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| | |
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Secretary to the ACFM

* Unable to attend the November 1981 Meeting.

** Replaced October 1981 by Dr A I Mukhin, who participated in the November meeting.

I. REPORT OF THE MEETING, 1-9 July 1981

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 Meetings, 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, p.21 ff).

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, the 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.

REPORT TO THE NORTH-EAST ATLANTIC FISHERIES COMMISSION

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 they 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 classed 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 | 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 (100 000 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 TAC's 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 ($\bar{F} = 0.35$), 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 (\bar{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) | \bar{F}_{5-10} | Catch | | Stock biom. (≥ 2) | \bar{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-VIId (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 | $F = .9 \times F_{81} \text{ recom.}$ | 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 Fs 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 Fs until values were produced which gave a corresponding change between the 1980 F values and the means for the period 1975-79. Input Fs 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 |
| | | | 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 F s in 1980 were assessed in the same way as for haddock for the same grouping of ages. Again the F s 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 (≥ 2) | F^* | Catch | | F^* | Catch | Spawning stock biomass (≥ 2) |
| 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. (≥ 2) | F | Catch | | Spawn. stock biom. (≥ 2) | F | Catch | Spawn. stock biom. (≥ 2) |
| 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 VIIIf.

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 VIIf,c and VIIfg-k | Table 54 |
| Haddock in Divisions VIId and VIIE | Table 55 |
| Haddock in Divisions VIIf,c and VIIfg-k | Table 56 |
| Whiting in Divisions VIId and VIIE | Table 57 |
| Whiting in Divisions VIIf,c and VIIfg-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 VIIIf and VIIg)

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 IYFS 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)

| | <u>in '000 tonnes</u> | | | | | | |
|-----------------|-----------------------|-------|-------|------|------|---------|------|
| | 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 under-estimate 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 VIIa and VIIb)

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 | VIIa,b | IVa+VIa +VII | VIIa,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 VIIa,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 VIIId,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 Faroes 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 10. 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 | 810 | 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 | 488 | 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 | 552 | 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 | | 35.7 | | 26.6 | | 23.1 | | 20.3 | 14 | 20 ¹³⁾ |
| Haddock | 17 | 26 | 23 ²⁾ | 19 | 20 | 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⁾ |
| 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.

..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>NORTH SEA</u> | | | | | | | | | | |
| Herring | 0 ⁴⁾ | 46 | 0 ⁴⁾ | 11 | 0 ⁴⁾ | 25 | 0 ⁴⁾ | 61 | 20 ²⁾ 12) | |
| Sprat | 450 ²⁾ | 304 | 400 ⁷⁾ | 378 | 400 ⁷⁾ | 380 | 400 | 323 | 400 | |
| Mackerel ⁵⁾ | 220 ²⁾ | 261 | 145 ⁷⁾ | 153 | 145 ⁷⁾ | 160 | 0(50?) | 96 | 0 (40?) | 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⁾ |
| Plaice | 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</u> (excl. Division VIIa) | | | | | | | | | | |
| 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.

...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>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 VIIB,C</u> | | | | | | | | | | |
| Herring | 10 | 13 | 7 | 8 | 7 | 15 | 7 | 24 | 7 | 7 ¹⁴⁾ |
| <u>DIVISION VIIJ</u> | | | | | | | | | | |
| Herring | - | >5 | - | 3.5 | - | 5.0 | 6 | 5.0 | 6 | 6 ¹⁴⁾ |
| <u>ENGLISH CHANNEL</u> | | | | | | | | | | |
| Plaice VIID | 2.0 | 2.25 | 2.5 | 2.32 | 2.2 | 2.6 | { 2.0 | 3.6 | { 2.2 | ... ¹¹⁾ |
| VIIIE | 0.45 | 0.7 | 0.6 | 0.94 | 0.72 | 1.0 | | 0.6 | | ... ¹¹⁾ |
| Sole VIID | 1.0 | 1.28 | 1.15 | 1.39 | 2.2 | 1.84 | 1.38 | 1.34 | 1.2 | ... ¹¹⁾ |
| VIIIE | 0.45 | 0.61 | 0.35 | 0.86 | 0.5 | 1.18 | 0.78 | 1.12 | 1.0 | ... ¹¹⁾ |
| <u>DIVISIONS VIIIF AND VIIIG</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 IVA, VIA AND VIIA,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 IIa.

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 | 13 930 | 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 | - | - | - |
| 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 |
|-----------------|---------|------------------|----------------------------|------------------------------|---------|--------|--------|-------------------|------|-------|
| 1970 Total | 2.2 | - | 0.8 | 48.9 | 23.8 | - | 0.3 | 2.9 | + | 78.9 |
| 1970 S.mar. | 2.2 | - | 0.8 | 13.1 | 23.3 | - | 0.3 | 2.9 | - | 42.6 |
| 1970 S.ment. | - | - | - | 35.8 | 0.5 | - | - | - | - | 36.3 |
| 1971 Total | 2.8 | + | 0.2 | 46.6 | 29.1 | + | + | 3.6 | + | 82.3 |
| 1971 S.mar. | 2.8 | - | 0.2 | 12.2 | 28.6 | - | - | 3.6 | - | 47.4 |
| 1971 S.ment. | - | - | - | 34.4 | 0.5 | - | - | - | - | 34.9 |
| 1972 Total | 2.5 | + | 0.1 | 44.0 | 27.0 | + | + | 3.7 | + | 77.3 |
| 1972 S.mar. | 2.5 | - | 0.1 | 4.1 | 26.4 | - | - | 3.7 | - | 36.8 |
| 1972 S.ment. | - | - | - | 39.9 | 0.6 | - | - | - | - | 40.5 |
| 1973 Total | 1.6 | 0.2 | - | 38.4 | 26.5 | + | - | 3.0 | + | 69.7 |
| 1973 S.mar. | 1.6 | 0.2 | - | 3.1 | 25.7 | - | - | 3.0 | - | 33.6 |
| 1973 S.ment. | - | - | - | 35.3 | 0.8 | - | - | - | - | 36.1 |
| 1974 Total | 2.1 | 0.3 | + | 36.4 | 27.8 | + | + | 2.5 | - | 69.1 |
| 1974 S.mar. | 2.1 | 0.3 | - | 4.3 | 27.0 | - | - | 2.5 | - | 36.2 |
| 1974 S.ment. | - | - | - | 32.1 | 0.8 | - | - | - | - | 32.9 |
| 1975 Total | 1.9 | 0.1 | - | 33.6 | 32.7 | + | - | 2.4 | - | 70.7 |
| 1975 S.mar. | 1.9 | 0.1 | - | 4.3 | 31.3 | - | - | 2.4 | - | 40.0 |
| 1975 S.ment. | - | - | - | 29.3 | 1.4 | - | - | - | - | 30.7 |
| 1976 Total | 1.5 | 0.2 | - | 32.9 | 34.0 | + | - | 1.1 | - | 69.7 |
| 1976 S.mar. | 1.5 | 0.2 | - | 4.3 | 33.3 | - | - | 1.1 | - | 40.4 |
| 1976 S.ment. | - | - | - | 28.6 | 0.7 | - | - | - | - | 29.3 |
| 1977 Total | 1.4 | 0.3 | - | 31.6 | 28.1 | 0.1 | - | + | - | 61.5 |
| 1977 S.mar. | 1.4 | 0.3 | - | 9.2 | 27.5 | 0.1 | - | - | - | 38.5 |
| 1977 S.ment. | - | - | - | 22.4 | 0.6 | - | - | - | - | 23.0 |
| 1978 Total | 1.5 | 0.2 | - | - | 33.3 | 0.1 | - | - | - | 35.1 |
| 1978 S.mar. | 1.5 | 0.2 | - | - | 29.4 | 0.1 | - | - | - | 31.2 |
| 1978 S.ment. | - | - | - | - | 3.9 | - | - | - | - | 3.9 |
| 1979 Total | 1.4 | 0.6 | - | - | 62.3 | 0.1 | - | - | - | 64.4 |
| 1979 S.mar. | 1.4 | 0.6 | - | - | 54.6 | 0.1 | - | - | - | 56.7 |
| 1979 S.ment. | - | - | - | - | 7.7 | - | - | - | - | 7.7 |
| 1980* Total | 1.4 | 1.1 | - | - | 68.5 | 0.1 | - | - | - | 71.1 |
| 1980* S.mar. | 1.4 | 1.1 | - | - | 58.5 | 0.1 | - | - | - | 61.1 |
| 1980* S.ment. | - | - | - | - | 10.0 | - | - | - | - | 10.0 |

*Preliminary

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 |
|-------------------------------------|-----------------|-----------------|------------------|----------------------------|-----------------------------|-----------------|-----------------|-----------------|-------------------|-----------------------|-----------------------|
| 1970 Total S.mar. S.ment. | - | - | - | 0.4 0.4 - | 16.3 16.3 - | 1.0 1.0 - | - | 0.4 0.4 - | + | - | 18.1 18.1 - |
| 1971 Total S.mar. S.ment. | - | - | - | 0.6 0.6 - | 17.1 17.1 - | 2.4 2.4 - | - | 0.3 0.3 - | + | 0.1 0.1 | 20.5 20.5 - |
| 1972 Total S.mar. S.ment. | - | - | - | 0.7 0.7 - | 7.3 7.3 - | 5.5 5.5 - | - | 0.5 0.5 - | + | + | 14.0 14.0 - |
| 1973 Total S.mar. S.ment. | - | - | + | 0.8 0.8 - | 4.5 4.5 - | 2.1 2.1 - | - | 0.3 0.3 - | 0.1 0.1 - | 0.1 0.1 - | 7.9 7.9 - |
| 1974 Total S.mar. S.ment. | - | - | + | 1.3 1.3 - | 2.6 2.6 - | 9.8 9.8 - | - | + | 0.1 0.1 - | 0.1 0.1 - | 13.9 13.9 - |
| 1975 Total S.mar. S.ment. | - | - | + | 4.5 4.5 - | 5.0 5.0 - | 5.6 5.6 - | 0.1 0.1 - | 0.3 0.3 - | 0.1 0.1 - | 9.8 5.4 4.4 | 25.4 21.0 4.4 |
| 1976 Total S.mar. S.ment. | 0.4 0.4 - | 0.1 0.1 - | + | - | 4.4 4.4 - | 7.4 7.4 - | + | - | 0.3 0.3 - | 101.0 41.3 59.7 | 113.6 53.9 59.7 |
| 1977 Total S.mar. S.ment. | - | + | + | - | 13.3 13.3 - | 0.1 0.1 - | 0.1 0.1 - | - | 0.6 0.6 - | 0.3 0.3 - | 14.4 14.4 - |
| 1978 Total S.mar. S.ment. | - | + | - | - | 20.7 15.3 5.4 | 0.2 0.2 - | + | - | + | - | 20.9 15.5 5.4 |
| 1979 Total S.mar. S.ment. | - | - | + | - | 21.1 15.8 5.3 | - | - | - | - | - | 21.1 15.8 5.3 |
| *1980 Total S.mar. S.ment. | - | - | - | - | 33.0 22.4 10.6 | 0.1 0.1 - | - | - | - | - | 33.1 22.5 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 |

¶) Preliminary

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 1V 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 ^{a)} | 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 ^{c)} | 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 ^{e)} | 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 Fiskirannsóknarstofnun

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 ^{c)} |
| 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. 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 | - | - | - | 14 341 | 300 | - | - | - | - | 14 641 |
| 1980*) | - | - | 1 | 14 392 | 1 265 | - | 1 | - | 8 500 | 24 159 |

*) Preliminary

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 | - | - | - | | 3 955 |
| 1979 | 584 | - | 20 | 2 123 | 850 | - | - | - | 850 | 4 427 |
| 1980* | 9 | - | 2 | 3 416 | 392 | - | - | - | 3 705 | 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.

- = Magnitude known to be nil.

/Cont'd.

Table 32 (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, Fed. Rep. of ¹⁾ | 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 ^{c)} | 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 VIIb,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 VIId 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 VIIIf 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 VIIIf and VIIg). 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 VIIIf 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 VIIf 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).

| Year Country | 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 |
|------------------------|--------|--------|--------|--------|--------|--------|---------|---------|--------|--------|------|
| 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 |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------|
| 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, 1961-80.¹⁾

| 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, VIb 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.)

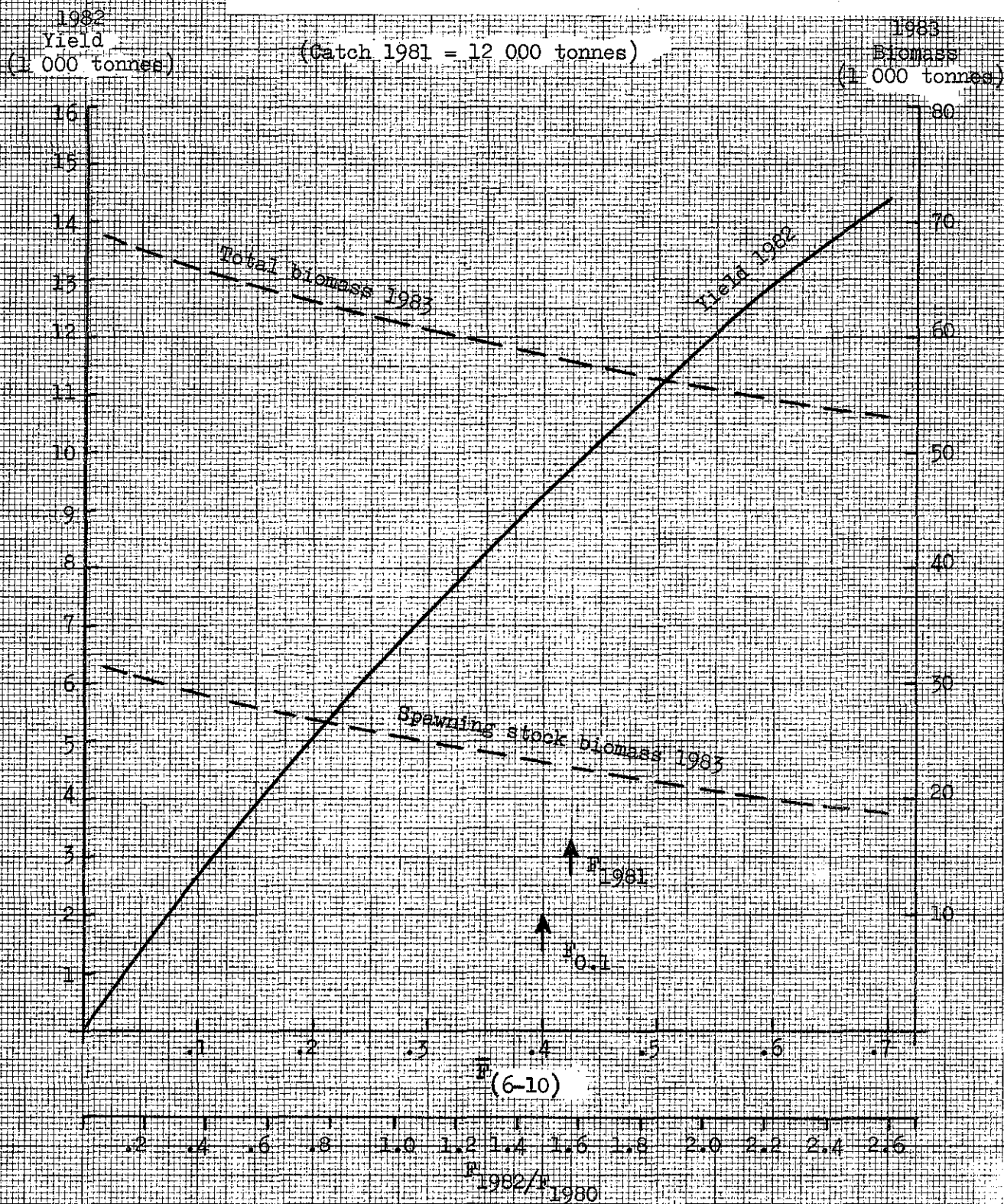
| Country | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 ¹⁾ |
|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------------------|
| German, Dem. Rep. | - | 78 | - | - | - | - | - | - | - | - | - |
| Germany, Fed. Rep. | - | - | - | - | - | - | - | - | 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.



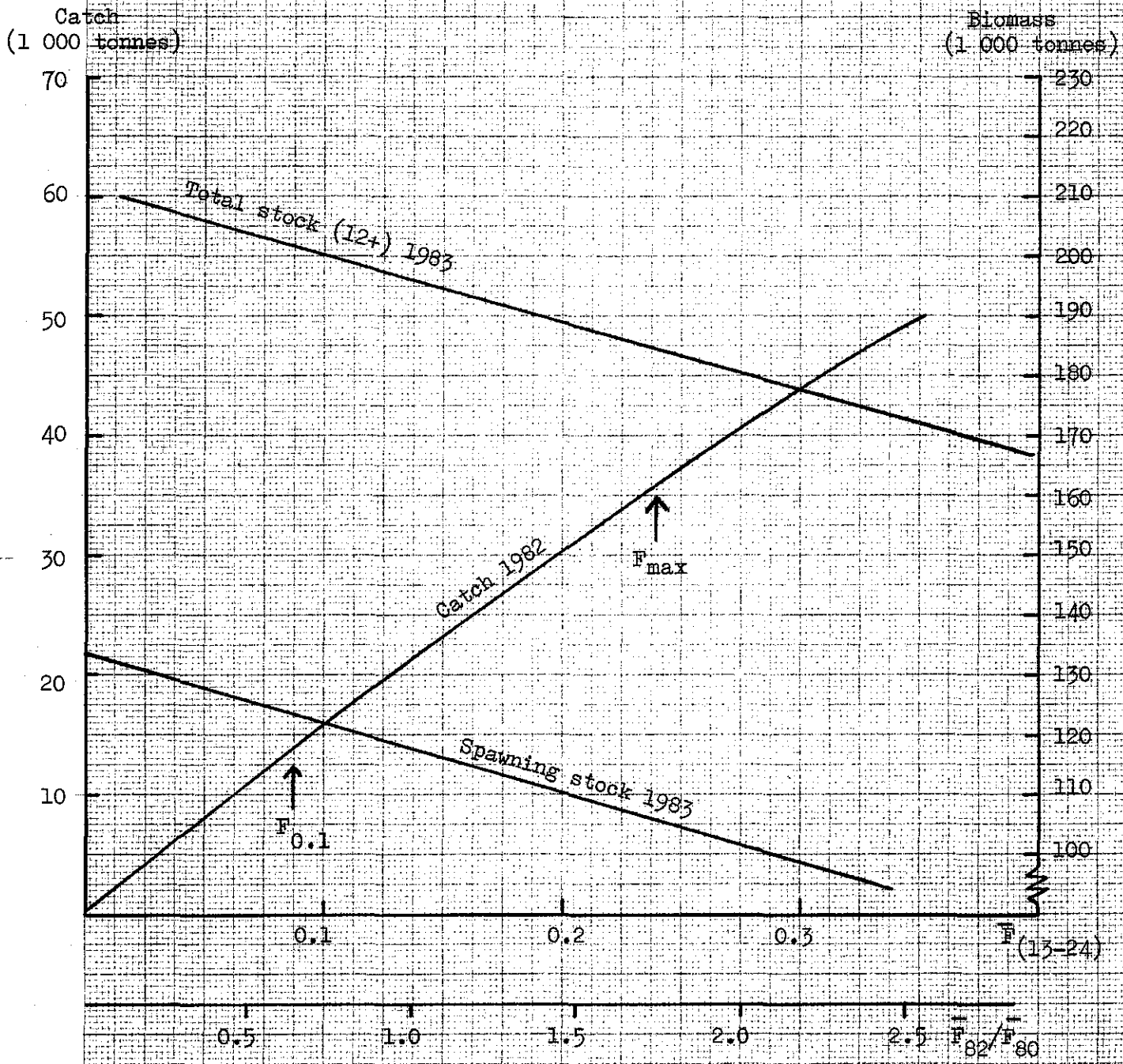


Figure 2. *Sebastes marinus* in Sub-area I and Division IIIa. Predictions for catch in 1982 and stock biomasses in 1983.

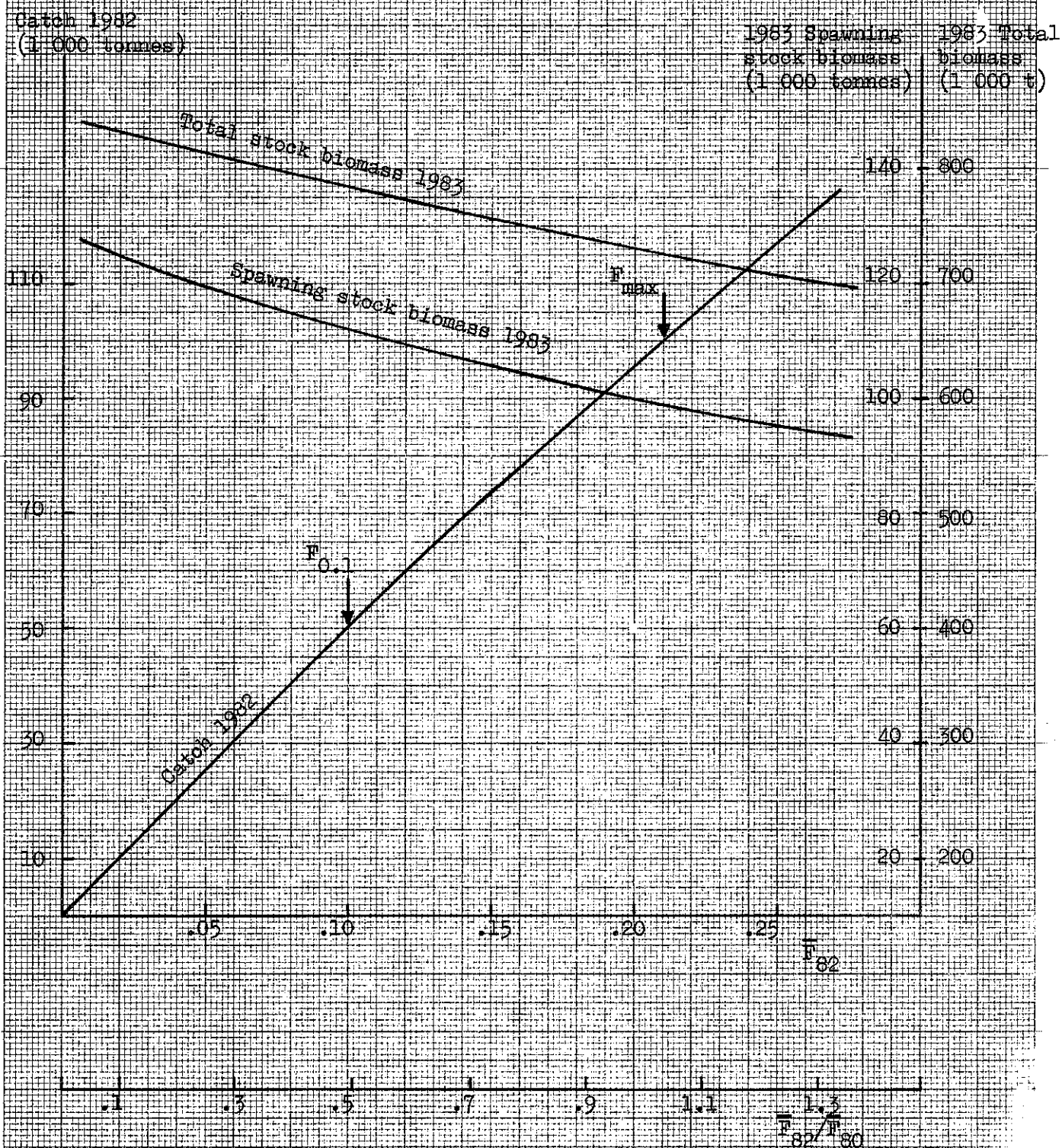


Figure 3. *Sebastes mentella* in Divisions IIa and IIb. Catch in 1982; total biomass (age 6+) and spawning stock biomass (age 15+) at the beginning of 1983 at different levels of $F(8-19)$ in 1982.

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.

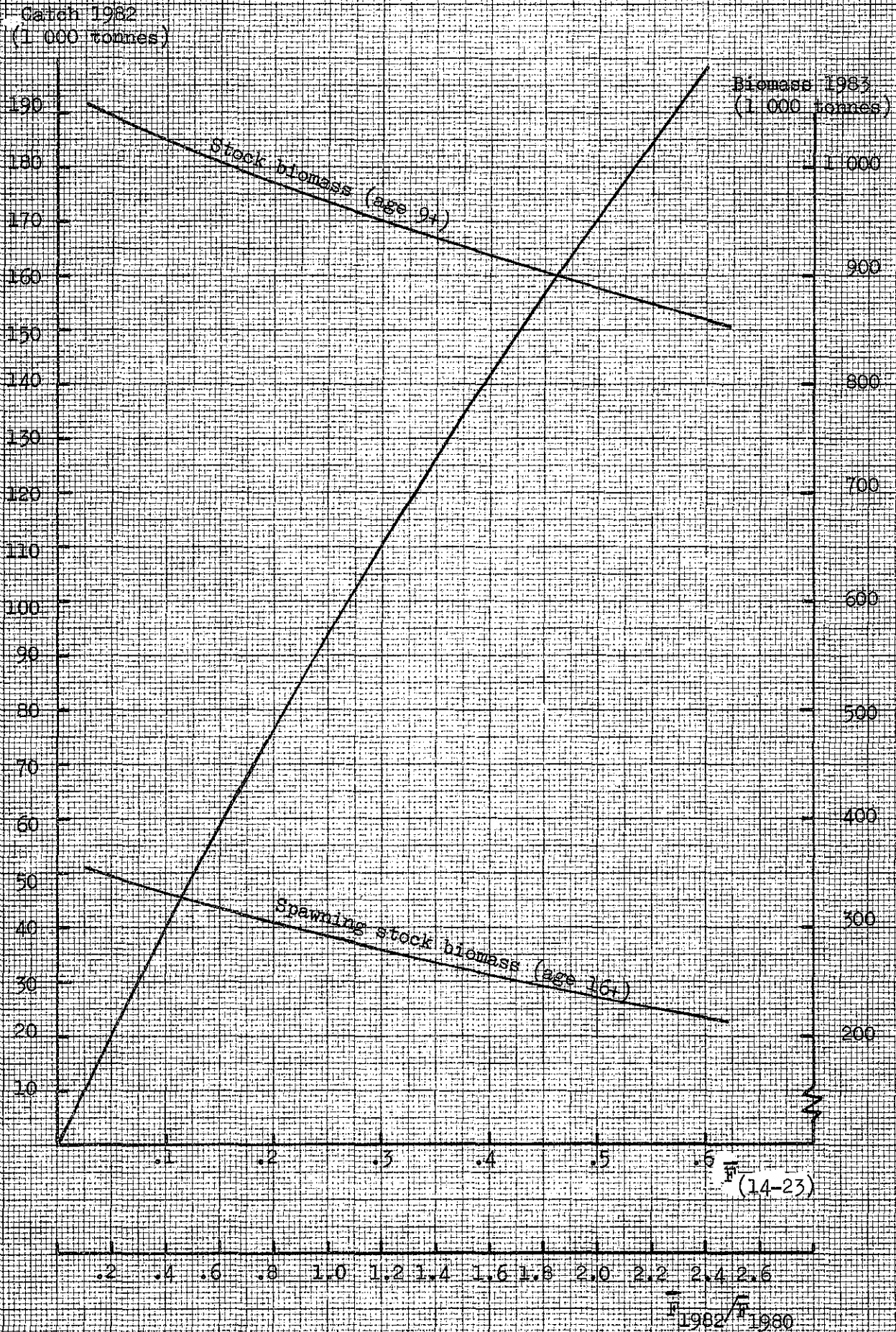


Figure 5. *Sebastes mentella* in Sub-areas V + XIV. Predictions for catch 1982, total biomass and spawning stock biomass at the beginning of 1983 at different levels of F in 1982.

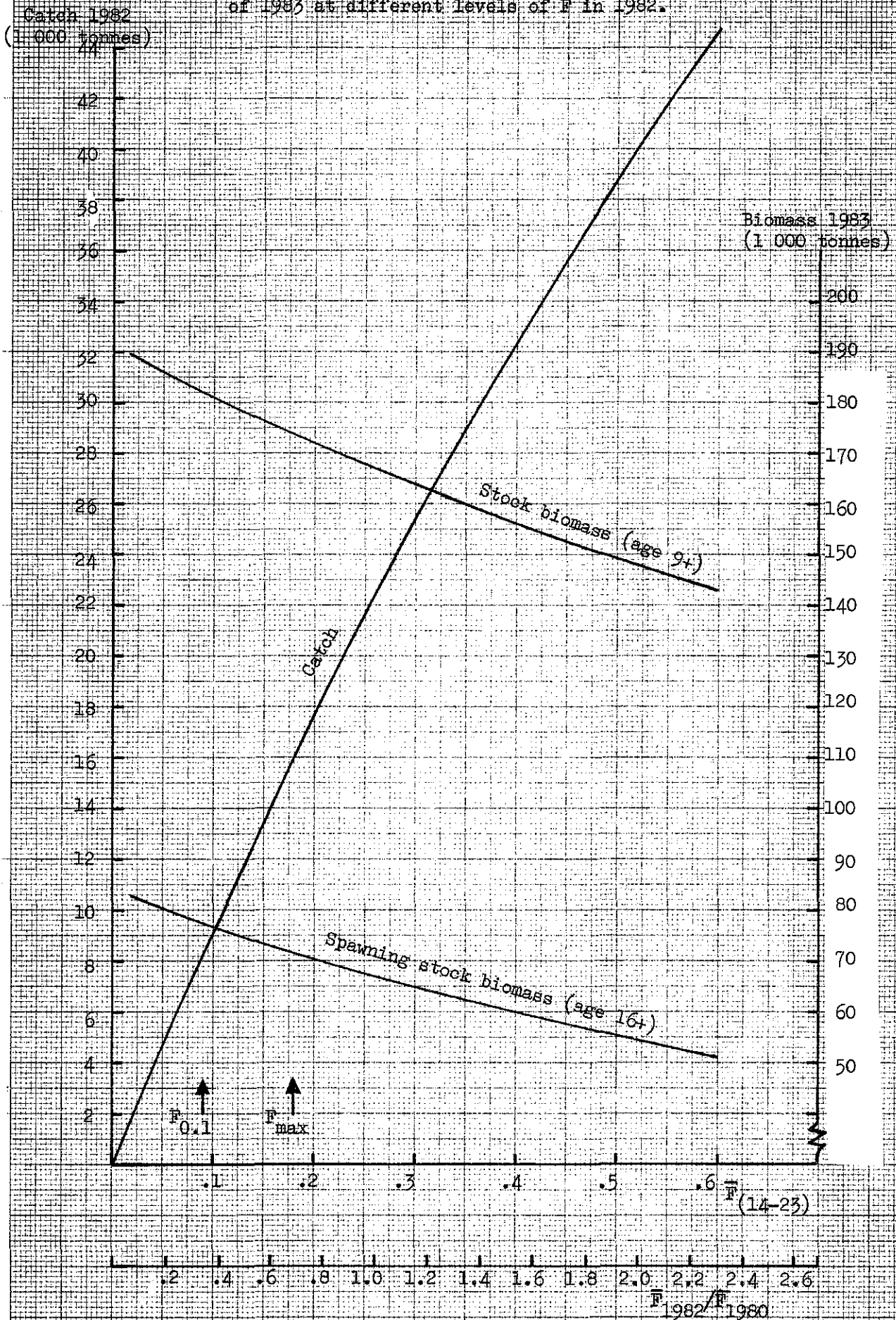


Figure 6. GREENLAND HALIBUT in Sub-areas I and II. Predictions for catch in 1982, and the spawning stock (9+) and the total stock (3+) at the beginning of 1983.

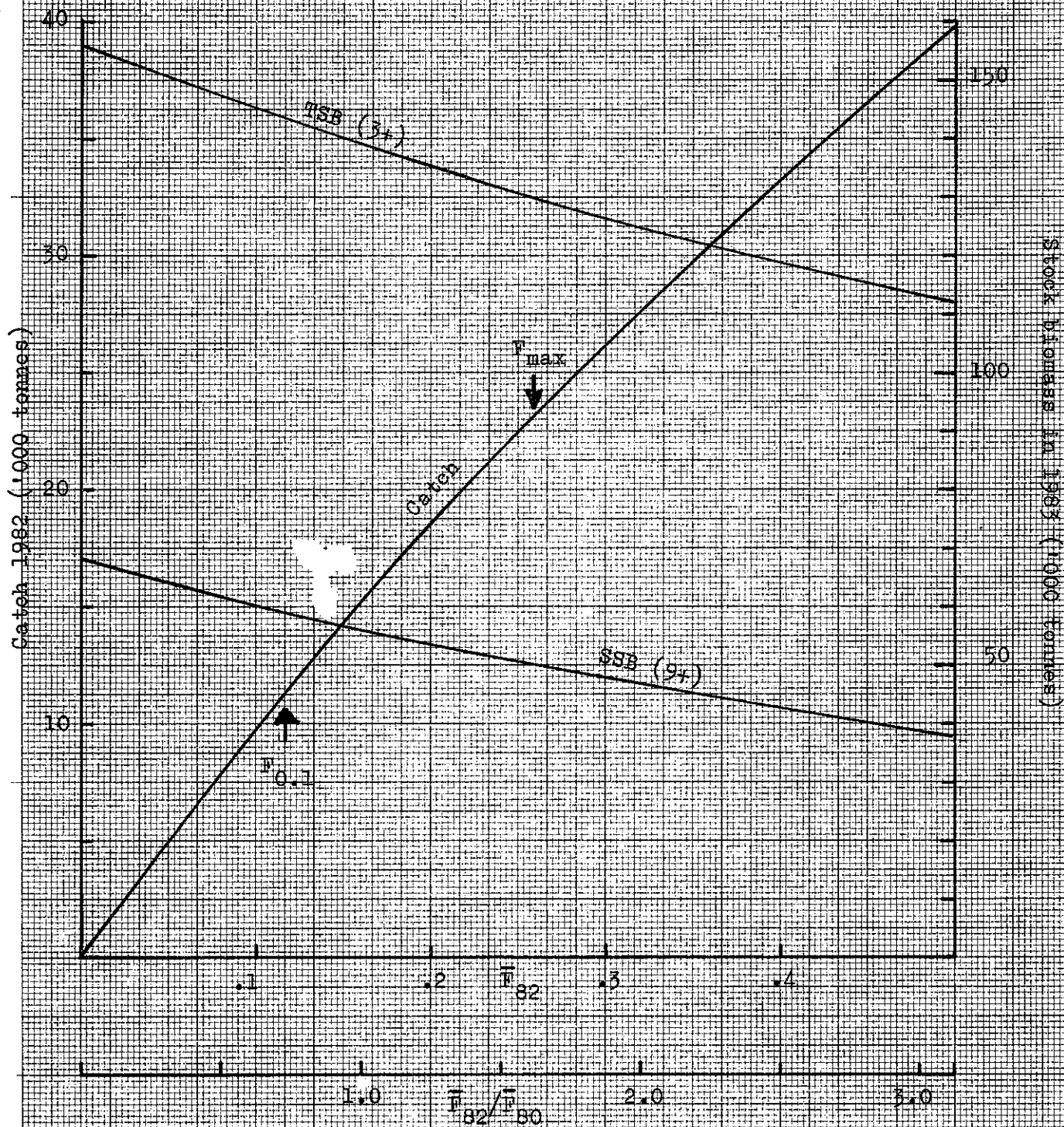
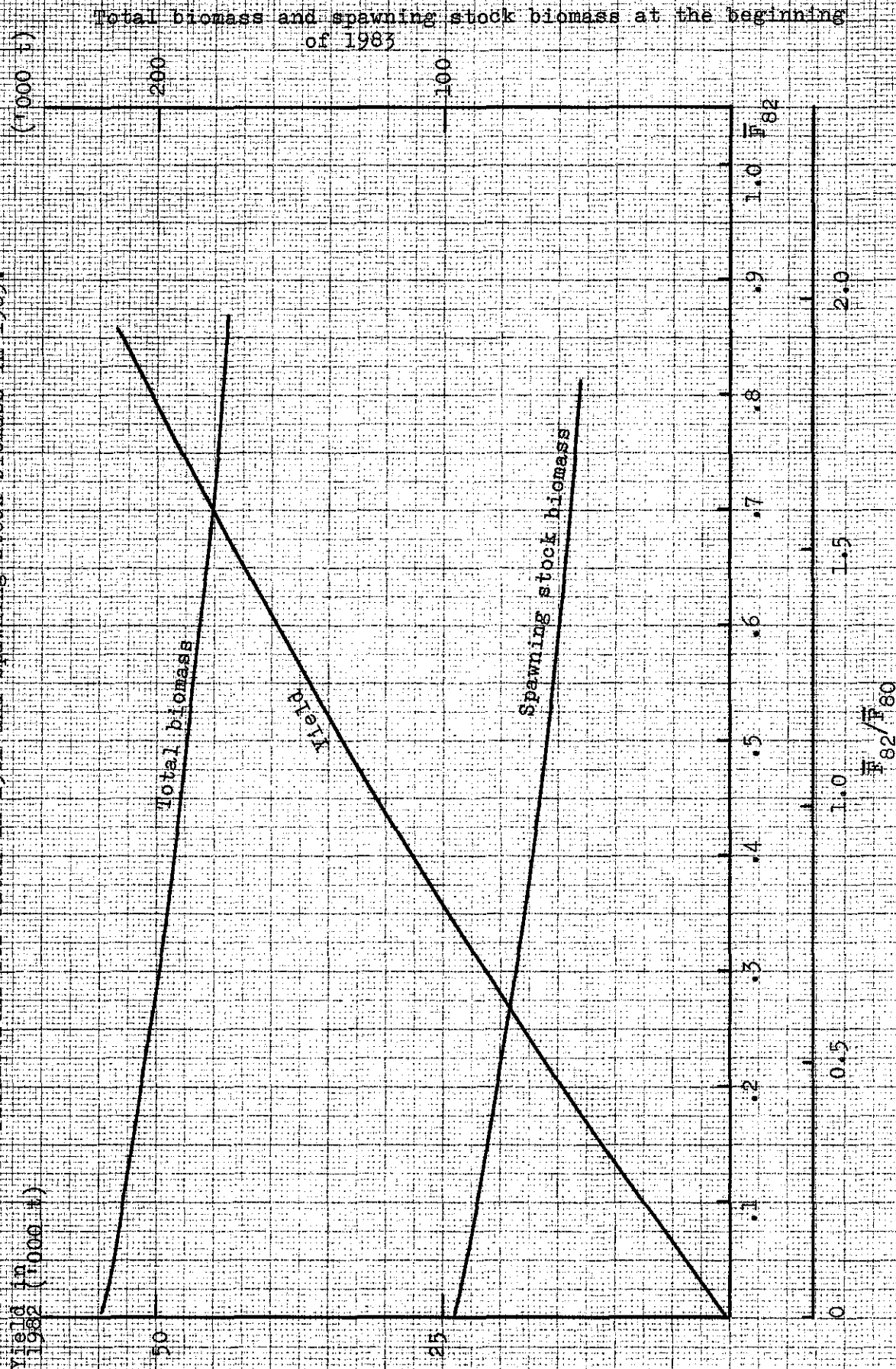


Figure 7. GREENLAND HALIBUT in Sub-areas V and XIV.
Predictions for catch in 1982 and spawning stock biomass in 1983.



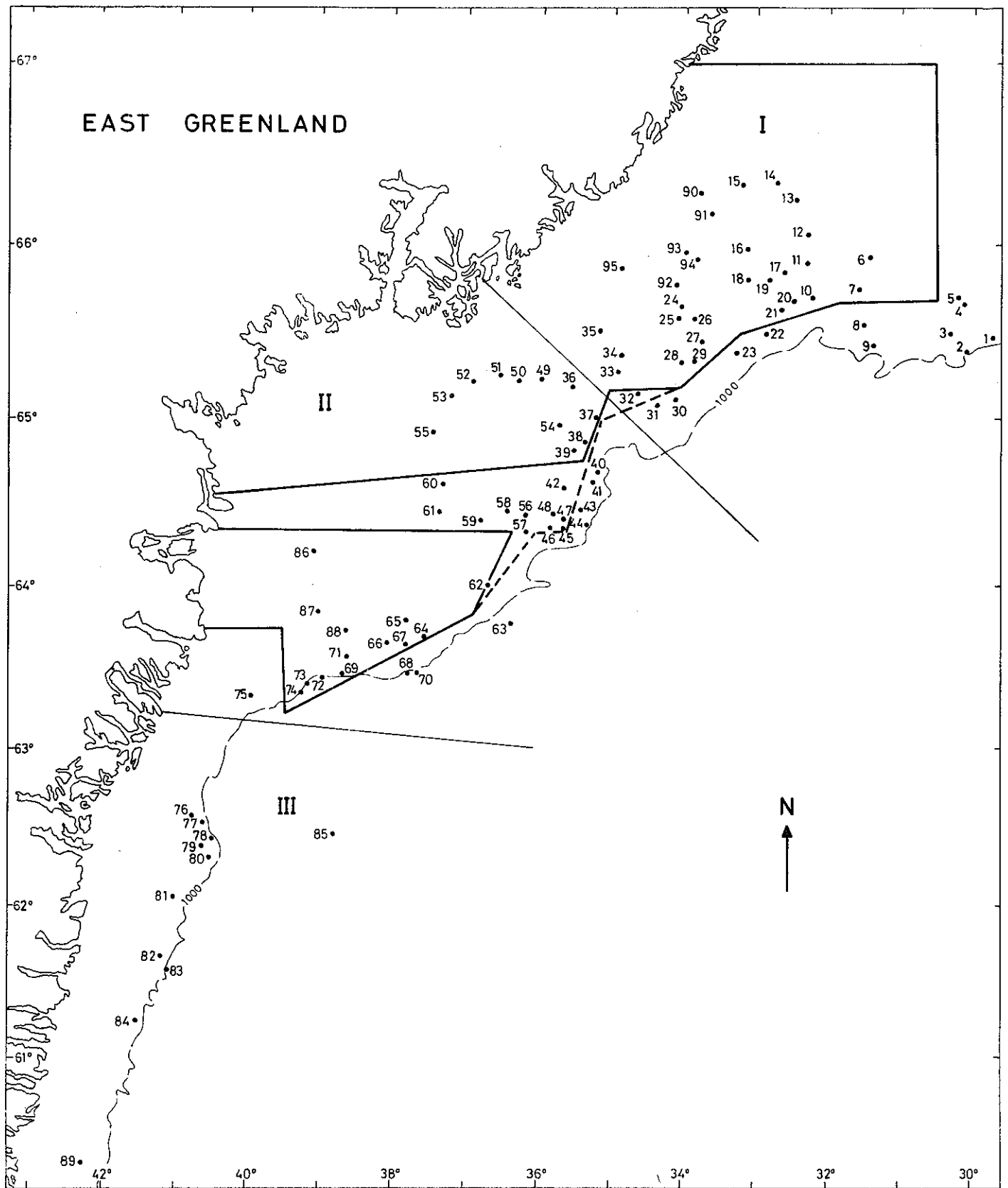


Figure 8. Closed areas for bottom trawl fishing.

