 000 tonnes will take place with a limited fishery operating. It was considered that at this level, the risk of recruitment failure due to low spawning stock biomass was relatively low. Applying the criteria previously adopted for the total North Sea would result in maintaining the recommendation that no directed fishery should be allowed in 1981.

89. At its meeting in May 1980 ACFM added, however, that since the stock components of the North Sea herring may recover at different rates, and since the level of recruitment to these components may differ, reopening of the total North Sea herring fishery may prevent one component from recovering while another may remain lightly fished, depending on the distribution of fishing effort.

From the sections above dealing with recruitment and spawning stock sizes it is clear that herring in the North Sea is not responding as a homogeneous unit to the closure of the total North Sea. The data from the individual North Sea components have, therefore, been considered to assess the feasibility of reopening fisheries on different individual components.

90. Since no data are available on recruitment to each individual component in earlier years, no stock/recruitment relationship can be constructed. It is, therefore, not possible to split the defined goal of 800 000 tonnes for the total North Sea herring stocks into each spawning component. However, the other criteria for reopening the fishery as stated in previous reports can be applied to each component. This means that firstly, there should be evidence of a recovery of the spawning stock and of improved recruitment and secondly, the observed increases in spawning stock and recruitment should be of an order that will ensure that further rebuilding will take place with a limited fishery operating.

91. The results described above indicate a rapid increase during the last two years in the herring spawning in Div. IVc-VIIId (Downs herring). It was concluded that the spawning stock could not be estimated from the regression line of spawning stock against larval indices, since one would have to extrapolate outside the range where the line is fitted. This is a very dangerous approach, especially in cases where the correlation is low. However, larval indices for the years 1947, 1948 and 1952, not utilised when estimating the regression line, were 2-3 times higher than the larval index for 1980. The spawning stock during those years was 400-500 thousand tonnes. Assuming the same relation between spawning stock and the larval index in 1980 as in those early years, this indicates that the spawning stock in 1980 was at least of the order of 100 000 tonnes and possibly appreciably larger. Assuming that half of the 1978 year class as estimated in the IYFS is Downs herring, the spawning stock will increase further in 1981 to a level of 150 000 tonnes or higher if a limited fishery of not more than 20 000 tonnes is allowed in 1981. It was felt that the evidence of a significant recovery of the spawning stock and of increased recruitment was strong enough to allow a limited fishery of this order. Significantly higher catches could, however, seriously reduce the rate of recovery. It should be pointed out that in 1980, when a zero TAC was recommended, approximately 60 000 tonnes were caught.

92. Accordingly, ACFM recommends that a limited fishery could be allowed on Div. IVc-VIId stocks, but the TAC should not be more than 20 000 tonnes.

This would generate an F slightly above 0.1 or lower.

Unlike in the other North Sea Divisions, in Division IVc south of 53°N and in Division VIId, the open sea catch consists only of Downs herring. While Downs herring are also caught during the feeding migration in Div. IVa and IVb, the other stock components spawning in other parts of the North Sea do not migrate into the Southern Bight after spawning. The herring fishery in Division IVc south of 53°N and in Division VIId from October to March, therefore, exploits solely Downs herring.

ACFM recommends that any TAC allowed should only be taken in the area south of 53°N in Div. IVc and VIId and within the time period October 1981 to March 1982, subtracting from the TAC any illegal catches already taken in 1981.

93. The state of the stocks in Division IVa and, particularly, in Division IVb gives rise to concern about their response to the North Sea ban. In Division IVa the spawning stock, after an increase in 1978, appears to have remained at a level of 200 - 300 thousand tonnes. This is considered to be below the level one should aim for to increase the probabilities of improved recruitment. In Division IVb there have been no signs of recovery of the spawning stock at all. The larval indices in 1980 indicate even a further decrease. It should also be noted that the recruitment from the most recent year classes to the spawning components in Div. IVb and IVa will probably be low. For these reasons ACFM does not recommend any herring fishery for 1981 in Divisions IVa and IVb.

94. No advice for 1982 can be given before the results of the larval surveys during the period August 1981 - January 1982 and the results of the IYFS in February 1982 are available.

D.1.1.2 West of Scotland herring (Division VIa)

95. The catches of 6 600 tonnes in 1980 were almost entirely taken to the northwest of Ireland (Table 25).

96. Catch in number data would suggest that the 1976 year class is a fairly strong one and age compositions from research vessel surveys indicate that the 1977 year class is appreciably stronger. The latter data would also suggest that the 1978 and 1979 year classes are appreciably weaker. However, in view of the fact that a major recruitment to the Div. VIa population is derived from nursery areas in Sub-area IV, this may not be a reliable indicator of the ultimate size of these year classes. The number of 1-ringers taken as by-catch in the Moray Firth sprat fishery in 1980 might point to the 1978 year class being a fairly strong one.

97. The herring larval surveys carried out in Division VIa provide the only quantifiable data from which to estimate the size of the spawning stock. From the regression equation between spawning stock size and larval abundance, the following estimates of spawning stock biomass are derived: 1978: 75 000 tonnes, 1979: 201 000 tonnes, 1980: 369 000 tonnes.

It should be noted that: a) the estimate of the spawning stock in 1978 from these data is a minimal value because of some inadequacies in the larval sampling that year; b) the confidence limits in all of these estimates are rather wide; and c) the regression line has a large negative intercept on the Y (spawning stock)- axis, which could mean that the slope is biased upwards and that, therefore, spawning stock estimates for high larval indices have a bias in the same direction. Accepting these limitations of the larval estimates, however, they would still point to a very rapid increase in spawning stock size in Division VIa over the period 1978-80, and the question must be faced whether increases of these magnitudes are compatible with data available from other sources.

The larval survey estimates mean that the stock increased by a factor of 2.7 from 1978 to 1979 and by a factor of 1.8 from 1979 to 1980. Such increases must be principally derived from recruitments to the spawning stock.

98. The age composition of the catches in 1979 would suggest that the spawning stock doubled between 1978 and 1979 due to the recruitment of the 1976 year class. The 1980 catch composition would suggest a smaller increase of approximately 30% between 1979 and 1980. It must be borne in mind, however, that the catch in number data are almost entirely generated by the fisheries off the northwest coast of Ireland, and may therefore not be indicative of the age composition of the stock as a whole. In the north of Ireland area the increase in larval indices between 1979 and 1980 was very small relative to the increase in the more northern areas.

Using the winter 1981 age composition from research vessel surveys as representative for the autumn 1980 stock, one can convert the age composition for the fish ≥ 3 rings to a spawning stock in numbers in 1980 by equating the biomass to the measured 1980 biomass from the larval survey of 369 000 tonnes. One can then from catch in number data project the spawning stock backwards to 1979 and 1978. This results in spawning stock sizes of 161 000 tonnes in 1979 and 81 000 tonnes in 1978. This suggests that the major increases estimated from the larval surveys in these years find some support in the other data available on stock composition.

A VPA calculating the stock further backwards is in general conformity with and supports the Working Group's previous estimate that the spawning stocks in 1977 and 1978 were at such a low level that closure of the fishery was imperative.

99. The best estimate of spawning stock in 1980, of 369 000 tonnes, is very appreciably greater than the target biomass (200 000 tonnes) for a reopening of the fishery on this stock set by ACFM in earlier reports. There would, therefore, appear to be fairly good evidence that this fishery could be reopened in 1981, with a conservative TAC. To calculate such a TAC the age composition derived from the survey in winter 1981 has been used and equated to a spawning stock biomass in 1980 of 369 000 tonnes.

In the projections it has been assumed that there is no exploitation of fish younger than age 2 rings. Yield and resulting spawning stock size in 1981 at various values of F are given in Figure 15. $F_{0.1}$ is estimated to be equal to 0.27 under the assumed exploitation pattern (knife-edged recruitment at age 2 rings). In the light of the dubieties which still surround the data, it would be advisable to apply a more conservative F value when the fishery is reopened. An F equal to 0.15 (i.e. approximately

half $F_{0.1}$) would seem appropriate. This would result in a TAC for 1981 of 65 000 tonnes and a further increase in the spawning stock to 415 000 tonnes. Accordingly, ACFM recommends a TAC of not more than 65 000 tonnes for herring in Division VIa in 1981.

100. Estimating a TAC for 1982, at this juncture, has even greater uncertainties attached to it. Retaining an $F = 0.15$ and assuming a very conservative value of 240×10^6 fish of the recruiting 1979 year class, which is the lowest value ever recorded for this stock, would result in a TAC for 1982 of 60 000 tonnes. This indicates that even under conservative assumptions on recruitment, the TAC for 1982 could be set at about the same level as in 1981. A similar research vessel survey will be carried out in early 1982 as that carried out in 1981, and the final advice on a TAC for 1982 cannot be given before the results of this survey and the fishery data for 1981 have been evaluated.

D.1.1.3 Firth of Clyde herring

101. The landings in 1980 of 2 081 tonnes were very close to those of 1979 as a result of the TAC regulation in operation in both years (Table 26).

102. The results of the most recent tagging experiments in 1979 and 1980 continue to demonstrate the complex origin of the Clyde herring population. Since it is not yet possible to quantify the contribution made by stocks in adjacent areas, it is appropriate to continue to treat the Firth of Clyde herring as a separate management unit. It is, however, hoped that the recommencement of fishing in other parts of Division VIa and associated tag returns, and a new approach to tagging planned for 1981, using microwire tags, will provide more quantitative information on the contribution of both the Division VIa and Irish Sea stocks.

103. Previous management advice on Clyde herring has taken into account the need for protection of the indigenous Clyde spring spawning stock and of the stocks in adjacent areas. The age composition of herring in the Firth of Clyde in 1980 indicated that there has been some influx of herring from other parts of Division VIa. The stocks in Division VIa and the Mourne have both shown recent increases and it, therefore, seems likely that a higher proportion of the catches will consist of herring from these stocks. For these reasons some increase in the TAC for 1982 would appear to be justified. However, since there is a continuing need for protection of the Manx herring which contributes to the Clyde population, there is no justification for a large increase in the TAC for the Clyde.

Accordingly, ACFM recommends that the TAC for the Firth of Clyde be set at 2 500 tonnes for 1982.

D.1.1.4 West of Ireland herring (Division VIIb,c)

104. The total landings in 1980 were approximately 24 000 tonnes compared to 14 600 tonnes in 1979 and 7 500 tonnes in 1978 (Table 27). The TAC advised by ACFM in 1980 was 7 000 tonnes, a figure exceeded by a factor of 3.5.

105. The herring fishery in this area takes place across the border between Division VIIb,c and Division VIa. The herring caught in the two areas have no biological characteristics to separate them, their age compositions are very similar, and the spawning area also extends across the border. Furthermore, it is likely that there was some mis-allocation of catches between the areas in earlier years. Taking all these facts into consideration, one possible approach would be to carry out a joint assessment of the herring population in Division VIIb,c and that part of Division VIa in which this fishery takes place. However, it is not possible at present to ascertain the present size of the stock in this area. Furthermore, even if an assessment of this combined area were possible, this would necessitate a complete re-assessment of the remaining part of Division VIa, including a whole new analysis of the larval data. The Working Group was not in a position to carry out such a radical re-assessment at the 1981 meeting.

ACFM, therefore, recommends that a precautionary TAC of 7 000 tonnes is set for Division VIIb,c in 1982.

106. It is hoped that separate assessments can be made in 1982 of the northern part of Division VIa and the southern part combined with Division VIIb,c, and that these assessments can be compared with assessment of the whole of Divisions VIa and VIIb,c combined.

D.1.1.5 Irish Sea herring (Division VIIa)

107. The reported catch from the area was 10 613 tonnes in 1980, i.e. slightly above the recommended TAC (Table 28). Actual catches almost certainly exceeded the reported landings.

108. 8 660 tonnes of the reported catch were considered to be Manx herring. This is the second lowest catch in 12 years and reflects not only the relatively low TAC, but also the difficulty experienced in finding herring. The TAC was not, as expected, taken prior to the closure on 21 September. The remainder was taken in the period October to December. These circumstances have not previously arisen since TACs were first set in 1975. It must be concluded that the stock was lower than it had been for several years.

Larval surveys show that larvae had been very few in recent years in comparison with 1974 and 1975. Trial VPAs showed that the spawning stock was low in 1977. It was considered that the spawning stock biomass must have been even lower in 1980 than in 1977 and that fishing mortality in 1980 was at least as high as in 1977. From this it was concluded that F in 1980 probably was at a level around 1.0. This resulted in a spawning stock of about 5 000 tonnes in 1980, which is such a low value that recruitment is likely to be affected. Management actions should be taken as soon as possible to reduce the present high fishing mortality and rebuild the spawning stock.

109. In the projections an input number of 1-ring fish at 1 January 1980 and 1981 of 45×10^6 was assumed, which is the lowest value so far recorded (1977 year class). If the present TAC for 1981 is taken, this would generate an $F = 0.5$ on Manx herring. Catches and spawning biomass in 1981 for a range of F s are shown in Figure 16. It

should be noted that about 50% of the catches and spawning biomass will consist of recruit spawners and that even the assumed low recruitment may be too high.

110. The total nominal catch of the Mourne stock in 1980 was 1 953 tonnes. The catch was entirely composed of fish for human consumption for the first time since 1969. Because of the cessation of the industrial fishery in early 1979, there has been a marked change in the overall age composition both in 1979 and 1980. There were no catches of 0-group herring in 1980 and the catches of 1-group herring decreased again.

111. A value of $F = 0.3$ was considered the most likely to reflect the level of fishing during 1980 on age group 2 and over. From the cessation of the industrial fishery it was concluded that F on 1-ringers had been reduced to 0.1. The spawning stock biomass in 1980 and 1979 was estimated from VPA to be 6 000 tonnes and 4 000 tonnes respectively, which supports last year's observation that the decline in the spawning stock biomass has been reversed. Assuming a conservative value for the 1979 year class (the lowest value from the VPA), a prognosis was run for 1981. In Figure 17 catches and spawning stock biomass in 1981 are shown for various values of F .

112. ACFM recommends that a single TAC be set for herring in the Irish Sea rather than separate TACs for Manx and Mourne stocks.

113. In view of the serious state of the Manx stock ACFM considers it imperative that the TAC for 1981 is reduced. The fishing mortality on Manx herring should at least be reduced to $F_{0.1} = 0.2$, which, according to the present assessment, would generate a catch of about 2 000 tonnes.

In view of the recovery of the Mourne stock, ACFM considered the possibility of maintaining the general ban within the 12-mile zone as advocated previously, but allowing a small selective fishery, i.e. a gill net fishery, in the Mourne spawning area. For this stock $F_{0.1} = 0.18$. $F = 0.15$ would seem appropriate from which to calculate a TAC for 1981. This would result in a catch of about 1 800 tonnes in 1981, including by-catches in the Isle of Man fishery.

Accordingly, ACFM recommends that the TAC of herring in Division VIIa be reduced to 3 800 tonnes in 1981.

114. To protect the spawning stock of Manx herring, directed herring fishery should be prohibited in the whole of the North Irish Sea from 20 September 1981 to 15 November 1981, except for a selective fishery for adult Mourne herring not exceeding the difference between 1 800 tonnes and the amount of Mourne herring taken as by-catch in the Isle of Man fishery. Assuming that by-catches will be around 1 400 tonnes, the allowable catch for the drift net fishery would then be 400 tonnes. Apart from this limited drift net fishery, the present prohibition on fishing for herring within 12 miles off the east coast of Ireland, between 53°N and 55°N, should be continued.

115. ACFM has previously recommended the closure of the area within 12 miles off the coast of Scotland, England and Wales from 55°N to 53°20'N in order to protect the juvenile component of the Manx stock. Since this measure has excluded fishing from an important adult distribution

area off the Mull of Galloway, the Working Group made an appraisal of all available data on juvenile catches in that area, and the following alteration is recommended:

The northern boundary should no longer be at latitude 55°N but along a line joining the Mull of Galloway (Scotland) to Point of Ayr (Isle of Man). Logan Bay, however, should continue to remain closed to herring fishing. The remaining area southwards to latitude 53°20'N should remain unchanged.

116. Under the present uncertainties about likely catches in 1981 and the critical role of recruitment assumptions for the assessment of both the Manx and the Mourne herring, TAC recommendations for 1982 cannot be made before catches in 1981, and their age compositions, are known.

D.1.1.6 Celtic Sea herring

117. Despite the prohibition of herring fisheries in the Celtic Sea which was first recommended by ICES in 1976 and introduced in 1977, fishing has taken place each year and the catch taken during the 1980/81 season was the highest recorded since 1975/76 (Tables 29 and 30). Official catches may be slightly underestimated because of the difficulties in obtaining statistics in a closed fishery. Unallocated catches during the 1980/81 season amounted to 3 800 tonnes.

118. Young herring surveys have been carried out in 1980 and 1981 in the northwestern Irish Sea. This area is recognised as being an important nursery area for both autumn and winter/spring spawning herring. Although the abundance of 1-ringers appeared to be considerably higher in 1981 than in 1980, it is not known whether this would indicate an increase in the winter/spring component or whether this component eventually recruits to the Celtic Sea population.

The trawl survey carried out during 1979/80 off the southern Irish coast indicated that considerable quantities of 1-ring fish (1977/78 year class) were present in the area.

119. The larval surveys initiated in the 1978/79 season were continued in 1980/81. Because only three seasons' data are available, no regression line relating spawning stock biomass to larval abundance can be established. Estimates of relative changes in spawning biomass can, however, be made. The indices show a rather steady level or a slight decrease over the period 1978/79 - 1980/81, thus indicating no recovery of the spawning stock.

As in other seasons it has not been possible to calculate fishing mortality from catch per effort data. From trial VPAs it was concluded that $F = 0.8$ in 1980/81 gave spawning stock sizes over the last three seasons which were consistent with the trend in larval abundance indices. This level of F is also consistent with results of catch curve analyses for the period 1976-80, although such analyses can only give a mean mortality over a period of years and not an estimate for the last season.

120. With a continuation of the recent low level of recruitment of 1-ringers of 30 million fish, the stock size at 1 April 1981 was estimated to be 13 000 tonnes. Assuming that 50% of 1-ringers would spawn, this corresponds to a spawning stock biomass at the beginning of the season of 11 000 tonnes.

This is far below the level of 40 000 tonnes which previously has been defined as the minimum level the stock should reach before a fishery is allowed. The stock has remained at a very low level and has shown no sign of a recovery. Apart from some evidence that the 1977/78 year class may be above the average of the most recent years, there is no clear evidence of an improvement in recruitment. Therefore, there is no adequate evidence available to meet the biological criteria for re-opening the fishery. Consequently, ACFM recommends that the fishery remains closed for the 1981/82 season.

D.1.1.7 Herring in Division VIIj (southwest of Ireland)

121. The catches in 1980 were about 5 000 tonnes or at about the same level as in 1979. There was a decrease in effort in the area because of lack of markets and because of a change to mackerel fishing. It has still not been possible to make an assessment of the stock due to lack of reliable catch and effort data. ACFM, therefore, again recommends that a precautionary TAC of 6 000 tonnes is set for this area for 1982.

It is anticipated, however, that sufficient data will be available to enable the stock to be analytically assessed at the 1982 meeting.

D.1.1.8 Herring in the Skagerrak and the Kattegat (Division IIIa)

122. At present the proportion of autumn spawning herring in the adult stocks in Division IIIa is probably small. It has been shown that the vast majority of 2-group and older herring in the Skagerrak and the Kattegat belong to the spring spawning component (Rosenberg and Palmén, in MS). 1-group herring could during the first part of the year be separated by length measurements into spring and autumn spawned components. The proportion of spring spawned herring caught during the 1980 IYFS in February was approximately 60%. Most of the rest could originate from autumn spawners in the North Sea and its adjacent waters judging by their means of VS. In a scientific trawl survey in September 1980 in Division IIIa, approximately 80% of 1-group herring were spring spawners according to separation by otolith measurements. The results from the surveys are not directly applicable to commercial landings, but should be supplemented with data from commercial samples which hitherto have not been treated in this respect.

123. The preliminary figure of total landings based on official catch statistics in 1980 for Division IIIa amounted to approximately 64 000 tonnes (Table 31). However, estimates made by the Working Group indicated that at least an additional 20 000 tonnes had been landed and should be added as unallocated landings. Adding a further 7% for discards gives a total removal of approximately 90 000 tonnes, which still could be an underestimate, but closer to the actual total catch. Thus, the catch was nearly twice the recommended TAC of 50 000 tonnes.

124. Compared to previous years, the age composition of the catch in 1980 reflects two features shown already in last year's report, i.e., the rather strong 1977 year class and the rather weak 1978 year class.

0- and 1-group herring continued to dominate in the catch in numbers. The 0-group has been estimated to be 43% of the catch in numbers, and the 1-group 29%, giving a total of 72%. The 0-group percentage may, however, be an overestimate due to assumptions made on age composition of discards.

The IYFS carried out in February 1981 gave a slightly higher index for the 1-group abundance than the index from the previous year and indicated that the 1980 year class was of average strength. It must be kept in mind, however, that no separation has so far been made between spring and autumn spawned components in 1981.

125. Two acoustic estimates of the herring stocks were reported to the Working Group from surveys carried out in September and November 1980. The estimate from the September survey is based on a length-dependent factor to convert integrated echo-signals into biomass. The target strength value used was -38.3 dB per kg for herring with a mean length of 23.7 cm. A total biomass of 230 000 tonnes was estimated in the area surveyed, which was equal to about 75% of the total Division IIIa area. 0- and 1-group herring were not adequately covered during this survey.

A second acoustic survey was carried out in Division IIIa in November 1980. This survey gave much higher values for 0- and 1-group herring, but very low values for 2-ringers and older herring. 0- and 1-group herring could be overestimated due to problems of catching herring with trawl. If older herring avoid the trawl, the acoustic values of these will then be designated to younger age groups. It should, however, be noted that the adult stock at this time is normally found close to the coast and in its overwintering areas, the Sound and the Belt, and would, therefore, not be adequately covered by the survey.

126. Taking into account that great uncertainties still exist in the absolute biomass estimates from acoustic surveys, but that such surveys can give reliable figures for relative changes from one year to another, total mortality from September 1979 to September 1980 was estimated from the reduction in numbers of the 1977 year class between the September acoustic surveys in those two years. This gave total mortality of $Z = 0.8$ or fishing mortality of $F = 0.7$ ($M = 0.1$). This value was used as VPA input for fishing mortality on 2-ringers and older fish in 1980. F on 1-ringers and 0-ringers was assumed to be 0.25 and 0.2 respectively, which resulted in the 1979 and 1980 year classes being of average strength in accordance with the IYFS.

127. By comparing the VPA stock of 2-ringers and older fish in September 1979 and 1980 with the stock as estimated from the acoustic surveys, the VPA gives much lower stock size in both years. In 1979, there is a good agreement for 3-ringers and older fish, but great discrepancy for 2-ringers which were the dominating age group. One of the possible reasons for this could be that a significant part of this year class spawned in the Baltic-Belt Seas area in early 1980 and was subject to fishing in those areas; this would mean that the catches corresponding to $F = 0.7$ are higher than those used in the VPA. However, since the 1980 VPA stock estimate shows much lower values than the acoustic survey also for the older age groups, it is considered dangerous to base a prognosis on the acoustic stock size estimates which could be in serious

error due to uncertainties in the target strength value used. Therefore, stock projections were based on the stock size in 1980 as estimated from the VPA described above. It should be stressed that this does not mean that the acoustic results were completely disregarded, since the relative changes from one year to another in the acoustic surveys' findings have been used to estimate mortality as input for VPA.

128. According to the assumptions made in the VPA, the spawning stock biomass at 1 January 1981 was about 60 000 tonnes. Figure 18 shows catches in 1981 and the spawning stock biomass at the beginning of 1982 for various levels of F in 1981. Since the 1979 year class plays a dominant role in the prognoses for both 1981 and 1982, it will be important to have a new estimate of this year class strength in September 1981 before any recommendation on a TAC for 1982 can be made.

Regarding the TAC of 53 000 tonnes recommended for Division IIIa in 1981, ACFM cannot find serious grounds for recommending a revision of it in either direction. Even if a pronounced increase in the spawning stock biomass in 1982 is indicated at this level of fishing, one cannot advocate an increase in the TAC considering the uncertainties about the actual strength of the 1979 year class and its origin. Accordingly, ACFM recommends that the TAC of 53 000 tonnes previously recommended for 1981 remains unchanged and that the TAC for 1982 is set after ACFM has considered the situation at its meeting in November 1981.

129. ACFM would again stress the difficulties in assessing Division IIIa herring caused by the uncertainties about the origin of herring, particularly of 0- and 1-group, caught in the area. It should be noted that the large stock of 0- and 1-group herring relative to the low adult stock may not be a result of a completely different stock/recruitment relationship in this area compared to other areas. A large part of 0- and 1-group herring probably originate from stocks in adjacent areas, e.g. the North Sea, and return to these areas before they recruit to the adult stock. A separation of herring landings into stock components would significantly improve the assessment, and it is expected that some progress can be made in this respect before the next meeting of the Herring Assessment Working Group.

130. Regardless of the origin of young herring, every effort should be made to decrease the exploitation of the youngest age groups. One method of achieving this could be to increase the trawl mesh size (see Section D.1.1.9).

Accordingly, ACFM recommends that the minimum mesh size in trawl gears for herring is increased to 40 mm in Division IIIa.

D.1.1.9 Mesh size in trawl gears for herring

131. Mesh selection experiments with herring trawls carried out in the North Sea in the early 1960s indicated selection factors to be slightly above 4. This corresponds to a 50% retention length of about 17 cm for a 40 mm mesh size. Meshing does not seem to be a problem with this mesh size. An increase in the minimum mesh size to 40 mm would reduce catches of 0- and 1-group herring in such areas as Division IIIa, where the catching and subsequent discarding of juvenile herring is a serious problem at present. In other areas this is not expected to be a problem, but a 40 mm minimum mesh size may reduce the possibility of the one arising.

132. The present legal minimum mesh size for herring fishing is 16 mm in Region 2, except Division IIIa, where it is 32 mm. Under the current practice of fishing for adult herring, most countries are utilising a 40 mm mesh size.

Accordingly, ACFM considers that in the directed herring fisheries the appropriate minimum mesh size would be 40 mm in Sub.areas IV, VI and VII.

D.1.1.10 Herring by-catches in sprat fisheries (Figure 19)

133. ACFM has for some years requested member countries to submit detailed data on the seasonal and areal distribution of herring by-catches in the sprat fisheries in order to make it possible for ACFM to advise on practicable methods of reducing the mortality generated by the sprat fishery on juvenile herring. Although more and better data are strongly needed, the limited data presented to the Herring Assessment Working Group, and some additional data presented at the ACFM meeting, made it possible to identify some inshore areas where by-catches during parts of the year were very high. In some cases individual landings contained more than 50% of herring by weight. Substantial sprat fisheries have been carried out in these areas, and closing them could, therefore, significantly reduce the total by-catch of herring. It should be noted that the figures given in last year's ACFM report of by-catches by rectangles were biased due to some wrong allocations of catches to rectangles. Furthermore, those figures were based on more limited data. The areas identified from all data available at present were the statistical rectangles 42 F 7 and 41 F 7 off the Danish coast during mid-summer and early autumn and the inner part of the Moray Firth and statistical rectangles 41 E 6 and 39 E 8 off the United Kingdom coast during winter. Accordingly, ACFM recommends that no sprat fishery should be allowed in statistical rectangles 42 F 7 and 41 F 7 during the period July-October and in statistical rectangles 41 E 6, 39 E 8 and the inner parts of the Moray Firth west of 3°30'W during the period October-March.

134. The average by-catch level, taking the North Sea as a whole, was shown by ACFM last year to have been of the order of 3.6% of the total catches in 1979. Its subsequent recommendation applied this level to individual catches. Experience has shown, however, that a strict enforcement of that recommendation would make it difficult to carry out any sprat fisheries in the main sprat areas. Taking also into account the somewhat improved situation expected to result from the closure of the areas recommended above, ACFM recommends that the by-catch limitation on individual catches be increased to 10%. ACFM would accordingly recommend that the by-catch of herring in any sprat landing, or part landings, should not exceed 10% by weight of the total catch landed or on board the vessel at any given time.

D.1.2 Sprat stocks

D.1.2.1 North Sea sprat (Sub-area IV)

135 Recent catches and recommended TACs, in thousand tonnes:

1977		1978		1979		1980		1981
Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC
450	304	400	378	400	380	400	323	400

The total catch in 1980 of 323 000 tonnes has decreased from the level of 380 000 tonnes in 1979 and 1978 (Table 32). There was a large reduction in 1-group catches which was mainly due to reduced catches in Division IVb east. It is believed that the reduction reflects a reduction in abundance and not just an effect of effort withdrawal.

136. The ICES Coordinated Acoustic Survey was completed by English, Scottish and Norwegian vessels in January 1981. Again, as in previous years, problems arise in interpreting and quantifying the integrated acoustic signals.

With the agreed revision of the target strength measurements made in 1980, the 1980 estimate was reduced from $1\ 010 \times 10^3$ tonnes to 380×10^3 tonnes. The uncertainties in target strength illustrate one of the difficulties underlying the use of acoustic surveys in making an estimate of biomass in absolute tonnage. However, using the same target strength (- 29 dB/kg) for both the 1980 and 1981 surveys gives an apparent reduction in biomass of about 50%, and it was concluded that this probably reflected a real change in sprat biomass. In addition to the reduction in biomass there was a striking change in the distribution between the two years with a large increase in the stock in the southwestern area.

137. Although recognising the limitations of VPA for short-lived species, VPAs were run to estimate recruitment in the past and to get the levels of fishing mortality which would give relative stock biomasses in 1980 and 1981 as estimated from the acoustic surveys. This would indicate a fishing mortality of 1.5 - 2.0 on age groups 2 and 3 in 1980 and biomasses in the range of 300 000 - 340 000 tonnes at 1 January 1980 and of 140 000 - 190 000 tonnes at 1 January 1981.

It should be stressed that the VPA estimate of stock size at 1 January 1981 is dependent on the recruitment of 0-group in 1980 on which we have no information.

The VPAs which were consistent with the acoustic surveys showed a sharp increase in fishing mortality in 1980 compared to 1979 and 1978. No data giving supporting evidence of this increase in fishing mortality were available to the Working Group.

The Norwegian acoustic survey indicated a major reduction in 1-group abundance from 1980 to 1981. This feature does not occur in the VPA. If such a feature was to be simulated, great changes in exploitation pattern would be needed.

138. The Working Group did not consider it possible to provide an assessment of the TAC for 1981 or 1982 with the type of data available. An essential requirement for any TAC regulation is a reliable estimate of 1-group. Utilising January to March catch data would to some

extent improve the situation, and for the future as many as possible of such data should be worked up prior to the Working Group meeting. It could then be possible for ACFM to adjust its TAC recommendation for the current year.

139. In its report of last year ACFM recommended that the 1981 TAC for North Sea sprat should be set at the estimated long-term average yield of 400 000 tonnes. The available data suggest a downward trend in biomass and recruitment. Total catches in 1980 were about 80 000 tonnes below the TAC set. This TAC seems, therefore, not to have restricted the fishing to any high extent. There is the possibility that the stock is now declining and that, therefore, the present TAC of 400 000 tonnes could lead to an increase in fishing mortality far above any advisable level.

140. No advice can be given for 1982 before the results of the surveys which will be carried out during the winter 1981/82 are available.

D.1.2.2 Sprat in Division IIIa

141. Recent catches and recommended TACs, in thousand tonnes:

1978		1979		1980		1981
Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch ¹⁾	Rec. TAC
80 ²⁾	79 ²⁾	70 ²⁾	84 ²⁾	70 ²⁾	105 ²⁾	70

1) Preliminary.

2) Including Norwegian fjords south of 62°N.

Landings in 1980 from Division IIIa (excluding Norwegian fjord landings) amounted to 102 400 tonnes (Table 33). This is an increase of 23 000 tonnes from 1979 and was only exceeded by the peak landings of 110 000 tonnes in 1975. The high landings figure was achieved despite a closure of the most important fishery in the last four months of the year.

142. In order to estimate herring and sprat stocks in Division IIIa acoustic surveys were carried out in September and in November 1980. The stock biomasses of sprat were estimated at about 74 000 tonnes and 65 000 tonnes respectively. This is about half the biomass estimated in September 1979 and corresponds to that from September 1976 being the only earlier reference estimate. The stock size in 1981 will, however, mainly depend on the 1980 year class which could not be estimated during the two acoustic surveys. The results of the IYFS in February 1981 would suggest that this year class is of about average strength compared to the indices of the last decade.

143. On this basis ACFM finds no strong reason to change its earlier recommendation of the TAC of 70 000 tonnes for 1981.

144. In 1982, the 1981 year class will be the main component of the stock and of the catches. Nothing is currently known about the strength of this year class, and ACFM can at present only suggest a tentative TAC of 70 000 tonnes for 1982 being subject to revision at the next meeting of ACFM in 1982 in the light of data obtained by then.

D.2 Stocks in Division IIIa

145. The Working Group on Division IIIa Stocks met at ICES headquarters from 18 to 24 March 1981 to: 1) evaluate any new data available on stock components in Division IIIa herring; 2) assess TACs for 1982 for cod, whiting, haddock, plaice and sprat in Division IIIa; 3) examine any new data available which might cast more light on the interrelations between cod and herring in Division IIIa and in the Baltic; 4) estimate the species composition of by-catches in the Pandalus borealis fisheries and advise on an appropriate by-catch limit.

146. The available data for the stocks in Division IIIa are in most cases inadequate to allow analytical assessments to be made. No effort data at all have been presented; there is no sampling for age composition of the haddock and whiting catches. In some instances the time-series of age data are still too short to base an analytical assessment on.

147. Recent nominal catches and recommended TACs, in thousand tonnes:

Stocks in Division IIIa	1979		1980		1981	1982
	Rec. TAC	Actual catch	Rec. TAC	Actual catch ¹⁾	Rec. TAC	TAC
Cod	26	32	30	41	34	32,6 ²⁾
Haddock	6.6	4.8	6.6	7.6	4.5	7.2
Whiting	22	18	22	23	22	22.2
Plaice	-	22	25	16	22	11.2 ³⁾

- 1) Preliminary.
- 2) Precautionary TAC.
- 3) Recommended TAC.

D.2.1 Cod (Table 34)
Cod in the Kattegat

148. Landings reached about 13 000 tonnes in 1980 or some 1 800 tonnes less than in 1979 (Table 35). This decline to a level well below the recommended TAC of 16 400 tonnes may not indicate any major decrease in effort or in stock size. Denmark increased the legal minimum landing size from 33 cm to 38 cm in late 1979 and the effect of this would be the removal from the landings of a major part of fish less than 3 years of age.

149. As in other Division IIIa fisheries the lack of effort data makes it difficult to indicate the likely development in the fishing mortality rate, but a reasonable assumption may be that no significant change took place in recent years.

A more serious uncertainty in the assessment is the strength of the 1979 year class, which will be a major component of the catches in 1982. In IYFS in 1980 the abundance index of this year class was 4-5 times the average and there were other indications of its above average strength. ACFM could not place much confidence in this assessment.

150. As a precautionary TAC for 1982, ACFM would indicate a catch of 15 000 tonnes, which is close to the average catch over the last five years. If the 1979 year class should prove to exceed average strength this would be expected to reduce the fishing mortality in 1982 without causing severe changes in the levels of landings.

Cod in the Skagerrak

151. Landings in 1980 increased to 27 700 tonnes from the 1979 figure of 17 200 tonnes (Table 36). This is the highest landing figure on record and about 36% above the average for the preceding 5-years' period 1975-79 (20 300 tonnes).

152. The data base is at present covering too few years to allow an analysis of the stock size and its reaction to fishing. ACFM, therefore, advises, on a precautionary basis, that the TAC set for 1981 be adhered to and be retained into 1982; viz. 1 600 tonnes for the coastal area of the Skagerrak and 16 000 tonnes for the remainder of the Skagerrak. There are indications that the strength of the 1979 year class may be above average and could result in an increase in biomass in that year.

D.2.2 Haddock (Table 37)

153. Sampling of commercial landings covered the years 1978-80 and abundance indices were only available from the most recent IYFS in 1981. The landings in 1980 increased to 7 600 tonnes from 4 800 tonnes in 1979. Without an analytical assessment ACFM can only indicate a catch for haddock in Division IIIa of 7 000 tonnes, corresponding to the level of the mean for the last five years, as a precautionary TAC for 1982.

D.2.3 Whiting (Table 38)

154. Landings in 1980 reached 22 600 tonnes, or the same as the average for the period 1971-80. The increase from the 1979 landings of 18 000 tonnes is mainly due to a dispensation in part of 1980 from the Danish ban on directed fishing for industrial purposes which was introduced in 1979.

155. There is no data base for an analytical assessment, and the only indication of the state of the stock in the near future is the abundance index of the 1980 year class obtained by IYFS in 1981. According to this index and the distribution pattern of the 1-year old whiting, the 1980 year class should be above average strength.

On this basis, ACFM can only advise that the TAC of 22 000 tonnes set for 1979, 1980 and 1981 should also be retained on a precautionary basis in 1982.

D.2.4 Plaice (Table 39)

Plaice in the Kattegat

156. Landings declined sharply from 10 000 tonnes in 1979 to 5 900 tonnes in 1980 (Table 40). This reduction cannot be attributed to closed periods, since only about 55% of the TAC were taken.

157. Without any useful indication of the strength of the most recent year classes the prognoses in 1979 and 1980 were based on the assumption of average recruitment (about 50 million 1-year old fish). The low number of 2 years old fish caught in recent years indicate that the 1976-78 year classes have been much below average, and that the decline in landings must be due to poor recruitment. Under the assumption that the 1977 year class is only 25% of average strength and that the following year classes are about 50% of average recruitment, the expected landings in 1982 would be about 5 000 tonnes with $\bar{F}_{82} = \bar{F}_{81} = \bar{F}_{80}$ (Figure 20). As the assumed fishing mortality rate in 1980 is much higher than F_{max} , ACFM recommends a TAC of 4 000 tonnes for 1982, which might reduce the fishing mortality by 20% relative to 1980.

1981	Management options for 1982	1982		1983
\bar{F}_{3-6}		\bar{F}_{3-6}	Catch	Spawning stock biomass
0.59	$\bar{F}_{82} = 0.8 \bar{F}_{81}$	0.47	4	22
	F_{max}	0.15	2	25

Plaice in the Skagerrak

158. Landings have shown a declining trend in recent years. They reached 9 600 tonnes in 1980 or 70% of the peak landings in 1978 (Table 41).

159. There is no data base available for an analytical assessment of the plaice stock in the Skagerrak, but it is reasonable to assume that the declining catches are due to reduced recruitment, as is, apparently, the case in the Kattegat. In such a case the TAC should be reduced in 1982 with the same rate (50%) as proposed for the Kattegat. ACFM, therefore, recommends a TAC for plaice in the Skagerrak in 1982 of 7 000 tonnes on a precautionary basis.

D.2.5 By-catch in the Pandalus fisheries

160. Data on species composition in Danish and Swedish Pandalus fisheries in Division IIIa were available on an annual basis (Tables 42 and 43). They indicate that the catches of protected species are small, that no single species exceeds 10% by weight and that most species amount to less than 5% each of the total annual catch.

The unspecified portion in both data sets is dominated by species such as Norway pout, blue whiting, grenadier, Argentina sp., rays, skates and sharks.

161. The data presented are, however, not sufficiently detailed to allow an analysis of the seasonal and areal variations and the advice on an appropriate by-catch limit for single landings must await a more detailed analysis of the basic data.

D.2.6 Minimum landing size for Nephrops

162. Advice on the minimum mesh size and the minimum landing size for Nephrops in Region 2 was provided by ACFM in its 1978 report (Coop.Res.Rep., No.85).

The text table below gives, for certain length intervals, carapace length with the corresponding total length for Nephrops:

<u>Carapace length (mm)</u>	<u>Total length (mm)</u>
20	71
25	86
27	92
33	110
36	120
40	132
43.5	143

163. The carapace length corresponding to a total length of 130 mm would, accordingly, be 39 mm.

D.2.7 70 mm mesh size in whiting fishery and by-catch

164. At present ACFM is not in the position to evaluate the effect of a mesh change in the whiting fishery in Division IIIa and the corresponding by-catches.

The Working Group on Division IIIa Stocks will be requested to consider this matter at its next meeting.

D.3 Cod, Haddock and Whiting Stocks

165. In its report to ACFM in 1981, the North Sea Roundfish Working Group suggested that the TACs previously advised by ACFM for 1981 in its 1980 report, were very seriously underestimated for cod, haddock and whiting stocks in Sub-areas IV and VI. This was partly due to higher levels of recruitment to some of these stocks than had previously been assumed, but the major reason for this discrepancy was that the North Sea Roundfish Working Group had used a new technique for assessing the terminal F in 1980. This has a major influence on the estimated stock sizes at the start of 1981.

166. ACFM has, therefore, looked critically during its current meeting at the technique used for assessing these terminal Fs, and at the outputs from it to see how compatible they are with the resulting Fs in preceding years and what is known of changes in fishing effort between 1980 and immediately preceding years.

As a result of this examination, ACFM has come to the conclusion that, although the method has considerable potential for the future in the problem of assessing terminal Fs for many stocks, as applied by the North Sea Roundfish Working Group, the method has major deficiencies, both theoretically and logistically, and this is clearly demonstrated in their outputs for all the stocks considered here.

167. Accordingly ACFM, in the limited time available to it, has re-assessed the terminal Fs for all of these stocks using the effort data as indicative of the change in F between 1980 and the average F of the period 1975-79. The results of these re-assessments are given below with the resulting TACs for 1981. In some cases, these re-assessments have resulted in appreciable changes in the previously advised TACs for 1981; but this has largely resulted from changes in the recruitment levels to the stocks. In all cases, the management policy has remained unchanged from that adopted by ACFM in making the previous recommendations on TACs for these stocks given in its 1980 report.

