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REPORTS OF THE ICES ADVISORY COMMITTEE ON FISHERY MANAGEMENT

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P R E F A C E
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This volume of the Cooperative Research Report contains the reports of the Advisory Committee on Fishery Management in 1983.

ACFM held two meetings in 1983, 10-19 May and 26 October - 2 November at ICES headquarters.

From the first meeting were issued the complete report to the International Baltic Sea Fishery Commission and Part I of the report to the North-East Atlantic Fisheries Commission.

The second part of the report to the North-East Atlantic Fisheries Commission was issued from the October-November meeting. In order to make the advice reach managers as fast as possible, the report was issued in chapters and sections and distributed immediately after the chapters had been finalised.

This volume contains the two reports to NEAFC together. They have been edited into one report, bringing the stocks in logical sequence and all advice on each stock into one place.

The report to NEAFC is followed by the report to IBSFC.

The summary sheets, included for the benefit of managers in the reports issued immediately after the meetings, have not been included in this volume.

Copenhagen, December 1983

Kjartan Hoydal
Secretary to ACFM

MEMBERS OF THE ADVISORY COMMITTEE ON FISHERY MANAGEMENT, 1982/83

Mr D de G Griffith	Chairman
Mr A C Burd	Chairman, Demersal Fish Committee
M A Maucorps	Chairman, Pelagic Fish Committee
Dr O Rechlin	Chairman, Baltic Fish Committee

Dr V C Anthony/Alternate Dr R L Edwards

*M E Cadima/Alternate Ms A M Caramelo**

Dr R De Clerck/Alternate Dr F Redant

Dr J Guéguen/Alternate Dr J Dardignac

*****Dr W G Doubleday/Alternate Dr R G Halliday**

*Mr J Jakobsson/Alternate Dr S A Schopka**

Mr J Molloy

Mr N A Nielsen/Mr K Popp Madsen

Dr V Nikolaev/Alternate Dr J Efimov*

M J A Pereiro/Alternate M J Fernández

Prof. J Popiel/Alternate Dr J Netzel*

Mr K H Postuma/Alternate Dr R Boddeke

Mr A Saville/Alternate Mr D J Garrod

Prof. A Schumacher/Alternate Mr H P Cornus

Prof. V Sjöblom/Alternate Mr R Parmanne

Mr B Sjöstrand/Alternate Mr J Modin

Mr Ø Ulltang/Alternate Mr O Nakken

Mr B Vaske

Mr K Hoydal, ICES Statistician, Secretary to ACFM

* Unable to attend the May 1983 Meeting.

** Participated in the May 1983 Meeting.

*** Unable to attend the October/November 1983 Meeting.

***** Participated in the October/November 1983 Meeting.

***** Replaced Dr Halliday as a member of ACFM at the October/November 1983 Meeting.

REPORTS OF THE ICES ADVISORY COMMITTEE ON FISHERY MANAGEMENT,

May and October/November 1983

INTRODUCTION

Last year it was decided to change the time-table for the ACFM meetings. Instead of having one main meeting in July, dealing with most of the stocks, with an additional minor one in November, taking care of a few stocks, the work has now been more equally divided between two meetings, one in early May and one in late October/early November.

The time-table of the Assessment Working Groups had to be changed accordingly, and the advice on the different stocks has been distributed between the two meetings, taking into account various factors like the deadlines set by the management authorities for receiving advice, timing of surveys and collection of other scientific data etc.

Basis of the Biological Advice Provided

There has been no change in the last two years in the basic criteria on which ACFM bases its advice. The ACFM still considers that the biological advice provided should not be seen in isolation from economic considerations, and would welcome a continuing dialogue with the other parties in the management process, in order to tailor the biological advice to best suit the needs of the subsequent stages in the process of creating viable management.

As described in earlier reports, the stocks are grouped for the purpose of providing management advice into

1. Stocks which are rapidly depleted and 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 of stock and catch.
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 an implementation of TACs, and their levels

5. (ctd) on this basis. Since 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 historic catch levels.

In order to allow more flexibility to the management authorities, the type of recommendation given for a Category 2 stock is that fishing mortality should be reduced to one of the biological reference points ($F_{0.1}$ or F_{max}) as quickly as possible, or (in some cases) towards one of these points.

A. REVIEW OF NOMINAL CATCHES IN NEAFC AREA, 1972-82

In the assessments, the Working Groups try to estimate discards, landings which are not officially reported, and the composition of the industrial by-catches. These amounts of different species, which have to be included in the estimates of what has been taken from a given stock, if assessments are to be correct, thus appear in the tables and Figures produced by the Working Groups. These levels of discards, unreported landings and industrial by-catches vary very much between different stocks and fisheries, being in some cases negligible, in others constituting important parts of the total removal from a stock.

The catch data used in the assessments are given in the table section. In all cases, where there might be doubt, it has been indicated if discards, by-catches and eventual estimates of unreported landings are included in the assessments, and how they come out in the predictions. Generally it can be said that, wherever the data allow it, discards are included in the assessments, but are not included in the catch options, which are the basis of the TACs. Estimates of catches landed as by-catches, especially from the industrial fisheries, are included, wherever data allow it, in the assessments and are included in the catch options.

It should be noted that, as a general rule, catches of protected species above the minimum landing size, which are sorted out and landed for human consumption, are included in the estimates of human consumption landings, both in the catch input data and in the projected catch options. Estimates of industrial by-catches cover in most cases that part of the by-catch which is used for reduction purposes.

B. NEAFC REGION 1 STOCKS

B.1 North-East Arctic Cod and Haddock

The Arctic Fisheries Working Group met at ICES headquarters from 15-22 September 1983 to assess catch options for 1984 for cod and haddock in Sub-areas I and II and to advise on the distribution of cod in and around the 'Mentella box'.

B.1.1 North-East Arctic cod

Recent catches and TACs, in thousand tonnes:

1980			1981		1982		1983	
Rec. TAC	Total quota	Actual catch	Total quota	Actual catch	Total quota	Actual catch*	Total quota	Estim. catch*
390	390	380	300	399	300	365	300	308

*Preliminary

B.1.1.1 Trends in catch and effort

Revised figures for cod landings in 1981 amounted to 399 037 tonnes (Tables B.1.1.1 and B.1.1.2). The provisional catch figure for 1982 of 364 869 tonnes indicates a decrease of about 9% compared to the previous year. Catches in Sub-area I continued to decline and reached a level of 97 012 tonnes in 1982 compared to 538 231 tonnes in 1977.

Since 1974 an increasing proportion of the total catch has been taken in Division IIa, reaching a level of 65% in 1982 compared to 11% in 1974. This is the result of the combined effect of a more westward distribution of fish since 1978 due to hydrographical changes, poor year classes among the younger age groups and as a consequence reduced fishing effort in Sub-area I.

Expected total landings for 1983 were estimated to be 308 000 tonnes.

In Sub-area I the catch per unit effort for the trawler fleets continued to decline in the period 1980-83. In Division IIa the preliminary figure of catch per unit effort indicates an increase in availability from 1982 to 1983.

For long-line and hand-line fishing in Division IIa, catch per unit effort more than doubled in the period 1980-82 and decreased by about 50% from 1982 to 1983.

Gill-net catch per unit effort fluctuated in the same period. However, the reduced cpue from 1981 to 1982 is considerable compared with other types of gears. This was mainly caused by the high rate of maturation of the relatively strong 1975 and 1976 year classes in 1982. The fish were too small to be caught by gill nets with the normal mesh size, but they were highly vulnerable to the long-line and hand-line fisheries. In 1983, these year classes were readily available to gill nets, which resulted in an increased catch per unit effort compared to 1982.

B.1.1.2 State of the stock

Fishing mortalities for 1983 were estimated on the basis of information from Norwegian surveys and checked against effort data from Norwegian trawlers in Sub-area I and Division IIa. Resulting fishing mortalities for age groups 6 and 7 were considerably higher than indicated by the effort figures and were, therefore, reduced by 23% and 25%, respectively, giving the two sources of information equal weight. The calculated F-values from the surveys for the older (10+) age groups are unusually low and of the same order as the fishing mortality generated (mainly in Division IIa) by gears other than trawls alone. In view of the likely overestimate of older fish in the surveys, fishing mortalities on age groups 10 and older were raised to the level, which was estimated from the survey for the 9 year old fish, i.e., 0.43. This adjustment has only marginal effects on the assessment, since these age groups make up less than 2% of the catch in numbers.

Mean fishing mortality on age groups 5 to 10 increased to a level of 0.83 and 0.92 for the years 1977 and 1978, respectively, from a relatively stable level of about 0.6 in the preceding years. In the 1979-81 period, the mean $F_{(5-10)}$ fluctuated around a level of 0.68 and decreased to 0.46 and 0.44 in 1982 and 1983, respectively.

Estimated total recruited biomass (age 3+) declined continuously since 1974 (3.1 million tonnes), when the strong 1970 year class was fully recruited to the fishery. The expected level at the beginning of 1984 (0.8 million tonnes) is the lowest ever recorded in the history of this stock.