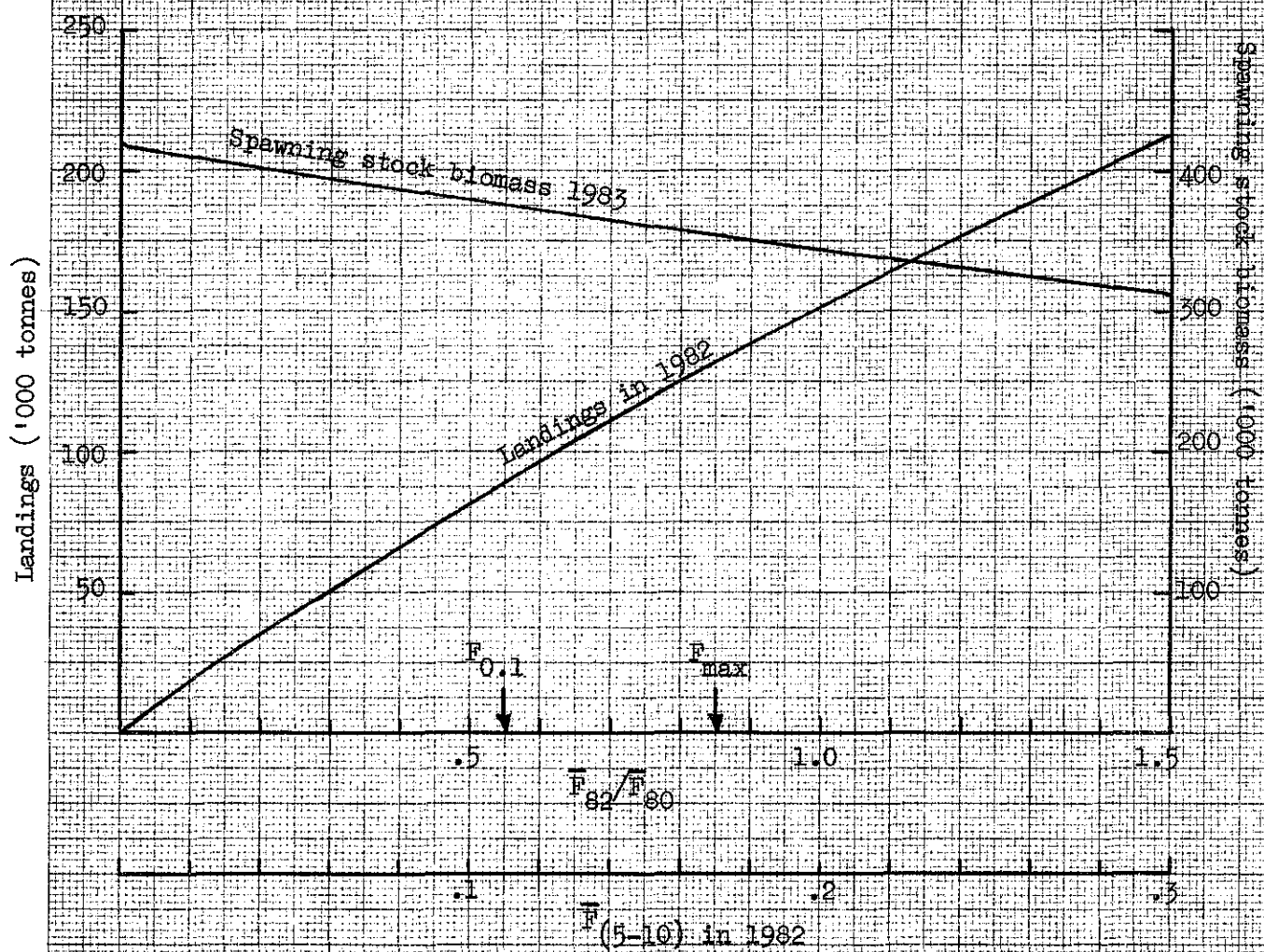


Figure 9. North-East Arctic SAITHE. Predictions for landings in 1982 and spawning stock biomass in 1983.

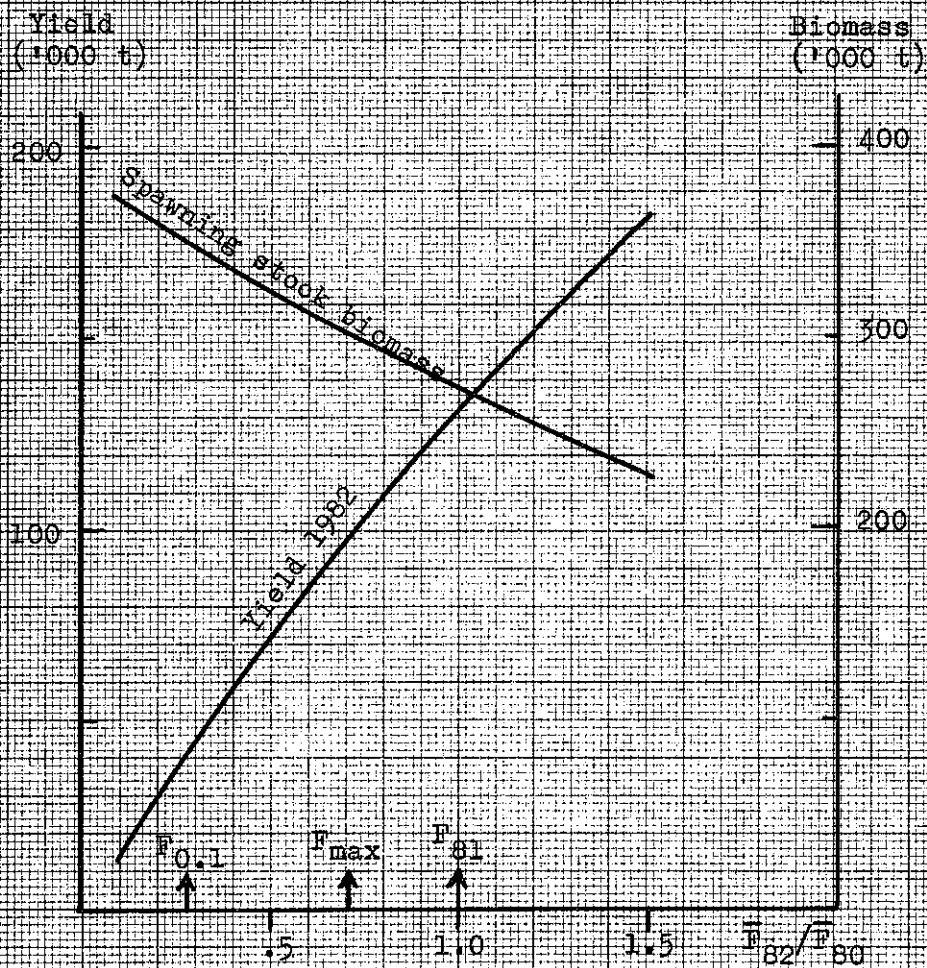


Figure 10. NORTH SEA SAITHE.
Predictions for catches in 1982 and
spawning stock biomass in 1983.

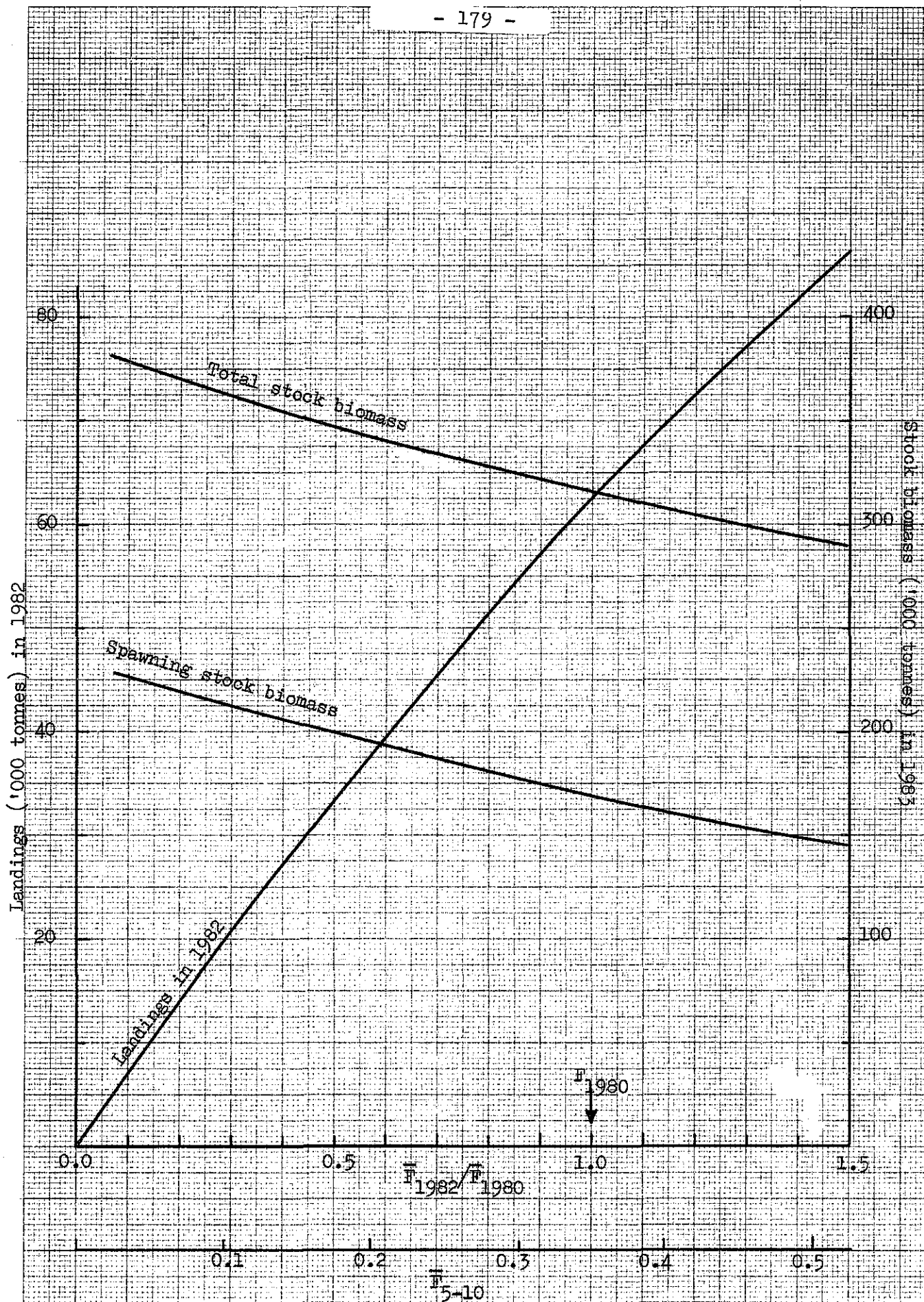


Figure 11. Icelandic SALTRE. Predictions for landings in 1982 and spawning and total stock biomass in 1983.

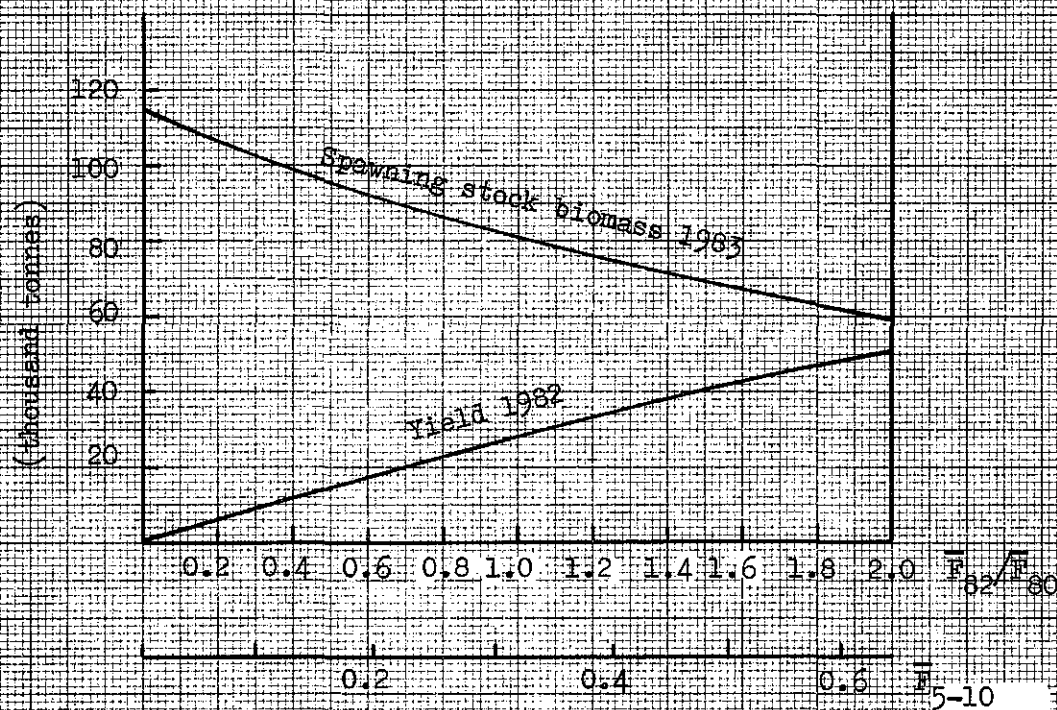


Figure 12. Faroe SAHTE. Predictions for landings in 1982 and spawning stock biomass in 1983.

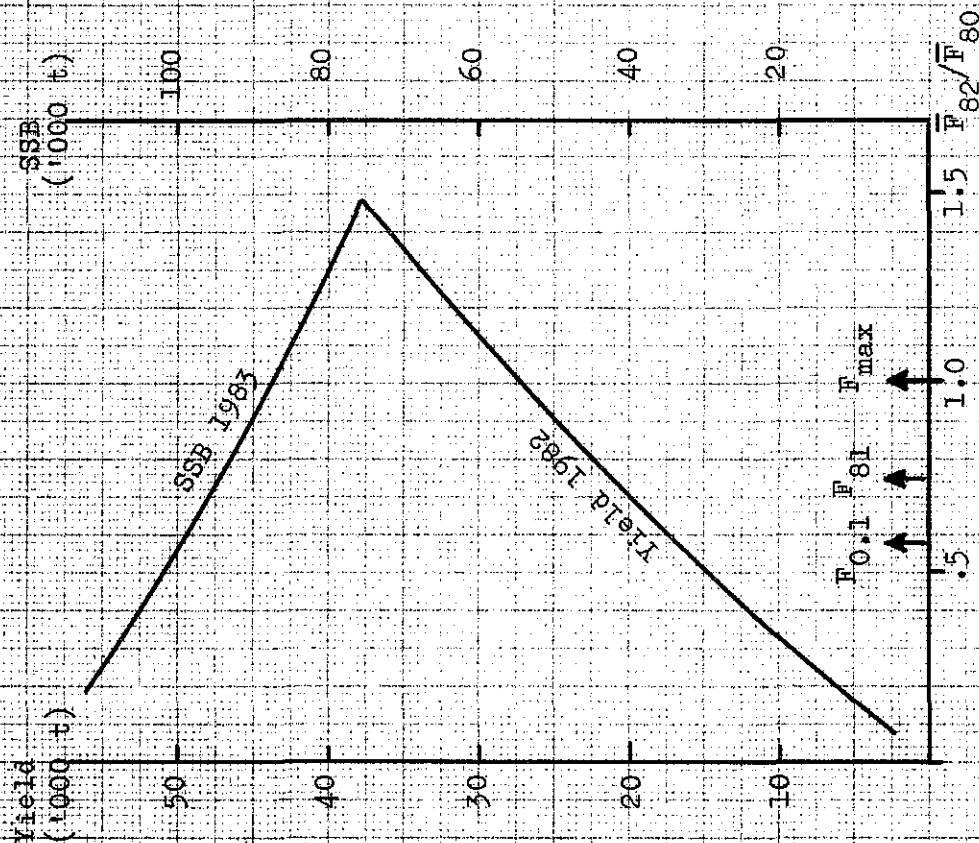


Figure 13. Faroe Plateau CQD. Predictions for catch in 1982 and spawning stock biomass in 1983.

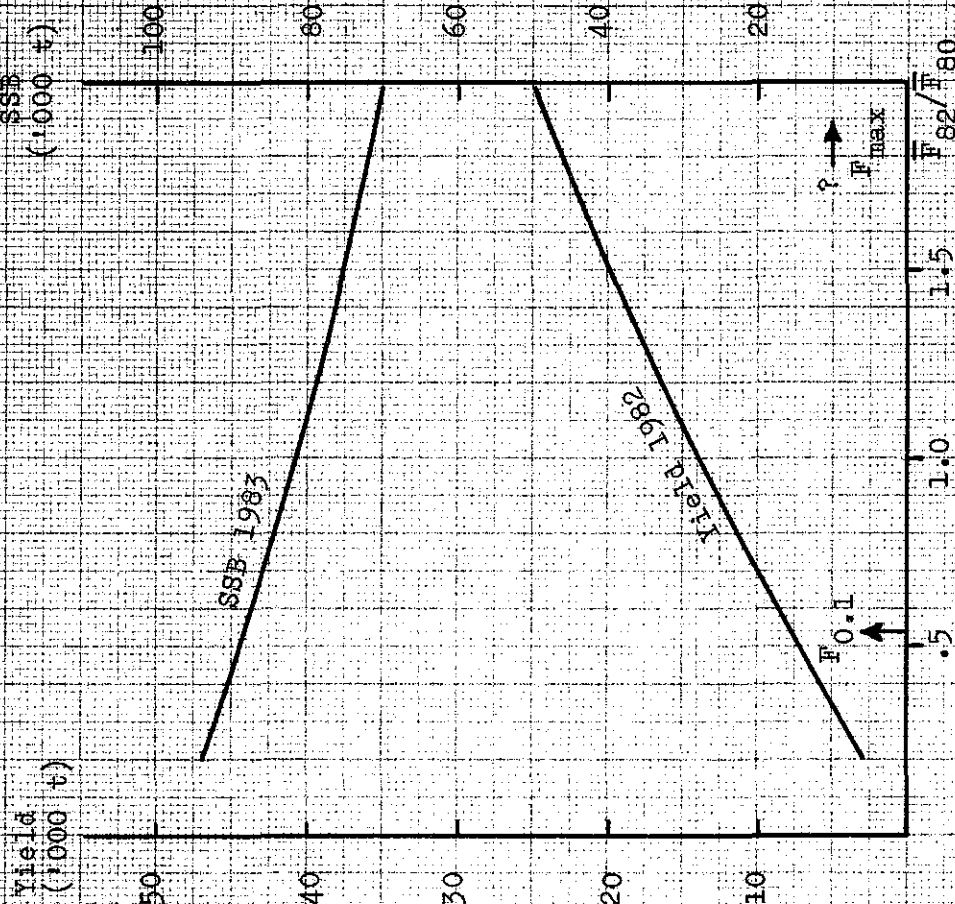


Figure 14. Faroe Haddock. Predictions for catch in 1982 and spawning stock biomass in 1983.

Figure 15. Spawning stock biomass and yield in 1981 for Division
Via HERRING stock at different values of F .

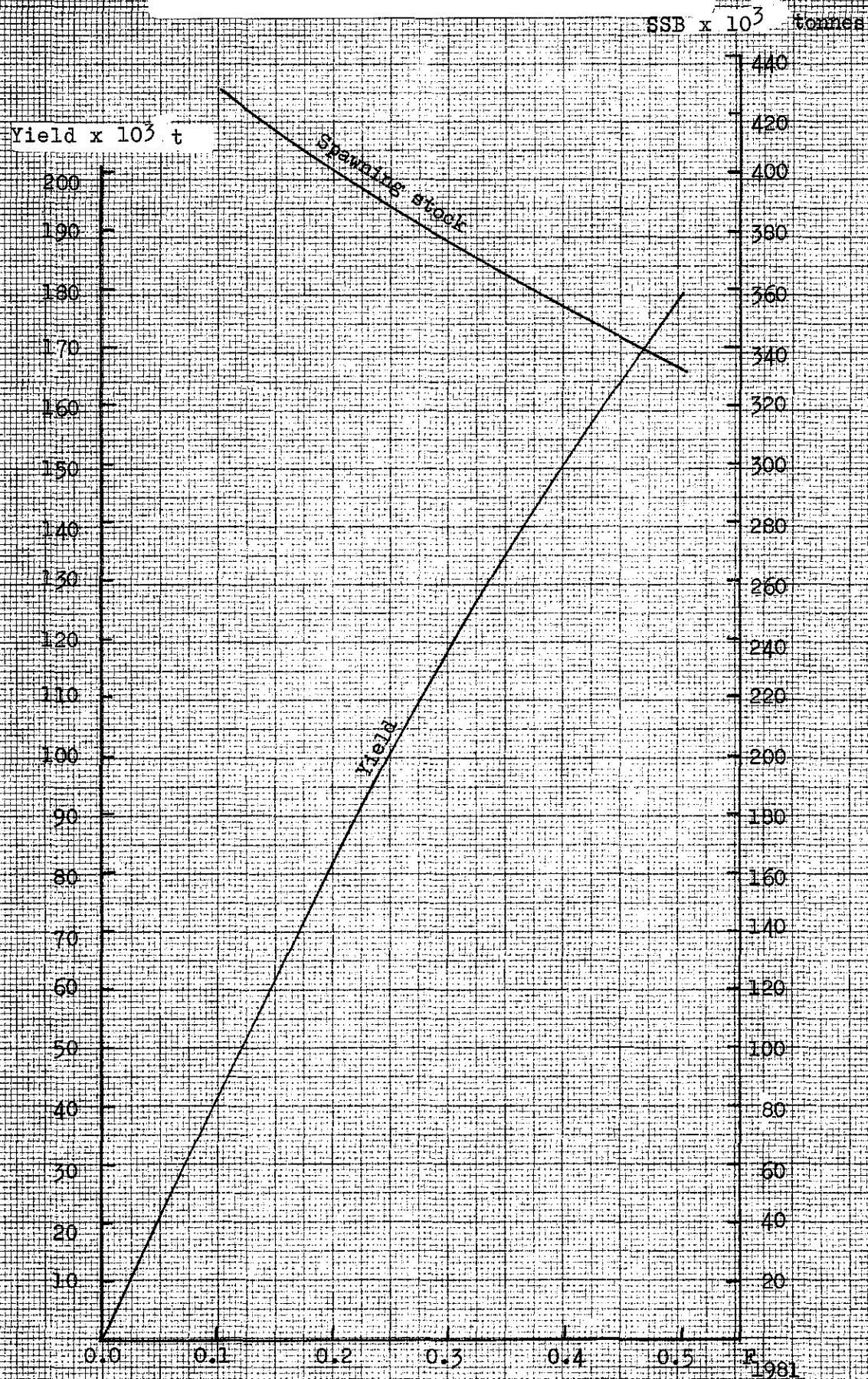


Figure 16.

Manx herring. Catch forecast for 1981 and resulting spawning stock biomass 1981 at spawning time for a range of fishing mortality.

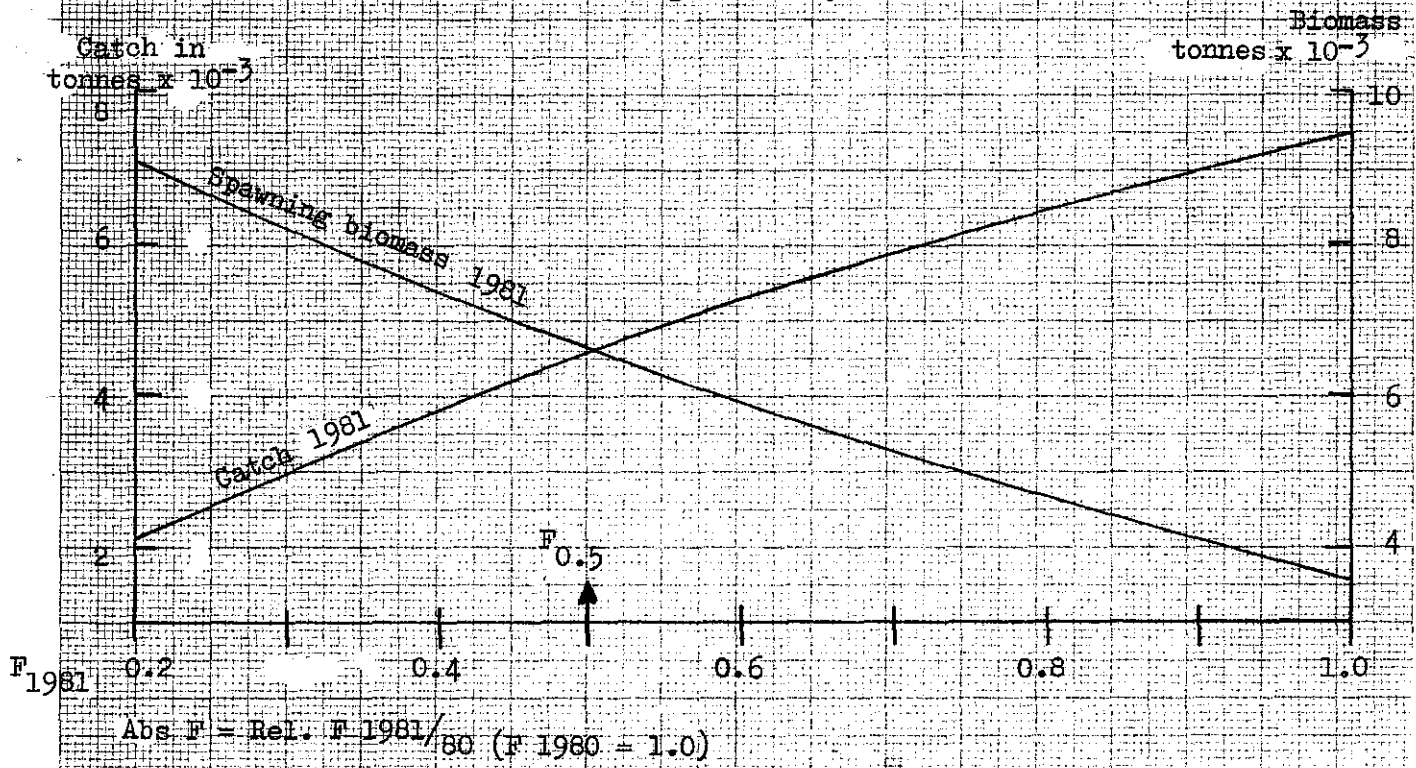
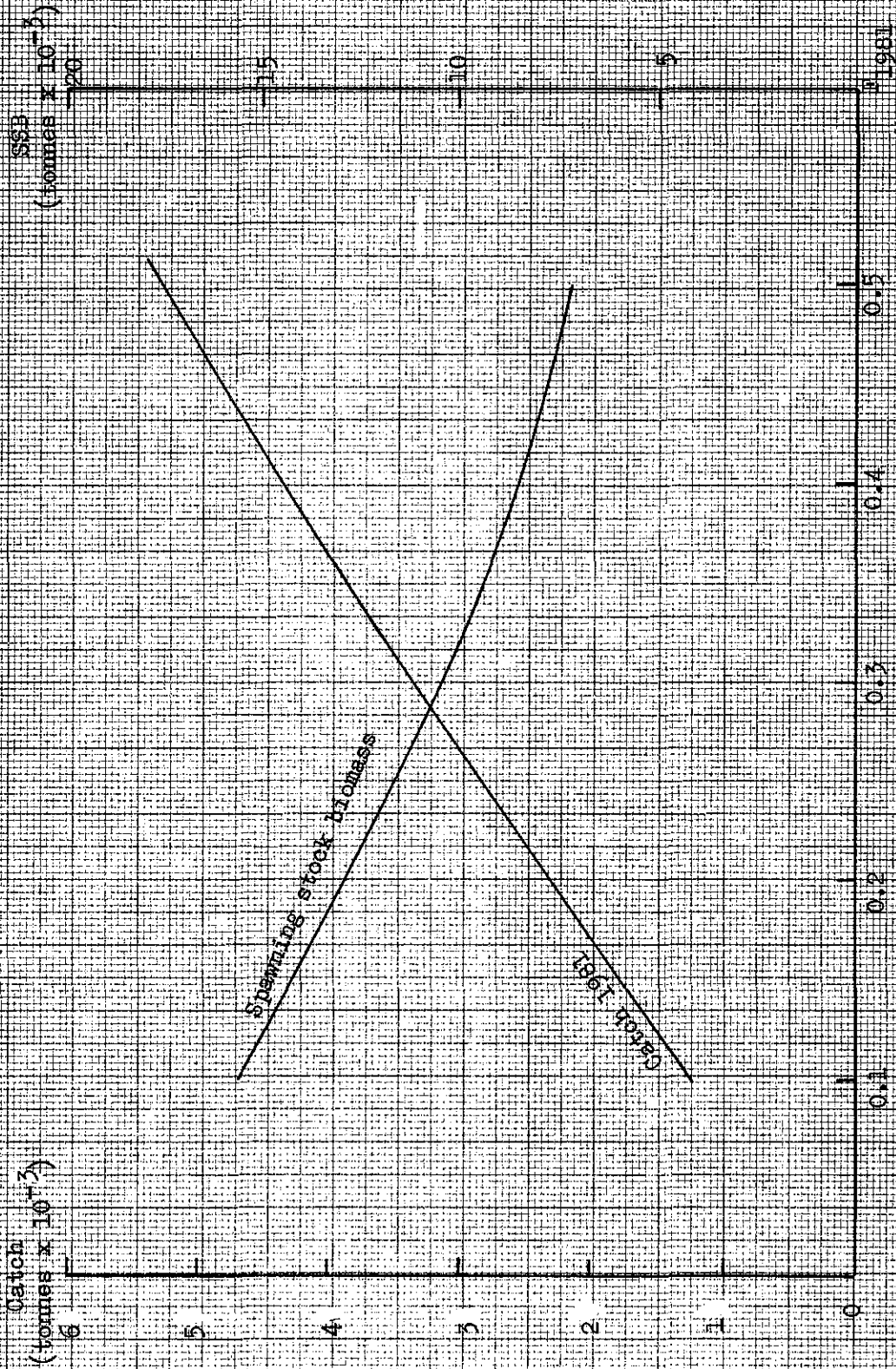


Figure 17. Mourne herring. Catch forecasts for 1981 and resultant stock biomass at time of spawning for a range of fishing mortalities in 1981.



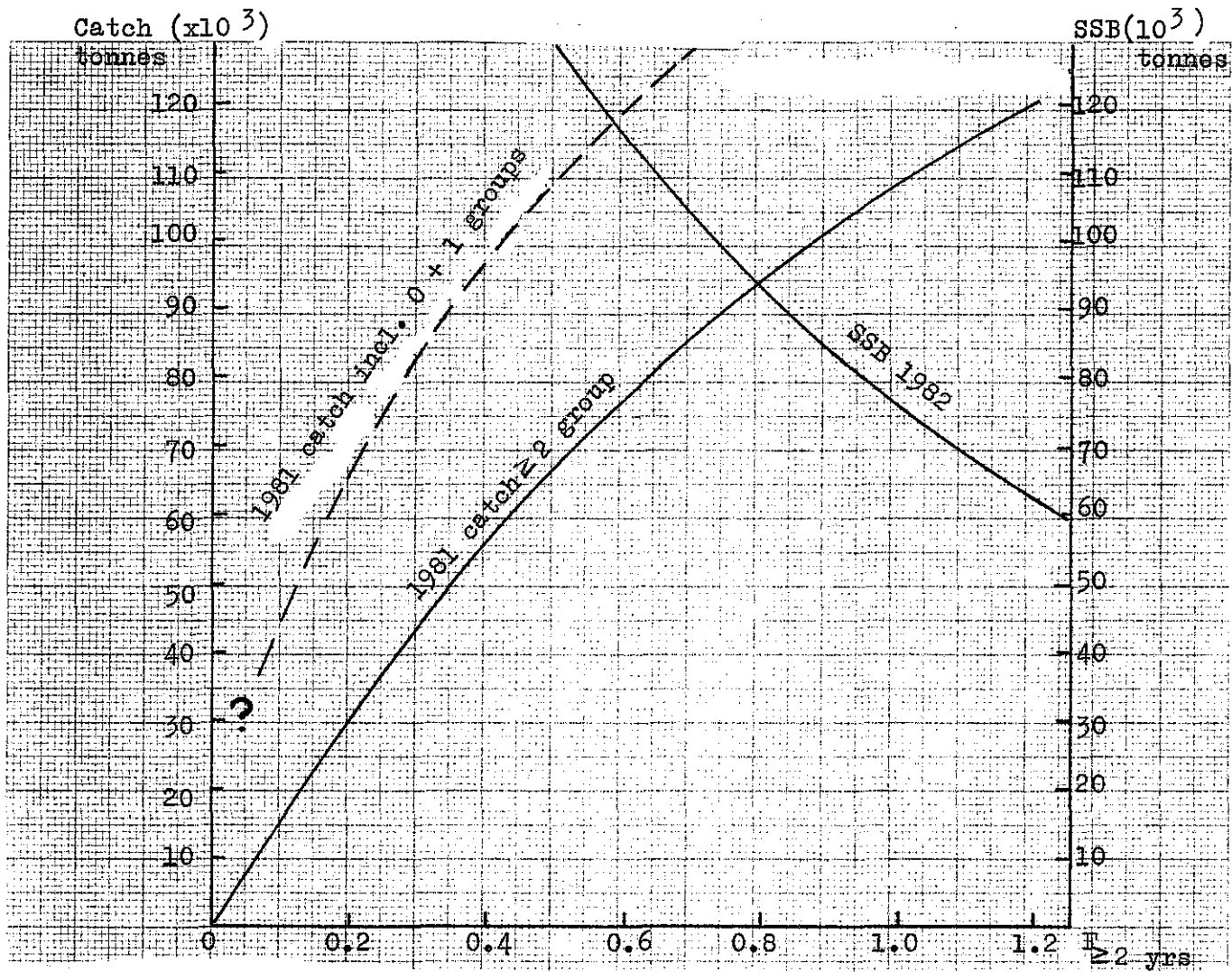


Figure 18. Division IIIa HERRING. Catch in 1981 and spawning stock biomass 1 January 1982 plotted against $F(2+)$ in 1981.

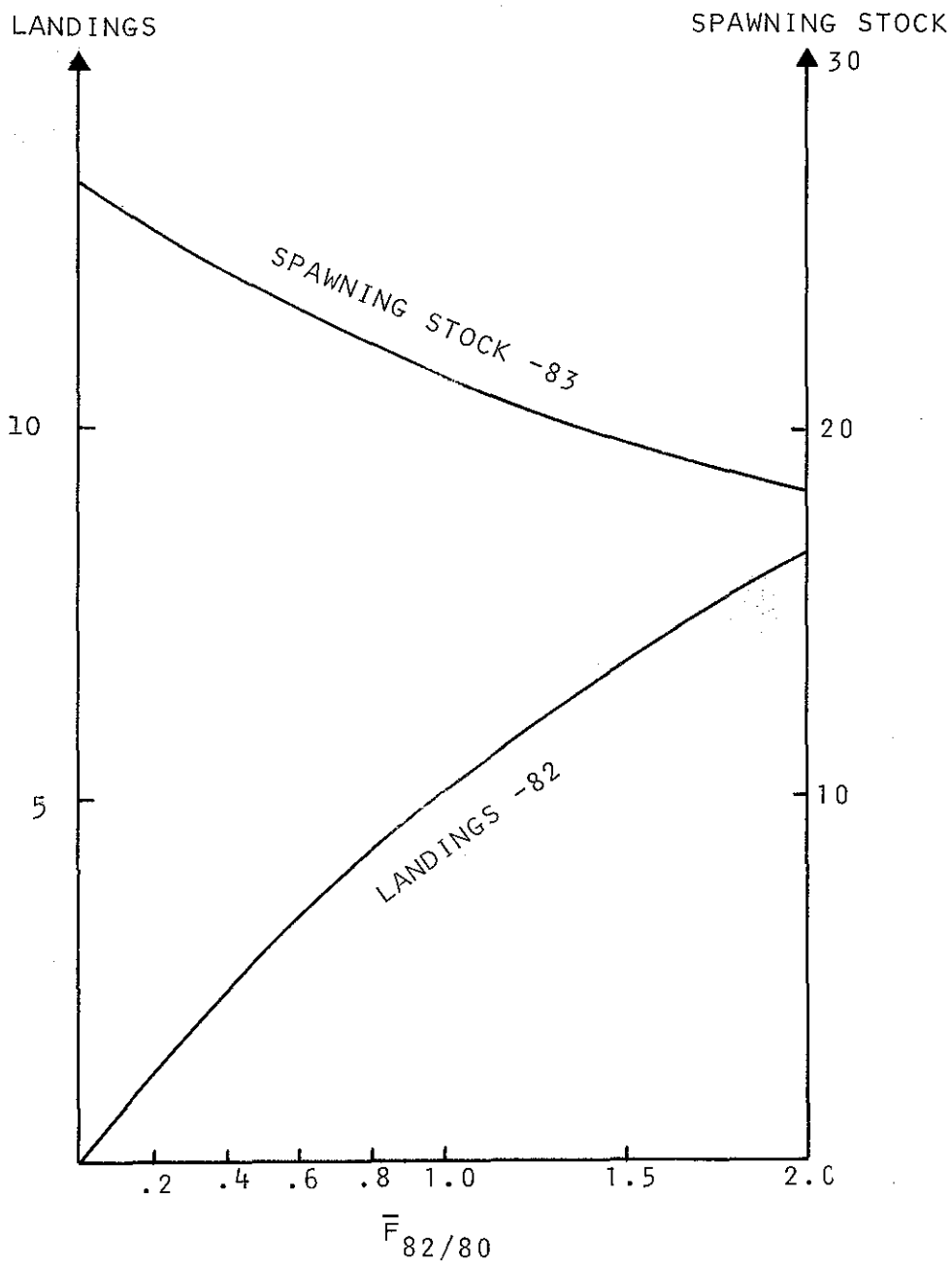


Figure 20. PLAICE in the Kattegat.
Predictions for catch in 1982 and spawning
stock biomass in 1983 (in thousand tonnes).

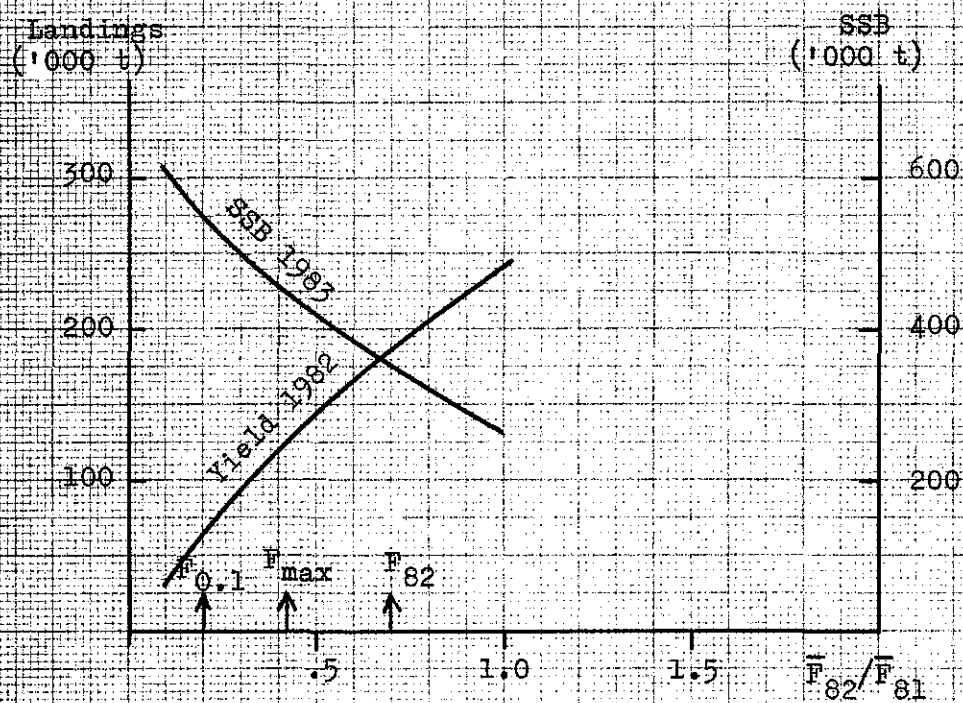


Figure 21. North Sea COD.
Predictions for landings in 1982
and spawning stock biomass in
1983.

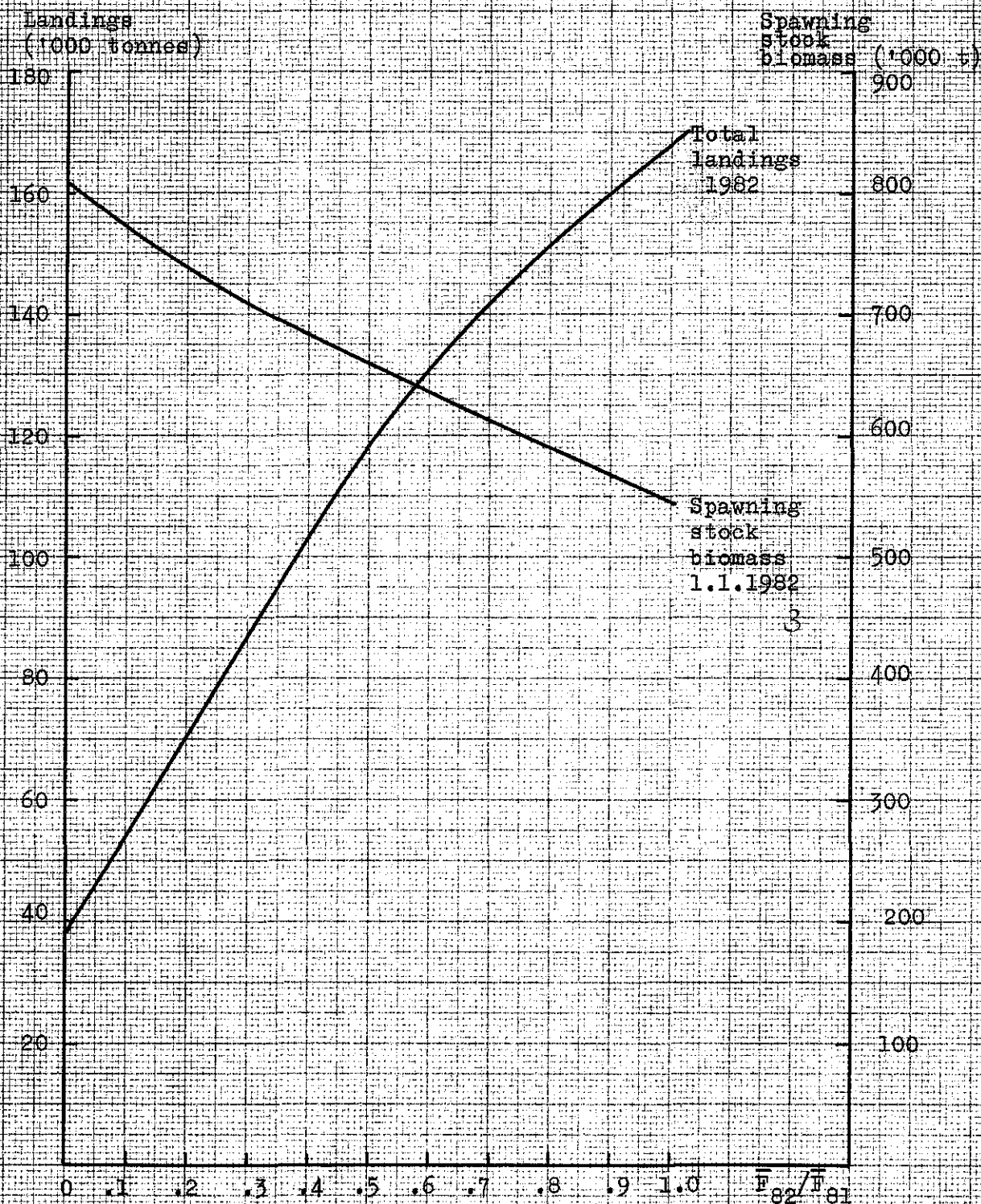


Figure 22. North Sea HADDOCK.
Predictions for landings in 1982 and
spawning stock biomass in 1983.