D.3.1 Sub-area IV

168. Recent catches and recommended TACs, in thousand tonnes:

North Sea stock	1979		1980		1981	1982
	Rec. TAC	Actual catch	Rec. TAC	Actual catch ¹⁾	Rec. TAC	Rec. TAC
Cod	183	235	200	258	220 ²⁾	190
Haddock	83	101	90 ²⁾	121	140 ²⁾	160
Whiting	85	158	150 ²⁾	132	150 ³⁾	100

1) Preliminary.

2) Revised.

3) At the July 1981 ACFM meeting revised to 120 000 tonnes.

D.3.1.1 North Sea cod (Table 44)

169. Since the meeting of the North Sea Roundfish Working Group, the Young Gadoid Working Group has reviewed the recruitment data on North Sea cod, including the data from the 1981 Young Fish Surveys. The Roundfish Working Group considered that the 1980 IYFS underestimated the abundance of the 1979 year class. From the 2-group estimate in the 1981 IYFS, it was possible to obtain a stock size estimate from the VPA/IYFS index regression. This in turn allowed an estimation of the stock as 1-group, assuming an average fishing mortality.

170. ACFM examined the methodology in utilization of the little data on discarding. It considered that the method of raising the relatively few discard observations to the total international catch might lead to a large increase in the variance of the 1-group VPA estimate. The

fluctuations may reflect changes in sampling intensity rather than real estimates of total discard level. For the 2-group, the 1970-77 discards averaged 4.9% of the reported catch, rising to 30% and 23% in 1978 and 1979, respectively, when additional countries reported. Similarly, for the 1-group, large increases in discard percentage occur in these years. ACFM considered, in view of the limited source of data over the years, that the stock projections and TAC calculations should be made on the basis of the human consumption landings alone, not including the discard figures. VPAs were re-run to obtain new estimates of stock and fishing mortalities.

171. New VPA/IYFS regressions were calculated for both 1- and 2-groups.

The Young Gadoid Survey Working Group had noted that a new index of 1-group abundance, which took account of annual spatial distribution of 1-group cod, further improved the predictive nature of the regression. This new 1-group index combined with the new VPA stock indices resulted in a predictive regression with a very high correlation coefficient, 0.99, compared to 0.65 initially.

Further evidence from the English roundfish surveys was presented to ACFM which gave additional confirmatory independent evidence of the recent year class strengths.

From these analyses, the stock sizes ($\times 10^6$) of the 1979 and 1978 year classes at 1 January 1980 were set at:

<u>Year class</u>	<u>Million</u>
1979	345.5
1978	158

172. Input fishing mortality values for the older fish were calculated by similar methods to those described for the other gadoid species. These were based on the 1975-79 F values utilizing effort data. F values for 1- and 2-groups were calculated from the ratio of 1980 catch to stock size at 1 January. All other input parameters are as used by the Working Group.

ACFM noted that the 1980 mean (3-8) fishing mortality ($F = .72$) on the spawning stock is still at the high level of 1979 and is far to the right of the F_{max} .

173. The management objective at present should be gradually to reduce F towards this level, i.e., F_{max} , as a first stage in developing a conservation regime.

ACFM repeats this advice, and its recommendation that F_{1981} should be reduced by 20% from the 1979 F value. It was on this basis that the 1981 TAC of 190 000 tonnes was proposed. The revised advice for 1981 becomes 220 000 tonnes, when the new recruitment estimates are taken into account.

Maintenance of the 190 000 tonnes TAC for 1981 would require a reduction in F of 46% from the 1980 level.

The predicted annual catches and spawning stock biomass in each year under each option are given below:

1980				Management option for 1981	1981				1982	
Stock biom. (1-12)	Spawn. stock biom. (≥ 3)	F	Catch		Stock biom. (1-12)	Spawn. stock biom. (≥ 3)	F	Catch	Stock biom. (1-12)	Spawning stock biom. (≥ 3)
530	271	.72	242	Option 1 $F_{81} = .80F_{79}$	547	262	.56	217	582	355
				Option 2 TAC for 1981 to remain at 190 000 t					262	.45	190	641	408

ACFM recommends that the 1981 TAC be revised to 220 000 tonnes as under Option 1.

174. In assessing the possible catch levels for 1982, ACFM has considered two assumptions with regard to the 1981 catch:

Assumption 1: ACFM's revised TAC for 1981 will be implemented and enforced.

Assumption 2: The fishing mortality in 1981 will remain at the same level as in 1980 and 1979.

Assumption 2 seems to be the more likely alternative, although it is not biologically advisable and will result in a catch of 266 000 tonnes in 1981.

175. The 1982 yields and spawning stock biomass for 1 January 1983

for varying levels of F in 1982 are shown in Figure 21, and for selected options in the text table below:

1981		Management options for 1982	1982				1983	
F	Catch		Stock biom.	Sp. stock biom.	F	Catch	Stock biom.	Sp. stock biom.
0.70	266	$F = .9 \times F_{81}$ recom.	511	293	.50	190	590	360
		F_{max}			.30	125	718	440
		$F_{0.1}$			.15	70	804	550

The position of F_{max} is indicated on the Figure. As recruitment has been

input at an average level, and as these fish form an important part of the catches, the yields differ little under both assumptions.

ACFM recommends a reduction of 10% of the fishing mortality level recommended for 1981, corresponding to a TAC of 190 000 tonnes in 1982.

176. ACFM wishes to point out that the exploitation pattern with a very high fishing mortality on the recruiting year class is very unsatisfactory and one of the salient examples of the state described in the Introduction on pages 2 and 3, Section "Advice on Fishery Management". To improve the exploitation pattern, several measures might be applied, and ACFM will request the North Sea Roundfish Working Group to consider this problem.

D.3.1.2 North Sea haddock (Table 45)

177. The F_s in 1980 were assessed for age groups 2, 3 and ≥ 4 by taking the change in fishing effort in 1980 from the mean for the period 1975-79 and running iterative VPAs with varying input F_s until values were produced which gave a corresponding change between the 1980 F values and the means for the period 1975-79. Input F_s for the 0- and 1-group were taken directly from the North Sea Roundfish Working Group report as these are based on the strength of the year class as measured by the IYFS. The results of these surveys in 1980 and 1981 show that the 1979 year class is rather more than twice the average strength, whilst the 1980 year class is rather below average strength.

178. With the current exploitation pattern the North Sea haddock stock is clearly being exploited very much in excess of the rate which would give the maximum sustainable yield. ACFM's recommendation in its 1980 report that the TAC in 1981 should be fixed at a reduction of about 40% of the 1979 human consumption fishery mortality rate would seem fully justified if any progress is to be made in reducing the exploitation rate towards a more reasonable level. The exploitation rate in 1981 would then still be about twice the F_{max} level. Applying this reduction to the new estimate of stock size in 1981 results in landings of 137 000 tonnes in that year and an increase in the spawning stock biomass in 1982 to 530 000 tonnes. ACFM would accordingly advise that the TAC for North Sea haddock for 1981 could be increased from the previously recommended level of 120 000 tonnes to 140 000 tonnes.

179. To predict landings in 1982 for various levels of exploitation, recruitment as 0-group for the 1982 year class has been assumed to be average. The fishing mortality generated by the industrial fishery, the rate of discarding by the human consumption fishery and mean weights at age have been assumed to remain at the average levels of recent years. If the fishing mortality rate generated by the human consumption fishery remains at the 1981 level, and there is no change in the minimum mesh size, the TAC in 1982 would be 170 000 tonnes and the spawning stock biomass in 1983 would increase marginally to 550 000 tonnes. ACFM considers, however, that further action should be taken in 1982 to reduce the exploitation rate. A reduction of 10% from the 1981 level would give a TAC in 1982 of 160 000 tonnes and would increase the spawning stock biomass to 570 000 tonnes. The effects of various changes in exploitation rates in the human consumption fishery relative to that of 1981 are shown in Figure 22, and for selected options in the text table below.

1981			Management options for 1982	1982			1983
Spawning stock biom. (≥ 2)	F*	Catch		Spawning stock biom. (≥ 2)	F*	Catch	Spawning stock biom. (≥ 2)
504	.63	140	10% reduction in F ₈₁	530	.57	160	570
			Retention of F ₈₁		.63	170	550
			F _{max}		.38	132	640

* F on the most heavily exploited age group.

ACFM, therefore, recommends a further 10% reduction of the fishing mortality level corresponding to a TAC of 160 000 tonnes in 1982.

D.3.1.3 North Sea whiting (Table 46)

180. The Fs in 1980 were assessed in the same way as for haddock for the same grouping of ages. Again the Fs on 0- and 1-groups were taken directly from the report of the North Sea Roundfish Working Group.

The results of the IYFS in 1980 and 1981 show that the 1979 year class is very close to average strength and the 1980 year class only about 65% of average.

181. With the current exploitation rate and pattern, the North Sea whiting stock is being exploited well beyond the F_{max} level. On this basis, ACFM in its 1980 report recommended that the TAC in 1981 should be set at a level which would mean a 30% reduction of the exploitation rate generated by the human consumption fishery in 1979. Applying this policy to the re-estimated stock size at the beginning of 1981 would result in a TAC of 120 000 tonnes.

182. In July 1981 ACFM advised the management bodies of this reduced estimate of the 1981 TAC. If the TAC of 120 000 tonnes is taken, the catch in 1982 would be 142 000 tonnes if the 1981 F is maintained in 1982. With a 10% reduction of the 1981 F in 1982, the corresponding TAC would be 135 000 tonnes.

183. However, ACFM considers, in the light of the large reduction in F which would be required to take the revised 1981 TAC and the late date at which the revision was notified, that it is highly unlikely that the 1981 catch will be kept at this level. It, therefore, considers it more likely that the initially recommended TAC for 1981 of 150 000 tonnes will be taken. On this basis, a figure of catch and spawning stock biomass at various rates of F in the human consumption fishery in 1982 to that in 1981 is shown in Figure 23. If the fishing mortality rate is maintained at the same level in 1982 as in 1981, the landings will be 140 000 tonnes, and the spawning stock biomass in 1983 275 000 tonnes. However, in the

light of the very high exploitation rate of this stock, ACFM would advise a reduction of the F in 1982. A 10% reduction would appear an appropriate level; this would result in a TAC of 100 000 tonnes and a spawning stock biomass in 1983 of 390 000 tonnes.

1981			Management options for 1982	1982		1983
Spawning stock biomass (\geq)	F*	Catch		F*	Catch	Spawning stock biomass (\geq)
402	1.17	150	F _{max}	.37	86	435
			F ₈₂ = 0.9 x rec. level for 1981	.53	100	390
			F ₈₂ = F ₈₁ expected level	1.17	140	275

* F on the most heavily exploited age group.

184. Therefore, ACFM recommends a reduction of 10% of the fishing mortality level recommended for 1981, corresponding to a TAC of 100 000 tonnes in 1982.

D.3.2 Sub-area VI

185. Recent catches and recommended TACs, in thousand tonnes:

Sub-area VI stock	1979		1980		1981	1982
	Rec. TAC	Actual catch	Rec. TAC	Actual catch ¹⁾	Rec. TAC	TAC
Cod	10.4	17	12.1	18	20 ²⁾	17.5 ³⁾
Haddock	11	16	15.5 ²⁾	20	20.6 ⁴⁾	21.5 ⁵⁾
Whiting	12	17	13 ²⁾	13	14	13 ³⁾

1) Preliminary.

2) Revised.

3) Recommended TAC.

4) See paras. 190 and 193 for details.

5) Including a recommended TAC of 15 500 tonnes for Division VIa and a precautionary TAC of 6 000 tonnes for Division VIb.

D.3.2.1 Cod (Tables 47 and 48)

186. The fishing mortalities for Division VIa cod in 1980 were estimated as described for North Sea haddock using efforts and catches per age group for Scottish motor trawl, seine net and light trawl over the years 1975-80 for age groups 2, 3 and ≥ 4 . The 1980 F for 1-group was taken directly from the report of the North Sea Roundfish Working Group.

The resulting estimates of stock would suggest that the 1978 year class is a very strong one, but the 1979 year class a little more than average.

187. With the current exploitation pattern this stock is being exploited at about 50% above the F_{max} level. In setting the TAC for 1981 in its previous report, ACFM recommended a value of 9 500 tonnes for Division VIa based on a 20% reduction of the 1979 level of F . Continuing with this policy, applied to the re-estimated stock size at 1 January 1981, would result in a TAC of 19 500 tonnes. Adding to this 500 tonnes for Division VIb, as in the previous report, would result in a TAC of 20 000 tonnes for the whole of Sub-area VI for 1981. As in the case of North Sea cod, this increase is predominantly due to the better recruitment than had been originally envisaged.

188. Catches have been calculated in 1982 over a range of F values on the assumption that this TAC will be taken in 1981 and assuming average recruitment, as 1-group, in 1982. The resulting catches and spawning stock biomass are shown in Figure 24. Maintenance of the same fishing mortality rate as in 1981 would result in a catch of 18 000 tonnes, but would reduce the spawning stock biomass to 33 000 tonnes in 1983. As the stock is still exploited well above the F_{max} level, a reduction of 10% of the 1981 fishing mortality rate would appear to be a preferable option. This would result in a TAC of 17 000 tonnes for Division VIa. Adding 500 tonnes for Division VIb would give a TAC of 17 500 tonnes for the whole of Sub-area VI. The resulting spawning stock biomass in Division VIa in 1983 would be 35 000 tonnes.

1981			Management options for 1982	1982		1983
Spawn. stock biom. (≥ 3)	F	Catch		F	Catch	Spawn. stock biom. (≥ 3)
43	.67	19.5	Retention of 1981 F	.67	18	33
			10% reduction of F_{81}	.60	17	35
			F_{max}	.33	10.4	44

Therefore, ACFM recommends a further 10% reduction of the fishing mortality level corresponding to a TAC of 17 500 tonnes for the whole of Sub-area VI in 1982.

D.3.2.2 Haddock

Division VIa (Table 49)

189. The fishing mortality rates for Division VIa haddock in 1980 were estimated in the same way as for Division VIa cod. For 1-group, the F was taken directly from the North Sea Roundfish Working Group report as this is firmly based on the catch in numbers of this age group and a relationship between year class strength in the North Sea and in Division VIa. The fishing mortality on this stock in 1980 was about 20% lower than

the mean for the period 1975-79. The 1979 year class is somewhat more than twice the average strength, but the 1980 year class is appreciably below average.

190. With the current exploitation pattern, the stock would appear to have been exploited only slightly above the F_{max} level in 1980, but the yield per recruit curve is rather flat-topped and F_{max} is, therefore, of little significance. On this basis, ACFM's advice for 1981 in its report of 1980 was based on a reduction of 10% of the 1980 exploitation rate. Applying this policy to the re-estimated stock size at 1 January 1981 would give a catch of 14 600 tonnes compared to ACFM's previous advice of 15 500 tonnes for Division VIa. There would therefore seem to be no justification for increasing the TAC for 1981.

191. In 1982, recruitment as 1-group has been assumed to be average. Retention of the same fishing mortality rate in that year would give a catch of 17 000 tonnes in Division VIa and leave a residual spawning stock biomass of 52 000 tonnes in 1983. The curves of yield in 1982 and spawning stock biomass in 1983 at various levels of F in 1982 are shown in Figure 25. If the fishing mortality rate were reduced by 10% from the 1981 level, the TAC in 1982 would be 15 500 tonnes in Division VIa and the spawning stock biomass would remain at nearly the 1982 level.

1981			Management options for 1982	1982			1983
Spawn. stock biom. (\geq)	F	Catch		Spawn. stock biom. (\geq)	F	Catch	Spawn. stock biom. (\geq)
61	.50	15.5	Retention of F 1981	56	.50	17	52
			10% reduction of F_{81}		.45	15.5	54

ACFM, therefore, recommends a TAC of 15 500 tonnes for Division VIa haddock for 1982, based on a 10% reduction of the fishing mortality rate from 1981 to 1982.

Division VIb (Table 50)

192. The TAC for this area has been based on average catch levels rather than any analytical assessment. The years 1974-76, when catches in excess of 40 000 tonnes were reported, were excluded from this average. In 1980, the total catch rose to over 7 000 tonnes, mainly due to English freezer trawler vessels redeveloping a fishery in the area as a result of new markets created in 1979 for whole frozen haddock. The catches of 1 654 tonnes and 6 261 tonnes in 1979 and 1980 thus represent total catches in contrast to earlier years when the reported catches refer to landed catches after considerable discarding. These recent catches taken in some 5-6 weeks are at rates which are consistent with the high catches reported in 1974-76 and raise doubts as to the validity of excluding them from the long-term mean used in calculation of the TAC.

Re-examination of English catch returns for recent years give the following percentage discards:

		Adjusted catch (tonnes)
1979	56%	3 475
1978	63%	7 292
1977	22%	3 649
1976	31%	4 847
1972	68%	9 911

Assuming that these are applicable to the other United Kingdom vessels, which fish for similar markets, the adjusted total catches are also shown.

ACFM recommends that the Roundfish Working Group should re-examine the data on this stock in the light of this new information.

193. ACFM considers that it is not possible to perform any safe assessment at present, but would expect further advice to become available at its meeting in 1982. In the meantime, ACFM suggests that the catch be limited to 6 000 tonnes for 1981 and 1982 on a precautionary basis.

D.3.2.3 Whiting (Tables 51 and 52)

194. The fishing mortality rates for Sub-area VI whiting in 1980 were estimated as described for Division VIa cod. That for 1-group was taken directly from the North Sea Roundfish Working Group report. There was a reduction of about 15% in the fishing mortality rates of the major exploited age groups in 1980 from the means of the period 1975-79.

The 1979 year class is estimated to be about 30% above average, whilst the 1980 year class is a poor one.

195. The yield per recruit curve for this stock is flat-topped and accordingly F_{max} has little significance as a guide to management advice. The exploitation rate in 1980, however, was well above this value. The advice on a TAC for 1981 contained in ACFM's 1980 report was based on a 10% reduction in the 1980 fishing mortality rates. If this policy is applied to the re-estimated stock size in 1981, the catch is 14 100 tonnes compared with the value of 14 000 tonnes recommended by ACFM in its 1980 report. There would, therefore, seem to be no reason to suggest any change in the TAC for this stock in 1981.

196. In estimating TACs for 1982, the assumption has been made that recruitment as 1-group in that year will be average. This age group has in any case little influence on the catch which will be taken. Retention of the same F_s as in 1981 would result in a catch of 14 000 tonnes and would leave a spawning stock in 1983 of 31 000 tonnes. The curves of yield in 1982 and spawning stock biomass in 1983 at various levels of F in 1982 are shown in Figure 26. A 10% reduction from the 1981 levels would seem a preferable option. This would give a catch of 13 000 tonnes and a spawning stock biomass in 1983 of 32 000 tonnes.

1981			Management options for 1982	1982			1983
Spawn. stock biom. (≥ 2)	F	Catch		Spawn. stock biom. (≥ 2)	F	Catch	Spawn. stock biom. (≥ 2)
34	.77	14	$F_{82} = 0.9 \times F_{81}$	28	.69	13	32
			$F_{82} = F_{81}$		.77	14	31

Therefore, ACFM recommends a further 10% reduction of the fishing mortality level corresponding to a TAC of 13 000 tonnes in 1982.

D.3.3 Sub-area VII (excluding Division VIIa)

197. Recent catches and recommended TACs, in thousand tonnes:

Stocks	1978	1979		1980		1981
	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch ¹⁾	Rec. TAC
Cod	15.1	8 ²⁾	12 ²⁾	9	10.6	9
Haddock	2.3	8 ²⁾	2.6 ²⁾	9	2.7	9
Whiting	18	17 ²⁾	16 ²⁾	18	15.3	18

- 1) Preliminary.
- 2) Excluding Division VIIf.

198. No analytical assessments of these stocks were possible due to the lack of necessary data. Therefore, any TAC for 1982 will have to be based, as a precautionary measure, on historical catches, given in the following tables:

Cod in Divisions VIId and VIIe	Table 53
Cod in Divisions VIIb,c and VIIg-k	Table 54
Haddock in Divisions VIId and VIIe	Table 55
Haddock in Divisions VIIb,c and VIIg-k	Table 56
Whiting in Divisions VIId and VIIe	Table 57
Whiting in Divisions VIIb,c and VIIg-k	Table 58

D.3.4 Effects of a mesh increase to 90 mm in Sub-area VI

199. New assessments were made for cod, haddock and whiting for Division VIa on the basis of yield per recruit calculations using F at age arrays averaged for the period 1975-80 to represent exploitation patterns prior to 1981 and amended exploitation patterns calculated to represent the exploitation patterns corresponding to a 90 mm mesh size.

200. Results indicated expected long-term changes from the adoption of a 90 mm mesh. For cod the effects are insignificant over the range of fishing mortalities studied. For haddock there would be small (approximately 1% at recent levels of F) long-term gains except at low levels of fishing mortality. For whiting long-term gains will result at levels of fishing mortality greater than 60% of recent levels. The expected gain at recent levels of F is about 2%. These are the gains in yield. Gains in spawning stock biomasses are significantly higher. No account was taken of discards. Discarding is known to occur, but no adequate data are yet available. As a consequence of omitting discards, long-term gains both in yield and spawning stock biomass will be underestimated.

201. In the light of the above mesh assessment, ACFM would recommend an increase of the minimum mesh size in Sub-area VI for Recommendation 1 fisheries to 90 mm irrespective of twine type. Any enforcement benefits of such an increase in Sub-area VI will be upset by the serious enforcement problem in adjacent Divisions of Sub-area VII, where current minimum legal mesh sizes are 70/75 mm for Division VIIa, 75 mm for Divisions VIId and VIIe, and 80 mm for the rest of Sub-area VII.

D.3.5 Effects of an increase of minimum mesh size to 80 mm in the English Channel (Divisions VIId,e)

202. For both cod and whiting in Divisions VIId and e the data available for mesh assessments are very poor, and the Working Group was unable to improve on earlier assessments. However, the present minimum legal mesh size is 75 mm. For any fleet using that mesh size a further increase to 80 mm would be expected to have a minimal effect in the long term.

D.3.6 Species composition of by-catches in the North Sea fisheries for *Pandalus borealis*

203. No data were available on by-catches in the North Sea commercial fisheries for *Pandalus borealis* in recent years, and the only relevant data presented to the North Sea Roundfish Working Group were those from research surveys by the Federal Republic of Germany carried out in 1965, using a chartered commercial fishing cutter.

In view of the limited amount of data brought to the 1981 meeting, the Working Group was not able to make any recommendation on appropriate by-catch limits.

It is expected that more data will be presented at the next Working Group meeting.

D.4 Irish Sea and Bristol Channel Stocks

204. The Irish Sea and Bristol Channel Working Group met from 31 March to 9 April 1981 to:

- (i) assess TACs for cod, haddock, whiting, plaice and sole in Divisions VIIa, VIIf and VIIg;
- (ii) continue the examination of interactions between fisheries in these Divisions.

D.4.1 Revision of 1981 TACs

205. The ACFM reviewed the 1981 TACs recommended in last year's report, in the light of the latest assessment information on recruitment levels in these stocks in recent years. These have been higher than was anticipated, and as a result the TACs originally recommended represent a cutback in fishing effort much more drastic than the reductions envisaged in the ACFM advice of last year. In view of the increased recruitment, therefore, the ACFM recommends that the 1981 TACs be revised as indicated in the text table below. Except for two sole stocks, which are considered to be optimally exploited, the TACs correspond to a 10% reduction of the 1980 level of fishing mortality.

Stock	1980		1981	
	TAC	Actual catch	Old TAC	Revised TAC
Irish Sea cod	5 000	10 271	5 000	13 000
Irish Sea whiting	10 000	12 100	8 000	12 000
Irish Sea plaice	2 500	3 853	2 000	4 000
Irish Sea sole	1 300	1 866	1 500	1 800
Celtic Sea plaice	700	1 412	600	1 400
Celtic Sea sole	1 000	1 283	1 000	1 400

D.4.2 Irish Sea cod

206. Recent catches and recommended TACs, in thousand tonnes:

1977		1978		1979		1980		1981	1982
Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch ¹⁾	Rec. TAC	Rec. TAC
-	8.1	8.6	6.3	7.3	8.4	5	10.3	13 ²⁾	12.5

1) Preliminary.

2) Revised.

The total catch rose by 23% in 1980 to 10 271 tonnes (Table 59), while catch rates by French and British trawlers rose by 32% and 46% respectively. These increases followed the recruitment of the strong 1979 year class. The 1980 TAC was 5 000 tonnes.

207. The average level of fishing mortality in 1980 for the fully recruited age groups corresponds to that of the 1968-80 period. The total stock biomass at the beginning of 1980 is calculated to have been over 25 000 tonnes, showing a continuation of the rising trend since the low biomass of 1978. The spawning stock biomass appears to have remained static at around 6 000 tonnes since 1978.

208. In forecasting catches, it was assumed that fishing mortality in 1981 would continue at the 1980 level. This will give a catch of 14 300 tonnes in 1981 (compared to an earlier recommended TAC of 5 000 tonnes), leaving a total stock biomass of 32 600 tonnes and a spawning stock biomass of 18 700 tonnes at the beginning of 1982.

The level of F_{max} on the yield per recruit curve conditional on the present exploitation pattern is about 40% of the current value of fishing mortality, and in order to approach the conditional F_{max} the ACFM advises a 20% reduction in fishing mortality in 1982 compared to the anticipated 1981 level. This would correspond to a 1982 catch of 12 500 tonnes if the present exploitation pattern is allowed to continue (see Figure 27).

ACFM, therefore, recommends a catch of 12 500 tonnes as a TAC for 1982.

1981			Management options for 1982	1982			1983
Spawn. stock biom. (≥ 3)	F_{peak}	Catch		Spawn. stock biom. (≥ 3)	F	Catch	Spawn. stock biomass (≥ 3)
14	0.8	14	$F_{0.1}$	19	.24	6	31
			F_{max}		.32	7.5	28
			$0.8 F_{81}$		.64	12.5	21
			F_{81}		.8	15	18

If recruitment in 1981 is greater than has been assumed in this assessment, then the recommended level of fishing mortality for 1982 would yield a catch of 14 000 tonnes. Alternatively, if the 1982 catch is restricted to 12 500 tonnes, then the corresponding reduction in F will be 30% rather than 20%.

209. In previous ACFM reports, the value of improving the exploitation pattern - by reducing the fishing mortality on 1-year old cod - was pointed out. If this improvement were to be implemented, then the stock could be exploited more intensively (or, alternatively, the yield at a given level of exploitation would be greater).

Calculated trends in catch weights, total stock biomass and spawning stock biomass to 1990 are indicated in Figure 28 assuming (a) maintenance of fishing mortality on 1-year olds, (b) prevention of this fishing mortality from 1982 onwards and (c) from 1981 onwards.

Mortality on young fish is usually reduced by increasing the mesh size, but this cannot be done for Irish Sea cod, because they are mainly taken in a mixed fishery and such a mesh size would be too big to catch the other species. Because young cod tend to occur in fairly discrete concentrations in the later months of the year (last quarter), it would be possible to reduce mortality by avoiding those areas, but the available

information on codling distribution does not allow these areas to be defined at present. It would almost certainly require cooperation from the fishing industry to define areas of juvenile cod concentrations. A minimum landing size of 45 cm during the last quarter of the year should encourage avoidance of small cod concentrations (although inevitably there will be some discarding), but such a seasonal application of a minimum size would not be feasible at present.

When documented information on codling distribution becomes available, the ACFM may be in a position to review the minimum size regulation.

D.4.3 Irish Sea whiting

210. Recent catches and recommended TACs, in thousand tonnes:

1977		1978		1979		1980		1981	1982
Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch ¹⁾	Rec. TAC	Rec. TAC
-	10.7	-	11.1	10	9.9	10	12.1	12 ²⁾	10

1) Preliminary.

2) Revised.

The total catch for 1980 rose by 20% to 12 100 tonnes (Table 60); the TAC was 10 000 tonnes. Juvenile whiting are known to be caught in the Irish Sea Nephrops fisheries and discarded, but although some information is available from samples taken at sea during 1980, it is not considered to be sufficiently quantitative to be included in the whiting stock assessment.

211. Both the Working Group and the ACFM are very concerned at the shortcomings in these data, since such information as is available suggests strongly that fishing mortality on 0-group and 1-group whiting is much higher than the landings would indicate. It is estimated that the two major exploiters of whiting, Ireland and Northern Ireland, caught and discarded almost three times the number of one year old whiting in their landed catch. The reliability of the assessment must be judged in the light of this situation.

212. Total stock biomass, which fluctuated around 17 000 tonnes since 1972, appears to have increased from 15 000 tonnes in 1978 to 19 000 tonnes in 1980. The 1976 year class was a strong one, and young fish surveys have indicated that the 1979 year class is above average strength. The yield per recruit curve conditional on the 1980 exploitation pattern is flat-topped, and current levels of fishing mortality are about 2.5 times that corresponding to $F_{0.1}$.

213. Assuming that fishing mortality remains at the 1980 level (0.9) through 1981, the 1981 catch will be 12 800 tonnes, leaving a total stock biomass of 20 000 tonnes and a spawning stock biomass of 16 000 tonnes at the beginning of 1982.

If fishing mortality remains unchanged from 1981, the catch in 1982 will be 11 800 tonnes; the spawning stock biomass at the beginning of 1983 will be 14 600 tonnes (see Figure 29).

1981			Management options for 1982	1982			1983
Spawn. stock biom. (≥ 2)	\bar{F}_{3-7}	Catch		Spawn. stock biom. (≥ 2)	\bar{F}	Catch	Spawning stock biomass (≥ 2)
16	.9	13	$F_{0.1}$	16	.32	6	20
			$0.8 \bar{F}_{81}$		.72	10	16
			\bar{F}_{81}		.9	12	14

In order to reduce the level of fishing mortality, the ACFM advises a 20% reduction in fishing mortality from 1981 to 1982; this would correspond to a catch of 9 700 tonnes, leaving a total stock biomass of 20 000 tonnes and a spawning stock biomass of 16 000 tonnes at the beginning of 1983. The ACFM, therefore, recommends a TAC of 10 000 tonnes for 1982.

D.4.4 Irish Sea plaice

214. Recent catches and recommended TACs, in thousand tonnes:

1977		1978		1979		1980		1981	1982
Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch ¹⁾	Rec. TAC	Rec. TAC
4	2.9	4	3.2	2.5	3.4	2.5	3.9	4 ²⁾	3

- 1) Preliminary.
2) Revised.

The 1980 catch rose by 12% to 3 900 tonnes, continuing the rising trend from 1977 (Table 61). The 1980 TAC was 2 500 tonnes.

215. Fishing mortality rose from 1972 to 1976, since when it has been falling. The total stock biomass fell steadily during the 1972-77 period, but since 1978 it has been rising to its present level of almost 10 000 tonnes (spawning stock biomass 9 000 tonnes). Three very good year classes - 1976, 1977 and possibly 1978 - have recruited to the stock in recent years. They appear to be stronger than the good 1975 year class. The yield per recruit curve conditional upon the 1980 exploitation pattern shows that the level of fishing mortality is about twice that corresponding to F_{max} .

216. Assuming that the 1980 values of fishing mortality (0.6 for males and 0.5 for females) will continue through 1981, the catch in 1981 will be 4 000 tonnes, leaving a total stock biomass of 10 000 tonnes and a spawning stock biomass of 8 000 tonnes at the beginning of 1982.

Catches in 1982, and corresponding stock biomasses at the beginning of 1983, are shown in Figure 30, and in the text table below four management options for 1982 are indicated.

1981			Management options for 1982	1982			1983
Sp. stock biom. (≥ 3)	\bar{F}_{3-10}	Catch		Spawn. stock biom. (≥ 3)	\bar{F}	Catch	Spawning stock biomass (≥ 3)
9	.5	4	$F_{0.1}$	8	.15	1.3	10.5
			F_{max}		.25	2	10
			$0.8 \bar{F}_{81}$		.4	3	9
			\bar{F}_{81}		.5	3.6	8

In order to reduce the level of fishing mortality, ACFM recommends a 20% reduction in the exploitation rate and a 1982 TAC of 3 000 tonnes.

D.4.5 Celtic Sea plaice (Divisions VIIIf and VIIg)

217. Recent catches and recommended TACs, in thousand tonnes:

1977	1978	1979		1980		1981	1982
Actual catch	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch ¹⁾	Rec. TAC	Rec. TAC
0.8	0.9	-	0.9	0.7	1.4	1.4 ²⁾	1.2

- 1) Preliminary.
- 2) Revised.

Catches rose in 1980 to 1 400 tonnes (Table 62), an increase of 64% over the 1979 catch, and double the recommended TAC of 700 tonnes. Total demersal fishing effort was about 20% higher in 1980 than in the previous year.

Fishing mortality in 1980 (0.25 for both males and females) was lower than in 1979. The yield per recruit curve conditional upon the current exploitation pattern indicates that the 1980 value of F is about twice the conditional F_{max} . Stock biomass and spawning stock biomass have been increasing since 1976 and 1977 respectively.

218. Assuming that the 1981 level of fishing mortality will be the same as in 1980, the 1981 catch will be about 1 400 tonnes (compared to the recommended TAC of 600 tonnes), leaving a total stock biomass of 7 200 tonnes and a spawning stock biomass of 4 700 tonnes at the beginning of 1982.

If fishing mortality remains unchanged in 1982, the catch in 1982 will be 1 400 tonnes; the total stock biomass at the beginning of 1983 will be 7 600 tonnes and the spawning stock biomass 5 700 tonnes (see Figure 31).

1981			Management options for 1982	1982			1983
Sp. stock biom. (≥ 3)	\bar{F}_{3-8}	Catch		Sp. stock biom. (≥ 3)	\bar{F}	Catch	Spawning stock biomass (≥ 3)
5	.25	1.4	$F_{0.1}$	5	.06	.4	6.7
			F_{max}		.13	.75	6.3
			$0.8 \bar{F}_{81}$		.2	1.2	6
			\bar{F}_{81}		.25	1.4	5.75

In order to reduce fishing mortality towards more acceptable levels, the ACFM advises a 20% reduction in F in 1982, corresponding to a catch of 1 200 tonnes. The total stock biomass remaining at the beginning of 1983 will be 8 000 tonnes, with a spawning stock biomass of 6 000 tonnes.

Therefore, ACFM recommends a TAC of 1 200 tonnes for this stock in 1982.

D.4.6 Irish Sea sole

219. Recent catches and recommended TACs, in thousand tonnes:

1977		1978		1979		1980		1981	1982
Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch ¹⁾	Rec. TAC	TAC
1.4	1.1	1.4	1.1	1.4	1.7	1.3	1.9	1.8 ²⁾	1.6 ³⁾

- 1) Preliminary.
- 2) Revised.
- 3) Catch level preferred by ACFM.

The 1980 catch of 1 866 tonnes was 13% higher than the 1979 catch (Table 63), and exceeded the TAC of 1 300 tonnes. Estimated total fishing effort increased during 1980, by between 4% and 27% depending on which catch per unit effort (cpue) data are used. Most of the available cpue figures (two series from United Kingdom and three from Belgium) show a considerable

increase from 1978 to 1979 and a small decrease in 1980. The higher cpue in 1979 and 1980 (compared to 1978) was due to the strong 1975 year class, which in these two years accounted for 50% and 40% of the total catch, respectively.

The yield per recruit curve is flat-topped; the present level of fishing mortality (0.28) lies at approximately the same position as on the curve derived in last year's assessment.

220. On the assumption that the 1980 fishing mortality rate (0.28) will continue through 1981, the catch in 1981 will be 1 800 tonnes, leaving a spawning stock biomass of 5 900 tonnes at the beginning of 1982.

The 1982 yields and spawning stock biomass for 1 January 1983 for varying levels of F in 1982 are shown in Figure 32 and for selected options in the text table below:

1981			Management options for 1982	1982			1983
Spawn. stock biom.	\bar{F}_{3-12}	Catch		Spawn. stock biom.	\bar{F}_{3-12}	Catch	Spawning stock biomass
6	.28	1.8	$F_{0.1}$	6	.14	.9	6.3
			$0.8 \bar{F}_{81}$		.22	1.3	5.8
			\bar{F}_{81}		.28	1.6	5.5

This stock is fully exploited, and fishing mortality should not be allowed to rise.

The ACFM, therefore, considers a catch of 1 600 tonnes as the preferred level for a TAC in 1982. This will leave a spawning stock biomass of 5 500 tonnes at the beginning of 1983.

D.4.7 Celtic Sea sole (Divisions VII f and VII g)

221. Recent catches and recommended TACs, in thousand tonnes:

1977	1978	1979		1980		1981	1982
Actual catch	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch ¹⁾	Rec. TAC	TAC
1.0	0.8	-	1.0	1.0	1.3	1.4 ²⁾	1.3 ³⁾

1) Preliminary.

2) Revised.

3) Catch level preferred by ACFM.

The total 1980 catch of 1 283 tonnes rose by around 25% compared to 1979 (Table 64). The 1980 TAC was 1 000 tonnes. Fishing effort, which declined from 1976 to 1979, rose by approximately 30% in 1980.

Stock biomass, which fell steadily throughout the early 1970s as three strong year classes were fished out, appears to have risen since 1978 as a result of strong recruitment. The yield per recruit curve conditional on the current exploitation pattern is flat-topped and current levels of fishing mortality are close to the optimum.

222. On the assumption that the 1980 level of exploitation will continue through 1981, the catch in 1981 will be 1 400 tonnes and the spawning stock biomass will be just over 7 000 tonnes at the beginning of 1982.

The 1982 catches and spawning stock biomass for 1 January 1983 for varying levels of F in 1982 are shown in Figure 33 and for selected options in the text table below.

1981			Management options for 1982	1982			1983
Spawn. stock biom.	\bar{F}_{3-13}	Catch		Spawn. stock biom.	\bar{F}_{3-13}	Catch	Spawning stock biom.
7	.24	1.4	F _{0.1}	7	.19	1.1	7.2
			F ₈₁		.24	1.3	6.8

In order to maintain close to the optimum exploitation of this stock, the level of F should not be increased. ACFM, therefore, considers a catch of 1 300 tonnes as the preferred level for a TAC in 1982. The spawning stock biomass remaining at the beginning of 1983 will be 7 000 tonnes.

D.4.8 Celtic Sea cod (Divisions VIIIf and VIIg)

223. The total 1980 catch was 5 491 tonnes, the highest for the last ten years (Table 65). Effort data from France, which account for 90% of the catches, show an increase of 29% in 1980 following a stable period from 1974 to 1979. French catch per unit effort rose in 1979 and 1980 (by 25% and 49% respectively). The conditional F_{max} on the yield per recruit curve is about 40% of the present level of fishing mortality.

224. The data on which this assessment is based are not good, consisting of United Kingdom age distributions for the period 1969-80 (when they accounted for only 2% - 9% of the total catch) and French length distributions from 1978 onwards. These were converted into ages using English quarterly age/length keys for Division VIIa.

The ACFM recommends a precautionary TAC of 3 500 tonnes, which corresponds to the average level of catches over the past ten years.

D.4.9 Total demersal production, Irish Sea and Bristol Channel

225. The total demersal catch in Divisions VIIa and VIIf rose by 30% in 1980 to just under 58 000 tonnes. Total fishing effort could not be calculated by the method used in previous years, because Belgian data were not available. Catch per unit effort data from France and the United Kingdom give conflicting estimates of total fishing effort in 1980.

226. As discussed in earlier reports of the Working Group and of the ACFM, the area under examination (particularly the Irish Sea) shows a high degree of fisheries interaction. Consequently, management techniques which are based only on single species assessments and single species TACs are not the most appropriate, regardless of the state of the individual stocks which have been assessed in this way. A more comprehensive approach to the regulation of fishing effort, such as a total demersal TAC, therefore needs to be considered seriously at the same time as single species regulations. Two points can be emphasized in support of this:

(i) There could be diversion of effort onto other species, if the single species TACs are enforced. Several of these other species, particularly the rays, are known to be very vulnerable to over-fishing. A total demersal TAC might help to prevent too much diversion of effort. Shellfish species such as Nephrops and scallops might also suffer from diversion of effort and the state of these stocks should be monitored closely if whitefish fishing is restricted. They are not included in the total demersal production model.

(ii) Although the degree to which present fishing effort is too high is uncertain, there is little doubt that the level of fishing mortality in 1980 was above the maximum of the surplus production model and that some reduction is needed. A total demersal TAC would provide a means of doing this which would include all of the available demersal fish resources and, therefore, clearly show the limit for the fishery as a whole.

D.5 Norway Pout and Sandeels in the North Sea

227. The Working Group on Norway Pout and Sandeels in the North Sea has not met since April 1979. A detailed analysis is therefore not available, but a short review of the recent development in the fisheries and stocks can be given.

D.5.1 Norway pout (Table 66)

228. Landings increased from 270 000 tonnes in 1978 to 372 000 tonnes in 1979 and 526 000 tonnes in 1980. This development is compatible with the observed increase in the indices for 1-group Norway pout derived from the YFS in 1978-80. The introduction in late 1977 of a closed area for this fishery and later enlargements of the so-called "Norway pout box" have led, however, to a re-distribution of effort. This makes it difficult to evaluate the correlation between abundance indices and landings over a longer time period. The preliminary abundance estimate of the 1980 year class indicates a strength well below average and is in agreement with the rather weak occurrence of 0-group in the commercial landings in the autumn of 1980. This will probably result in lower landing levels in 1981.

At present, the strength of the 1981 year class is unknown, and it is not possible to indicate the likely level of catch in 1982.

D.5.2 Sandeels (Table 67)

229. Landings in 1979 decreased to 577 500 tonnes from the peak landings of 787 000 tonnes in the two preceding years. The latter level was almost reached again in 1980, when landings amounted to 729 000 tonnes. The development is different in the southern and the northern North Sea (divided by 56°30'N). The decline in landings in 1979 was thus confined to the southern North Sea while a minor increase took place in the northern North Sea.