The results of the assessment are illustrated in Figure B.1.1.1 A-C. Compared to the present assessment, the 1982 assessment overestimates the total biomass in 1982 by about 20%. This overestimate is related to the year classes 1975, 1978 and 1979. The size of the 1975 year class was overestimated in the Norwegian surveys in 1982 due to some double-counting by the acoustic method. The size of the 1978 and 1979 year classes was underestimated in the surveys in 1982. However, the corrections which were made, based on information from the USSR youngfish survey as well as from the Norwegian bottom trawl survey, overestimated the size of these year classes and hence underestimated fishing mortality on the respective age groups.

For the estimation of the spawning stock size it is important to know the proportion of mature individuals in each age group. In previous assessments the mature part of the stock was assumed to be all fish of age 8 and older. However, it would be more realistic to use a maturity ogive as recommended by ACFM, and, therefore, maturity ogives were constructed based on historic data (ALTERNATIVE 2, already used in the 1982 assessment) as well as on more recent information (ALTERNATIVE 1).

ALTERNATIVE 2 was based on summarised data from trawl sampling in Sub-areas I and II in the period November to February, when the fish migrate to wintering and spawning areas. The long-time series indicates a slight trend of decreasing age at first maturity.

ALTERNATIVE 1 is based on more recent observations obtained from the Norwegian surveys in 1982 and 1983 referring to the total stock. This approach gives more weight to adequate sampling but has to ignore possible trends in time at present.

The resulting estimates of spawning stock biomass for both these alternatives show large differences, and no conclusions can be drawn from the historic time series up to 1979. However, the trends since 1979 are almost identical. In 1981 and 1982, spawning stock biomass increased from the very low level in 1980 as a result of the early maturation of the 1975 and 1976 year classes. Spawning stock biomass at the beginning of 1984 is expected to decrease from the 1982-83 level.

For the estimate of spawning stock biomass in 1983 and in the projections ALTERNATIVE 1 was used, since it is based on the most recent data.

In view of the difficulties in estimating historical spawning stock biomasses, no conclusions can be drawn from either of the two stock/recruitment curves calculated by the Working Group, until a more refined evaluation of the historic data series can be undertaken.

B.1.1.3 Recruitment

The size of the 1980 and 1981 year classes at age 3 is indicated to be very poor by both the USSR youngfish survey and the Norwegian surveys. The Working Group used the estimate from the acoustic survey of 30 million cod at age 3 for these two year classes.

The estimate of the strength of the 1982 year class of 400 million cod at age 3, which are expected to recruit to the fishery in 1985, was derived from the international 0-group fish survey. Observations reported from the 1982 USSR egg- and larval survey, as well as indications of improved environmental conditions, also suggest that the 1982 year class might be stronger than the preceding ones.

For the 1983 year class the index from the 0-group survey is about 3 times higher than that for the 1982 year class. Its size is estimated to be about 900 million 3 year old cod.

The estimates of the 1982 and 1983 year classes do not affect the projection for 1984, and only marginally the medium-term projection of the spawning stock biomass for 1987 and 1988.

B.1.1.4 Short-term projection

The results of the catch projection are given in Figure B.1.1.2. In the text table below, management options for 1984 related to the reference points on the Y/R curve (see Figure B.1.1.2) and to certain levels of catch in 1984 are given.

Species: NE Arctic COD

Area: Sub-areas I and II

1983				Management option for 1984	1984				1985	
Stock biom. (3+)	Spawn. stock biom.	\bar{F} (5-10)	Catch (3+)*		Stock biom. (3+)	Spawn. stock biom.	\bar{F} (5-10)	Catch (3+)	Stock biom. (3+)	Spawn. stock biom.
963	533	.44	308	$F_{0.1}$	763	480	.15	94	1000	557
				F_{max}			.27	157	920	494
				$F_{84} = F_{83}$.44	236	830	415
				TAC 1984 = 300			.60	300	760	352
				TAC 1984 = 200			.36	200	870	451
				TAC 1984 = 150			.26	150	930	501

Weights in thousand tonnes.

*Expected catch estimated by the Working Group.

Medium-term projection

Calculated spawning stock biomass (SSB) in 1984-88(87) at the beginning of the year and calculated catch 1984-86 for different management strategies associated with constant fishing mortalities and constant catch levels are shown below. Catch figures for 1987 and 1988 are dependent on recruiting year classes beyond 1983 and are therefore not given in the text table below. (Weights in '000 tonnes.)

Management strategy	$\bar{F}_{0.1} = 0.15$		$\bar{F}_{max} = 0.27$		$\bar{F} = \bar{F}_{1983} = 0.44$		TAC 200		TAC 250		TAC 300	
Year	SSB	Catch	SSB	Catch	SSB	Catch	SSB	F	SSB	F	SSB	F
1984	480	94	480	157	480	236	480	0.36	480	0.47	480	0.60
1985	557	97	494	145	415	187	451	0.44	401	0.67	352	1.07
1986	615	104	492	145	360	169	387	0.50	282	0.95	180	2.05
1987	660		494		337		337		201		106	
1988	760		558		384							

B.1.1.5 Management advice

The early maturation of the relatively good 1975 year class observed in 1981 and 1982 has increased the spawning stock biomass at the beginning of 1981 and 1982 from the very low 1980 level. This increase is levelling off in 1983 and 1984.

It has to be noted that the 1975 year class is followed by a series of six poor year classes. As a consequence, the level of spawning stock biomass estimated for 1984 can only be maintained if the level of exploitation does not exceed F_{max} . This strategy is associated with catches in the order of 150 000 tonnes. If management aims at increasing the level of spawning stock biomass during the 1984-87 period, then fishing at less than F_{max} is required, which would result in catch levels around 100 000 tonnes.

Management strategies based on stable catch levels at and above 200 000 tonnes in the period 1984-87 are all associated with levels of fishing mortality in excess of F_{max} and increasing with time. Spawning stock biomass is estimated to decline rapidly under this type of management.

No substantial increase in spawning stock biomass can be expected before 1988, when the 1982 and 1983 year classes, which are expected to be strong, start to enter the spawning stock.

ACFM is concerned about the mortality of young cod from the 0-group stage to their recruitment to the fishery due to large by-catches of young cod in the growing shrimp fishery. ACFM has insufficient information at present to provide any specific advice on the matter.

In view of the considerations above and since the fishing mortality estimated for 1983 of 0.44 is still considerably above the F_{max} value (0.27), ACFM recommends that fishing mortality should be reduced to F_{max} and that a TAC of 150 000 tonnes should be set for 1984.

B.1.2 North-East Arctic haddock

Recent catches and TACs, in thousand tonnes:

1980		1981		1982		1983	
Total quota	Actual catch	Total quota	Actual catch	Total quota	Actual catch*	Total quota	Estim. catch*
75	87	110	77	?	47	?	27

* Preliminary

B.1.2.1 Trends in catch and effort

Final figures for haddock landings in 1981 amounted to 77 153 tonnes (Tables B.1.2.1 and B.1.2.2). The preliminary figure for 1982 of 47 252 tonnes shows a considerable decrease of about 39%. Expected total catches of haddock in 1983 are estimated at 27 000 tonnes.

In 1981, the catch of haddock in Division IIa was higher than in Sub-area I for the first time in the period for which data are available. As expected, the same situation occurred in 1982, when

the catch in Division IIa exceeded that in Sub-area I by about 38%. This might be due to the more westerly distribution of the fish as well as to the fact that a great proportion of the haddock stock consists of spawning fish exploited mainly in Division IIa.

An upward trend in catch per unit effort of Norwegian trawlers in Sub-area I was observed from 1977 to 1981. However, the cpue declined by about 20% from 1981 to 1982 and by about 50% from 1982 to 1983. The reason is that a great proportion of the stock has reached the age of maturity in 1981-82, particularly the good 1975 and 1976 year classes. These fish migrate to the spawning areas in Division IIa, and the increase in catch per unit effort up to 1982 in that area might be explained by this migration. In 1983, catch per unit effort in Division IIa declined considerably. Although the 1983 figure is preliminary, this indicates that the year classes now recruiting to the spawning stock are poor.

B.1.2.2 State of the stock

The results of the Norwegian surveys for haddock are not very conclusive and could not be used to estimate stock size and fishing mortalities for that species.

Fishing mortality for 1983 was, therefore, estimated under the assumption that the major part of the trawl catch of haddock is taken as by-catch in the trawl fishery for cod, and the haddock stock is exposed virtually to the same trawl effort as cod. Therefore, comparison between fishing mortality, catch per unit effort and biomass of these two species is thought to allow conclusions to be drawn for haddock from the cod assessment.

The exploitation pattern for 1983 was taken to be close to the one selected for 1982 in last year's assessment. On this basis, an average F of 0.24 on the 4-7 year olds in 1983 gave a reasonable value of the average fishing mortality on the 5-7 year old haddock in 1983 versus the average fishing mortality on the 6-7 year old cod, both averages referring to Norwegian trawlers in Division IIa. The resulting biomass of haddock also compared reasonably well with the total biomass of cod when related to the ratio of these two species in the 1983 trawl catch.

There are indications that the basic assumption for this approach to estimate fishing mortality is not completely valid. Some directed trawl fishing for haddock occurs and, therefore, the assessment of this stock may not be very precise. However, ACFM considers the trends indicated by the assessment as real and based its conclusions on it.

In the earlier assessments the Working Group has taken the mature part of the stock to be all fish of age 6 and older. In order to obtain a more realistic estimate of the mature part of the stock, a maturity ogive for the estimate of the spawning stock biomass was introduced in the 1982 assessment.