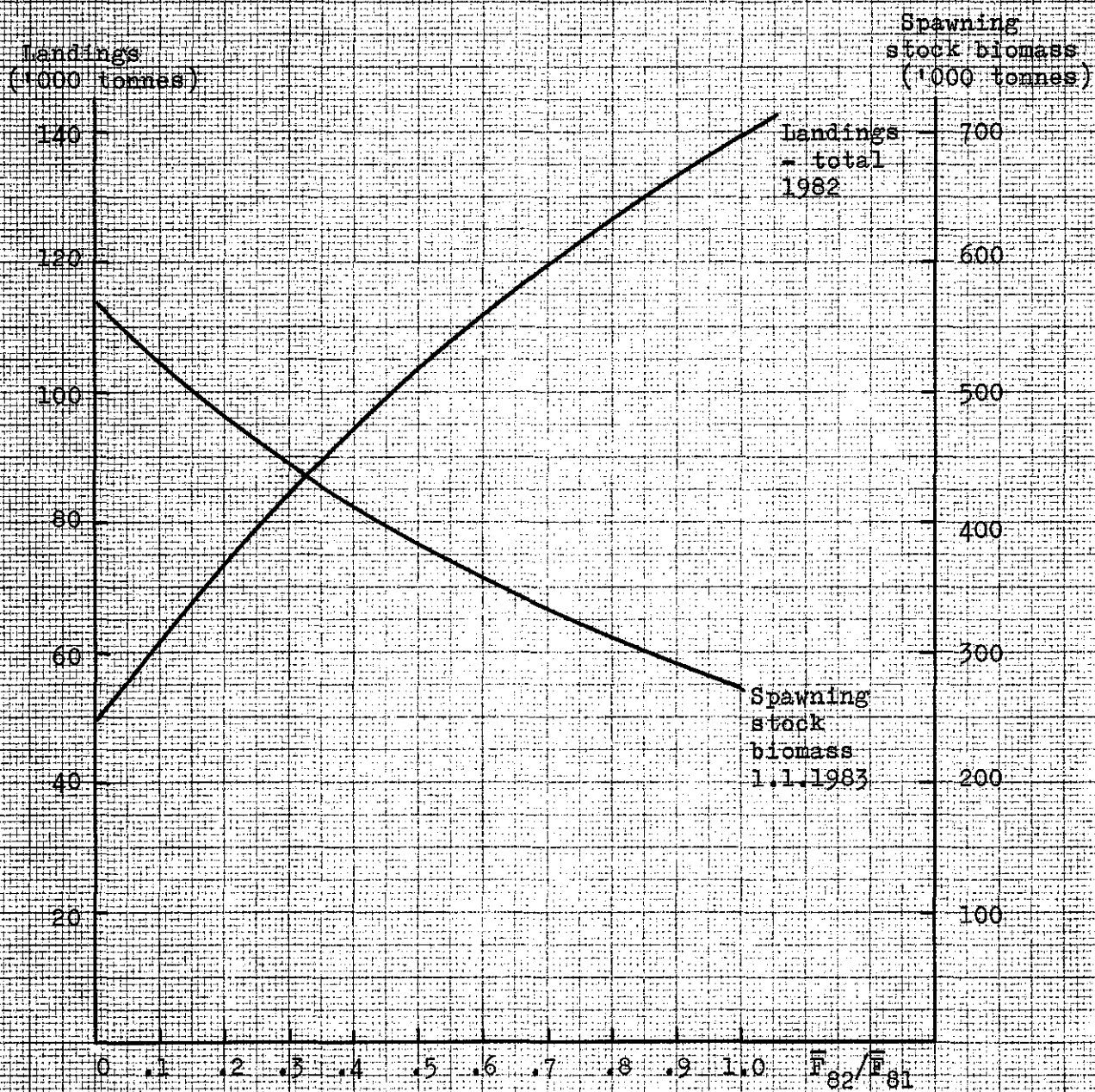


Figure 23. North Sea WHITING.
Predictions for landings in 1982 and
spawning stock biomass in 1983.

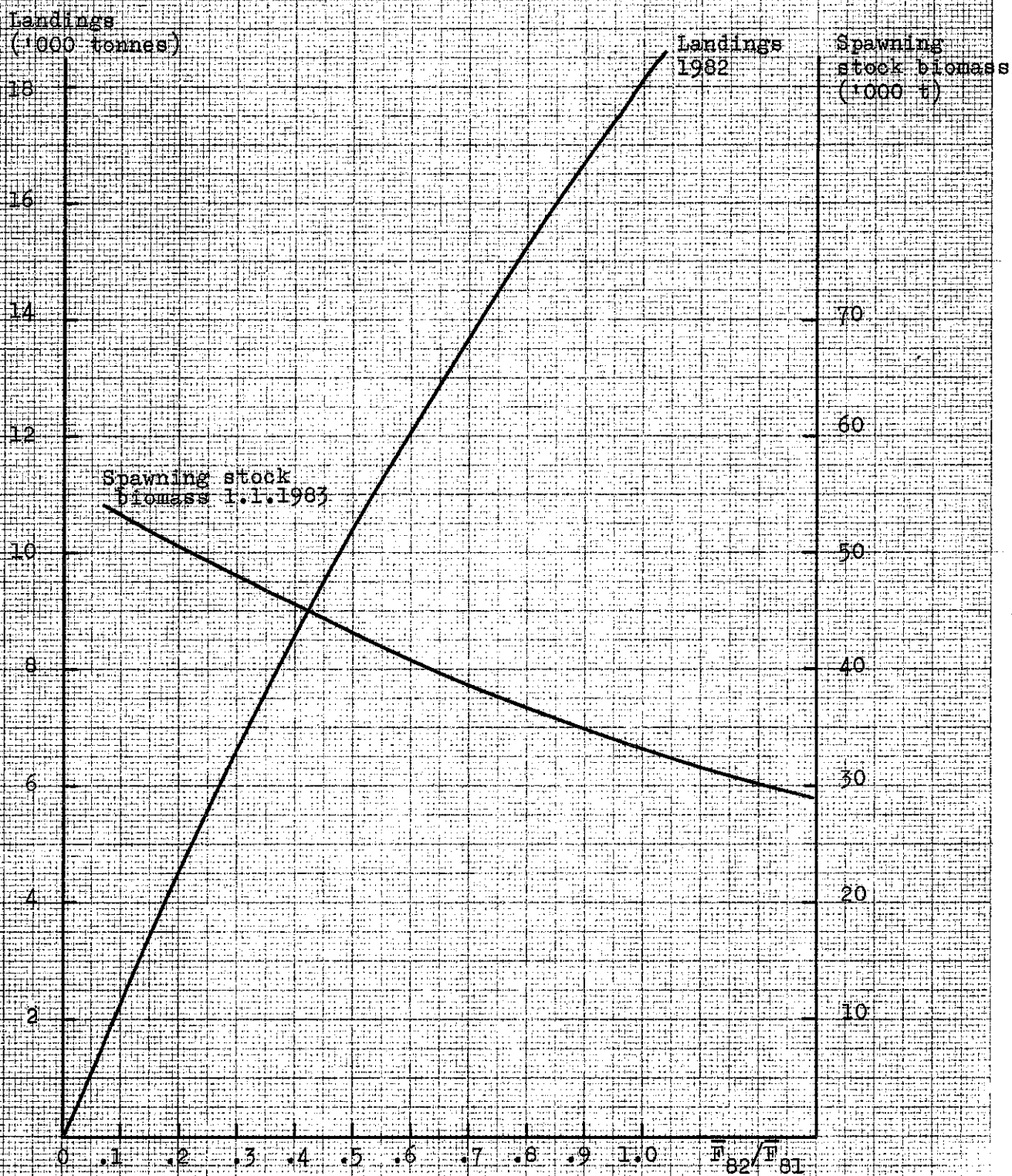


Figure 24. GOD in Division VIa.
Predictions for catches in 1982 and
spawning stock biomass in 1983.

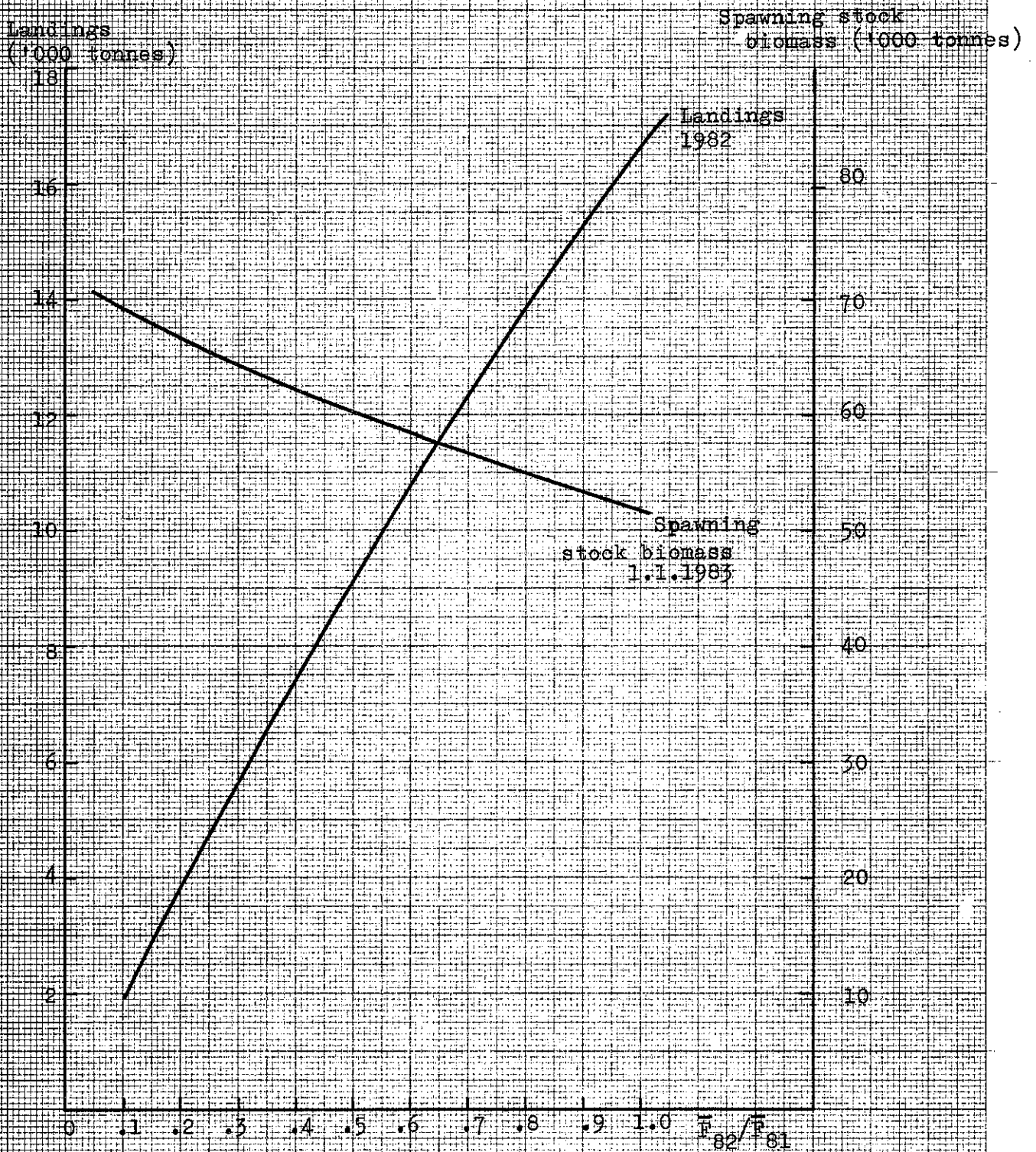


Figure 25. HADDOCK in Division VIa.
Predictions for catch in 1982 and spawning
stock biomass in 1983.

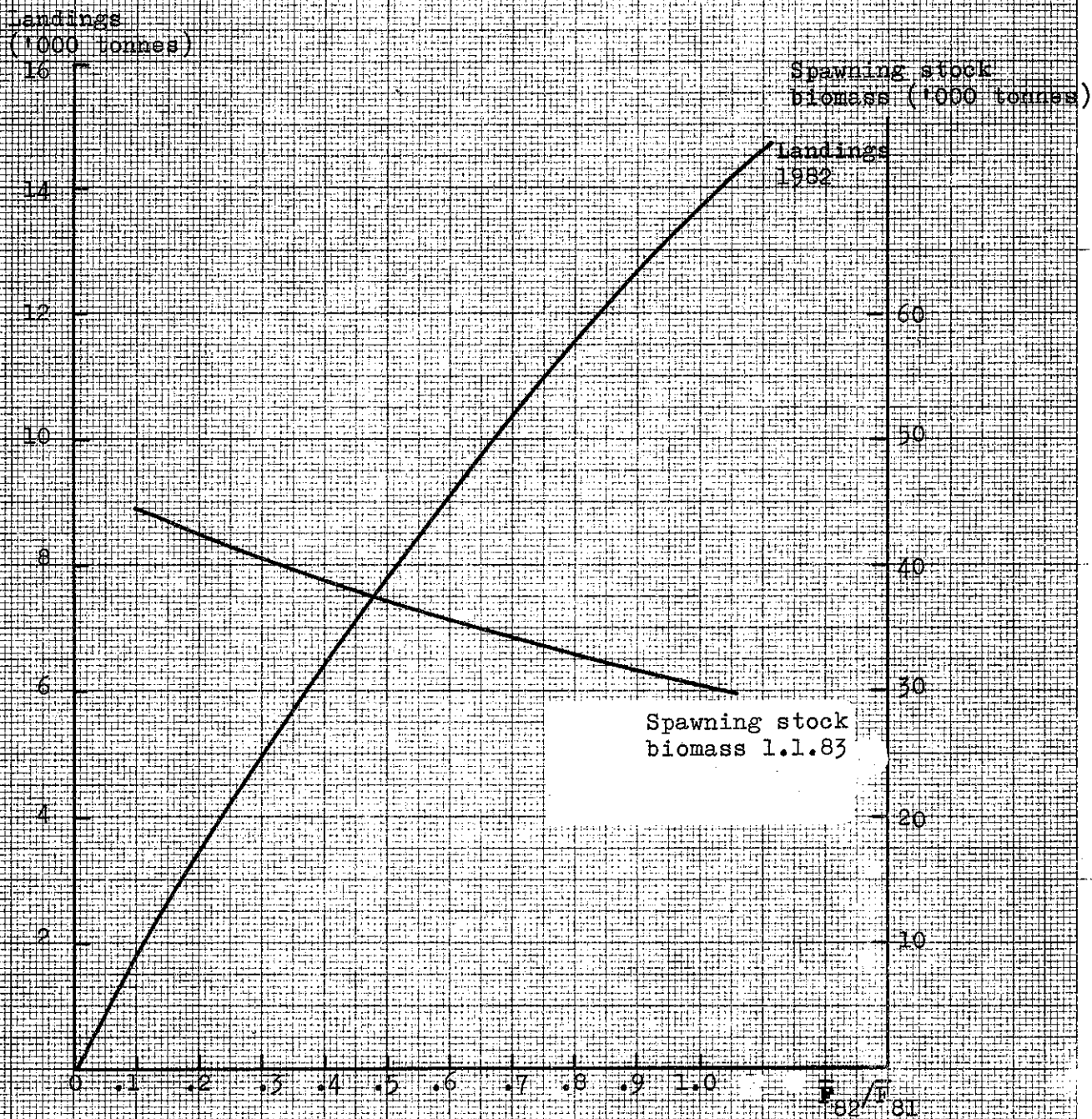


Figure 26. WHITING in Division VIa.
Predictions for catch in 1982 and spawning
stock biomass in 1983.

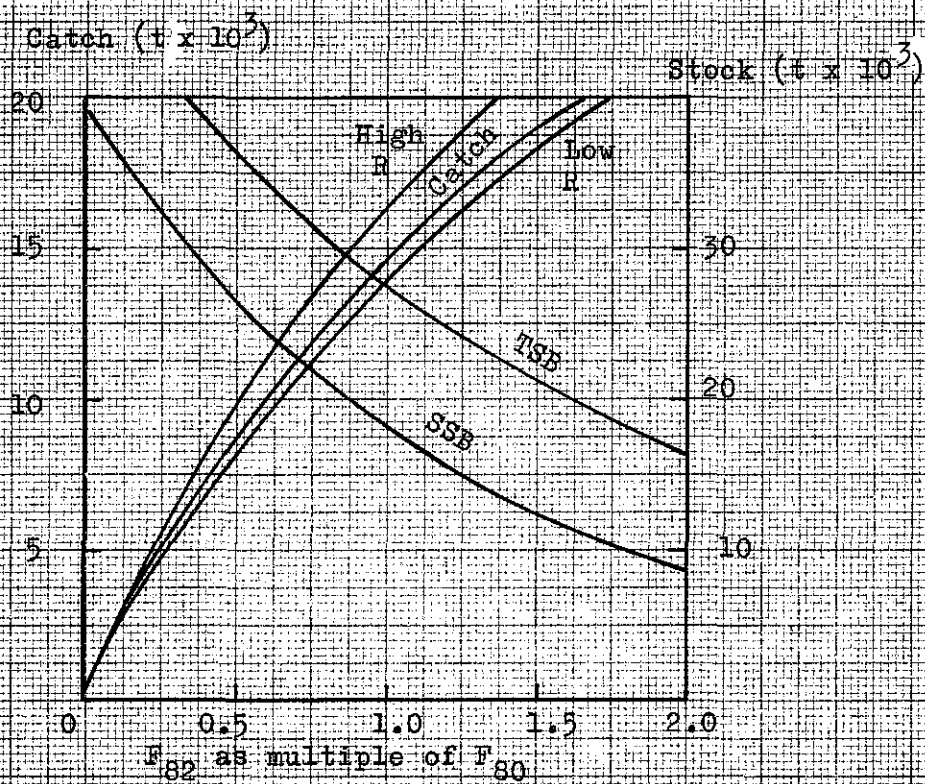


Figure 27. IRISH SEA COD (Division VIIa).

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.)

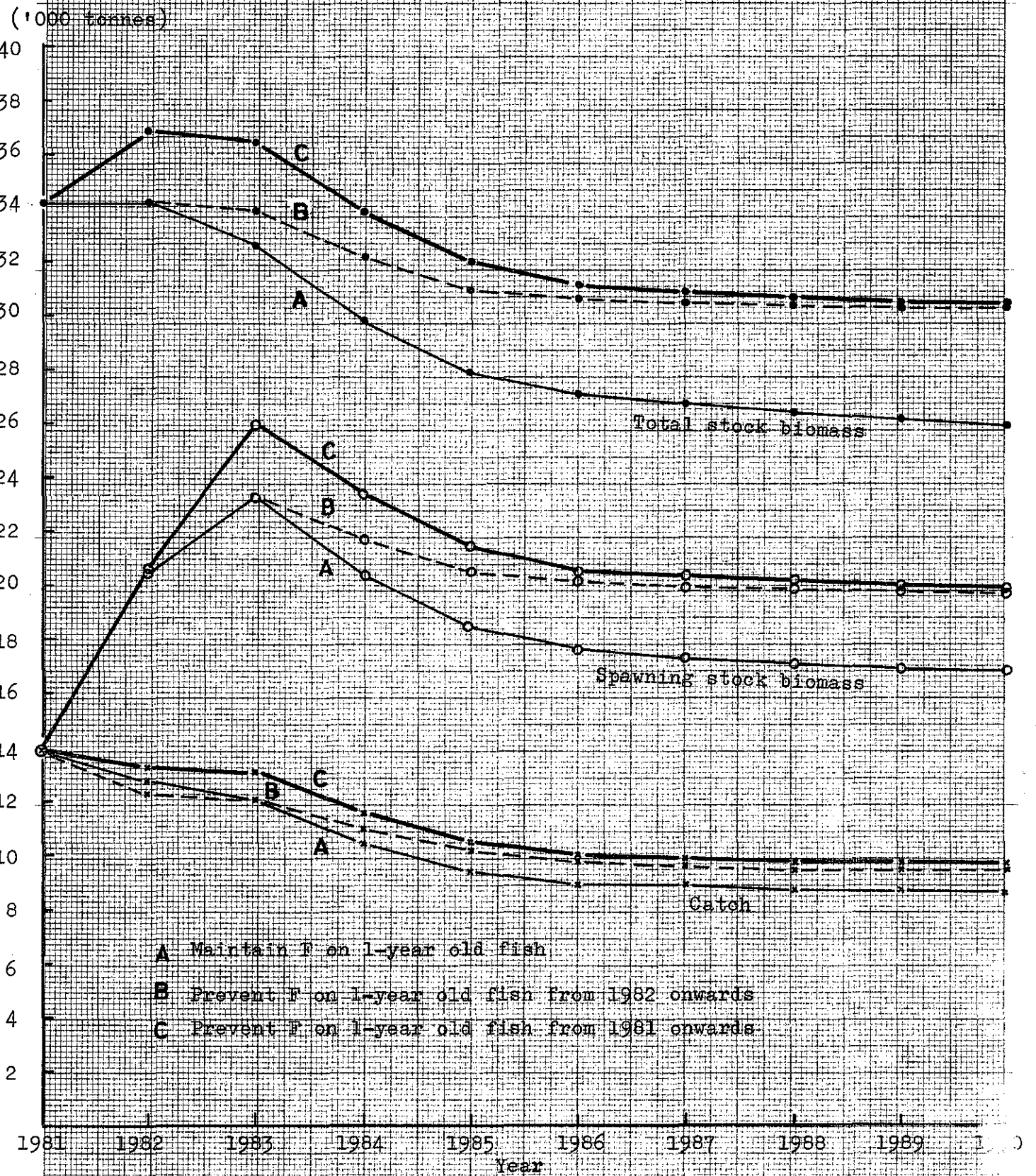


Figure 28. Irish Sea COD.

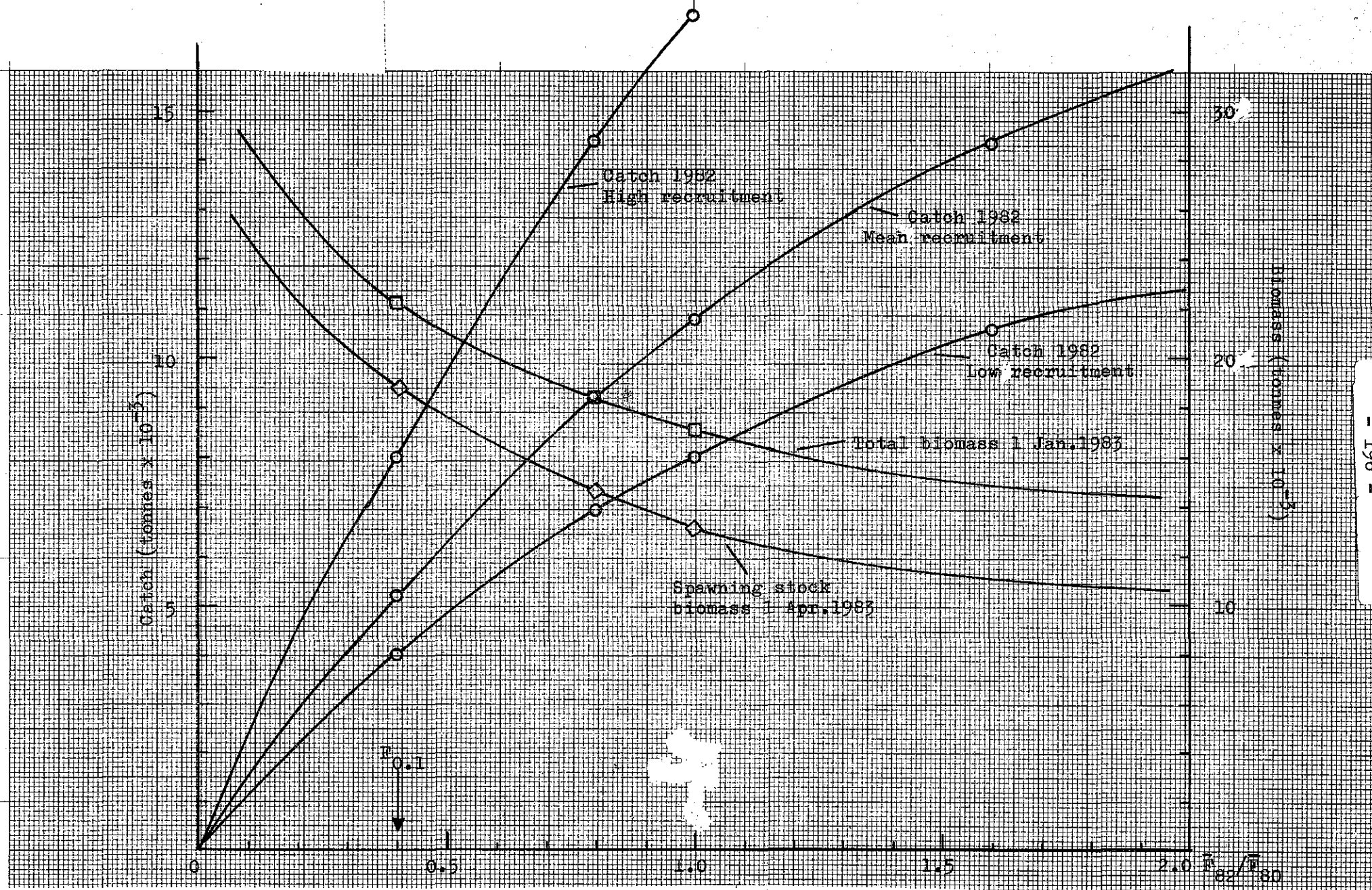


Figure 29. IRISH SEA WHITING. Catch forecasts for 1982 and resulting stock biomass in 1983 for a range of values in 1982, showing for the catch, the effect of the 5% confidence limit of two high and two low recruitments.

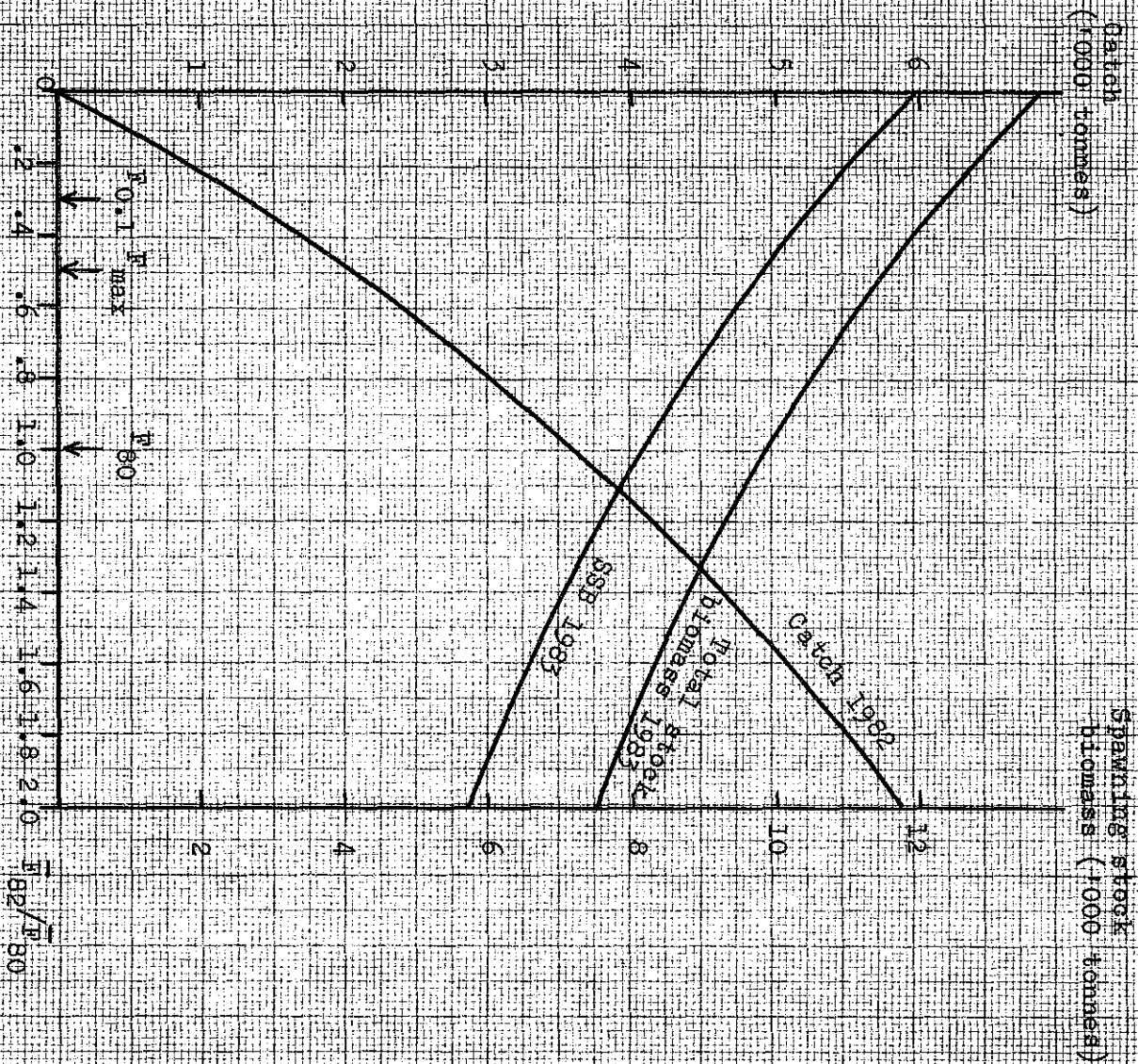


Figure 30. Irish Sea PLAICE.
Catch in 1982 and spawning stock biomass
at 1.1.1983 for various levels of F in
1982.

Figure 31.

CELTIC SEA PLATON.

Catch forecast for 1982 and resulting stock biomass in 1983 for range of fishing mortalities in 1982.

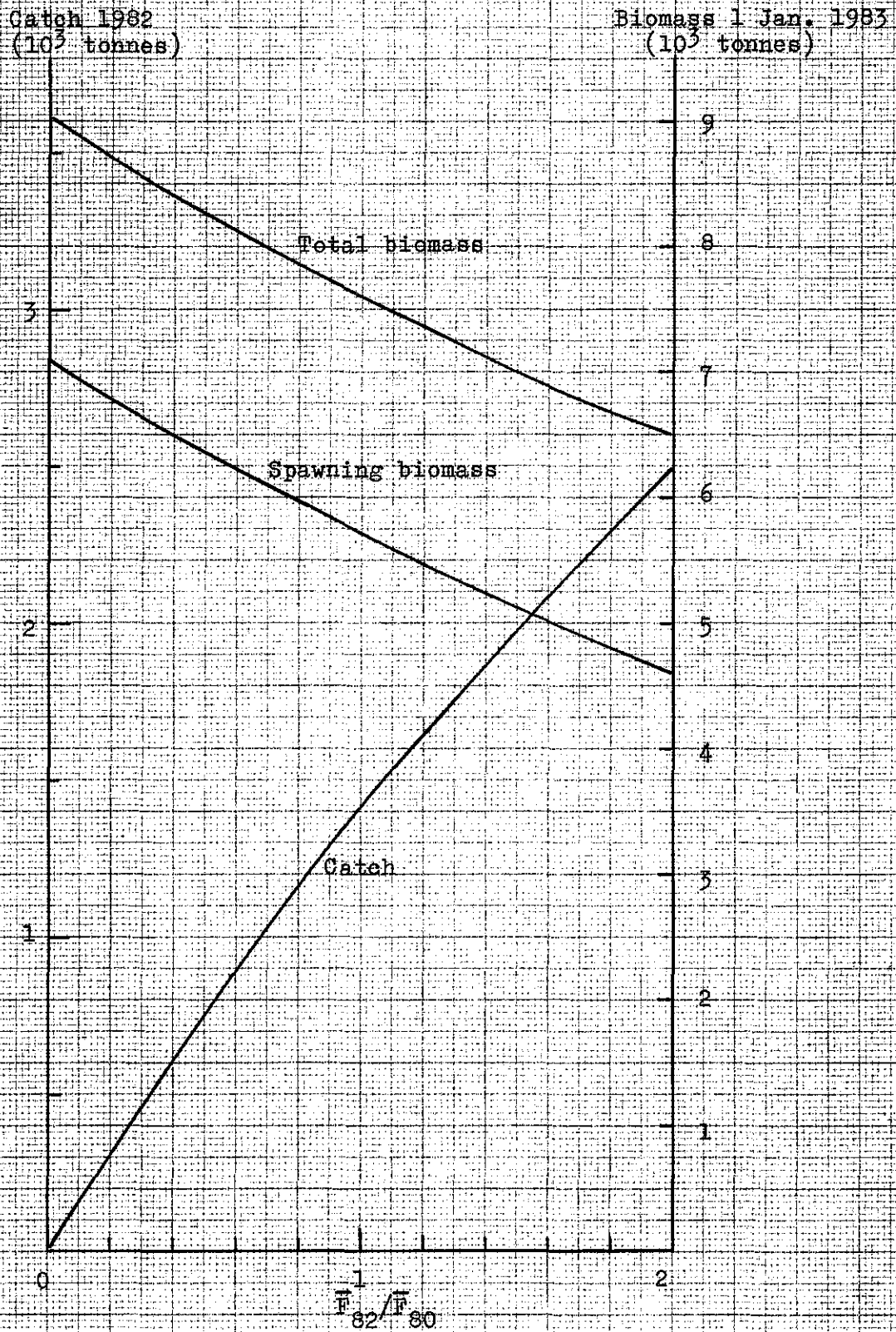
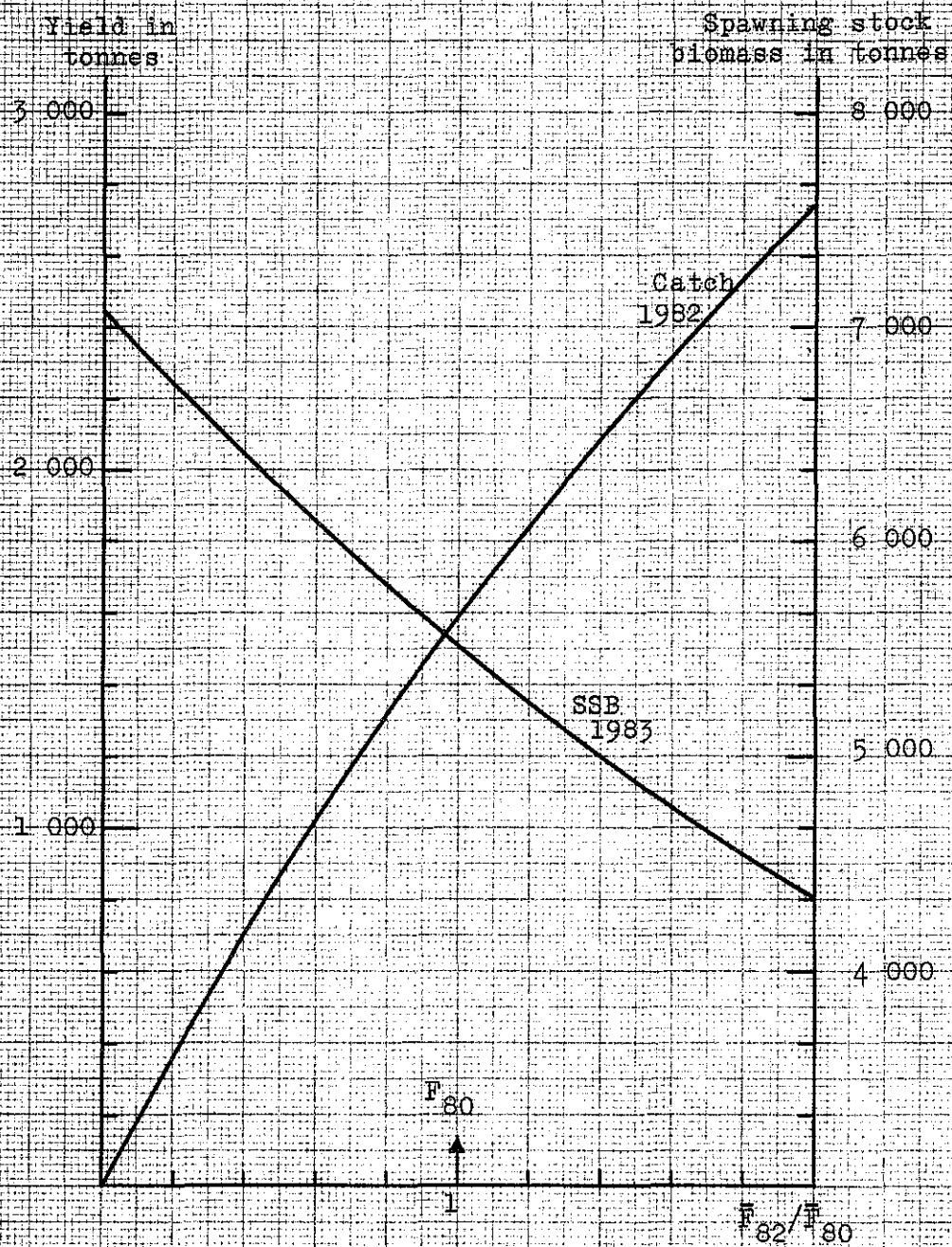


Figure 32. IRISH SEA SOLE.
Catch 1982 and spawning stock biomass
1983 for various levels of F in 1982.



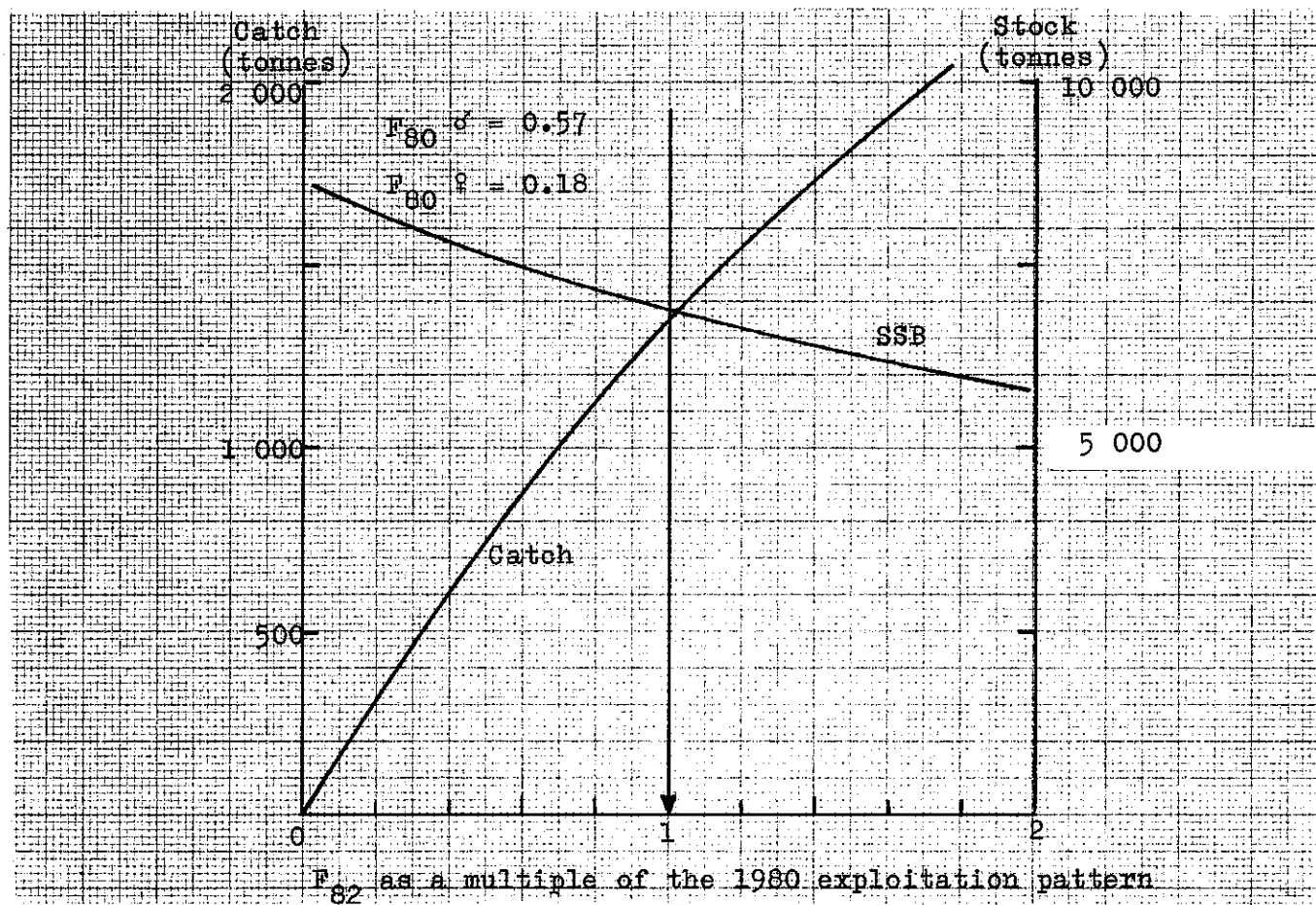


Figure 33. Celtic Sea SOLE (Divisions VIIIf and VIIg). Catch forecasts for 1982 and resulting spawning stock biomass in 1983 for a range of fishing mortalities in 1982.