Data on total effort are not available after 1978. Estimates of fishing mortalities from catch in number at age data indicate, however, that the level has been fairly stable since 1976-77 in both areas, and that fluctuations in catch levels mainly reflect fluctuations in availability, e.g. year class strength. From the time series available it does not appear that the catch of 0-group sandeels allow any accurate estimate of recruiting year class strength. Having no other means of obtaining a basis for predicting short-term developments in the stocks, no firm management advice can be given at present.

General

230. ACFM considers that a new Working Group should be created to include Industrial Fish Species, particularly those which are short-lived, such as Norway pout, sandeels and sprat. The terms of reference are discussed below.

D.6 Industrial Fisheries in the North Sea and Adjacent Waters

231. At its meeting in 1981 ACFM was unable to give advice on management in 1982 of the main target species for the industrial fisheries, i.e., Norway pout, sandeel and sprat, in the North Sea and adjacent waters. This is largely due to the fact that these fisheries depend, to a large extent, on the recruiting year classes which are exposed to fishing as 0- and 1-group fish and which cannot be assessed with any reasonable accuracy, especially in the first part of the year.

232. ACFM is also concerned about the by-catches in the industrial fisheries of mainly young fish which are expected to recruit to the fisheries for direct human consumption and to the presently depleted stock, i.e. herring. The 1.7 million tonnes catch of the industrial fisheries at present account for approximately 60% of the total yield from the North Sea and Division IIIa. Within this, the by-catch in numbers of fish is expected to be large as a proportion of their levels of recruitment of the species. In this situation, ACFM feels that more scientific effort should be exerted to these problems at all levels from biological sampling of catches to stock assessments.

233. ACFM, therefore, recommends that:

a "Working Group for Norway Pout, Sandeels and Sprat Fisheries in the North Sea and Adjacent Waters (ICES Sub-area IV, Divisions IIIa and VIa)" should be set up, with the following terms of reference:

1. make available and review all existing data from the industrial fisheries on catch and effort, species composition of catch, and size (age) composition of the different species as far back as possible;
2. report the results for the by-catch species, e.g., herring, cod, haddock, whiting, mackerel and saithe to the relevant ICES assessment Working Groups;

3. evaluate the sampling and reporting procedures;
4. assess the state of the stocks of the target species for industrial fishing, i.e., sprat, Norway pout and sandeels.

This Working Group should meet in advance of the next ACFM meeting (November 1981).

234. If this recommendation is implemented, then the existing Working Group on Norway Pout and Sandeels can be discontinued and assessment work on sprat can be removed from the terms of reference of the Herring Working Group and the Working Group on Division IIIa Stocks.

E. STOCKS IN REGIONS 2 AND 3

E.1 Eastern and Western Mackerel Stocks

235. The Mackerel Working Group met at ICES headquarters from 7 to 14 April 1981 to:

- (i) assess the mackerel stocks in Sub-areas II, III, IV, VI, VII, VIII and IX;
- (ii) give further clarification of the biological reasoning underlying the selection of 30 cm as the length below which catching mackerel is undesirable, both for the North Sea and the Western stocks;
- (iii) provide the best statistics available, sub-divided by gear type and by month (or season) of catches of horse mackerel, pilchard, sprat and mackerel in the area recommended for closure in para. 205 of the ACFM report of 1980;
- (iv) assess the benefits to the mackerel stock of the closure proposed in the paragraph of the ACFM report mentioned above, including data available on the length distribution of catches, the mortality per age group, by months, and by gear types and mesh sizes;
- (v) assess the effects of a 40 mm minimum mesh size for trawl gears for mackerel in Sub-area IV.

The Group was also asked by Portugal to include the assessment of horse mackerel in ICES Divisions VIIIc and IXa in its Agenda.

E.1.1 Tagging results

Stock delineation:

236. Since in 1980 a suggestion was made that the existence of an untagged component could explain the difference in tag densities between Divisions IVa and VIa, the Group had tried to clarify this matter.

The following migration pattern was supposed:

Following the conclusions of Dutch scientists, the Western stock could be divided into a faster growing and northerly distributed component and a slower growing southerly distributed component.

In winter the North Sea stock is concentrated in the Norwegian Trench and to the west of Shetland/Hebrides. The Western stock is distributed from Northern Ireland (fast growing fish) to the Bay of Biscay (slow growing fish) with an overlapping area in the Celtic Sea.

In early summer the North Sea stock spreads out to its spawning area and the fast growing part of the Western stock migrates through Division VIa to the northern North Sea. The slow growing part migrates to the south of Division VIa and through the Channel to the southern North Sea.

In summer both stocks overlap in the North Sea.

In autumn part of the North Sea stock migrates to the west of Shetlands, and the fast growing component of the Western stock retracts to the west of the British Isles, whereas the slow growing part concentrates in the Celtic Sea.

237. Tagging off Ireland in May is supposed to be done on the front part of the Western fast growing component. This tagged part migrates to the North Sea together with the untagged part of the same component and mixes with the North Sea stock. The increase in density of North Sea tags recovered in January-February 1979 in the northern part of Division VIa compared to that in Division IVa in summer can be explained by assuming that an untagged component of the Western stock has left the area by that time. The high density of tags from releases off Ireland in Division VIa in winter compared to that in Division VIa in summer, may result from the tagged population representing part of the Western fast growing component only. In winter this population migrates through Division VIa and will, to a limited extent, be mixed with North Sea mackerel. In summer, the same tagged population may occur together with North Sea mackerel and other parts of the Western stock. Consequently, the density of tag returns from releases off Ireland will be lowered.

These explanations of the tagging results must be considered as a working hypothesis.

Use of tagging results in the VPA

238. Although a detailed revision of all tagging data available was undertaken at the meeting, it was not possible to calculate a fishing mortality rate which could be utilized as input to the VPA due to the very low number of tag recoveries and the uncertainties related to the catch data.

E.1.2 North Sea area (Tables 68 and 69)

239.

	1976	1977	1978	1979	1980	1981	1982
Recommended TAC	249	220**	145	145	0-50	0-40	0***
Actual catch	316	261	153	160*	96		

TACs and catch in '000 tonnes.

- *) Includes unallocated catches.
- **) Revised.
- ***) Recommended ban on mackerel fishing in Sub-area IV and Div. IIIa.

The TAC of 50 000 tonnes was exceeded by about 100%, the reported international catch amounting to 96 000 tonnes. No information was available on "unallocated" catches, which means that the above figure must be considered as a minimum.

Egg surveys and spawning stock estimates

240. Three Norwegian cruises during the spawning season in the North Sea in 1980 together with the results of plankton sampling at a fixed position provided an estimate for the total number of eggs of 694×10^{12} .

Difficulties arose when applying a fecundity estimate to derive the spawning population: using the Norwegian value a spawning stock of 406 000 tonnes was estimated, whereas using the value calculated for the Western stock one arrives at an estimate of a stock of 138 000 tonnes. It was admitted that further experiments are needed to confirm the fecundity rate of North Sea mackerel.

Stock assessments

241. Using catch at age data derived from sampling and split by stock using tagging results, a series of trial VPAs was run. A terminal F value of 0.2 gave a spawning stock size of 340 000 tonnes which is close to the upper estimate obtained from egg surveys. The spawning stock will decrease to 270 000 tonnes in 1981. During nine years it has been reduced to less than a quarter of its 1972 abundance (1.2 million tonnes). This is what might be expected in a stock suffering from low recruitment year after year.

One can only conclude that the North Sea mackerel stock is in a very depleted state, reaching the point of a serious risk of the total collapse if the recruitment does not improve in the near future.

242. As mentioned above, the abundance of this stock will decrease in 1981 to an unprecedented low level. This decrease is primarily caused by a constant failure of recruitment since the 1969 year class recruited to the fishery in 1971-72.

In the light of the serious state of the stock, ACFM recommends that no mackerel fishery be allowed in the North Sea (Sub-area IV) and in the Skagerrak and Kattegat (Division IIIa).

243. As shown by biological and tagging data, mackerel belonging to the North Sea stock do occur in the northern part of Division VIa during winter time and, since a total ban on fishing for mackerel in the North Sea and Division IIIa is recommended, ACFM further recommends a closure of Division VIa north of 56°N in the period from 1 November to 30 April for mackerel fishing.

E.1.3 Western area (Table 70)

	in '000 tonnes						
	1976	1977	1978	1979	1980	1981	1982
Recommended TAC	295	250**	450**	435	330	333-353	270
Actual catch	507*	326	504	606*	605*		

*) Includes unallocated catches and catches by non-member countries.
 **) Revised.

ACFM recommended an area TAC of 330 000 tonnes in 1980, and the actual catches reported to the Working Group by national experts add up to 497 300 tonnes to which 107 500 tonnes of "unallocated" catches must be added. The latter figure is the best estimate the members of the Working Group could provide, but the possibility of this being an underestimate cannot be ruled out. This must be kept in mind when considering the results of the VPA and prognoses. No new survey of discarding was undertaken in 1980, and the raising factors applied to the numbers at age were the same as in 1979, except for the English data in the fourth quarter to which a higher percentage was applied. This was done in order to take into account conditions of fishing in late autumn off Cornwall and the abundance of the 1978-79 year classes in the catches which resulted in a higher discarding rate.

Egg surveys and spawning stock estimates

245. The Working Group studied the findings of the ad hoc Working Group meeting, which took place at Lowestoft in February 1981 to analyse the data from the 1980 egg survey cruises, and adopted them. The fecundity estimate was kept the same as for the 1977 egg surveys but a maturity ogive was introduced and a sex ratio of 1:1 assumed. The spawning stock was estimated at $6\ 200 \times 10^6$ fish in the spring of 1980.

Stock assessments

246. Catches by number of the Western stock mackerel taken in the North Sea area are assumed to represent less than 5% of the total Western stock catch. That means that the effects of errors in calculating those numbers should not be important for the assessment. No data were available to estimate the input F to the VPA, and, as in the last 3 years, it was decided to select an F which would match a spawning stock size at 1 June 1980 corresponding to the value obtained from egg surveys ($6\ 200 \times 10^6$ fish). A maturity ogive was also introduced in the VPA instead of the knife-edge maturity used previously.

The fishing mortality rate on fully recruited age groups in 1980 has reached a maximum value of 0.30.

The Fs on 1 year olds and 2 year olds have been set at 0.15 and 0.25 respectively to adjust for the expected abundance of the corresponding year classes, i.e., the 1978 year class about average and the 1979 year class above average.

The spawning stock, estimated to be 1.8 million tonnes in 1980, is expected to fall below half the maximum in 1974 of 3.4 million tonnes by the end of 1981 (see Figure 34).

247. From the available information, it can be supposed that the TAC in 1981 will not be adhered to and the catch will be not less than 580 000 tonnes. This will result in a spawning stock biomass on 1 January 1982 of 1 500 000 tonnes instead of 1 800 000 tonnes if the TAC has been adhered to. In the light of the rapid decrease in the spawning stock biomass during recent years, a cautious assumption has to be made on the level of recruitment of the 1979 year class. This was set at $1\ 100 \times 10^6$ recruits at age 1.

In order to keep the spawning stock in 1983 well above the level of 1 000 000 tonnes, fishing mortality should not be higher than 0.15. This means a reduction of the effort of about 50% and would result in a TAC for 1982 of 270 000 tonnes.

248. As a serious warning, ACFM made projections of the development of the spawning stock biomass for the period 1978-86 (see Figure 34) under the assumption of constant low recruitment ($1\ 100 \times 10^6$ fish) and the continuation of the 1981 F level. In such a case, the spawning stock biomass will fall below 1 000 000 tonnes by 1984.

E.1.4 Exploitation pattern

249. The biomass of the North Sea and Western mackerel has decreased in recent years as a consequence of too high exploitation rates and, for the North Sea stock, also of a recruitment failure.

One of the main objectives of the fishery management is to ensure that spawning stocks are kept at or restored to such a level that the stock has the potential to produce average recruitment. When the age at first capture in the mackerel fishery could be increased from 1 to 3 years the likely increase in the spawning biomass at an F of 0.2 would be about 30% to 50%.

250. Measures to restrict fishing on juvenile mackerel below age 3 would help to restore or keep the spawning stock at the level sufficient to produce average recruitment. Since the growth patterns of mackerel in the North Sea and in the Western area are rather similar, ACFM recommends a minimum landing size of 30 cm for mackerel in all areas.

251. In order to minimize the capture of mackerel below 30 cm in length, the ACFM recommended in its 1980 report that fishing for mackerel by vessels using pelagic trawl and/or purse seine gear should be permitted in that part of Division VIIe north of $49^{\circ}30'N$ and west of $5^{\circ}W$, and in that part of Division VIIf south of $50^{\circ}30'N$, only during the period mid-December to mid-February, commencing in 1980. ACFM wants to reiterate this recommendation to prevent fishing of undersized mackerel.

Since there are indications that juvenile mackerel do occur in substantial quantities outside the area mentioned above, accurate data on the distribution of juvenile mackerel in Sub-area VII have to be collected in order to enable improvement of the recommendation on the closed areas.

Minimum mesh size

252. In the absence of any results of selectivity experiments, no assessment was made on the effect of a 40 mm mesh for trawl gears.

E.2 Horse Mackerel in Divisions VIIIc and IXa

253. The request for assessment of this stock came only just before the Mackerel Working Group was to meet. Therefore, possibly not all parties interested in this assessment had the opportunity to take part in the meeting and not all data available were included.

The Spanish and Portuguese data, however, particularly for the most recent years, cover a high proportion of the horse mackerel catches.

254. A series of data on landings, effort and cpue for the Portuguese and Spanish fisheries were presented to the Working Group, together with data on growth and age composition of catches in 1980.

Catches have decreased from 167 000 tonnes in 1970 to 75 000 tonnes in 1980.

Fox's surplus production model applied to the data show that the MSY is about 150 000 tonnes. To obtain this level a reduction of 50% of the fishing effort would be needed.

A yield per recruit model shows that F_{max} corresponds to an F of 0.2 compared to the estimated F of 0.4 in 1980.

255. ACFM felt that the present assessment did not allow calculation of a specific figure for a TAC; it hopes that this will become possible next year.

It is, however, obvious that this stock has been reduced drastically in recent years, as can be seen clearly from the catch (Tables 71 and 72) and effort data.

ACFM would, therefore, recommend that fishing effort be restricted considerably on a precautionary basis.

Fishing mortality on younger age groups could be reduced by the enforcement of the present legal mesh size of 60 mm, and would be reduced even further if the ACFM recommendation of last year on an increase in a minimum mesh size for this area to 80 mm was implemented.

E.3 Hake Stocks in Sub-areas IV, VI, VII, VIII and IX

256. The Working Group on Assessments of Hake Stocks met at ICES headquarters from 30 April to 7 May 1981 to:

- (i) assess 1982 TACs for hake,
- (ii) review the exploitation patterns of hake stocks and advise on any additional measures required to improve them,
- (iii) discuss the data requirements for assessments of sea bream, monkfish and flatfish in Sub-areas VII, VIII and IX and draw up plans for collecting the requisite data.

257. Recent nominal catches (revised to correct for under-reporting) and recommended and adopted total TACs for hake in both NEAFC Regions 2 and 3, in thousand tonnes, are as follows:

Year	Revised nominal catches	Total figures (Northern + Southern Stocks)	
		Recommended TAC	Adopted quota
1977	67	-	-
1978	62	-	-
1979	70	63	63
1980	75	40	50
1981		38.5	48.5

The catches in 1979 and 1980 were 11% and 50% higher than the adopted total TACs, respectively.

258. The lack of adequate catch, effort, length and age composition data have in the past greatly hindered the assessment of these stocks. However, encouraging reports were received on improved sampling levels in 1980. Landing data reported to ICES are erroneous in many cases; information on discards or illegal landings and by-catches in the Nephrops fisheries (which take large amounts of small hake) is very limited. This year some data on the relative quantities and length composition of small hake discarded in the Nephrops fishery were made available by France, but some further revisions are likely to be necessary.

259. Two stocks, the "Northern" and the "Southern" stocks, were identified as in last year's report.

E.3.1 Northern stock (Divisions IVa and VIa, Sub-area VII and Divisions VIIIa and VIIIb)

260. The estimated catches, TACs recommended and adopted (in thousand tonnes) and mesh sizes recommended and in use after 1975 in the Northern stock are as follows:

Year	Revised nominal catches	Recommended TAC	Adopted quota	Mesh size (mm)			
				Recommended		In use	
				IVa+VIa +VII	VIIIa,b	IVa+VIa +VII	VIIIa,b
1975	74.5	-	-	70	60	40-80	40-50
1976	67.3	-	-	70	60	40-80	40-50
1977	51.2	-	-	70	60	60-80	40-60
1978	47.6	-	-	70	60	70-80	40-60
1979	52.1	43	43	70	60	70-80	40-60
1980	53.1*	30	40	80	80	70-80	40-60
1981	-	30	40	80	80	70-80	40-60
1982	-	30**	-	-	-	-	-

*) Preliminary.

***) Precautionary TAC.

It should be noted that the TAC for 1980 recommended by ACFM was 30 000 tonnes. This figure was increased by the EEC to 40 000 tonnes. The reported landings agree with this figure (Table 73); however, the estimated catch in 1980, including unreported landings (Table 74), is 53 100 tonnes (77% above ACFM's TAC).

The general level of estimated catch was the same as in 1979. The estimated catch in Divisions IVa and VIa increased by 400 tonnes (6%); in Sub-area VII fell by 3 200 tonnes (17%) and in Divisions VIIIa,b rose by 3 800 tonnes (15%).

261. Over the whole area inhabited by the Northern stock, it seems probable that effort by the larger and more powerful units is decreasing, while effort by the smaller units, that is, French artisans and the smaller English trawlers, has stabilized at a high level. Having

no comparable data set for Spain means that it is impossible to decide whether the total effort on the Northern stock has increased or decreased over the last 20 years. The ACFM is, however, of the opinion that Spanish effort is reduced and more closely confined to the western parts of Division VIIj than previously.

Almost all components of the fleet show some increase in cpue in 1980 compared to 1979. On the evidence available, it is difficult to distinguish between the effects of:

- reduced effort by the EEC fleets.
- a general reduction of Spanish effort.
- a somewhat stronger year class, or year classes, passing through the fishery.
- a gradual increase of mesh size in many components of the fleet.

262. ACFM is of the opinion that the long-term decline in the stock has been halted; there has been some reduction in effort and some increase in cpue in some components of the fleets in comparison with the previous year. However, ACFM is concerned that the 1980 EEC TAC had, as far as can be estimated, been substantially exceeded. The total catch still includes a high proportion of very small hake.

263. ACFM stresses again the overriding importance of improving the exploitation pattern for hake and it is recommended that a minimum mesh size of 80 mm for all components of the fleet other than those with a directed fishery for Nephrops be introduced and effectively enforced. Fishing effort is already too high and further increases could be expected through attempts to compensate for immediate losses due to the increase in mesh size. A precautionary TAC is, therefore, advisable and it is recommended that a 1982 TAC of 30 000 tonnes be adopted, which is at the level recommended for 1980 and 1981.

264. It is pointed out that the immediate losses represented by the reduction in catch rates of hake due to the mesh size increase, although moderate for the whole of the fleet, could have serious repercussions on those components most heavily dependent on small hake. However, the reduction in total catch of hake from the 1980 level is required in any case to reduce exploitation rates to more moderate levels, and, if not achieved in part by increasing mesh size, it will have to be achieved by more substantial reductions in fishing effort. The effect on yields of species associated with hake in the catches has not yet been quantified and further research and data analysis are proposed.

E.3.2 Southern stock (Divisions IXa and VIIIc)

265. The estimated catches, TACs recommended and adopted (in thousand tonnes), mesh sizes recommended, and in use after 1975 in the Southern stock are as follows:

Year	Revised nominal catches	Recommended TAC	Adopted quota	Mesh size (mm)	
				Recommended	In use
1975	31.9	-	-	60	40
1976	26.1	-	-	60	40
1977	15.8	-	-	60	40
1978	14.8	-	-	60	40
1979	17.5	20	20	60	40
1980	21.9*	10	10	80	40
1981	-	8.5	8.5	80	40
1982	-	8.5**	-	-	-

- *) Preliminary.
 **) Precautionary TAC.

According to the data, a small increase of the 1980 catches can be observed in relation to 1979 (20%). This increase is mainly due to artisanal gears (gill net and longline). The increase of the Spanish longline landings in 1980 is due to better statistical information for the Cantabrica area. The 1980 TAC recommended by ACFM was 10 000 tonnes, but the catch in 1980 (22 000 tonnes) greatly exceeded it (Table 75).

266. The Portuguese trawl fleet working in Division IXa in 1980 comprised 119 trawlers. Their GRT varies between 70 and 400, 90% having an average GRT of about 150. The mean mesh size in cod ends was near 40 mm.

The Spanish fleet working in Divisions IXa and VIIIc comprises several types of gear:

- trawl: "Bakas", "Bous", and "Parejas"
- artisanal: "Volanta" (gill nets), "Betas" (small gill nets) and longlines.

The total number of trawlers operating in 1980 was 287, of gill netters 416, and of longliners 484.

The Spanish trawl fleet which worked in 1980 off the Portuguese coast consisted of 86 vessels with an average GRT of 170 and HP of 500.

267. The cpue for Portuguese and Spanish trawl fleets showed a small increase in 1980 in several components of the fleet when compared to recent years. However, in comparison with the long-term trend, which shows a very substantial decline from the mid-1960s until 1978, the stock remains at a very low level of abundance.

268. Indices of recruitment in 1980 showed some improvement over recent levels but still substantially below that for 1974. The marginal improvements in catch rates and recruitment indices are not particularly encouraging in contrast to the longer-term decline in stock abundance, the substantial over-run of catches in relation to the 1980 TAC and the continuing dependence of the fishery on very small hake.

269. In view of the seriousness of the situation, ACFM recommends adoption of a minimum mesh size of 80 mm for all towed gears applied in the fishery, and its effective enforcement. ACFM noted that steps have been taken to introduce closed areas/season to reduce the proportion of small hake in the catches as proposed last year. This is considered complementary to, rather than replacement for, an 80 mm minimum mesh size regulation. A precautionary TAC should be set and it is recommended that a TAC of 8 500 tonnes be set for 1982, the same level as recommended and adopted for 1981. This recommendation implies that fishing effort will have to be reduced substantially from that employed in 1980, assuming constant stock abundance.

F. BLUE WHITING IN REGIONS 1, 2 AND 3

270. The Blue Whiting Working Group met at ICES headquarters from 6-12 May 1981 to:

- (a) assess the current exploitation rate of the blue whiting stocks and advise on the biological need for and form of any regulatory action;
- (b) promote and coordinate further biological research on blue whiting in accordance with the recommendations presented in document C.M.1980/H:5.

271. The total landings of blue whiting in 1980 were almost the same as in 1979, and this is for the first time that the catches have not increased significantly since 1975 (Table 76).

272. Data presented to the Working Group gave indications that blue whiting caught in Sub-areas VIII and IX and Divisions VIIg-k and VII d,e belong to a separate stock. Length at age is much lower, and maturation appears to be complete at a much lower age and size than in the northern areas. For these reasons, a separate assessment was made for the southern area.

New data presented for the area west of Iceland indicate a separate stock unit in this area also. The evidence for this, however, is still too weak to be conclusive. The major proportion of the northern stock is thought to spawn west of Ireland and the British Isles, although the Working Group acknowledges the fact that spawning occurs in the other areas.

F.1 Northern Stock (Tables 77-80)

273. The outcome of an otolith exchange programme initiated by the Blue Whiting Planning Group in 1979 was presented to the Working Group. This showed large differences between readers in age determination on the same otoliths. There are 2.9 years' difference in mean age calculated for the same sample between readers from Norway and USSR. As the catch taken by these countries amounted to 83% of the total catch in 1980, the Working Group felt that the catch in number by age group data brought to the meeting were of very limited value for any assessment purposes.

274. Data on catch per unit effort were available broken down by vessel tonnage class, gear types and areas. Cpue of Faroese 500 - 999.9 GRT class vessels indicates a declining availability of post-spawning blue whiting in the fishery on the Faroe Plateau in May when catch per hour decreased annually from 17.6 tonnes in 1977 to 6.2 tonnes in 1980. The catch rates of Icelandic trawlers of the same tonnage class in May in the same area showed a rapid decline from 1978 to 1979, but a considerable increase (25%) in 1980. The results of Polish vessels from the same Division fluctuated widely from year to year and were the highest in 1979. The stability of cpue by USSR and German Democratic Republic vessels on feeding concentrations of blue whiting could indicate, however, that no substantial changes in stock abundance have taken place during the last two years in that area.

In a new fishery, such as the blue whiting fishery in the Northeast Atlantic, there is most probably a learning factor involved which will mask any reduction in stock size. Differences in the hydrographic conditions might also alter the catchability significantly in certain areas from one year to another. The observed trends do not allow any definite conclusions to be drawn at present on stock density. A better analysis could have been performed if some of the countries who have fished for blue whiting in the Norwegian Sea for several years provided more detailed catch/effort data for all the years with regard to area and season.

275. A coordinated acoustic survey was carried out by Norway with R/V "G.O.Sars" (9 March - 4 April) and Scotland with R/V "Scotia" (25 March - 14 April 1981). Acoustic surveys gave a mean estimate of the spawning stock biomass of 7.2 million tonnes, compared to 6 million tonnes in 1980.

276. Age composition data were available for the period from 1970 and used to perform some trial VPA calculations. The choice of values of M and input values of F has a marked effect on the estimates of stock size over the whole range of years, and the VPA is, therefore, difficult to interpret. The Working Group concluded, due to uncertainties of the input values, that no reliable estimate of the current exploitation pattern or of the level of fishing mortality could be given. Furthermore, the Working Group was not able to improve the graphs showing yield and spawning stock per recruit given in its last year's report. The statement made in the 1980 report, however, needs to be reiterated - that they should be interpreted with great caution.

277. It is not possible to give any exact figure for the long-term sustainable yield at present. The rate of increase in effort in this fishery should be brought down, until such a figure is available. Effort should not be allowed to grow to a level which has subsequently to be reduced drastically when the accumulated stock has been fished down.

ACFM, therefore, recommends that a precautionary TAC of 1 million tonnes is set for 1982.

F.2 Southern Stock

278. In Table 81, data on landings in 1970-80 are provided. Portuguese landings of this species were not separated from the "other fish" category until 1977. In addition to the landings, significant quantities are discarded at sea.

279. No catch at age data were available. Length catch composition was provided by Spain for the years 1977-80 and by Portugal for 1980. Based on this, a tentative assessment of the state of the stock was attempted using a cohort by length analysis.

Assuming $E = 0.5$ in the last length class (that implies $F = M$) and $M = 0.2, 0.3$ and 0.4 , a stock size in the range of 160 - 300 thousand tonnes was calculated. However, the data available were not found adequate for providing advice on a TAC.

G. NORTH ATLANTIC SALMON

280. Two meetings of the Working Group on North Atlantic Salmon were held, at Ottawa, Canada, on 17-18 March 1981 and at ICES headquarters, Copenhagen, on 6-9 April 1981 respectively. The first of these meetings was convened at the request of the Canadian Government to assess aspects of the West Greenland salmon fishery, with special reference to the effects of changes in the opening date of and mesh size used in the fishery on the catch quota which might be set for it for a given magnitude of its impact on North American and European home-waters stocks. The results of that assessment were reviewed and extended at the second meeting, when consideration was also given to the effects of the northern Norwegian Sea and Faeroes area salmon fisheries on home-waters stocks and to the most recent information on the home-waters fisheries themselves.

West Greenland Fishery

281. In 1980, the reported nominal catch at West Greenland was 1 194 tonnes, which was in close agreement with the quota of 1 190 tonnes set for the fishery.

The distribution of the fishery between NAFO Divisions was similar to that in 1979, the greatest part of the catch being taken in NAFO Division 1C. As in previous years, the reported catch from East Greenland in 1980, at less than one tonne, was small.

282. Analysis of the scale characteristics of salmon suggests that the proportion of North American origin salmon may have increased in the period 1978-80, but for assessment purposes the average estimated proportions, i.e. 42.85% North American and 57.15% European origin salmon were used for 1971-79.

283. In 1980, as in previous years, the exploited salmon population consisted principally (over 90%) of one sea-winter fish which, if surviving, would do so as multi sea-winter salmon, and of females, the female/male sex ratio being approximately 3:1. The data for recent years also show a downward trend in the proportion of multi sea-age salmon (i.e. fish which would return to home waters as three or more sea-winter salmon) in the population from approximately 10% in 1969 to less than 3% in 1980. A similar trend was also evident in Scottish and Newfoundland commercial catches of three or more sea-winter salmon in home waters. The data for 1980 also confirmed those of previous years in showing a higher mean length and weight for European than for North American origin salmon in the West Greenland population, although the difference was smaller than in 1978 and 1979.

The West Greenland Quota in relation to Changes in Timing of Fishery and Mesh Size

284. A relationship between the size of the West Greenland quota and associated target mesh sizes was constructed for different opening dates for the fishery between 10 August and 1 September, for 'longer' and 'shorter' duration fisheries as occurred in 1976-77 and 1979-80 respectively, so as to produce the same catch by number as in 1976-77 and to maintain the same relative proportions of North American and European origin salmon in the catch.

ACFM concluded that, taking into account current uncertainties about the selectivity parameters for gill nets used in the West Greenland fishery, and possible differences between nominal and measured mesh sizes, a target stretched mesh size of 140 mm could be established for any of the opening dates between 10 August and 1 September, without excessive potential deviation from the objective of equalising the proportions of continent of origin in the catches and the exploited population. ACFM emphasized that the method of mesh size measurement used for regulation purposes should be calibrated with the method used in the experiments from which the selectivity parameters in the assessment were derived.

285. The corresponding quota would be 1 190 tonnes for an opening date of 10 August, and an increase in the quota by 4.3 tonnes per day for every day if the opening date is postponed up to 1 September. These figures refer to the longer duration of the fishery. Shortening of the season would decrease the quota by as much as 26 tonnes.

Norwegian Sea Fishery

286. Catch data were presented for the northern Norwegian Sea (outside Norwegian 200 miles fishery limits to the north of latitude 67°N) and Faroes Area (within the Faroes economic zone mainly to the north and east of the islands) long-line fisheries. They showed that in 1980, the reported catch taken in the northern Norwegian Sea fishery, prosecuted mainly by Danish vessels, at 155 tonnes was slightly higher than in 1978 and 1979, but still considerably smaller than in the peak years 1969-70 when it exceeded 900 tonnes. The data for the Faroes Area fishery on the other hand showed a recent large and rapid increase, from an average of 44 tonnes in the years 1976-78 to 194 tonnes in 1979 and 718 tonnes in 1980. In 1980 the fishery, prosecuted by Faroese (1980 catch = 568 tonnes) and Danish (1980 catch = 150 tonnes) vessels took place between October and June, with the main effort in the period November-April.

287. Insufficient information was available to determine quantitatively the country of origin composition of the exploited salmon populations in the northern Norwegian Sea and Faroes Area respectively. But, tag recapture data indicate that the salmon exploited in the northern Norwegian Sea originate mainly from Norway, with smaller contributions from Sweden, the USSR, Denmark and Iceland, while those in the Faroes Area originate from these countries and from all parts of the British Isles and from France. They also indicate that some of the salmon in the Faroes Area are en route to more distant feeding grounds (e.g. at West Greenland and northern Norwegian Sea), while others remain in the Faroes Area and return to home waters as one or multi sea-winter salmon.

288. Length composition data for Danish landings from the northern Norwegian Sea fishery indicate that the exploited population in that area is composed mainly (at least 85%) of two sea-winter salmon, with the remainder being approximately equally divided between one and three sea-winter fish. Length and age data for the Faroes Area population indicate that the three most recent smolt year classes predominate, although older year classes and previous spawners occur in small numbers. Between October and March few of the youngest age class exceed the size limit of 60 cm, but an increasing proportion of it is subsequently retained in the catch.
289. The landing level of 718 tonnes in 1980 reported from the Faroes Area makes this fishery of comparable magnitude with other fisheries on these salmon stocks, and the fishery could represent an increase in the total mortality exerted. No estimates of the total mortality on these salmon stocks were presented to ACFM, and the impact of the various components of the fishery therefore cannot at present be evaluated.

Introduction of Coho Salmon for Studies on their Suitability for Mariculture

290. A Norwegian request for advice on the introduction of Coho salmon for mariculture studies together with the comments of the Working Group on Introductions and Transfers of Marine Organisms was put to the ACFM.

These comments can be forwarded to the interested parties, but it should be emphasized that ACFM has no expertise on this subject.

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Table 1. Nominal catch (in 000's tonnes) by Sub-areas and main species in NEAFC Region 1, 1970-1979.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Total Nominal Catch in Region 1*)	4 357	4 255	4 153	4 313	4 516	4 592	5 739	6 301	5 421	5 613
Sub-areas I and II (North-East Arctic)										
<u>Pelagic Fish</u>										
Herring	62	22	13	7	8	5	1	18	12	4
Capelin	1 314	1 392	1 593	1 336	1 147	1 416	2 546	2 940	2 036	1 829
Others	4	3	4	26	12	40	16	8	9	10
Total Pelagic Fish	1 380	1 417	1 610	1 369	1 167	1 461	2 563	2 966	2 057	1 843
<u>Demersal Fish</u>										
Cod	956	729	643	831	1 143	886	908	945	733	485
Haddock	86	80	188	294	231	182	139	112	97	110
Polar cod	243	348	167	82	124	63	12	8	5	+
Saithe	265	241	214	212	264	233	242	183	154	164
Redfish	29	44	37	60	97	278	318	186	124	113
Flatfish	102	111	65	48	57	53	55	48	42	37
Others	81	95	68	79	92	77	66	105	246	775
Total Demersal Fish	1 762	1 648	1 382	1 606	2 008	1 772	1 740	1 587	1 401	1 684
Total Catch of all Species	3 142	3 065	2 992	2 975	3 175	3 233	4 303	4 553	3 458	3 527
Sub-area V (Iceland and Faroes)										
<u>Pelagic Fish</u>										
Herring	19	14	+	9	9	13	20	29	38	45
Capelin	192	183	277	442	462	461	430	761	833	868
Others	-	+	+	4	+	-	1	+	+	+
Total Pelagic Fish	211	197	277	456	471	474	451	790	871	913
<u>Demersal Fish</u>										
Cod	506	482	423	407	401	410	390	377	363	397
Haddock	66	66	56	64	57	66	69	65	63	68
Saithe	146	168	157	168	144	129	115	97	78	91
Redfish	80	84	81	79	77	79	75	69	45	77
Flatfish	48	32	23	19	17	14	16	26	21	26
Others	55	64	60	75	79	63	131	181	257	236
Total Demersal Fish	901	896	800	812	775	761	796	815	827	895
Total Catch of all Species	1 112	1 093	1 077	1 267	1 246	1 235	1 247	1 605	1 698	1 808
Sub-area XIV (East Greenland)										
Total Catch of all Species	44	68	56	33	49	53	148	97	219	230

*) Including non-teleost fish, unsorted and unidentified species.

+ = less than 500 tonnes.

Table 2. Nominal catch (in 000's tonnes) by Sub-areas and main species in NEAFC Region 2, 1970-1979.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Total Nominal Catch in Region 2*)	4 078	4 000	4 043	4 330	4 901	5 062	5 086	3 937	4 058	3 910
Sub-area IV (North Sea) and Division IIIa (Skagerrak and Kattegat)										
<u>Pelagic Fish</u>										
Herring	834	735	715	740	427	416	255	157	108	79
Mackerel	322	243	188	327	298	263	306	259	153	155
Sprat	58	100	97	270	376	758	670	385	477	478
Horse mackerel	12	32	8	42	31	10	9	4	5	2
Others	7	4	3	3	6	6	4	4	3	3
Total Pelagic Fish	1 233	1 114	1 011	1 382	1 138	1 453	1 244	809	746	717
<u>Demersal Fish</u>										
Cod	239	339	368	258	238	219	252	227	306	263
Haddock	673	260	216	199	198	180	214	160	96	91
Whiting	195	126	123	165	217	160	210	139	152	159
Norway pout ¹⁾	290	385	510	461	833	662	575	455	347	390
Saithe	222	253	240	219	270	268	307	190	140	115
Sandeels	195	404	366	307	532	445	517	803	610	637
Plaice	145	133	144	144	128	124	132	144	124	132
Sole	20	24	21	20	18	19	15	15	11	12
Other Flatfish	18	22	24	27	28	28	26	29	30	33
Others	27	32	36	45	39	42	37	63	138	141
Total Demersal Fish	2 024	1 976	2 048	1 842	2 501	2 146	2 285	2 225	2 154	1 973
Total Catch of all Species	3 257	3 090	3 059	3 224	3 639	3 599	3 529	3 034	2 900	2 690
Sub-areas VI and VII (West and South of United Kingdom and Ireland)										
<u>Pelagic Fish</u>										
Herring	230	295	290	324	277	226	179	91	66	45
Mackerel	65	87	134	184	249	431	419	307	498	528
Sprat	14	9	13	19	19	16	21	21	32	21
Horse mackerel	74	51	102	121	119	121	181	30	26	51
Others	8	8	13	9	7	14	16	21	21	22
Total Pelagic Fish	391	450	532	657	671	808	816	470	633	667
<u>Demersal Fish</u>										
Cod	29	32	33	29	33	33	39	31	36	38
Haddock	41	54	58	44	78	72	67	26	24	20
Whiting	28	32	30	38	45	53	59	46	43	46
Hake	14	21	18	21	45	44	41	17	17	20
Flatfish	31	32	35	34	37	40	43	33	33	32
Others	77	99	106	134	177	193	233	162	226	266
Total Demersal Fish	220	270	280	300	415	435	482	315	379	422
Total Catch of all Species	611	720	832	957	1 086	1 243	1 298	785	1 012	1 089

*) Including non-teleost fish, unsorted and unidentified species.

1) From 1974-1976 includes by-catches of several other species taken by Norway.

Table 3. Nominal catch (in 000's tonnes) by main species in NEAFC Region 3, 1970-1979.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Total Nominal Catch in Region 3*)	785	838	891	869	625	641	681	723	638	597
<u>Pelagic Fish</u>										
Pilchard	136	184	173	170	127	164	146	130	162	145
Mackerel ¹⁾	82	46	42	77	78	52	61	34	29	28
Horse mackerel	163	85	156	190	130	134	181	191	114	91
Others	107	80	141	94	92	124	117	158	136	119
Total Pelagic Fish	488	395	512	531	427	474	505	513	441	383
<u>Demersal Fish</u>										
Hake	100	38	71	86	48	54	47	46	29	42
Others	108	84	142	88	57	77	94	135	138	105
Total Demersal Fish	208	122	213	174	105	131	141	181	167	147
Total Catch of all Species	696	517	735	705	532	605	646	694	608	530

*) Including non-teleost, unsorted and unidentified species.

1) Catches of Chub (=Spanish) mackerel included in figures for 1970-1976.

Table 4. Recent nominal catches and recommended TACs for fisheries regulated by calendar year (in 000's tonnes).

Fishery	1977		1978		1979		1980		1981	1982
	Recom. TAC	Actual Catch	Recom. TAC	Actual Catch	Recom. TAC	Actual Catch	Recom. TAC	Actual Catch ¹⁾	Recom. TAC	TAC
<u>NORTH-EAST ARCTIC</u>										
Cod	850	905	850)	699	600	444	390	401	...	11)
Haddock	110	110	150)	95	206	102	55-78	71	...	...11)
Saithe	200	183	160	154	153	164	122-129	144	123	130 ¹³⁾
Greenland halibut	-	29	40	25	25	17	14	13	12	12 ¹³⁾
Golden redfish	-	40	20	32	22	26	19	23	19	14 ¹³⁾
Beaked redfish	-	146	130	93	135	87	81	78	70	70 ¹³⁾
<u>SUB-AREA XIV</u>										
Cod	-	18	-	26	-	34	-	10	-	6 ¹⁵⁾
<u>SUB-AREAS V & XIV</u>										
Greenland halibut	-	17	-	14	15	24	15	31	15	19 ¹³⁾
Golden redfish	-	53	-	48	58 }	75	58	88	60	60 ¹³⁾
Beaked redfish	-	31	-	18	12 }	23	7	26	25	12 ¹⁵⁾
<u>ICELAND</u>										
Saithe	60	62	58 ²⁾	50	58	63	54	58	72	62 ¹³⁾
<u>FAROEES</u>										
Cod (Bank	32	2.0)	30	5.5)	28	2.0)	3.3)	1.2)	2)	2 ¹⁴⁾
Plateau	17	35.7)	23 ²⁾	26.6)	20	23.1)	22.0)	20.3)	14)	20 ¹³⁾
Haddock	26	26	23 ²⁾	19	12	12	20	15	15	14 ¹³⁾
Saithe	40	35	32 ²⁾	28	31	27	34	26	29	29 ¹³⁾
<u>DIVISION IIIA</u>										
Herring	-	115	-	88	-	74	50 ²⁾	84	53	... 11)
Sprat ³⁾	80	79	80	79	70 ²⁾	84	70	105	70	...
Cod	-	41	-	40	26 ²⁾	32	30	41	34	32.6 ¹⁴⁾
Haddock	-	9.8	-	6.6	6.6	4.8	6.6	7.6	4.5	7.14 ¹⁴⁾
Whiting	-	19	-	49	22	18	22	23	22	22 ¹⁴⁾
Plaice	-	26	-	27	-	22	25	16	22	11 ¹⁵⁾ +14)

For footnotes, see page 95.