Spawning stock biomass decreased continuously from the very high level in 1975-76 of above 300 000 tonnes to the lowest on record in 1980 of 84 000 tonnes, followed by an increase up to 1982 to about 118 000 tonnes as a result of the contribution to the spawning stock by the good 1975 and 1976 year classes. However, the estimate for 1983 indicates a slight reduction in spawning stock biomass to 113 000 tonnes due to poor year classes entering the spawning stock.

Total recruited biomass (age 3+) decreased almost continuously from the high level of 1 million tonnes in 1972-73 to about 158 000 tonnes at the beginning of 1983, which is the lowest level on record.

B.1.2.3 Recruitment

Recruitment of the 1980 and 1981 year classes are both indicated by the USSR youngfish survey and the 0-group survey to be poor. Since the preceding year classes 1977-79 are also very poor, a series of five poor year classes is expected to determine the size of the stock in the coming years. The 1982 year class, which is expected to recruit to the fishery in 1985, is estimated by the surveys to be stronger than the preceding ones, and the 0-group survey indicates that the 1983 year class is of even greater strength.

Historic trends in total biomass, catch, fishing mortality and recruitment are given in Figure B.1.2.1, A-C.

B.1.2.4 Short-term prediction

The results of the catch projection are given in Figure B.1.2.2. In the text table below, three management options are listed, which are related to reference points on the Y/R curve (Figure B.1.2.2) as well as to the level of fishing mortality in 1983.

Species: HADDOCK

Area: ICES Sub-areas I and II

1983				Management option for 1984	1984				1985	
Stock biom. (3+)	Spawn. stock biom.	\bar{F} (4-7)	Catch (3+)		Stock biom. (3+)	Spawn. stock biom.	\bar{F} (4-7)	Catch (3+)	Stock biom. (3+)	Spawn. stock biom.
158	112	.24	27	$F_{0.1}$	143	100	.17	18	235	91
				$F_{84} = F_{83}$.24	25	227	85
				F_{max}			.36	35	216	76

Weights in thousand tonnes.

* Expected catch.

Medium-term projection

Calculated spawning stock biomass (SSB) in 1984-88 at the beginning of the year and calculated catch 1984-86 for different management strategies associated with constant fishing mortalities and constant catch levels.

Catch figures for 1987 and 1988 are dependent on recruiting year classes beyond 1983 and are therefore not given in the text table below.

Recruitment: Year class 1982 165 million haddock at age 3
 Year class 1983 270 million haddock at age 3
 (from 0-group survey)

Management strategy	$\bar{F}_{0.1} = 0.17$		$\bar{F}_{max} = 0.36$		$\bar{F} = \bar{F}_{1983} = 0.24$		TAC 5		TAC 10		TAC 15		TAC 20		TAC 25	
Year	SSB	Catch	SSB	Catch	SSB	Catch	SSB	F	SSB	F	SSB	F	SSB	F	SSB	F
1984	100	18	100	35	100	25	100	0.04	100	0.09	100	0.14	100	0.19	100	0.24
1985	91	19	76	33	85	25	103	0.04	99	0.08	94	0.13	90	0.18	85	0.24
1986	95	35	69	59	85	45	120	0.02	111	0.04	102	0.07	93	0.10	85	0.13
1987	135		94		117		180		167		154		142		129	
1988	226		153		194		315		297		279		261		243	

Weights in thousand tonnes

B.1.2.5 Management advice

From the very low 1979-80 level, the spawning stock in 1982 has increased slightly to about 118 000 tonnes, due to the contribution by the good 1975 and 1976 year classes. However, this development ceased in 1983, and no substantial increase in spawning stock biomass can be expected before 1987, since all the 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.

Fishing at $F_{0.1}$ would result in a catch of 20 000 tonnes in 1984. Maintaining this level of catch beyond 1984 would result in only a slight reduction in spawning stock biomass from the 1984 level up to 1986. From 1987 onwards an increase in spawning stock biomass is expected, reaching the long-term average by 1988 as a result of the contribution of the 1982 and 1983 year classes to the spawning stock.

ACFM recommends that fishing mortality on this stock should be reduced to $F_{0.1}$ and that a TAC of 20 000 tonnes should be set for 1984.

In setting the TAC for haddock, it has to be remembered that a considerable part of the haddock catch is taken as by-catch in the fisheries for other species (mainly cod) in Sub-areas I and II. The ratio of cod and haddock in the trawl catches indicates that, at present biomass levels, the amount of haddock taken as by-catch in the trawl fishery for cod in 1984 is expected to be about 1/7 of the cod catches.

B.1.3 Distribution of cod in and around the "Mentella box"

The available material consisted of distribution maps from the Norwegian bottom trawl surveys in the Barents Sea in the months January to March 1981-83 for cod greater than 41 cm and for cod less than 42 cm (Figures 18 to 23 of the Working Group report) and the paper by L M Shestova and E G Lukmanov (1983) on "Biological substantiation of redfish fishery in the Barents Sea" (Doc. C.M.1983/G:34, pp.1-21, ICES).

On the basis of this limited material, no firm advice on the distribution of cod in and around the "Mentella box" can be given at present.

The ICES Redfish Working Group will be asked to consider this matter further.

B.2 Redfish in Sub-areas I and II

B.2.1 Recent catches and TACs, in '000 tonnes:

	1979		1980		1981		1982		1983
	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC 2)	Actual catch ¹⁾	Rec. TAC
Golden redfish (<u>S. marinus</u>)	22	26	19	23	19	20	14	15	15 ³⁾
Beaked redfish (<u>S. mentella</u>)	135	87	81	79	70	81	70	115	70 ²⁾
Total	157	113	100	102	89	101	84	130	85

1) Preliminary

2) Catch level preferred by ACFM 3) Precautionary TAC

A considerable increase in total redfish catches in the North-East Arctic region was recorded in 1982. The preliminary catch figure in 1982 is 130 000 tonnes compared to 101 000 tonnes in 1981.

In Sub-area I the total catch increased from 1 800 tonnes in 1981 to 2 600 tonnes in 1982. In Division IIa, the total catch increased from 73 000 tonnes in 1981 to 78 000 tonnes in 1982, and in Division IIb the catch in 1982 was 50 000 tonnes in comparison with 27 000 tonnes in 1981.

Compared to 1981, the total landings in 1982 of S. marinus decreased from 20 000 tonnes to 15 000 tonnes, and those of S. mentella increased from 81 000 tonnes to 115 000 tonnes. Thus the catch of 15 000 tonnes of S. marinus was close to the catch level of 14 000 tonnes recommended by ACFM, while for S. mentella the ACFM recommendation of 70 000 tonnes was exceeded by 64%.

B.2.2 Sebastes marinus in Sub-areas I and II

In the absence of any effort data or fishery-independent data it was not possible to estimate the terminal fishing mortality in the VPA. An attempt was made to calculate a maximum sustainable yield for this stock from a general production model which could be fitted without effort data, but this method gave no reliable results. ACFM therefore concluded that an analytical assessment of the present state of the stock is not possible with the data available. ACFM, therefore, can only recommend that the precautionary TAC of 15 000 tonnes set for 1983 should be retained in 1984.

B.2.3 Sebastes mentella in Sub-areas I and II

The terminal fishing mortality in the VPA was estimated on the basis of total effort values, which were calculated from catch per unit effort data observed in the USSR fishery.

According to VPA results the mean fishing mortality on age groups 8-19 was low in the period 1965-74, fluctuating around 0.08. An increase to an average level of 0.49 was recorded for the period 1975-77, with a peak of 0.54 in 1976.

From 1978 to 1981 the fishing mortality remained fairly stable at a level of 0.24. An increase to 0.34 was observed in 1982.

The total stock biomass increased steadily from about 300 000 tonnes in 1965 to about 1 000 000 tonnes in 1975. By 1979 it decreased to about 550 000 tonnes and remained fairly stable up to 1982. The spawning stock biomass shows similar trends up to 1978. Since 1978 an increase from 130 000 tonnes to 175 000 tonnes in 1982 was recorded.

The present assessment gives estimates of total stock biomass and spawning stock biomass for 1982, which are somewhat below those estimated in last year's report.

For catch projections it was assumed that a catch of 100 000 tonnes will be taken in 1983. This catch level corresponds to the TAC established by countries responsible for the management of S. mentella in Sub-areas I and II. The fishing mortality required to achieve this catch is $F(8-19) = 0.32$. Furthermore, the average recruitment of 412×10^6 at age 6 was applied in the projections for 1983-85.

Based on these assumptions, several management strategies have been considered. The results of catch predictions for selected reference fishing mortalities in 1984 are given in the text table below.

Sebastes mentella

Sub-areas I and II

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	$\bar{F}(8-19)$	Catch		Stock biom.	Spawning stock biomass	$\bar{F}(8-19)$	Catch	Stock biom.	Spawning stock biomass
529	168	.32	100	$F_{0.1}$	523	156	.14	45	575	176
				F_{max}			.24	71	546	159
				$\bar{F}_{84} = \bar{F}_{82}$.34	97	518	143
				$\bar{F}_{84} = \bar{F}_{83}$.32	94	521	145
				TAC 100 000 t			.35	100	514	141

Weight in '000 tonnes.

Stock biomass: fish at age 6 to 24.

Spawning stock biomass from maturation ogive.