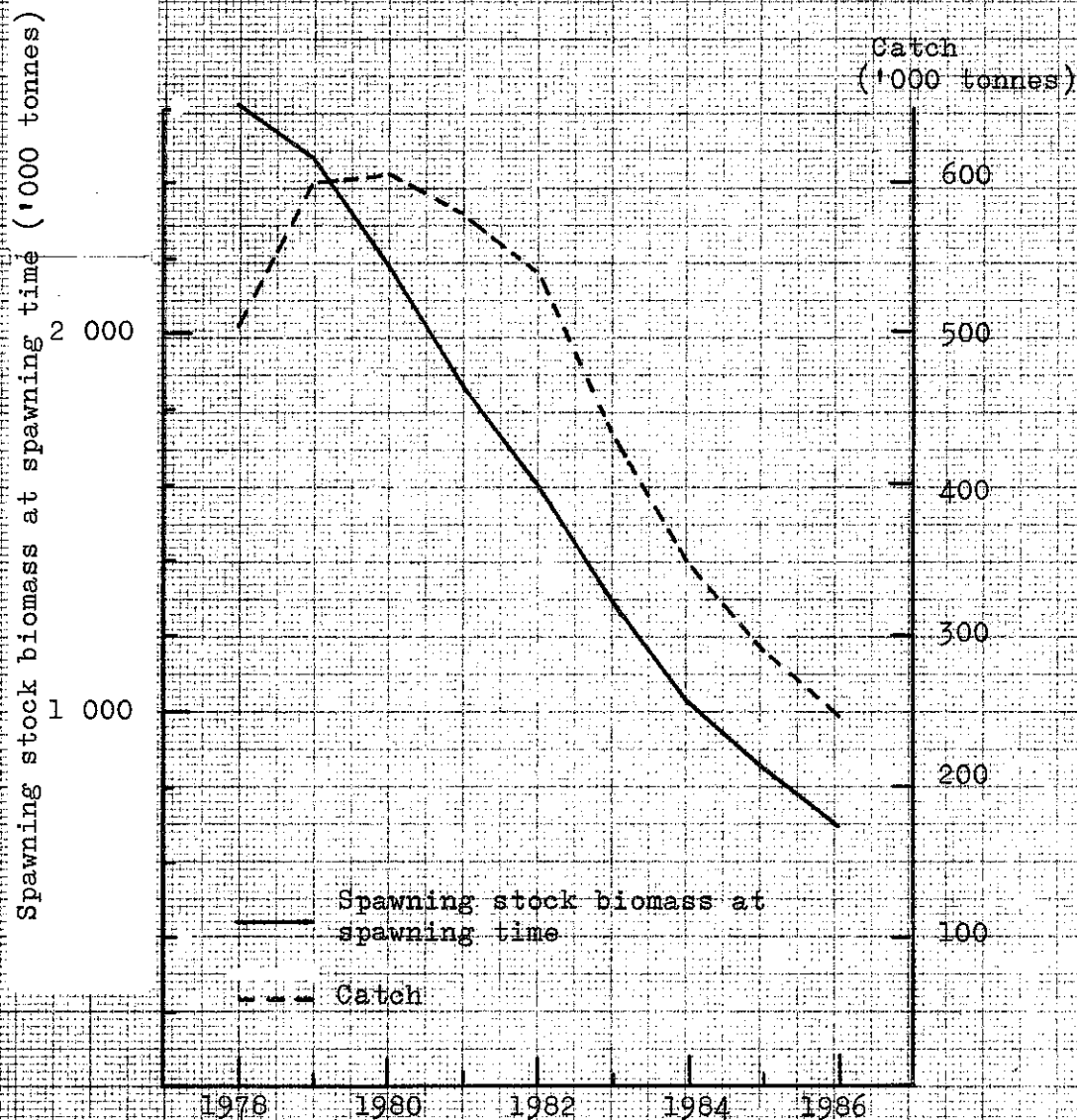


Figure 34. MACKEREL - Western stock.
 Projection of spawning stock biomass and catch under assumptions of low recruitment from 1982 onwards and of the recommended 1982 TAC being exceeded by 100%.

REPORT TO THE INTERNATIONAL BALTIC SEA FISHERY COMMISSION¹⁾

A. REVIEW OF NOMINAL CATCHES IN THE BALTIC, 1970-79

1. The nominal fish catches in the Baltic from 1970-79 are summarized in the text-table below, in thousand tonnes:

| Species \ Year | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
|--------------------|------|------|------|------|------|------|------|------|------|------|
| Cod | 192 | 160 | 186 | 189 | 189 | 234 | 255 | 213 | 196 | 273 |
| Herring | 312 | 335 | 345 | 404 | 407 | 415 | 393 | 413 | 420 | 459 |
| Sprat | 153 | 185 | 207 | 213 | 242 | 201 | 195 | 211 | 132 | 78 |
| Flatfishes | 19 | 19 | 20 | 18 | 21 | 24 | 19 | 22 | 23 | 24 |
| Salmon | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 2 |
| Freshwater species | 17 | 14 | 17 | 23 | 21 | 20 | 21 | 22 | 22 | 20 |
| Others | 49 | 51 | 54 | 55 | 54 | 60 | 46 | 42 | 44 | 47 |
| Total | 745 | 766 | 831 | 905 | 937 | 957 | 932 | 925 | 839 | 903 |

Cartilaginous species as well as unsorted and unidentified fish are included in the "Others" category, whereas anadromous species, except salmon, shellfish catches and seaweed products are not reflected in the table. It should be noted that the table above is based on the official nominal catch figures as reported to ICES by national statistical offices by Divisions IIIb,c and d. These do not necessarily correspond to the biological data used by ICES Working Groups for assessments, based on smaller Sub-divisions or groups of Sub-divisions, which are given in the sections below dealing with stock assessments.

2. The present report includes three tables of nominal catches from 1963-80 for cod, herring and sprat, and one table (1963-79) for flatfishes. The 1963-79 figures are those officially reported to ICES by national offices. The 1980 figures are preliminary ones. (see Tables 1-4.)

A combined table of recent catches by Sub-divisions and recommended TACs is given on page 224 (Table 5).

3. Total catches of all fish species combined had grown steadily from 745 000 tonnes in 1970 to a peak of 957 000 tonnes in 1975; thereafter they started to decline at approximately the same rate as they had previously increased. In 1979, however, the declining trend was arrested and at 903 000 tonnes the total catch was close to the catch level in 1973.

4. Catches of Cod increased sharply in 1979 and at the level of 270 000 tonnes were 77 000 tonnes higher than in 1978 and 18 000 tonnes above the previous record level of 1976. The biostatistical data used by the Working Group on Assessment of Demersal Stocks in the Baltic indicate a further increase in the catches in 1980 to a record level of 387 000 tonnes.

1) Relevant parts of the "Introduction" (pages 2-5 in this issue) were included in the report submitted to the IBSEFC.

5. After a decline in 1976, following a period of steady growth from 1970-75, Herring catches recovered in 1977 and continued to increase to a record level of 459 000 tonnes in 1979. This continued increase is confirmed by biostatistical data used by the Working Group on Assessment of Pelagic Stocks in the Baltic, which takes into account herring and sprat by-catches in each of those fisheries. These data indicate that purely herring removals in 1979 were about 6% higher than in 1978, and that the catch in 1980 stabilized at 453 000 tonnes.
6. Having reached a peak of 242 000 tonnes in 1974, catches of Sprat fluctuated around approximately 200 000 tonnes in 1975-77. However, reduced stocks caused catches to drop first to 132 000 tonnes in 1978 and then to only 78 000 tonnes in 1979. The sharp decrease in sprat catches is confirmed by biostatistical data used by the Working Group on Assessment of Pelagic Stocks in the Baltic, which indicate a continued decline in 1980 to a level of 57 000 tonnes.
7. Catches of Flatfishes were relatively stable during the period under consideration, fluctuating from 18 000 tonnes to 24 000 tonnes (the latter in both 1975 and 1979). Flounder continued to be the leading species item in this category, followed by plaice.
8. Catches of Salmon fluctuated between 2 000 and 3 000 tonnes. The exact figure reported for 1979 was 2 257 tonnes.
9. Catches of Freshwater Species were at about the same levels as the flatfish catches throughout the period in question, taking into account the pre-1973 catches of the German Democratic Republic not included in the table. The catch of 20 000 tonnes in 1979 was 2 000 tonnes lower than in 1977-78.
10. Catches of "Other Species" were at an average level of 52 000 tonnes in 1970-74 and rose to a peak of 60 000 tonnes in 1975. After that, the average annual level decreased to 44 000 tonnes. Sticklebacks, eelpout, river eel and garfish were the most important single species items in the 1979 catch of 47 000 tonnes. Nearly 46% of the total was reported as unsorted and unidentified species.

B. THE BALTIC PELAGIC FISHERIES

11. The Working Group on Assessment of Pelagic Stocks in the Baltic met at ICES headquarters from 5-14 May 1981 to:
 - a) estimate TACs for herring and sprat stocks in the Baltic area,
 - b) compile available data on by-catches of herring in the sprat fisheries and in the industrial fisheries,
 - c) assess the effects of these by-catches on herring stocks and advise on means of minimizing these effects,
 - d) reconsider the advice previously given on measures to protect juvenile herring in the Baltic.

B.1. Herring Stocks

B.1.1. General

12. Recent catches¹⁾ of herring and TACs in thousand tonnes:

| Sub-divisions | 1977 | | | 1978 | | | 1979 | | | 1980 | | |
|--------------------------|---------------|--------------|-----------------|---------------|--------------|-----------------|---------------|--------------|-----------------|---------------|--------------|-------------------------------|
| | Recom. TAC | IBSFC TAC | Actual catch | Recom. TAC | IBSFC TAC | Actual catch | Recom. TAC | IBSFC TAC | Actual catch | Recom. TAC | IBSFC TAC | Actual catch ²⁾ |
| 22-24 | | | 75 | } 290 | | 78 | 68 | | 94 | 67 | | 109 |
| 25,26 | | | 152 | | | 142 | 115 | | 168 | 118 | | 143 |
| 27,28 ³⁾ ,29S | | | 68 | | | 73 | 65 | | 63 | 61 | | 70 |
| Gulf of Riga | | | 24 | } 74 | | 17 | 16 | | 17 | 15 | | 15 |
| 29N,30,31 | | | 65 | | | 73 | 78 | | 70 | 73 | | 71 |
| 32 | | | 50 | | | 53 | 44 | | 46 | 40 | | 45 |
| Total | 400 | 422 | 434 | 397 | 444 | 436 | 386 | 405 | 458 | 374 | 420.2 | 453 |

| Sub-divisions | 1981 | | 1982 |
|-----------------------|-------------------|--------------|-------------------|
| | Recom. TAC | IBSFC TAC | TAC |
| 22-24 | 71 | | 70 ⁶⁾ |
| 25,26,27 | 115 | | 130 ⁷⁾ |
| 28 ³⁾ ,29S | 28 | | 28 ⁷⁾ |
| Gulf of Riga | 15 | | 12 ⁸⁾ |
| 29N,30,31(E) | 62 | | 63 ⁷⁾ |
| 29N,30,31(W) | 4) | | 8 ⁶⁾ |
| 32 | 50 | | 54 ⁷⁾ |
| Total | 341 ⁵⁾ | 418.6 | 365 |

- 1) Working Group data (incl. by-catches in sprat fisheries). 2) Preliminary. 3) Excluding Gulf of Riga.
4) Owing to lack of data, it was not possible to propose a TAC. 5) Without the areas 29N,30,31(W)
6) Precautionary TAC. 7) Catch level preferred by ACFM.
8) Recommended TAC.

Herring catch data presented to the Working Group for 1979 and 1980 include some data on herring catches in mixed fisheries and exclude some sprat catches in herring fisheries. As in previous years, only very incomplete data were presented on herring by-catches in sprat fisheries and on herring discards.

In 1980, the total landings of Baltic herring were only slightly lower than in 1979 (correspondingly 453 261 and 458 519 tonnes).

13. As in 1980, assessment of herring stocks were carried out by the following groups of Sub-divisions: 22-24, 25+26+27, 28+29S, Gulf of Riga; 29N+30+31(East), 29N+30+31(West), 32. Because the importance of autumn herring is still very low in all of the Sub-divisions, the stocks of spring and autumn herring were assessed together as one unit. The natural mortality rates were taken to be in Sub-divisions 22+24 - 0.3, in Sub-divisions 25+26+27 - 0.2, in the Gulf of Finland and Gulf of Bothnia - 0.15. Because herring stocks in Sub-divisions 28 and 29S have been the most affected by the cod invasion in about 1978, for these stocks M values were varied by periods. In the open sea stock M₁₉₇₀₋₇₇ was assumed to be 0.2, M₁₉₇₈₋₈₀ - 0.3 and M₁₉₈₁₋₈₃ - 0.25; for the Gulf of Riga herring the applied M values were as follows: M₁₉₇₀₋₇₈ = 0.15; M₁₉₇₉₋₈₀ = 0.25; M₁₉₈₁₋₈₃ = 0.20. Instead of knife-edge maturation assumed in previous assessments, this year maturity ogives were applied for VPA of corresponding stocks.

Abundance of the 1981-83 year classes was assumed to be of the long-term average level. As an exception, in Sub-divisions 22-24, based on preliminary data of the German Democratic Republic larval survey and low water temperatures, the 1981 year class was taken to be about half the long-term average abundance.

With the exception of one assessment unit (25+26+27), the stocks were assessed on the basis of data originating from commercial catches and larval and young fish experimental catches. For assessment of herring stocks in Sub-divisions 25+26+27, a combination of data collected from commercial fishery and hydroacoustic investigations was used. Acoustic surveys have substantially contributed to better understanding of other stocks of the Baltic Proper. Therefore, this work should be continued.

B.1.2. State of the stocks and catch predictions.

14. Herring spawning stocks estimated by VPA, in thousand tonnes.

| Assessment Units | From VPA | | | | | | | | | Acc. to input F_0 and prognoses | | | | |
|---------------------------------|----------|------|-------|-------|-------|-------|-------|-------|-------|-----------------------------------|-------|-------|-------|-------|
| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 |
| 25+26+27 | | | 923.4 | 901.3 | 861.2 | 929.1 | 852.1 | 764.3 | 697.1 | 692.8 | 714.6 | 882.6 | 886.8 | 918.7 |
| 28(excl. Gulf of Riga) + 29S | | | 208.7 | 199.5 | 192.6 | 188.7 | 169.8 | 180.6 | 191.6 | 175.1 | 163.3 | 125.8 | 118.1 | 115.2 |
| Gulf of Riga | 44.2 | 40.8 | 73.5 | 72.4 | 63.2 | 57.9 | 41.5 | 54.7 | 42.4 | 37.8 | 29.6 | 22.6 | 29.8 | 38.3 |
| 29N+30+31(East) | | | | 296.4 | 306.9 | 327.2 | 344.3 | 347.5 | 380.6 | 370.3 | 337.7 | 311.9 | 321.2 | 319.6 |
| 32 | 110.3 | 93.2 | 113.0 | 131.0 | 132.2 | 116.4 | 107.7 | 123.3 | 125.8 | 116.1 | 112.9 | 97.1 | 122.2 | 127.9 |

Sub-divisions 22, 23 and 24

15. The 1980 catch was about 109 000 tonnes, exceeding the 1979 landings by about 15 000 tonnes.

On the basis of the German Democratic Republic young herring survey revised data, the 1980 year class was estimated to be below average ($2\,477 \times 10^6$ fish) and the 1981 year class was assumed to be a weak one ($1\,480.6 \times 10^6$ fish). Fishing mortalities for age groups 3-9 were taken from the 1980 Working Group Report, since the fishing effort on these age groups seemed to have remained constant. Fishing for reduction purposes has ceased, therefore F on age group 1 has decreased substantially. With the current exploitation pattern, herring are fully recruited to the fishery at the end of their second summer. Although the recruitment has not shown any signs of failure, it is quite obvious that the stock is fished at a high exploitation level.

Tagging experiments carried out on the Rügen spawning grounds have given high recapture rates from Division IIIa. This migration pattern, however, up to now could not be taken into account when assessing the stock. Therefore this assessment could not be accepted.

Due to these uncertainties in the assessments, ACFM recommends to lower the exploitation level for the assessment unit with a precautionary TAC of about 70 000 tonnes for 1982.

16. A stabilization of the stock biomass can be expected by improving the exploitation pattern. Mesh selection experiments recently carried out in the Western Baltic indicated selection factors of about 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 the Western Baltic. Accordingly, ACFM recommends that the minimum mesh size in trawl gears for herring is increased to 40 mm in Sub-divisions 22-24. This measure was also recommended for the adjacent Division IIIa.

Sub-divisions 25, 26 and 27

17. The catches have dropped from about 190 000 tonnes in 1979 to about 162 000 tonnes in 1980. The abundance of the 1980 year class was derived from VPA and acoustic survey data ($4\,500 \times 10^6$ fish or about 65% of the average 1972-78 year class abundance). F values for age groups in 1980 were estimated from the stock size calculated from the acoustic survey in 1980 and catch in numbers data. If the 1980 exploitation rate and pattern are applied to the 1981 stock, the predicted catch will be 137 000 tonnes. ACFM recommended 115 000 tonnes for 1981.

The proportion of total catch reported from the assessment unit for 1980 applied to the TAC agreed upon by the IBSFC would give 150 000 tonnes for 1981. The resulting fishing mortality would be $F = 0.23$. Assuming this as the level of exploitation for 1981, the catch in 1982 at the $F_{0.1}$ ($= 0.19$) level would amount to 126 400 tonnes, and for the same exploitation level as in 1981 to 150 000 tonnes.

| 1981 | | | Management option for 1982 | 1982 | | | 1983 |
|-----------------|-----------|-------|---|-----------------|-----------|-------|-----------------|
| SSB ≥ 3 | \bar{F} | Catch | | SSB ≥ 3 | \bar{F} | Catch | SSB ≥ 3 |
| 604 | 0.23 | 150 | $F_{0.1}$ | 487 | 0.19 | 126 | 466 |
| | | | $\bar{F}_{82} = \bar{F}_{81}$ | | 0.23 | 150 | 447 |
| | | | $\bar{F}_{82} = 0.85 \times \bar{F}_{81}$ | | 0.196 | 130 | 463 |

A catch of 150 000 tonnes in 1982 would have caused a further decrease in the spawning stock biomass in 1983. Therefore, ACFM considers a catch of 130 000 tonnes as the preferred level for a TAC in 1982, since this would correspond to a 15% reduction of fishing mortality of the 1981 level and would bring F close to the $F_{0.1}$ level. The catches in 1982 and spawning stock biomasses in 1983 at various levels of F in 1982 are also shown graphically in Figure 1.

Sub-divisions 28 and 29S

18. For the last three years, catches of sea herring have been fairly constant at a level of 40 000 tonnes, whereas landings of the Gulf of Riga herring have diminished since 1974 and in 1980 were equal to about 15 000 tonnes.

Based on a rather low number of young herring in the experimental catches, the abundance of the 1980 year class of the open sea stock was estimated to be 70% of the average 1972-77 level, or $1\,694 \times 10^6$ fish. For the prediction, the average 1978-80 weight at age data weighted by stock size were used. Mean fishing mortality values for 1972-78 were applied as input F s for 1980. The 1980 exploitation pattern and rate applied to the 1981 stock would give a catch of about 32 000 tonnes with the 1981 year class assumed to be average (i.e., $2\,397 \times 10^6$ fish).

| 1981 | | | Management option for 1982 | 1982 | | | 1983 |
|------|-----------|-------|-------------------------------|------|-----------|-------|-----------------|
| SSB | \bar{F} | Catch | | SSB | \bar{F} | Catch | SSB ≥ 3 |
| 126 | 0.4 | 32 | $F_{0.1}$ | 118 | 0.32 | 28 | 125 |
| | | | $\bar{F}_{82} = \bar{F}_{81}$ | | 0.4 | 31 | 115 |

Continuation of the 1980 exploitation level ($\bar{F} = 0.4$) into 1982 would result in a catch of about 31 000 tonnes from the open sea stock, with a further decrease in the spawning stock biomass in 1983. An exploitation level at $F_{0.1}$ ($= 0.32$) results in a catch of about 28 000 tonnes for 1982 and the increased spawning stock biomass in 1983.

ACFM therefore considers a catch of 28 000 tonnes as the preferred level for a TAC in 1982.

The catches in 1982 and spawning stock biomasses in 1983 at various levels of F in 1982 are shown graphically in Figure 2.

19. In the Gulf of Riga, the 1980 year class was assumed to be close to the average for 1970-79 ($1\,767 \times 10^6$ fish). For the prediction, the average 1979-80 weight at age data were used. Mean fishing mortality values for 1973-78 were used as input F s for 1980. Since the current level of fishing mortality on this stock is beyond the F_{max} point on the yield-per-recruit curve, a 20% decrease in F values as compared to the 1980 mortality rates ($\bar{F}_{80} = 0.8$) is recommended for 1982. The corresponding yield would be at about 12 000 tonnes.

ACFM, therefore, recommends 12 000 tonnes as the TAC for this stock in 1982. At F_{max} and $F_{0.1}$ ($= 0.36$) levels, the 1982 catches would be about 6 000 tonnes and 5 000 tonnes, respectively.

The catches in 1982 and spawning stock biomasses in 1983 at various levels of F in 1982 are shown graphically in Figure 3.

20. Acoustic survey data were available for the assessment units, and were considered by the Working Group. The relative F at age arrays obtained from them were consistent with those from VPA. However, due to some uncertainties in them these data considered by the Working Group were not used as a basis for the present assessment.

Sub-divisions 29N, 30 and 31(East)

21. For the most recent three years, the catches have been at a constant level, and in 1980 amounted to 62 980 tonnes. On the basis of the number and size of larvae and the amount of young herring in the catches, the 1980 year class was taken as average for the period 1973-79 ($4\ 152 \times 10^6$ fish). Due to an increase in fishing effort, the input fishing mortality in 1980 was taken as the smoothed average for 1973-78 and increased by 10%. An increase of 5% above the 1980 level of fishing mortality ($F = 0.2$) was estimated to correspond with the TAC for 1981 of 62 000 tonnes. Application of the 1981 level of F ($= .21$) to the 1982 stock would give a yield of 63 000 tonnes. As the levels of F in 1980-81 are close to the $F_{0.1}$ level ($= .15$), ACFM considers a catch of 63 000 tonnes in 1982, based on constant F levels in 1981-82, as the preferred level for a TAC in 1982.

The catches in 1982 and spawning stock biomasses in 1983 at various levels of F in 1982 are shown graphically in Figure 4.

Sub-divisions 29N, 30 and 31(West)

22. Owing to the short time series of data, no analytical assessment of this stock unit could be carried out. ACFM considered it to be appropriate to stabilize the fishery on an average level with a catch of 8 000 tonnes. In order to avoid misreporting of catches from this area, ACFM recommends a precautionary TAC of 8 000 tonnes for this area for 1982.

Sub-division 32

23. The catch has been at about the same level as in the seventies, and in 1980 the catch figure (45 373 tonnes) was equal to that of 1979.

On the basis of the number and size of larvae and of the number of young herring, the 1980 year class was estimated to be at least at an average level in Finnish waters, but its abundance was assumed to be below average off the south coast of the Gulf of Finland. For the whole Sub-division, the 1980 year class was taken to be of the average 1970-79 level, i.e., $3\ 271 \times 10^6$ fish. For the prediction, smoothed mean weights at age from Finnish and USSR catches (weighted by catches) in 1980 were used. Smoothed average F values for the period 1970-78 were used as the input fishing mortalities for VPA.

The current fishing mortality level ($F = 0.4$) is close to the maximum on the yield-per-recruit curve ($F_{max} = 0.41$). F_{1980} applied to the 1981 stock gives a yield of 49 500 tonnes, which is close to the one recommended by ACFM for 1981 (50 000 tonnes). Continuing the same exploitation rate into 1982 would give a yield of 54 000 tonnes, and the spawning stock biomass would increase to 128 000 tonnes in 1983. An exploitation level at $F_{0.1}$ ($= 0.16$) would result in a yield of 24 000 tonnes in 1982 and a further increase in the spawning stock biomass to 158 000 tonnes in 1983.

| 1981 | | | Management option for 1982 | 1982 | | | 1983 |
|-----------|-----------|-------|--|-----------|-----------|-------|-----------|
| SSB ≥3 | \bar{F} | Catch | | SSB ≥3 | \bar{F} | Catch | SSB ≥3 |
| 97 | 0.4 | 49.5 | $\bar{F}_{82} = \bar{F}_{81} = \bar{F}_{80}$ | 122 | 0.4 | 54 | 128 |
| | | | $F_{0.1}$ | | 0.16 | 24 | 158 |

The catches in 1982 and spawning stock biomasses in 1983 at various levels of \bar{F} in 1982 are shown graphically in Figure 5.

B.2. Sprat Stocks

B.2.1. General

24. Recent catches¹⁾ of sprat and recommended TACs ('000 tonnes).

| Sub-divisions | 1977 | | | 1978 | | | 1979 | | | 1980 | | | 1981 | | 1982 |
|---------------|------------|-----------|--------------|------------|-----------|--------------|------------|-----------|--------------|------------|-----------|----------------------------|------------|-----------|------------|
| | Recom. TAC | IBSFC TAC | Actual catch | Recom. TAC | IBSFC TAC | Actual catch | Recom. TAC | IBSFC TAC | Actual catch | Recom. TAC | IBSFC TAC | Actual catch ²⁾ | Recom. TAC | IBSFC TAC | Recom. TAC |
| 22,24,25 | | | 36 | | | 22 | 34 | | 17 | 17 | | 12 | 15 | | |
| 26,28 | | | 85 | | | 73 | 80 | | 32 | 46 | | 26 | 31 | | |
| 27,29-32 | | | 60 | | | 38 | 41 | | 31 | 14 | | 19 | 14 | | |
| Total | 240 | 275 | 181 | 210 | 184.3 | 133 | 155 | 161 | 80 | 77 | 80.5 | 57 | 60 | 60 | 0 |

1) Working Group data (excl. herring by-catches).

2) Preliminary.

In 1980, the total landings diminished to 57 241 tonnes, i.e., about 20 000 tonnes less than in 1979. Catches decreased mainly in Sub-divisions 24, 28 and 22, but a slight increase occurred in Sub-division 26. The total catch amounted to about 74% of the TAC recommended by ACFM for 1980. The decrease in yield in 1980 corresponds to both a further considerable decrease in the sprat stock biomass and a decrease in fishing effort that has shifted from the sprat to the cod fishery, particularly in the central Baltic.

Trends in sprat catches by Management Units are graphically illustrated in Figure 6.

B.2.2. State of the stocks

25. Due to this sharp decreasing trend in the sprat stock biomass, at the present state any catches will speed up the collapse of the stocks.

It must be remembered, however, that even a total ban on sprat catches may not halt the stocks' decline, because, as we know from the past, sprat stocks in the Baltic have collapsed also in periods when they were lightly fished (e.g., in 1937).

The estimates of fishing and natural mortalities are of comparable sizes, and fishing, therefore, constitutes a significant part of total mortality. If the management objective is to maintain a viable sprat stock in the area, ACFM can only recommend a ban on fishing for sprat.

B.3. Juvenile Herring

26. According to the decision taken by the Working Group at its 1980 meeting, the values of the separation lengths used for the estimation of the percentage of juvenile herring in catches had to be revised. Since the relevant data were presented for only some Sub-divisions, the Working Group members were requested to provide data for all Sub-divisions, in order to enable the Group to consider the matter at its next meeting in 1982.

Results of Soviet selection experiments were presented to and discussed by the Working Group. Some of the findings have already been used for the introduction of new mesh size regulations for the USSR fishery zone. Similar work has been done by the German Democratic Republic in the Western Baltic. The results of that investigation have been taken into account when ACFM recommended an increase in a minimum mesh size for the herring fishery in Sub-divisions 22-24.

C. THE BALTIC DEMERSAL FISHERIES

27. The Working Group on Assessment of Demersal Stocks in the Baltic met at ICES headquarters from 5-11 May 1981 to:

- (i) provide advice on TACs for cod for each stock fishery unit,
- (ii) assess the effects on cod stocks of fishing with smaller meshed gears than those applied for cod,
- (iii) advise on possible conservation measures for cod stocks in Sub-divisions 22-24 in the absence of effective TACs.

C.1. Cod in Sub-division 22

28. Recent catches¹⁾ and recommended TACs in thousand tonnes:

| 1977 | | 1978 | | 1979 | | 1980 | | 1981 | 1982 |
|------------|--------------|------------|--------------|------------|--------------|------------|----------------------------|------------|------------------|
| Recom. TAC | Actual catch | Recom. TAC | Actual catch | Recom. TAC | Actual catch | Recom. TAC | Actual catch ²⁾ | Recom. TAC | Recom. TAC |
| 27.2 | 30 | 28 | 24 | 29 | 26 | 19 | 23 | 17 | 17 ³⁾ |

- 1) Working Group data.
- 2) Preliminary.
- 3) Precautionary TAC.

Provisional landings of 22 563 tonnes in 1980 were the lowest on record. The recommended TAC for 1980 was 19 000 tonnes. Discards in 1980 were estimated to be 8.3% of the catch (1 877 tonnes), whereas in 1979 and 1978 discards were estimated to be 3.9% and 10% respectively. This difference may be explained by the weak 1978 year class, as 1-year-olds, in the 1979 fishery.

29. ACFM examined the technique used by the Working Group of raising the numbers landed of 1-, 2- and 3-group cod by 59%, 28% and 2%, respectively, to the total international catch for all years since 1970. It considered that this method, based on the 1980 discard observations, might lead to a large increase in the variance of the 1-group VPA estimate, which should not, necessarily, reflect the true total discard level in previous years. Taking into account the above-mentioned differences in the annual percentage of discards in the three most recent years for which the data were available, which may have been caused by changes in sampling intensity and/or fluctuations in year class strengths, the ACFM concluded that in view of the very short relevant time series of source data, any current assessments of this stock should be based on the alternative of the human consumption landings alone, not including the discard figures, as was the case last year.

The 1977 year class has now been confirmed to be more abundant than estimated last year, but the 1978 year class appears to be extremely poor, only about 50% of the last year's low estimate. This finding from the Federal Republic of Germany young fish survey abundance index is substantiated by both the corresponding abundance index from the German democratic Republic survey and the catch in numbers returns. From the young fish surveys' results, the 1979 year class has been estimated as being somewhat below average, or close to the strength of the 1977 year class. Abundance indexes from the two surveys indicate the 1980 year class to be poor, but from 50-100% higher than the very poor 1978 year class.

Analytical assessment of this cod stock has been tried, but its results were inconclusive, since there was no quantitative information available on the relationship between the cod stock in Sub-division 22 and those in Division IIIa and Sub-division 24. The effects of migrations between these cod stocks on the accuracy of assessments are likely to be very considerable. However, both from the trial assessment and the age composition of the catches, it is evident that the level of fishing mortality is too high and should be reduced. Therefore, ACFM considers that catches should be reduced from the average level of recent years and recommends a TAC of 17 000 tonnes for this stock in 1982, which is equal to the TAC recommended for 1981.

0.2. Cod in Sub-division 24

30. Recent catches¹⁾ and recommended TACs, in thousand tonnes:

| 1977 | | 1978 | | 1979 | | 1980 | | 1981 | 1982 |
|------------|--------------|------------|--------------|------------|--------------|------------|----------------------------|------------|------------------|
| Recom. TAC | Actual catch | Recom. TAC | Actual catch | Recom. TAC | Actual catch | Recom. TAC | Actual ²⁾ catch | Recom. TAC | Recom. TAC |
| 12.4 | 15 | 12 | 15 | 10 | 16 | 14 | 15 | 10 | 12 ³⁾ |

1) Working Group data.

2) Preliminary.

3) Including Sub-division 23, for which a precautionary TAC of 2 000 tonnes is recommended.

The 1980 landings of cod at 15 000 tonnes were close to the very stable average level since 1965. The recommended TAC for 1980 was 14 000 tonnes. No complete data on by-catches of cod in other fisheries were available for 1980.

31. No age composition data were submitted for the Danish and Swedish landings accounting for 65% of the total, and the German Democratic Republic data had to be raised to account for these. Since only the Federal Republic of Germany reported data on discards for 1980, discards were not included in the trial assessments.

The accuracy of any analytical assessment is seriously limited by lack of effort data for recent years, and, particularly by the unknown degree of mixing with cod stocks in the adjacent areas (see para. 29). The German Democratic Republic young fish survey results indicate the 1978 year class to be very poor. This is substantiated by the catch in numbers returns. The survey abundance indexes indicate the 1979 year class as below average, and the 1980 year class to be of the average strength. Both from the trial assessment and the age composition of the catches, it is evident that the level of fishing mortality is too high and should be reduced. Therefore, ACFM considers that catches should be reduced from the average level of recent years and recommends a TAC of 10 000 tonnes for this stock in 1982, which is equal to the TAC recommended for 1981.

32. Taking into account increasing catches of cod from Sub-division 23 in recent years (see Table 5), and in order to prevent diversion of effort to and misreporting of catches from this Sub-division, ACFM recommends to set a precautionary TAC of 2 000 tonnes for cod in Sub-division 23 for 1982.

The combined TAC for cod in Sub-divisions 23 and 24 recommended for 1982 would then be 12 000 tonnes.

C.3. Alternative Conservation Measures for Cod Stocks in Sub-divisions 22-24

33. Decrease in the fishing effort towards more rational exploitation rates was considered to be the optimum long-term conservation measure. The next best measure would be to improve the exploitation pattern (see section "The Biological Basis of the Management" of the Introduction, page 2 in this issue).

An alternative protection to the recruitment could be provided by introducing closed seasons on nursery grounds in fjords and in coastal areas.

C.4. Cod in Sub-divisions 25-32

34. Recent catches¹⁾ and recommended TACs, in thousand tonnes:

| 1977 | | 1978 | | 1979 | | 1980 | | 1981 |
|------------|--------------|------------|--------------|------------|--------------|------------|----------------------------|------------|
| Recom. TAC | Actual catch | Recom. TAC | Actual catch | Recom. TAC | Actual catch | Recom. TAC | Actual catch ²⁾ | Recom. TAC |
| 120 | 165 | 131 | 154 | 136 | 224 | 179 | 346 | 170 |

1) Working Group data.

2) Preliminary.

The 1980 catch of 346 000 tonnes was nearly twice the recommended TAC level and 54% above the second highest catch in 1979. Catches have increased in all Sub-divisions. Since there were little data on discarding, with only the Federal Republic of Germany and Denmark having reported, discards were not included in assessments.

35. Soviet and Polish data indicate an increase in effort from the 1979 level. For the Federal Republic of Germany, the fishing effort has decreased. Higher landings by Denmark, Sweden and Finland were assumed to result from an increase in effort. Cpue data were submitted by the Federal Republic of Germany, Poland and USSR, and all of them indicate a very strongly pronounced increase in catch rates from 1978-80.

The ACFM considered that amongst different assumptions made by the Working Group on the level of fishing effort in 1980 compared to recent years, the one associated with a 20% increase over the average 1976-78 level appeared to be the most reasonable. Therefore, mean fishing mortalities for the years 1976-78 were used as a reference set to calibrate the corresponding trend between the 1980 F values and the means for that period. The reference index of fishing mortality (the arithmetic mean F on age groups 4-7) showed an increase of 62% in 1980 compared to 1979. As in previous years, natural mortalities were taken to be $M = 0.3$ for all age groups.

A value of average recruitment of 502×10^6 fish at age 2 was derived from VPA, using the period 1966-79, with the 95% confidence limits of $\pm 204 \times 10^6$ fish. Since both the mean and the variance were strongly influenced by the two very abundant year classes of 1976 and 1977, the mean value of $417 \times 10^6 \pm 112 \times 10^6$ fish for the period 1966-77 was chosen as the reference average. From the predictive regression of the young fish survey abundance indexes on the VPA estimates of 2 year old cod, the 1978 and 1979 year classes were estimated to be below average, of around 300×10^6 fish at 2 years old. The 1980 year class was estimated to be of above average strength.

However, for catch predictions, a conservative figure of slightly below average abundance was used, i.e., 400×10^6 at 2 years old corresponding to 542.6×10^6 at 1 year old. The revised figures of recruitment resulted in higher stock biomass estimates for the most recent years and the years of prediction than those indicated in the last year's report.

36. Results of catch predictions are given in Table 6. This year, to illustrate longer-term effects of various management options, ACFM considered it useful to make projections of possible catches and spawning stock biomasses for 1982-85 for the current exploitation pattern.

For all options, except the last one, fishing mortality in 1981 was assumed to remain at the 1980 level of $F = 0.84$, resulting in a catch of 303 000 tonnes. For all years in the prediction, the average recruitment of 400×10^6 two-year-olds (i.e., 542.6×10^6 at age 1) was assumed, since this figure is slightly below the mean value for the period 1966-77, which is not affected by the very strong 1976 and 1977 year classes as two year olds.

Under Option 1 (annual catches equal to the recommended 1981 TAC of 170 000 tonnes), F_{82} would have to be reduced by 33% from the 1980 level. In later years, fishing mortality would stabilize at $F = 0.6$ and the spawning stock biomass would be marginally increasing annually over the level at the beginning of 1982.

Fishing at $F_{\max} = 0.36$ for the average 1976-78 exploitation pattern (Option 2) would result in a 57% reduction in fishing mortality and a catch of only 117 000 tonnes in 1982. In later years, the spawning stock biomass would be growing very rapidly and catches would gradually increase to a level of 161 000 tonnes in 1985.

If \bar{F} were kept at the same level as in 1980 (Option 3), the 1982 catch would drop to 228 000 tonnes and then stabilize at 164 000 tonnes in 1984-85. The spawning stock biomass would be marginally decreasing in 1983-85 and would be at a level of 392 000 tonnes in 1982, which is still 65 000 tonnes above the long-term average for the period 1966-77.

If a constant TAC of, say, 200 000 tonnes were set by the managers and adhered to (Option 4), this would reduce fishing mortality in 1982 by 17%, but would result in a rapid increase in \bar{F} in later years to $\bar{F} = 1.31$ in 1985. Besides, this is the sole option under which the spawning stock biomass would be noticeably decreasing in successive years.

Reducing \bar{F} to the average 1976-78 level and keeping it at that level (Option 5) would bring results similar to the previous option in 1982. The spawning stock biomass, however, would be stabilized at about 446 000 tonnes in 1983-85, and the catch at about 170 000 tonnes (i.e., the TAC recommended for 1981).

Options 6 and 7 (stabilizing \bar{F} at the 1979 level and setting TAC at the average 1966-78 level of catches) are very similar in their consequences. Both result in annual catches of about 160 000 tonnes and growing spawning stock biomasses.

If, commencing with 1982, fishing mortality were reduced annually by 10% (Option 8), it would become equal to $\bar{F} = 0.55$ in 1985. The spawning stock biomass would be steadily growing and the catch would stabilize at about 147 000 tonnes in 1984-85.

If one sets as a goal to retain the spawning stock biomass at a safe level of, say, 400 000 tonnes, i.e., a buffer stock of 73 000 tonnes compared to the historic average (Option 9), 237 000 tonnes could be caught in 1982 with a corresponding slight increase (by 6%) in \bar{F} . In 1983-85, fishing mortality would then remain constant at $\bar{F} = 0.8$ (a decrease of 5% from the 1980 level) as would the catches at 164 000 tonnes.

If the industry maintained the high 1981 level of catch in 1982, this could have only been associated with a sharp increase in \bar{F} (by 49%) and a steep drop in the spawning stock biomass to a level of 327 000 tonnes. Even to maintain this historic average level of the spawning stock biomass (Option 10), would require a reduction of catches to 154 000 tonnes in 1983-85. These, in association with high levels of \bar{F} at about $\bar{F} = 1.04$ would mean low catch rates, and the stock would be vulnerable to effects of poor recruitment.

The last Option (Option 11) illustrates the rapidly increasing trend in the spawning stock biomass if a TAC of 170 000 tonnes was adhered to in 1981-85. In that case, fishing mortality would decrease to F_{\max} level in 1984.

The catches in 1982 and spawning stock biomasses in 1983 at various levels of \bar{F} in 1982 are also shown graphically in Figure 7.

Because of possible interactions of cod with pelagic species, ACFM considered that the choice of a management option for this stock should be left to the managers, since this would involve socio-economic factors beyond the scope of the ACFM competence.

C.5. By-Catch of Cod by Gear with Smaller Mesh Sizes than those Applied for Cod

37. No proper information on by-catches of cod by smaller-meshed gears than those applied for cod was supplied for Sub-divisions 24 and 25-32. The relevant information submitted for Sub-division 22 was considered to be inadequate for a detailed discussion. ACFM regrets that under these circumstances it is again unable to make any suggestions as to how to resolve this problem and has to point out that the situation will remain unchanged in the future unless adequate data are made available to the Working Group.

C.6. Changes in Minimum Mesh Size and Minimum Landing Size for Baltic Cod

38. In its 1979 Report, ACFM indicated that the assessments of the effects of a change in mesh size show that considerable gains in yield for all Sub-divisions would result from an increase in mesh size from 90 mm to 100 mm. In some Sub-divisions, there would be appreciable short-term losses, but these would be very short-lived. The 50% retention length for a 100 mm mesh size is about 38 cm; but fixing the minimum landing size at that level would result in considerable discarding.

Therefore, ACFM accordingly recommended that a 100 mm mesh size and a 35 cm minimum landing size be introduced in all cod fisheries in the Baltic. ACFM reiterates this recommendation.

D. BALTIC SALMON STOCKS

39. The Baltic Salmon Assessment Working Group met at ICES headquarters from 10-16 March 1981 to:

- (i) provide advice on a TAC for Baltic salmon in 1982; to advise on the additional data which are required to increase the accuracy of this advice, and the design of sampling programmes to meet this end,
- (ii) estimate the effects of extending the present final date of the closed season for salmon fishing in the Baltic from 1 September until 15 September,
- (iii) assess the effects of reducing the current minimum hook size for fishing for Baltic salmon from 19 mm to 15 mm,
- (iv) estimate the contributions by individual States to the reproduction of the total stock of salmon in the Baltic and advise on the distribution of these reproductive products during their sea phase between the fishing zones of the Member States.

The Group investigated the appropriateness of assessing the Baltic salmon as two stocks, one stock which in its sea life phase occupies Sub-divisions 24-31 and the other the Gulf of Finland stock (Sub-division 32). Tagging experiments confirm that little exchange of salmon between these two areas takes place, and the two stock components are therefore assessed separately.

D.1 Sub-divisions 24-31

40. The reported catches over the last decade are given below, in tonnes. The table includes some minor river catches.

| 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------------|
| 2 361 | 2 020 | 2 024 | 2 466 | 2 817 | 2 931 | 2 966 | 2 561 | 1 965 | 2 064 | 2 150 ^{*)} |

*) Preliminary.

The recruitment is about 4 million a.s.u. (artificial smolt units) of which about 2.8 million are hatchery reared. The wild production is estimated from electro-fishing to be 1.26 million a.s.u. The releases in 1981 were at about the same level, even though the number of hatchery-reared smolts available for stocking had increased by some 400 000 a.s.u. Due to the lack of an EEC-Swedish agreement on fishing rights, these 400 000 a.s.u. have been sold to mariculture enterprises, and the earlier anticipated increased stocking to the Baltic Sea was not implemented in 1981.

The fishery in autumn 1980 revealed very poor growth of the 1979 year class. This changed growth rate could be a permanent feature of the Baltic salmon stock; such major changes have previously been experienced during the period 1938-45. If this slow growth prevails, the loss to the fishery in the long term could be about 200 tonnes per annum, all other factors being equal.

The return rates in the tagging programmes have declined in recent years reflecting either decreasing returns from the fishermen, increased recruitment of the wild stock (dilution effects), changes in the exploitation pattern or changes in the early smolt mortality. Which cause (i.e., one, several or all of these factors) the observed changes are due to, cannot be said at present, and the Group abstained from conclusions.

41. ACFM's management objective for these stocks is to secure optimal wild production. This is based upon a general policy of utilizing the potential of nature through prudent management of the resources. ACFM therefore finds it advisable to manage the fishery by optimising the wild production. Alternatively, a 50% (1.4 million) increase in the releases of hatchery-reared smolts is necessary to fill the spawning sites. Such an increase has to be balanced river by river against the available potential spawning sites. Furthermore, even at the present level of releases, some concern about the preservation of genetic variability within the stocks has been expressed and work within ICES is underway on this topic.

The calculated TAC for 1982 is based upon assumed total recruitment (artificial and wild) of 4 million a.s.u.

The observed poor growth of the 1979 year class is taken as an abnormal situation, and this slow growth should therefore affect the 1982 yield only to a very limited degree.