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Table 4. (continued)

Fishery	1977		1978		1979		1980		1981	1982
	Recom. TAC	Actual Catch	Recom. TAC	Actual Catch	Recom. TAC	Actual Catch	Recom. TAC	Actual Catch ¹⁾	Recom. TAC	TAC
<u>NORTH SEA</u>										
Herring	0 ⁴⁾	46	0 ⁴⁾	11	0 ⁴⁾	25	0 ⁴⁾	61	20 ²⁾ 12)	
Sprat	450 ⁵⁾	304	400 ⁷⁾	378	400 ⁷⁾	380	400	323	400	
Mackerel ⁵⁾	220 ²⁾	261	145 ⁷⁾	153	145 ⁷⁾	160	0(50 ⁷⁾	96	0 (40 ⁷⁾	0 ¹⁵⁾
Cod	220 ²⁾	181	210 ²⁾	261	183	235	200 ²⁾	258	220 ²⁾	190 ¹⁵⁾
Haddock	165 ²⁾	172	105 ²⁾	96	83	101	90 ²⁾	121	140 ²⁾	160 ¹⁵⁾
Whiting	165 ²⁾	180	111 ²⁾	144	85	158	150 ²⁾	132	120 ²⁾	100 ¹⁵⁾
Saithe ⁸⁾	210	195	200 ²⁾	142	200	114 ¹⁾	129	117	127	100 ¹³⁾
Flaice	71	118	115 ²⁾	114	120	143 ¹⁾	112 ²⁾	98	105	... ¹¹⁾
Sole	6.7	18	8	20.3	13	22.5 ¹⁾	14 ²⁾	15	15	... ¹¹⁾
<u>SUB-AREA VI</u>										
Cod	19 ²⁾	13	12.2 ²⁾	14	10.4	17	12.1 ²⁾	18	20.0 ²⁾	17.5 ¹⁵⁾
Haddock	18 ²⁾	22	12	22	11	16	15.5 ²⁾	20	20.6 ²⁾	21.5 ¹⁵⁾ +14
Whiting	22 ²⁾	17	17 ²⁾	15	12	17	13.0 ²⁾	13	14.0	13 ¹⁵⁾
Saithe	20	28	32 ²⁾	32	32	22	31	22	27	26 ¹⁴⁾
<u>DIVISION VIA</u>										
Herring	48 ²⁾	48	0 ²⁾	34	0	8	0	7	65 ²⁾	
Clyde herring	-	4.8	-	3.9	2.0	2.0	2.0	2.1	2.0	2.5 ¹⁵⁾
<u>SUB-AREA VII (excl. Division VIIa)</u>										
Cod	-	10.2	-	15.1	8 ⁹⁾	12 ⁹⁾	9	10.6	9	
Haddock	-	3.4	-	2.3	8 ⁹⁾	2.6 ⁹⁾	9	2.7	9	
Whiting	-	18	-	18	17 ⁹⁾	16.0 ⁹⁾	18	15.3	18	

For footnotes, see page 95.

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Table 4. (continued)

Fishery	1977		1978		1979		1980		1981	1982	
	Recom. TAC	Actual Catch	Recom. TAC	Actual Catch	Recom. TAC	Actual Catch	Recom. TAC	Actual Catch ¹⁾	Recom. TAC	TAC	
<u>IRISH SEA</u>											
Herring	12 ²⁾	15	9 ²⁾	11	11	12	10	11	3.8 ²⁾	...	
Cod	-	8.1	8.6	6.3	7.3	8.4	5.0	10.3	13 ²⁾	12.5 ¹⁵⁾	
Whiting	-	10.7	-	11.1	10	9.9	10	12.1	12 ²⁾	10 ¹⁵⁾	
Plaice	4.0	2.9	4.0	3.2	2.5	3.4	2.5	3.9	4 ²⁾	3 ¹⁵⁾	
Sole	1.4	1.1	1.4	1.1	1.4	1.7	1.3	1.9	1.8 ²⁾	1.6 ¹³⁾	
<u>DIVISION VII B,C</u>											
Herring	10	13	7	8	7	15	7	24	7	7 ¹⁴⁾	
<u>DIVISION VII J</u>											
Herring	-	>5	-	3.5	-	5.0	6	5.0	6	6 ¹⁴⁾	
<u>ENGLISH CHANNEL</u>											
Plaice	VII D	2.0	2.25	2.5	2.32	2.2	2.6	{ 2.0	3.6	{ 2.2	... ¹¹⁾
	VII E	0.45	0.7	0.6	0.94	0.72	1.0		0.6		0.8	...^{11)}
Sole	VII D	1.0	1.28	1.15	1.39	2.2	1.84	1.38	1.34	1.2	... ¹¹⁾
	VII E	0.45	0.61	0.35	0.86	0.5	1.18	0.78	1.12	1.0	... ¹¹⁾
<u>DIVISIONS VII F AND VII G</u>											
Plaice	-	0.8	-	0.9	-	0.9	0.7	1.4	1.4 ²⁾	1.2 ¹⁵⁾	
Sole	-	1.0	-	0.8	-	1.0	1.0	1.3	1.4 ²⁾	1.3 ¹³⁾	
Cod	-	2.3	-	2.8	-	3.5	-	5.5	-	3.5 ¹⁴⁾	

For footnotes, see page 95.

...Continued

Table 4. (continued)

Fishery	1977		1978		1979		1980		1981	1982
	Recom. TAC	Actual Catch	Recom. TAC	Actual Catch	Recom. TAC	Actual Catch	Recom. TAC	Actual Catch ¹⁾	Recom. TAC	TAC
<u>SUB-AREA VII AND DIVISIONS VIIA, VIA AND VIIIA,B</u> Hake	-	51	-	48	43	52	30	53	30	30 ¹⁴⁾
<u>DIVISIONS VIIIC AND IXA</u> Hake	-	16	-	15	20	18	10	22	8.5	8.5 ¹⁴⁾
<u>SUB-AREAS VI, VII AND VIII</u> Mackerel	250 ²⁾	326	450 ²⁾	504	435	601	330	605	333-353	270 ¹⁵⁾
<u>SUB-AREAS I, II, V, VI, XIV AND DIVISIONS IIIa AND VIIb,c</u> Blue Whiting	-	236	-	570	-	1 090	-	1 107	-	1 000 ¹⁴⁾

1) Preliminary.

2) Revised.

3) Including Norwegian fjords south of 62°N for 1977-80.

4) Including Divisions VIIId and VIIe.

5) Including Divisions IIIa and IIIa.

6) 167 000 tonnes of this to be taken north of 60°N.

7) 100 000 tonnes of this to be taken north of 60°N and west of 2°E.

8) Including Division IIIa.

9) Excluding Division VIIIf.

10) Subject to revision at a later stage.

11) Advice to be provided after the ACFM Meeting in November 1981.

12) For the period October 1981 - March 1982 and including Division VIIId.

13) Catch level preferred by ACFM.

14) Precautionary TAC.

15) Recommended TAC.

Note: For Celtic Sea herring, regulated on a seasonal basis, it was recommended that there should be no fishing in the 1981/82 season. Advice for the 1982/83 season will be provided at a later stage.

Table 5. Nominal catches (in tonnes) of COD in Sub-area XIV, 1962-80.
(Data for 1962-79 broken down by countries are from Bulletin Statistique)

Country	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{x)}	
Canada	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	
Faroe Islands	-	-	-	-	-	-	-	-	-	-	924	167	652	581	440	1 407	6	-	-	
German Dem.Rep.	-	-	101	52	39	38	-	333	358	730	186	8	15	326	-	-	-	-	c)	
Germany, Fed. Rep.	14 299	13 877	30 623	10 965	7 786	12 117	8 323	12 635	13 950	25 644	21 592	9 262	2 309	1 552	7 075	3 564	3 936	1 062	3 466 ^{a)}	
Greenland	903	904	1 120	887	880	753	628	627	501	533	279	191	68	224	372	1 833	1 347	2 755	1 367	
Iceland	298	1 804	2 846	4 713	3 977	10 474	6 723	4 473	5 461	4 580	3 195	1 446	3 009	785	3 133	25	13	3	9	
Norway	-	-	-	-	-	-	-	-	-	-	-	-	-	1 864	364	537	17	-	-	
Poland	-	-	-	-	-	-	-	-	841	419	318	17	1	18	-	-	-	-	-	
U.K.(Engl.&Wales)	1 745	728	958	932	227	1 383	27	-	140	28	184	661	499	575	1 514	1 393	41	-	-	
U.K.(Scotland)	50	47	30	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	
U.S.S.R.	-	5 697	-	-	-	5	-	36	34	312	137	-	-	-	127	16	-	-	-	
¹ Total	17 295	23 507	35 678	17 549	12 909	24 770	15 701	18 104	21 265	32 246	26 815	11 752	6 553	5 925	13 027	8 775	5 362	3 820	4 842	
WG Total including estimates of unreported catches																18 000	26 000	34 000	12 000	b)

x) Preliminary

a) July to December catch estimates based on information from fishing vessels

b) Including 2 000 tonnes of estimated discards

c) From Data Form 5

Table 6. Nominal catch of REDFISH (in tonnes) by countries (Sub-area I, Divisions IIa and IIb combined).

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*
Belgium	-	-	-	-	30	28	2	2	-	-	-
Faroe Isl.	60	-	9	32	6	67	137	8	1	1 142	-
France	-	-	-	-	1 116	-	-	660	3 608	-	765
German Dem.Rep.	7 149	14 786	9 972	11 756	28 275	28 020	22 636	17 614	16 165	16 162	8 448
Germany, Fed.Rep.	2 416	3 076	1 697	3 479	6 597	5 182	7 894	7 231	11 483	11 913	8 231
Netherlands	-	-	-	-	-	-	127	-	-	-	-
Norway	3 832	4 644	6 776	7 714	7 055	4 966	7 305	7 381	7 802	9 025	9 034
Poland	4 631	2 532	1 112	215	1 269	4 711	4 137	175	2 957	261	87
Portugal	-	-	-	-	-	331	3 463	1 480	378	1 100	697
Spain	-	-	-	-	-	1 194	3 398	-	-	1 375	76
U.K.	4 554	4 002	4 379	4 791	3 509	2 746	4 961	6 330	3 390	1 756	1 308
USSR	13 091	29 839	22 647	31 829	48 787	230 950	263 546	144 993	78 092	70 451	72 202
Total	35 733	58 879	46 592	59 816	96 644	278 195	317 606	185 874	124 352**	113 620***	100 972

*) Provisional data.

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

Table 7. Nominal catch of Sebastes marinus and Sebastes mentella in Sub-area I and Divisions IIa and IIb combined (in tonnes).

Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*
<u>S. marinus</u>	12 817	13 816	17 730	21 436	27 272	39 125	48 584	39 509	31 741	26 475	22 620
<u>S. mentella</u>	22 916	45 063	28 862	38 380	69 372	239 070	269 022	146 365	92 611	87 145	78 352
Total	35 753	58 879	46 592	59 816	96 644	278 195	317 606	185 874	124 352	113 620	100 972

*) Provisional data.

Table 8. Nominal catch (in tonnes) of REDFISH in Sub-area XIV, Divisions Va and Vb, by species for Sub-area XIV and Sub-area V combined.

Year	Division Va	Division Vb	Sub-area XIV	Total	<u>S. marinus</u>	<u>S. mentella</u>
1965	114 100	5 862	36 513	156 475	97 006	59 469
1966	107 068	3 297	23 290	133 655	80 347	53 308
1967	95 083	5 013	33 198	133 294	85 249	48 045
1968	96 475	6 637	23 074	126 186	68 709	57 477
1969	87 736	1 326	30 367	119 429	79 467	39 962
1970	78 962	1 947	18 162	99 071	60 805	38 266
1971	82 370	2 352	20 436	105 158	68 374	36 784
1972	77 325	4 087	13 970	95 382	50 961	44 421
1973	69 650	9 696	7 899	87 245	41 856	45 389
1974	69 129	7 765	13 978	90 872	49 845	41 027
1975	70 734	8 591	25 329	104 654	60 980	43 674
1976	69 864	5 364	113 656	188 884	93 605	95 279
1977	61 525	7 402	14 433	83 360	52 752	30 608
1978	35 202	9 806	20 880 ¹⁾	65 888	47 791	18 097
1979	65 310	12 674	20 918 ¹⁾	97 902	75 056	22 846
1980 ^{x)}	71 052	9 911	33 050 ¹⁾	114 013	88 236	25 777

x) Provisional data.

1) Catches updated for Sub-area XII included.

Table 9. Nominal catch of REDFISH (1 000 t) in Division Va by countries.
Separation into the species components according to the method used by the Redfish Working Group.

Div. Va Year	Belgium	Faroe Islands	German Dem. Republic	Germany, Fed. Republic	Iceland	Norway	Poland	United Kingdom	USSR	Total
Total	2.2	-	0.8	48.9	23.8	-	0.3	2.9	+	78.9
1970 <u>S.mar.</u>	2.2		0.8	13.1	23.3		0.3	2.9		42.6
<u>S.ment.</u>	-		-	35.8	0.5		-	-		36.3
Total	2.8	+	0.2	46.6	29.1	+	+	3.6	+	82.3
1971 <u>S.mar.</u>	2.8		0.2	12.2	28.6			3.6		47.4
<u>S.ment.</u>	-		-	34.4	0.5			-		34.9
Total	2.5	+	0.1	44.0	27.0	+	+	3.7	+	77.3
1972 <u>S.mar.</u>	2.5		0.1	4.1	26.4			3.7		36.8
<u>S.ment.</u>	-		-	39.9	0.6			-		40.5
Total	1.6	0.2	-	38.4	26.5	+	-	3.0	+	69.7
1973 <u>S.mar.</u>	1.6	0.2		3.1	25.7			3.0		33.6
<u>S.ment.</u>	-	-		35.3	0.8			-		36.1
Total	2.1	0.3	+	36.4	27.8	+	+	2.5	-	69.1
1974 <u>S.mar.</u>	2.1	0.3		4.3	27.0			2.5		36.2
<u>S.ment.</u>	-	-		32.1	0.8			-		32.9
Total	1.9	0.1	-	33.6	32.7	+	-	2.4	-	70.7
1975 <u>S.mar.</u>	1.9	0.1		4.3	31.3			2.4		40.0
<u>S.ment.</u>	-	-		29.3	1.4			-		30.7
Total	1.5	0.2	-	32.9	34.0	+	-	1.1	-	69.7
1976 <u>S.mar.</u>	1.5	0.2		4.3	33.3			1.1		40.4
<u>S.ment.</u>	-	-		28.6	0.7			-		29.3
Total	1.4	0.3	-	31.6	28.1	0.1	-	+	-	61.5
1977 <u>S.mar.</u>	1.4	0.3		9.2	27.5	0.1		-		38.5
<u>S.ment.</u>	-	-		22.4	0.6	-				23.0
Total	1.5	0.2	-	-	33.3	0.1	-	-	-	35.1
1978 <u>S.mar.</u>	1.5	0.2			29.4	0.1				31.2
<u>S.ment.</u>	-	-			3.9	-				3.9
Total	1.4	0.6	-	-	62.3	0.1	-	-	-	64.4
1979 <u>S.mar.</u>	1.4	0.6			54.6	0.1				56.7
<u>S.ment.</u>	-	-			7.7	-				7.7
Total	1.4	1.1	-	-	68.5	0.1	-	-	-	71.1
1980 ^M <u>S.mar.</u>	1.4	1.1			58.5	0.1				61.1
<u>S.ment.</u>	-	-			10.0	-				10.0

^MPreliminary

Table 10. Nominal catch (1 000 t) of REDFISH in Division Vb by Countries.
Separation into the species components according to the method used by the Redfish Working Group.

Div. Vb Year	Faroe Islands	France	German Dem. Republic	Germany, Fed. Republic	Netherlands	Norway	United Kingdom	Total
1970 Total S.mar. S.ment.	- - -	- - -	- - -	1.9 - 1.9	- - -	- - -	+ - -	1.9 - 1.9
1971 Total S.mar. S.ment.	- - -	- - -	- - -	2.3 - 2.3	- - -	- - -	+ - -	2.3 - 2.3
1972 Total S.mar. S.ment.	- - -	- - -	- - -	4.0 - -	- - -	- - -	0.1 0.1 -	4.1 0.1 4.0
1973 Total S.mar. S.ment.	0.1 0.1 -	- - -	- - -	9.5 - 9.5	- - -	- - -	0.1 0.1 -	9.7 0.2 9.5
1974 Total S.mar. S.ment.	+ - -	0.3 0.3 -	+ - -	7.3 - 7.3	- - -	- - -	0.1 0.1 -	7.7 0.4 7.3
1975 Total S.mar. S.ment.	+ - -	0.8 0.8 -	+ - -	7.6 - 7.6	0.1 0.1 -	+ - -	+ - -	8.5 0.9 7.6
1976 Total S.mar. S.ment.	+ - -	- - -	- - -	5.3 - 5.3	- - -	+ - -	0.1 0.1 -	5.4 0.1 5.3
1977 Total S.mar. S.ment.	0.1 0.1 -	1.4 0.6 0.8	- - -	5.9 - 5.9	- - -	+ - -	0.1 0.1 -	7.5 0.8 6.7
1978 Total S.mar. S.ment.	1.5 1.5 -	0.4 0.4 -	- - -	7.8 - 7.8	- - -	+ - -	0.1 0.1 -	9.8 2.0 6.7
1979 Total S.mar. S.ment.	5.7 4.8 0.9	0.9 - 0.9	- - -	6.1 - 6.1	- - -	+ - -	- - -	12.7 4.8 7.9
* 1980 Total S.mar. S.ment.	5.3 4.8 0.5	0.8 - 0.8	- - -	3.8 - 3.8	- - -	+ - -	- - -	9.9 4.8 5.1

* Preliminary

Table 11. Nominal catch (1 000 t) of REDFISH in Sub-area XIV by countries.
Separation into the species components according to the method used by the Redfish Working Group.

Sub-area XIV Year	Canada	Denmark (G)	Faroe Islands	German Dem. Republic	Germany Fed. Republic	Iceland	Norway	Poland	United Kingdom	USSR	Total
Total	-	-	-	0.4	16.3	1.0	-	0.4	+	-	18.1
<u>S.mar.</u>	-	-	-	0.4	16.3	1.0	-	0.4	+	-	18.1
<u>S.ment.</u>	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	0.6	17.1	2.4	-	0.3	+	0.1	20.5
<u>S.mar.</u>	-	-	-	0.6	17.1	2.4	-	0.3	+	0.1	20.5
<u>S.ment.</u>	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	0.7	7.3	5.5	-	0.5	+	+	14.0
<u>S.mar.</u>	-	-	-	0.7	7.3	5.5	-	0.5	+	+	14.0
<u>S.ment.</u>	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	+	0.8	4.5	2.1	-	0.3	0.1	0.1	7.9
<u>S.mar.</u>	-	-	+	0.8	4.5	2.1	-	0.3	0.1	0.1	7.9
<u>S.ment.</u>	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	+	1.3	2.6	9.8	-	+	0.1	0.1	13.9
<u>S.mar.</u>	-	-	+	1.3	2.6	9.8	-	+	0.1	0.1	13.9
<u>S.ment.</u>	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	+	4.5	5.0	5.6	0.1	0.3	0.1	9.8	25.4
<u>S.mar.</u>	-	-	+	4.5	5.0	5.6	0.1	0.3	0.1	5.4	21.0
<u>S.ment.</u>	-	-	-	-	-	-	-	-	-	4.4	4.4
Total	0.4	0.1	+	-	4.4	7.4	+	-	0.3	101.0	113.6
<u>S.mar.</u>	0.4	0.1	+	-	4.4	7.4	+	-	0.3	41.3	53.9
<u>S.ment.</u>	-	-	-	-	-	-	-	-	-	59.7	59.7
Total	-	+	+	-	13.3	0.1	0.1	-	0.6	0.3	14.4
<u>S.mar.</u>	-	+	+	-	13.3	0.1	0.1	-	0.6	0.3	14.4
<u>S.ment.</u>	-	-	-	-	-	-	-	-	-	-	-
Total	-	+	-	-	20.7	0.2	+	-	+	-	20.9
<u>S.mar.</u>	-	+	-	-	15.3	0.2	+	-	+	-	15.5
<u>S.ment.</u>	-	-	-	-	5.4	-	-	-	-	-	5.4
Total	-	-	+	-	21.1	-	-	-	-	-	21.1
<u>S.mar.</u>	-	-	+	-	15.8	-	-	-	-	-	15.8
<u>S.ment.</u>	-	-	-	-	5.3	-	-	-	-	-	5.3
Total	-	-	-	-	33.0	0.1	-	-	-	-	33.1
<u>S.mar.</u>	-	-	-	-	22.4	0.1	-	-	-	-	22.5
<u>S.ment.</u>	-	-	-	-	10.6	-	-	-	-	-	10.6

*Preliminary

Table 12. GREENLAND HALIBUT. Nominal catch (tonnes) in Sub-areas I and II. 1970-80.
(Data for 1970-79 from Bulletin Statistique)

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{x)}
Faroe Isl.	44	-	-	-	-	-	2	21	-	24	-
German Dem.Rep.	18 729 ¹⁾	2 949 ¹⁾	1 633 ¹⁾	3 954	5 914	8 472	8 955	8 176	4 611	3 488	2 080
Germany, Fed.Rep.	-	3	3	59	88	94	31	148	321	481	288
Norway: trawl catch ¹⁾	1 638	2 309	9 656	10 217	4 656	1 686	4 030	2 526	2 302	921	1 528
long-line catch and gill net ¹⁾	14 233	7 157	6 327	3 772	4 135	3 172	1 975	1 628	1 780	1 992	1 595
Poland	19 262	12 277	7 981	2 140	5 146	3 645	3 566	224	544	106	-
UK (Engl. & Wales)	-	-	1 262	1 235	866	731	935	1 059	407	59	26
USSR	35 578	54 339	16 193	8 561	16 958	20 372	16 580	15 045	14 651	10 311	7 697
Others	-	-	-	-	-	-	-	-	1 ¹⁾	5	-
Total	89 484	79 034	43 055	29 938	37 763	38 172	36 074	28 827	24 617	17 312	13 214

x) Provisional data.

1) From national statistics.

Table 13. GREENLAND HALIBUT. Nominal catch (tonnes) in Sub-areas V and XIV, 1970-80.
(Data for 1970-79 from Bulletin Statistique)

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{x)}
Faroe Isl.	4 122	1 316	1 180	188	48	8	375	1 251	258	150	1 022
France	-	-	-	-	-	-	-	-	12	70	-
German Dem.Rep.	17 939 ¹⁾	6 808 ¹⁾	7 487 ¹⁾	9 126	25 801	16 963	-	-	-	-	-
Germany, Fed.Rep.	-	1 163	1 529	1 120	1 949	1 388	2 219	5 207	2 726	6 461	2 325
Greenland	-	2	3	4	2	1	1	4	6	6	1
Iceland	7 345	5 020	4 640	2 118	2 843	1 212	1 689	10 090	11 319	16 934	27 809
Norway	338	369	186	-	-	7	7	7	19	1	-
Poland	1 859	8 809	7 878	3 131	1 542	1 072	-	-	-	-	-
UK (Engl. & Wales)	-	-	2 236	3 710	2 323	1 209	1 680	19	9	-	-
USSR	2 220	5 486	1 333	1 066	1 772	1 634	74	-	-	-	-
Total	33 823	28 973	26 473	20 463	36 280	23 494	6 045	16 578	14 349	23 622	31 157

x) Provisional data.

1) From national statistics.

Table 14. Summary of total landings of SAITHE from the main fishing areas (in tonnes, whole weight). This table is based on the biological data supplied to the Working Group and used in the assessments. These figures differ to some extent from the official Bulletin Statistique data.

(IV + IIIa includes industrial fishery by-catch by Denmark and Norway)

Year	Fishing area					Total
	I + II	IV+IIIa	Va	Vb	VI	
1960	136 006	31 515	48 120	11 845	8 349	235 835
1961	109 821	35 489	50 826	9 592	6 724	212 452
1962	122 841	24 559	50 514	10 454	7 159	215 527
1963	148 036	30 300	48 011	12 693	6 609	245 649
1964	198 110	58 669	60 257	21 893	13 596	352 525
1965	184 548	73 274	60 177	22 181	18 395	358 575
1966	201 860	96 353	52 003	25 563	18 534	394 313
1967	191 191	76 759	75 712	21 319	16 034	381 015
1968	107 181	98 179	77 549	20 387	12 787	316 083
1969	140 379	115 550	115 853	27 437	17 214	416 433
1970	260 404	222 100	116 601	29 110	14 538	642 753
1971	244 732	252 619	136 764	32 706	19 246	686 067
1972	210 508	245 801	111 301	42 186	29 225	639 021
1973	215 659	225 771	110 888	57 574	35 812	645 704
1974	262 301	272 944	97 568	47 188	36 298	716 299
1975	233 453	278 126	87 954	41 578	30 949	672 060
1976	242 486	319 758	82 003	33 067	41 432	718 746
1977	182 808	194 858	62 026	34 829	28 467	502 988
1978	154 465	142 077	49 672	28 136	31 536	405 886
1979	164 180	114 394	62 504	27 246	21 708	390 032
1980 ^{*)}	143 608	117 403	57 776	25 568	22 030	366 385

^{*)}Preliminary

Table 15. Nominal catch (tonnes) of SAITHE in Sub-area I and Divisions IIa, IIb, 1971-80.
(Data for 1971-79 from Bulletin Statistique.)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*
Belgium	-	-	-	5	47	1	-	-	-	-
Faroe Islands	215	109	7	46	28	20	270	809	1 117	533
France	14 536	14 519	11 320	7 119	3 156	5 609	5 658	4 345	2 601	945
German Dem. Rep.	16 840	7 474	12 015	29 466	28 517	10 266	7 164	6 484	2 435	-
Germany, Fed.Rep.	12 204	24 595	30 338	33 155	41 260	49 056	19 985	18 190	14 823	12 511
Netherlands	-	-	-	-	-	64	-	-	-	-
Norway	128 499	143 775	148 789	152 699	122 598	131 675	139 705	121 069	141 346	128 445
Poland	6 017	1 111	23	2 521	3 860	3 164	1	35	-	-
Portugal	-	-	-	-	6 430	7 233	783	203	-	25
Spain	13 097	9 247	2 115	7 075	11 397	21 661	1 327	121	685	263
Sweden	-	-	-	-	8	-	-	-	-	-
U.K. (England & Wales)	10 361	8 223	6 503	3 001	2 623	4 651	6 853	2 790	1 170	794
U.K. (Scotland)	106	125	248	103	140	73	82	37	-	-
USSR	39 397	1 278	2 411	28 931	13 389	9 013	989	381	3	92
Total	241 272	210 456	213 769	264 121	233 453	242 486	182 817	154 464	164 180	143 608

* Preliminary

Table 16. Nominal catch (tonnes) of SAITHE in Sub-area IV and Division IIIa, 1971-80.
(Data for 1971-1979 from Bulletin Statistique.)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*
Belgium	44	59	55	33	81	127	107	44	14	-
Denmark	11 500	17 000	10 100	8 388	10 149	15 111	17 334	10 372	10 461	9 887
Faroe Islands	18	182	552	581	287	425	318	213	407	425
France	38 330	26 696	32 961	28 619	24 396	32 552	41 022	38 122	39 709	35 853
German Dem.Rep.	6 398	10 674	7 668	5 816	5 882	2 088	2 430	2 404	1 504	944
Germany Fed.Rep.	4 217	8 665	12 003	20 589	18 622	38 698	26 860	25 982	18 780	11 218
Iceland	97	4	23	5	1	-	-	-	-	-
Ireland	-	-	-	-	-	119	126	88	-	-
Netherlands	18 136	12 532	9 232	14 504	8 917	6 101	7 270	5 135	1 466	235
Norway	15 184	23 256	15 219	9 246	12 483	17 856	14 949	17 627	17 575	44 376
Poland	4	186	7 512	22 203	35 304	35 819	12 378	5 661	6 104	2 404
Spain	-	190	108	308	249	-	-	-	-	-
Sweden	4 523	3 899	1 876	1 187	913	1 271	1 275	990	211	304
UK(Engl.+Wales)	3 162	3 744	3 378	4 353	3 472	6 300	6 822	8 382	6 256	4 877
UK (Scotland)	6 106	10 797	10 834	10 956	8 898	13 034	11 366	14 330	8 257	6 517
USSR	110 200	99 883	83 333	104 500	110 743	83 669	46 385	10 161	2 015	-
Sub-total	217 919	217 767	194 854	231 288	240 397	253 170	188 642	139 511	112 759	117 040
By-Catch from Industrial Fisheries:										
Denmark ^{a)}	34 700	22 600	24 400	38 800	27 800	53 684	1 805	72	493	-
Norway ^{a)}		5 434	6 517	3 469	9 878	13 082	4 392	2 494	1 142	363
TOTAL	252 619	245 801	225 771	273 557	278 075	319 936	194 839	142 077	114 394	117 403

* Preliminary

Table 17. Nominal catch (tonnes) of SAITHE in Division Va, 1971-1980.
(Data for 1971-1979 from Bulletin Statistique.)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*
Belgium	3 490	2 250	2 131	2 371	1 638	1 615	1 448	1 092	980	673
Faroe Islands	2 046	857	1 467	1 712	1 366	3 267	3 013	4 250	5 457	4 931
France	3 987	-	-	94	32	51	-	-	-	-
German Dem.Rep.	2 637	3 471	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	40 628	30 918	38 565	18 627	13 820	13 785	10 575	-	-	-
Iceland	60 080	59 945	56 567	65 169	61 430	56 811	46 973	44 327	57 066	52 171
Norway	-	-	-	-	6	5	4	3	1	1
Poland	113	150	-	-	-	-	-	-	-	-
Spain	59	-	-	-	-	-	-	-	-	-
U.K. (England & Wales)	21 767	13 152	11 874	8 845	8 643	6 024	13	-	-	-
U.K. (Scotland)	1 743	545	509	731	1 021	443	-	-	-	-
USSR	5	-	-	-	-	-	-	-	-	-
Total	136 555	111 288	111 113	97 549	87 956	82 001	62 026	49 672	62 504	57 776

Table 18. Nominal catch (tonnes) of SAITHE in Division Vb, 1971-1980

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{*)}
Belgium	-	-	-	-	-	6	-	-	-	-
Faroe Islands	5 653	5 646	2 973	3 726	2 517	2 560	5 153	15 892	22 003	24 223
France	12 394	24 006	22 676	20 457	23 980	15 367	17 038	8 128	2 974	1 037
German Dem. Rep.	-	-	-	130	26	-	-	-	-	-
Germany, Fed. Rep.	2 254	3 440	9 329	6 661	5 229	2 605	3 086	1 088	581	193
Netherlands	63	-	-	-	491	232	58	-	-	+
Norway	1 839	470	355	1 660	486	2 232	1 279	1 124	1 137	64
Poland	-	-	4 050	1 925	815	1 007	-	-	-	+
Spain	-	423	390	500	654	117	-	-	-	-
UK(Engl.&Wales)	3 305	2 453	7 527	3 827	2 428	3 063	2 613	557	190	13
UK(Scotland)	7 198	6 225	10 131	8 302	4 950	5 860	5 608	1 349	361	38
USSR	-	-	-	-	-	16	-	-	-	-
Total	32 706	42 663	57 431	47 188	41 576	33 065	34 835	28 138	27 246	25 568

*) Preliminary

Table 19. Nominal catch (tonnes) of SAITHE in Sub-area VI, 1971-80
(Data for 1970-79 from Bulletin Statistique)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*
Belgium	29	125	191	209	21	95	-	-	1	-
Denmark	-	-	-	-	-	3	-	-	-	-
Faroe Islands	-	-	4	6	6	7	11	-	14	-
France	12 017	17 718	18 970	22 802	19 946	29 216	19 686	21 519	15 662	19 094
German Dem.Rep.	-	-	-	-	8	3	-	-	-	-
Germany, Fed. Rep.	1 068	350	52	16	481	511	254	604	131	74
Ireland	-	-	-	-	-	375	240	266	246	250 ¹⁾
Iceland	1	-	+	-	+	-	-	-	-	-
Netherlands	32	638	67	124	702	547	527	623	256	100
Norway	-	-	2	22	10	17	91	122	20	12
Poland	2	-	394	125	164	91	-	-	-	-
Spain	-	1 302	1 980	1 862	1 882	1 012	346	-	-	-
UK (Engl. & Wales)	1 965	2 268	2 138	1 333	1 571	1 560	2 758	3 193	1 765	1 594
UK (N. Ireland)	24	6	14	3	12	13	9	27	11	9
UK (Scotland)	4 620	6 706	11 330	9 527	6 131	5 807	4 628	5 181	3 602	2 897
USSR	105	112	670	269	15	2 550	-	-	-	-
Total	19 863	29 225	35 812	36 298	30 949	41 807	28 550	31 535	21 708	22 030

*) Preliminary.

1) W.G. Estimate

Table 20. Faroe Plateau Cod. Nominal catches by countries, 1968 - 80 (tonnes)

Year	Faroe Islands	France	Germany Fed.Rep.	Norway	Poland	UK England	UK Scotland	Others	Total
1968	13 763*)	1 260	1 556	686*)	-	5 620	7 394	-	30 279
1969	15 718*)	2 557*)	395	483	-	5 286	11 231	-	35 670
1970	15 245*)	2 616*)	443	238*)	-	2 236	8 259	-	29 037
1971	12 754*)	1 426*)	580	881*)	-	2 753	7 757	-	26 151
1972	12 143*)	1 462*)	451	266*)	-	2 159	5 175	-	21 656
1973	10 434	1 752*)	310	115	419*)	3 935	5 675	-	22 640
1974	12 541	465	292	446	320	2 879	7 516	20	24 479
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	332	853	-	809	4 071	2	35 694
1978	24 076	183	71	245	-	518	1 460	2	26 555
1979	21 773	133	23	274	-	263	660	-	23 126
1980**)	19 652	29	-	165*)	-	13	451	-	20 310

*) Vb₂ included

***) Preliminary data

Table 21. Faroe Bank Cod. Nominal catches by countries, 1968-1980 (tonnes).

Year	Faroe Islands	France	Germany Fed. Rep.	Norway	Poland	UK England	UK Scotland	Others	Total
1968	*	1 259	6	-	-	1 476	1 130	-	3 871
1969	*	*	8	-	-	1 431	1 018	-	2 457
1970	-	*	-	*	-	1 471	1 531	-	3 002
1971	-	*	-	*	-	732	1 345	2	2 079
1972	-	*	-	*	-	860	1 308	-	2 168
1973	2 842	*	-	-	*	1 144	1 081	-	5 067
1974	696	86	-	-	-	829	503	40	2 154
1975	378	81	50	-	-	749	804	55	2 117
1976	457	72	+	1	-	877	912	11	2 330
1977	851	219	-	99	-	9	780	-	1 958
1978	4 194	*	-	183	-	2	1 071	-	5 450
1979	1 273	-	-	33	-	-	677	-	1 983
1980 ^{**)}	873	-	-	*	-	85	257	-	1 215

*) Catches included in Vb₁

**) Preliminary data

Table 22. Faroe Plateau Haddock. Nominal catches by countries, 1968-80 (tonnes).

Year	Faroe Islands	France	Germany Fed.Rep.	Norway	Poland	UK England	UK Scotland	Others	Total
1968	6 751 ^{*)}	1 143	36	-	-	2 158	5 783	-	15 871
1969	11 122 ^{*)}	3 314 ^{*)}	73	-	-	1 549	6 392	-	22 450
1970	11 791	2 006 ^{*)}	14	-	-	769	5 428	-	20 008
1971	10 488	790 ^{*)}	19	-	-	1 896	4 949	-	18 142
1972	8 314	2 660 ^{*)}	24	-	-	844	2 842	-	14 690
1973	4 931	3 508	46	-	1 190 ^{*)}	1 510	3 665	-	14 850
1974	4 538	1 242	70	5	685	1 044	5 572	30	13 186
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	705	3 278	26	24 538
1978	15 539	71 ^{*)}	8	91	-	48	367	-	16 124
1979	11 258	47 ^{*)}	2	39	-	35	206	-	11 587
1980 ^{**)}	13 273	13 ^{*)}	8	16 ^{*)}	-	6	171	-	13 487

*) Catches including Vb₂

***) Preliminary estimates

Table 23. Faroe Bank Haddock. Nominal catches by countries, 1968-1980 (tonnes).

Year	Faroe Islands	France	Germany Fed.Rep.	Norway	Poland	UK England	UK Scotland	Others	Total
1968	*	1 143	-	-	-	287	556	-	1 986
1969	*	*	-	-	-	427	423	-	850
1970	-	*	-	-	-	368	993	-	1 361
1971	-	*	-	-	-	427	813	29	1 269
1972	-	*	1	-	-	527	1 267	-	1 795
1973	1 087	*	-	-	*	916	1 123	-	3 126
1974	273	209	-	-	-	573	500	22	1 577
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	*	-	39	-	-	394	-	3 076
1979	714	*	-	-	-	-	102	-	816
1980 ^{***}	548	*	-	*	-	152	307	-	1 007

*) Catches are included in Vb₁

**) Preliminary estimates

Table 24 HERRING. Catch in tonnes 1971-1980. North Sea (Sub-area IV and Division VIId) by country.
(Data provided by Working Group members)

Country/Year	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{*)}
Belgium	681	1 337	2 160	603	2 451	1 430	57	-	-	-
Denmark	185 393	213 738	174 254 ^{a)}	61 728 ^{b)}	115 616	34 841	12 769	4 359	10 546	4 458
Faroe Islands	45 524	48 444	54 935 ^{b)}	26 161 ^{b)}	25 854	14 378	8 070	40	10	-
Finland	-	-	-	-	-	1 034	-	-	-	-
France	11 408	12 901	22 235	12 548	20 391	14 486	1 613	2 119	2 560	3 330
German Dem. Rep.	475	127	1 728	3 268	2 689	2 624	2	-	-	-
Germany, Fed. Rep.	3 570	3 065	10 634 ^{c)}	12 470	6 953	1 654	221	24	10	147
Iceland	37 171	31 998	23 742 ^{d)}	29 017	16 286	9 412	-	-	-	-
Netherlands	32 479	24 829	34 070	35 106	38 416	20 146	4 134	18	-	509
Norway	125 842	117 501	99 739	40 975	34 183	27 386	4 065	1 189	3 617	2 110
Poland	2 031	2 235	5 738	9 850	7 069	7 072	2	-	-	-
Sweden	36 880	7 366	4 222 ^{e)}	3 561	6 858	4 777	3 616	-	-	-
UK (England) f)	4 113	394	2 268	5 699	6 475	9 662	3 224	2 843	2 253	77
UK (Scotland) f)	25 073	17 227	16 012	15 034	8 904	15 015	8 159	437	162	610
USSR	9 500	16 386	30 735	18 096	20 653	10 935	78	4	-	-
Total North Sea	520 140	497 548	484 012	275 116	312 798	174 834	46 010	11 033	19 158	11 241
Total including unallocated catches									25 148	60 994

a) Total includes 2 107 t for human consumption unspecified to area

b) Supplied by Fiskirannsóknarstofvan

c) From Federal Republic of Germany national statistics compiled by Federal Board of Fisheries, Hamburg

d) Excludes 15 938 t caught on Skagerrak border and allocated to that area on the basis of age analysis

e) Swedish catches in Danish ports reported by area (North Sea, Skagerrak) used for area allocation of Swedish landings reported as Skagerrak and North Sea in Swedish statistics.

f) Catches from Moray Firth not included

*) Preliminary

Table 25. Total catches of HERRING (tonnes) in Division VIa, 1971-80
(Data provided by Working Group members)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*
Belgium	-	-	-	-	-	12	-	-	-	-
Denmark	554	150	932	-	374	249	626	128	-	-
Faroe Islands ^{a)}	8 100	8 094	10 003	5 371	3 895	4 017	3 564	-	-	-
France	2 055	680	2 441	547	1 293	1 528	1 548	1 435	3	0.4
German Dem. Rep.	330	935	2 507	2 037	1 994	929	-	-	-	-
Germany Fed. Rep.	7 700	4 108	17 443	14 354	9 099	4 980	221	126	5	256
Iceland	5 416	2 066	2 532	9 566	2 633	3 273	-	-	-	-
Ireland ^{b)}	12 161	17 308	14 668	12 557	10 417	8 558	7 189	12 071	4 569	4 607
Netherlands	9 252	23 370	32 715	19 635	19 360	20 812	8 515	5 929	1 214	640
Norway	76 720	17 400	36 302	26 218	512	5 307	1 098	4 462	-	-
Poland	-	-	5 685	6 368	2 934	3 085	6	-	-	-
Sweden	-	-	-	-	-	2 206	261	-	-	-
U.K. (England)	-	-	-	45	125	20	301	134	54	33
U.K. (N. Ireland)	-	-	-	3	6	1	1	6	2	-
U.K. (Scotland)	99 537	107 638	120 800	107 475	85 395	53 351	25 238 ^{c)}	10 097 ^{c)}	3 ^{c)}	15
USSR	-	?	2 052	5 388	3 232	3 092	-	-	-	-
Unspecified catches	-	-	-	-	-	-	-	-	1 752	1 110
Total	221 825	181 749	248 080	209 564	141 269	111 420	48 568	34 388	7 602	6 661
Scottish juvenile Herring & Sprat fisheries in Moray Firth	5 666	10 242	7 219	13 003	2 454	313	205	1 502	21	273

* Preliminary Figures. a) Figures supplied by Fiskirannsóknarstovan. b) Catches prior to 1976 mainly taken in Div. VIIb and landed in Div. Div. VIa.

c) Including by-catch in local sprat fishery (16 tonnes in 1977, 157 tonnes in 1978, 3 tonnes in 1979, 11 tonnes in 1980).

Table 26. Monthly landings (tonnes) of HERRING from the Firth of Clyde (all fishing methods combined).
(Data provided by the Working Group.)

Month	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
January	272	*	*	*	*	*	*	4*	4*	6*
February	491	52*	71*	91*	68*	7*	*	6*	8*	3*
March	495	82*	36*	168*	85	69*	*	7*	13*	8*
April	406	400	316	398	369	521	530	246	12*	4*
May	305	569	385	280	283	436	544	245	4*	2*
June	111	657	468	607	203	281	640	238	356	114
July	260	416	688	690	354	332	494	376	466	656
August	385	700	593	543	240	473	601	587	450	645
September	519	263	668	310	515	541	559	581	374	559
October	461	410	711	451	811	598	556	653	263	79
November	193	463	464	245	571	595	560	647	1*	3*
December	190	166	248	91	120	236	328	272	-*	2*
Not Known		48	67	189	44	50	35			
Total	4 088	4 226	4 715	4 063	3 663	4 139	4 847	3 862	1 951	2 081

* Subject to closure of directed fishery.