In considering management options, ACFM recommends that the TAC level of 70 000 tonnes preferred by ACFM for 1983 should be retained in 1984. This corresponds to the F_{\max} level of exploitation.

B.2.4 Mesh size and "mentella box" problem

For two reasons this problem could not be considered at the Working Group meeting. Firstly, no representatives from the USSR were present; secondly, the data provided by the USSR did not arrive until the second last day of the meeting.

The problem should be in the terms of reference for next year's meeting of the Working Group.

B.3 Greenland Halibut in Sub-areas I and II

B.3.1 Recent catches and recommended TACs, in '000 tonnes:

1979		1980		1981		1982		1983
Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC ²⁾	Actual catch ¹⁾	Rec. TAC ²⁾
25	17	14	13	12	15	12	16	17

1) Preliminary

2) Catch level preferred by ACFM

The total catch in 1981 was 15 000 tonnes, i.e., 25% above the TAC of 12 000 tonnes for that year. In 1982 the total catch was 16 000 tonnes, or 36% above the 12 000 tonnes catch level preferred by ACFM.

B.3.2 State of the stock

For 1982 only the age composition of the Norwegian catches was available. Since the Norwegian catches only make up 20% of the total catch, and since the age composition of the Norwegian trawl catches has in the past differed considerably from the age compositions of other trawl fisheries, it was decided that it was not practicable to establish an age composition for the total fishery in 1982. The VPA was, therefore, done for the same period (1970-81) as last year. For all age groups except the 5-year olds in 1981 the input fishing mortalities were the same as those adopted last year. The F on age group 5 was adjusted to give about average recruitment at age 3 in 1979.

The average fishing mortality on age groups 7-11 was at a level of 0.14 in 1981. For comparison the $F_{0.1}$ and F_{\max} values are 0.12 and 0.20, respectively.

The VPA results show that the biomass of the total stock and the spawning stock decreased continuously from 1970 to 1978. Since 1978 an increasing trend seems to have occurred.

B.3.3 Catch projections

The stock composition at the beginning of 1984 was estimated using the average exploitation pattern for 1977-78 for the years 1982-84, an average recruitment of 36.6×10^6 at age 3; the recorded catch of about 16 000 tonnes in 1982 and the TAC of 17 000 tonnes in 1983. The catch in 1984 for selected values of fishing mortality, together with the resulting stock biomass and spawning stock biomass in 1985, are given in the text table below.

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	\bar{F} (7-11)	Catch		Stock biom.	Spawning stock biomass	\bar{F} (7-11)	Catch	Stock biom.	Spawning stock biomass
164	62	.139	17	$\bar{F}_{84} = \bar{F}_{82}$	175	77	.145	19.2	184	85
				$\bar{F}_{84} = \bar{F}_{83}$					185	85
				$F_{0.1}$					188	88
				F_{max}					177	80
				Catch = TAC 1983					186	86

Weight in '000 tonnes.

Stock biomass: fish at age 3 to 16.

Spawning stock biomass: fish at age 9 to 16.

Keeping the TAC at a level of 17 000 tonnes would bring the fishing mortality close to $F_{0.1}$. Thus, 17 000 tonnes is the level preferred by ACFM for the TAC in 1984.

B.4 Redfish in Sub-areas V and XIV

B.4.1 Recent catches and TACs in '000 tonnes:

	1979		1980		1981		1982		1983
	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual ¹⁾ catch	Rec. TAC
Golden redfish (<u>S. marinus</u>)	58	75	58	88	60	101	60 ²⁾	122	60 ²⁾
Beaked redfish (<u>S. mentella</u>)	12	23	7	27	25	44	12 ³⁾	47	12 ³⁾
Total	70	98	65	115	85	145	72	169	72

1) Preliminary.

2) Catch level preferred by ACFM.

3) Precautionary TAC.

The total catch from the Irminger Sea redfish stock complex increased from about 146 000 tonnes in 1981 to about 169 000 tonnes in 1982, i.e., by about 16%.

In Division Va the total catch increased further from 96 000 tonnes in 1981 to 115 000 tonnes in 1982 as a result of increased effort in the redfish fishery. In Division Vb the total catch went up from 7 100 tonnes

to 9 600 tonnes. Catches in Sub-area XIV increased slightly from 43 000 tonnes in 1981 to 44 000 tonnes in 1982.

B.4.2 Sebastes marinus in Sub-areas V and XIV

Catch per unit effort data from the Icelandic fishery for the period 1978-82 have been used to calculate total effort in the redfish fishery in Sub-areas V and XIV. Based on the proportion of S. marinus and S. mentella in the catches the effort data have been allocated to different species. The fishing mortality for 1982 in the VPA was estimated iteratively from the effort data derived for S. marinus. According to this procedure the average F in 1982 over age groups 14 to 23 was at a level of 0.33, which is the highest on record. Compared with last year's assessment the exploitation pattern from age 2 onwards was revised according to the mean fishing mortality per age group in 1977-79. The exploitation pattern for age groups 7 to 10 was adjusted to give about average recruitment at age 7 for the years 1979 to 1982.

The results of the VPA show that total biomass was relatively stable in the period 1976-82 at about 1 000 000 tonnes. Spawning stock biomass increased from about 350 000 tonnes in 1976 to 450 000 tonnes in 1982, but the 1982 assessment showed a decline in the spawning stock biomass from 300 000 tonnes to 260 000 tonnes in the same period. The VPA results should therefore be considered with caution, because of uncertainties in the estimated terminal F and the exploitation pattern, but nevertheless ACFM considers the assessment as the best one which can be made at present.

For catch projections, average recruitment of 282×10^6 at age 7 was used for the years 1983-85. The following text table gives the results for selected reference fishing mortalities in 1984.

For the management of this stock in 1984, it seems appropriate to reduce the present high fishing mortality to the 1979-81 level, i.e., $F=0.2$. ACFM, therefore, recommends that the TAC in 1984 should not exceed 80 000 tonnes.

Note on the option table

The options in the following text table refer to a catch level in 1983 of 120 000 tonnes. The weights given in the table can be corrected by adding (if the 1983 catch is below 120 000 tonnes) or subtracting (if the 1983 catch is higher than 120 000 tonnes) the following percentages for each 5 000 tonnes deviation:

Catch	1.167%
Spawning stock biomass..	0.781%
Total biomass (7+)	0.389%

Redfish (*Sebastes marinus*)

Sub-areas V and XIV

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	\bar{F} (14-23)	Catch		Stock biom.	Spawning stock biomass	\bar{F} (14-23)	Catch	Stock biom.	Spawning stock biomass
1 056	435	0.316	120	Maintaining 1983 SSB			.245	93	1015	435
				$\bar{F}_{84} = \bar{F}_{79-81}$.20	78	1030	450
				Maintaining 1982 level of exploit.			.33	120	990	410

Weight in '000 tonnes.

Stock biomass: fish at age 7 to 30.

Spawning stock biomass from maturation ogive.

B.4.3 Sebastes mentella in Sub-areas V and XIV

No effort data and no fishery-independent data were available from which a realistic estimate of the fishing mortality in 1982 could be made. ACFM was therefore in the same position as last year and could neither compute a VPA nor the subsequent catch projection in a situation where none of the parameters could be estimated with sufficient reliability. In view of the increase in catches during the last three years, a cautious approach seems to be advisable in the management of this stock.

ACFM, therefore, recommends a precautionary TAC of 25 000 tonnes in 1984, which is based on the average catch level during the period 1977-80.

B.5 Greenland Halibut in Sub-areas V and XIV

B.5.1 Recent catches and recommended TACs in '000 tonnes:

1979		1980		1981		1982		1983
Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch 1)	Rec. TAC
15	24	15	31	15	20	19 ²⁾	32	24 ²⁾

1) Preliminary

2) Catch level preferred by ACFM

Total catches of Greenland halibut in Sub-areas V and XIV increased considerably from 20 000 tonnes in 1981 to about 32 000 tonnes in 1982. The total catch in 1982 was thus 60% above the catch level preferred by ACFM.

B.5.2 State of the stock

Catch per unit effort values were available from the Icelandic fishery for the years 1978-82. Using these data, the terminal fishing mortality in 1982 in the VPA was calculated iteratively from a linear relationship between fishing mortality and total effort. This method produced an F of 0.22 on age groups 8 to 13 in 1982.

According to the VPA total stock biomass increased from 185 000 tonnes in 1975 to 286 000 tonnes in 1982. The spawning stock biomass increased from 59 000 tonnes in 1975 to about 120 000 tonnes in 1980 and remained stable at this level up to 1982.

B.5.3 Catch projection

For catch projections it was assumed that the total removals in 1983 will be 20 000 tonnes, i.e. a reduction compared to the 1982 catches. This catch corresponds to an average fishing mortality of 0.13. The results of catch projections for selected reference fishing mortalities in 1984 are given in the text table below.

Greenland Halibut

Sub-areas V and XIV

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	$\bar{F}(8-13)$	Catch		Stock biom.	Spawning stock biomass	$\bar{F}(8-13)$	Catch	Stock biom.	Spawning stock biomass
289	121	0.13	20	$F_{0.1}$	304	132	0.15	23	316	142
				$\bar{F}_{84} = \bar{F}_{82}$			0.22	34	304	132
				$\bar{F}_{84} = \bar{F}_{83}$			0.13	20	320	145

Weights in '000 tonnes.