In the 1980 Report of ACFM, the desired escapement (i.e., the level of survival from smolt to spawner) for stocks in Sub-divisions 24-31 was evaluated to be 2.4%. This estimate is based upon an evaluation of the River Torne which has the highest total wild production of smolts and the lowest recorded production per spawner in the area. Data from River Kalix suggest a desired escapement of much the same magnitude. The average value of an escapement of 2.4% is still accepted by ACFM as being the best estimate available at present.

Accepting these assumptions, the advice of last year is reiterated, that the desired escapement of 2.4% corresponds to a TAC of 1 550 tonnes. Other options are shown in Figure 8.

D.2. Sub-division 32 (Gulf of Finland)

42. The reported landings from Sub-division 32 over the last decade are given below (river catches from USSR, about 5-10 tonnes, included), in tonnes:

| 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 |
|------|------|------|------|------|------|------|------|------|------|-------------------|
| 136 | 124 | 138 | 135 | 111 | 74 | 95 | 88 | 75 | 70 | 86 [*]) |

*) Preliminary

Very little natural production exists in the effluents to the Gulf of Finland, and the escapement criterion suggested for the main stock has little relevance. Stocking of artificial smolt material is expected to increase. These increased stockings should turn up in the 1981 fishery for breeders.

The annual releases are planned to increase above 270 000 a.s.u. and the required number of spawners to maintain this artificial production is a few hundred salmon of each sex. With the current exploitation of the stock, escapement about 1%, the stock can be maintained. The 1981 releases are about 230 000 a.s.u. compared to the 1980 releases of 95 000 a.s.u., when the USSR releases were unusually low.

The present yield from the stock is about 80 tonnes, while 135 tonnes may be taken under the fully developed stocking programme maintaining the present exploitation pressure.

43. Tagging data show that about 20% of the recaptures originating from releases to the Gulf of Finland are reported from Sub-divisions 24-31. Similarly, 0.6% of the releases to Sub-divisions 30-31 and 10% of the releases to Sub-division 28 are recaptured in the Gulf of Finland. Taking into account the relative size of the smolt production in the various Sub-divisions, the difference in yield per 1 000 a.s.u. at present exploitation rates, it is calculated that about 20 tonnes of the Sub-divisions 24-31 stock is taken in the Gulf of Finland, and similarly about 20 tonnes of the Gulf of Finland stock is taken outside this Sub-division.

D.3. Extension of the Closed Period

44. The proposal was investigated to extend the closed period from 15 June - 31 August to 15 June - 14 September (Sub-divisions 24-31) and 1 July - 31 August to 1 July - 14 September (Sub-division 32).

Relevant data for evaluation were presented on the main stock (Sub-divisions 24-31) only.

September had in recent years accounted for about 15% in landed weight. The importance of September catches to the various Member States is shown in the text-table below (only off-shore catches are included):

| Country | Denmark | Finland | Germany, Fed.Rep. | Poland | Sweden | USSR |
|---|---------|---------|----------------------|--------|--------|------|
| Weight (%) of total annual landings | 11 | 24 | - | nil | 18 | 5-8 |

Analysis of day-to-day catch records shows high variability and the first fortnight of September shows no systematic differences compared to the second half. The evaluated effect therefore lies only in the corresponding reduction in total effort (number of nets fishing), which could result from the closure.

Taking into account that 1) the catch per unit effort (number of salmon per 100 nets) is higher in September compared to the entire season (10.6 vs. 8.5), 2) the mean weight per specimen is 3.68 kg vs. 3.59, 3) and the average catch in September is 300 tonnes, an estimated average reduction in fishing mortalities of 6% can be found. The corresponding calculated loss is less than 20 tonnes (1%) and a minimal increase in calculated escapement (1.8% to 1.9%) would result. There may thus be a minor beneficial effect to the escapement to the spawning stock with a minimal loss to the fisheries.

D.4. Introduction of a 15 mm Minimum Hook Size from the Current Minimum Hook Size of 19 mm

45. Little information on the likely effects of such a change is available. The difference in selection was found to be small, of no significance in the known experiments.

The number of salmon caught below 60 cm on long line is about 9 000 specimens (1974-78 average) and 45% of these are dead when hauled onboard, probably regardless of the hook sizes in question. The remaining part, about 5 000 specimens, may have a hook-size dependent chance of survival, but no information is available to reveal this possible dependence.

D.5. National Contributions to the Reproduction of the Baltic Salmon Stock

46. The estimated wild production and releases by country and stock in 1979-81 are given in Table 7.

D.6. Distribution of Salmon during the Sea Phase between National Fishing Zones

47. No survey data on the stock distribution in the Baltic Sea were presented. Lacking this data base, only the recaptures from tagging programmes may have relevance. However, as effort data are not collected for several important fisheries, it seems difficult to conclude anything on the distribution of the stock from that of the recaptures.

The distribution of recaptures by national fishing zones is given in Table 8 on the basis of Finnish, Polish, Swedish and USSR tagging experiments. The distribution of recaptures reflects the combination of effects from fishing effort, availability of salmon to the fisheries and the distribution of the exploitable stock of salmon.

Table 8 mainly represents the situation prior to establishment of EEZ's in 1978. Since then, the Danish and the Federal Republic of Germany fleet have changed their fishing grounds due to changes in the jurisdictional regime.

Table 1. Nominal catch (tonnes) of HERRING in Divisions II**I**b,c,d, 1963- 80.

(Data for 1963-79 as officially reported to ICES)

| Country Year | Denmark | Finland | German Dem. Rep. | Germany, Fed.Rep. | Poland | Sweden | USSR | Total |
|-----------------|----------|----------|---------------------|----------------------|--------|----------------------|----------------------|---------|
| 1963 | 14 991 | 48 632 | 10 900 | 16 588 | 28 370 | 27 691 | 78 580 ^{a)} | 225 752 |
| 1964 | 29 329 | 34 904 | 7 600 | 16 355 | 19 160 | 31 297 | 84 956 | 223 601 |
| 1965 | 20 058 | 44 916 | 11 300 | 14 971 | 20 724 | 31 082 ^{b)} | 83 265 | 226 216 |
| 1966 | 22 950 | 41 141 | 18 600 | 18 252 | 27 743 | 30 511 | 92 112 | 251 309 |
| 1967 | 23 550 | 42 931 | 42 900 | 23 546 | 32 143 | 36 900 | 108 154 | 310 124 |
| 1968 | 21 516 | 58 700 | 39 300 | 16 367 | 41 186 | 53 256 | 124 627 | 354 952 |
| 1969 | 18 508 | 56 252 | 19 100 | 15 116 | 37 085 | 30 167 | 118 974 | 295 202 |
| 1970 | 16 682 | 51 205 | 38 000 | 18 392 | 46 018 | 31 757 | 110 040 | 312 094 |
| 1971 | 23 087 | 57 188 | 41 800 | 16 509 | 43 022 | 32 351 | 120 728 | 334 685 |
| 1972 | 16 081 | 53 758 | 58 100 | 10 793 | 45 343 | 41 721 | 118 860 | 344 656 |
| 1973 | 24 834 | 67 071 | 65 605 | 8 779 | 51 213 | 59 546 | 127 124 | 404 172 |
| 1974 | 19 509 | 73 066 | 70 855 | 9 446 | 55 957 | 60 352 | 117 896 | 407 081 |
| 1975 | 18 295 | 69 581 | 71 726 | 10 147 | 68 533 | 62 791 | 113 684 | 414 757 |
| 1976 | 23 087 | 75 581 | 58 077 | 6 573 | 63 850 | 41 841 | 124 479 | 393 488 |
| 1977 | 25 467 | 78 051 | 62 450 | 7 660 | 60 212 | 52 871 | 126 000 | 412 711 |
| 1978 | 26 620 | 89 792 | 46 261 | 7 808 | 63 850 | 54 629 | 130 642 | 419 602 |
| 1979 | 33 761 | 83 130 | 50 241 | 7 786 | 79 168 | 86 078 | 118 655 | 458 819 |
| 1980 | 29 069** | 79 000** | 59 187 | 9 872* | 68 614 | 86 814** | 118 074 | 450 630 |

*) Preliminary.

**) Working Group data, by-catch of sprat excluded and by-catch of herring in sprat fisheries included.

a) Including Division IIIa.

b) Large quantity of herring used for industrial purposes is included with "Unsorted and Unidentified Fishes".

Table 2. Nominal catch (tonnes) of SPRAT in Divisions IIIb,c,d, 1963-80.
(Data for 1963-79 as officially reported to ICES)

| Country Year | Denmark | Finland | German Dem. Rep. | Germany, Fed.Rep. | Poland | Sweden | USSR | Total |
|-----------------|----------------------|----------------------|---------------------|----------------------|--------|----------------------|----------------------|---------|
| 1963 | 2 525 | 1 399 | 8 000 | 507 | 10 693 | 101 | 45 820 ^{a)} | 69 045 |
| 1964 | 3 890 | 2 111 | 14 700 | 1 575 | 17 431 | 58 | 55 753 | 95 518 |
| 1965 | 1 805 | 1 637 | 11 200 | 518 | 16 863 | 46 | 52 829 | 84 898 |
| 1966 | 1 816 | 2 048 | 21 200 | 366 | 13 579 | 38 | 52 407 | 91 454 |
| 1967 | 3 614 | 1 896 | 11 100 | 2 930 | 12 410 | 55 | 40 582 | 72 587 |
| 1968 | 3 108 | ... | 10 200 | 1 054 | 14 741 | 112 | 55 050 | 84 265 |
| 1969 | 1 917 | 1 118 | 7 500 | 377 | 17 308 | 134 | 90 525 | 118 879 |
| 1970 | 2 948 | 1 265 | 8 000 | 161 | 20 171 | 31 | 120 478 | 153 054 |
| 1971 | 1 833 | 994 | 16 100 | 113 | 31 855 | 69 | 133 850 | 184 814 |
| 1972 | 1 602 | 972 | 14 000 | 297 | 38 861 | 102 | 151 460 | 207 294 |
| 1973 | 4 128 | 1 854 | 13 001 | 1 150 | 49 835 | 6 310 | 136 510 | 212 788 |
| 1974 | 10 246 | 1 035 | 12 506 | 864 | 61 969 | 5 497 | 149 535 | 241 652 |
| 1975 | 9 076 | 2 854 | 11 840 | 580 | 62 445 | 31 | 114 608 | 201 434 |
| 1976 | 13 046 | 3 778 | 7 493 | 449 | 56 079 | 713 | 113 217 | 194 775 |
| 1977 | 16 933 | 3 213 | 17 241 | 713 | 50 502 | 433 | 121 700 | 210 735 |
| 1978 | 10 797 | 2 373 | 13 710 | 570 | 28 574 | 807 | 75 529 | 132 360 |
| 1979 | 8 897 | 3 125 | 4 019 | 489 | 13 868 | 2 240 | 45 727 | 78 365 |
| 1980 | 4 573 ^{##)} | 6 500 ^{##)} | 151 | 706 ^{##)} | 16 033 | 1 392 ^{##)} | 31 359 | 60 714 |

*) Preliminary.

##) Working Group data, by-catch of herring excluded and by-catch of sprat in herring fisheries included.

a) Including Division IIIa.

Table 3. Nominal catch (tonnes) of COD in Divisions IIIb,c,d, 1963-80.

(Data for 1963-79 as officially reported to ICES)

| Country Year | Denmark | Finland | German Dem. Rep. | Germany, Fed.Rep. | Poland | Sweden | USSR | Total |
|-----------------|------------------------|-----------------------|---------------------|----------------------|---------|-------------------------|----------------------|---------|
| 1963 | 35 851 | 12 | 7 800 | 10 077 | 47 514 | 22 827 | 30 550 ^{a)} | 154 631 |
| 1964 | 34 539 | 16 | 5 100 | 13 105 | 39 735 | 16 222 | 24 494 | 133 211 |
| 1965 | 35 990 | 23 | 5 300 | 12 682 | 41 498 | 15 736 | 22 420 | 133 649 |
| 1966 | 37 693 | 26 | 6 000 | 10 534 | 56 007 | 16 182 | 38 269 | 164 711 |
| 1967 | 39 844 | 27 | 12 800 | 11 173 | 56 003 | 17 784 | 42 975 | 180 606 |
| 1968 | 45 024 | 70 | 18 700 | 13 573 | 63 245 | 18 508 | 43 611 | 202 731 |
| 1969 | 45 164 | 58 | 21 500 | 14 849 | 60 749 | 16 656 | 41 582 | 200 558 |
| 1970 | 43 443 | 70 | 17 000 | 17 621 | 68 440 | 13 664 | 32 248 | 192 486 |
| 1971 | 47 563 | 3 | 9 800 | 14 333 | 54 151 | 12 945 | 20 906 | 159 701 |
| 1972 | 60 331 | 8 | 11 500 | 13 814 | 56 746 | 13 762 | 30 140 | 186 301 |
| 1973 | 66 846 | 95 | 11 268 | 25 081 | 49 790 | 16 134 | 20 083 | 189 297 |
| 1974 | 58 659 | 160 | 9 013 | 20 101 | 48 650 | 14 184 | 38 131 | 188 898 |
| 1975 | 63 860 | 298 | 14 740 | 21 483 | 69 318 | 15 168 | 49 289 | 234 156 |
| 1976 | 77 570 | 278 | 8 548 | 24 096 | 70 466 | 22 802 | 51 516 | 255 276 |
| 1977 | 74 495 | 310 | 10 967 | 31 560 | 47 703 | 18 327 | 29 680 | 213 042 |
| 1978 | 50 907 | 1 446 | 9 345 | 16 918 | 64 113 | 15 996 | 37 200 | 195 925 |
| 1979 | 60 071 | 2 938 | 8 997 | 18 083 | 79 697 | 24 003 | 78 730 | 272 519 |
| 1980 | 75 421 ^{***)} | 4 500 ^{***)} | 7 406 | 16 363 ^{*)} | 123 486 | 33 201 ^{**))} | 124 359 | 384 736 |

*) Preliminary.

**) Working Group data (provisional).

a) Including Division IIIa.

Table 4. Nominal catch (tonnes) of FLATFISHES in Divisions IIb,c,d, 1963-79.

(Data as officially reported to ICES)

| Country Year | Denmark | Finland | German Dem. Rep. | Germany, Fed.Rep. | Poland | Sweden | USSR | Total |
|-----------------|---------|------------------|---------------------|----------------------|--------|--------|---------------------|--------|
| 1963 | 9 888 | - | 3 900 | 794 | 2 794 | 1 026 | 1 460 ^{a)} | 19 862 |
| 1964 | 9 592 | - | 4 600 | 905 | 1 582 | 1 147 | 4 420 | 22 246 |
| 1965 | 8 877 | - | 2 300 | 899 | 2 418 | 1 140 | 5 471 | 21 105 |
| 1966 | 7 590 | - | 2 900 | 647 | 3 817 | 1 113 | 5 328 | 21 395 |
| 1967 | 8 773 | - | 3 400 | 786 | 2 675 | 1 077 | 4 259 | 20 970 |
| 1968 | 9 047 | - | 3 600 | 769 | 4 048 | 1 047 | 4 653 | 23 164 |
| 1969 | 8 693 | - | 2 800 | 681 | 3 545 | 953 | 4 167 | 20 839 |
| 1970 | 7 937 | - | 2 200 | 606 | 3 962 | 464 | 3 731 | 18 900 |
| 1971 | 7 212 | - | 2 500 | 553 | 4 093 | 415 | 4 088 | 18 861 |
| 1972 | 6 817 | - | 3 200 | 542 | 4 940 | 412 | 3 950 | 19 861 |
| 1973 | 6 181 | - | 3 419 | 655 | 4 278 | 724 | 2 550 | 17 807 |
| 1974 | 9 686 | 55 ^{b)} | 2 390 | 628 | 4 668 | 653 | 2 515 | 20 595 |
| 1975 | 8 257 | 100 | 2 172 | 937 | 5 139 | 658 | 6 455 | 23 718 |
| 1976 | 7 572 | 194 | 2 801 | 836 | 4 394 | 582 | 3 018 | 19 397 |
| 1977 | 7 239 | 203 | 3 378 | 960 | 4 879 | 484 | 4 754 | 21 897 |
| 1978 | 9 184 | 390 | 4 034 | 1 106 | 5 418 | 396 | 2 500 | 23 028 |
| 1979 | 10 376 | 399 | 4 396 | 665 | 5 137 | 450 | 2 670 | 24 093 |

a) Including Division IIIa.

b) Excluding subsistence fisheries.

Table 5. Recent catches^{a)} and recommended TACs (in '000 tonnes).

| Fishery and Sub-divisions | 1977 | | | 1978 | | | 1979 | | | 1980 | | | 1981 | | 1982 |
|---------------------------|------------|-----------|-------------------|------------|-----------|-------------------|------------|---------------------|-------------------|------------|-----------------------|-------------------|-------------------|-----------------------|----------------------|
| | Recom. TAC | IBSFC TAC | Actual Catch | Recom. TAC | IBSFC TAC | Actual Catch | Recom. TAC | IBSFC TAC | Actual Catch | Recom. TAC | IBSFC TAC | Actual Catch b) | Recom. TAC | IBSFC TAC | TAC |
| <u>Herring</u> | | | | | | | | | | | | | | | |
| 22-24 | } 400 | } 422 | 75 | } 290 | } 444 | 78 | 68 | } 405 ^{d)} | 94 | 67 | } 420.2 ^{d)} | 109 | 71 ^{f)} | } 418.6 ^{d)} | 70 ^{k)} |
| 25,26 ^{c)} | | | 152 | | | 142 | 115 | | 168 | 118 | | 143 | 115 ^{f)} | | 130 ^{f)} i) |
| 27,28 ^{c)} ,29S | | | 68 | | | 73 | 65 | | 63 | 61 | | 70 | 28 ^{f)} | | 28 ^{f)} i) |
| Gulf of Riga | | | 24 | | | 17 | 16 | | 17 | 15 | | 15 | 15 | | 12 ^{j)} |
| 29N,30,31 | | | 65 | | | 73 | 78 | | 70 | 73 | | 71 | 62 ^{g)} | | 71 ^{l)} |
| 32 | | | 50 | | | 53 | 44 | | 46 | 40 | | 45 | 50 | | ... |
| Total ... | | | 434 | 397 | | 436 | 386 | | 458 | 374 | | 453 | 341 | | |
| <u>Sprat</u> | | | | | | | | | | | | | | | |
| 22,24,25 | } 240 | } 275 | 36 | } 210 | } 184.3 | 22 | 34 | } 161 | 17 | 17 | } 80.5 | 12 | 15 | } 60 | } 0 ^{j)} |
| 26,28 | | | 85 | | | 73 | 80 | | 32 | 46 | | 26 | 31 | | |
| 27,29-32 | | | 60 | | | 38 | 41 | | 31 | 14 | | 19 | 14 | | |
| Total ... | | | 181 | | | 133 | 155 | | 80 | 77 | | 57 | 60 | | |
| <u>Cod</u> | | | | | | | | | | | | | | | |
| 22 | 27.2 | } 185 | 30 | 28 | } 173.8 | 24 | 29 | } 175 | 26 | 19 | } 235 | 23 | 17 | } 227 | 17 ^{k)} |
| 24 | 12.4 | | 15 | 12 | | 15 | 10 | | 16 | 14 | | 15 | 10 | | 12 ^{h)} k) |
| 25-32 | 120.0 | | 165 | 131 | | 154 | 136 | | 224 | 179 | | 346 | 170 | | ... |
| Total ... | 159.6 | | 210 ^{e)} | 171 | | 193 ^{e)} | 175 | | 266 ^{e)} | 212 | | 384 ^{e)} | 197 | | |

a) Working Group data by Sub-divisions (taking into account herring and sprat by-catches in each of those fisheries).

b) Preliminary.

c) Excluding Gulf of Riga.

d) Including 78 000 tonnes allocated to Management Unit 3 (Sub-divisions 29N, 30 and 31) in 1979 and 1980 and 80 000 tonnes in 1981.

e) Excluding catches from Sub-division 23 (of 1 716 t in 1977; 1 777 t in 1978; 2 729 t in 1979 and 3 696 t in 1980).

f) Sub-division 27 combined with Sub-divisions 25 and 26.

g) Eastern part.

h) Including Sub-division 23.

i) Catch level preferred by ACFM.

j) Recommended TAC.

k) Precautionary TAC.

l) Including a catch level of 63 000 t preferred by ACFM for the eastern part and a precautionary TAC of 8 000 t for the western part.

Table 6. COD in Sub-divisions 25-32. 1980: $\bar{F} = 0.84$, Catch = 345, Spawning stock biomass (SSB) = 828. Average historic SSB (1966-77) = 327, Average (1964-75) recruitment at age 1 = 542.6×10^6 .

| 1981 | | Management options | 1982 | | | 1983 | | | 1984 | | | 1985 | | |
|-------------------|-----|---|------|-----------|-------|------|-----------|-------|------|-----------|-------|------|-----------|-------|
| \bar{F} | SSB | | SSB | \bar{F} | Catch | SSB | \bar{F} | Catch | SSB | \bar{F} | Catch | SSB | \bar{F} | Catch |
| .84 Catch=303 | 664 | TAC = TAC 81 | 490 | .56 | 170 | 491 | .60 | 170 | 500 | .61 | 170 | 505 | .60 | 170 |
| | | F_{\max} | | .36 | 117 | 567 | .36 | 130 | 644 | .36 | 146 | 701 | .36 | 161 |
| | | $\bar{F} = \bar{F}_{81} = \bar{F}_{80}$ | | .84 | 228 | 413 | .84 | 178 | 396 | .84 | 165 | 392 | .84 | 164 |
| | | TAC = 200 | | .70 | 200 | 450 | .86 | 200 | 410 | 1.04 | 200 | 361 | 1.31 | 200 |
| | | $\bar{F} = \bar{F}_{76-78}$ | | .71 | 202 | 447 | .71 | 173 | 444 | .71 | 166 | 446 | .71 | 168 |
| | | $\bar{F} = \bar{F}_{79}$ | | .52 | 160 | 505 | .52 | 156 | 535 | .52 | 162 | 556 | .52 | 170 |
| | | TAC = average catch 1966-78 | | .51 | 157 | 508 | .52 | 157 | 539 | .50 | 157 | 567 | .46 | 157 |
| | | Annual 10% reduction in F | | .76 | 212 | 434 | .68 | 162 | 443 | .61 | 148 | 471 | .55 | 147 |
| | | SSB = 400 | | .89 | 237 | 401 | .79 | 165 | 400 | .81 | 163 | 401 | .81 | 164 |
| | | Average SSB | | 1.25 | 291 | 327 | 1.0 | 154 | 326 | 1.04 | 153 | 327 | 1.04 | 154 |
| .395 TAC = 170 | 664 | TAC = TAC 81 | 670 | .37 | 170 | 702 | .365 | 170 | 741 | .357 | 170 | 766 | .34 | 170 |

Table 7. Wild and artificial production in 1979-81 in '000 a.s.u. by country and by stock.

| Country | Wild | Hatchery Releases | | | | | |
|---------|----------|-------------------|-------------------|----------|-------|----------|-------|
| | 1979-81 | 1979 | | 1980 | | 1981 | |
| | SD 24-31 | SD 24-31 | SD 32 | SD 24-31 | SD 32 | SD 24-31 | SD 32 |
| Finland | 135 | 220 | 20 | 430 | 35 | 620 | 126 |
| Poland | 20 | - | - | - | - | - | - |
| Sweden | 905 | 2 180 | - | 2 150 | - | 1 800 | - |
| USSR | 200 | 320 | 116 ¹⁾ | 350 | 60 | 370 | 105 |
| Total | 1 260 | 2 720 | 136 | 2 930 | 95 | 2 790 | 231 |

1) Total number released was 221 000, but no information on age distribution available. The a.s.u. conversion estimated from the 1980-81 data.

Table 8. Distribution of recovered tagged SALMON according to fishing zones.

| National zone | Tagged salmon | | | | |
|-----------------|-------------------|--------------------|-------------------|-----------------|-------------------|
| | Sweden 1966-72 | Finland 1969-78 | | USSR 1970-76 | Poland 1960-62 |
| Denmark | 4.6 | 4.2 ¹⁾ | 4.5 ²⁾ | 8.8 | 16.7 |
| Finland | 6.2 | 39.5 | 37.5 | 21.8 | 8.3 |
| German Dem.Rep. | 0.8 | 0.4 | 0.5 | - | - |
| Poland | 9.0 | 3.2 | 3.4 | 2.6 | 33.3 |
| Sweden | 55.7 | 35.3 | 35.1 | 38.0 | 29.2 |
| USSR | 10.0 | 7.4 | 7.9 | 28.8 | 12.5 |
| Grey zone | 13.7 | 10.0 | 11.1 | - | - |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

1) Number of fish in %.

2) Weight of fish in %.

Figure 1. HERRING in Sub-divisions 25-27
Predictions for catches in 1982 and spawning stock (age groups 3 and older) biomass at 1 January 1983

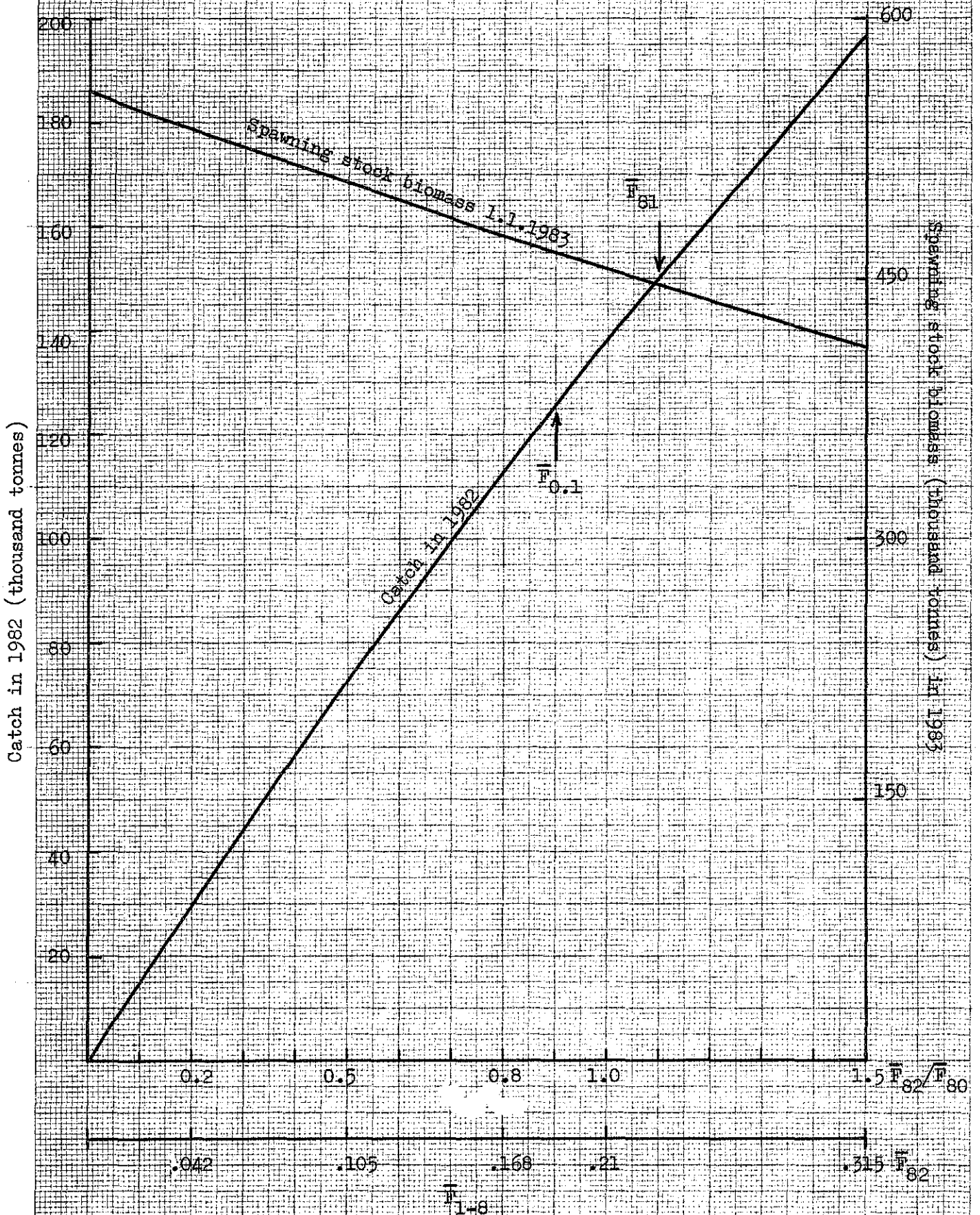


Figure 2. HERRING in Sub-divisions 28 and 29S.
Predictions for catch in 1982 and spawning stock biomass in 1983.

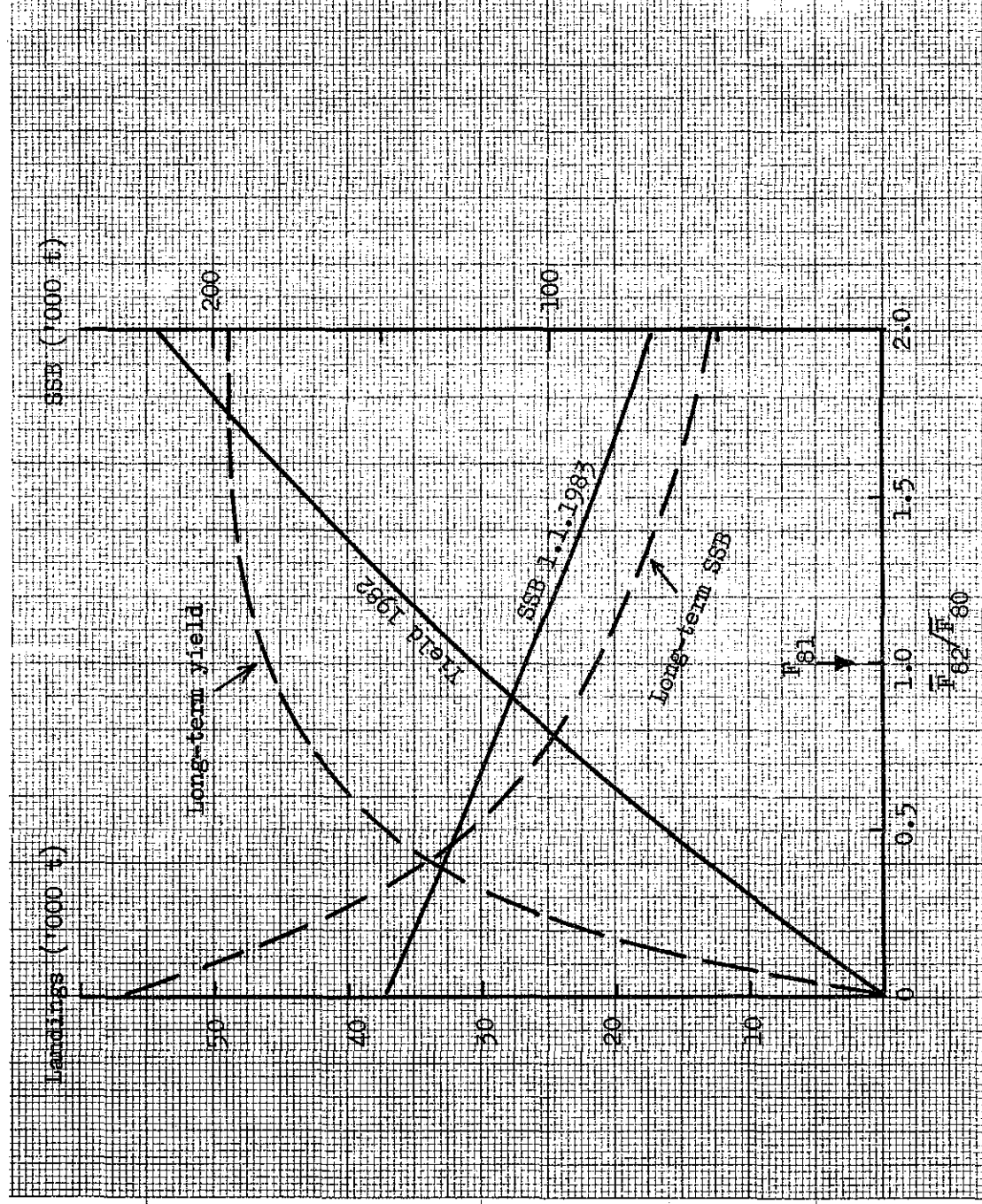


Figure 3. HERRING in the Gulf of Riga.
Predictions for catch in 1982 and spawning stock biomass in 1983.

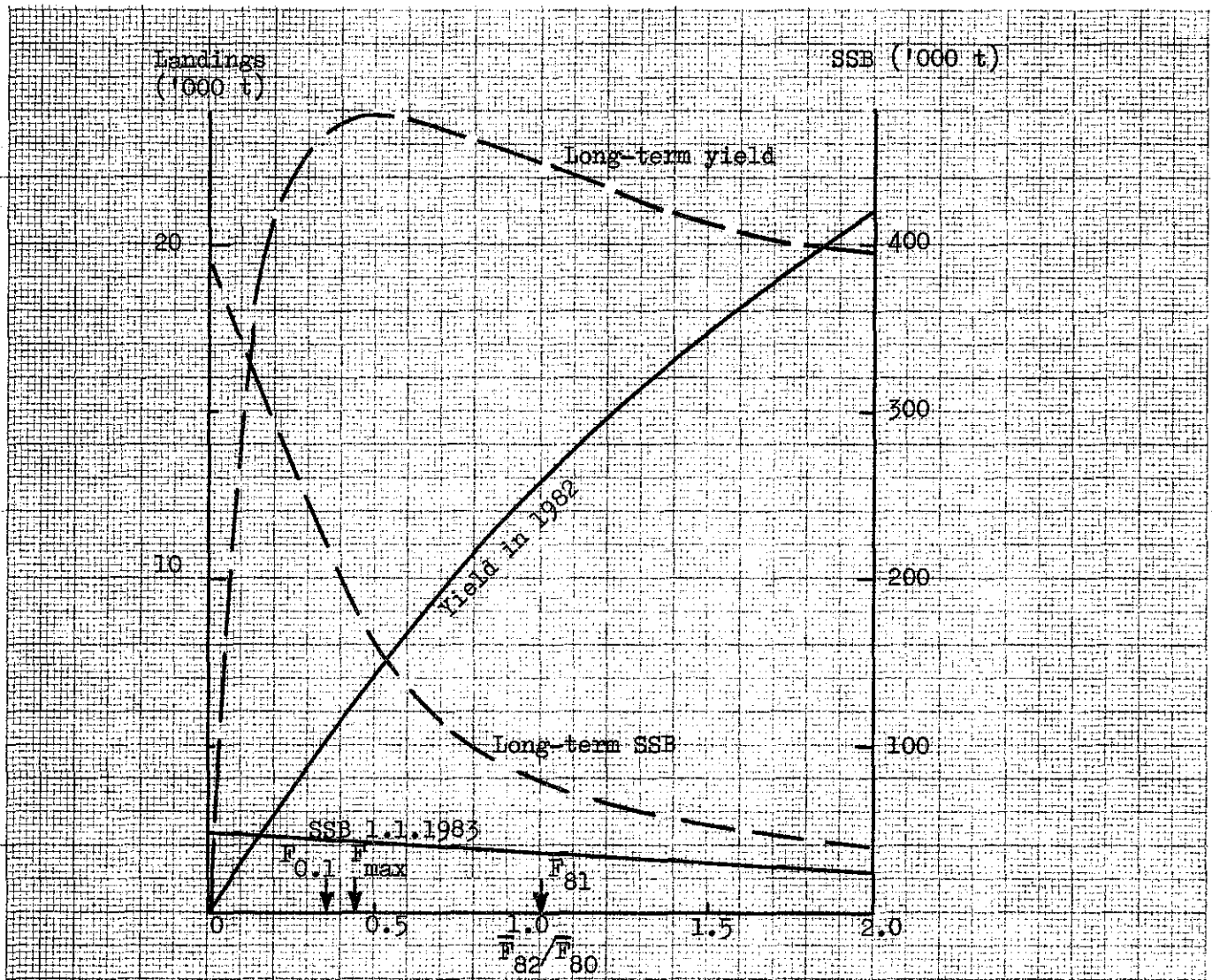


Figure 4. HERRING in Sub-divisions 29N, 30 and 31(East).
Predictions for landings in 1982 and spawning stock biomass
in 1983. Age of maturity = 3 years.

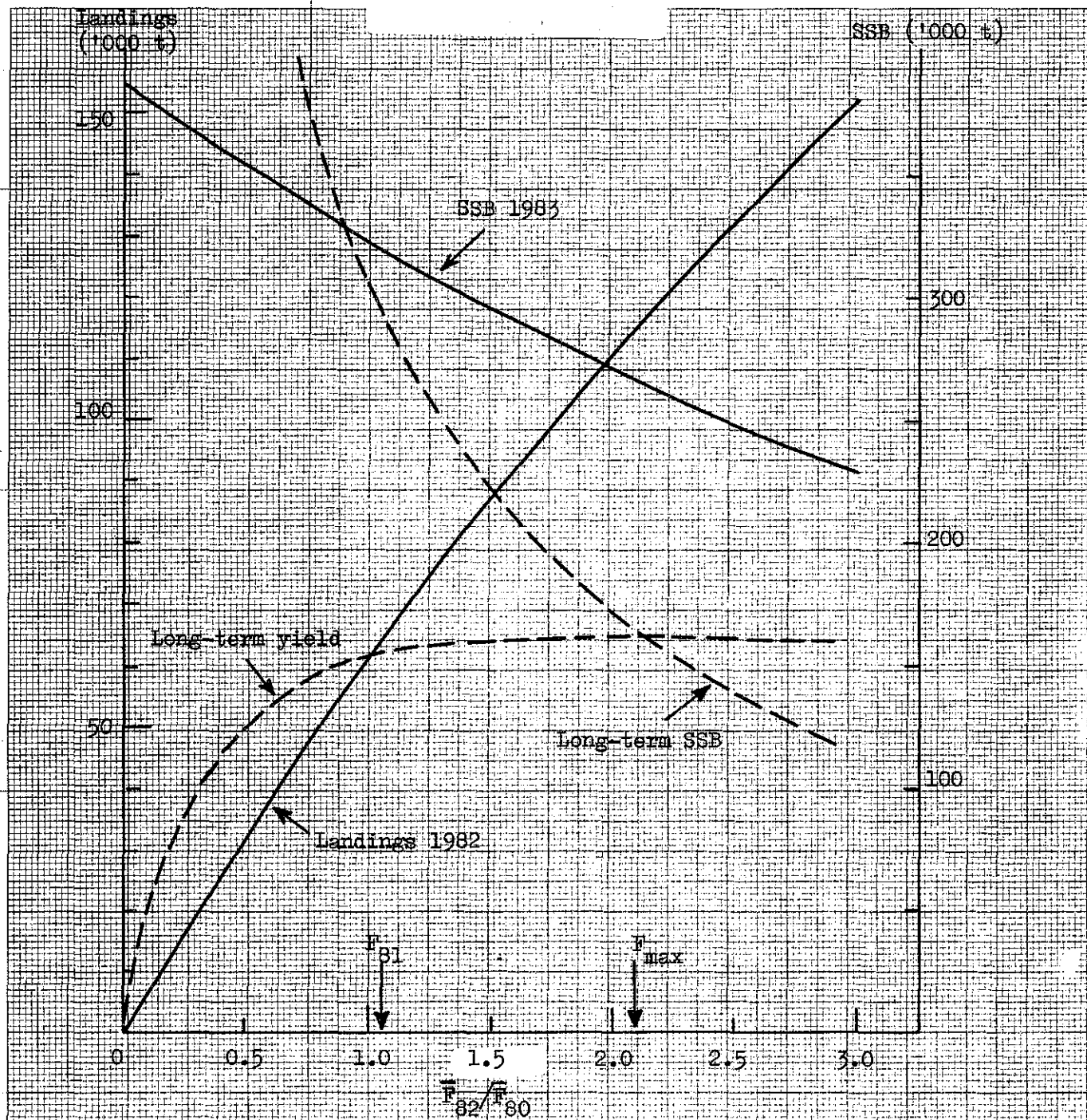
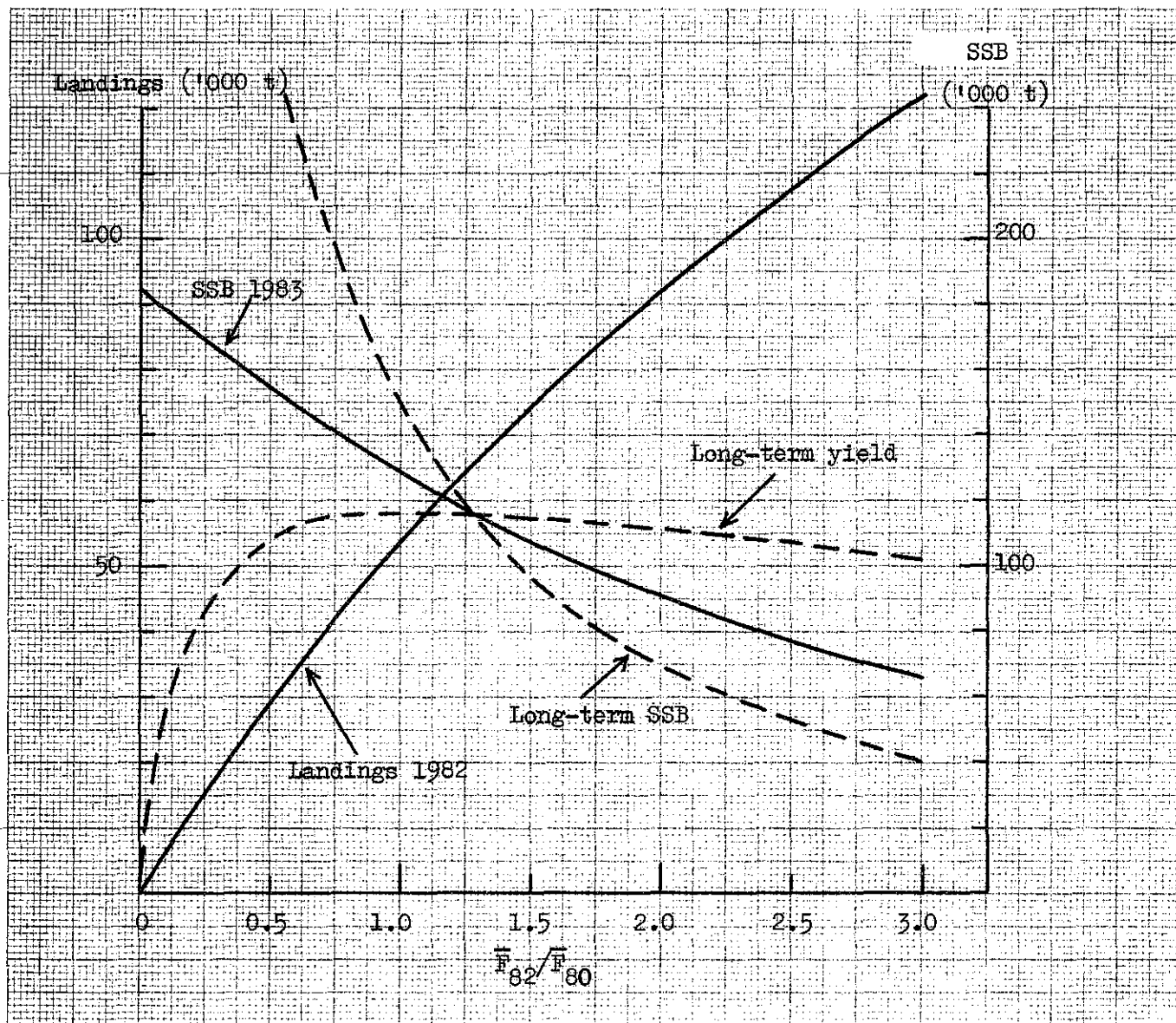


Figure 5. HERRING in Sub-division 32.
Predictions for landings in 1982 and spawning stock biomass in 1983.
Age of maturity = 3 years.