Table 27. HERRING in Division VIIb,c. Nominal catches (tonnes) 1967-80.

Year	France	German Dem.Rep.	Germany, Fed.Rep.	Ireland	Netherlands	Poland	U.K.	USSR	Unallocated	Total
1967	-	-	-	108	-	-	-	-	-	108
1968	713	-	-	30	525	-	-	-	-	1 268
1969	-	-	71	145	355	-	-	-	-	571
1970	733	-	180	1 518	179	-	-	2	-	2 612
1971	42	-	52	1 646	61	-	-	-	-	1 801
1972	312	-	23	3 154	71	-	-	347	-	3 907
1973	-	-	5	5 036	200	-	-	-	-	5 241
1974	10	-	-	4 412	51	-	25	1 266	-	5 764
1975	20	-	914	5 576	9 815	-	-	646	-	16 971
1976	-	240	28	5 537	12 306	83	-	118	-	18 312
1977	-	-	-	8 727	4 194	-	-	-	-	12 921
1978	-	-	-	7 057	475	-	-	-	-	7 532
1979 ^{a)}	-	-	-	14 341	300	-	-	-	-	14 641
1980 ^{a)}	-	-	1	14 392	1 265	-	1	-	8 500	24 159

Table 28. HERRING. Total catches (tonnes) in the Irish Sea (Division VIIa),
1970-80 (includes industrial catch).

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*
France	559	1 815	1 224	254	3 194	813	651	85	174	455 ²⁾	1
Ireland	3 933	3 131	2 529	3 614	5 894	4 790	3 205	3 331	2 371	1 805	1 340
Netherlands	-	-	260	143	1 116	630	989	500	98	-	-
U.K.	17 912	21 861	23 337	18 587	27 489	18 244	16 401	11 498	8 432 ¹⁾	10 078 ³⁾	9 272
USSR	-	-	-	-	945	26	-	-	-	-	-
Total	22 403	26 807	27 350	22 598	38 638	24 503	21 246	15 414	11 075	12 338	10 613

*) Preliminary. 1) Includes 68.5 tonnes of spring-spawned herring.

2) No data basis for allocation to stock.

3) Additional unrecorded catch of 106 tonnes estimated.

Table 29. Celtic Sea HERRING catches by season (1 April to 31 March). (Data provided by Working Group members)

Year	France	German Dem.Rep.	Germany Fed.Rep.	Ireland	Netherlands	Poland	UK	USSR	Unallocated	Total
1971/2	3 383		974	13 757	10 600	880	65			29 659
1972/3	7 327		393	18 846	6 852	751	-	618		34 878
1973/4	4 143	7	294	11 317	5 834	1 139	-	334		23 191 ^{a)}
1974/5	2 150	-	435	11 683	2 462	954	-	-		17 684
1975/6	2 451	-	399	6 524	2 441	579	24	1 054		13 472
1976/7	1 371	147	36	2 970	1 324	257	-	826		7 019
1977/8	95	-	96	1 322	1 378	-	-	-		2 891
1978/9	8	-	220	2 656	1 002	-	-	-		3 886
1979/80	584	-	20	2 920	850	-	-	-	935	5 309
1980/81*	9	-	2	3 582	392	-	-	-	3 803	7 788

*) Provisional

a) Including 123 tonnes for Bulgaria

Table 30. Annual Celtic Sea HERRING catches 1972-1980 (Data provided by Working Group members)

Year	France	German Dem.Rep.	Germany Fed.Rep.	Ireland	Netherlands	Poland	UK	USSR	Unallocated	Total
1972	7 327	-	393	20 109	6 758	751	-	618		35 956
1973	5 553	7	294	13 105	5 834	1 125	-	334		26 375 ^{a)}
1974	2 261	-	433	13 991	2 105	954	-	-		19 744
1975	1 924	-	361	8 430	2 825	512	24	1 054		15 130
1976	1 919	147	28	3 705	1 627	324	-	826		8 258
1977	106	-	96	1 394	1 455	-	-	-		3 051
1978	8	-	220	2 725	1 002	-	-	-	850	3 955
1979	584	-	20	2 123	850	-	-	-	3 705	4 427
1980*	9	-	2	3 416	392	-	-	-		7 524

*) Provisional

a) Including 123 tonnes for Bulgaria

Table 31. HERRING in Division IIIa. Landings in tonnes 1971-80.
(Data mainly provided by Working Group members)

	Country/Year	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{x)}
SKAGERRAK	Denmark	26 985	34 900	42 098	35 732	29 997	7 326	19 889	6 425	5 153	5 180
	Faroe Islands	5 636	4 115	5 265	7 132	8 053	1 553	10 064	1 041	817	526
	Germany, Fed. Rep.	-	-	-	36	108	6	32	28	181	-
	Iceland	3 066	7 317	15 938	231	1 209	123	-	-	-	-
	Norway (Open Sea)	6 120	1 045	836	698	196	-	-	1 860	2 460	1 350
	Norway (Fjords)	3 166	4 222	1 680	1 720	1 459	2 304	1 837	2 271	2 259	2 795
	Sweden	19 763	19 644	20 429	11 683	12 348	6 505	8 109	11 551	8 104	10 701
	Total	64 736	71 243	86 246	57 232	53 370	17 817	39 931	23 176	18 974	20 552
KATTEGAT	Denmark	50 177	52 755	78 125	54 540	48 974	41 749	38 205	29 241	21 337	25 380
	Sweden	49 760	39 972	40 418	39 779	23 769	30 263	37 160	35 193	25 272	18 260
	Total	99 937	92 727	118 543	94 319	72 743	72 012	75 365	64 434	46 609	43 640
	Division IIIa Total	164 673	163 970	204 789	151 551	126 113	89 829	115 296	87 610	65 583	64 192
	Unallocated									8 117	20 053
	GRAND TOTAL									73 700	84 245

x) Preliminary

Table 32. SPRAT catches in the North Sea ('000 tonnes), 1971-80 (data provided by Working Group members).

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{a)}
<u>IVa West</u>										
Denmark	-	-	-	5.3	0.5	0.6	0.1	-	-	-
Faroe Islands	-	-	-	0.2	12.9	2.5	0.4	-	-	-
France	-	-	-	-	-	-	+	-	-	-
German Dem. Rep.	-	-	-	-	-	-	+	-	-	-
Germany, Fed. Rep.	-	-	+	-	-	+	0.6	-	-	0.1
Netherlands	+	+	+	+	+	+	+	-	-	-
Norway	0.9	2.2	-	-	1.5	29.9	16.0	1.3	0	-
Poland	-	+	+	-	0.3	-	-	-	-	-
Sweden	-	-	1.0	2.2	11.0	+	0	-	-	-
U.K. (England)	+	-	0.2	-	-	-	0	-	-	-
U.K. (Scotland)	15.0	29.8	49.4	41.2	9.4	12.7	26.9	16.9	6.8	3.8
USSR	-	-	-	1.0	1.3	1.2	+	-	-	-
Total	15.9	32.0	50.6	49.9	36.9	46.9	44.0	18.2	6.8	3.9
<u>IVa East (North Sea stock)</u>										
Denmark	-	-	-	-	-	0.2	0.1	-	-	-
Norway	-	-	-	-	-	1.9	0.7	0.1	+	0.4
U.K. (Scotland)	-	-	-	-	-	+	0	-	-	-
Total	-	-	-	-	-	2.1	0.8	0.1	...	0.4
<u>IVb West</u>										
Belgium	-	-	-	-	-	+	0	-	-	-
Denmark	9.9	14.4	47.0	55.4	106.6	104.4	57.5	44.1	75.3	76.7
Faroe Islands	-	-	-	4.0	30.0	42.9	1.8	-	2.8 ^{b)}	2.8 ^{b)}
France	-	-	-	-	-	-	+	-	-	-
German Dem. Rep.	-	-	-	1.7	4.5	6.4	0.7	-	-	-
Netherlands	+	+	-	-	-	-	0	-	-	-
Norway	-	4.1	3.4	9.5	145.7	73.0	5.5	56.2	47.8	18.3
Poland	-	+	-	-	9.1	10.5	0	-	-	-
Sweden	-	-	-	-	-	7.9	0	-	-	-
U.K. (England)	25.5	21.8	34.6	25.5	32.5	49.7	51.9	53.9	12.9	2.4
U.K. (Scotland)	7.2	3.6	2.9	8.6	4.9	18.1	10.9	14.8	5.0	2.5
USSR	1.2	0.8	17.9	32.9	47.8	50.4	1.6	-	-	-
Total	43.8	44.7	105.8	137.7	381.1	362.3	123.9	169.0	143.8	102.7

a) Preliminary figures as reported.

b) IVb East and West.

+ = less than 0.1.

... = No data available.

- = Magnitude known to be nil.

/Cont'd.

Table 22 (ctd)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{a)}
<u>IvB East</u>										
Denmark	19.9	28.8	93.9	104.0	215.2	201.1	126.8	161.0	191.5	149.0
German Dem.Rep.	-	-	-	-	0.4	-	0.7	-	-	-
Germany, Fed.Rep.	5.1	1.7	11.0	17.5	0.5	1.7	4.3	-	1.8	6.1
Norway	-	-	-	-	-	5.1	0	29.8	27.4	33.7
Sweden	-	-	-	-	-	-	1.5	-	-	0.6
Total	25.0	30.5	104.9	121.5	216.1	207.9	133.3	190.8	222.7	189.4
<u>IvC</u>										
Belgium	0.1	0.1	0.2	+	+	-	0	-	-	-
Denmark	-	-	-	0.9	3.9	0.3	1.4	-	1.5	6.5
France	+	-	+	0.3	0.1	-	+	-	-	-
German Dem.Rep.	-	-	-	-	-	0.1	+	-	-	-
Germany, Fed.Rep.	-	+	-	-	-	-	0.4	-	-	-
Netherlands	1.0	0.4	+	+	0.2	-	0	-	-	-
Norway	-	-	-	-	-	-	-	0.2	3.1	16.2
UK (England)	0.2	+	0.8	3.4	2.9	0.7	0.2	0.0	1.4	4.3
USSR	-	-	-	+	+	0.2	-	-	-	-
Total	1.3	0.5	1.0	4.6	7.1	1.3	2.0	0.2	6.0	27.0
<u>Total North Sea</u>										
Belgium	0.1	0.1	0.2	+	+	+	+	+	+	+
Denmark	29.8	43.2	140.9	165.6	326.2	306.6	179.9	205.1	268.3	232.2
Faroe Islands	-	-	-	4.2	42.9	45.4	2.2	-	2.8	2.8
France	+	-	+	0.3	0.1	-	+	-	-	-
German Dem.Rep.	-	-	-	1.7	4.9	6.5	1.4	-	-	-
Germany, Fed.Rep.	5.1	1.7	11.0	17.5	0.5	1.7	5.3	-	3.8	6.2
Netherlands	1.0	0.4	+	+	0.2	+	+	-	-	-
Norway	0.9	6.3	3.4	9.5	147.2	109.9	22.2	87.6	78.6	68.6
Poland	-	+	+	-	9.4	10.5	+	-	-	-
Sweden	-	-	1.0	2.2	11.0	7.9	1.5	-	-	0.6
UK (England)	25.7	21.8	35.6	28.9	35.4	50.4	52.1	53.9	14.3	6.7
UK (Scotland)	22.2	33.4	52.3	49.8	14.3	30.8	37.8	31.7	11.8	6.3
USSR	1.2	0.8	17.9	33.9	49.1	51.8	1.6	-	-	-
Total	86.0	107.7	262.3	313.6	641.2	621.5	304.0	378.3	379.6	323.4

a) Preliminary figures as reported.

Table 33. Landings of SPRAT in Division IIIa and in Norwegian fjords in Division IVa ('000 tonnes)
(Data provided by Working Group members)

Year	SKAGERRAK				KATTEGAT			IIIa total	Norwegian fjords south of 62°N	Grand total
	Denmark	Sweden	Norway	Total	Denmark	Sweden	Total			
1969	0.8	1.9	1.7	4.4	0.8	1.6	2.4	6.8	11.8	18.6
1970	1.1	2.4	2.4	5.9	3.1	6.0	9.1	15.0	6.4	21.4
1971	0.7	2.4	2.9	6.0	1.5	9.6	11.1	17.1	4.4	21.5
1972	0.8	3.3	2.4	6.5	1.4	17.9	19.3	25.8	6.9	32.7
1973	19.4	2.5	3.2	25.1	19.3	16.2	35.5	60.6	8.8	69.4
1974	17.3	2.0	1.2	20.5	31.6	18.6	50.2	70.7	3.3	74.0
1975	14.9	2.1	1.9	18.9	69.7	20.9	90.6	109.5	2.9	112.4
1976	12.8	2.6	2.0	17.4	30.4	13.5	43.9	61.3	0.6	61.9
1977	7.2	2.2	1.2	10.6	53.3	9.8	63.1	73.7	5.4	79.1
1978	23.1	2.2	2.7	28.0	36.1	9.4	45.5	73.5	5.2	78.7
1979	17.3	8.1	1.8	27.2	45.8	6.4	52.2	79.4	5.0	84.4
1980	43.1	-	3.4	46.5	35.8	-	35.8	102.4 ^{x)}	2.9	105.3

x) Sweden: 20 124 tonnes in Div. IIIa. No allocation on the Skagerrak and the Kattegat possible.

Table 34. COD landings from Division IIIa - Kattegat and Skagerrak. (Data from national sources.)

Year	Denmark	Norway ^{x)}	Sweden	Others	Total
1971	17 662	1 355	6 002	35	25 054
1972	20 410	1 201	5 882	56	27 549
1973	21 586	1 253	5 540	101	28 480
1974	23 737	1 197	6 097	212	31 243
1975	25 920	1 190	4 559	146	31 815
1976	31 833	1 241	4 115	513	37 702
1977	35 286	979	3 960	726	40 951
1978	33 907	1 442	3 485	464	39 298
1979	25 052	1 745	5 042	235	32 074
1980	30 550	1 820	5 319	3 032	40 721

x) Mainly landings from Norwegian fiords

Table 35. COD landings from the Kattegat 1971-80 (tonnes).

Year	Denmark	Sweden	Germany, ¹⁾ Fed. Rep. of	Total
1971	11 748	3 962	22	15 732
1972	13 451	3 957	34	17 442
1973	14 913	3 850	74	18 837
1974	17 043	4 717	120	21 880
1975	11 749	3 642	94	15 485
1976	12 986	3 242	47	16 275
1977	16 668	3 400	51	20 119
1978	10 293	2 893	204	13 390
1979	11 045	3 763	22	14 830
1980	9 219	3 780	38	13 037

1) Landing statistics incompletely split on the Kattegat and the Skagerrak. The figures are estimated by the Working Group.

Table 36. COD landings from the Skagerrak
1971-80.

Year	Denmark	Sweden	Norway ^{x)}	Others	Total
1971	5 914	2 040	1 355	13	9 322
1972	6 959	1 925	1 201	22	10 107
1973	6 673	1 690	1 253	27	9 643
1974	6 694	1 380	1 197	92	9 363
1975	14 171	917	1 190	52	16 330
1976	18 847	873	1 241	466	21 427
1977	18 618	560	979	675	20 832
1978	23 614	592	1 442	260	25 908
1979	14 007	1 279	1 745	213	17 244
1980	21 331	1 539	1 820	2 994	27 684

x) Mainly landings from Norwegian fiords

Table 37. Nominal landings of HADDOCK from Division IIIa.

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{x)}
Belgium	-	-	-	-	-	181	118	25	50	- ^{d)}
Denmark	2 101	2 816	2 832	4 417	5 015	7 488	6 907	4 978	4 120	7 072
German Dem.Rep.	.. ^{a)}	.. ^{a)}	1	-	-	1	-	-	-	- ^{e)}
Germany, Fed.Rep.	9	20	+	+	12	1	16	11	1	6 ^{f)}
Netherlands	-	-	-	-	5	59	81	20	5	-
Norway	139	153	242	175	122	191	156	168	248	236
Sweden	.. ^{b)}	.. ^{b)}	.. ^{b)}	.. ^{b)}	921	1 075	2 485	1 435 ^{e)}	361	302
U.K. (England and Wales)	-	-	16	26	40	59	-	-	-	-
U.K. (Scotland)	-	-	-	+	-	-	-	-	-	-
Total	2 249	2 989	3 091	4 618	6 115	9 055	9 763	6 637	4 785	7 616

x) Preliminary.

a) Division IIIa included in Sub-area IV.

b) Division IIIa included in Division IVa.

c) Division IIIa includes in Division IVa,b.

d) Jan-Nov from Data Form 5.

e) Data Form 5.

f) Jul-Dec catch estimates based on information from fishing vessels.

Table 38. WHITING landings from Division IIIa
(from Bulletin Statistique).

Year	Denmark	Norway	Sweden	Others	Total
1971	13 971	17	IIIa incl. in IVa	1	13 989
1972	14 538	24	↓	-	14 562
1973	22 479	67	↓	1	22 547
1974	28 749	89	↓	4	28 842
1975	19 018	57	611	4	19 690
1976	17 870	48	1 002	57	18 977
1977	18 116	55	973	41	19 185
1978	48 102	58	899 ^{a)}	32	49 091
1979	16 971	63	1 033	16	18 083
1980 ^{x)}	21 106	57	1 478 ^{b)}	-	22 641

x) Preliminary

a) Swedish fishery statistics

b) Based on fishery logbook reports

Table 39. Plaice landings in Div. IIIa. The Kattegat and the Skagerrak combined. Data produced by Working Group members.

Year	Denmark	Sweden	Other Countries	Total
1971	19 560	395	19	19 974
1972	20 599	418	80	21 097
1973	13 892	311	55	14 258
1974	14 830	325	58	15 213
1975	15 046	446	199	15 691
1976	18 738	352	756	19 846
1977	24 466	442	884	25 792
1978	26 068	462	480	27 010
1979	20 766	386	810	21 962
1980 ^{x)}	15 096	381	56	15 533

x) Preliminary. No information from Belgium and the Netherlands.

Table 40. PLAICE landings from the Kattegat (tonnes)

Year	Denmark	Sweden	Total
1971	15 819	331	16 150
1972	15 504	348	15 852
1973	10 021	231	10 252
1974	11 401	255	11 656
1975	10 158	369	10 527
1976	9 487	271	9 758
1977	11 611	300	11 911
1978	12 685	368	13 053
1979	9 721	281	10 002
1980	5 582	289	5 871

Table 41. PLAICE landings from the Skagerrak (tonnes).

Year	Denmark	Sweden	Total
1971	3 741	64	3 805
1972	5 095	70	5 165
1973	3 871	80	3 951
1974	3 429	70	3 499
1975	4 888	77	4 965
1976	9 251	81	9 332
1977	12 855	142	12 997
1978	13 383	94	13 477
1979	11 045	105	11 150
1980	9 514	92	9 606

Table 42. Species composition in Danish Pandalus fishery in Divison IIIa.

Species/Year	Percentage				
	1973	1974	1975	1976	1977
<u>Pandalus</u>	13.02	16.09	21.41	47.93	33.27
Fish landed for consumption:					
Cod	3.12	2.63	1.03	1.98	2.79
Haddock	0.27	0.06	0.06	0.14	0.36
Whiting	0.16	0.01	0.03	1.24	0.78
Plaice	0.28	0.09	1.68	0.06	0.05
<u>Nephrops</u>	1.92	1.60	2.09	6.29	2.72
Other by-catch	81.23	79.52	73.70	42.36	60.03
Reported landings (tonnes)	2 032	1 100	1 655	153	180
Reported effort (hours)	28 634	14 047	22 072	2 937	2 898

Table 43. Species composition in the Swedish Pandalus fishery in Division IIIa.

Species / Year	Percentage				
	1976	1977	1978	1979	1980
<u>Pandalus</u>	56.29	51.06	49.58	53.04	59.68
By-catch:					
<u>Nephrops</u>	0.60	0.33	0.25	0.10	0.55
Cod	5.71	4.89	5.29	6.75	6.47
Haddock	0.26	0.22	0.75	0.44	0.63
Whiting	0.37	0.50	0.80	0.36	0.78
Hake	0.82	0.52	0.90	0.56	0.51
Pollack	0.79	1.27	1.21	0.82	0.45
Ling	0.85	1.00	1.06	0.79	0.55
Saithe	0.01	0.01	0.02	-	0.002
Plaice	0.23	0.24	0.23	0.15	0.21
Witch	2.39	2.39	2.35	2.00	1.24
Brill	0.004	0.01	0.01	0.01	0.002
Turbot	0.01	0.002	0.01	-	0.01
Lemon sole	0.004	0.01	0.02	0.01	0.01
Halibut	0.09	0.03	0.04	0.07	0.03
Dab	0.001				
Herring	0.01	0.43	0.06	0.02	0.16
Other species	31.58	37.09	37.40	34.88	28.71
Reported catch (tonnes)	405	368	304	350	366
Reported effort (hours)	8 808	8 139	7 395	6 712	6 693

Table 44. Nominal catch (in tonnes) of COD in Sub-area IV, 1971-80 (data for 1971-79 as officially reported to ICES).

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{x)}
Belgium	19 334	21 133	11 741	10 253	7 566	7 483	10 346	17 473	12 576	6 224
Denmark	68 179	72 520	47 950	54 207	46 344	53 277	42 582	41 858	48 509	53 848
Faroe Islands	123	284	803	416	732	448	260	56	113	-
France	24 769	24 038	13 247	7 275	8 667	8 079	7 511	11 944	12 559	10 713
German Dem.Rep. a)	18	122	343	132	223	69	21	75	84	63
Germany, Fed. Rep.	46 647	49 431	21 410	17 089	16 457	24 445	22 663	37 040	20 411	26 173
Iceland	1	-	-	+	-	-	-	-	-	-
Ireland	-	-	-	-	-	98	136	174	1	-
Netherlands	46 614	47 634	25 758	24 029	23 263	21 835	29 903	48 817	34 752	42 662
Norway ^{b)}	7 732	4 377	3 692	1 360	1 528	1 877	1 449	2 747	3 575	4 279
Poland	178	189	1 551	4 750	2 991	2 961	381	115	142	28
Spain	-	91	90	80	63	14	-	-	-	-
Sweden	3 060	2 887	2 534	2 071	900	597	36	... ^{d)}	298	293
UK(Engl.&Wales)	55 525	62 503	47 327	39 857	33 615	46 475	35 424	59 127	54 923	49 948
UK(Scotland)	37 229	55 190	48 844	39 887	37 308	39 597	34 406	41 984	42 811	44 713
USSR	5 153	774	2 497	2 667	6 796	6 187	-	17	17	-
Total IV	314 562	341 173	227 787	204 073	186 453	213 442	185 118	261 427	230 771	238 944
Total IVa	61 368	74 768	62 878	65 188	58 343	68 352	55 623	43 357	41 118	
Total IVb	184 957	215 160	134 953	114 087	107 227	126 218	100 191	164 388	147 313	
Total IVc	68 237	51 245	29 956	24 798	20 883	18 872	29 304	53 682	42 340	
WG Total catch ^{c)}	327 918	349 882	235 983	203 219	191 019	211 964	197 694	288 764	299 097	296 755

x) Provisional figures.

a) 1971-72 incl. IIIa.

b) Figures from Norway do not include cod caught in Rec. 2 fisheries.

c) Include discards.

d) Included in IIIa.

Table 45. Nominal catch (in tonnes) of HADDOCK in Sub-area IV, 1981-80.
(Data for 1971-79 as officially reported to ICES)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{x)}
Belgium	971	1 601	2 385	1 137	2 209	2 166	2 293	1 295	732	70
Denmark	31 043	34 858	13 118	44 342	32 930	46 899	20 069	8 093	8 248	12 250
Faroe Islands	-	5	1 198	435	267	183	385	12	7	-
France	8 738	7 814	4 695	4 020	4 646	5 500	6 914	5 122	7 208	6 758
German Dem. Rep. ^{a)}	3	90	22	8	44	20	8	37	12	36
Germany, Fed. Rep.	3 045	4 020	4 587	3 478	2 396	3 433	3 744	2 589	2 549	2 387
Iceland	1	-	-	-	-	-	-	-	-	-
Ireland	-	-	-	-	-	31	53	101	-	-
Netherlands	6 914	5 188	3 185	3 035	1 901	1 728	1 598	857	955	1 508
Norway ^{b)}	1 063	1 146	454	324	331	367	374	609	968	1 103
Poland	-	38	2 553	3 001	1 485	1 155	485	62	106	59
Spain	-	-	101	210	-	-	-	-	-	-
Sweden ^{c)}	5 857	5 305	4 550	3 098	2 083	2 455	113	-	907	1 165
UK(England+Wales)	16 648	20 827	16 586	10 798	11 499	17 238	17 167	12 200	10 774	12 195
UK(Scotland)	121 539	96 197	88 132	71 679	64 686	80 576	89 465	58 406	54 119	63 727
USSR	62 398	36 467	49 356	42 234	49 686	42 852	8 010	54	18	-
Total IV	258 220	213 556	190 922	187 799	174 163	204 603	150 678	89 599	86 603	101 258
Total IVa	197 306	135 095	126 662	122 977	110 848	138 591	116 577	57 886	51 741	
Total IVb	58 270	75 325	62 288	63 695	62 761	65 594	34 030	31 457	34 361	
Total IVc	2 644	3 136	1 972	1 127	554	418	71	94	501	
WG total catch ^{d)}	419 425	462 694	287 099	307 689	401 053	334 888	219 953	170 804	140 635	198 094

x) Provisional

a) 1971-72 includes IIIa

b) Figures from Norway do not include haddock caught in Rec.2 fisheries

c) 1971-74 includes IIIa

d) Includes discards

Table 46. Nominal catch (in tonnes) of WHITING in Sub-area IV, 1971-80.
(Data for 1971-79 as officially reported to ICES)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{x)}
Belgium	2 108	2 745	3 387	3 156	3 279	2 640	3 275	3 304	3 941	3 062
Denmark	55 618	50 109	73 928	109 654	61 941	116 973	46 479	15 741	41 965	17 457
Faroe Islands	-	-	1 453	1 126	764	1 262	472	42	581	-
France	16 668	19 822	20 353	19 825	20 079	19 557	17 592	22 525	27 590	17 753
German Dem.Rep.	-	-	5	-	3	18	-	22	5	-
Germany Fed.Rep.	233	264	403	454	446	302	461	348	1 280	1 266
Iceland	-	-	-	-	-	4	9	38	-	-
Netherlands	6 322	7 613	8 811	12 057	14 078	12 274	9 406	11 030	13 417	12 182
Norway ^{a)}	25	28	39	58	55	71	33	64	49	32
Poland	-	-	7	1 002	888	509	445	8	3	1
Spain	-	107	119	110	65	18	-	-	-	-
Sweden ^{b)}	616	596	2 328	2 440	255	153	341	...	31	16
UK(Engl.& Wales)	4 158	3 789	4 592	5 519	5 246	5 112	6 185	7 542	7 581	6 778
UK(Scotland)	26 755	23 846	20 756	25 274	27 969	26 167	33 017	42 779	44 841	42 029
USSR	541	613	3 522	2 978	5 098	5 612	2 413	-	-	-
Total Sub-area IV	113 044	109 532	139 703	183 653	140 166	190 672	120 128	103 443	141 284	100 576
Total Div. IVa	23 451	32 932	29 616	76 761	75 444	100 001	61 499	42 837	48 554	
Total Div. IVb	70 728	66 789	96 678	87 842	41 930	69 908	42 911	40 943	68 775	
Total Div. IVc	18 865	9 811	13 409	19 050	22 792	20 763	15 718	19 663	23 955	
WG total catch ^{c)}	233 407	291 394	364 740	351 266	290 589	345 951	294 635	178 773	234 947	188 706

x) Provisional figures.

a) Figures from Norway do not include whiting caught in Rec. 2 fisheries.

b) 1971-74 includes Div. IIIa, 1978 included in Div. IIIa.

c) Includes discards.

Table 47. Nominal catch (in tonnes) of COD in Division VIa, 1971-80.
(Data for 1971-79 as officially reported to ICES)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{x)}
Belgium	41	39	75	174	49	71	-	-	4	22
Denmark	-	-	-	-	7	-	-	-	-	27
Faroe Islands	-	-	7	13	3	39	43	-	40	-
France	1 054	2 360	3 445	3 678	3 546	5 611	3 583	4 499	4 590	5 523
German Dem.Rep.	-	-	-	-	2	-	-	-	-	-
Germany, Fed. Rep.	46	3	15	6	12	1	3	31	40	4
Iceland	+	-	-	-	-	-	-	-	-	-
Ireland	888	686	583	883	1 141	1 341	984	1 214	2 237	2 315
Netherlands	10	21	4	5	5	11	5	3	20	-
Norway	-	-	13	14	17	22	29	40	32	30
Poland	154	491	184	175	68	18	-	-	-	-
Spain	-	102	208	137	180	15	20 ^{a)}	108 ^{a)}	-	-
UK(England+Wales)	2 414	3 371	2 074	2 467	2 217	2 742	2 434	2 082	2 348	2 302
UK(Scotland)	5 732	7 018	5 645	6 084	5 806	7 475	5 513	5 539	6 929	7 569
UK (N.Ireland)	2	2	3	3	3	13	5	5	2	2
USSR	325	606	7	13	107	46	-	-	-	-
Total VIa	10 666	14 699	12 263	13 652	13 163	17 405	12 619	13 521	16 078	17 794
WG total catch ^{b)}								14 247	16 242	17 791

x) Provisional

a) Includes VIb

b) Includes discards

Table 48. Nominal catch (in tonnes) of COD in Division VIb, 1971-80.
(Data for 1971-79 as officially reported to ICES)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{x)}
Belgium	-	-	-	-	1	-	-	-	-	-
Faroe Islands	-	-	-	5	3	22	40	10	92	75
France	-	1 659	320	1 128	4	4	3	1	2	-
Germany, Fed. Rep.	-	-	-	-	-	-	-	-	111	135
Ireland	-	-	-	-	-	-	-	3	-	-
Norway	-	-	-	3	-	8	3	69	138	75
Poland	-	-	8	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	... a)	... a)	-	-
UK(England+Wales)	37	32	1	-	28	77	89	285	129	1
UK(Scotland)	57	175	128	39	98	61	33	384	198	370
USSR	-	701	26	-	110	1 398	-	-	-	-
Total VIb	94	2 567	483	1 175	243	1 571	168	752	528	656

x) Provisional

a) Included in VIa

Table 49. Nominal catch (in tonnes) of HADDOCK in Division VIa, 1971-80.
(Data for 1971-79 as officially reported to ICES)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{x)}
Belgium	9	44	45	98	23	45	-	-	2	-
Denmark	-	-	-	-	-	13	-	-	37	-
Faroe Islands	-	-	2	1	-	-	-	-	2	-
France	2 354	5 014	5 141	3 979	2 328	3 026	3 401	4 255	4 786	2 861
German Dem.Rep.	10	87	-	-	9	-	-	-	-	-
Germany.Fed.Rep.	15	7	15	18	3	30	+	20	2	3
Iceland	+	-	-	-	-	-	-	-	-	-
Ireland	4 316	3 982	2 631	1 715	599	1 115	616	441	877	490
Netherlands	78	205	169	63	19	30	28	13	2	-
Norway	-	-	-	-	-	3	7	13	9	-
Poland	10	-	402	97	20	-	-	-	-	-
Spain	-	101	497	540	-	-	-	-	-	-
Sweden	-	-	-	-	-	-	-	-	-	-
UK(Engl.&Wales)	1 491	2 393	2 187	1 512	1 214	1 971	3 827	2 805	1 654	1 279
UK(Scotland)	33 087	27 730	17 631	9 583	8 973	11 992	11 422	9 629	7 459	8 185
UK(N.Ireland)	2	1	-	-	-	-	-	-	-	+
USSR	4 927	1 480	110	364	495	533	-	-	-	-
Total VIa	46 299	41 044	28 830	17 970	13 683	18 758	19 301	17 176	14 830	12 818
WG total catch									13 965	12 783

x) Provisional

Table 50. Nominal catch (in tonnes) of HADDOCK in Division VIb, 1971-80.
(Data for 1971-79 as officially reported to ICES)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{x)}
Belgium	-	-	-	-	-	33	-	-	-	-
Faroe Islands	-	-	-	2	1	8	3	11	20	-
France	182	1 527	600	353	21	4	4	3	4	-
Germany, Fed. Rep.	-	-	-	-	-	-	-	-	-	17
Ireland	-	-	-	-	-	-	-	61	-	-
Norway	-	-	-	-	-	-	+	4	16	-
Poland	-	-	54	-	-	-	-	-	-	-
UK(Engl.&Wales)	117	27	1	-	5	2 111	2 694	2 365	1 654	6 261
UK(Scotland)	313	616	72	22	71	640	297	2 060	548	1 051
USSR	9	7 304	3 291	48 911	49 830	40 447	-	-	-	-
Total VIb	621	9 474	4 018	49 288	49 928	43 243	2 998	4 504	2 242	7 329

x) Provisional

Table 51. Nominal catch (in tonnes) of WHITING in Divisions VIa, 1971-1980
(Data for 1971-1979 as officially reported to ICES)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*)
Belgium	9	7	5	10	1	14	-	-	-	-
Denmark	-	-	121	-	-	-	-	119	92	-
Faroe Islands	-	-	5	1	30	2	-	-	770	-
France	2 507	1 662	2 777	2 983	2 763	3 655	3 395	3 610	2 779	2 611
German Dem. Rep.	-	-	-	-	-	31	-	-	-	-
Germany, Fed. Rep.	+	148	127	80	62	1	1	2	4	1
Iceland	-	-	-	-	-	-	-	-	-	-
Ireland	1 178	1 122	2 117	2 431	2 429	3 255	2 752	2 080	2 791	2 862
Netherlands	28	40	57	23	85	255	78	23	17	-
Norway	-	-	-	-	-	1	-	-	-	-
Poland	2	-	10	9	-	-	-	-	-	-
Spain	-	1 397	1 540	1 479	1 871	821	763 ^{a)}	-	-	-
U.K. (Engl.+ Wales)	66	102	91	112	132	244	520	669	320	227
U.K. (Scotland)	11 435	10 707	9 796	9 929	12 668	16 658	9 873	8 174	10 613	7 371
USSR	-	128	-	-	-	-	-	-	-	-
Total VIa	15 225	15 313	16 646	17 057	20 041	24 937	17 382	14 677	17 386	13 072
Working Group total catch									17 082	12 767

*) Provisional

a) Includes VIb.

Table 52. Nominal catch (in tonnes) of WHITING in Division VIb, 1971-1980
(Data for 1971-1979 as officially reported to ICES)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*)
Faroe Islands	-	-	-	1	-	-	+	-	-	-
France	800	69	62	-	-	-	-	-	-	-
Ireland	-	-	-	-	-	-	-	1	-	-
Spain	-	-	-	-	-	-	a)	-	-	-
U.K. (Engl.+ Wales)	+	+	+	-	-	3	2	5	1	+
U.K. (Scotland)	7	12	1	+	12	15	5	24	2	59
Total VIb	807	81	63	1	12	18	7	30	3	59

*) Provisional

a) Included in VIa

Table 53. Nominal catch (in tonnes) of COD in Divisions VIId and VIIe, 1971-80.

(Data for 1971-79 as officially reported to ICES)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{x)}
Belgium	213	124	93	67	59	65	53	435	699	-
Denmark	-	-	-	-	2 718	1 506	1 120	2 160	2 052	655 ^{a)}
France	4 544	2 658	1 425	3 099	2 143	1 646	5 185	8 044	4 848	3 798
Germany, Fed. Rep.	+	-	-	-	-	-	-	-	-	-
Netherlands	13	30	2	4	+	2	1	+	-	-
Poland	-	7	13	6	-	-	-	-	-	-
UK(England+Wales)	662	717	499	260	159	142	581	654	485	363
UK(Scotland)	-	-	-	-	-	-	-	-	+	-
USSR	-	8	45	-	3	4	-	-	-	-
Total VIId,e	5 432	3 544	2 077	3 436	5 082	3 365	6 940	11 293	8 084	4 816

x) Provisional

a) Includes VIId,c

Table 54. Nominal catch (in tonnes) of COD in Divisions VIIb,c and VIIg-k, 1971-80.
(Data for 1971-79 as officially reported to ICES)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{x)}
Belgium	295	77	323	167	116	159	85	52	51	-
Denmark	-	-	-	-	-	-	-	-	18	... ^{b)}
Faroe Islands	-	-	256	-	-	-	-	-	-	-
France	5 570	4 168	2 791	2 302	2 877	3 196	1 972	2 192	2 918	-
Germany, Fed. Rep.	2	-	1	-	-	-	-	3 ^{a)}	-	7
Ireland	347	352	568	283	474	506	315	323	552	-
Netherlands	81	22	14	9	54	46	291	279	-	-
Norway	-	-	-	-	1	-	+	-	-	-
Poland	33	130	75	39	19	40	6	-	2	-
Spain	-	137	301	232	588	1 140	51	11	-	-
UK(England+Wales)	13	56	60	26	73	44	33	28	33	82
UK(Scotland)	-	-	-	-	-	-	-	2	1	12
USSR	24	139	10	72	134	203	-	-	-	-
Total VIIb,c, g-k	6 365	5 081	4 399	3 130	4 336	5 234	2 753	2 890	3 575	101

x) Provisional

a) Catch in VIIg only

b) Included in VIIe

Table 55. Nominal catch (in tonnes) of HADDOCK in Divisions VIIId and VIIe, 1971-80.
(Data for 1971-79 as officially reported to ICES)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{x)}
Belgium	1	2	1	+	+	+	1	-	1	-
Denmark	-	-	-	-	-	-	2	22	21	-
France	97	224	208	487	868	405	438	356	333	297
Germany, Fed. Rep.	1	-	-	-	+	-	-	-	-	-
Ireland	-	-	-	-	-	-	4	-	-	-
Netherlands	-	9	1	-	1	-	-	-	-	-
Poland	-	-	12	-	-	-	-	-	-	-
UK(Engl.&Wales)	71	166	135	113	99	45	29	22	51	59
USSR	-	10	2	33	3	-	-	-	-	-
Total VIIId,e	170	411	359	633	971	450	474	400	406	356

x) Provisional

Table 56. Nominal catch (in tonnes) of HADDOCK in Divisions VIIb,c and VIIg-k, 1971-80.
(Data for 1971-79 as officially reported to ICES)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{x)}
Belgium	23	45	65	35	33	19	13	5	2	-
Denmark	-	-	-	-	-	-	-	-	1	-
Faroe Islands	-	-	3	-	-	-	-	-	-	-
France	3 652	6 456	5 524	6 057	4 583	3 726	2 244	1 479	1 931	-
Germany,Fed.Rep.	1	-	1	-	+	3	-	-	-	-
Ireland	947	1 103	1 348	829	507	287	153	111	155	-
Netherlands	66	56	12	2	4	14	1	-	16	-
Poland	3	-	62	143	-	-	-	-	-	-
Spain	-	733	890	1 100	-	-	294	-	-	-
UK(Engl.&Wales)	25	107	24	39	46	24	18	13	20	51
UK(Scotland)	-	-	-	-	-	-	-	8	22	56
USSR	136	253	24	456	1 290	183	-	-	-	-
Total VIIb,c and VIIg-k	4 853	8 753	7 953	8 661	6 643	4 256	2 723	1 616	2 147	107

x) Provisional

Table 57. Nominal catch (in tonnes) of WHITING in Division VIId and VIIE in 1971-1980
(Data for 1971-1979 as officially reported to ICES)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*
Belgium	25	19	38	39	70	103	36	85	92	-
Denmark	-	-	-	-	-	18	-	1	2 585	-
France	2 999	3 121	5 050	7 917	10 060	8 390	8 886	8 010	5 352	6 509
Netherlands	1	21	42	12	14	5	1	2	1	-
Ireland	-	-	-	-	-	-	11	12	-	-
U.K. (Engl. + Wales)	567	515	498	579	1 255	1 504	1 342	1 038	930	839
Germany, Fed. Rep.	+	-	-	25	1	-	-	-	-	-
USSR	-	-	19	-	-	-	-	-	-	-
Total VIId,e	3 592	3 676	5 647	8 572	11 400	10 020	10 276	9 148	8 960	7 348

*) Provisional

Table 58. Nominal catch (in tonnes) of WHITING in Divisions VIIb,c and VIIg-k
(Data for 1971-1979 as officially reported to ICES)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*
Belgium	54	20	124	75	83	97	60	37	26	-
France	4 893	5 695	4 035	4 331	3 637	4 731	3 962	3 848	4 127	-
Germany, Fed. Rep. of	-	-	+	-	2	-	1	45	-	6
Ireland	482	1 141	1 894	1 641	2 562	1 980	1 201	1 172	2 674	-
Netherlands	100	377	2 080	915	66	112	86	63	3	-
Poland	-	-	14	-	-	-	-	-	-	-
Spain	-	1 491	1 121	1 367	2 974	2 772	-	-	-	-
U.K. (Eng.+ Wales)	17	34	21	15	61	21	26	38	22	60
U.K. (Scotland)	-	-	-	-	-	-	2	1	1	80
USSR	-	3	16	-	64	2	-	-	-	-
Total VIIb,c and g-k	5 546	8 761	9 305	8 344	9 449	9 715	5 338	5 204	6 853	146

*) Provisional

Table 59. Nominal catch (tonnes) of COD in Division VIIa, 1969-1980.