Stock biomass: fish at age 4 to 18.

SSB from maturity ogive.

The TAC preferred by ACFM for 1984 is 23 000 tonnes, which corresponds to the $F_{0.1}$ level of fishing mortality.

B.6 Stocks off East Greenland

B.6.1 Cod at East Greenland

B.6.1.1 Recent trends in the fishery

The major part of the cod catch from East Greenland waters is obtained by trawlers either from a directed cod fishery or as a by-catch in the redfish fishery. This fishery takes place on the offshore banks. Landings declined from 32 000 tonnes in 1971 to 6 000 tonnes in 1975. This decline was mainly due to small recruiting year classes resulting

in a very low abundance of the fishable stock. From 1977 to 1980 no directed cod fishing at East Greenland was allowed, except for a small quantity to be taken by Greenland vessels. From 1981, vessels other than Greenlandic were again allowed to catch cod in a directed fishery.

The nominal landings from Sub-area XIV, as reported to ICES, have continued to decline during the period 1977-82 but the reported catches seem to be only a small part of the total catch in the Sub-area. Table B.6.1.1 includes estimates of the unreported landings for the years 1977-79, landings reported for Sub-area XII from the years 1980-82, and for 1982 also some landings reported from Division Vb, which are thought to have been caught in Sub-area XIV. Table B.6.1.1 also includes estimates of marketable cod taken in the redfish fishery but discarded as a result of the by-catch regulations, which allows only 10% cod in the catch of redfish. In 1982 this regulation was in force only for the first months.

Since 1977 the estimated total catch of cod in East Greenland waters has fluctuated between 12 000 tonnes and 34 000 tonnes. The 1982 catch figure used in the assessment was 27 000 tonnes.

B.6.1.2 Groundfish biomass survey results

Under the present conditions the information available from the commercial fishery still does not adequately reflect the situation in the development of the East and West Greenland cod stock and hence does not allow valid assessments to be based on fisheries data. Groundfish survey programs were therefore introduced by the Federal Republic of Germany off East Greenland in 1980. The existing program off West Greenland was intensified in 1982 in order to obtain reasonable estimates of the trawlable biomass of cod in both areas.

Estimates of the trawlable biomass of cod as obtained from the 1980 to 1982 surveys off East Greenland showed an increase of the trawlable biomass from 63 000 tonnes in 1980 to 88 000 tonnes in 1981, followed by a drastic decline to only 20 000 tonnes in 1982. The decline observed in 1982 may have been caused by heavy fishing and/or emigration out of the area. The high figure of the trawlable biomass off East Greenland in 1981 may partly have been due to further immigration of older cod (namely of the strong 1973 year class) from West Greenland, but also by an overestimate of the trawlable biomass caused by the comparatively late date of the survey in 1981 which may have encountered pre-spawning concentrations.

In a situation without considerable immigration and emigration, the survey stock can be used directly as the starting population at the beginning of the following year, together with recruitment estimates, for the purpose of calculating catch and stock size levels for different fishing mortalities in that year.

In the East Greenland area the situation is quite different. There is a larval drift with currents from Iceland via East Greenland waters to the West Greenland banks. The magnitude of this drift and the survival rate of the larvae seem to vary much from year to year. In some years the drift seems negligible, while in other years, e.g., in 1963 and 1973, considerable numbers of larvae seem to have drifted from Iceland to East Greenland and to the southern part of West Greenland.

Considerable and variable migration takes place in the area (see Figure B.6.1.2). Tagging experiments carried out at Greenland and Iceland show that mature cod at West Greenland migrate to East Greenland and some of them further to Iceland. Results of tagging experiments carried out in East Greenland waters also show that only mature cod from that area migrate to Iceland. On the other hand, in some years immature cod migrate from East Greenland to West Greenland. At Iceland, tagging experiments show that migration of cod from Icelandic to Greenland waters hardly occurs and, therefore, the migrations from Greenland waters to Iceland can be regarded as a one-way emigration.

The estimated proportion of mature cod migrating from the combined West and East Greenland stocks to Iceland is 25%, and 45% from the East Greenland stock alone. On this basis the emigration to Iceland during 1982 is estimated to about 5.9 million fish corresponding to 33 000 tonnes. Consequently, for the East Greenland cod population the survey estimate cannot be used directly for projection purposes.

In order to arrive at an estimate of population size, which could serve as the initial population for a projection, the basic idea was to use the proportion of the stock calculated for the beginning of a year from the survey results in autumn of the same year to the survey results of the preceding autumn. In this way a factor for each age group could be developed, which would allow the autumn 'survey stock' to be raised to account for partial recruitment from East Greenland and immigration from West Greenland in the following year.

B.6.1.3 Management advice for 1983

The total biomass, as estimated for the beginning of the year by this method, decreased from the 1981 level of about 67 000 tonnes to about 57 000 tonnes in 1982 and about 31 000 tonnes in 1983.

Spawning stock biomass shows a similar trend over the three years, but the reduction in spawning stock biomass was more pronounced in 1981, when the fishery concentrated on the strong 1973 year class. In 1983 this year class will have contributed only about 18% to the spawning stock biomass. No further significant contribution can be expected from it in 1984.

Depending on the fishing mortality generated in 1983, the corresponding catches and resulting spawning stock biomass estimates in 1984 compared to 1982 are shown in the text table below.

COD			East Greenland				
1982			Management option for 1983	1983			1984
Spawn. Stock biomass	$\bar{F}(5-10)$	Catch (4+)		Spawn. stock biomass	$\bar{F}(5-10)$	Catch (4+)	Spawning stock biomass ^{x)}
36.4	0.85	27		26.5			
			$F_{83}=0.5 \times F_{82}$		0.425	9.0	17.0
			$F_{83}=F_{81}$		0.22	5.1	20.8
			Maintaining 82 level of exploit.		0.85	15.1	11.0

Weights in '000 tonnes.

x) Immigrants in 1984 not included (see section below).

In interpreting the projected spawning stock biomass figures, it must be kept in mind that the estimates for 1984 do not include estimates of immigrants from West Greenland. A rough guess of the number of immigrants in 1984 has an upper limit equal to the immigration estimated for 1983, corresponding to about 8 000 tonnes. This figure should be added to the projected biomass figures if comparison with previous levels is intended.

By maintaining the 1982 exploitation level in 1983, the spawning stock biomass will be at a very low level in 1984. In relation to management objectives, the maintenance of a viable spawning stock is therefore the most important one.

The cod fishery at East Greenland takes place mainly during the first half of the year. In 1982, 62% of the total cod catch was taken during the period January-May (Table B.6.1.2). By assuming the same fishing mortality in 1983 as in 1982 at the end of May 1983, the estimated catch may have reached 9 000 tonnes. If the timing of this advice still allows any consequent management action to be taken, then ACFM recommends that directed cod fishery should be stopped immediately for the remainder of 1983.

B.6.1.4 Management advice for 1984

At its November 1983 meeting ACFM decided that it would be possible to advise on a preliminary TAC for 1984 for this stock. This should be based on preliminary results of the 1983 autumn ground-fish survey by the research vessel "Walther Herwig". The preliminary results are:

Trawlable biomass	26 431 tonnes	± 38%
Stock size (numbers)	6 549 000	± 33%

The catch of the Federal Republic of Germany fleet in 1983 is estimated at 13 000 tonnes. Catches taken by Greenlandic vessels are of the order of about 200 to 300 tonnes.

Stock size in numbers at the beginning of 1984 was estimated in the following way (details of the calculation are given in Table B.6.1.2):

- (i) Fishing mortality which is associated with a catch of 13 000 tonnes in 1983, i.e., 0.68, was applied to the stock size at the beginning of 1983 from the previous assessment. The resulting age composition of the stock at the end of 1983 was applied to the estimated population numbers from the survey to give the numbers per age group in October 1983.

The calculated biomass, using mean weights at age from the previous assessments deviates from the estimated survey biomass by -7.5%. This indicates that the approach taken, to use the age composition from the previous assessment, might be justified. The estimated age composition also compared reasonably well with the length compositions obtained from the survey catches (Figure B.6.1.1).

- (ii) In order to account for fishing, natural mortality and emigration in November and December, 1/6 of the 1983 fishing mortality and of the natural mortality (including the emigration rate from age 7 onwards) was applied to give the Sub-area XIV population at 1 January 1984.
- (iii) From the NAFO assessment of the West Greenland cod stock, the number of emigrants to East Greenland was estimated, based on the emigration coefficient of 0.05. The resulting number of immigrants was then added to the respective age groups of the East Greenland stock estimated for January 1984. This stock was used to project catches in 1984 for different levels of fishing mortality.
- (iv) Recruitment of the 1980 year class at age 4 in 1984 was estimated from the ratio of the 1980/79 year class in the West Greenland assessment, which was applied to the estimated number of 4 year olds in the previous East Greenland assessment.

Summarised results of the previous assessments, together with management options for 1984 from the preliminary assessment, are given in the text table below. Resulting spawning stock biomass figures for 1985 are not given since they do not include immigrants in 1985 and are, therefore, not comparable with those given for 1981-84.

It should be noted that in this preliminary assessment no survey correction factor was used to account for partial recruitment.