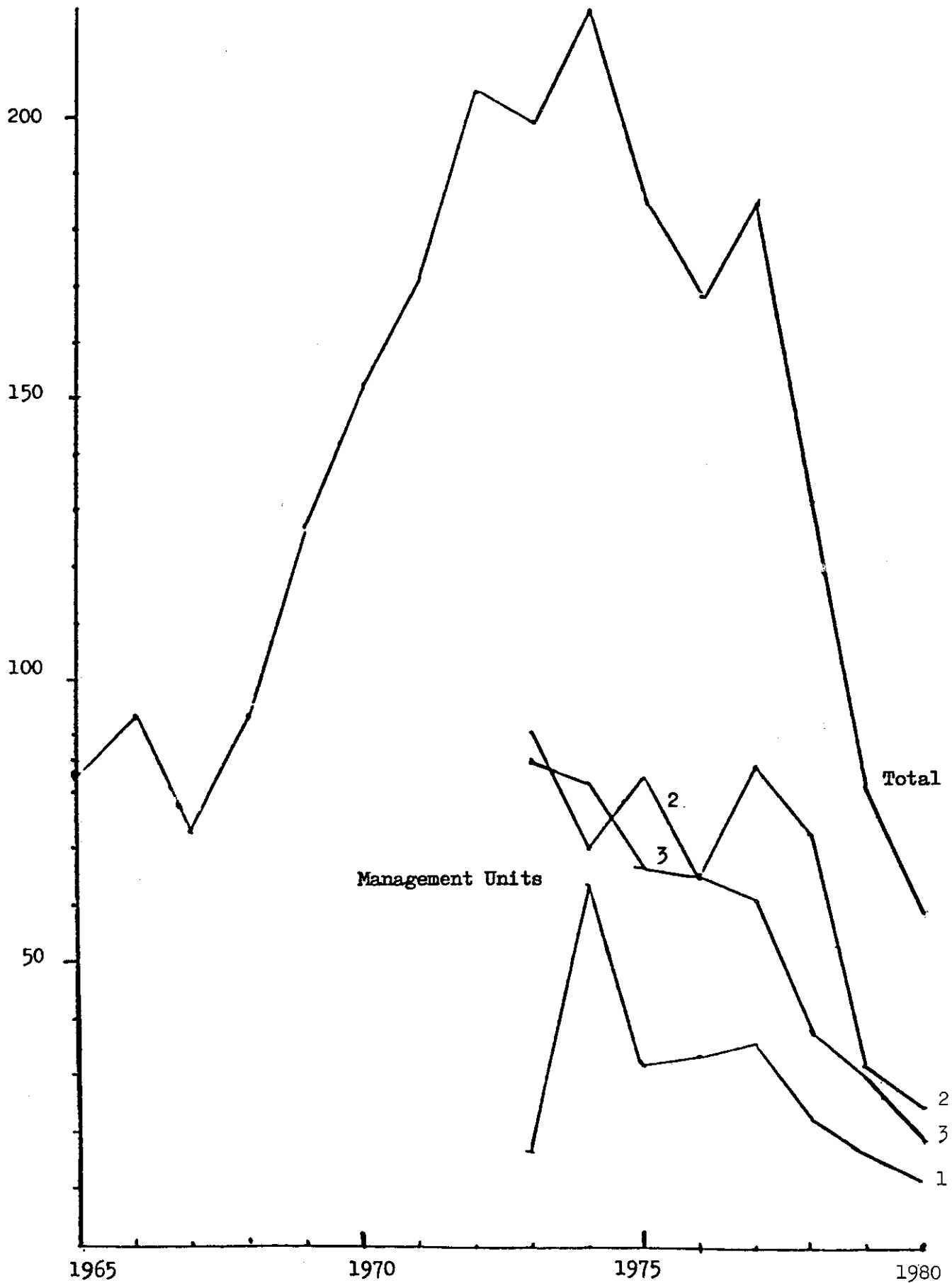


Figure 6. SPRAT catches ('000 tonnes) in the Baltic Sea in 1965-80
(data from Working Group reports, corrections for by-catches
taken into account).

Figure 7. OOD in Sub-divisions 25-32.
Predictions for catches in 1982 and spawning stock (age groups 3 and older) biomass at 1 January 1983.

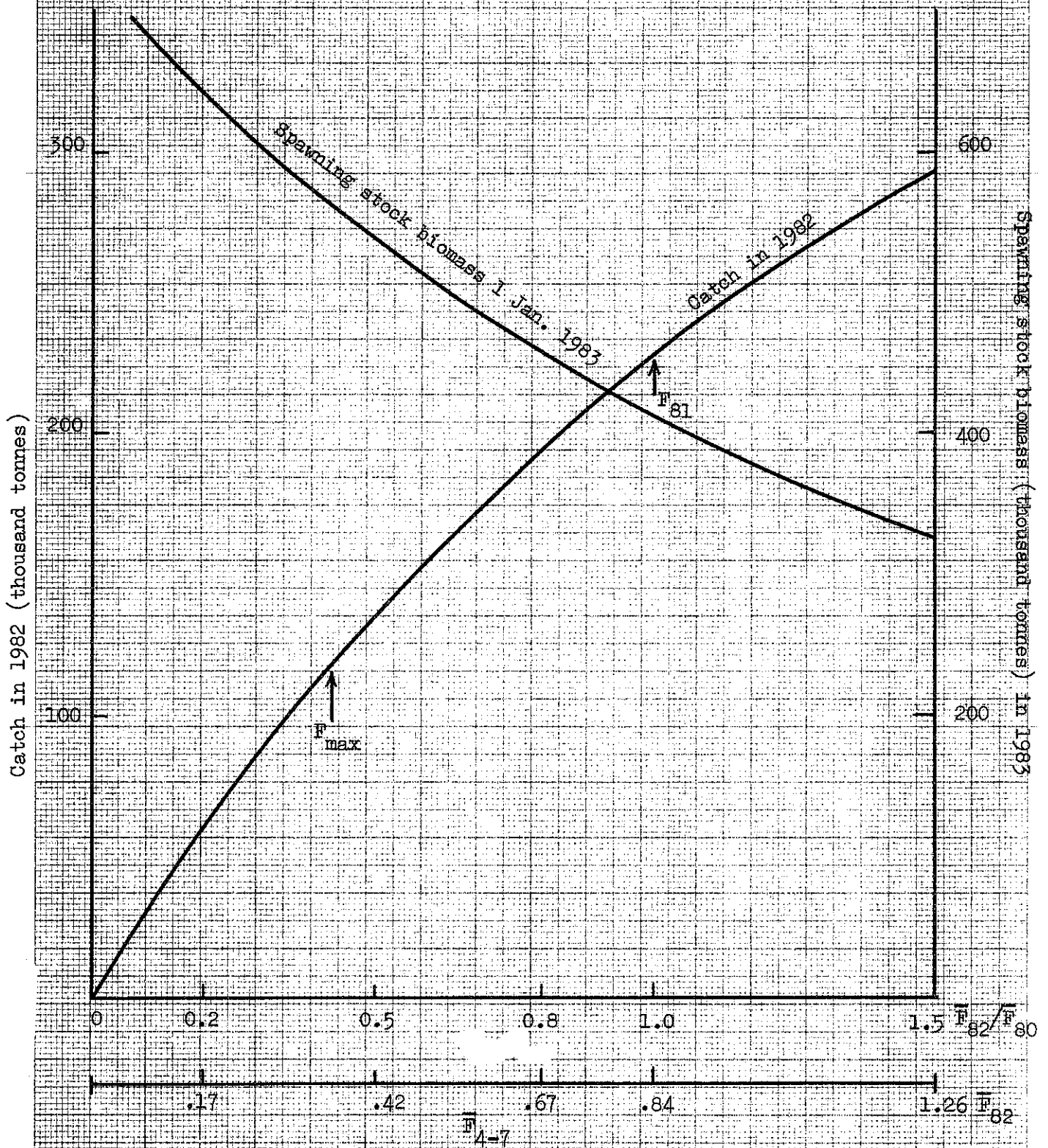
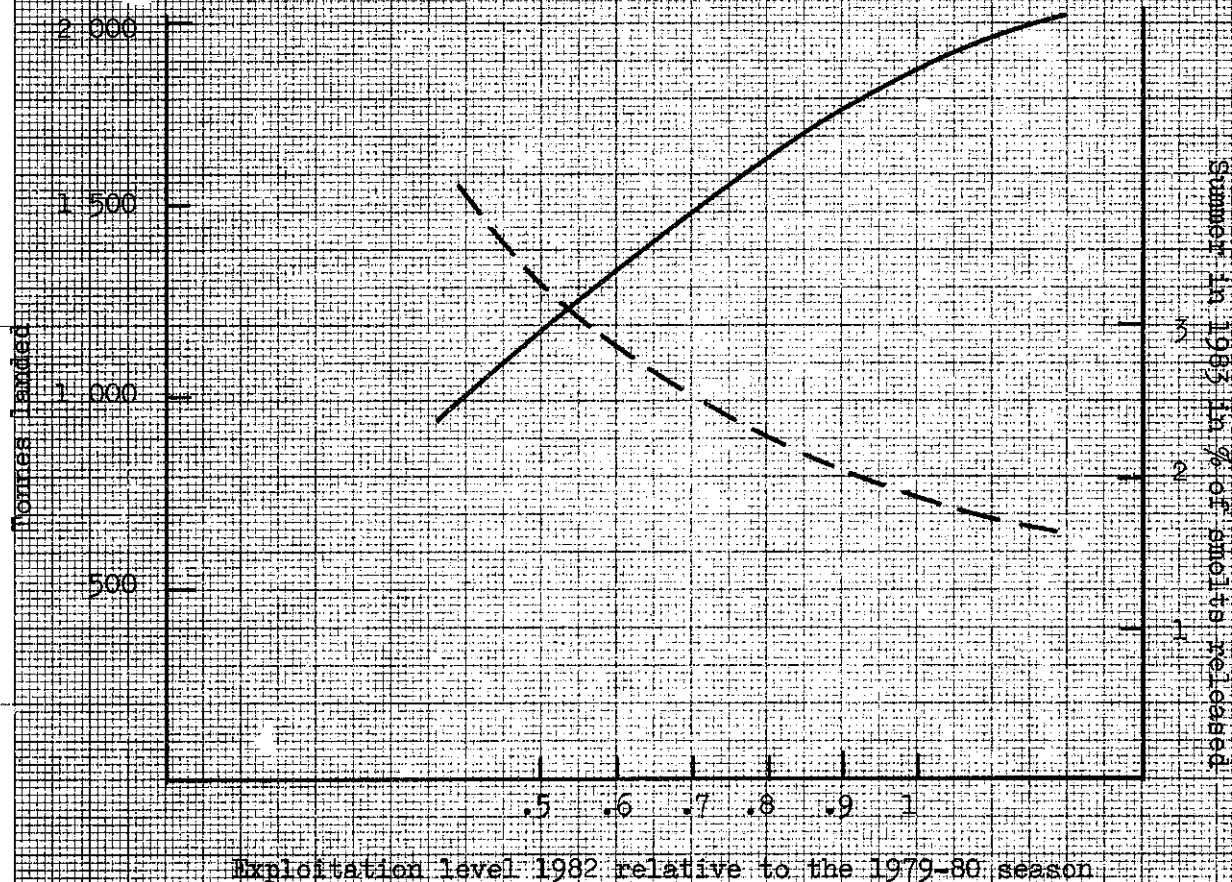
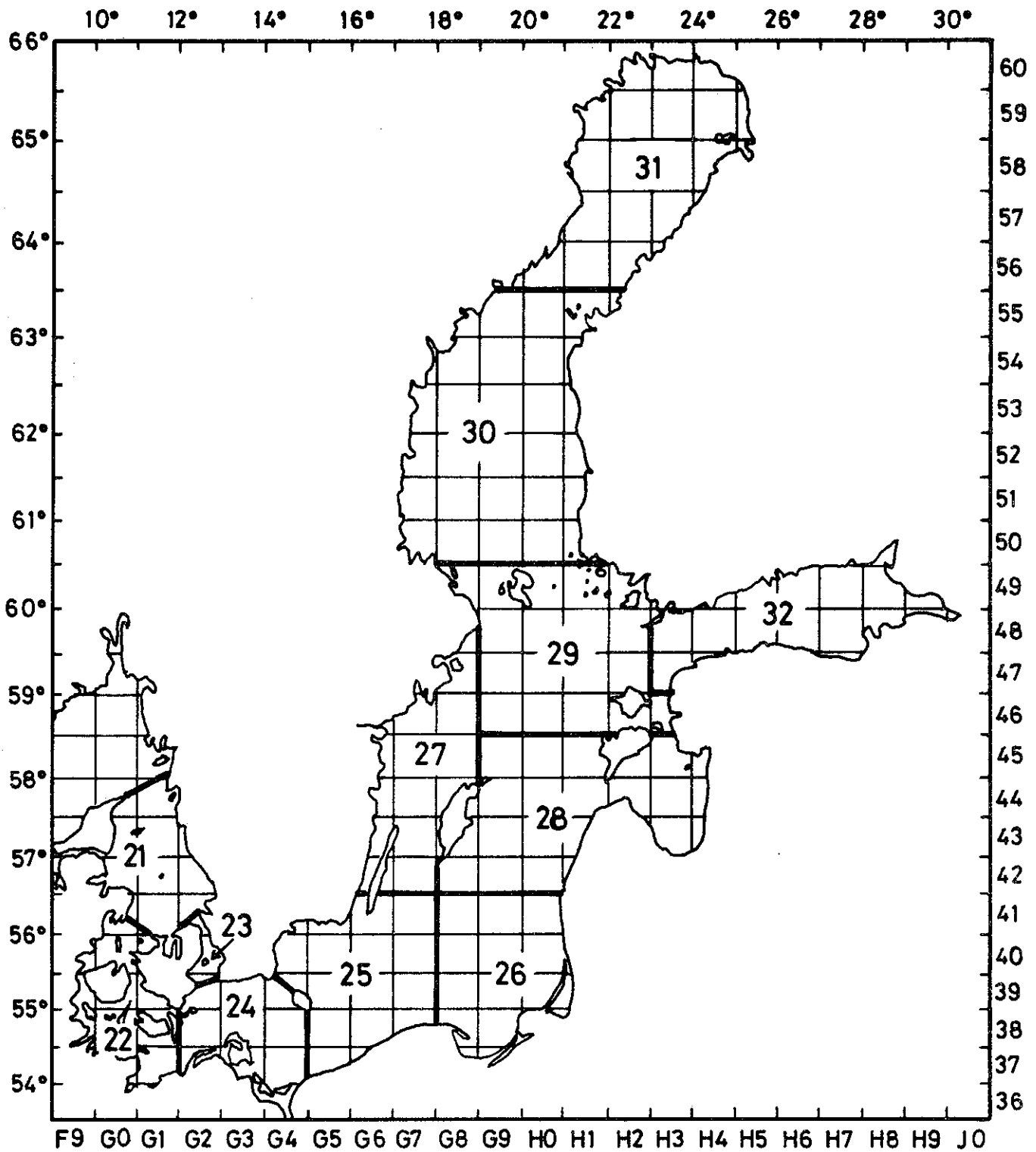


Figure 8. Yield 1982 (—) in Sub-divisions 24-31, assuming a release of 4 million a.s.u. each year and escapement in spring 1983 (\cdots) as function of the exploitation level. An initial loss of 80% of smolts is assumed. The 1980-81 season and autumn 1981 are assumed identical to the 1979-80 season.





ICES 27.3.03.00 (Baltic)

II. REPORT OF THE MEETING 3 - 5 November 1981

ADDENDUM TO THE REPORT TO THE NORTH-EAST ATLANTIC FISHERIES COMMISSION

INTRODUCTION

As has been indicated in the Introduction to the ACFM Report to the Twentieth Annual Meeting of NEAFC, with the new timetable of ICES with one ACFM meeting in July and the other in November, three of the Assessment Working Groups did not meet until after the July 1981 ACFM meeting. Advice for the stocks considered by those Working Groups is provided by the present report.

During its July 1981 meeting ACFM had to defer providing complete advice on a number of topics because the requisite data were not then available. These items have also been dealt with during the November 1981 ACFM meeting. Therefore this report should be considered as a supplement to the ACFM Report issued in July 1981, and should be read in relation to what was said on these topics in that report.

B. REGION 1 FISHERIES

B.6 CAPELIN STOCKS

1. The Atlanto-Scandian Herring and Capelin Working Group met at ICES headquarters from 28-30 October 1981 to assess the state of the capelin stocks in Sub-areas I, II, V and XIV, and advise on any necessary management measures for these stocks.

2. As this was the first time that capelin stocks were dealt with in an ICES Assessment Working Group, it was decided to include sections on the general biology and life history of the two stocks concerned, i.e., the Barents Sea and the Icelandic capelin stocks.

Both stocks have short life span. The Barents Sea capelin become mature and spawn when they are 4 years and 5 years old. The Icelandic capelin has a faster growth, and they mature and spawn a year younger than the Barents Sea stock.

The most important biological characteristic from the harvesting point of view is that the spawning mortality is considered total. Therefore, the main object of the fisheries management is to secure that a certain minimum proportion of the stock is allowed to spawn in order to safeguard recruitment. The stock/recruitment data that are available so far do not allow one to pinpoint this minimum spawning stock abundance, but as guidelines the scientists concerned have in their advice arrived at a spawning stock of 500 000 tonnes and 400 000 tonnes for the Barents Sea and the Icelandic capelin, respectively.

3. The basis for the assessment of both stocks are the results of acoustic surveys, which are carried out in the autumn. In the case of the Barents Sea capelin, the acoustic surveys started in the early 1970s, while for the Icelandic capelin the acoustic surveys did not start until 1978. A length-dependent conversion factor is used to calculate fish abundance from echo-intensity. The value used corresponds to a target strength of -37 dB per kilo for 15 cm capelin weighing 17 g.

B.6.1 BARENTS SEA CAPELIN

4. Since 1979 the Barents Sea capelin fishery has been regulated by bilateral fishery management agreements between the USSR and Norway. Recent TACs and catches (in thousand tonnes) are given in the text table below (see also Table 1):

| 1979 | | | 1980 | | | 1981 | | 1982 |
|-------------|-------|-------|-------------|-------|-------|-------------|-------|-------------|
| Rec. TAC | TAC | Catch | Rec. TAC | TAC | Catch | Rec. TAC | TAC | Rec. TAC |
| 1 800 | 1 800 | 1 783 | 1 600 | 1 600 | 1 649 | 1 900 | 1 900 | 1 600 |

These TACs have been recommended by a bilateral USSR/Norwegian assessment group.

5. As in previous years the basis for the present assessment of the Barents Sea capelin is the results of the USSR/Norwegian acoustic survey carried out in September-October each year. The 1981 survey gave the following abundance estimate:

| Year class | No. x 10^{-11} | Mean weighting | Biomass in t x 10^{-6} |
|---------------|------------------|----------------|--------------------------|
| 1980 | 3.85 | 2.2 | 0.85 |
| 1979 | 1.95 | 9.4 | 1.82 |
| 1978 | 0.48 | 17.0 | 0.81 |
| 1977 | 0.14 | 23.3 | 0.33 |

Compared to a similar estimate in 1980 the number of 1 year old capelin in 1981 is very high and that of 2 year old capelin is about the same in 1981 as estimated in 1980. In 1981 the numbers of 3 and 4 year old capelin were only about 1/3 of the number of these age groups estimated in 1980. Besides, the mean weight was lower in 1981 than in the previous year, and therefore the total biomass of 3 and 4 year old capelin was 1.1 million tonnes in 1981 compared to 3.6 million tonnes in 1980.

6. Estimates of the abundances of 2 and 3 year old capelin are made each year by acoustic techniques. The ratio of these values, adjusted for the catches, provides estimates of natural mortality.

During the period 1973-78 these estimates of the natural mortality coefficient M were very stable giving an $M = 0.05$ per month for 2-3 year old capelin. The low estimate of 3 ringers in 1981 in comparison with the number of 2 ringers in 1980 means that the calculated M value for 2-3 ringers in 1980-81 is more than twice the value calculated for the period 1973-78.

This increase in the calculated M value could be due to an underestimate of stock size in 1981.

7. In order to study the effects of various catch levels during the winter of 1982, the stock in number by age at 1st January 1982 was calculated from the 1981 acoustic stock estimate using an M value of 0.05 per month. Assuming that all capelin with the length of

above 14 cm will mature and spawn, the effects of various levels of winter catches on the potential spawning stock are given in the text table below:

TAC estimates (in thousand tonnes) and corresponding spawning stock biomass (maturing length = 14 cm)

| TAC | 600 | 700 | 800 | 900 | 1 000 |
|----------------|-----|-----|-----|-----|-------|
| Spawning stock | 584 | 493 | 401 | 312 | 223 |

8. A TAC of 800 000 tonnes will reduce the spawning stock biomass below the minimum level of stock size (500 000 tonnes) agreed upon as the guideline for the TAC assessment. It was, however, felt that the apparently high mortality rate estimated in 1980-81 for the immature part of the stock could partly be due to an underestimate of the present stock in the 1981 survey. On this basis, the ACFM agreed to recommend that the TAC for the period 1 January to 1 May 1982 should be set at the range of 600 000 - 800 000 tonnes.

9. By projecting the immature stock, i.e., capelin below 14 cm, one year ahead, and using an $M = 0.05$ per month, a total catch of 1.6 - 1.8 million tonnes taken in the autumn of 1982 and the winter of 1983 would reduce the total potential spawning stock to the same level as in 1982. On the basis of this prognosis, the ACFM recommends that the TAC for the autumn fishery (15 August - 31 December 1982) should be in the order of 800 000 tonnes, this being approximately half of the expected catch in the 1982-83 season.

B.6.2 ICELANDIC CAPELIN

10. Recent catches and TACs for the Icelandic capelin are given below in thousand tonnes (see also Table 2):

| 1979/80 | | | 1980/81 | | | 1981/82 |
|-----------------|----------|-------|-----------------|----------|-------|-----------------|
| Preliminary TAC | Rec. TAC | Catch | Preliminary TAC | Rec. TAC | Catch | Preliminary TAC |
| 650 | 850 | 962 | 775 | 450 | 680 | 700 |

11. Preliminary TACs were set prior to the fishing season after bilateral negotiations between Iceland and Norway. Recommended TACs were based on results of the acoustic surveys which were carried out in October and January, each season. On the basis of the winter surveys it has been possible to calculate the spawning stock in 1979-1981. The results are given in the text table below:

| Year | 1979 | 1980 | 1981 |
|----------------|------|------|------|
| Spawning stock | 600 | 300 | 160 |

Thus, there has been a drastic reduction in the spawning stock during the last three years.

In the case of the Icelandic capelin stock the available series of data on stock/recruitment relationship is too short to pinpoint the minimum amount that must be allowed to spawn in order not to reduce recruitment for that reason. The data nevertheless strongly indicate overfishing.

12. The acoustic abundance estimate this year is much lower than that obtained in corresponding surveys in 1980 and 1979. Thus, the present biomass is only 1/6 of the estimated biomass in 1979 as shown in the text table below.

Acoustic estimates of the Icelandic capelin stock
obtained in October surveys 1979-1981

| Age | 1981 | | 1980 | | 1979 | |
|-----|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| | Number x 10 ⁻⁹ | Tonnes . 10 ⁻³ | Number x 10 ⁻⁹ | Tonnes . 10 ⁻³ | Number x 10 ⁻⁹ | Tonnes . 10 ⁻³ |
| 1 | 0.9 | 5 | 23.6 | 171 | 22.3 | 141 |
| 2 | 7.0 | 135 | 19.6 | 378 | 42.4 | 639 |
| 3 | 0.2 | 4 | 4.8 | 128 | 7.9 | 167 |
| Sum | 8.1 | 144 | 48.0 | 677 | 72.6 | 947 |

It is, however, noted that the extension of the drift ice prevented surveying in areas where dense concentrations of capelin were located in 1980. Therefore, it is possible that the estimate for 1981 given in the text table above is a serious underestimate.

13. A preliminary TAC of 700 000 tonnes has been agreed between Iceland and Norway. At the time of the survey, approximately 360 000 tonnes had been taken by various nations fishing on the stock.

Although the 1981 acoustic stock estimate may be an underestimate, there is a real danger that if the remainder (340 000 tonnes) of the preliminary TAC were taken, the spawning stock will be fished out before the spawning season begins.

14. In previous years it has been established that an acoustic estimate can be obtained in January (Vilhjálmsson et al., 1980) at the beginning of the spawning migration when capelin have migrated away from the ice border. In view of this and the fact that the remainder of the preliminary TAC can be taken during the winter season in 1982, it is recommended that the fishery on the Icelandic capelin stock should be stopped until a new acoustic abundance estimate has been carried out.

15. A final TAC should be calculated in the light of the results of that estimate and taking into account the guidelines for an appropriate spawning stock. This will have to be done on a real time basis without the ACFM being able to evaluate the results prior to their implementation.

B.7 NORTH-EAST ARCTIC COD AND HADDOCK

16. The Arctic Fisheries Working Group met at ICES headquarters from 16-23 September 1981 to assess TACs for cod and haddock in Sub-areas I and II. In addition, the Working Group considered a suggestion from the Dialogue Meeting (October 1980) concerning specific TACs for the Svalbard (Spitsbergen) area.

B.7.1 NORTH-EAST ARCTIC COD

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

| 1978 | | | 1979 | | | 1980 | | | 1981 | |
|----------|-------------|--------------|----------|-------------|--------------|----------|-------------|---------------|-------------|---------------|
| Rec. TAC | Total quota | Actual catch | Rec. TAC | Total quota | Actual catch | Rec. TAC | Total quota | Actual catch* | Total quota | Estim. catch* |
| 850 | 850 | 699 | 600 | 700 | 441 | 390 | 390 | 382 | 300 | 400 |

* Preliminary

18. Revised figures for cod landings in 1979 amounted to 440 538 tonnes (Tables 3 and 4). The provisional catch figure for 1980 of 381 709 tonnes indicates a reduction of about 13% compared to the previous year. Total landings for 1981 were estimated to be 400 000 tonnes.

19. Some preliminary estimates of total trawler effort have been made which seemed to indicate that the total trawler effort exerted in 1981 would be somewhat lower than that in 1980, continuing the declining tendency of recent years.

20. The declining trend in catch per unit effort observed in the trawl fishery for all three regions (i.e., Sub-area I and Divisions IIa and IIb) during the period 1976-79 was reversed in 1980. The increase in catch per unit effort figures for gears other than trawl in Division IIa might be interpreted as a combined effect of the increased available stock abundance (1975 year class) and higher catchability in the Lofoten area.

21. The more westward distribution of cold water masses observed in 1978, 1979 and 1980 continued in 1981. The corresponding westward distribution of cod was observed in all four years and the fishing activity of the different fleets has been adapted to this new distribution pattern.

22. Fishing mortalities for different age groups in 1981 were estimated on the basis of information from the Norwegian acoustic survey and the Norwegian groundfish survey for the younger ages and for the older age groups (8+) and on catch and effort data for the two components (trawls and other gears) of the fishery.

Mean fishing mortality on age groups 5 to 10 increased to a level of 0.82 and 0.90 for the years 1977 and 1978, respectively, from a relatively stable level of about 0.6. Since 1979, $\bar{F}_{(5-10)}$ declined continuously to a level of 0.48 in 1981 which, however, is still almost twice as high as $F_{\max} = 0.25$.

23. Estimated total recruited biomass (age 3+) declined continuously since 1974, when the strong 1970 year class was fully recruited to the fishery. The expected level at the beginning of 1982 is the lowest ever recorded in the history of this stock. The declining trend in the spawning stock biomass from the relatively high level of 680 000 tonnes in 1971-72 (when the strong 1963 and 1964 year classes became 8 years old) was interrupted in 1977 and 1978 by a relatively small contribution by the rich 1970 year class which had been heavily fished at younger ages. For 1980, 1981 and 1982, the level of spawning stock biomass is estimated to be around 220 000 tonnes.

24. Results of the catch predictions and the historic development of yield and spawning stock biomass are given in Figures 1 and 2 respectively. In the following text table a number of options are presented.

| 1981 | | | | Management option for 1982 | 1982 | | | | 1983 | |
|------------------|---------------------------|--------------------|------------|----------------------------|------------------|---------------------------|--------------------|------------|------------------|---------------------------|
| Stock biom. (3+) | Spawning stock biom. (8+) | $\bar{F}_{(5-10)}$ | Catch (3+) | | Stock biom. (3+) | Spawning stock biom. (8+) | $\bar{F}_{(5-10)}$ | Catch (3+) | Stock biom. (3+) | Spawning stock biom. (8+) |
| 1 562 | 225 | 0.48 | 400 | $F_{0.1}$ | 1 434 | 221 | 0.14 | 142 | 1 540 | 710 |
| | | | | F_{\max} | | | 0.25 | 240 | 1 420 | 630 |
| | | | | TAC 1982 = 300 | | | 0.32 | 300 | 1 350 | 580 |

Weights in thousand tonnes

25. In the 1979 report of the Arctic Fisheries Working Group (C.M.1979/G:20) it was pointed out that, based on a Ricker stock/recruitment relationship, the optimum level of spawning stock biomass ranges from 500 000 tonnes to 1 000 000 tonnes. The lower level of this range is considered by the Working Group as a minimum requirement to reduce the probability of recruitment failure due to low spawning stock levels.

The relatively strong 1975 year class will be fully recruited to the spawning stock in 1983. Its contribution to the spawning stock biomass in 1983 is expected to be within a range of approximately 500 000 tonnes to 300 000 tonnes, depending on the level of exploitation in 1982.

However, the 1975 year class is followed by a series of at least six relatively poor or even very weak year classes. As a consequence, the spawning stock biomass can only be maintained into 1984 at the required minimum level if the exploitation in 1982 and 1983 will not exceed the $F = 0.4$ level. This management strategy is associated with catch levels around 350 000 tonnes for the years 1982 and 1983 (see the next text table).

Fishing at higher levels of exploitation, e.g., $F = 0.5$ is expected to prevent a substantial recovery of the spawning stock. Fishing with a stable TAC of 400 000 tonnes would drastically reduce the spawning stock by 1986, if estimates of recruiting year classes' strength proved to be accurate.

At a stable TAC of 300 000 tonnes over a series of years the spawning stock biomass will be maintained above the required minimum level into 1985 and is expected to fall slightly below that level by 1986. This management strategy is considered by ACFM as the upper level of exploitation inside safe biological limits.

ACFM recommends that fishing mortality should be reduced as far as possible towards F_{max} . Fishing at F_{max} from 1982 onwards is expected to keep the spawning stock biomass safely within its optimal range up to the beginning of 1986.

Fishing at the $F_{0.1}$ level would result in a rapid increase in the spawning stock biomass to a level above 1 million tonnes in 1984 corresponding to the spawning stock biomass at the end of the 1950s.

Calculated spawning stock biomass in 1982-86 and calculated catch 1982-84 at constant levels of exploitation in thousand tonnes.

(Catch figures for 1985 and 1986 are depending on recruiting year classes beyond 1981 and are therefore not given in the table)

| MANAGEMENT STRATEGY | $F_{0.1} = 0.14$ | | $F_{MAX} = 0.25$ | | $F = 0.4$ | | $F = 0.5$ | | Stable TAC 300 000 t | | Stable TAC 400 000 t | |
|---------------------|------------------|-------|------------------|-------|-----------|-------|-----------|-------|----------------------|--------------|----------------------|--------------|
| YEAR | SSB | CATCH | SSB | CATCH | SSB | CATCH | SSB | CATCH | SSB | $F_{(5-10)}$ | SSB | $F_{(5-10)}$ |
| 1982 | 221 | 142 | 221 | 240 | 221 | 362 | 221 | 434 | 221 | 0.320 | 221 | 0.451 |
| 1983 | 710 | 176 | 630 | 269 | 534 | 354 | 479 | 388 | 583 | 0.302 | 505 | 0.494 |
| 1984 | 1043 | 196 | 832 | 269 | 608 | 307 | 494 | 309 | 732 | 0.320 | 521 | 0.676 |
| 1985 | 1074 | | 764 | | 479 | | 353 | | 623 | 0.390 | 298 | 1.484 |
| 1986 | 1014 | | 645 | | 349 | | 235 | | 448 | | 60 | |

B.7.2 NORTH-EAST ARCTIC HADDOCK

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

| 1978 | | | 1979 | | | 1980 | | | 1981 | |
|----------|-------------|--------------|----------|-------------|--------------|----------|-------------|---------------|-------------|---------------|
| Rec. TAC | Total quota | Actual catch | Rec. TAC | Total quota | Actual catch | Rec. TAC | Total quota | Actual catch* | Total quota | Estim. catch* |
| 150 | 150 | 95 | 206 | 206 | 104 | 55-78 | 75 | 87 | 110 | 80 |

* Preliminary

27. Final figures for haddock landings in 1979 amounted to 103 623 tonnes (Tables 5 and 6), the preliminary figure for 1980 is 87 246 tonnes, i.e., a decrease from the 1979 level of about 16%. Expected landings in 1981 have been estimated to be 80 000 tonnes.

28. In 1980 and 1981 the catch per unit of effort continued the upward trend observed since 1978 in Sub-area I and Division IIa. This is mainly due to the 4-6 years old fish of the good 1975 and 1976 year classes.

29. Fishing mortalities on age groups 5 and 6 for 1981 were estimated on the basis of fishing effort by both trawls and other gears. These age groups contribute most to the catches. F values for age groups 3 and 4 were selected to give the expected levels of recruitment derived from surveys. For the older age groups (7+), which are making up only 5% of the estimated catch in numbers in 1981, the value of F on 6 year old haddock was adopted. Average fishing mortality on age groups 4-7 declined continuously from a high level of 0.71 in 1977 to 0.21 in 1981, i.e., a level considerably below $F_{max} = 0.42$ and close to $F_{0.1} = 0.17$.

30. Total recruited biomass (age 3+) increased to about 430 000 tonnes in 1980-81 from the 1977-78 level of 350 000 tonnes which was the lowest on record.

Spawning stock biomass decreased continuously from the very high level in 1975-76 of about 400 000 tonnes to the lowest on record of 81 000 tonnes in 1980. This downward trend was followed by an increase to 214 000 tonnes in 1981 due to the contribution of the good 1975 year class.

31. Results of the catch predictions are given in Figure 3, and the historic yield and spawning stock biomass are shown in Figure 4. Four management options are listed in the following text table.

| 1981 | | | | Management option for 1982 | 1982 | | | | 1983 | |
|------------------------|----------------------------------|--------------------|---------------|--|------------------------|----------------------------------|--------------------|---------------|------------------------|----------------------------------|
| Stock biom. (3+) | Spawn. stock biom. (6+) | \bar{F} (4-7) | Catch (3+) | | Stock biom. (3+) | Spawn. stock biom. (6+) | \bar{F} (4-7) | Catch (3+) | Stock biom. (3+) | Spawn. stock biom. (6+) |
| 439 | 214 | 214 | 80 | TAC 1982 = 1981 catch | 414 | 286 | .25 | 80 | 377 | 250 |
| | | | | $F_{0.1}$ | | | .17 | 57 | 404 | 275 |
| | | | | F_{max} | | | .42 | 122 | 332 | 210 |
| | | | | Maintaining 1981 level of exploit. | | | .214 | 70 | 388 | 260 |

Weights in thousand tonnes

32. Following the increase in 1981 from the very low 1980 level, the spawning stock biomass in 1982 is expected to increase further to a level of about 286 000 tonnes due to the contribution by the good 1976 year class in 1982 of about 100 000 tonnes. No further increase in the spawning stock biomass can be expected up to 1987, since all year classes recruiting to the spawning stock during this period are poor. If management aims at maintaining a reasonable spawning stock size over a longer period, a cautious approach in the long-term policy is advisable.

33. Long-term projections for different management strategies in the haddock fishery are not very meaningful, since in setting a TAC for haddock it has to be remembered that a considerable part of the haddock catch is taken in a mixed fishery together with other species (mainly cod) in Sub-areas I and II. Therefore, the haddock stock cannot be managed completely independently from the management adopted for cod.

The ratio of cod and haddock in the catches indicates that, at the present biomass levels, the weight of haddock taken in the mixed fishery is about $\frac{1}{4}$ of that of cod.

The present level of exploitation corresponds to a position on the yield per recruit curve where the curve has almost reached the top level. Therefore, ACFM prefers that fishing mortality should not be above the 1981 level.

B.7.3 SPECIFIC TACs FOR THE SVALBARD FISHERY PROTECTION ZONE

34. Cod and haddock in the Svalbard fishery protection zone (the major part of Division IIb) are part of the North-East Arctic cod and haddock stocks.

Catches from this area are highly variable depending on year class strengths and on hydrographic conditions. These factors are hard to predict and their effects on the distribution of cod and haddock in that area cannot be quantified. It is, therefore, not possible to estimate the proportion of a TAC for Sub-areas I and II which is likely to be caught in Division IIb. Furthermore, no data are available which would allow a further breakdown between the Svalbard fishery protection zone and the remaining part of Division IIb.

B.7.4 MESH SIZE

35. In its 1980 report (Coop.Res.Rep., No.102, p. 79-80) ACFM reiterated the advice given in 1979 (Coop.Res.Rep., No.93) on an increase in a minimum mesh size which reads:

"ACFM recommends that in Sub-areas I and II the minimum mesh size for all towed gears, in Recommendation 1 fisheries, should be increased to 155 mm".

36. If this advice had been followed, the good 1975 year classes of both cod and haddock would have been protected as 3 and 4 yearsold fish and their contribution to the total yield and to the spawning stock biomass would have been greater.

37. In the present situation when the recruiting year classes are all poor, at least up to 1984, the immediate losses due to an increase in the mesh size cannot be large. Since ACFM is concerned about the state of the spawning stock biomass, particularly for cod, good survival of recruits is essential if a viable spawning stock is to be maintained. ACFM, therefore, again reiterates the advice quoted above.

D. REGION 2 FISHERIES

D.1.1.8 HERRING IN THE SKAGERRAK AND THE KATTEGAT (Division IIIa)

Survey Results

38. A Danish-Swedish acoustic survey was, as in 1979 and 1980, carried out in August-September 1981. The area covered had been extended and the fishing intensified compared to the previous surveys. The Swedish R/V "Argos" undertook the fishing operations, while the Danish R/V "Dana" made the acoustic integrations using a SIMRAD EX-38 KHz equipment.

39. From this survey the stock size of herring was calculated based upon a target strength of -38.3 dB/kg measured by "Argos" in 1980 using a 120 KHz echosounder. Intercalibration between "Dana" and "Argos" suggests that these systems are not directly comparable, since the comparison during daytime and during nighttime gives rather different relationships. Furthermore, ACFM has reservations on the applicability of the target strength measured by "Argos" on different makes of equipment. The target strength applied for North Sea herring is about -34 dB/kg in contrast to that of -38.3 dB/kg obtained by "Argos".

40. ACFM concluded that little confidence could be placed on the absolute level of stock size estimated by the 1981 survey without measurement of target strength of herring, using the "Dana" equipment. These measurements will be available before the next round of the Assessment Working Group. The 1981 survey represents a significant step forward towards a reliable assessment of the Division IIIa herring.

41. The year class 1979 appears to be strong. This is confirmed by the age composition data obtained through the August-September survey and by the index of 2 group in the International Young Fish Survey in 1981.

Preliminary data from the fishery in January-August 1981 also suggest that the 1979 year class is abundant. The 1980 year class appears from the IYFS to be average. Comparison of the 1980 year class with the 1979 year class in the acoustic survey suggests that the 1980 year class is 30% to 40% of the 1979 year class strength.

42. Taking into account dubieties regarding the absolute level of the stock estimated from the acoustic survey and the highly variable F estimates obtained from trial VPAs, no analytical assessment is possible at present for this stock.

Commercial Fishery in 1981

43. No agreement between EEC, Norway and Sweden on a TAC for 1981 for the Skagerrak has been reached. EEC and Sweden agreed on a TAC of 35 600 tonnes for 1981 for the Kattegat. In October 1980 ACFM recommended a TAC for Division IIIa of 53 000 tonnes.

Preliminary data on the commercial landings in the period January-August 1981 indicate a total of 95 000 tonnes. This includes landings for human consumption, by-catches and withdrawals. There is no information on discards at sea. In 1981, the Danish herring fishery in the Skagerrak did not start before June, and by agreements between the Danish and Swedish fishermen's organisations the Danish fishery stopped in early August when the Swedish trawl fishery commenced. Purse-seiners were allowed to fish from 16 June to 7 August in the Skagerrak. Since fishing for herring in the Skagerrak is prohibited from 1 October and Denmark banned all its herring fisheries for the last 3 weeks of September, it is reasonable to assume that at least 80% of the 1981 landings were taken prior to the survey.

44. The total landings in 1981 are thus expected to total about 120 000 tonnes. Of this total about 40% by weight is taken as "by-catch" in the sprat fishery.

The TACs in previous years have also been overshoot by around a factor of 2 (see Table 31 of the July 1981 ACFM report). The catch of herring in the sprat fishery is such that no effective enforcement of the by-catch regulation has taken place. Very few sprat (about 10% by weight of the herring) were recorded in the acoustic survey suggesting that little directed sprat fishery is possible in Division IIIa at present.

The species composition obtained from the acoustic survey is shown in Figure 5.

45. ACFM must point out the harmful effects of the uncontrolled sprat fishery on the herring stocks and strongly stresses the importance of adherence to the by-catch regulations. If these are not adhered to, a complete ban on the sprat fishery may be the only feasible action, if viable herring stocks have priority.

The state of the sprat stocks will be reviewed by the ICES Working Group on Norway Pout, Sandeels and Sprat Fisheries in the North Sea and Adjacent Waters (ICES Sub-area IV, Divisions IIIa and VIa) in March 1982.

46. The herring stock in Division IIIa is of mixed origin including indigenous spring spawners, spring spawners from the Baltic and autumn spawners from the North Sea. The 0 and 1 groups exploited by the sprat fishery contain a major North Sea herring stock component, and this could be a factor in the failure of the rebuilding of the Divisions IVa and IVb herring stock components.

47. ACFM recommends a TAC in the range of 30 000 - 40 000 tonnes for herring in Division IIIa for 1982. This range is calculated from the TAC for 1981 corrected for the underestimation of the 1979 year class strength (TAC - 1981 \approx 85 000 tonnes) and the expected catch of about 120 000 tonnes in 1981.

48. ACFM repeats the advice from its July 1981 report that:

"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 in directed fisheries for herring is increased to 40 mm in Division IIIa.

D.3 COD, HADDOCK AND WHITING STOCKS IN THE NORTH SEA (Sub-area IV)

49. In the report from the July 1981 meeting of ACFM it was described how ACFM had to undertake the major task of redoing all the assessments of the North Sea and Division VIa roundfish stocks.