Country	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*
Belgium	272	332	390	348	276	409	282	257	135	144	174	245
Germany, Fed.Rep.	...	.....	...	...	...	...	...	...	...	...	...	2
France	563	1 282	2 575 ^{a)}	2 024	2 507	2 601	2 623	1 938	1 370	1 022	1 125	971
Ireland	2 176	1 574	2 800	2 275	4 224	3 276	3 477	4 815	3 862	3 128	3 755	3 884
Netherlands	-	4	148	58	35	113	53	87	32	15	11	28
UK (Eng.+Wales)	3 445	1 710	2 451	2 856	3 158	2 463	2 132	1 815	1 186	875	980	1 918
UK (N. Ireland)	1 380	1 267	1 112	1 522	1 537	1 279	1 153	1 175	1 409	1 064	1 898	2 583
UK (Isle of Man)	...	...	...	...	...	...	...	...	...	...	297	269
UK (Scotland)	131	88	64	90	50	49	70	91	60	79	118	371
Total	7 967	6 257	9 540	9 173	11 787	10 190	9 790	10 178	8 054	6 328	8 358	10 271
Total figures used by Working Group for stock assessment:	7 991	6 426	9 246	9 234	11 819	10 251	9 863	10 247	8 054	6 271	8 371	10 271

*) Preliminary

a) Includes Division VIIIf

Table 60. Nominal catch (tonnes) of WHITING in Division VIIa, 1970-80
(Data for 1970-79 as officially reported by ICES)

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*
Belgium	159	154	38	102	94	99	68	63	51	42	44
France	1 312	3 172	2 805	3 101	2 700	2 784	2 985	1 952	2 098	1 897	1 593
Ireland	1 282	2 306	2 188	3 414	4 184	3 946	5 055	4 821	4 562	3 847	5 563
Netherlands	+	23	5	12	52	52	56	24	12	11	18
UK (England & Wales)	706	810	639	1 224	685	617	635	1 008	1 105	842	1 000
UK (N. Ireland)	1 314	1 899	1 976	2 437	2 045	2 280	3 290	2 692	3 089	2 946	3 961
UK (Scotland)	31	19	29	47	52	54	104	161	152	154	242
UK (Isle of Man)	...	...	...	....	...	...	...	...	...	372	243
USSR	-	-	-	-	7	-	-	-	-	-	-
Total	4 804	8 383	7 680	10 337	9 819	9 832	12 193	10 721	11 069	10 111	12 664
Total figures used by the Working Group for stock assessment	4 667	6 917	7 445	9 972	9 364	9 275	11 651	10 204	10 404	9 892	12 125
Industrial catches total (Ireland only):	2 198	2 531	1 231	744	283	353	425	760	927	-	-

*) Preliminary

Table 61. Nominal catch (tonnes) of PLAICE in Division VIIa, 1970-1980
(Data for 1970-1979 as officially reported to ICES)

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*
Belgium	305	175	179	221	247	248	136	110	109	151	212
France	250	-	440	500	132	134	126	141	110	152	104
Ireland	678	1 080	909	1 079	891	884	1 032	953	1 025	1 032	1 087
Netherlands	8	61	48	42	47	75	73	24	15	18	34
UK (England & Wales)	1 869	2 744	3 366	3 002	2 240	2 544	1 945	1 422	1 792	1 817	2 139
UK (Isle of Man)	...	...	...	...	...	...	...	...	...	52	20
UK (N. Ireland)	184	132	134	142	104	125	120	165	173	161	140
UK (Scotland)	58	92	89	73	54	53	52	89	89	106	139
USSR	-	-	-	-	1	-	-	-	-	-	-
Total	3 352	4 284	5 165	5 060	3 716	4 063	3 484	2 904	3 313	3 489	3 875
Total figures used by Working Group for stock assessment:	3 583	4 232	5 119	5 060	3 715	4 063	3 473	2 904	3 231	3 428	3 853

* Preliminary

Table 62.A PLAICE in Divisions VIIf and VIIg. Nominal catches (tonnes) 1970-80.
(Data provided by Working Group members)

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*)
Belgium	369	326	217	309	270	195	307	214	196	171	365
France	165	213	320	185	218	413	360	365	527	467	706
Ireland	19	74	46	39	20	50	49	28		49	63
Netherlands	-	-	-	16	-	2	-	-	-	-	-
UK (England + Wales)	552	568	413	398	214	227	153	150	152	176	278
USSR	-	-	-	4	-	1	-	-	-	-	-
Total	1 105	1 181	996	951	722	888	869	757	918	863	1 412

*) Preliminary

Table 62.B

Division	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*)
VIIg	276	434	372	408	358	419	555	424	528	478	782
VIIIf	829	747	624	539	364	468	314	333	392	385	630
VIIIf + g	1 105	1 181	996	947	722	887	869	757	920	863	1 412

*) Preliminary

Table 63. Irish Sea SOLE. Nominal catches (tonnes) 1970 - 1980
(Data for 1970-1979 as officially reported to ICES)

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*
Belgium	1 142	883	561	793	664	805	674	566	453	779	992
France	115	45	38	12	54	59	72	39	65	48	42
Ireland	25	45	50	27	28	24	74	84	127	134	159
Netherlands	235	552	514	281	320	234	381	227	177	280	176
UK (Engl. & Wales)	267	316	238	258	218	281	195	160	189	290	367
UK (N. Ireland)	24	40	40	46	23	24	49	49	57	47	44
UK (Scotland)	1	1	9	11	...	15	18	21	30	42	66
UK (Isle of Man)	...	...	...	...	...	...	...	...	...	30	20
Total	1 809	1 882	1 450	1 428	1 307	1 442	1 463	1 146	1 098	1 650	1 866

*) Preliminary

Table 64.A Celtic Sea SOLE (Divisions VIIg and VIIf). Nominal catch (tonnes) 1970-80 by country.

(Data provided by Working Group members)

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*)
Belgium	1 003	989	546	822	914	663	1 054	779	506	693	985
France	386	731	587	435	75	133	181	80	160	153	140
Ireland	4	6	4	2	2	5	10	2	2	7	14
Netherlands	-	-	7	4	15	2	7	7	-	-	-
UK (Engl. & Wales)	164	135	134	128	99	116	99	93	112	101	144
Total	1 557	1 861	1 278	1 391	1 105	919	1 351	961	780	954	1 283

*) Preliminary

Table 64.B Total nominal catch of SOLE (tonnes) in Divisions VIIg and VIIf for 1970- 1980

Division	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*)
VIIg	727	1 095	730	613	442	354	831	595	436	530	656
VIIIf	830	766	548	778	663	565	520	366	344	424	627
VIIIf + VIIg	1 557	1 861	1 278	1 391	1 105	919	1 351	961	780	954	1 283

*) Preliminary

Table 65. Nominal catch (tonnes) of COD in Divisions VIIIf and VIIg 1971-1980.

(Data provided by Working Group members)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*
Belgium	807	394	524	197	377	226	107	88	110	171
France	3 330	2 814	2 229	1 770	2 472	3 351	2 088	2 567	3 244	4 923
Ireland	28	27	64	24	15	13	17	30	72	245
Netherlands	-	-	-	-	-	-	-	-	-	-
UK (Engl. & Wales)	298	328	196	153	127	92	59	67	81	152
USSR		61	30		30	1	-	-	-	-
Total	4 463	3 624	3 043	2 144	3 021	3 683	2 271	2 752	3 507	5 491

* Preliminary

Table 66. Norway POUT. Annual landings (in thousand tonnes). North Sea 1971-80.
(Data provided by Working Group members and from Bull.Stat.)

	Denmark	Faroese	Norway	Sweden	U.K.	Others	Total
1971	178.5	47.2	79.3		0.1	0.2	305.3
72	259.6	56.8	120.5	6.8	0.9	0.2	444.8
73	215.2	51.2	63.0	2.9	13.0	0.6	345.9
74	464.5	85.0	154.2	2.1	26.7	3.3	735.8
1975	251.2	63.6	218.9	2.3	22.7	1.0	559.7
76	244.9	64.6	108.9	+	17.3	1.7	435.4
77	232.2	50.9 ^{xx})	98.3	2.9	4.6	1.0	389.9
78	163.4	19.7	80.8	0.7	5.5	-	270.1
79	219.9	21.9	127.6	-	3.0	-	372.4
1980 ^{x)}	366.2	36.2 ^{xx})	123.2	-	0.6	-	526.2

x) Preliminary figures

xx) Including Div. VIa.

Table 67. SANDEELS. Annual landings (in thousand tonnes). North Sea 1971-80.
(Data provided by Working Group members and from Bull.Stat.)

	Denmark	Germany, Fed.Rep.	Faroese	Norway	Sweden	U.K.	Total
1971	371.6	0.1	0	2.1	0	8.3	382.1
72	329.0	+	0	18.6	8.8	2.1	358.5
73	273.0	0	1.4	17.2	1.1	4.2	296.9
74	424.1	0	6.4	78.6	0.2	15.5	524.8
1975	355.6	0	4.9	54.0	0.1	13.6	428.2
76	424.7	0	-	44.2	-	18.7	487.6
77	664.3	0	11.4	78.7	5.7	25.5	785.6
78	647.5	0	12.1	93.5	1.2	32.5	786.8
79	449.8	0	13.2	101.1	-	13.4	577.5
1980 ^{x)}	542.2	0	9.2	144.7	-	33.3	729.4

x) Preliminary figure

Table 68. Nominal catch (tonnes) of MACKEREL in the North Sea, Skagerrak and Kattegat (IV and IIIa) 1970 - 1980.
(Data for 1970-1979 as officially reported to ICES).

Country \ Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*
Belgium	19	85	129	78	145	134	292	49	10	-	-
Denmark	26 753	17 950	2 023	7 459	3 890	9 836	27 988	21 833	18 068	19 171	18 649
Faroe Islands	2 134	3 603	7 551	11 202	18 625	23 424	63 476	42 836	33 911	28 118	13 393
France	4 677	9 061	6 882	636	2 254	2 749	2 607	2 529	3 452	3 620	1 881
Germany, Dem.Rep.	51	166	346	214	234	141	259	41	233	-	-
Germany, Fed.Rep.	225	407	374	563	270	276	284	-	284	211	56
Iceland	1 492	649	687	3 079	4 689	198	302	-	-	-	-
Netherlands	2 956	4 945	4 436	2 339	3 259	2 390	2 163	2 673	1 065	1 009	1 075
Norway	278 631	200 635	160 141	277 304	248 314	206 871	197 351	180 800	82 959	90 720	44 200
Poland	205	130	244	561	4 520	2 313	2 020	298	-	-	-
Sweden	4 407	3 163	4 748	2 960	3 579	4 789	6 448	4 012	4 501	3 935	1 484
UK (England & Wales)	35	23	32	31	61	33	89	105	142	95	77
UK (Scotland)	148	616	395	2 943	390	578	1 199	1 590	3 704	5 272	7 363
USSR	718	2 600	611	17 150	8 161	9 330	1 231	2 765	488	162	-
Unallocated										** 500	-
Total	322 451	243 673	188 599	326 516	298 391	263 062	305 709	259 531	148 817	152 830	88 178

* Preliminary.

** Working Group estimate.

Note: In contrast to the corresponding tables in previous years' ACFM reports, the catches do not include catches taken in Sub-area IIA (see Table 69).

Table 69. Nominal catches (tonnes) of MACKEREL in the Norwegian Sea (Division IIa) 1970-1980.

Country \ Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ³⁾
Faroe Islands ¹⁾	-	-	-	-	-	-	-	-	283	6	795
France ²⁾	-	42	-	-	-	7	8	-	2	-	-
Germany, Dem.Rep. ²⁾	-	-	-	-	11	-	-	-	-	-	-
Germany, Fed.Rep. ²⁾	-	-	-	-	-	-	-	-	53	174	-
Netherlands ²⁾	-	-	-	-	-	-	2	-	-	-	-
Norway ¹⁾	140	316	88	21 573	6 818	34 662	10 516	1 400	3 867	6 887	6 200
UK (England & Wales) ²⁾	-	-	-	-	+	+	+	+	1	-	-
USSR ²⁾	23	-	-	-	-	-	-	-	-	5	844
Total	163	358	88	21 573	6 829	34 669	10 526	1 400	4 206	7 072	7 839

1) Data provided by Working Group members

2) Data reported to ICES

3) Preliminary

Table 70. Nominal catch (tonnes) of MACKEREL in the Western Area (VI, VII, and VIII)
(Data for 1970-77 as officially reported to ICES).

Country \ Year	1970	1971	1972	1973	1974	1975	1976	1977	1978**	1979**	1980*
Belgium	8	2	1	3	7	17	10	1	1	3	-
Denmark	-	-	-	-	-	-	3	698	8 677	8 535	14 932
Faroe Islands	-	-	-	635	8 659	1 760	5 539	3 978	15 076	10 609	15 234
France	42 899	33 141	35 354	41 664	37 824	25 818	33 556	35 702	34 860	31 510	23 907
Germany, Dem.Rep.	130	93	214	1 733	2 885	9 693	4 509	431	-	-	-
Germany, Fed.Rep.	783	258	98	559	993	1 941	391	446	28 873	21 493	21 088
Iceland	90	86	74	52	-	21	10	-	-	-	-
Ireland	1 055	3 107	4 592	8 314	8 526	11 567	14 395	23 022	27 508	24 217	40 791
Netherlands	3 828	3 837	6 166	7 785	7 315	13 263	15 007	35 766	50 815	62 396	81 839
Norway	-	1 611	-	34 600	32 597	1 907	4 252	362	1 900	25 414	25 500
Poland	6 054	10 832	13 219	10 536	22 405	21 573	21 375	2 240	-	92	-
Spain	31 368	37 506	31 416	25 677	30 177	23 408	18 480	21 853	19 142	15 556	15 000
Sweden	-	-	-	-	-	-	38	-	-	-	-
UK (England & Wales)	3 374	4 791	6 923	13 081	21 132	31 546	57 311	132 320	213 344	244 293	150 598
UK (N. Ireland)	243	315	57	93	75	30	95	97	46	25	-
UK (Scotland)	807	805	1 412	5 170	8 466	16 174	28 399	52 662	103 671	103 160	108 372
USSR	13 555	36 390	71 249	65 202	103 435	309 666	262 384	16 396	-	-	-
Unallocated	-	-	-	-	-	-	-	-	-	54 000	107 500
Total, ICES members	104 194	132 774	170 775	215 104	284 496	468 384	465 754	325 974	503 913	601 303	604 761
Bulgaria	-	-	-	4 341	13 558	20 830	28 195	-	-	-	-
Rumania	-	-	-	-	-	2 166	13 222	-	-	-	-
Grand Total	104 194	132 774	170 775	219 445	298 054	491 380	507 178	325 974	503 913	601 303	604 761

* Preliminary

** Working Group estimate

Table 71. HORSE MACKEREL in Sub-area VIII. Nominal catch data from Bulletin Statistique.

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{*a)}
Denmark	-	-	-	-	-	-	-	-	-	127	-
France	1 408	1 719	2 436	3 556	2 477	2 386	3 380	4 881	3 643	4 240	-
German Dem. Rep.	-	-	-	-	-	-	14	-	-	-	-
Netherlands	-	-	-	-	-	-	-	-	19	-	-
Spain	93 761	24 671	62 385	90 368	56 583	71 224	91 993	100 757	63 537	39 939	-
U.K. (England & Wales)	-	-	-	-	-	-	-	-	-	22	-
U.S.S.R.	-	-	-	1 120	925	11 436	30 763	15 213	3	-	-
Total	95 169	26 390	64 821	95 044	59 985	85 046	126 150	120 851	67 202	44 328	-

Table 72. HORSE MACKEREL in Sub-area IX. Nominal catch data from Bulletin Statistique.

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ^{*a)}
Poland	-	-	-	-	-	-	-	168	-	-	-
Portugal	60 057	53 707	59 635	42 194	48 111	43 474	48 505	51 269	31 869	26 978	-
Spain	4 657	1 496	2 088	1 518	2 660	1 838	3 220	943	11 724	12 029	-
U.S.S.R.	-	-	-	-	-	422	644	14 898	381	250	-
Total	64 714	55 203	61 723	43 712	50 771	45 734	52 369	67 278	43 974	39 257	-

Table 73. Nominal Hake catches (thousands of tonnes) as reported to ICES by country and area, 1961-1980.

YEARS	TOTAL	FRANCE					PORTUGAL		SPAIN					U.K.			OTHERS		
		TOTAL	IV+VI	VII	VIII	IX	IX	TOTAL	IV+VI	VII	VIII	IX	TOTAL	IV+VI	VII	TOTAL	IV+VI	VII	
1961	(133.4) ¹	35.0 ²	1.5	18.0	12.3	3.1	13.0	(72.4) ¹	.	.	40.6	31.8 ³	11.8	10.5	1.3	1.2	1.0	0.2	
1962	(128.3)	39.5 ²	0.7	19.4	14.8	3.1	6.4	(67.8)	.	.	32.0	35.8 ³	13.7	12.3	1.4	0.9	0.6	0.3	
1963	(132.5)	33.4 ²	1.5	14.9	12.4	3.2	6.9	(79.1)	.	.	39.3	39.8 ³	11.9	10.7	1.2	1.2	1.0	0.2	
1964	(129.7)	30.7 ²	3.2	11.3	13.0	2.9	9.0	(79.8)	.	.	34.0	45.8 ³	9.2	8.7	0.5	1.0	0.8	0.2	
1965	(120.0)	26.2 ²	3.7	11.7	10.7	-	10.4	(74.7)	.	21.0	7.1	46.6 ³	7.7	7.3	0.4	1.0	0.8	0.2	
1966	(106.6)	18.1	3.0	7.6	5.5	2.0	8.3	(73.2)	.	.	27.5	45.7 ³	5.9	5.3	0.6	1.1	0.9	0.2	
1967	(116.5)	25.9	2.9	9.6	11.0	2.4	7.6	(76.7)	.	.	31.6	45.1 ³	4.9	4.1	0.8	1.4	0.9	0.5	
1968	(106.4)	22.5	2.5	7.8	10.2	2.0	7.2	(69.7)	.	.	32.2	37.5 ³	5.4	4.5	0.9	1.6	1.3	0.3	
1969	(99.6)	21.3	2.9	7.9	8.8	1.7	6.6	(65.7)	.	.	27.1	38.6 ³	4.3	3.9	0.4	1.7	0.5	1.2	
1970	(116.4)	25.7	1.5	9.8	12.8	1.5	9.3	(76.1)	.	.	34.3	41.8 ³	3.2	2.7	0.5	2.1	1.9	0.2	
1971	(61.6)	23.6	0.8	9.1	13.1	0.6	8.0	(24.8)	0.9	7.8	14.0	2.1 ³	2.6	2.2	0.4	2.6	2.1	0.5	
1972	108.8 ⁴	21.8	0.4	8.8	12.6	-	8.7	73.2 ⁴	1.1	4.8	32.4	17.3	2.9	2.4	0.5	2.2	2.2	-	
1973	108.6	24.2	2.2	10.7	11.3	-	15.3	63.0	0.5	4.7	37.0	20.8	2.8	2.2	0.6	3.3	2.9	0.4	
1974	96.5	21.7	2.5	11.8	7.3	0.1	7.8	61.7	7.1	21.9	18.5	14.1	2.7	2.1	0.6	2.6	2.3	0.3	
1975	101.4	22.2	3.2	11.0	7.9	0.1	9.4	63.9	6.4	20.5	18.0	19.0	2.6	2.3	0.3	3.3	2.4	0.9	
1976	90.7	19.1	3.8	10.4	4.8	0.1	7.9	58.8	4.1	20.8	20.2	13.7	2.3	1.7	0.6	2.6	1.8	0.8	
1977	64.9	15.3	2.6	6.1	6.6	-	5.5	41.0	1.6	5.3	16.6	17.5	1.9	1.6	0.3	1.2	0.8	0.3	
1978	49.6	18.4	2.2	7.3	8.8	-	4.4	21.7	1.3	5.0	6.6	8.8	2.0	1.6	0.3	3.1	.	.	
1979	62.8	22.4	2.5	9.2	10.7	-	5.3	32.0	1.1	6.1	16.7	8.1	1.7	1.5	0.2	1.4	1.0	0.4	
1980 ⁵	62.0	24.4	2.8	5.5	13.1	-	8.3	26.4	1.1	3.3	8.4	13.6	2.3	1.8	0.5	0.6	0.4	0.2	

¹Numbers in brackets include unknown African catches for Spain (see footnote 3)

²Includes small amounts unreported by area.

³Data refer to port of landing, not area of capture (includes African catches).

⁴Includes 17.6 thousand tonnes for Spain which were not reported by area

⁵Preliminary; not reported to ICES.

Table 74. Revised catches (thousands of tonnes) for the Northern Hake stock (Divisions IVa and VIa, Sub-area VII and Divisions VIII a and b) by country and area determined by the Hake Working Group, 1961-80.

YEARS	TOTAL	FRANCE				SPAIN				U.K.			OTHERS		
		TOTAL	IVa+VIa	VII	VIIIa,b	TOTAL	IVa+VIa	VII	VIIIa,b	TOTAL	IVa+VIa	VII	TOTAL	IVa+VIa	VII
1961	95.6	42.0	5.3	20.7	16.0	40.6	.	.	40.6	11.8	10.5	1.3	1.2	1.0	0.2
1962	86.3	39.7	4.9	19.3	15.5	32.0	.	.	32.0	13.7	12.3	1.4	0.9	0.6	0.3
1963	86.2	33.8	4.0	16.2	13.6	39.3	.	.	39.3	11.9	10.7	1.2	1.2	1.0	0.2
1964	76.8	32.6	4.6	15.2	12.8	34.0	.	.	34.0	9.2	8.7	0.5	1.0	0.8	0.2
1965	64.7	27.9	3.3	13.0	11.6	28.1	.	21.0	7.1	7.7	7.3	0.4	1.0	0.8	0.2
1966	60.9	26.4	3.2	13.0	10.2	27.5	.	.	27.5	5.9	5.3	0.6	1.1	0.9	0.2
1967	62.1	24.2	3.2	9.9	11.1	31.6	.	.	31.6	4.9	4.1	0.8	1.4	0.9	0.5
1968	62.0	22.8	2.5	9.2	11.1	32.2	.	.	32.2	5.4	4.5	0.9	1.6	1.3	0.3
1969	54.9	21.8	3.5	10.9	7.4	27.1	.	.	27.1	4.3	3.9	0.4	1.7	0.5	1.2
1970	64.9	25.3	4.3	11.5	9.5	34.3	.	.	34.3	3.2	2.7	0.5	2.1	1.9	0.2
1971	51.3	23.4	3.3	10.7	9.4	22.7	0.9	7.8	14.0	2.6	2.2	0.4	2.6	2.1	0.5
1972	65.5	22.1	3.7	9.6	8.8	38.3	1.1	4.8	32.4	2.9	2.4	0.5	2.2	2.2	.
1973	79.5	24.0	3.2	12.3	8.5	49.4	2.4	17.9	29.1	2.8	2.2	0.6	3.3	2.9	0.4
1974	74.2	21.3	2.8	11.9	6.6	47.6	3.6	16.1	27.9	2.7	2.1	0.6	2.6	2.3	0.3
1975	74.5	22.2	3.3	12.1	6.8	46.4	4.9	15.8	25.7	2.6	2.3	0.3	3.3	2.4	0.9
1976	67.3	18.3	3.8	10.3	4.2	44.1	4.2	15.6	24.3	2.3	1.7	0.6	2.6	1.8	0.8
1977	51.2	17.2	2.8	7.6	6.8	31.0	1.6	13.0	16.4	1.9	1.6	0.3	1.1	0.8	0.3
1978	47.6	17.4	2.2	7.3	7.9	27.4	1.4	12.4	13.6	2.0	1.6	0.3	0.8	0.5	0.3
1979	52.1	20.5	2.5	7.1	10.9	29.2	2.4	11.6	15.2	1.7	1.5	0.2	0.7	0.3	0.4
1980 ²	53.1	24.4	2.8	8.5	13.1	25.6	2.2	6.6	16.8	2.3	1.8	0.5	0.8	0.3	0.5

1) Data for 1961-1972 not revised; revised figures for Sub-area VIII for 1973-1978 include data for VIIIa+b only.

2) Preliminary.

Table 75. Revised catches (thousand of tonnes) for the Southern hake stock (ICES Divisions VIIIc and IXa) by country and area adopted by the Working Group

Year	Total	Portugal (IXa)			Spain (IXa + VIIIc)			France (Divs. VIIIc and IXa)
		Total	Trawl	Artisanal*	Total	Trawl	Artisanal*	
1961	**	7.5	4.6	2.9	**	**	**	0.7
1962	**	7.5	5.1	2.4	**	**	**	0.7
1963	**	8.1	5.5	2.6	**	**	**	0.6
1964	**	10.5	6.4	4.1	**	**	**	0.7
1965	**	12.1	7.9	4.2	**	**	**	0.8
1966	**	9.6	5.4	4.2	**	**	**	0.6
1967	**	7.8	4.0	3.8	**	**	**	0.6
1968	**	8.0	3.8	4.2	**	**	**	0.4
1969	**	7.1	2.8	4.3	**	**	**	0.5
1970	**	9.9	5.8	4.1	**	**	**	0.2
1971	**	9.5	4.9	4.6	**	**	**	0.1
1972	26.7	9.4	4.4	5.0	17.3	10.2	7.1	0.0
1973	35.6	14.6	7.7	6.9	20.8	12.3	8.5	0.2
1974	23.4	9.2	3.8	5.4	14.1	**	**	0.1
1975	31.9	11.0	4.6	6.4	20.8	**	**	0.1
1976	26.1	9.6	3.3	6.3	16.4	**	**	0.1
1977	15.8	6.4	1.7	4.7	9.2	**	**	0.2
1978	14.8	5.2	1.5	3.7	9.5	5.9	3.6	0.1
1979	17.5	6.2	2.0	4.2	11.3	7.2	4.1	0.0
1980	21.9	8.3	2.4	5.9	13.6	6.3	7.3	0.0

* Gillnets and longlines

** Unknown

Table 76. Landings of BLUE WHITING from the main fisheries 1970-80 (thousand tonnes).
(Data provided by Working Group members and from Bulletin Statistique)

Area	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*
"Norwegian Sea" Fishery (Sub-Areas I+II and Divisions Va, XIVa + XIVb)	14 807	35 219	625	878	146	6 746	3 436	57 250	236 124	737 546	767 224
Spawning Fishery, (Divisions Vb, VIa, VVb and VIIb,c)	354	18 394	15 396	15 027	15 207	30 335	81 200	135 364	227 382	287 674	257 944
Icelandic Industrial Fishery (Division Va)			12	2 833	4 230	1 294	8 220	5 838	9 484	2 500	-
Industrial Mixed Fishery (Divisions IVa-c, IIIa)	-	600	27 959	56 826	62 197	39 765	28 251	37 945	97 145	62 623	81 815
Southern Fishery (Sub-areas VIII+IX, Divisions VIIId, e + VIIg-k)	22 788	21 386	33 503	27 452	25 733	31 715	35 035	30 264	32 974	26 215	29 944
Total	37 949	75 599	77 495	103 016	107 513	109 855	156 142	266 661	603 109	1 116 558	1 136 927

* Preliminary.

Table 77. Landings (tonnes) of BLUE WHITING from the "Norwegian Sea" (Sub-areas I and II, Divisions Va, XIVa and XIVb) fisheries 1970-80.

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ¹⁾
Faroes	-	-	-	-	-	-	-	593	2810	762	482
German Dem. Rep.	-	-	3	-	-	-	90	2031	7301	22502	14294
Germany, Fed.Rep. 2)	-	-	-	3	2	35	33	7028	9319	1157	9079
Iceland	-	-	622	60	119	3	569	4768	17756	12428	4562
Norway	-	-	-	-	20	31	837	-	-	30060 ³⁾	626
Poland	-	-	-	-	-	-	95	1536	5083	4346	11307
UK, (England & Wales)	-	-	-	-	-	-	60	165	11	-	-
UK (Scotland)	-	-	-	-	-	-	-	-	-	32	-
USSR	14807	35219	-	815	5	6677	1752	41129	193844	666259	726874
Total	14807	35219	625	878	146	6746	3436	57250	236124	737546	767224

1) Preliminary

2) Including catches off the south-east coast of East Greenland (Division XIVb).
(327 t in 1977, 897 t in 1978, 204 t in 1979 and 8784 t in 1980).

3) Including purse seine catches of 29162 tonnes of juvenile Blue Whiting.

Table 78. Landings (t) of the blue whiting from the Spawning Fishery
(Divisions Vb, VIa, b, and VIIb, c.) 1970-80.

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ¹⁾
Denmark	-	-	-	-	-	-	-	18745	23498	21200	19242
Faroes	-	-	-	1155	1527	-	12826	29096	39491	38907	35082
German Dem. Rep.	-	-	-	-	-	-	4971	1094	1714	172	181
Germany, Fed. Rep.	-	-	-	-	2655	-	85	3260	6363	3304	633
Iceland	-	-	-	319	-	-	-	5172	7537	4864	5375
Ireland	-	-	-	-	-	-	160	-	-	-	-
Netherlands	-	-	-	-	-	-	-	-	1172	154	-
Norway	-	-	651	2445	3247	7301	24691	36791	114969	186737	143697
Poland	-	-	-	-	116	4704	10950	3996	2469	4643	-
Spain	-	-	6955	6571	6484	8153	5910	183	14	-	-
Sweden	-	-	-	-	-	-	-	6391	6260	-	3005
UK(England & Wales)	-	-	-	-	-	455	341	1475	5287	4136	3878
UK(Scotland)	-	-	-	-	-	279	1488	3001	1599	1466	6819
USSR	354	18394	7790	4537	1178	9443	19778	26160	17009	22091	40032
Total	354	18394	15396	15027	15207	30335	81200	135364	227382	287674	257944

1) Preliminary.

Table 79. Landings (t) of blue whiting from the Icelandic mixed industrial trawl
fisheries Division Va 1970-80.

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Iceland	-	-	12	2833	4230	1294	8220	5838	9484	2500	-

Table 80. Landings (t) of blue whiting from the Mixed Industrial Fisheries
and caught as by catch in ordinary fisheries in the North Sea
(Divisions IV a-c and IIIa).

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ¹⁾
Denmark	-	-	-	-	-	-	-	16071	54804	28932	48159
Faroes	-	-	-	3714	2610	428	1254	-	1177	1489	1925
German Dem.Rep. ²⁾	-	-	-	-	-	-	-	-	988	49	-
Germany,Fed.Rep. ²⁾	-	-	-	-	-	-	-	76	1514	13	400
Norway	-	-	27609	50835	59151	38020	26827	20293	37260	30220	30428 ³⁾
Poland ²⁾	-	-	-	-	55	-	45	838	601	-	-
Spain ²⁾	-	-	350	350	318	195	47	-	-	-	-
Sweden ⁴⁾	-	-	-	-	-	-	-	639	648	1249	901
UK (England & wales) ²⁾	-	-	-	-	-	-	-	3	+	-	-
UK (Scotland)	-	-	-	-	-	414	58	25	153	37	2
USSR ²⁾	-	600	-	1927	63	708	20	-	-	634	-
Total	-	600	27959	56826	62197	39408	28251	37945	97145	62623	81815

1) Preliminary.

2) Reported landings in human consumption fisheries.

3) Including mixed industrial fishery in the Norwegian Sea.

4) Reported landings assumed to be from human consumption fisheries.

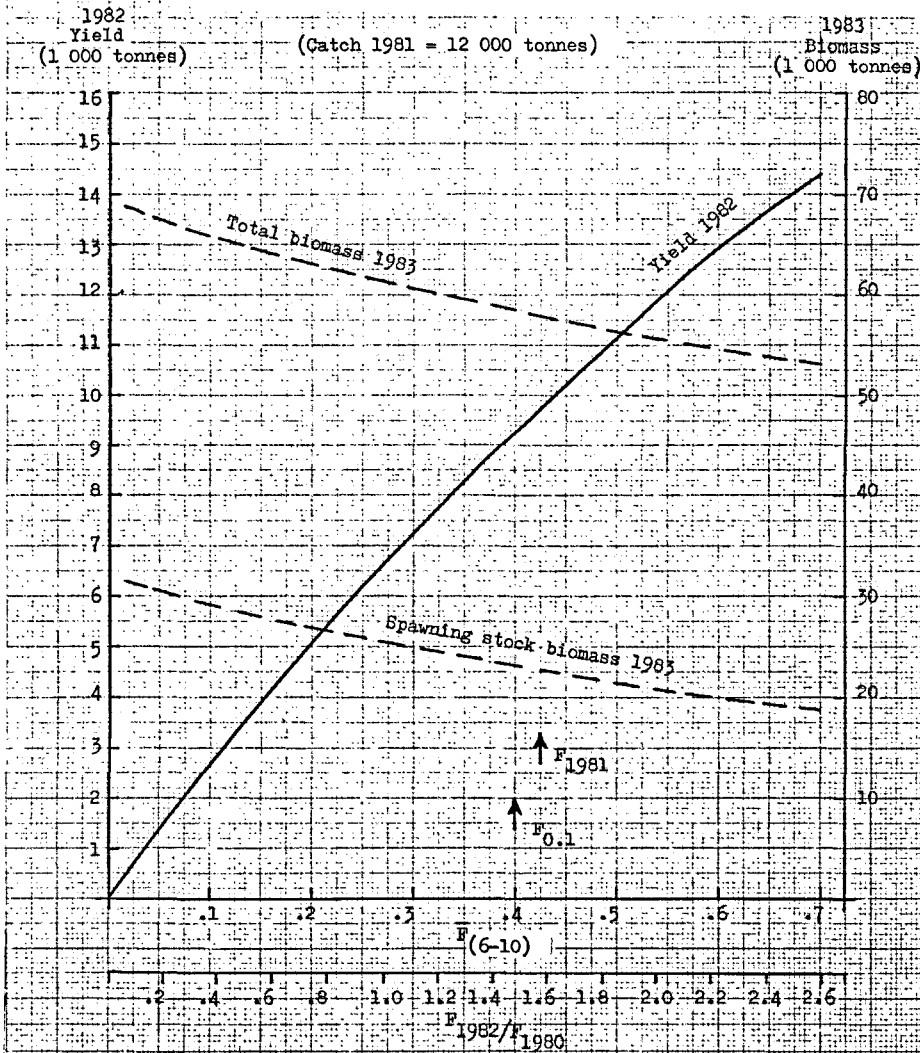
Table 81. Landings (t) of blue whiting from the Southern Areas. (Sub-areas VIII and IX and Divisions VII g-k and VII d, e.)

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 ¹⁾
German, Dem. Rep.	-	78	-	-	-	-	-	-	-	-	-
Germany, Fed. Rep.	-	-	-	-	-	-	-	-	25	-	-
Ireland	-	-	-	-	-	-	-	-	-	1	-
Netherlands	-	-	-	-	-	-	-	-	7	-	31
Poland	-	-	-	-	170	-	385	169	53	-	-
Portugal	-	-	-	-	-	-	-	1557	2381	2096	6051
Spain ²⁾	16360	11800	28090	26741	24627	30790	29470	24800	30504	24055	23862
UK(England & Wales)	-	-	-	-	-	-	-	+	-	-	-
UK(Scotland)	-	-	-	-	-	-	-	-	-	63	-
USSR	6428	9508	5413	711	936	925	5180	3738	4	-	-
Total	22788	21386	33503	27452	25733	31715	35035	30264	32974	26215	29944

1) Preliminary.

2) Significant quantities taken in Division VII g-k not included in the Table are discarded every year.

Figure 1. Cod off East Greenland.
Yield 1982, total biomass and spawning stock biomass at beginning of 1983 for different levels of fishing mortality in 1982.



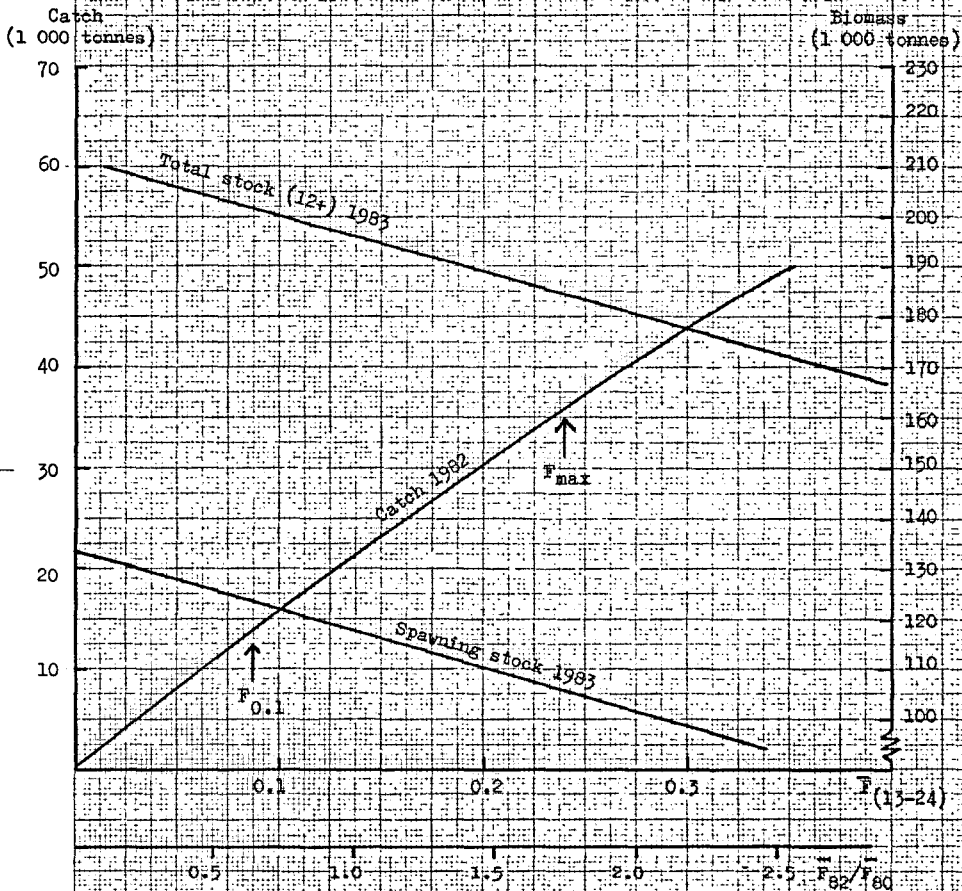


Figure 2. *Sebastes marinus* in Sub-area I and Division IIa.
Predictions for catch in 1982 and stock biomass in 1983.

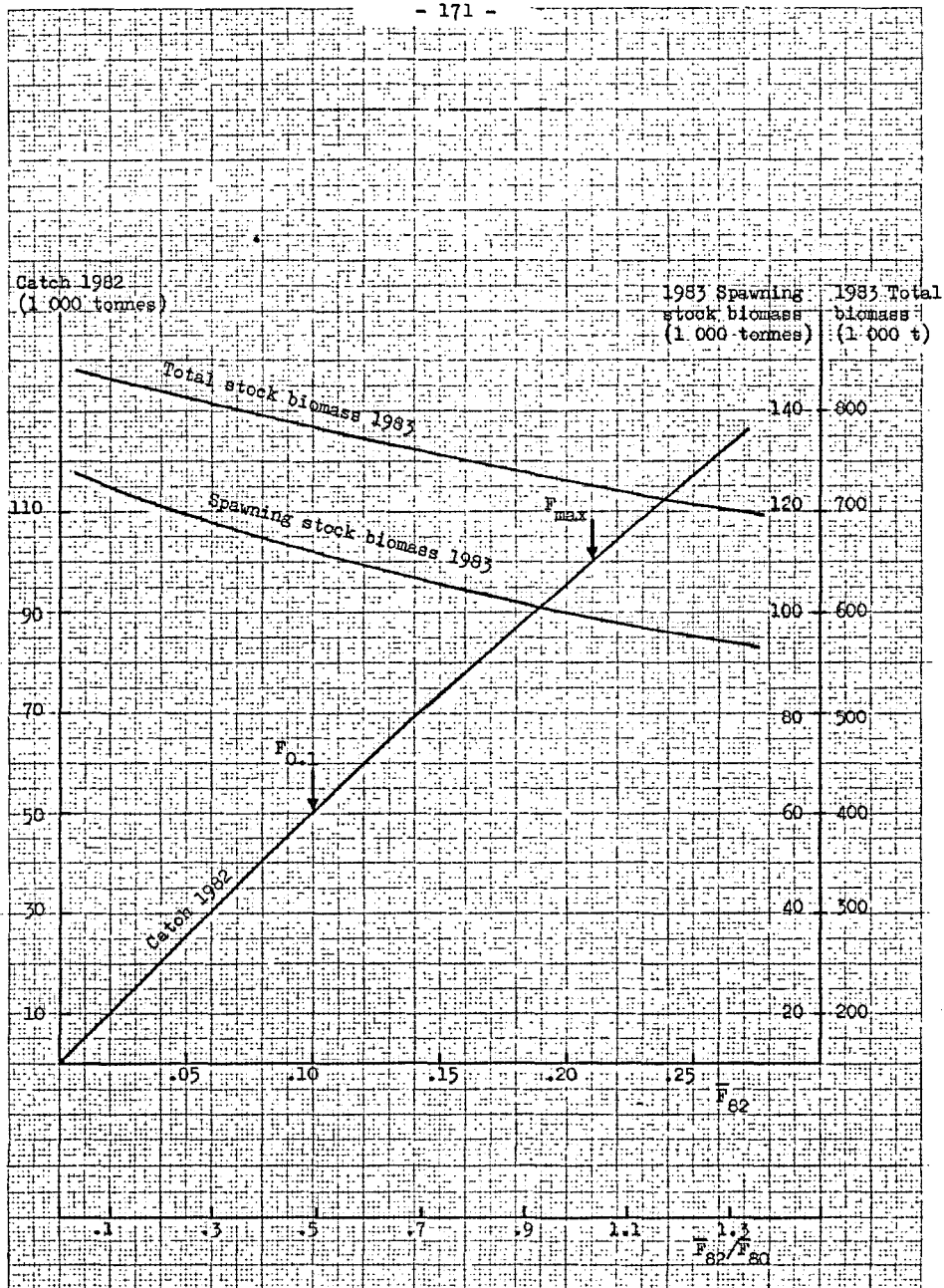


Figure 3. *Sebastes mentella* in Divisions IIA and IIB. Catch in 1982; total biomass (age 6+) and spawning stock biomass (age 15+) at the beginning of 1983 at different levels of $F(8-19)$ in 1982.