1981				1982				1983				1984			
Total biom.	Spawn. stock biom.	\bar{F}	Catch	Total biom.	Spawn. stock biom.	\bar{F}	Catch	Total biom.	Spawn. stock biom.	\bar{F}	Catch	Total biom.	Spawn. stock biom.	\bar{F}	Catch
67	59	0.22	16*	57	36	0.85	27*	31	27	0.68	13	27	23	$F_{84}=0.5F_{83}=0.34$	6
														$F_{84}=0.8F_{83}=0.55$	9
														$F_{84}=F_{83}=0.68$	11

Weights in thousands of tonnes
*incl. discards

This preliminary analysis of the 1983 survey indicates that the stock is reduced, and consequently the 1984 TAC will be low. ACFM therefore recommends a preliminary 1984 TAC of 6 000 tonnes, subject to review early in 1984, when the full assessment will be available to ACFM.

B.6.1.5 Interaction between cod and redfish fisheries at East Greenland

A detailed knowledge of the interaction between the two fisheries (cod and redfish) seems to be necessary background information in order to ensure proper conservation of both stocks. ACFM therefore recommends that detailed studies be conducted to determine the degree of interaction between the fisheries for cod and redfish, including their seasonal and geographical distribution as well as the 'mixed' fishery in Sub-area XIV.

B.6.2 Shrimp (*Pandalus borealis*) at East Greenland

Recent catches (in tonnes):

1978	363
1979	1 285
1980	8 260
1981	4 792
1982	4 592*

* Provisional.

This stock has been assessed by the Scientific Council of NAFO, and management advice on the management of the fishery in 1983 has been passed on to managing bodies in the January 1983 Provisional Report of that Council (NAFO SCS Doc. 83/1/1).

The main fishing season is during April-May and June.

Based on continuing declines in commercial catch rates, particularly in the spring which may reflect a sharp decline in spawning biomass of females from 1980 to 1982, and based also on some new biological information, the Scientific Council of NAFO advised that the overall TAC for 1983 should not exceed the level of 4 200 tonnes previously advised for 1982.

ACFM notes and draws attention to the concern expressed by NAFO that this stock may be very sensitive to possible overexploitation and that the advised TAC might even be considered too high. Although no reliable estimates of the stock in Sub-area XIV are available, ACFM expresses concern at the evidence (as described in the NAFO Report referred to above) that this stock may be at a dangerously low level, and points out that maintaining the 1982 TAC could therefore result in increased fishing mortality.

ACFM supports the NAFO recommendation for further research work on this stock.

B.7 Atlanto-Scandian Herring

B.7.1 The Icelandic spring-and summer-spawning herring

B.7.1.1 No signs of recovery of the Icelandic spring-spawning herring were observed and the fishery in 1982 was entirely based (99.8%) on Icelandic summer spawners.

The landings of summer-spawning herring from 1973-82 are given in Table B.7.1.1. The 1982 landings were about 53 900 tonnes. Of these about 14 500 tonnes were taken by drift-nets, 1 900 tonnes by set-nets, and 37 500 tonnes by purse-seines. The fishery took place during the last four months of the year. The text table below gives the catches, the set TACs and the recommended TACs during the last four years for this fishery.

Landings and TACs (in tonnes $\times 10^{-3}$) of Icelandic summer-spawning herring 1979-82

<u>Year</u>	<u>Landings</u>	<u>TACs</u>	<u>Rec. TACs</u>
1979	45.1	35.0	35.0
1980	53.3	50.0	45.0
1981	39.5	42.5	40.0
1982	53.9	50.0	50.0

- B.7.1.2 During the period 1975-77 the catches were dominated by one year class, i.e., the 1971 year class. In 1979 two new strong year classes had recruited to the fishery, that is the 1974 and the 1975 year classes. These year classes dominated in the catches until 1981. However, the catches in 1982 are based on a much wider range of age groups, especially those belonging to the 1979-1974 year classes. Out of the 210 million herring caught in 1982, 20.6 million were immature or just about 10% by numbers.
- B.7.1.3 The state of the Icelandic summer-spawning herring has been monitored by acoustic abundance surveys since 1973. It has been shown (Jakobsson, 1982) that the acoustic estimates are correlated with the subsequent VPA outputs.

As discussed in the report of the Atlanto-Scandian Herring and Capelin Working Group 1982 (Anon., 1982), the summer-spawning herring assembled at the beginning of 1982 on new wintering grounds near southwest Iceland. During January 1982 acoustic abundance estimates were obtained under excellent weather conditions. Despite a considerable effort in December 1982 and in January 1983 a new acoustic estimate of the adult stock could not be obtained, either because the herring were too close to the coast, or because long spells of very bad weather, especially in January 1983, prevented the work at sea. However, the 3-ringers, i.e., the 1979 year class, had assembled in January 1983 in one fjord at the east coast and two almost identical acoustic estimates were obtained. In the absence of a new acoustic estimate for the adult stock it was decided to use the results of the January 1982 acoustic survey and the catches taken in 1982 to calculate the fishing mortality for the adult herring (4-ringers and older). On this basis, the fishing mortality was $F_{4+} = 0.25$. The fishing mortality for 3-ringers was taken to be about half of the adult F . This is a conservative estimate since an acoustic estimate of the year class as 1-ringers would have resulted in F on 3-ringers of only about 25% of the adult F . The fishing mortality for 2-ringers in 1982 of $F_2 = 0.05$ was calculated from the new acoustic estimate of the 1979 year class in 1983 and the catches taken in 1982.

- B.7.1.4 Using catch at age data and input fishing mortalities derived as described above, a VPA was run. The results were similar to those given in the 1982 report of the Atlanto-Scandian Herring and Capelin Working Group (Anon., 1982). The fishery for this stock was re-opened in 1975, and according to this assessment, the fishing mortality for 4-ringers and older herring was about 0.15 during the first three years of exploitation. During the period 1977-82 the fishing mortality has been around, or just above, 0.2.

The spawning stock biomass increased from about 11 000 tonnes in 1972 to about 200 000 tonnes in 1978. During the four-year period 1979-82 the spawning stock biomass has been about 250 000 tonnes.

- B.7.1.5 According to the present assessment, the spawning stock biomass has remained stable at a level of about 250 000 tonnes during the last four years. In 1983 it is expected to increase somewhat. This level of stock abundance is within the range of spawning stock biomass during the 1954-63 period of high and steady recruitment. Catches have been calculated, over a range of F s, for 1983 using a 1983 starting population as derived from the VPA except for the 1- and 2-ringers in 1983 which are assumed to be 400 million as 1-ringers. These age groups are a very small proportion of the catch. The exploitation pattern has been assumed to be the same as in 1982. The resulting catches and

spawning stock biomasses over a range of F s are illustrated in Figure B.7.1.1, which also shows the yield per recruit and spawning stock biomass per recruit.

Projections of stock abundance and catches in '000 tonnes for some selected F values are given in the text table below.

1982		1983			1984
Catch	F_{4+}	Spawn. stock at 1 July	F_{4+}	Catch	Spawning stock at 1 July
54	0.25	265	0.1	24	303
			0.22($F_{0.1}$)	50	277
			0.3	66	261

In '000 tonnes.

During the last five years (1977-82) the fishing mortality in the adult component of this stock has been about, or just above, 0.2. Since the stock abundance has also been at a steady level and its abundance is within the target range of spawning biomass (200 000 - 300 000 tonnes) which during the period 1954-63 gave high and steady recruitment, it would seem appropriate that the exploitation of this stock should be continued at about the $F = 0.2$ level.

ACFM therefore prefers a catch level of 50 000 tonnes in 1983.

B.7.2 Norwegian spring spawners

Recommended TACs, quotas and catches in recent years are given below in thousand tonnes:

1980			1981			1982		
Rec. TAC	Nat. quota	Catch ¹⁾	Rec. TAC	Nat. quota	Catch ²⁾	Rec. TAC	Nat. quota	Catch ²⁾
0	9.3	17.6	0	9.3	12.8	0	12.0	16.7

1) Including unreported catches of approximately 10 000 tonnes.

2) Including unreported catches of approximately 5 000 tonnes.

Trends in the fishery

In addition to the national quotas, the fishermen were allowed to fish herring with gill nets for bait and their own consumption throughout the year. These catches are estimated to have been about 5 000 tonnes in 1982.

The commercial fishing season was restricted to 30 August 1982 - 15 February 1983. A minimum landing size of 25 cm, with allowance of 15% undersized fish (in weight) was in force. Certain areas with dense herring concentrations were closed for fishing. The reported catch in the autumn fishery in 1982 was 10 447 tonnes consisting predominantly of 3 year old herring (1979 year class).

By-catches of 0-group herring in the sprat fishery occur frequently. The by-catches have increased in 1982 compared to the two previous years. This is associated with the strength of the year classes, the 1982 year class being relatively strong. Catches containing up to 50% of 0-group herring can be landed in the sprat fishery.

State of the stock

Based on tagging data the total spawning stock biomass in 1983 is estimated to be 635 000 tonnes. This is an increase of about 150 000 tonnes compared to 1982. This increase in stock size is mainly due to the relatively strong 1979 year class. The increase in spawning stock biomass has also been reflected in the larval production, which was much higher in 1983 than in any previous year since the larval survey series started in 1976.

Based on these stock estimates and catch data, the fishing mortality in 1982 for the 3-12 year olds was 0.02.