The time to do this during the meeting was very restricted and nobody from the Working Group on North Sea Roundfish stocks was present to assist ACFM in doing this.

It was felt wise to have these re-assessments checked once more by the people usually involved in these assessments and, therefore, the Chairman of the North Sea Roundfish Working Group had a meeting with the Chairman and Secretary of ACFM prior to the November meeting of ACFM to achieve this.

50. The outcome of this meeting is given in the text table below as the final version of the option tables for the three North Sea stocks (see also Figures 6-8).

There are some minor differences in the figures coming from the recalculations compared to the figures given in the July report for cod and haddock, but for whiting the difference is significant and no explanation can be given for that.

| 1981 | | | North Sea COD | 1982 | | | 1983 |
|---------------------|--------------------|-----|-------------------------------------|------|-----------|-----|------|
| | | | Management options for 1982 | | | | |
| SSB (≥ 3) | \bar{F} (3-8) | HCL | | SSB | \bar{F} | HCL | SSB |
| 280 | .57 | 230 | $\bar{F}_{0.1}$ | 370 | .125 | 65 | 655 |
| | | | \bar{F}_{max} | | .19 | 95 | 605 |
| | | | $\bar{F} = 0.8 \times \bar{F}_{81}$ | | .46 | 200 | 445 |
| | | | $\bar{F} = 0.9 \times \bar{F}_{81}$ | | .51 | 220 | 415 |
| | | | $\bar{F} = \bar{F}_{81}$ | | .57 | 235 | 390 |

| 1981 | | | North Sea HADDOCK (Option 1 : $\bar{F}_{81} = \bar{F}_{80}$) | 1982 | | | 1983 |
|---------------------|--------------------|-------------------------|--|------|-----------|-------------------------|------|
| SSB (≥ 2) | \bar{F} (2-6) | Landings [*]) | | SSB | \bar{F} | Landings [*]) | SSB |
| 660 | .95 | 230 | \bar{F}_{max} | 440 | .21 | 90 | 585 |
| | | | $\bar{F} = 0.8 \times \bar{F}_{81}$ | | .76 | 180 | 400 |
| | | | $\bar{F} = 0.9 \times \bar{F}_{81}$ | | .86 | 190 | 380 |
| | | | $\bar{F} = \bar{F}_{81}$ | | .95 | 200 | 360 |

| 1981 | | | North Sea WHITING (Option 1 : $\bar{F}_{81} = \bar{F}_{80}$) | 1982 | | | 1983 |
|---------------------|--------------------|-------------------------|--|------|-----------|-------------------------|------|
| SSB (≥ 2) | \bar{F} (2-6) | Landings [*]) | | SSB | \bar{F} | Landings [*]) | SSB |
| 580 | .516 | 210 | \bar{F}_{max} | 500 | .17 | 140 | 605 |
| | | | $\bar{F} = 0.8 \times \bar{F}_{81}$ | | .41 | 185 | 525 |
| | | | $\bar{F} = 0.9 \times \bar{F}_{81}$ | | .46 | 195 | 510 |
| | | | $\bar{F} = \bar{F}_{81}$ | | .516 | 200 | 500 |

Weights in thousand tonnes.

*) For human consumption and industrial purposes (see separate graphs in Figures 7 and 8).

SSB = Spawning stock biomasses

For cod - fish at age 3 and older

For haddock and whiting - fish at age 2 and older.

HCL = Human consumption landings.

F = Fishing mortality generated by human consumption fisheries only.

51. One of several reasons why ACFM could not accept the assessments done by the North Sea Roundfish Working Group this year, was that the approach used by the Group produced estimates of fishing mortality which would seem to infer a drastic change in fishing pattern for haddock and whiting, which was difficult to explain.

In the approach used by ACFM the assessments still seem to produce rather low estimates of fishing mortality on 1 and 2 group haddock and whiting and a generally lower level of fishing mortality in the whiting fisheries.

At present ACFM saw no way to solve this problem, but the Working Group will be urged to have a closer look at this at its forthcoming meeting in March 1982.

52. To illustrate the effect of these low estimates of fishing mortality on certain age groups of haddock and whiting, ACFM made computer runs for each stock, assuming the average 1975-77 exploitation pattern for 1980. This assumption would mean that the calculated catch options for 1982 for haddock and whiting would have to be reduced by 50% and 20%, respectively.

Therefore, the options calculated for haddock and whiting and given in the text table above should be interpreted with some caution.

53. For several years ACFM advised that the only way to reach a more stable situation in the fisheries for roundfish in the North Sea is to a) bring the total mortality level in these fisheries down closer to the biological reference points, which indicate the potentials of these stocks, and b) bring down the fishing mortality levels on the younger age groups.

It is obvious that very little has been achieved in this respect. This is indicated by the low F_{max} values for all three stocks and by the fact that the present level of exploitation for cod is 3 times F_{max} , for haddock 4.5 times F_{max} and for whiting 3 times F_{max} .

54. At its July 1981 meeting ACFM based its advice on TACs for 1982 on a continuous decrease in fishing mortality from the 1979 level and onwards, recommending stepwise reductions from the recommended levels rather than from the actual levels.

As nothing has been achieved in bringing the general fishing pressure on the three stocks down, these reductions in fishing mortality recommended for 1982 meant drastic cutbacks compared to the 1981 levels.

55. In view of what has been said about reaching fishing mortality levels which are closer to the biological reference points, ACFM recommends that fishing mortality on all three North Sea roundfish stocks should be reduced as far as possible towards F_{max} .

D.7 PLAICE AND COMMON SOLE STOCKS IN THE NORTH SEA (Sub-area IV) AND THE CHANNEL (Divisions VIId and VIIE)

56. The North Sea Flatfish Working Group met at ICES headquarters from 21-26 September 1981 to:

- (i) assess TACs for sole and plaice in the North Sea and Channel for 1982,

- (ii) collate the results of mesh selection experiments using beam trawls carried out in 1980 and comment on the effects of the results on ICES previous advice on this topic,
- (iii) comment on the available by-catch data in fisheries for Crangon and advise if there are areas within 12 mile limits or seasons when a by-catch limit of 10% should be needed.

In addition, the Group was asked to:

- (i) estimate the short-term losses and long-term gains for all species for which data are available, but in particular soles, which will arise from the change to 90 mm in the minimum mesh size for trawls and Danish seines in Sub-area IV from 1.10.1982, on the assumption that 80 mm mesh will have been in effect from 1.12.1980. Mesh sizes are those irrespective of material;
- (ii) evaluate whether the selectivity factor for sole is proportional to brake horsepower and to advise, in particular, whether there is any scientific evidence that the selectivity of trawls used by vessels of less than 300 brake horsepower is less than that of larger vessels;
- (iii) estimate the short-term losses and long-term gains or losses for all species for which there are data available which will result from the introduction of an 80 mm mesh size irrespective of material, for trawls and Danish seines in Divisions VIIId and VIIe.

D.7.1 NORTH SEA SOLE

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

| 1977 | | | 1978 | | | 1979 | | |
|----------|-----------|--------------|----------|---------|--------------|----------|---------|--------------|
| Rec. TAC | NEAFC TAC | Actual catch | Rec. TAC | EEC TAC | Actual catch | Rec. TAC | EEC TAC | Actual catch |
| 6.7 | 12.5 | 18.2* | 8 | 10 | 20.3* | 13 | 15 | 22.5* |

| 1980 | | | 1981 | | 1982 |
|----------|---------|--------------|----------|---------|----------|
| Rec. TAC | EEC TAC | Actual catch | Rec. TAC | EEC TAC | Rec. TAC |
| 15 | 15 | 15.8** | 15 | 15 | 15 |

* Including estimates of non-reported landings

** Preliminary

58. Compared to 1979, the catches decreased by 30% in 1980 due to the poor recruitment of the 1977 and 1978 year classes (Table 7). The latter was severely reduced by the severe 1979 winter.

59. The 1979 year class was estimated to be 1.5 times the average recruitment. From the 1981 autumn pre-recruit survey it appears that the 1980 year class is about 1.3 times the average.

The present level of fishing mortality was derived from regressions between indices of total international effort and terminal F values in trial VPAs. These seem to indicate that fishing mortality in 1980 was close to the 1979 level.

60. The VPA results indicate that the spawning stock biomass decreased continuously since 1966 from 104 000 tonnes to 35 600 tonnes in 1977. This decrease is caused by fishing out the extremely strong 1963 year class (6 times the average) and by a considerable increase in effort in that period. Thereafter the spawning stock biomass increased in 1978 and 1979 to 40 000 tonnes and 45 000 tonnes respectively due to the recruitment of the good 1975 and 1976 year classes. A considerable decrease occurred in 1980 to a level of 34 000 tonnes.

The catch per unit of effort series for Belgium, United Kingdom and the Netherlands do not show the same trend in spawning stock biomass during the period 1971-81.

61. ACFM reviewed the relationship between the decline in calculated biomass from VPA and catch per unit of effort (cpue) by Dutch beam trawls. The agreement was quite good from 1964 to 1972 and poor from 1973 to 1980. From 1973 to 1976 the catch per unit effort did not decline, whereas the VPA estimate of the spawning stock biomass continued the apparent steady decline which began after 1966. From 1977 to 1980 the agreement between the estimates of spawning stock biomass and cpue was very good but the absolute values of cpue were greater than expected, given the estimates of spawning stock biomass in the Working Group report and the relationship of cpue and biomass of earlier years. These high estimates of cpue can be explained if the abundance has increased or the catchability of sole or the effective fishing effort have increased. The Working Group apparently felt that, due to an increase in fishing mortality, the abundance of sole continued to decrease through 1980, except for temporarily slight increases in 1978 and 1979. The relationships between fishing mortality and effort suggest that catchability is constant although the straight lines do not go through the origin. If catchability is constant and spawning stock biomass is declining, then it could be assumed that the fishing effort efficiency has increased in recent years and the effective effort could be much higher in 1980 than reported in the Working Group report. If effective effort has increased in recent years, then the estimate of F in the Working Group report may, in turn, be underestimated. The lack of agreement between estimates of cpue and SSB need to be resolved by the Working Group in future assessments, preferably before the July 1982 ACFM meeting.

62. ACFM recommends that the North Sea Flatfish Working Group should hold a special meeting in advance of their 1982 September meeting in order to review the historical data base on a quarterly basis. This meeting should require 4 days and is planned to take place in IJmuiden. The exact date of the meeting will be set by the Chairman of the Working Group after consultation with the Working Group members.

63. The assessment has been done assuming the unchanged minimum mesh size, i.e., the unchanged exploitation pattern, although an 80 mm mesh size has been introduced from 1.12.1980 onwards, since the effective mesh size in the sole fishery is well below 75 mm (see Section D.7.6).
64. From the existing assessment the management advice could be based on two grounds:
- 1) a minimum spawning stock size of 40 000 tonnes produced during the last ten years almost continuously year classes of above average strength. A spawning stock size of 40 000 tonnes in 1983 and no change in the actual fishing mortality would be obtained with a 1982 catch of 21 500 tonnes;
 - 2) bringing fishing mortality to the F_{max} level in 1982 would require a reduction in F of 40% resulting in a catch of 14 000 tonnes (Figure 9).
65. However, there is serious concern that the above-mentioned analytical assessment could have overestimated the stock size, due to uncertainties about the actual fishing mortality levels in recent years. A cautious approach is therefore warranted and ACFM recommends a TAC for 1982 of 15 000 tonnes.

D.7.2 NORTH SEA PLAICE

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

| 1977 | | | 1978 | | | 1979 | | |
|----------|-----------|--------------|----------|--------------|--------------|----------|--------------|--------------|
| Rec. TAC | NEAFC TAC | Actual catch | Rec. TAC | EEC/Nor. TAC | Actual catch | Rec. TAC | EEC/Nor. TAC | Actual catch |
| 71 | 99.9 | 118* | 115 | 115 | 112* | 120 | 120 | 145* |

| 1980 | | | 1981 | |
|----------|--------------|--------------|----------|--------------|
| Rec. TAC | EEC/Nor. TAC | Actual catch | Rec. TAC | EEC/Nor. TAC |
| 112 | 112 | 139** | 105 | 105 |

* Including estimates of non-reported landings

** Preliminary and including estimated non-reported landings

In 1980, landings by most countries were similar to those in 1979, but a drop of 30% in the United Kingdom catch was noted (Table 8).

67. The international effort estimate suggests that fishing mortality was increasing in recent years.

According to commercial catch and research vessel data the 1977 and 1979 year classes are of the same order as the 1972 year class, i.e., about 600 million fish.

Yield and biomass per recruit were calculated for both sexes. The yield per recruit curve shows that the current fishing mortality is close to the F_{max} point on the curve for males, but well above F_{max} for females.

68. Maintenance of the F_{80} over the period 1981 and 1982 would result in a catch of 148 000 tonnes in 1981 and 145 000 tonnes in 1982. The resulting spawning stock biomass in 1983 would then be 310 000 tonnes (see text table below and Figure 10).

| 1981 | | | | Management option for 1982 | 1982 | | | | 1983 | |
|-------------------|---|------------------------------|-------|----------------------------|-------------|--------------------|--------------------------------|-------|-------------|--------------------|
| Stock biom. 1-17+ | Spawn. stock biom. $\geq 4 \text{ } \sigma$ $\geq 2 \text{ } \sigma$ | \bar{F} (2-10) | Catch | | Stock biom. | Spawn. stock biom. | \bar{F} (2-10) | Catch | Stock biom. | Spawn. stock biom. |
| 488 | 336 | .55 σ .41 σ | 148 | F_{max} | 466 | 316 | 0.22 σ 0.16 σ | 70 | 540 | 390 |
| | | | | $F_{1982} = F_{1980}$ | | | 0.55 σ 0.41 σ | 145 | 435 | 310 |
| | | | | $F_{1982} = 0.8 F_{1980}$ | | | 0.44 σ 0.33 σ | 120 | 450 | 340 |

Weights in thousand tonnes.

69. Fishing mortality on plaice has increased recently and the general trend in stock size has been downwards since the peak level of 1970. The stock is increasing at the moment because of the effect of the 1972 year class, and the 1979, 1977 and 1978 year classes. The stock and recruitment diagram does not suggest an immediate concern for the spawning stock biomass. However, the yield per recruit curve indicates that fishing mortality is well above F_{max} for the current exploitation pattern. Diversion of effort from the sole fishery may further increase the fishing mortality on plaice.

70. ACFM recommends that fishing mortality should be reduced towards F_{max} as far as possible as a step towards the long-term objective of increasing the female spawning stock size.

D.7.3 SOLE IN DIVISION VIId

71. 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 |
| 1.0 | 1.28 | 1.15 | 1.4 | 2.2 | 1.8 | 1.38 | 1.6* | 1.2 |

* Preliminary and including estimated non-reported landings

Recent landings including unreported catches were amended by a field and questionnaire survey. After a peak of 1 842 tonnes in 1979 the landings decreased to 1 553 tonnes in 1980 (Table 9).

72. Total international effort appears to have increased by about 40% since 1973.

As the separate sex data are extremely variable, the Working Group decided that the assessment should be based on combined data.

The 1979 year class seems to be very abundant from the pre-recruit surveys. The series of these surveys is, however, too short and does not allow to produce a reliable estimate. Recent catch figures also indicate the abundance of this year class.

73. An analytical assessment made by the Working Group could not be endorsed because of uncertainties about the present levels of fishing mortality, although some improvement has been made in recent years. ACFM endorses further every improvement in the biological sampling in that area.

Therefore, any advice must be based on historic catches given in Table 9.

D.7.4 SOLE IN DIVISION VIIe

74. 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 | Rec. TAC | Rec. TAC |
| 0.45 | 0.6 | 0.35 | 0.86 | 0.5 | 1.2 | 0.78 | 1.3* | 1.0 | 0.8 |

* Preliminary estimate of landings

75. Landings increased in 1980 by a factor of 3.7 since 1969 (Table 9). Indices of total international effort indicated an increase by a factor of 3 from the 1972-77 mean to 1980.

76. An analytical assessment made by the Working Group could not be endorsed because the only available catch at age data base was derived from one country accounting for about 60% of the total international catches. Therefore, in order to stop the increase in fishing effort on the stock, a TAC of 800 tonnes is recommended.

D.7.5 PLAICE IN DIVISIONS VIId and VIIe

77. Landings increased considerably in 1980 and accounted for about 4 400 tonnes which is similar to the catches obtained in 1966-67 (Table 10).

In the past it has been felt that the English Channel plaice data were poor because only some part of the landings was sampled for age. Despite the inclusion of French length distributions, the situation has not changed substantially, and it was therefore decided not to proceed with a trial analytical assessment at present.

There are indications that the 1977 and 1978 year classes are abundant.

78. In the absence of an analytical assessment, any advice must be based on historic catches given in Table 10.

D.7.6 SELECTIVITY EXPERIMENTS

79. Mesh assessments for North Sea sole have been carried out in 1968 and 1974. It was suggested that the increasing ship size and the corresponding increase in horse power and weight of the gear might lead to a different selectivity rate for sole on all fishing grounds.

From October 1979 up to August 1981, more than 50 sole selectivity experiments on beam trawlers have been carried out by four countries. The results obtained from these experiments do not indicate that the selectivity in the North Sea sole fisheries has changed significantly after 1968.

The selection factor and the selection range calculated from the recent experiments are 3.3 and 3.8, respectively, which are similar to those previously derived for otter trawls.

The results also indicate that selection factor and selection range are largely independent of riggings, horse power, towing speed and towing duration.

80. ACFM could not endorse the results on short-term losses or long-term gains calculated by the Working Group, since the effective mesh size had not been taken into account in these assessments. It is believed that although an 80 mm mesh size has been introduced from 1.12.1980 onwards, the effective mesh size in the sole fishery is well below 75 mm. No data were, however, available to produce an estimate of this effective mesh size, and ACFM recommends further examination in this field; therefore, no assessment of the effects of a 90 mm mesh size was possible at present.

The 50% retention length for an 80 mm minimum mesh size is 26.4 cm, and the 25% retention length is 24.5 cm.

D.7.7 BY-CATCH DATA IN FISHERIES FOR CRANGON

81. ACFM took notice of the EEC's request to ICES dated 10 October 1980. However, in the meantime a contract for scientific research on this topic was made between the Commission and a member country. This study started on 1 April 1981 and will be completed by the end of March 1982.

E. STOCKS IN REGIONS 2 AND 3

E.1 EASTERN AND WESTERN MACKEREL STOCKS

E.1.5 MACKEREL IN DIVISIONS IIa AND Vb

82. In previous assessments of the mackerel stocks in the ICES area the catches in Division IIa have been combined with those from Sub-area IV and Division IIIa on the assumption that the catches taken in Division IIa were predominantly part of the North Sea stock. The recommendations from ACFM regarding TAC levels for 1982 for both

the Western and North Sea stocks, however, did not include Division IIa in the areas to which they should apply, largely because of the doubts existing about the stock composition in that Division.

83. Catches in Division IIa in 1979 and 1980 were within the range 7 000 - 8 000 tonnes (see Table 69 in the July 1981 ACFM report), but in 1981 the preliminary catch estimates from this area have probably increased to 15 000 tonnes - including some catches reported from Divisions Vb and IIa which may have been taken elsewhere to evade limitation of catches in areas subject to regulations.

84. Accordingly, because of the uncertainties about the stock identity of mackerel caught in Division IIa, special efforts were made in 1981 to recover possible tags in catches taken from that area. Due to various technical difficulties only about 1 800 tonnes could be screened. 12 tags were recovered and 9 and 3 of these had been released off Ireland and in the North Sea, respectively. Although the number of tags are too few to make an accurate assessment of stock composition in Division IIa, the data indicate that the catches were dominated by mackerel from the Western stock. Under various assumptions about the mixing into the Western stock of tags released off Ireland, the calculated proportion of North Sea mackerel in the catches varies from 6% to 25%. Taking into account the possibility that some of the mackerel tagged in the North Sea may be Western mackerel, the real percentage may be even lower.

85. Assuming that mackerel in Division Vb are of the same origin as mackerel in Division IIa, ACFM would, accordingly, recommend that the TAC for the Western stock mackerel in 1982 should be 272 000 tonnes applicable in Divisions IIa and Vb and in Sub-areas VI, VII and VIII.

H. REGION 3 FISHERIES

H.1 SARDINE IN DIVISIONS VIIIc AND IXa

86. The Working Group for Appraisal of the Sardine Stocks in Divisions VIIIc and IXa met in Lisbon from 30 June to 3 July 1981, with the following terms of reference:

- (i) to summarise and update current data on the biology of sardine in Divisions VIIIc and IXa,
- (ii) to standardise age-reading methods,
- (iii) to assess the state of the exploited stocks.

Landings

87. Sardine in Divisions VIIIc and IXa are exploited by Portuguese and Spanish purse-seiners. Recent landings (during 1976-80) are as follows:

| Year | 1976 | 1977 | 1978 | 1979 | 1980 |
|-----------------|---------|---------|---------|---------|---------|
| Landings (t) | 135 306 | 121 146 | 134 935 | 141 956 | 175 474 |

Landings increased by about 30 000 tonnes in 1980 above the level maintained from 1976 to 1979.

Fleet

88. The Portuguese fleet is composed of 283 purse-seiners, with mean horse power (HP) of 283, while the Spanish fleet is composed of 168 purse-seiners of 208 HP on average.

Annual landings per a Portuguese purse-seiner during the period 1970-80 were as follows (tonnes):

| Year | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 |
|------------|------|------|------|------|------|------|------|------|------|------|------|
| Land./boat | 168 | 206 | 259 | 373 | 294 | 374 | 309 | 320 | 323 | 282 | 319 |

Data base

89. The Group compiled data on maturity, length distribution, age/length and weight at age. The recent years' catches have been quite extensively sampled, but the time series is rather short.

Assessments

90. In previous reports, general production models and Beverton & Holt yield per recruit curves were calculated. At present, in spite of the incomplete data base, a VPA was tried. M values of 0.5 and 0.6 were assayed. Average Z values were obtained from catch curves for the years 1976-80; F values were derived from them and used as terminal Fs for the corresponding year.

1980 Fs for ages 0 and 1, and 1979 F for age 0 were taken as a fixed proportion of the terminal F of the corresponding year, given that these age groups are not completely recruited. The other Fs at age in the period considered were computed by cohort analysis (Pope method). F at age in 1980 was considered to be constant for two year olds and older age groups. The biomasses estimated from cohort analysis for the years 1976-80 are around 600 000 tonnes.

91. The Working Group considered that the current level of catches should not be increased, and the ACFM requested the Group to meet again in April 1982 to assess the state of the exploited stocks and advise on any necessary management measures for these stocks in 1983.

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Table 1. Annual catches of Barents Sea CAPELIN ('000 tonnes) in the years 1965-80.

| Year | Norway | USSR | Other | Total |
|------|--------|------|-------|-------|
| 1965 | 217 | 7 | | 224 |
| 1966 | 380 | 9 | | 389 |
| 1967 | 403 | 6 | | 409 |
| 1968 | 522 | 15 | | 537 |
| 1969 | 679 | 1 | | 680 |
| 1970 | 1 301 | 13 | | 1 314 |
| 1971 | 1 371 | 21 | | 1 392 |
| 1972 | 1 556 | 37 | | 1 593 |
| 1973 | 1 291 | 45 | | 1 336 |
| 1974 | 987 | 162 | | 1 149 |
| 1975 | 943 | 431 | 43 | 1 417 |
| 1976 | 1 949 | 596 | | 2 545 |
| 1977 | 2 116 | 822 | 2 | 2 940 |
| 1978 | 1 122 | 747 | 25 | 1 894 |
| 1979 | 1 109 | 669 | 5 | 1 783 |
| 1980 | 999 | 641 | 9 | 1 649 |

Table 2. Annual catches ('000 tonnes) from the Icelandic CAPELIN stock, 1964-80.

| Year | Winter Season | | Summer and Autumn Seasons | | | Total |
|--------|---------------|--------|---------------------------|--------|----------------|---------|
| | Iceland | Faroes | Iceland | Norway | Faroes and EEC | |
| 1964 | 8.6 | | | | | 8.6 |
| 1965 | 49.7 | | | | | 49.7 |
| 1966 | 124.5 | | | | | 124.5 |
| 1967 | 97.2 | | | | | 97.2 |
| 1968 | 78.1 | | | | | 78.1 |
| 1969 | 170.6 | | | | | 170.6 |
| 1970 | 190.8 | | | | | 190.8 |
| 1971 | 182.9 | | | | | 182.9 |
| 1972 | 276.5 | | | | | 276.5 |
| 1973 | 440.9 | | | | | 440.9 |
| 1974 | 461.9 | | | | | 461.9 |
| 1975 | 457.6 | | 3.1 | | | 460.7 |
| 1976 | 338.7 | | 114.4 | | | 453.1 |
| 1977 | 549.2 | 25.0 | 259.7 | | | 833.9 |
| 1978 | 468.4 | 38.4 | 497.5 | 154.1 | | 1 158.4 |
| 1979 | 521.7 | 17.5 | 441.9 | 126.0 | 2.5 | 1 109.6 |
| 1980 | 392.0 | | 367.2 | 118.6 | 38.7 | 916.5 |
| 1981 * | 156.0 | | | 91.4 | | |

* Preliminary

Table 3. COD. Total nominal catch (tonnes) by fishing areas (landings of Norwegian coastal cod not included).

| Year | Sub-area I | Division IIb | Division IIa | Total catch |
|-------|------------|--------------|--------------|-------------|
| 1960 | 375 327 | 91 599 | 155 116 | 622 042 |
| 1961 | 409 694 | 220 508 | 153 019 | 783 221 |
| 1962 | 548 621 | 220 797 | 139 848 | 909 266 |
| 1963 | 547 469 | 111 768 | 117 100 | 776 337 |
| 1964 | 206 883 | 126 114 | 104 698 | 437 695 |
| 1965 | 241 489 | 103 430 | 100 011 | 444 930 |
| 1966 | 292 253 | 56 653 | 134 805 | 483 711 |
| 1967 | 322 798 | 121 060 | 128 747 | 572 605 |
| 1968 | 642 452 | 269 160 | 162 472 | 1 074 084 |
| 1969 | 679 373 | 262 254 | 255 599 | 1 197 226 |
| 1970 | 603 855 | 85 556 | 243 835 | 933 246 |
| 1971 | 312 505 | 56 920 | 319 623 | 689 048 |
| 1972 | 197 015 | 32 982 | 335 257 | 565 254 |
| 1973 | 492 716 | 88 207 | 211 762 | 792 685 |
| 1974 | 723 489 | 254 730 | 124 214 | 1 102 433 |
| 1975 | 561 701 | 147 400 | 120 276 | 829 377 |
| 1976 | 526 685 | 103 533 | 237 245 | 867 463 |
| 1977 | 538 231 | 109 997 | 257 073 | 905 301 |
| 1978 | 418 265 | 17 293 | 263 157 | 698 715 |
| 1979 | 195 166 | 9 923 | 235 449 | 440 538 |
| 1980* | 172 375 | 17 523 | 191 811 | 381 709 |

*) Provisional figures

Expected Catches

| | | | | |
|------|---------|--------|---------|---------|
| 1981 | 160 000 | 12 000 | 228 000 | 400 000 |
|------|---------|--------|---------|---------|

Table 4. COD. Nominal catch (tonnes, whole weight) by countries (landings of Norwegian coastal cod not included). (Sub-area I and Divisions IIa and IIb combined.) (Data provided by Working Group members.)

| Year | Faroe Islands | France | German Dem. Rep. | Germany Fed. Rep. | Norway | Poland | United Kingdom | USSR | Others | Total all countries |
|-------|---------------|--------|------------------|-------------------|---------|--------|----------------|-----------------------|--------|---------------------|
| 1960 | 3 306 | 22 321 | | 9 472 | 231 997 | 20 | 141 175 | 213 400 | 351 | 622 042 |
| 1961 | 3 934 | 13 755 | 3 921 | 8 129 | 268 377 | - | 158 113 | 325 780 | 1 212 | 783 221 |
| 1962 | 3 109 | 20 482 | 1 532 | 6 503 | 225 615 | - | 175 020 | 476 760 | 245 | 909 266 |
| 1963 | - | 18 318 | 129 | 4 223 | 205 056 | 108 | 129 779 | 417 964 | - | 775 577 |
| 1964 | - | 8 634 | 297 | 3 202 | 149 878 | - | 94 549 | 180 550 | 585 | 437 695 |
| 1965 | - | 526 | 91 | 3 670 | 197 085 | - | 89 962 | 152 780 | 816 | 444 930 |
| 1966 | - | 2 967 | 228 | 4 284 | 203 792 | - | 103 012 | 169 300 | 121 | 483 704 |
| 1967 | - | 664 | 45 | 3 632 | 218 910 | - | 87 008 | 262 340 | 6 | 572 605 |
| 1968 | - | - | 255 | 1 073 | 255 611 | - | 140 387 | 676 758 | - | 1 074 084 |
| 1969 | 29 374 | - | 5 907 | 5 343 | 305 241 | 7 856 | 231 066 | 612 215 | 133 | 1 197 226 |
| 1970 | 26 265 | 44 245 | 12 413 | 9 451 | 377 606 | 5 153 | 181 481 | 276 632 | - | 933 246 |
| 1971 | 5 877 | 34 772 | 4 998 | 9 726 | 407 044 | 1 512 | 80 102 | 144 802 | 215 | 689 048 |
| 1972 | 1 393 | 8 915 | 1 300 | 3 405 | 394 181 | 892 | 58 382 | 96 653 | 166 | 565 287 |
| 1973 | 1 916 | 17 028 | 4 684 | 16 751 | 285 184 | 843 | 78 808 | 387 196 | 276 | 792 686 |
| 1974 | 5 717 | 46 028 | 4 860 | 78 507 | 287 276 | 9 898 | 90 894 | 540 801 ¹⁾ | 38 453 | 1 102 434 |
| 1975 | 11 309 | 28 734 | 9 981 | 30 037 | 277 099 | 7 435 | 101 834 | 343 580 ¹⁾ | 19 368 | 829 377 |
| 1976 | 11 511 | 20 941 | 8 946 | 24 369 | 344 502 | 6 986 | 89 061 | 343 057 ¹⁾ | 18 090 | 867 463 |
| 1977 | 9 167 | 15 414 | 3 463 | 12 763 | 388 982 | 1 084 | 86 781 | 369 876 ¹⁾ | 17 771 | 905 301 |
| 1978 | 9 092 | 9 394 | 3 029 | 5 434 | 363 088 | 566 | 35 449 | 267 138 ¹⁾ | 5 525 | 698 715 |
| 1979 | 6 320 | 3 046 | 547 | 2 513 | 294 821 | 15 | 17 991 | 105 846 | 9 439 | 440 538 |
| 1980* | 9 981 | 1 740 | 233 | 1 924 | 229 628 | 3 | 10 366 | 115 194 | 12 640 | 381 709 |

*) Provisional figures.

1) Murman cod included.

Table 5. HADDOCK. Total nominal catch (tonnes) by fishing areas.
(Data provided by Working Group members.)

| Year | Sub-area I | Division IIb | Division IIa | Total |
|--------|------------|--------------|--------------|---------|
| 1960 | 125 675 | 1 854 | 27 925 | 155 454 |
| 1961 | 165 165 | 2 427 | 25 642 | 193 234 |
| 1962 | 160 972 | 1 727 | 25 189 | 187 888 |
| 1963 | 124 774 | 939 | 21 031 | 146 744 |
| 1964 | 79 056 | 1 109 | 18 735 | 98 900 |
| 1965 | 98 505 | 939 | 18 640 | 118 079 |
| 1966 | 124 115 | 1 614 | 34 892 | 160 621 |
| 1967 | 108 066 | 440 | 27 980 | 136 486 |
| 1968 | 140 970 | 725 | 40 031 | 181 726 |
| 1969 | 88 960 | 1 341 | 40 208 | 130 509 |
| 1970 | 59 493 | 497 | 26 611 | 86 601 |
| 1971 | 56 300 | 435 | 21 567 | 78 302 |
| 1972 | 221 183 | 2 155 | 41 979 | 265 317 |
| 1973 | 283 728 | 12 989 | 23 348 | 320 065 |
| 1974 | 159 037 | 15 068 | 47 033 | 221 138 |
| 1975 | 121 686 | 9 726 | 44 330 | 175 742 |
| 1976 | 94 064 | 5 649 | 37 566 | 137 279 |
| 1977 | 72 159 | 9 547 | 28 452 | 110 158 |
| 1978 | 63 965 | 979 | 30 478 | 95 422 |
| 1979 | 63 841 | 615 | 39 167 | 103 623 |
| 1980 * | 64 431 | 67 | 32 748 | 87 246 |

*Provisional figures

Expected catches

| | | | | |
|------|--------|--------|-----|--------|
| 1981 | 42 000 | 37 800 | 200 | 80 000 |
|------|--------|--------|-----|--------|

Table 6. HADDOCK. Nominal catch (tonnes) by countries. (Sub-area I and Divisions IIa and IIb combined.)
(Data provided by Working Group members.)

| Year | Faroe Islands | France | German Dem.Rep. | Germany Fed.Rep. | Norway | Poland | U.K. | USSR | Others | Total |
|-------|---------------|--------|-----------------|------------------|--------|--------|--------|----------------------|--------|---------|
| 1960 | 172 | - | - | 5 597 | 47 263 | - | 45 469 | 57 025 | 125 | 155 651 |
| 1961 | 295 | 220 | - | 6 304 | 60 862 | - | 39 650 | 85 345 | 558 | 193 234 |
| 1962 | 83 | 409 | - | 2 895 | 54 567 | - | 37 486 | 91 910 | 58 | 187 438 |
| 1963 | 17 | 363 | - | 2 554 | 59 955 | - | 19 809 | 63 526 | - | 146 224 |
| 1964 | - | 208 | - | 1 482 | 38 695 | - | 14 653 | 43 870 | 250 | 99 158 |
| 1965 | - | 226 | - | 1 568 | 60 447 | - | 14 345 | 41 750 | 242 | 118 578 |
| 1966 | - | 1 072 | 11 | 2 098 | 82 090 | - | 27 723 | 48 710 | 74 | 161 778 |
| 1967 | - | 1 208 | 3 | 1 705 | 51 954 | - | 24 158 | 57 346 | 23 | 136 397 |
| 1968 | - | - | - | 1 867 | 64 076 | - | 40 129 | 75 654 | - | 181 726 |
| 1969 | 2 | - | 309 | 1 490 | 67 549 | - | 37 234 | 24 211 | 25 | 130 820 |
| 1970 | 541 | - | 656 | 2 119 | 36 716 | - | 20 423 | 26 802 | - | 87 257 |
| 1971 | 81 | - | 16 | 896 | 45 715 | 43 | 16 373 | 15 778 | 3 | 78 905 |
| 1972 | 137 | - | 829 | 1 433 | 46 700 | 1 433 | 17 166 | 196 224 | 2 231 | 266 153 |
| 1973 | 1 212 | 3 214 | 22 | 9 534 | 86 767 | 434 | 32 408 | 186 534 | 2 501 | 322 626 |
| 1974 | 925 | 3 601 | 454 | 23 409 | 66 164 | 3 045 | 37 663 | 78 548 ¹⁾ | 7 348 | 221 157 |
| 1975 | 299 | 5 191 | 437 | 15 930 | 55 966 | 1 080 | 28 677 | 65 015 ¹⁾ | 3 163 | 175 758 |
| 1976 | 537 | 4 459 | 348 | 16 660 | 49 492 | 986 | 16 940 | 42 485 ¹⁾ | 5 358 | 137 265 |
| 1977 | 213 | 1 510 | 144 | 4 798 | 40 118 | - | 10 878 | 52 210 ¹⁾ | 287 | 110 158 |
| 1978 | 466 | 1 411 | 369 | 1 521 | 39 955 | 1 | 5 766 | 45 895 ¹⁾ | 38 | 95 422 |
| 1979 | 343 | 1 198 | 10 | 1 948 | 66 849 | 2 | 6 454 | 26 365 | 454 | 103 623 |
| 1980* | 497 | 220 | 15 | 1 365 | 61 410 | - | 2 948 | 20 706 | 85 | 87 246 |

* Provisional figures

1) Murman haddock included

Table 7. Nominal catches (tonnes) of SOLE in Sub-area IV, 1968-80. (Data for 1968-78 allocated by countries are from Bulletin Statistique.)

| Country | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 ^{*)} | 1980 ^{*)} |
|----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------------------|--------------------|
| Belgium | 3 874 | 2 703 | 1 880 | 2 227 | 1 834 | 1 485 | 1 130 | 1 383 | 1 456 | 1 673 | 1 728 | 2 043 | 1 378 |
| Denmark | 1 590 | 842 | 525 | 1 149 | 671 | 957 | 705 | 682 | 574 | 348 | 465 | 279 | 754 |
| France | 273 | 364 | 265 | 403 | 206 | 250 | 195 | 297 | 598 | 308 | 346 | 309 | 232 |
| Germany, Fed.Rep. of | 1 138 | 692 | 318 | 600 | 258 | 336 | 173 | 233 | 192 | 316 | 467 | 242 | 338 |
| Netherlands | 25 175 | 22 032 | 16 024 | 18 776 | 17 662 | 15 883 | 15 343 | 15 242 | 11 044 | 10 873 | 6 749 | 7 646 | 12 695 |
| Poland | - | - | - | - | - | - | - | - | 5 | - | - | - | - |
| Sweden ^{a)} | ... | - | 13 | 12 | 13 | 13 | 12 | + | - | - | - | - | - |
| U.K. (Engl.+Wales) | 1 129 | 927 | 660 | 485 | 449 | 387 | 340 | 426 | 455 | 492 | 626 | 600 | 430 |
| U.K. (Scotland) | - | - | 1 | 2 | + | 1 | ... | - | 2 | 2 | 1 | + | - |
| Total | 33 179 | 27 560 | 19 686 | 23 654 | 21 093 | 19 312 | 17 898 | 18 263 | 14 326 | 14 012 | 10 382 | 11 119 | 15 827 |
| Unreported landings | | | | | | | | 2 500 | 3 000 | 4 000 | 9 900 | 11 354 | - |
| Grand Total | | | | | | | | 20 763 | 17 326 | 18 012 | 20 282 | 22 473 | 15 827 |

^{*)} National landings as determined by the Working Group.

a) Figures include catches made in Division IIIa. The 1968 catch was included in 148 tonnes of Various Pleuronectiforms.

Table 8. North Sea PLAICE. Nominal catch (tonnes) in Sub-area IV, 1969-80 (from Bulletin Statistique).

| Country | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980* |
|--------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Belgium | 4 476 | 4 360 | 5 073 | 5 531 | 6 133 | 6 202 | 6 154 | 4 574 | 6 547 | 6 036 | 7 687 | 7 006 |
| Denmark | 35 227 | 32 807 | 22 278 | 24 494 | 23 266 | 19 814 | 22 731 | 25 612 | 20 900 | 21 285 | 27 497 | 25 879 |
| Faroe Islands | - | - | - | - | 1 | - | 1 | - | 1 | - | - | - |
| France | 1 330 | 1 406 | 1 380 | 1 062 | 1 355 | 519 | 536 | 497 | 598 | 750 | 856 | 711 |
| Germany, Fed. Rep. of | 5 071 | 5 519 | 3 296 | 4 318 | 5 451 | 3 233 | 4 040 | 3 654 | 5 423 | 4 674 | 4 315 | 4 550 |
| Netherlands | 39 420 | 46 080 | 44 502 | 52 048 | 57 948 | 54 438 | 51 293 | 46 457 | 42 307 | 28 219 | 38 295 | 39 782 |
| Norway | 26 | 22 | 18 | 19 | 15 | 13 | 13 | 20 | 16 | 13 | 13 | 13 |
| Poland | - | - | - | - | 1 | - | 153 | 40 | - | - | - | - |
| Sweden ^{a)} | 772 | 608 | 588 | 626 | 432 | 431 | 35 | 28 | - | - | 7 | 6 |
| UK (England & Wales) | 30 349 | 34 839 | 32 576 | 31 642 | 30 400 | 23 854 | 20 290 | 23 789 | 27 623 | 27 862 | 25 825 | 18 687 |
| UK (Scotland) | 4 981 | 4 703 | 4 210 | 3 410 | 4 815 | 4 002 | 3 266 | 3 310 | 3 622 | 3 877 | 4 126 | 4 336 |
| USSR | - | - | - | - | 397 | 39 | - | - | - | - | - | - |
| Total | 121 652 | 130 344 | 113 921 | 123 150 | 130 214 | 112 545 | 108 512 | 107 981 | 107 037 | 92 716 | 108 621 | 100 970 |
| Unreported landings ^{b)} | | | | | | | | 5 000 | 11 384 | 21 150 | 36 705 | 38 023 |
| Grand Total | | | | | | | | 112 981 | 118 421 | 113 866 | 145 326 | 138 993 |

- *) Preliminary
 a) 1969-74 includes Division IIIa.
 b) Estimated by the Working Group

Table 9. English Channel SOLE. Nominal catch (in tonnes) in Divisions VIId and VIIe, 1969-80.

| Year | Belgium | | Denmark | France | | Netherl. | Ireland | U.K. | | Total | |
|------|---------|------|---------|-------------------|-------------------|----------|---------|-------------------|------|---------------|-------|
| | VIId | VIIe | VIIe | VIId | VIIe | VIId,e | VIIe | VIId | VIIe | VIId | VIIe |
| 1969 | 10 | 8 | - | 606 | | - | - | 177 | 138 | 939 | (353) |
| 1970 | 127 | 10 | - | 753 | | 1 | - | 228 | 125 | 1 244 | (391) |
| 1971 | 157 | 3 | - | 816 | | 1 | - | 254 | 152 | (953) 1 383 | (432) |
| 1972 | 147 | 6 | - | 676 | | 8 | - | 322 | 201 | (921) 1 360 | (437) |
| 1973 | 126 | 2 | - | 775 | | - | - | 360 | 194 | (1 000) 1 457 | (459) |
| 1974 | 159 | 6 | - | 706 | | 3 | - | 309 | 181 | (940) 1 364 | (427) |
| 1975 | 132 | 3 | - | 464 | 271 | 1 | - | 244 | 217 | 841 | 491 |
| 1976 | 203 | 4 | - | 599 | 352 | - | - | 404 | 260 | 1 206 | 616 |
| 1977 | 225 | 3 | - | 737 | 331 | - | - | 315 | 272 | 1 277 | 606 |
| 1978 | 241 | 4 | 20 | 782 | 384 | - | - | 366 | 453 | 1 389 | 861 |
| 1979 | 311 | 1 | - | 1 129 | 515 | - | - | 402 | 665 | 1 842 | 1 181 |
| 1980 | 304 | 45 | - | 970 ¹⁾ | 483 ¹⁾ | - | 13 | 278 ²⁾ | 764 | 1 553 | 1 305 |

1) Figures supplied by French Working Group member.

2) Official figure + 120 tonnes unreported; estimated by the English Working Group member.

Bracketed figures are those used in the assessments.