Figure 4. *Sebastes marinus* in Sub-areas V + XIV. Predictions for catch in 1982, total biomass and spawning stock biomass at the beginning of 1983 at different levels of fishing mortality in 1982.

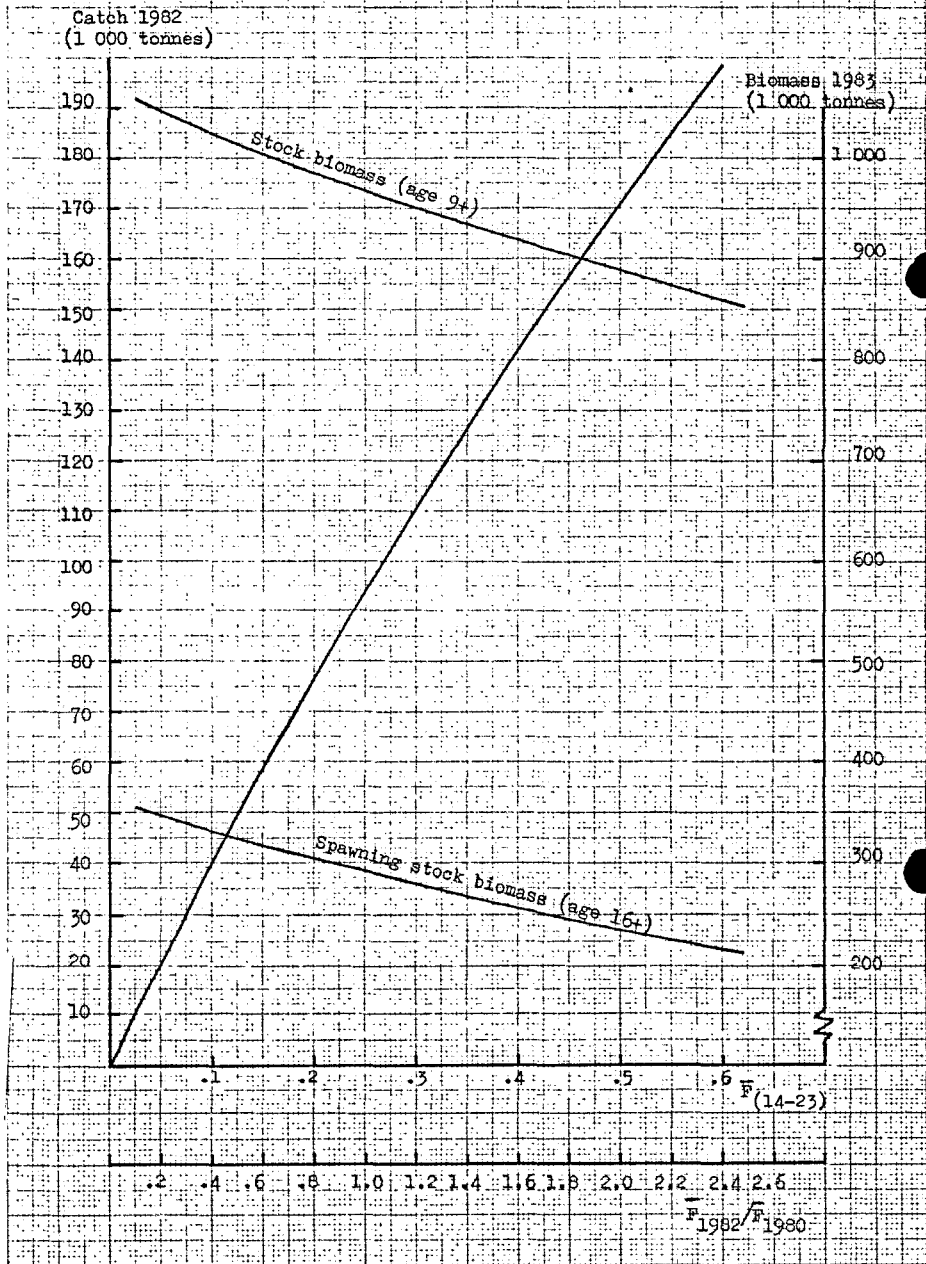


Figure 5. *Sebastes mentella* in Sub-areas V + XIV. Predictions for catch 1982, total biomass and spawning stock biomass at the beginning of 1983 at different levels of F in 1982.

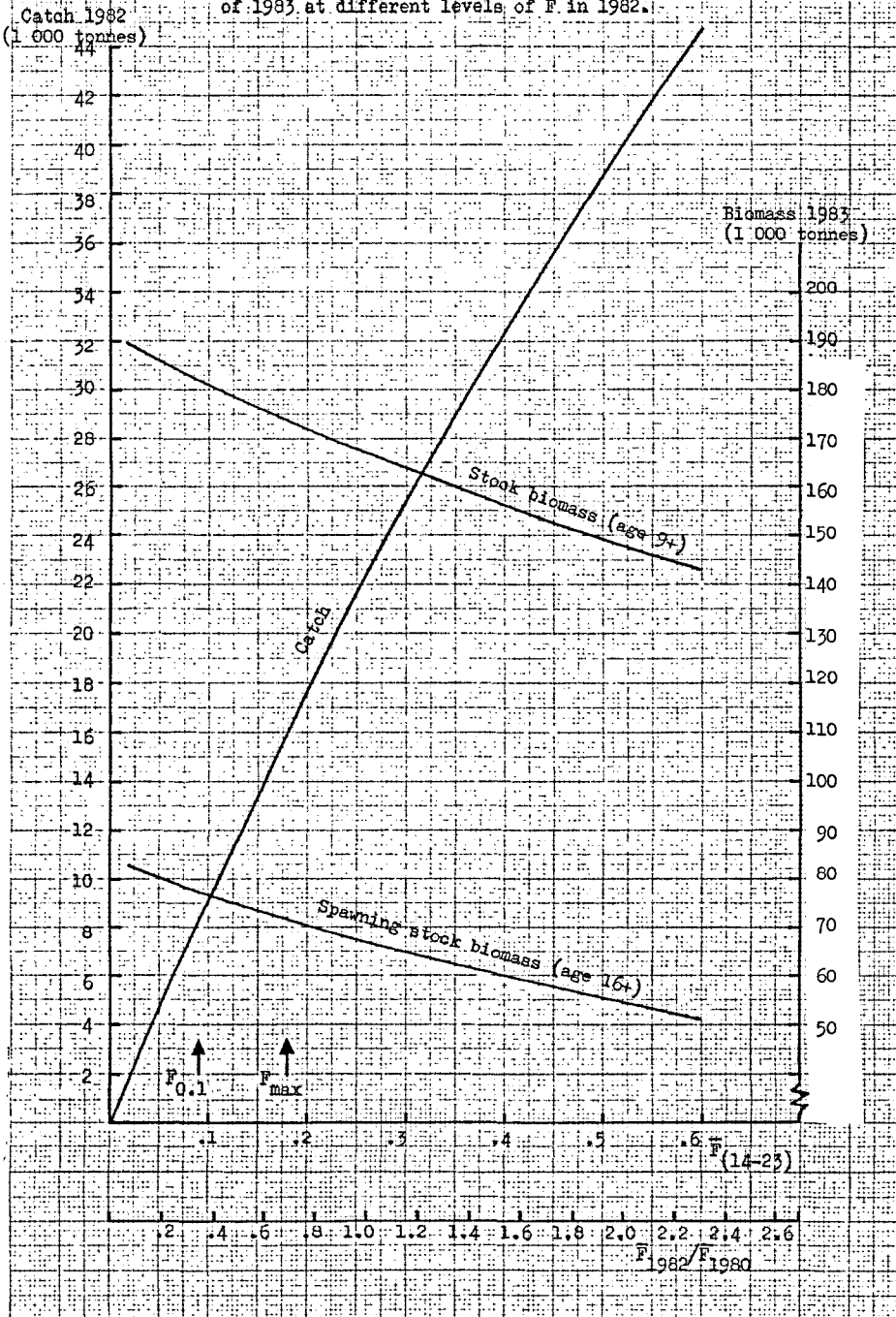


Figure 6. GREENLAND HALIBUT in Sub-areas I and II. Predictions for catch in 1982, and the spawning stock (9+) and the total stock (3+) at the beginning of 1983.

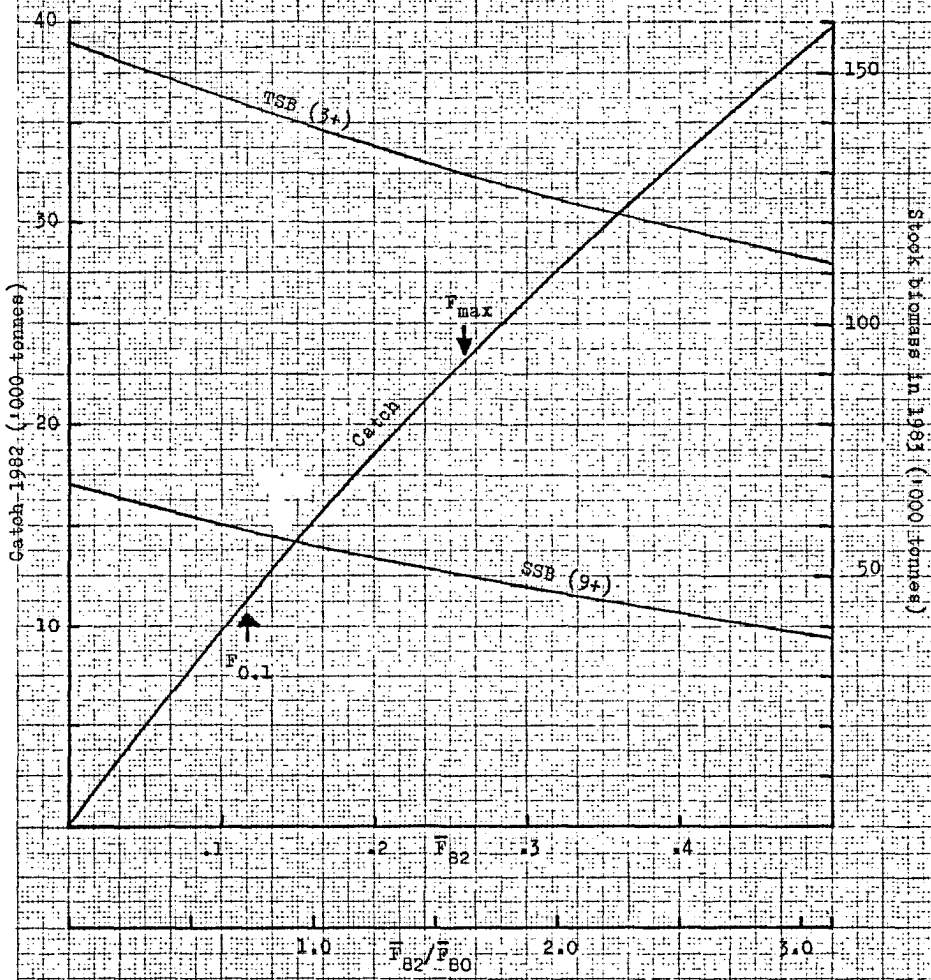
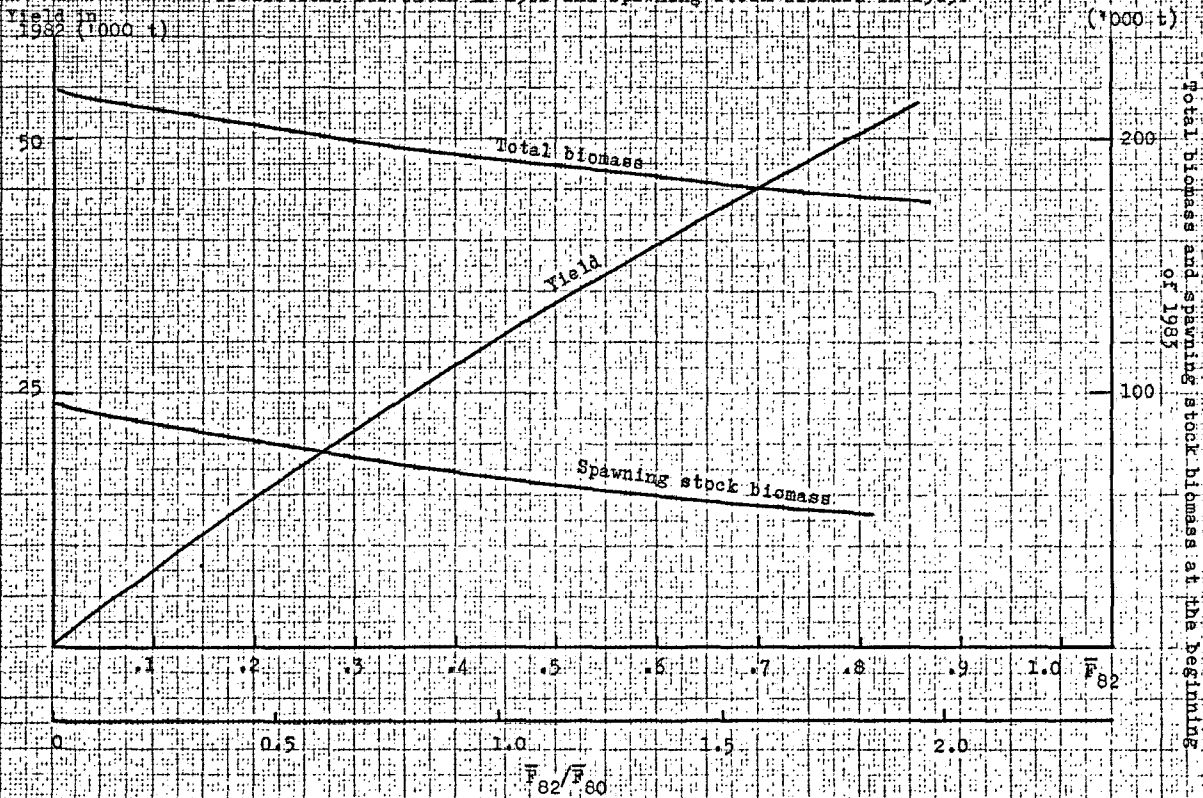


Figure 7. GREENLAND HALIBUT in Sub-areas V and XIV.
 Predictions for catch in 1982 and spawning stock biomass in 1983.



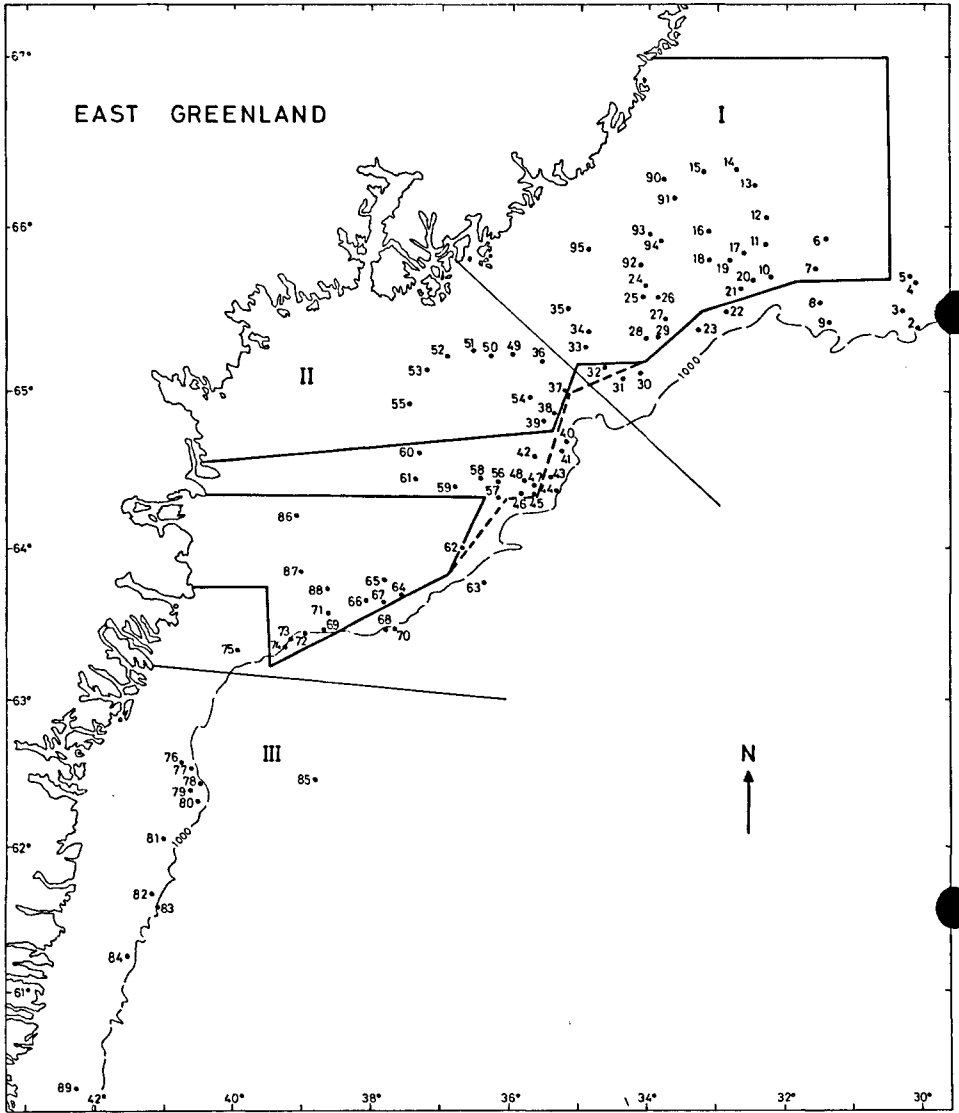


Figure 8. Closed areas for bottom trawl fishing.

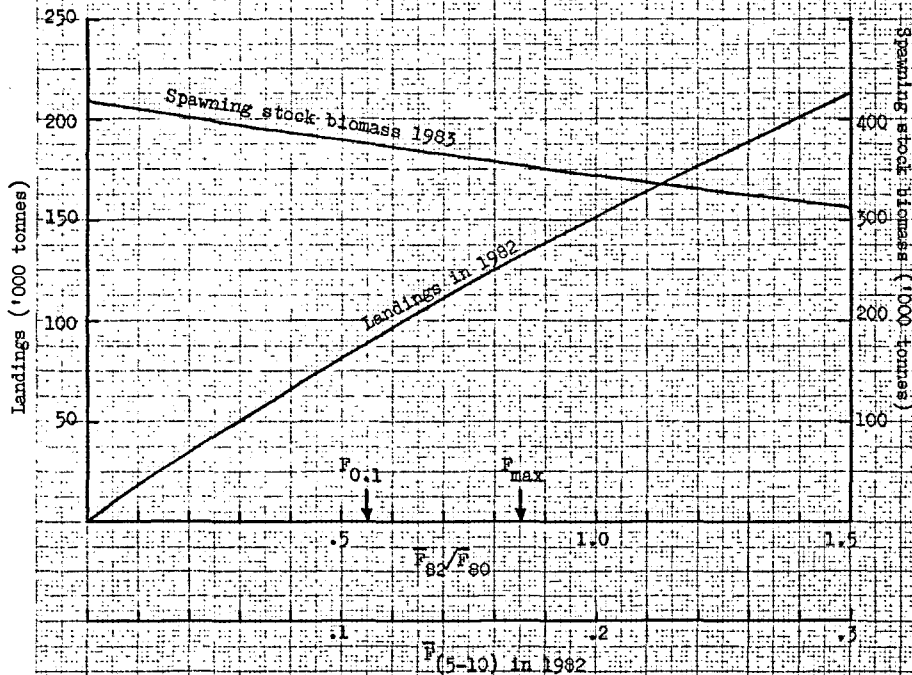


Figure 9. North-East Arctic SAITFB: Predictions for landings in 1982 and spawning stock biomass in 1983.

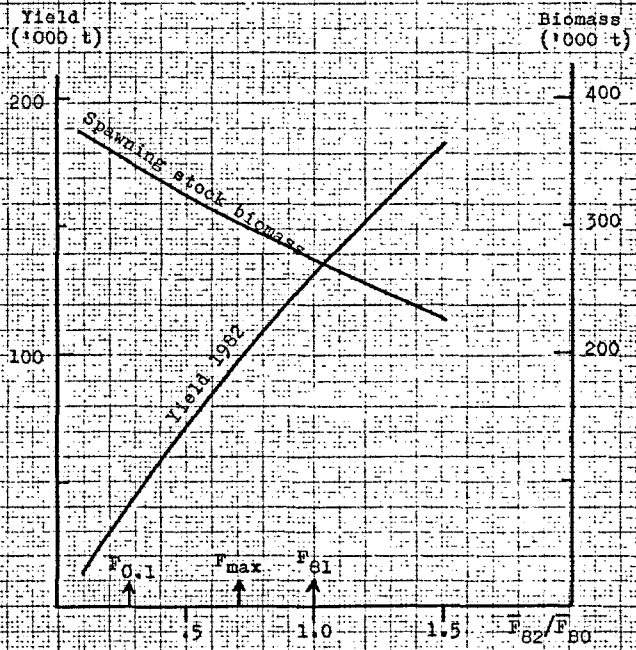


Figure 10. NORTH SEA SAITHE.
Predictions for catches in 1982 and
spawning stock biomass in 1983.

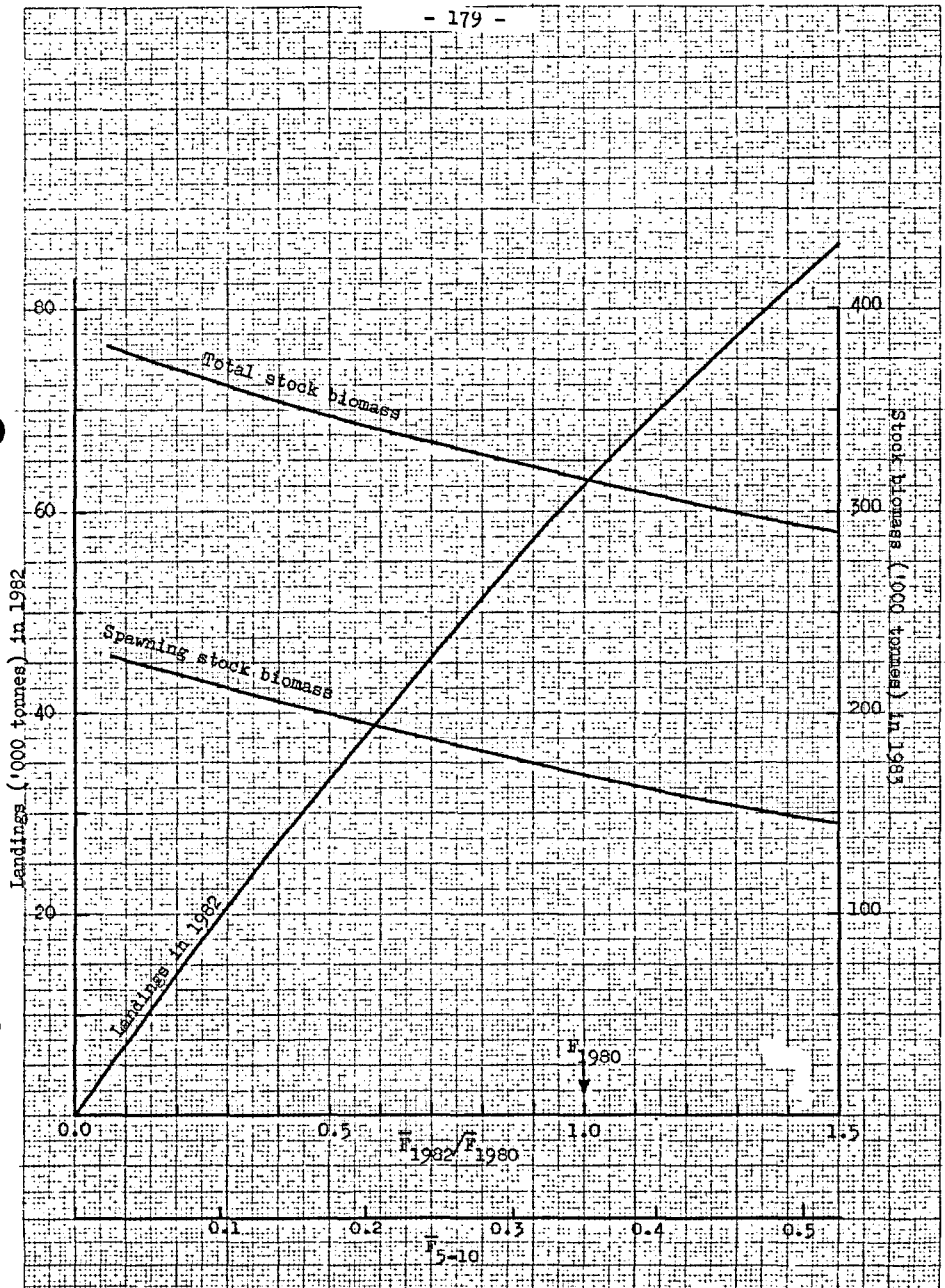


Figure 11. Icelandic SAITH. Predictions for landings in 1982 and spawning and total stock biomass in 1985.

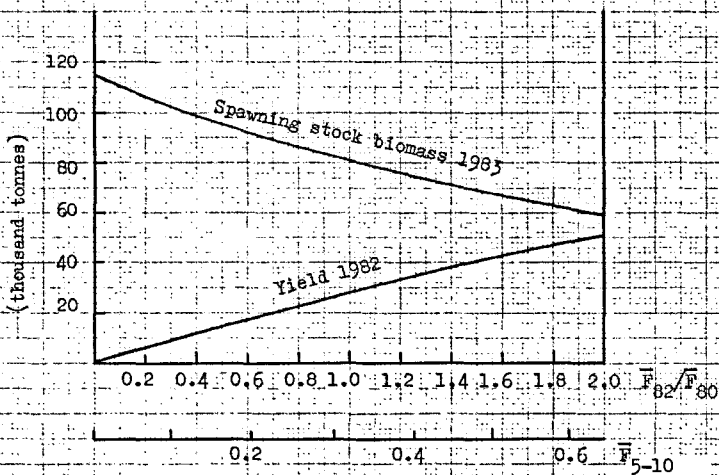


Figure 12. Faroe SAITEE. Predictions for landings in 1982 and spawning stock biomass in 1985.

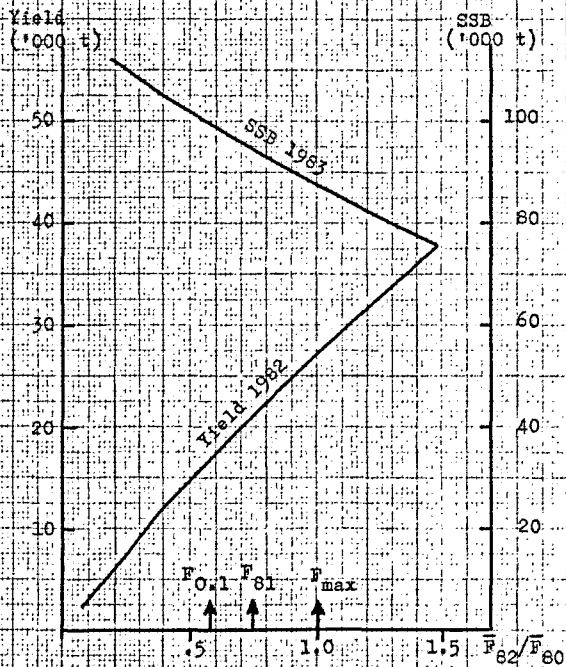


Figure 13. Faroe Plateau COD. Predictions for catch in 1982 and spawning stock biomass in 1983.

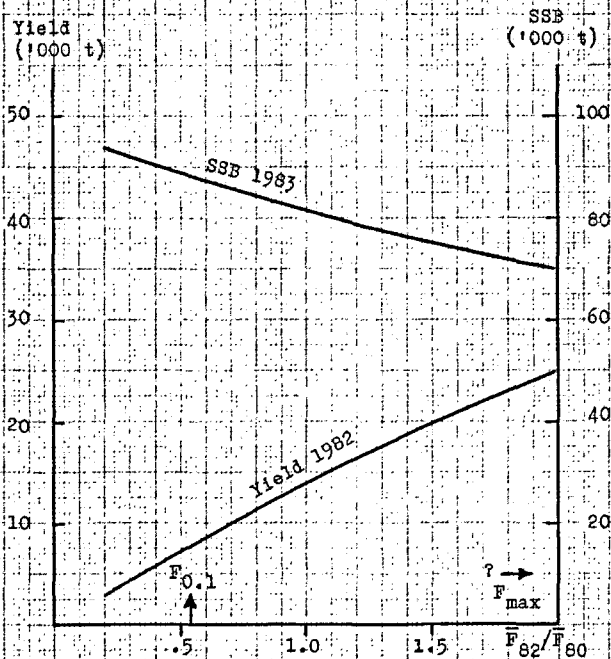


Figure 14. Faroe HANDBOOK. Predictions for catch in 1982 and spawning stock biomass in 1983.

Figure 15. Spawning stock biomass and yield in 1981 for Division
Via HERRING stock at different values of F.

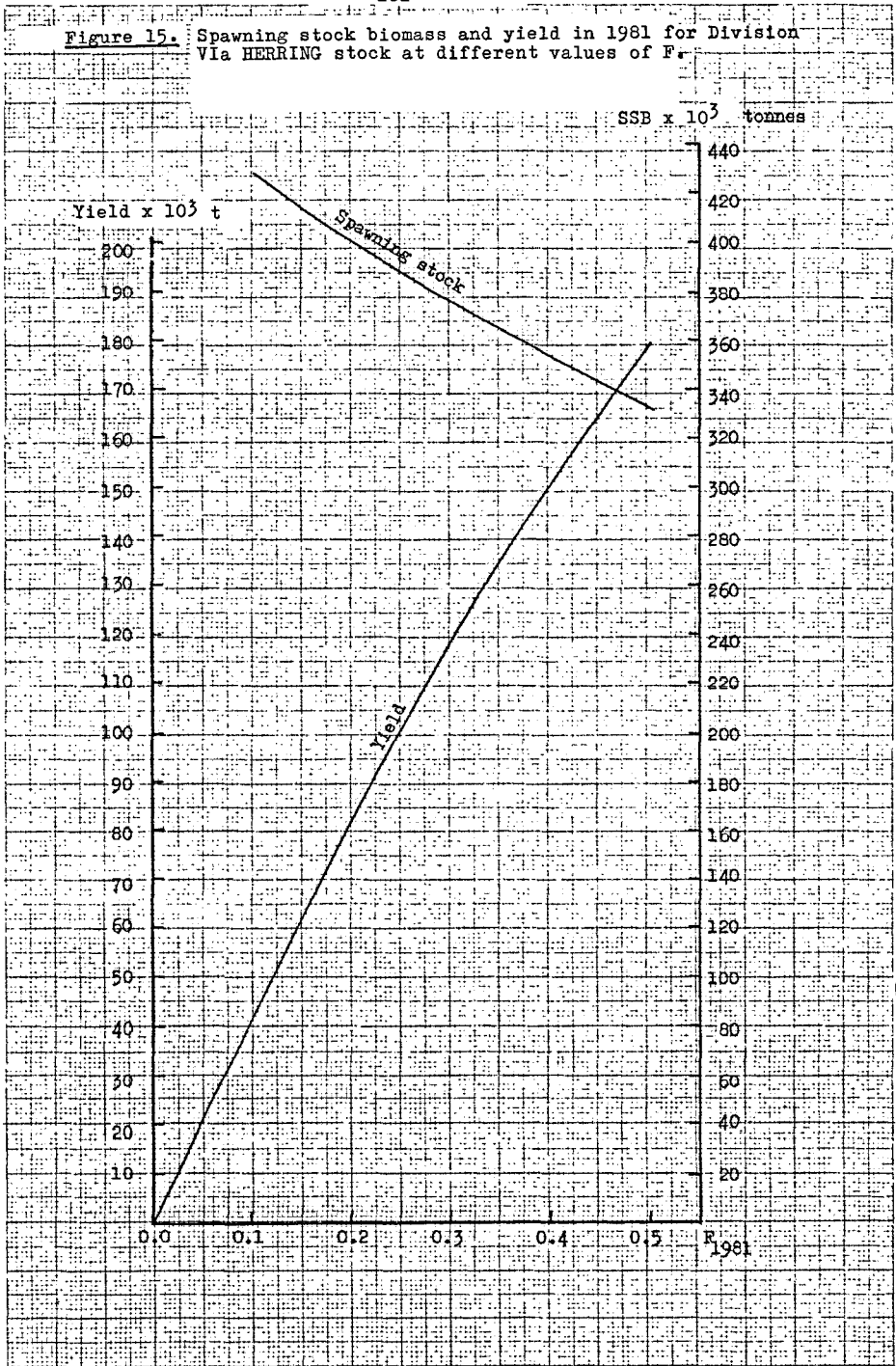


Figure 16. Mawr herring. Catch forecast for 1981 and resulting spawning stock biomass 1981 at spawning time for a range of fishing mortality.

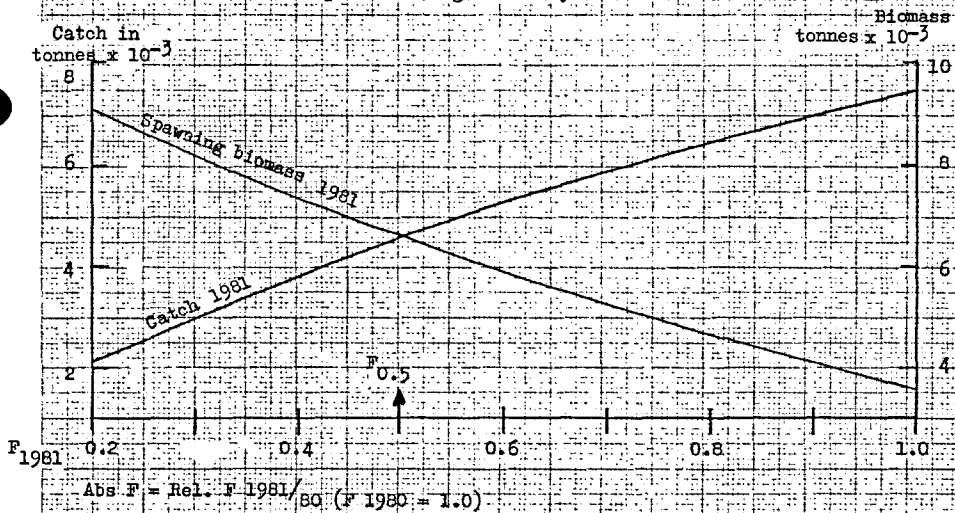
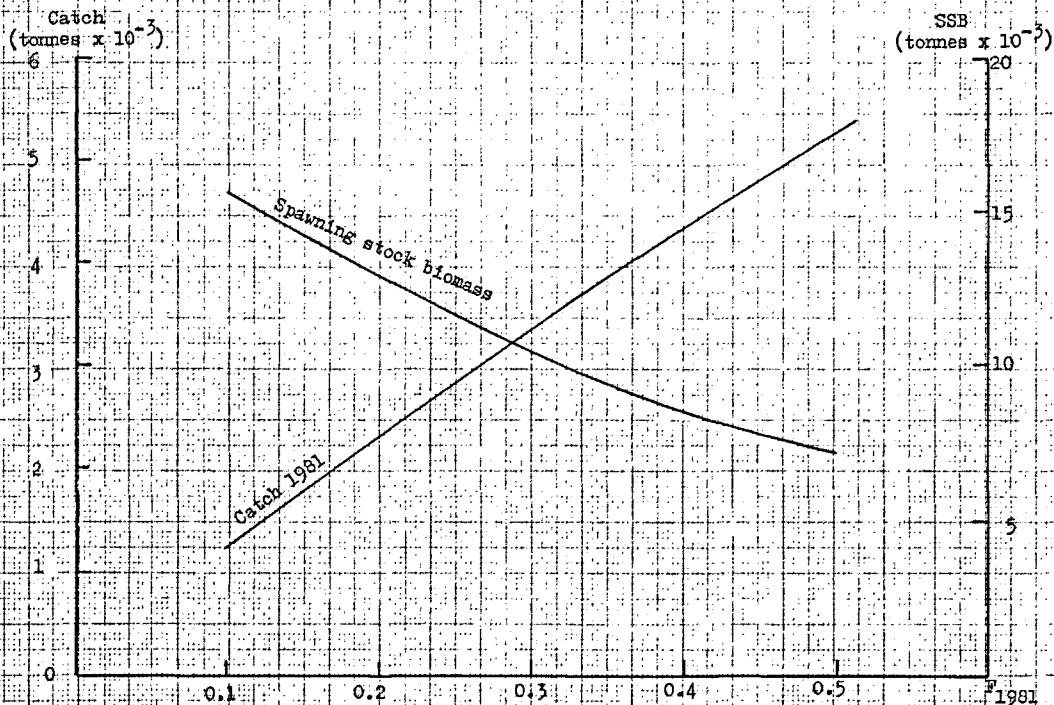


Figure 17. Mourne herring. Catch forecasts for 1981 and resultant stock biomass at time of spawning for a range of fishing mortalities in 1981.



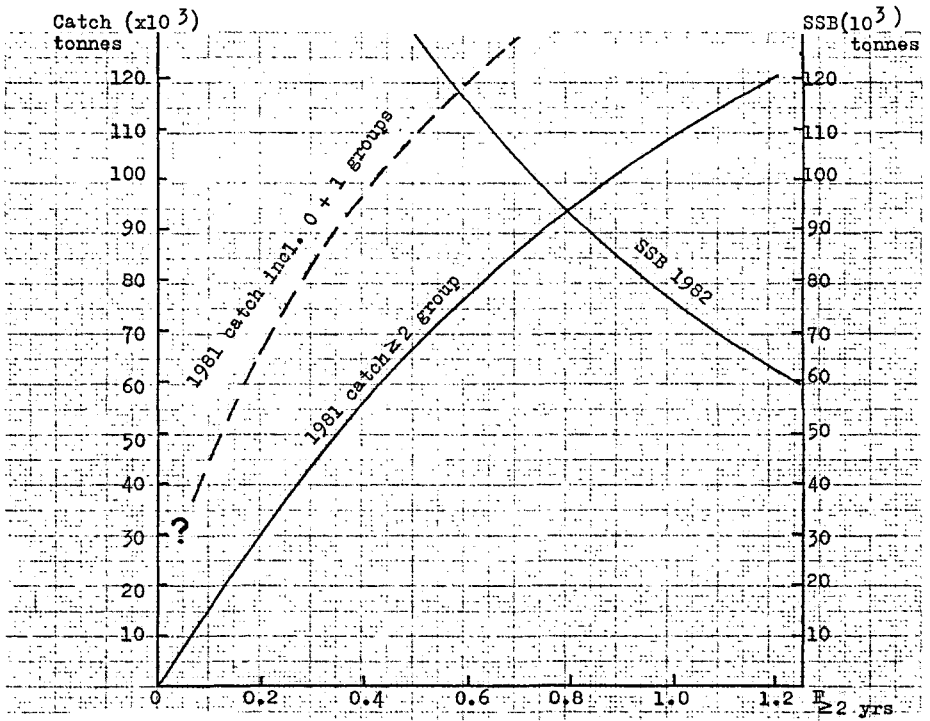


Figure 18. Division IIIa HERRING. Catch in 1981 and spawning stock biomass 1 January 1982 plotted against F (2+) in 1981.

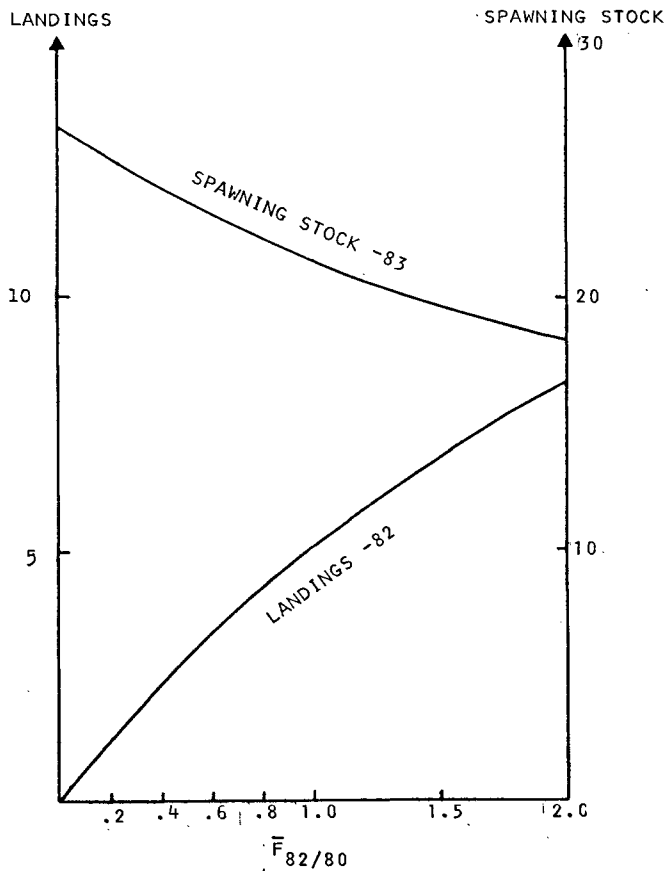


Figure 20. PLAICE in the Kattegat.
Predictions for catch in 1982 and spawning
stock biomass in 1983 (in thousand tonnes).