The 0-group surveys indicate that the year classes 1980 and 1981 are poor, but the 1982 year class seems to be of similar strength as the 1979 year class. However, the results of the 1983 international 0-group survey in the Barents Sea and various other sources provide evidence to conclude that the 1983 year class is extraordinarily abundant as 0-group herring and not comparable to any other 0-group index observed since the international 0-group surveys in this area started in 1965.

Management advice for 1984

Management options for 1984 are given in the text table below (in thousand tonnes):

1983				Management option 1984	1984			1985		
Stock biom.	Spawn. stock biom.	\bar{F}_{3+}	Catch		Stock biom.	Spawn. stock biom.	Catch	Stock biom.	Spawn. stock biom.	Catch
925	635	0.03	20	$\bar{F} = 0$	1 145	740	0	1 545	810	0
				$\bar{F} = 0.03$		740	23	1 521	780	26
				$\bar{F} = 0.05$		740	38	1 504	770	42
				$\bar{F} = 0.10$		740	74	1 404	730	79
				$\bar{F} = 0.15$		740	109	1 425	700	110

The table shows that the spawning stock will not increase to any appreciable degree from 1984 to 1985 under any management option. This is due to the poor year classes of 1980 and 1981 recruiting to the spawning stock in 1984 and 1985.

However, in 1986-87 the 1983 year class will start to recruit to the spawning stock. It is reasonable to believe that the 1983 year class is very much stronger than the relatively good 1979 year class, resulting in greatly improved prospects for the rebuilding of the spawning stock. A fishing mortality on the adult component of the stock of the order of $F = 0.05$ will have very little effect on the long-term development of the spawning stock.

In view of the rebuilding of the spawning stock biomass which has already taken place and its anticipated continuation, ACFM recommends a cautious re-opening of the fishery at a level of F not exceeding 0.05. Any higher level of exploitation will reverse the rebuilding of the stock. ACFM therefore recommends a TAC in 1984 of 38 000 tonnes to include all catches from the stock and not just the directed fishery.

Additional conservation measures

The collapse of the Atlanto-Scandian herring in the late 1960s was by far the largest loss of fishable biomass recorded in the Northeast Atlantic. Although there has been some increase in stock size in recent years, it is still at a low level compared with the period before the collapse. However, if the 1983 year class turns out to be as strong as indicated by the 0-group survey, and if it is not fished as juveniles, the spawning stock could be rebuilt rapidly in 1986-88.

In order to achieve this, ACFM recommends that a minimum landing size of 27 cm be introduced for herring in ICES Sub-areas I, II, V and XIV. This would protect the 1983 year class until the end of 1985.

B.8 Capelin Stocks

B.8.1 Barents Sea capelin

The Barents Sea capelin fishery has been regulated by bilateral fishery management agreements between the USSR and Norway since 1979. TACs and catches (in thousand tonnes) are given in the text table below:

1979			1980			1981			1982		
Rec. TAC	TAC	Catch	Rec. TAC	TAC	Catch	Rec. TAC	TAC	Catch	Rec. TAC	TAC	Catch
1 800	1 800	1 783	1 600	1 600	1 649	1 900	1 900	1 987	1 600	1 700	1 759

For the years 1982 and 1983 recommended TACs were in the range of 1.4 - 1.6 million tonnes and 2.0 - 2.2 million tonnes, respectively. USSR and Norway agreed to limit their total catch in 1983 to 2.3 million tonnes.

B.8.1.1 State of the stock

The TAC assessment of the Barents Sea capelin is based on acoustic surveys carried out jointly between USSR and Norway in September-October each year. The 1983 survey gave the following abundance estimate by year classes:

Year class	Number x 10 ⁻⁹	Mean weight (g)	Biomass (tonnes x 10 ⁻⁶)
1982 (1981)	515 (496)	3.1 (2.4)	1.61 (1.19)
1981 (1980)	200 (311)	9.5 (9.0)	1.89 (2.80)
1980 (1979)	38 (63)	18.9 (20.9)	0.72 (1.32)
1979 (1978)	+ (2)	19.4 (24.9)	0.01 (0.05)

The 1982 estimates of the corresponding age groups are shown in parantheses. The 1982 year class is abundant and of similar strength as the 1981 year class measured as 1 year olds. The 1981 year class is considerably lower than than the 2 year olds measured in 1982, and weak compared to what was expected from the 1981 year class measured as 1 year olds, the biomass being nearly 30% lower than the biomass of the 2 year olds measured in 1982. The 1980 year class is about 40% lower in number than the 3 year olds in 1982, and nearly 50% lower in weight. The 1979 year class has more or less disappeared. The total stock biomass was estimated to be 4.2 million tonnes compared to 5.4 million tonnes in 1982. Although an underestimate in 1983 cannot be ruled out, the Working Group agreed to base the TAC calculation for 1984 on the results of the 1983 survey. The stock in number by age at 1 January 1984 was calculated from the acoustic estimate in September 1983, reduced by the remaining catch quota after 1 October. By using a maturing length of 14.0 cm and a natural mortality of 0.05 month⁻¹ as in previous years, one arrives at the catch/spawning stock biomass relation as shown in the text table below (in thousand tonnes):

Catch	750	630	520	410	300	195
Spawning stock biomass	100	200	300	400	500	600

The catches refer to the period 1 January - 30 April 1984.

B.8.1.2 Management advice for the winter fishery in 1984 (Jan-Apr 1984)

A spawning biomass of 500 000 tonnes has been used as a guideline for the management of Barents Sea capelin. However, recent studies (Hamre and Tjelmeland, 1982) show that the yield curve has its peak value at a spawning stock level of about 400 000 tonnes. A general safe-guarding limit of 500 000 tonnes for the spawning stock biomass should be used more strictly in situations of weak juvenile year classes. This year's survey indicated that both the 1982 and 1983* year classes are good.

* Based on the Barents Sea International O-Group Survey in 1983.

Therefore, the Working Group feels that a catch bringing the spawning stock biomass in 1984 somewhat below 500 000 tonnes could be allowed. The spawning stock biomass in 1974, 1975, 1979 and 1980 was 200 000 - 400 000 tonnes, yielding about average recruitment measured as 2 year old fish. On this basis ACFM recommends that a TAC for the winter of 1984 should not exceed 500 000 tonnes.

B.8.1.3 Management advice for the autumn fishery in 1984 (15 Aug - 31 Dec)

The autumn catch in 1984 is expected to consist mainly of the 1981 and 1982 year classes. It is expected that the 1980 year class would be depleted as 4 year old fish due to the present low number of fish and the fast maturation resulting from the present high growth rate.

By projecting the immature stock, i.e., capelin below 14 cm one year ahead using $M = 0.05$ per month and a growth rate as in 1982 and a strength of the 2 year olds of 270×10^9 in 1984, a total catch of 1.4 million tonnes taken in the 1984/85 seasons is calculated to reduce the potential spawning stock in 1985 to a level of 500 000 tonnes. In previous years equal catches in autumn and winter have been assumed. However, the consequence of the failure of one or more of the assumptions underlying the $1\frac{1}{2}$ year forecast calculation can be made less severe by allocating a smaller fraction of the catch on the autumn fishery. A wrong prognosis may then have a smaller effect on the autumn stock. Therefore, an autumn catch of 600 000 tonnes is recommended.

B.8.2 Capelin in the Iceland - East Greenland - Jan Mayen area

For the last four years, Iceland and Norway have bilaterally agreed to limit their catches in order to preserve the spawning stock, and since the 1982 winter season a complete fishing ban has been in force (Table B.8.2). Recent agreed TACs and catches for the capelin in the Iceland - East Greenland - Jan Mayen area are given in the text table below (in thousand tonnes):

1979/80			1980/81			1981/82			1982/83	
Prel. TAC	Agreed TAC	Catch	Prel. TAC	Agreed TAC	Catch	Prel. TAC	Agreed TAC	Catch	Prel. TAC	Agreed TAC
650	850	962	775	450	680	700	-	626	-	0

Preliminary TACs have been set prior to the fishing season and have been based, mainly, on the indices of abundance derived from the 0-group surveys. The agreed TACs have been based on acoustic abundance estimates obtained in October and January each year.

B.8.2.1 Preliminary advice for autumn 1983

At the November 1982 meeting of ACFM, the Committee was not in a position to give any final advice for the autumn 1983 - winter 1984 fishery for capelin in the Iceland - East Greenland - Jan Mayen area. This was due to the uncertainty about the acoustic estimate of juvenile capelin. A new estimate was expected from a survey carried out in January-February 1983.

The results of this survey were evaluated by correspondence by the Atlanto-Scandian Herring and Capelin Working Group, and in a note to ACFM the Chairman of that Working Group gives the conclusions.

In the areas surveyed, juvenile capelin was of very low abundance. However, the main distribution area of these fish was covered by ice.

At its May 1983 Meeting ACFM, therefore, had no other option than recommending that the complete fishing ban in force at present be continued for the autumn (August-December) 1983.

State of the stock October 1983

The present TAC assessment for the autumn fishery 1983 and the winter fishery 1984 is based on an acoustic survey carried out jointly by Iceland and Norway in October 1983. The results from this survey, together with comparable values from the 1981 and 1982 surveys (in brackets) are shown in the following text table:

Year class	Number x 10 ⁻⁹	Mean weight (g)	Biomass (tonnes x 10 ⁻³)
1982 (1981) (1980)	44.1 (68.0) (24.0)	5.1 (3.8) (3.8)	225 (260) (90)
1981 (1980) (1979)	75.8 (16.6) (23.8)	15.1 (15.7) (17.6)	1142 (262) (420)
1980 (1979) (1978)	5.6 (1.6) (0.6)	22.5 (24.1) (25.0)	127 (39) (15)

This year there was no interference by drift-ice and the coverage of the distribution area of the capelin as well as general working conditions appeared to be satisfactory.