Table 10. English Channel PLAICE. Nominal catch (tonnes) in Divisions VIIId and VIIe, 1962-80.

| Year | Belgium | | Denmark | | France | | Netherlands | U.K. (England & Wales) | | Total | |
|------|---------|------|------------------|-------------------|---------------------|------|-------------|---------------------------|------|-------|-------|
| | VIIId | VIIe | VIIId | VIIe | VIIId | VIIe | VIIId,VIIe | VIIId | VIIe | VIIId | VIIe |
| 1962 | 24 | | - | - | 874 | | - | 545 | 373 | 1 816 | |
| 1963 | 32 | | - | - | 1 162 | | - | 472 | 506 | 2 172 | |
| 1964 | 28 | | - | - | 1 393 | | - | 616 | 422 | 2 459 | |
| 1965 | 33 | | - | - | 2 130 | | - | 841 | 445 | 3 449 | |
| 1966 | 25 | | - | - | 2 700 ¹⁾ | | - | 1 067 | 681 | 4 473 | |
| 1967 | 11 | | - | - | 2 905 | | - | 976 | 829 | 4 721 | |
| 1968 | 30 | | - | - | 1 920 | | - | 713 | 641 | 3 304 | |
| 1969 | 18 | 12 | - | - | 1 681 | | - | 521 | 508 | 2 740 | |
| 1970 | 170 | 13 | - | - | 2 161 | | 6 | 1 126 | 391 | 3 867 | |
| 1971 | 175 | 4 | - | - | 2 635 | | - | 1 025 | 440 | 4 279 | |
| 1972 | 163 | 14 | - | - | 1 866 | | 17 | 855 | 327 | 3 242 | |
| 1973 | 139 | 5 | - | - | 1 735 | | - | 889 | 367 | 3 135 | |
| 1974 | 148 | 4 | - | - | 2 180 | | 13 | 564 | 248 | 3 157 | |
| 1975 | 153 | 8 | - | - | 1 802 | 288 | - | 293 | 279 | 2 248 | 575 |
| 1976 | 147 | 5 | 1 ²⁾ | - | 1 439 | 323 | - | 376 | 312 | 1 963 | 640 |
| 1977 | 149 | 3 | 81 ²⁾ | - | 1 714 | 336 | - | 302 | 363 | 2 246 | 702 |
| 1978 | 161 | 3 | - | 156 ³⁾ | 1 810 | 314 | - | 349 | 467 | 2 320 | 940 |
| 1979 | 217 | 2 | 28 | - | 2 094 | 458 | - | 278 | 515 | 2 617 | 975 |
| 1980 | 435 | 22 | - | - | 2 346 | 440 | - | 517 [*]) | 606 | 3 298 | 1 068 |

*) Raised for under-reporting.

1) Figure from Revue des Travaux de l'Institut des Pêches maritimes raised to round fresh weight.

2) Includes VIIe.

3) Includes VIIId.

Note: All combined VIIId,e figures and the 1975-78 data are from Bulletin Statistique. All others from national statistics.

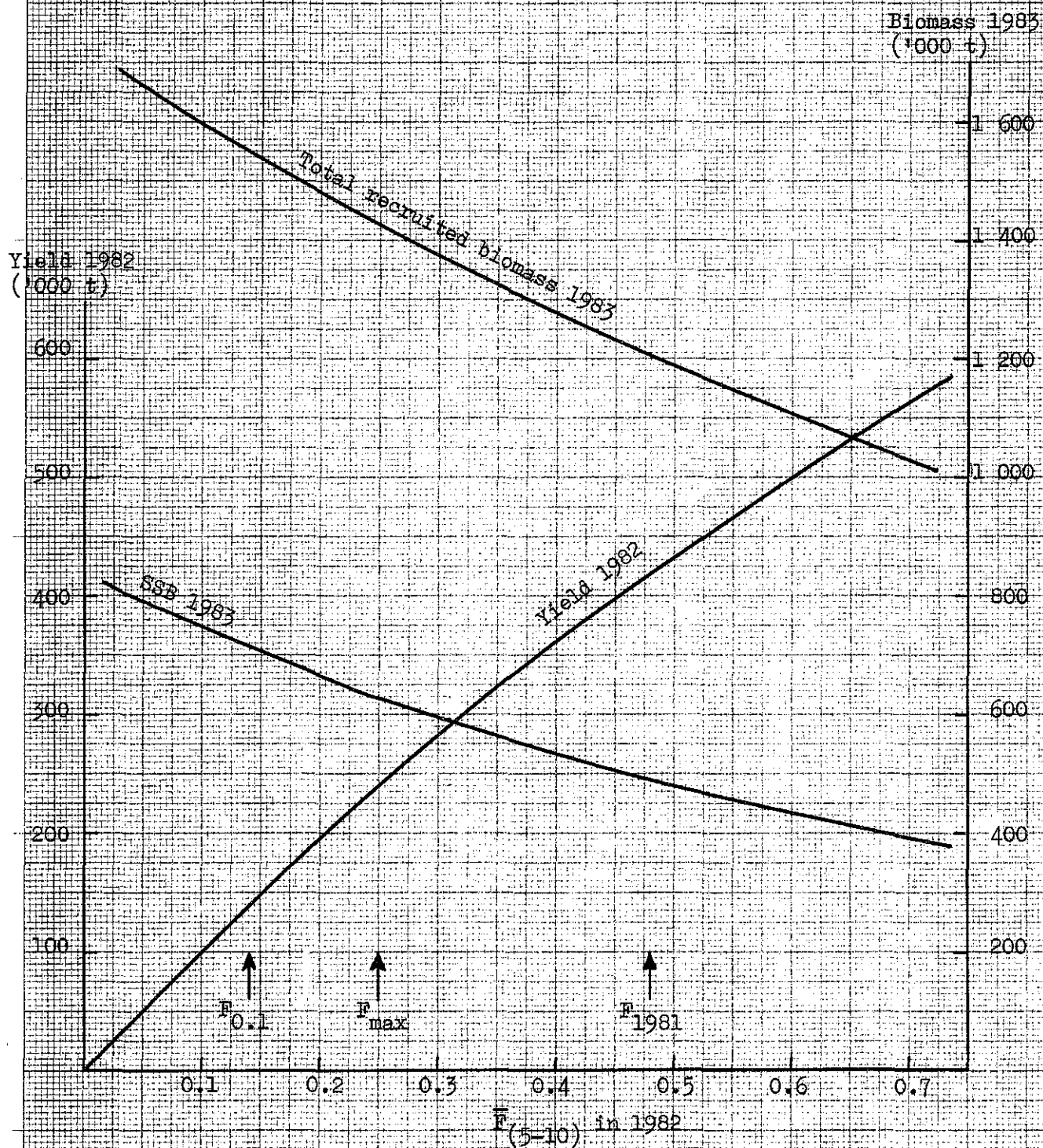


Figure 1. North-East Arctic COD. Yield 1982, total recruited biomass (age 3+) and spawning stock biomass (age 8+) at the beginning of 1983 for different levels of fishing mortality in 1982.

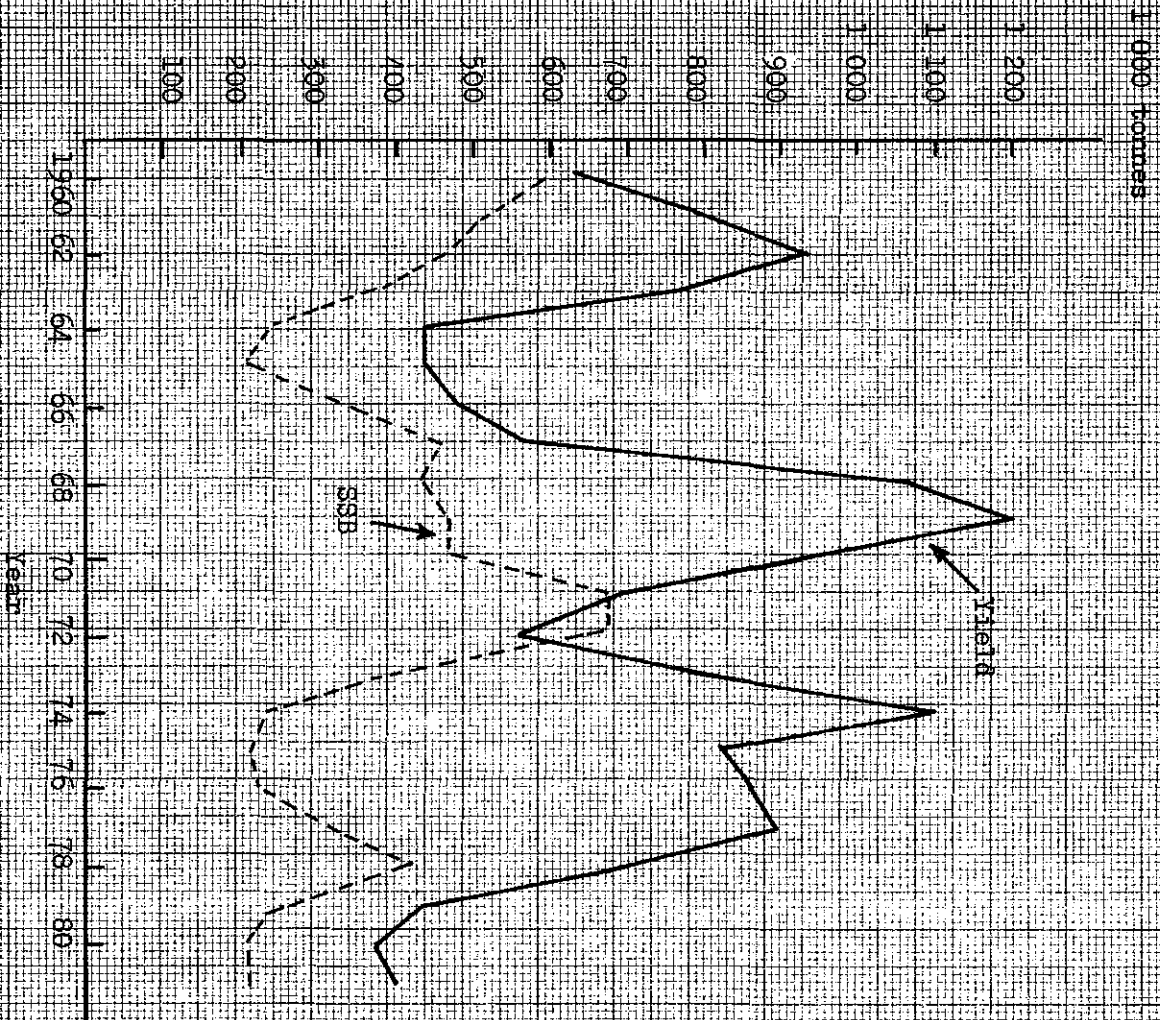


Figure 2. North-East Arctic COD. Historic yield and spawning stock biomass 1960-81.

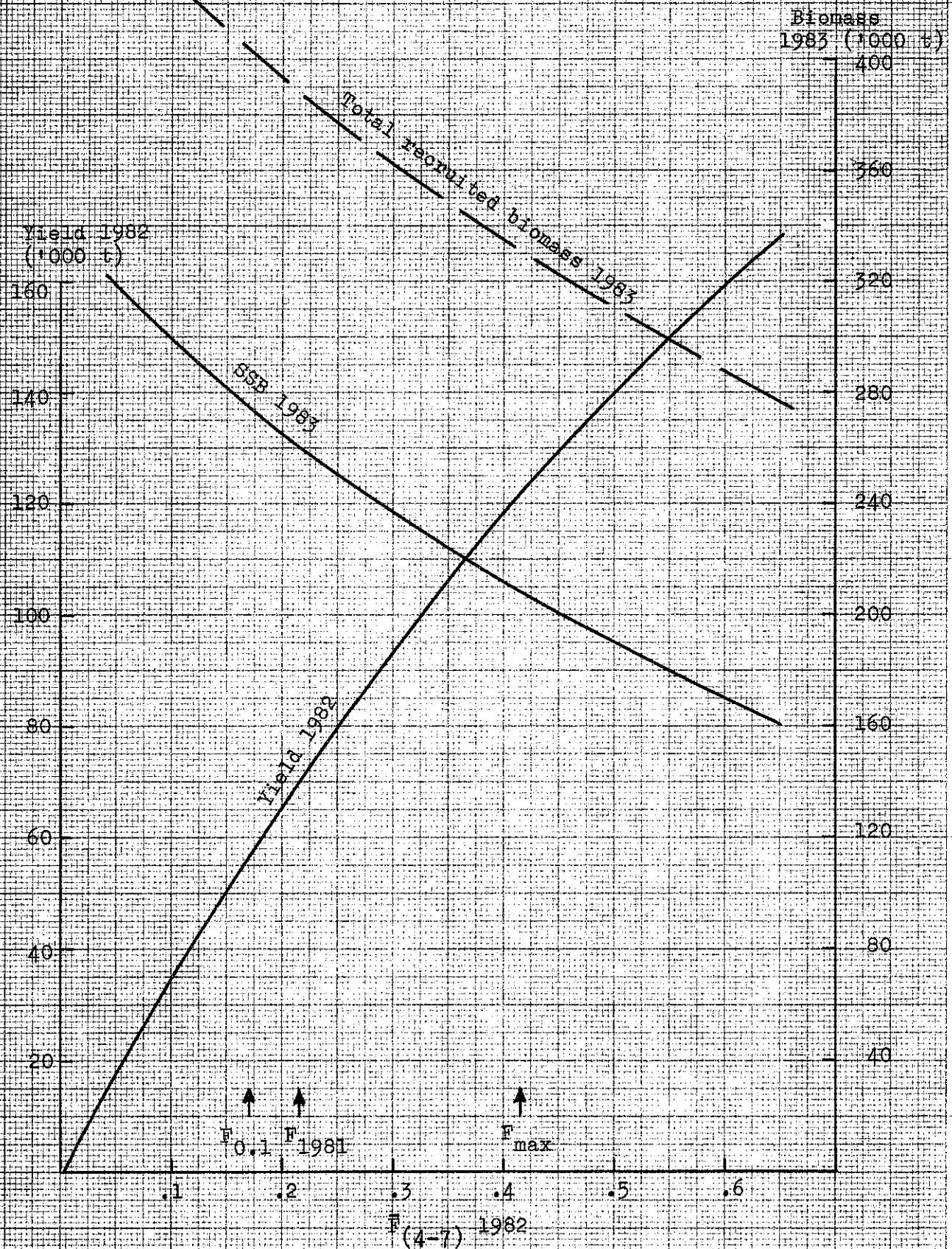


Figure 3. North-East Arctic HADDOCK. Yield 1982, total recruited biomass (age 3+) and spawning stock biomass (age 6+) at the beginning of 1983 for different levels of fishing mortality in 1982.

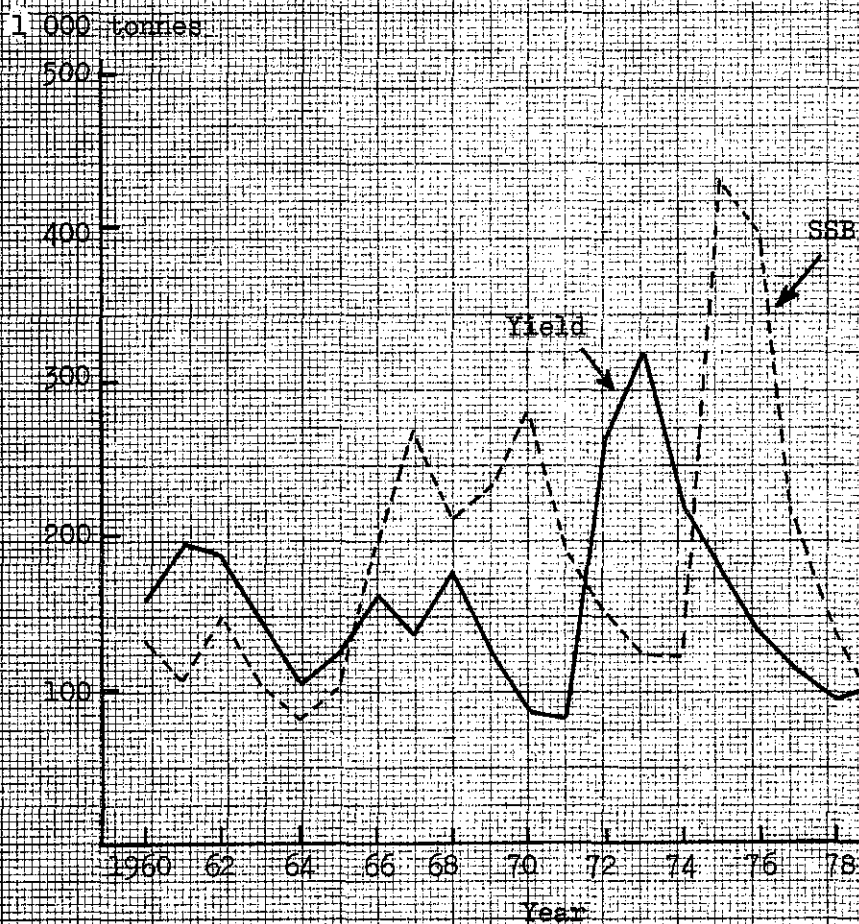
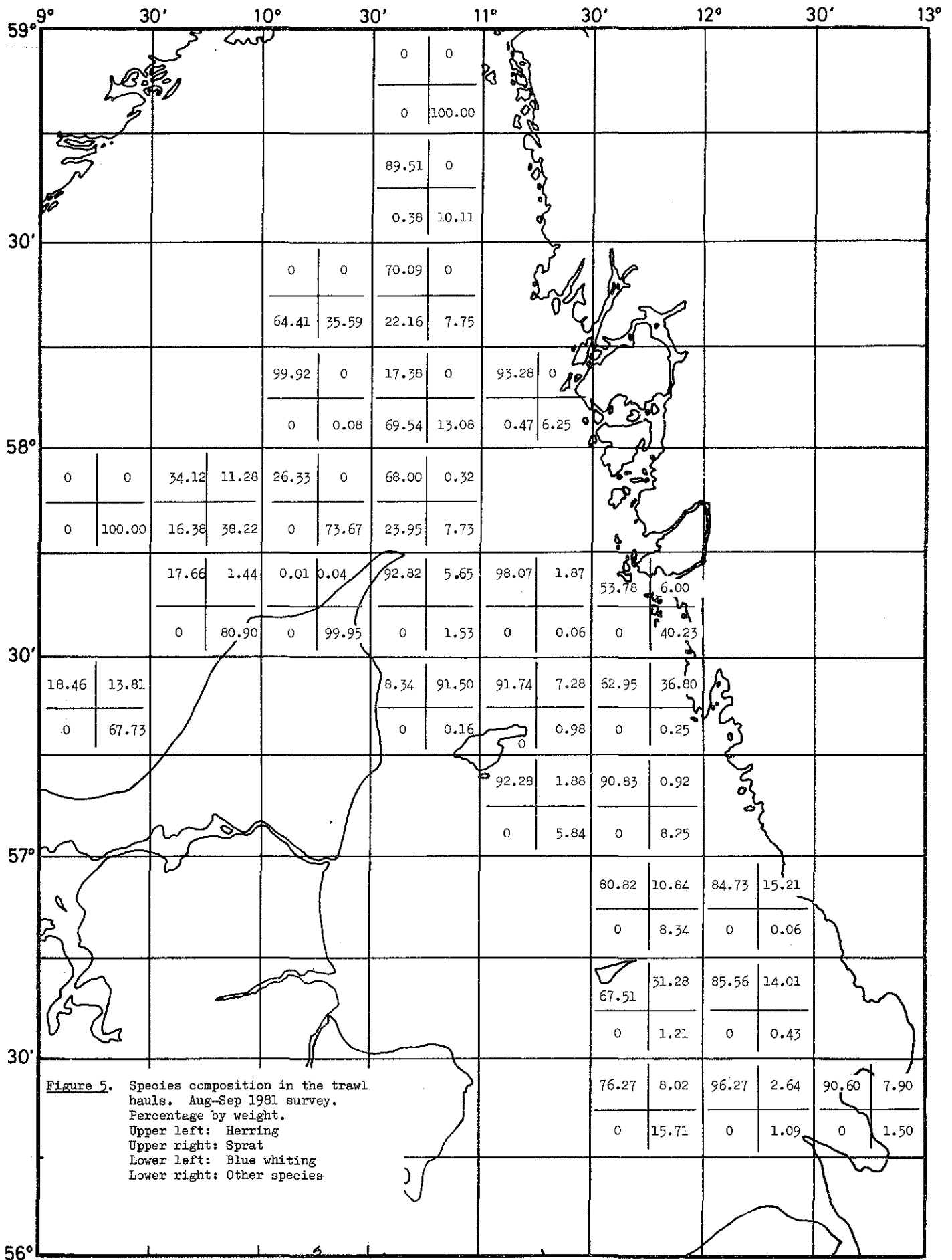


Figure 4. North-East Arctic HADDOCK. Historic yield and spawning biomass 1960-81.



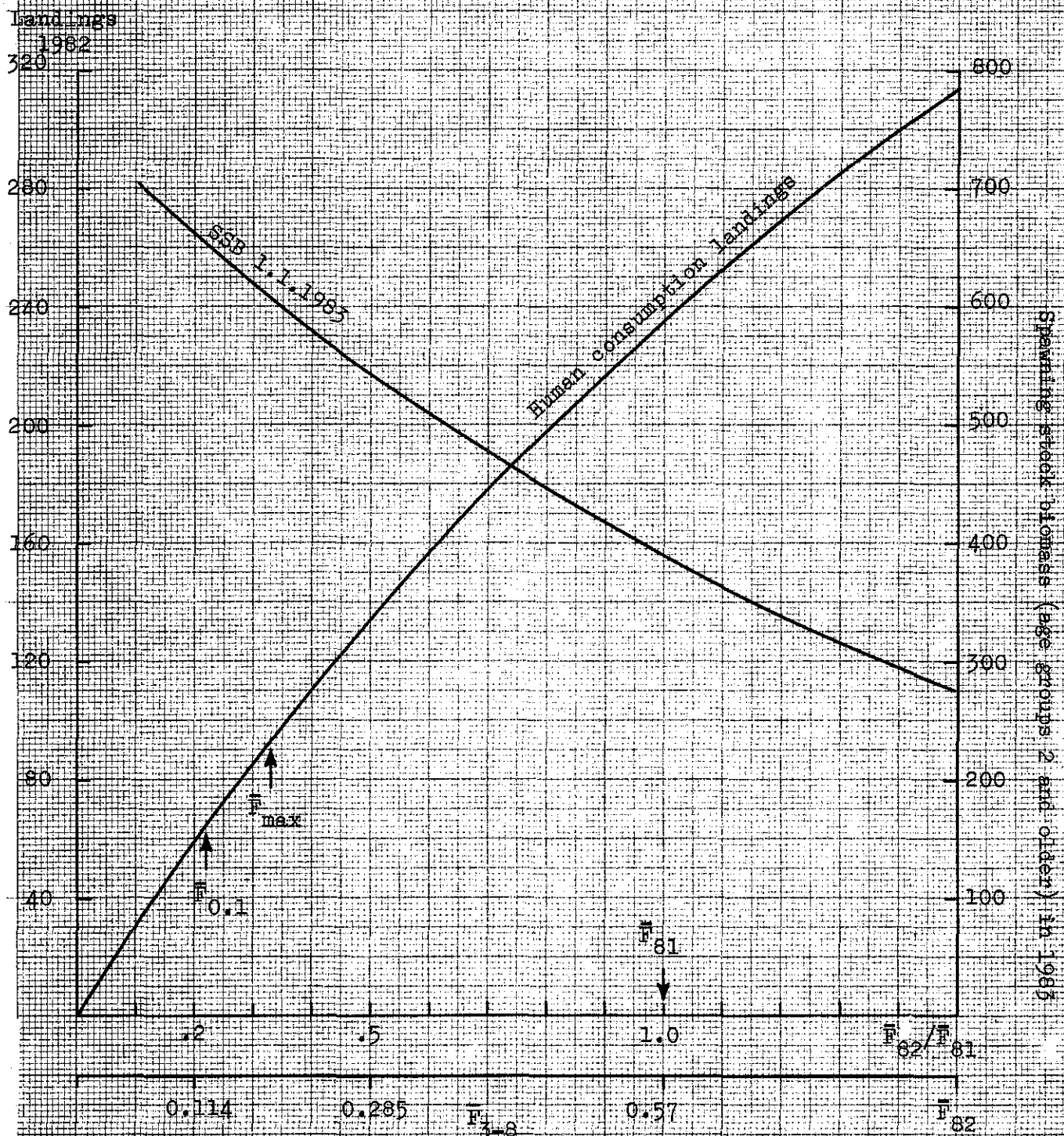


Figure 6. North Sea COD. Predictions for catch in 1982 and spawning stock biomass in 1983, in thousand tonnes. ($F_{81} = F_{80} = 0.57$)

Figure 7. North Sea HADDOCK. Predictions for catch in 1982 and spawning stock biomass in 1983, in thousand tonnes.

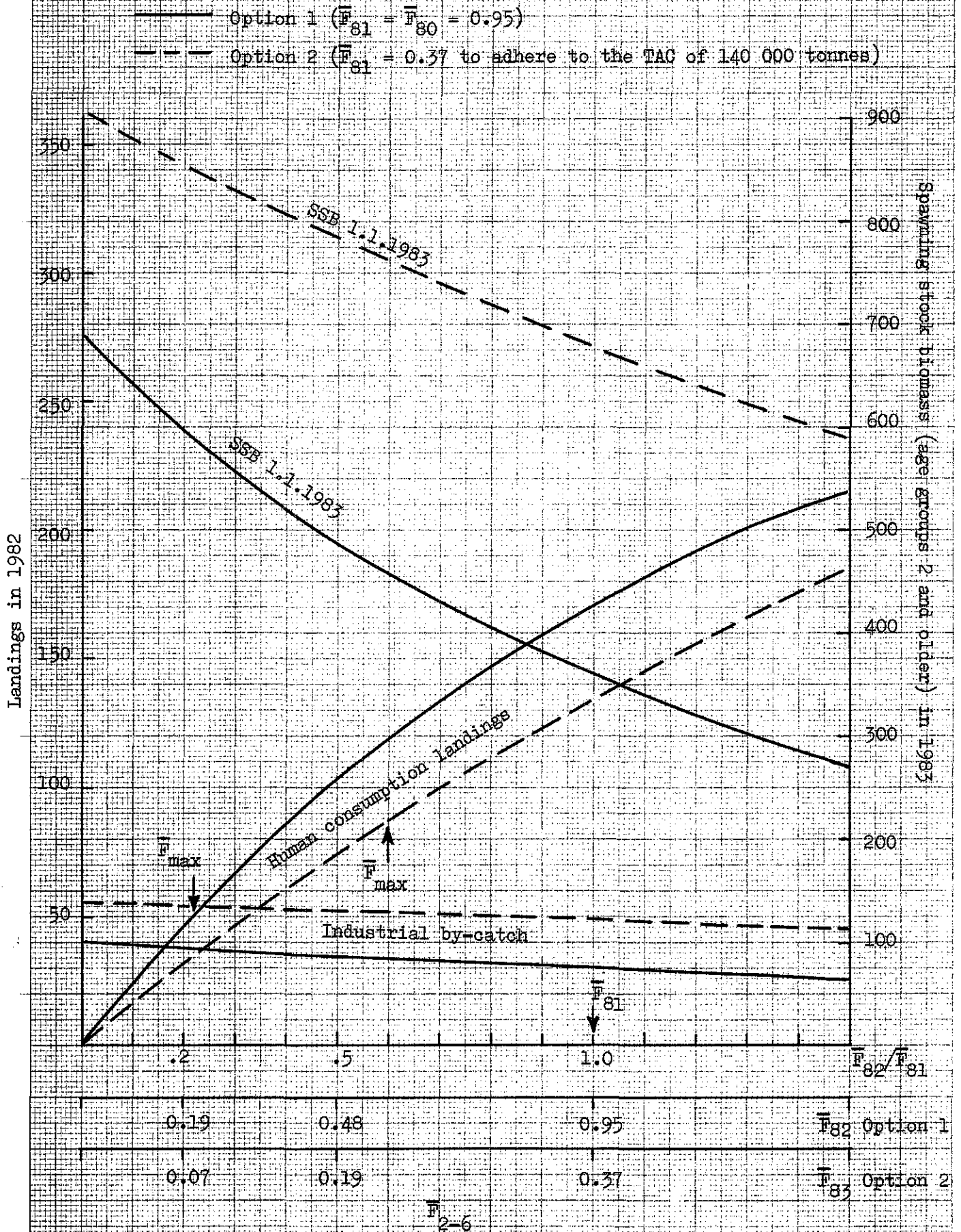
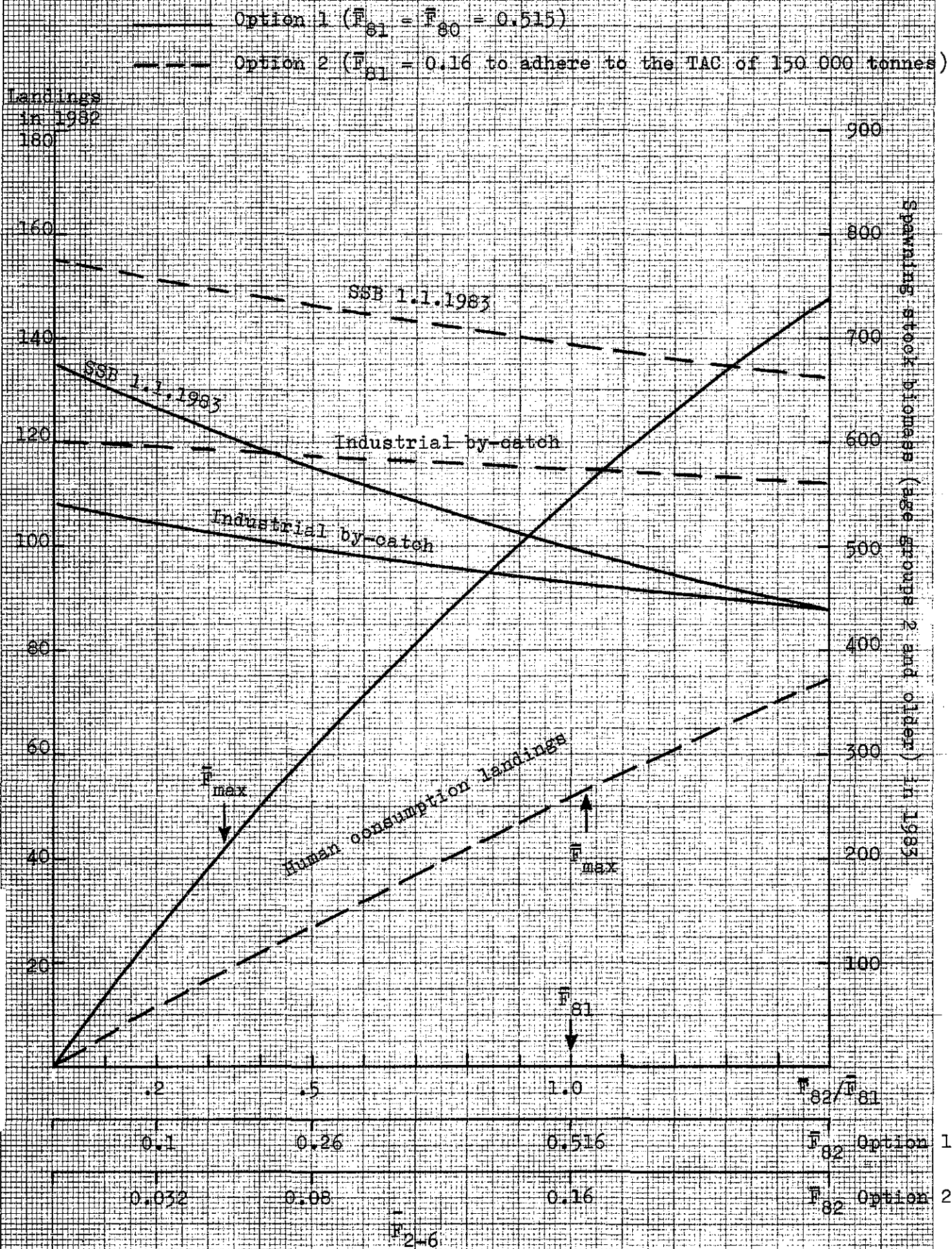


Figure 3. North Sea WHITING. Predictions for catch in 1982 and spawning stock biomass in 1983, in thousand tonnes.



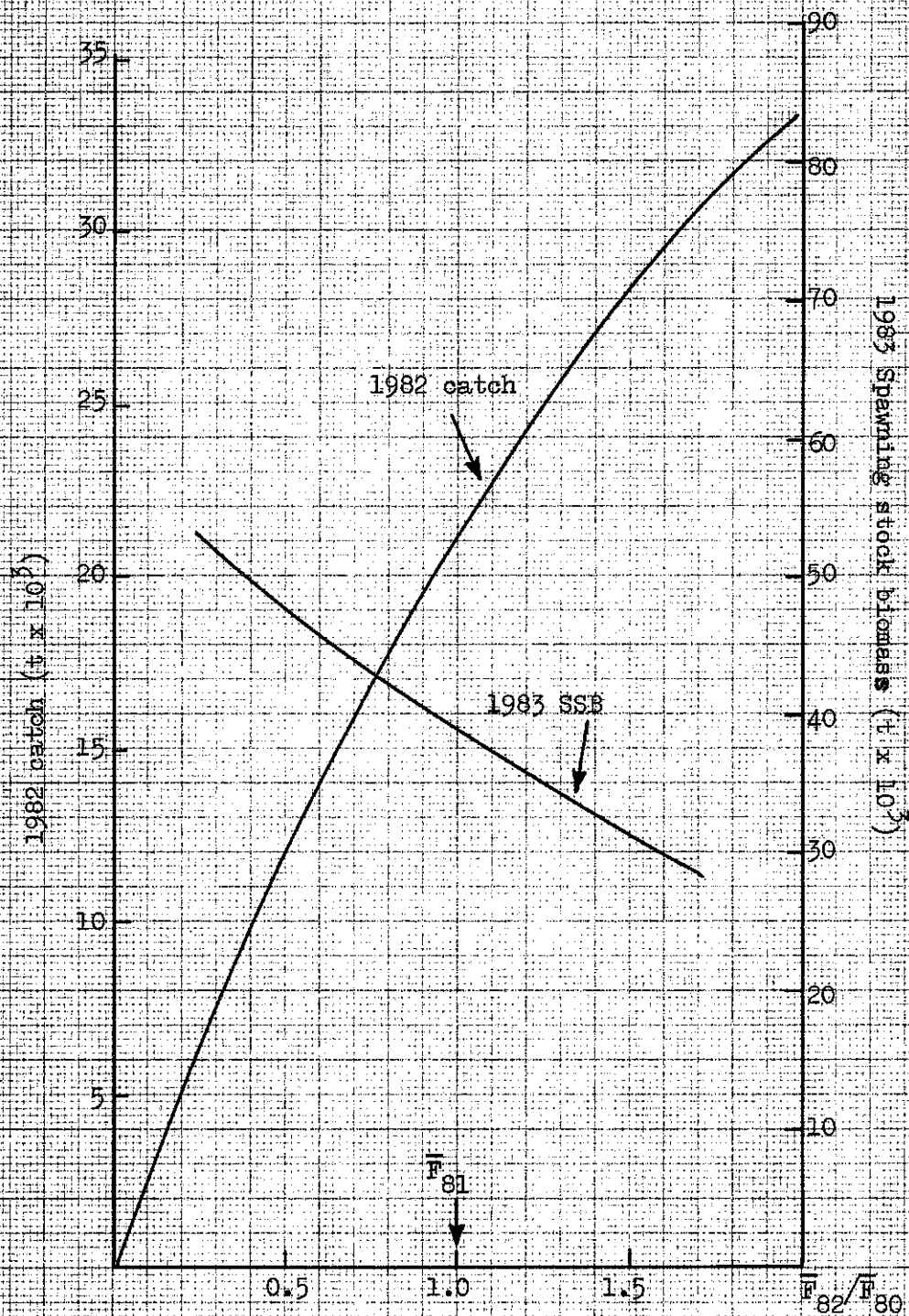


Figure 9. North Sea SOLE. Predictions for catch in 1982 and spawning stock biomass in 1983.

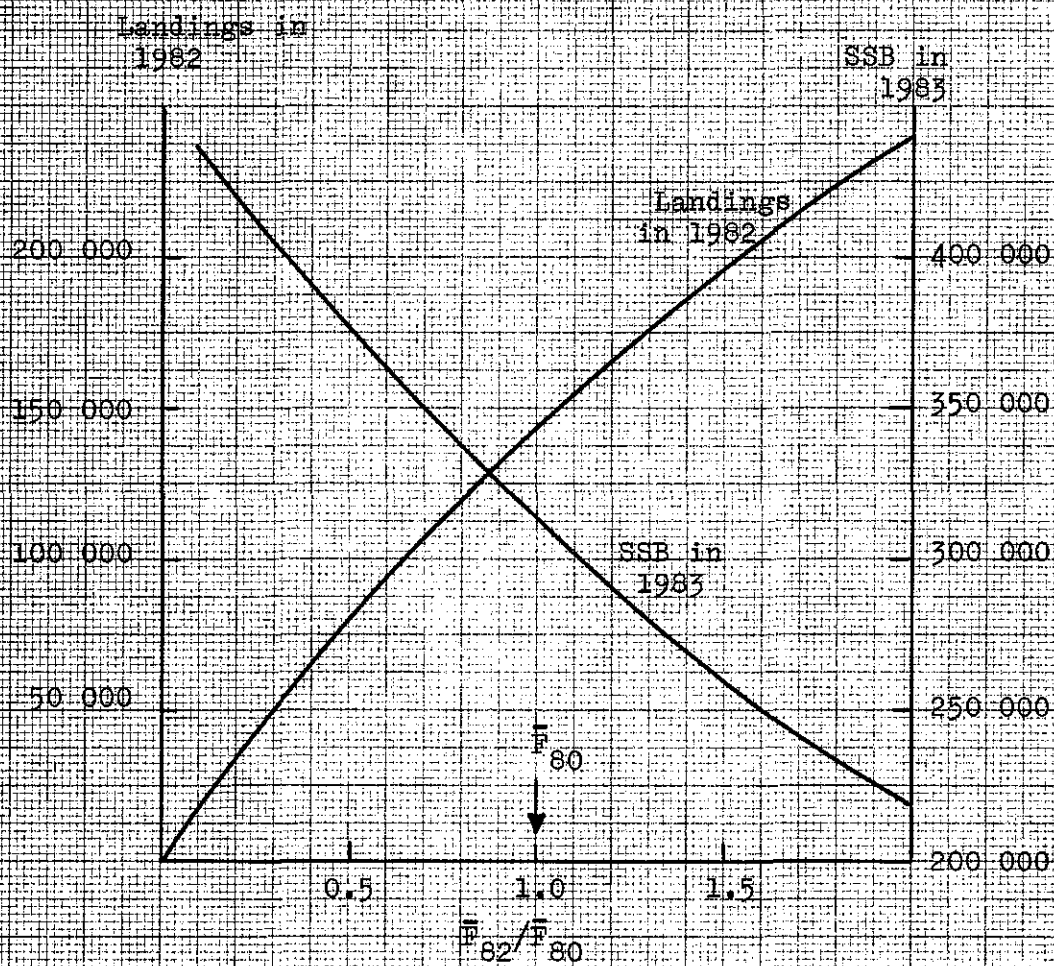
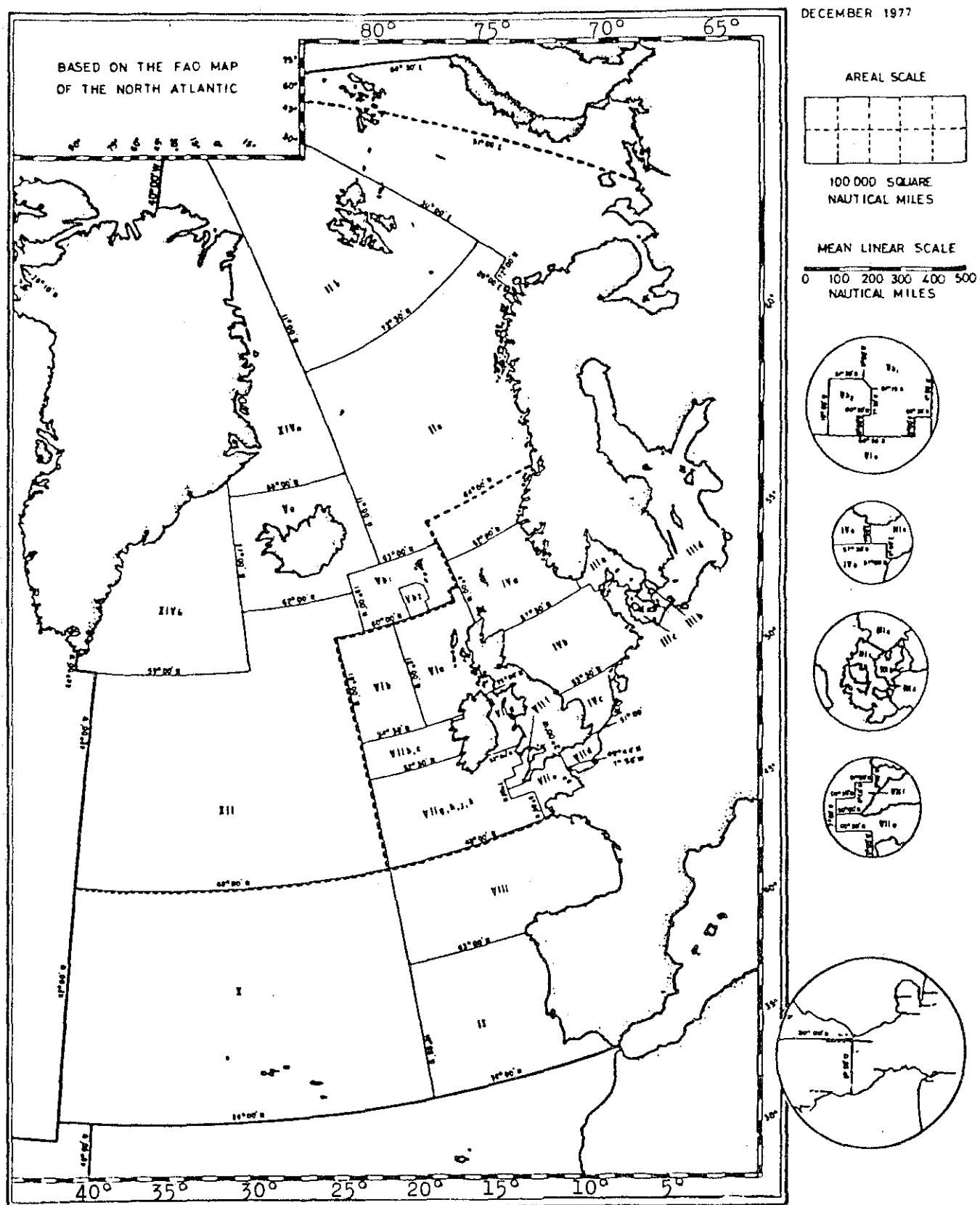


Figure 10. North Sea PLAIKE. Predictions for landings in 1982 and spawning stock biomass in 1983.

DECEMBER 1977



ICES FISHING AREAS

Indication of spine colours

| | |
|--|--------|
| Reports of the Advisory Committee on Fishery Management | Red |
| Reports of the Advisory Committee on Marine Pollution | Yellow |
| Fish Assessment Reports | Grey |
| Pollution Studies | Green |
| Others | Black |

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