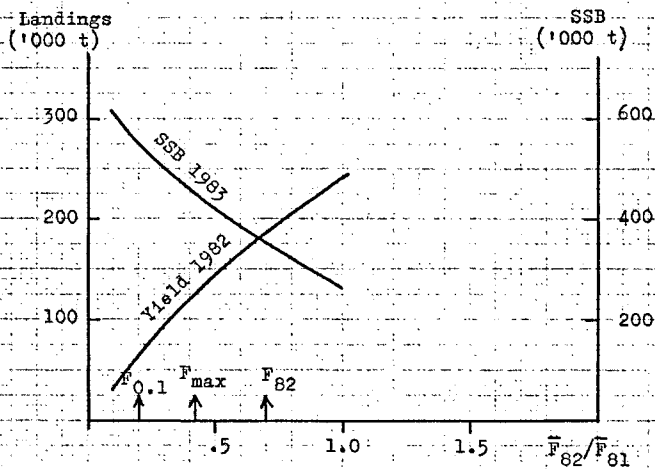


Figure 21. North Sea COD.
Predictions for landings in 1982
and spawning stock biomass in
1983.

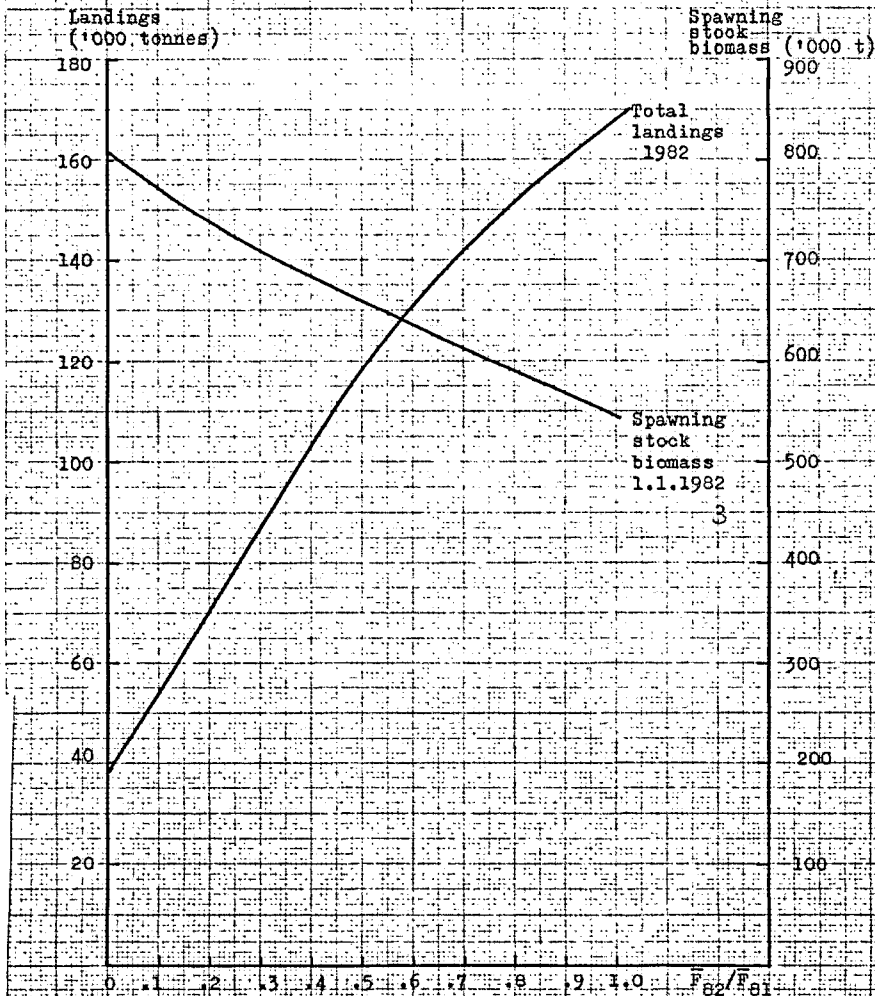


Figure 22. North Sea HADDOCK.
Predictions for landings in 1982 and
spawning stock biomass in 1983.

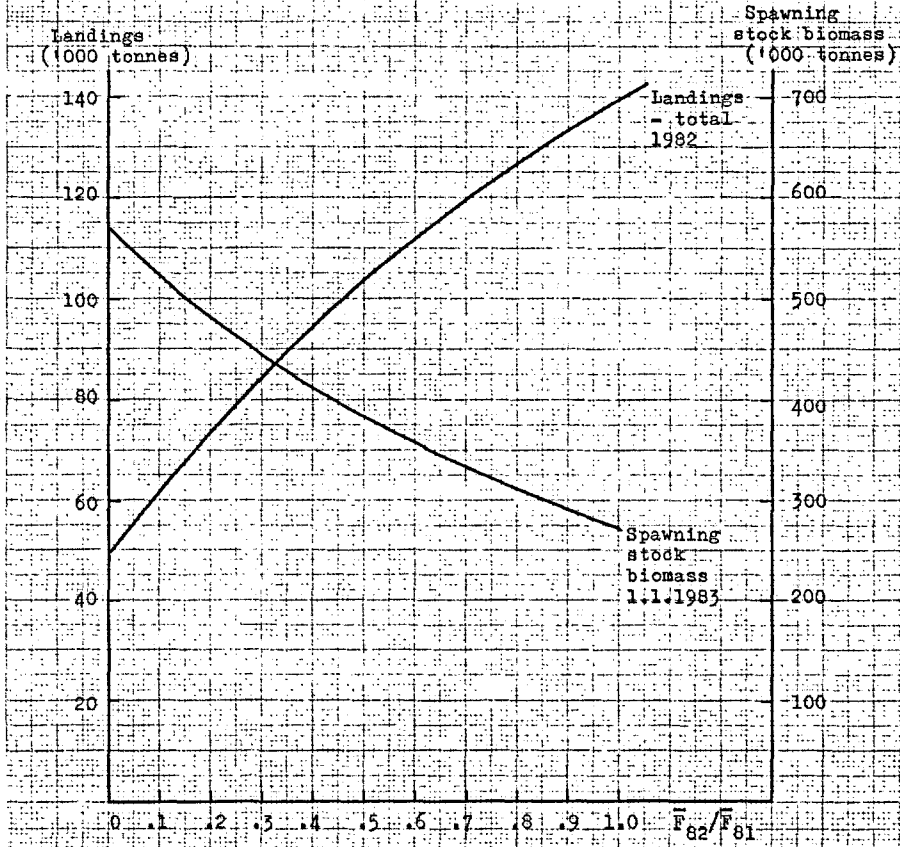


Figure 23. North Sea WHITING.
Predictions for landings in 1982 and
spawning stock biomass in 1983.

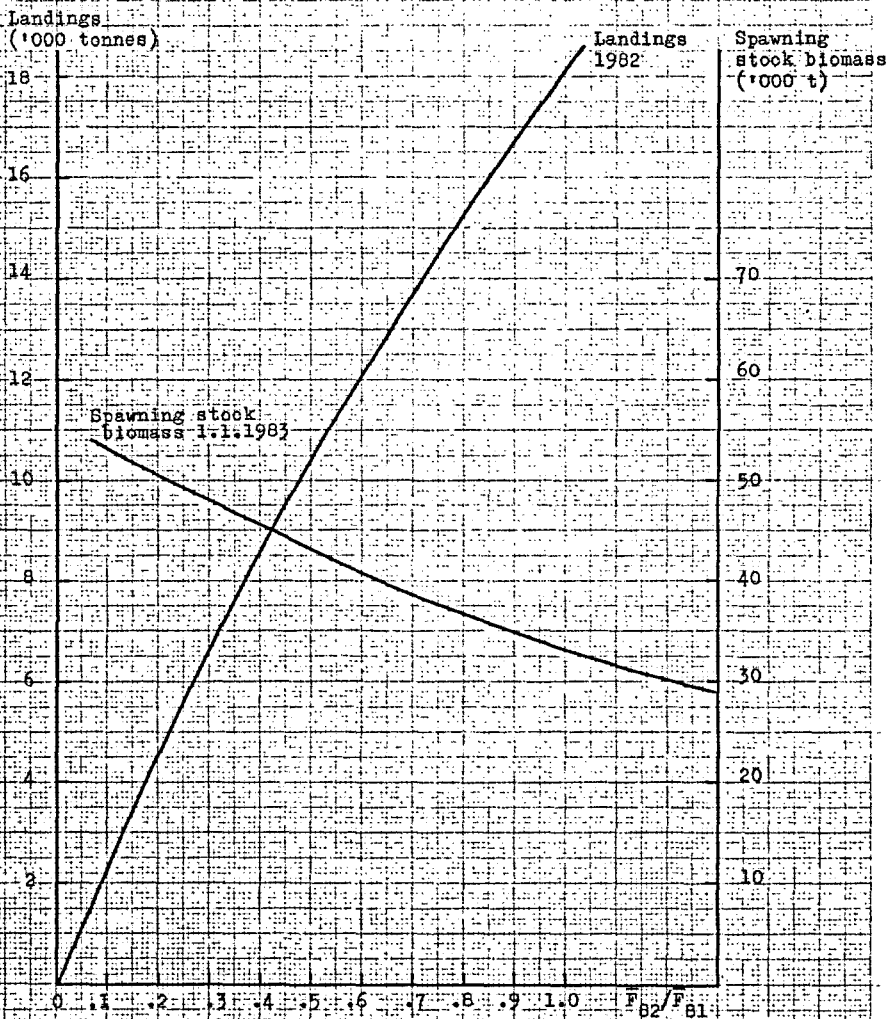


Figure 24. COD in Division VIa.
Predictions for catches in 1982 and
spawning stock biomass in 1983.

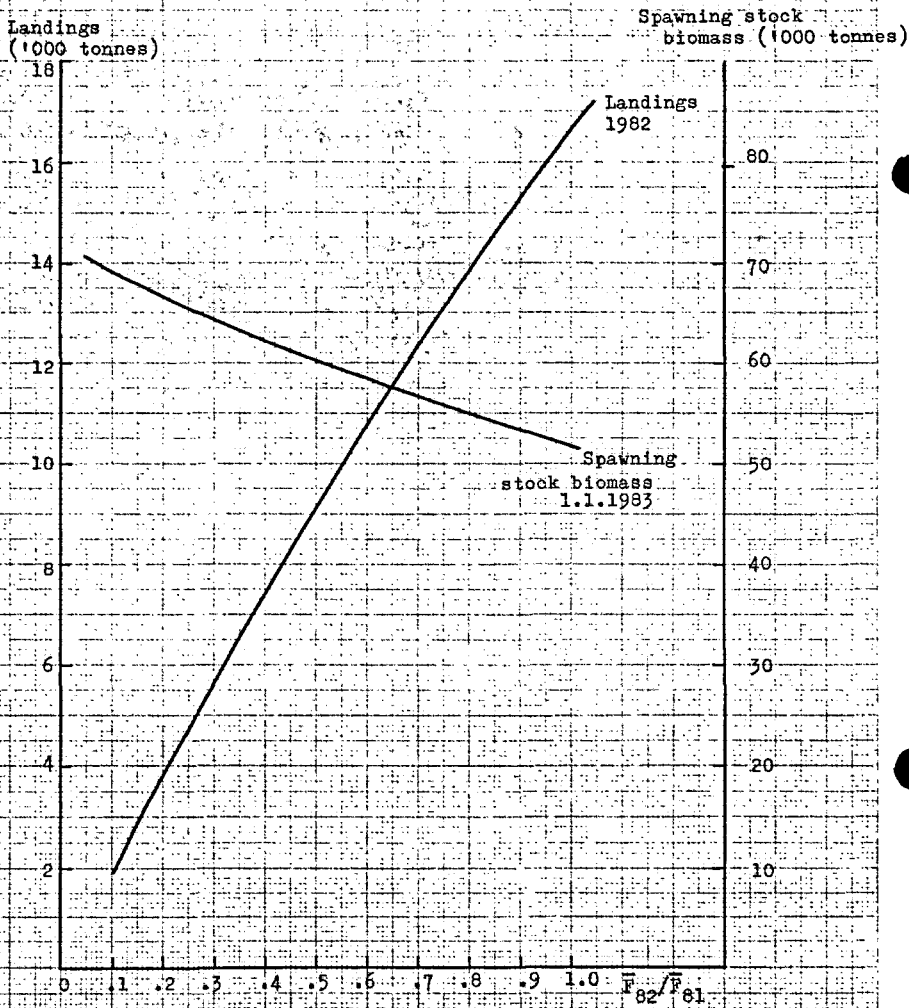


Figure 25. HADDOCK in Division VIIa.
Predictions for catch in 1982 and spawning
stock biomass in 1983.

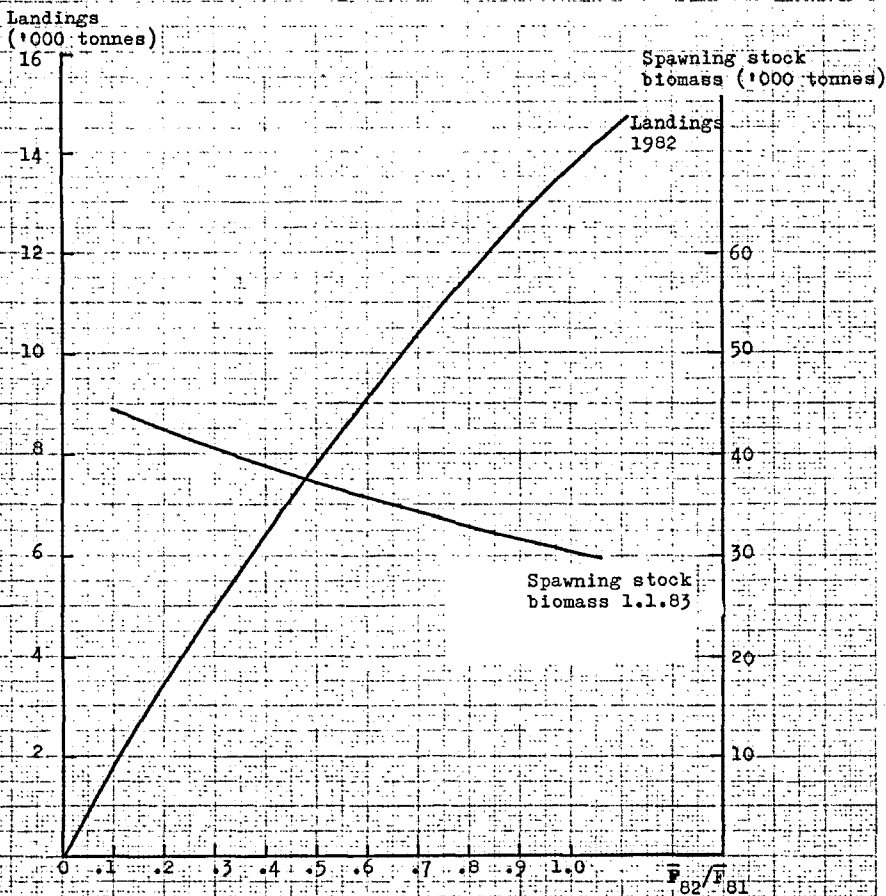


Figure 26. WHITING in Division VIa.
Predictions for catch in 1982 and spawning
stock biomass in 1983.

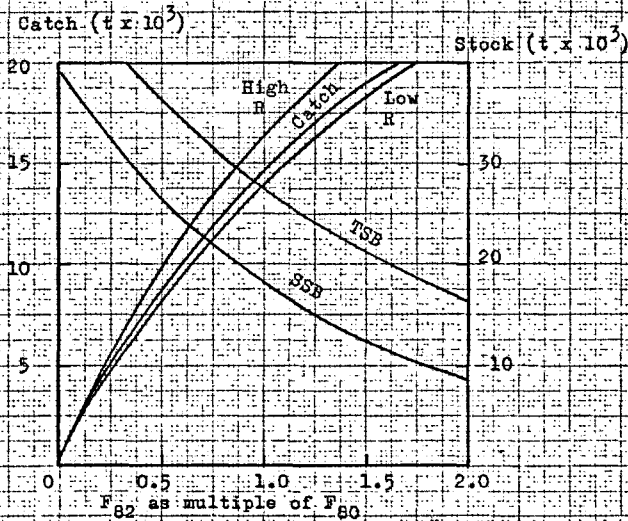


Figure 27. IRISH SEA COD (Division VIIa).

Catch forecasts for 1982 and resultant stock biomass in 1983 for a range of fishing mortalities in 1982. For the catch the 95% confidence interval resulting from a high and low recruitment is shown.

SSB = spawning stock biomass (1 Jan.)

TSB = total stock biomass (1 Jan.)

('000 tonnes)

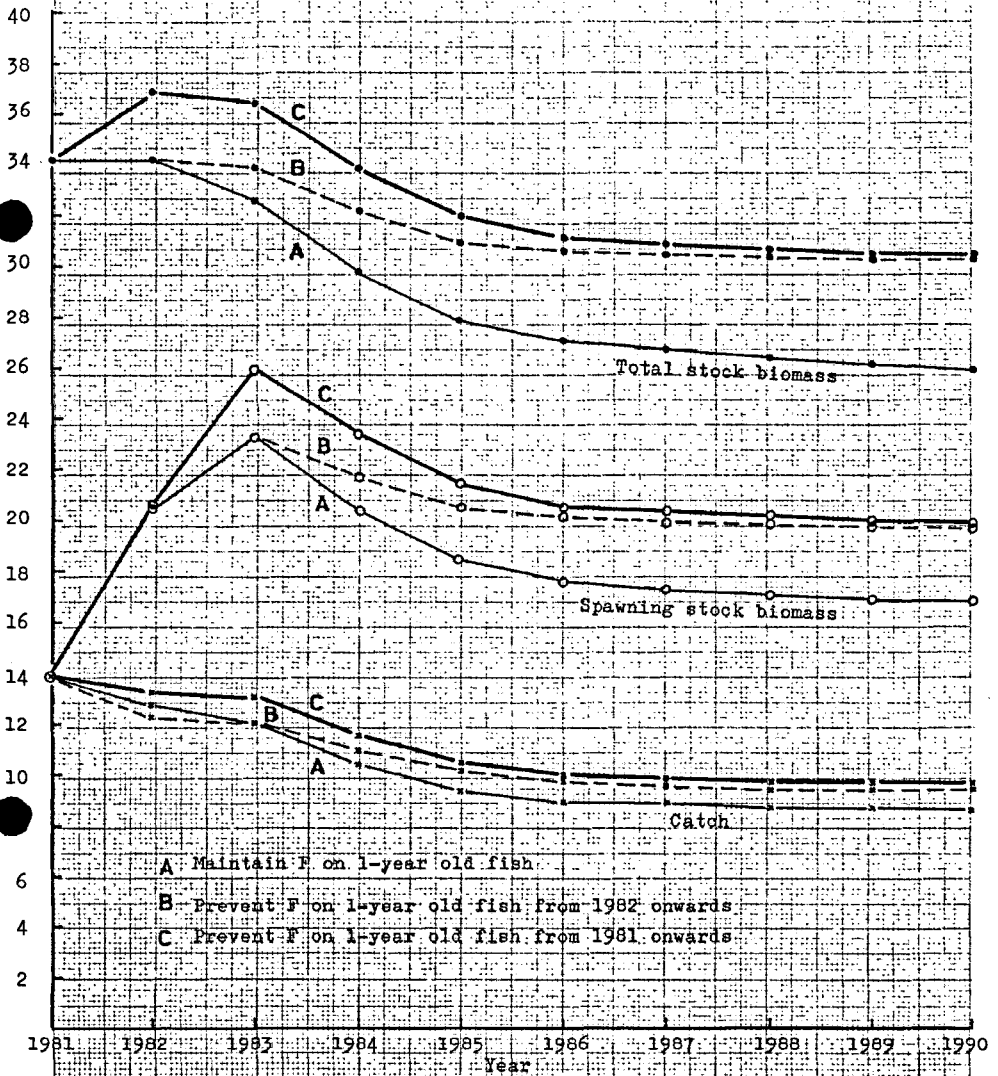


Figure 28. Irish Sea COD.

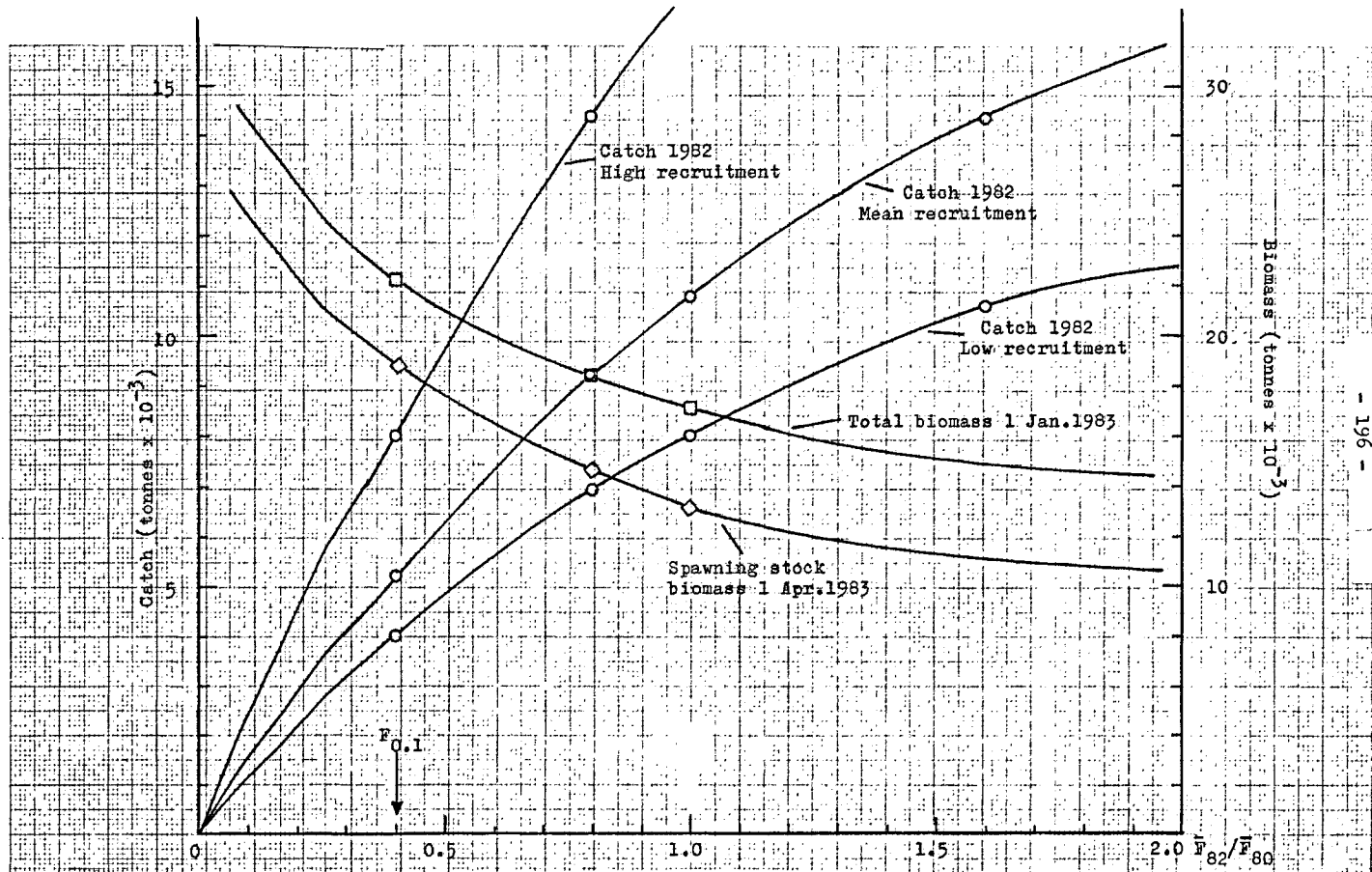


Figure 29. IRISH SEA WHITING. Catch forecasts for 1982 and resulting stock biomass in 1983 for a range of values in 1982, showing for the catch, the effect of the 5% confidence limit of two high and two low recruitments.

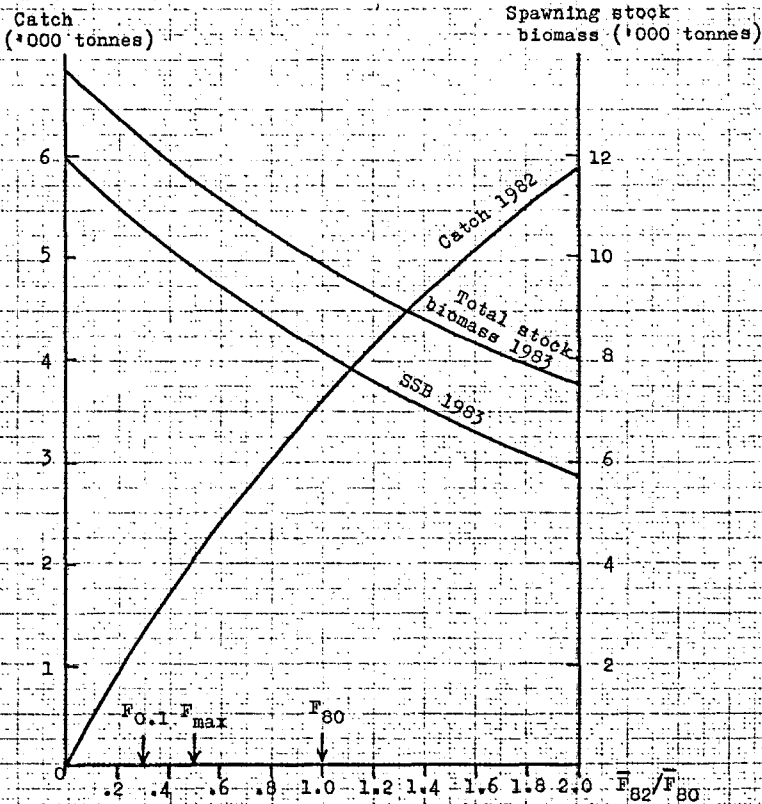


Figure 30. Irish Sea PLAICE.
Catch in 1982 and spawning stock biomass
at 1.1.1983 for various levels of F in
1982.

Figure 31. CELTIC SEA PLAICE.
Catch forecast for 1982 and resulting stock
biomass in 1983 for range of fishing mortalities
in 1982.

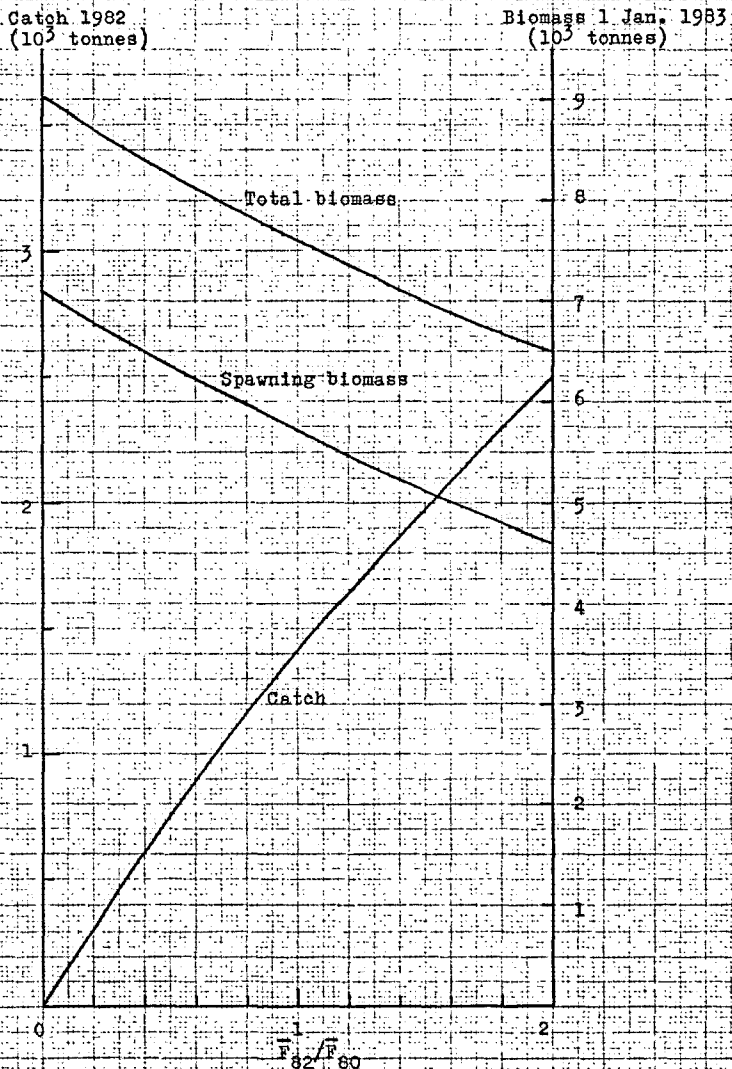
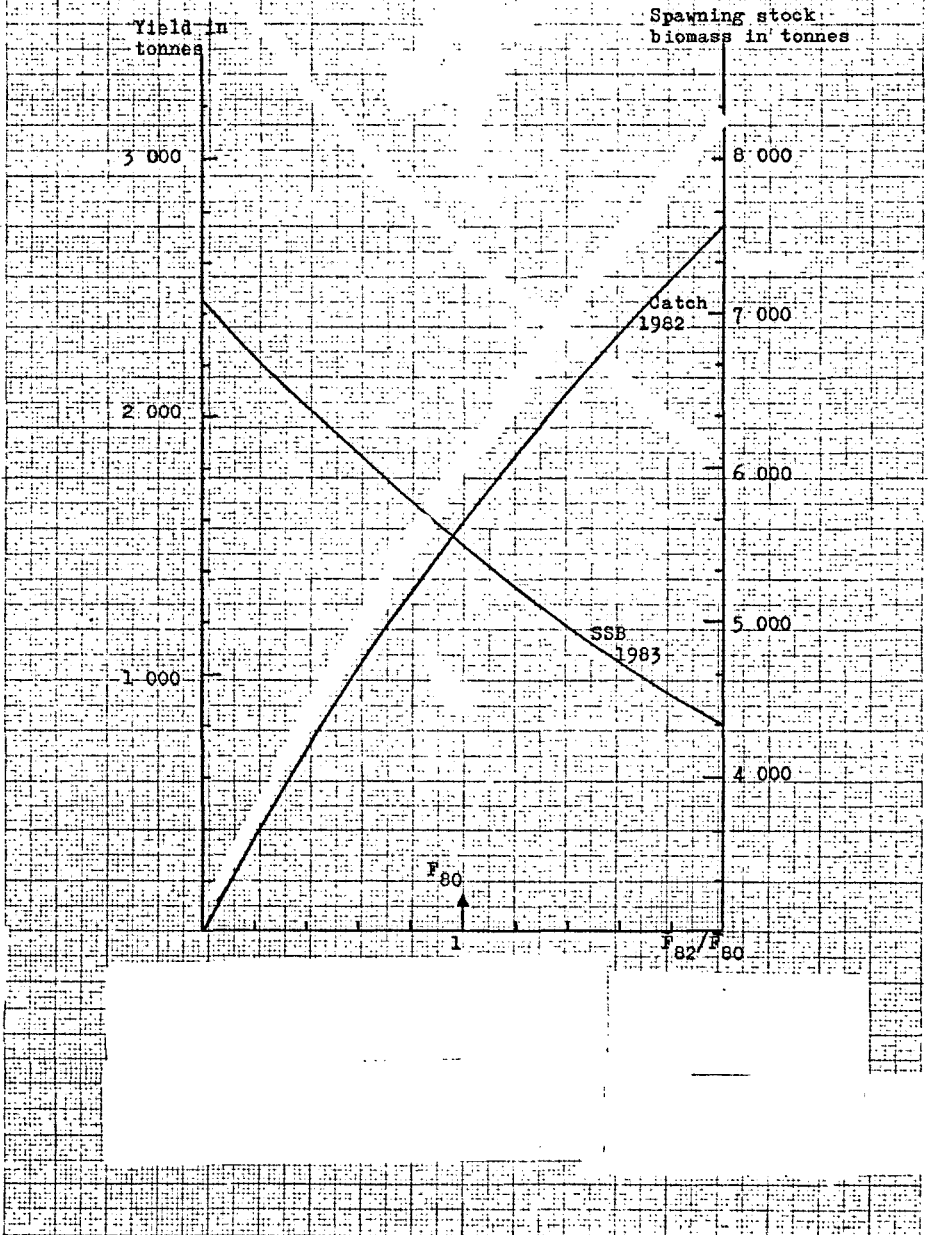


Figure 32. IRISH SEA SOLF.
Catch 1982 and spawning stock biomass
1983 for various levels of F in 1982.



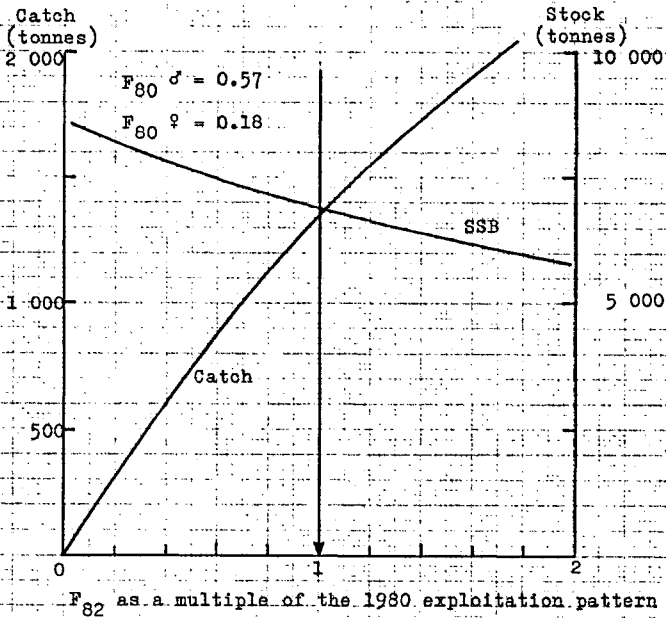


Figure 33. Celtic Sea SOLE (Divisions VIIf and VIIg). Catch forecasts for 1982 and resulting spawning stock biomass in 1983 for a range of fishing mortalities in 1982.

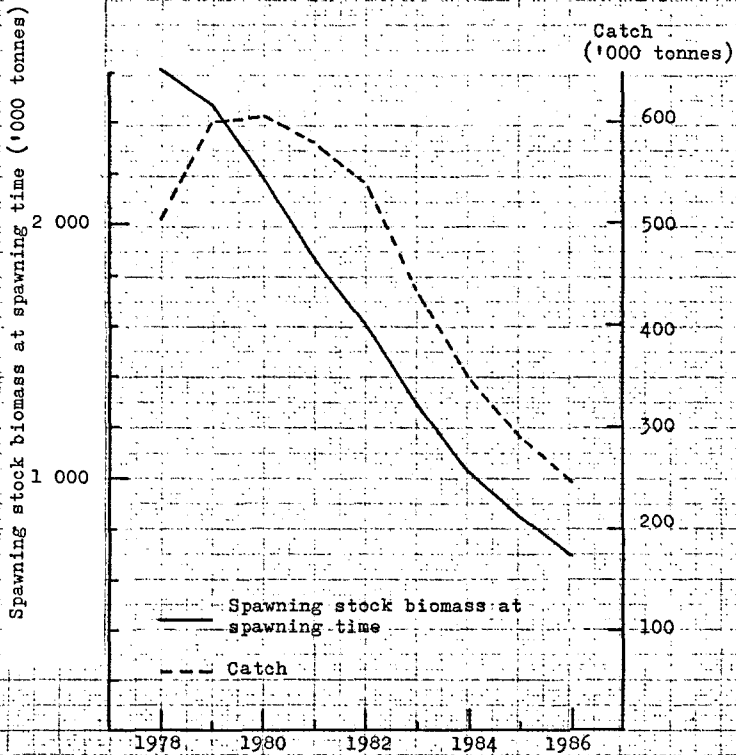
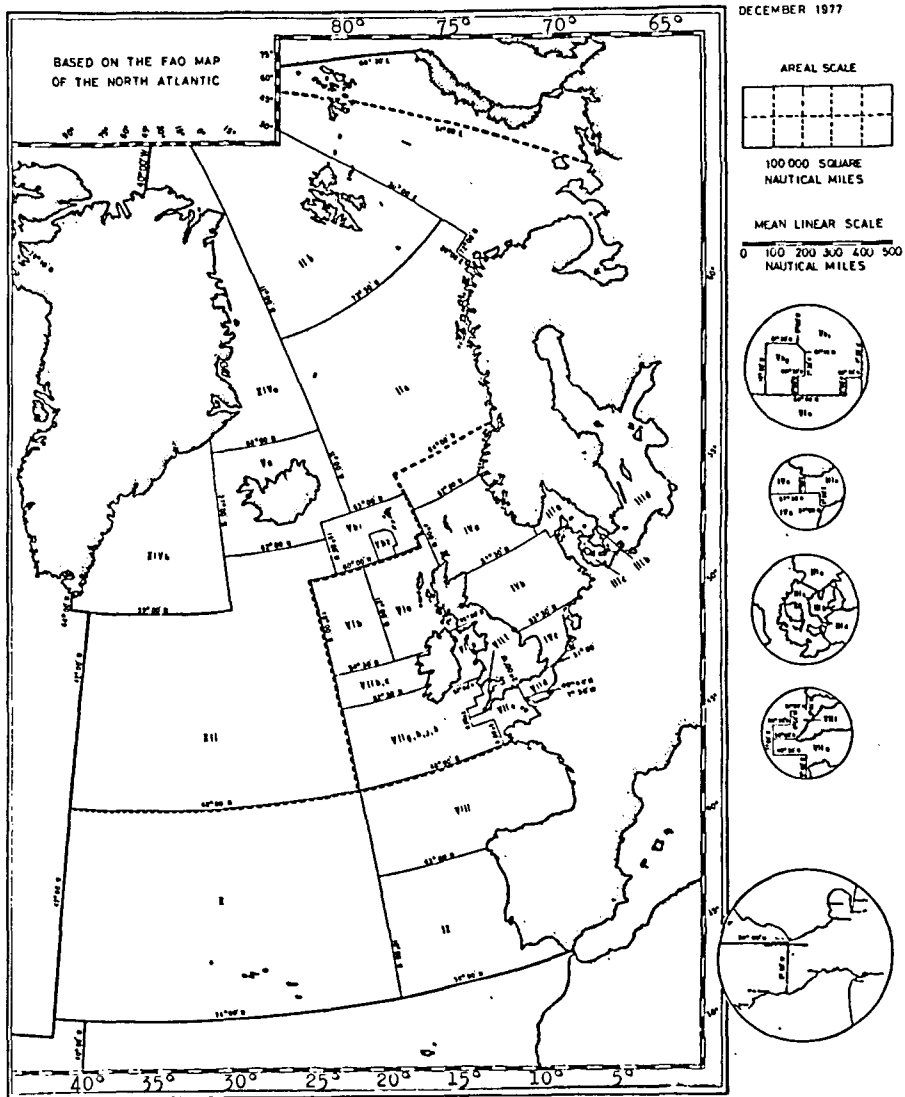


Figure 34. MACKEREL - Western stock.
Projection of spawning stock biomass and catch under assumptions of low recruitment from 1982 onwards and of the recommended 1982 TAC being exceeded by 100%.



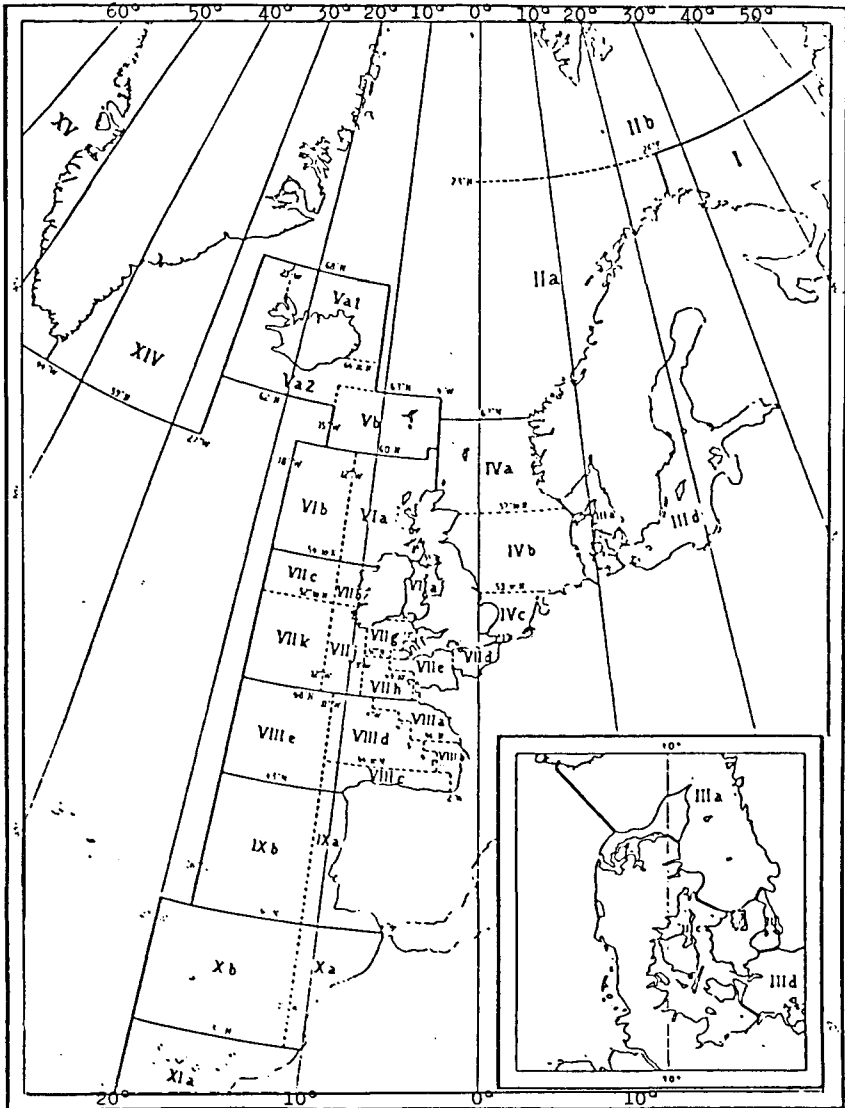


Chart of former statistical Divisions referred to in the Report.