B.8.2.2 Management advice for the fishery autumn 1983 - winter 1984

Approximately 970 000 tonnes, comprising all the 1980 year class and the majority of the 1981 year class, will spawn in 1984.

Taking the mid-October estimate of maturing capelin, assuming a monthly natural mortality of 0.04 until 31 December and a monthly natural mortality of 0.08 during January-March, allows 400 000 tonnes to spawn in 1984, if 375 000 tonnes are caught. ACFM, therefore, recommends a TAC of 375 000 tonnes to be divided about equally between the autumn 1983 and winter 1984 seasons.

B.8.2.3 Preliminary management advice for the fishery Aug. 1984 - March 1985

The 0-group index, obtained annually since 1972, shows a downward trend since 1976 coinciding with the large increase in fishing effort and catches. The 1982 0-group index is the lowest on record with a slight improvement in 1983.

The main contributor to the 1985 spawning stock will be the 1982 year class. On the basis of the October 1983 survey results it is, however, estimated that a proportion of the 1981 year class will not spawn in 1984, but will recruit to the 1985 spawning stock.

B.8.2.4 Preliminary advice for autumn 1984

Using data from the October 1983 survey on the abundance of juvenile capelin from the 1982 and 1981 year classes and reducing them with a monthly natural mortality of 0.04, it is calculated that

the biomass of maturing capelin will be about 650 000 tonnes on 1 August 1984. Allowing 400 000 tonnes to spawn in 1985 would correspond to a TAC of about 100 000 tonnes in the period August 1984 - March 1985.

In view of the low abundance of the Icelandic capelin stock in recent years as well as the extremely low 0-group index in 1982, ACFM recommends that a preliminary TAC of 50 000 tonnes be set for the autumn fishery in 1984. This TAC should be re-assessed and adjusted, if necessary, when a new stock abundance estimate becomes available.

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

Recent catches and recommended TACs, in thousand tonnes, are given in the text table below. (SA = Sub-area.)

Species	Stock	1980		1981		1982		1983
		Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch ^{x)}	Rec. TAC
Saithe	NE Arctic (SA I & II)	122	145	123	175	130 ¹⁾	175	130 ³⁾
Saithe	North Sea (SA IV and Div.IIIa)	129	123	127	127	100 ¹⁾	154	97 ³⁾
Saithe	Iceland (Div. Va)	54	58	72	59	62 ¹⁾	69	66 ¹⁾
Saithe	W.ofScotland (SA VI)	31	20	27	22	25 ²⁾	22	23 ¹⁾
Saithe	Faroe (Div. Vb)	34	25	29	30	29 ¹⁾	31	26 ¹⁾
Cod	Faroe Plateau (Sub-div.Vb ₁)	22	21	14	23	20 ¹⁾	22	23 ³⁾
Cod	Faroe Bank (Sub-div.Vb ₂)	3.3	1.2	2.0	1.2	2.0 ²⁾	2.2	2.0 ²⁾
Haddock	Faroe (Div. Vb)	20	15	15	12	14 ¹⁾	12	10 ¹⁾

x) Preliminary.

1) Catch level preferred by ACFM.

2) Precautionary TAC.

3) Level corresponding to F_{max} . Reduction to this level as quickly as possible recommended.

C.1 Saithe in the North-East Arctic and the North Sea

C.1.1 Interrelationship between Division IIa and Sub-area IV

Tagging experiments have demonstrated a substantial migration of young saithe from the southern part of Division IIa to the North Sea. The data from tagging experiments on the Norwegian coast 1971-77 have been analysed on an estimated age basis. The numbers of recaptures in the North-East Arctic and the North Sea were taken as indices of the number of tagged fish of age groups 2-5 present in the two areas. The young saithe in the coastal area from which significant migration to the North Sea takes place were estimated on the basis of purse-seine catches to represent 29% of the total North-East Arctic stock of young saithe. On this basis, and applying equations given by Ulltang (1977), emigration rates were calculated: $E_2 = 0.01$, $E_3 = 0.05$, $E_4 = 0.17$. To roughly estimate the effect of migration to the North Sea, immigration rates (equal to the emigration rates) were used.

If migration takes place at these rates, fishing mortalities in the North-East Arctic have been overestimated by 5% - 10% for age 4 and by 10% - 20% for age 3 and age 2. The number of recruits at age 1 have been underestimated by about 10%. The changes in the North Sea have been of the same order, but fishing mortalities have been underestimated and recruits overestimated. Prediction made on this basis shows results which are not significantly different from those of the traditional assessments. They indicate that fishing of young saithe between 62° and 66°N is of importance also for the North Sea, but is likely to be less significant than previously indicated. However, the estimates of migration rates are based on assumptions for which little supporting evidence has been available, and the accuracy of the estimates is therefore open to doubt.

C.1.2 North-East Arctic saithe (Sub-areas I and II)

C.1.2.1 Fishery trends

Fishing continues to be conducted at a level clearly in excess of F_{max} . Fishing by non-coastal states in 1982 was restricted by quotas, and landings by these countries made up 5% of the total. The Norwegian fisheries for saithe have not been restricted by quotas. The provisional estimate of the 1982 landings is about 175 000 tonnes.

A comprehensive revision of the catch in number data, provided by the Bergen Laboratory, was accepted by ACFM (see below). This revision, based on projected age composition data from 1981 to 1982, was necessary to correct sampling deficiencies in 1982 of gill-net and part of the trawl catches as mentioned in the Working Group report. The catch of immature fish (below age 6) has fluctuated at a high level, between 89% and 94% since 1976 (92% in 1982). Thus, there has been no improvement in the exploitation pattern.

C.1.2.2 The 1983 assessment

Norwegian data on trawl effort and catch per unit effort were available, but gave no basis for estimating the current level of fishing mortality. Since 1980, Norwegian stern trawlers have directed more of their effort towards saithe and the total international trawl catches in 1982 were at the same level as the average for 1977-79. For other gears, there are no indications of changes in effort and the assessment was made on the basis that fishing mortalities in 1982 were equal to the 1977-79 average.

Inputs and results of this new assessment differ to some extent from those reported by the Working Group as a consequence of the revision of the data base. The current level of fishing mortality is higher than in last year's assessment, but appears more reliable.

Fishing on saithe in this area is carried out at a level far in excess of F_{\max} (\bar{F}_{82} for age groups 3-8 being 0.49 and $\bar{F}_{\max} = 0.27$).

The continuous decline of the spawning stock biomass (Figure C.1.2.1) which began in the early 1970s seems to have been halted but its actual level is only about 1/4 of what it was at that time.

The yield per recruit curve (Figure C.1.2.2) has also been redrawn to take into account the revision agreed by ACFM, and the predictions are made on this basis. In management of this saithe stock, both the drastic decline of the spawning stock biomass and the high level of catch of immature fish have to be considered. Reduction of the latter would inevitably have a major influence on the yield per recruit. With an improved fishing pattern F_{\max} will be at a higher level than at present and the necessary reduction of F (and effort) under the present regime of exploitation would be minimised.

The need to improve the exploitation pattern by reducing the landings of young saithe has repeatedly been stressed by ACFM (see July 1980 ACFM Report, para. 83, p.39). A major reduction in saithe fishing by purse seiners would be the most effective way of improving the exploitation pattern.

C.1.2.3 Management options

North-East Arctic SAITHE

Sub-areas I and II

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	\bar{F} (3-8)	Catch		Stock biom.	Spawning stock biomass	\bar{F} (3-8)	Catch	Stock biom.	Spawning stock biomass
642	142	0.49	167	$F_{0.1}$	656	183	0.16	65	820	194
				F_{\max}			0.27	103	769	179
				$\bar{F}_{84} = \bar{F}_{82}$			0.49	172	678	149

Weights in '000 tonnes.

ACFM recommends that the exploitation level should be reduced to F_{\max} as quickly as possible.

C.1.3 North Sea saithe (Sub-area IV and Division IIIa)

C.1.3.1 Fishery trends

Landings increased from a level of 125 000 tonnes in 1980-81 to 154 000 tonnes in 1982. This is 29 000 tonnes more than the agreed TAC. The Working Group estimate of industrial by-catches was 5 000 tonnes, which were included in the assessment. There seems to have been little change in fishing effort in the most recent years.

There is an increased proportion of immature fish (below age 5) in the catches which reached 75% in 1982 against 72% in 1981 and 63% in 1980.

C.1.3.2 The 1983 assessment

Data on effort and catch per unit of effort were available for French and Norwegian trawlers, but the Norwegian time-series was too short to be useful in the assessment. Total effort in French units calculated from monthly cpue for the period 1974-82 was used to estimate the level of fishing mortality in 1982. Using the 1977-79 exploitation pattern for 1982, this gave a satisfactory relationship both for fishing mortality against fishing effort and stock number (age groups 3-6) against French cpue. It must be pointed out that, as compared to last year's assessment, fishing mortalities are significantly lower over all age groups but more markedly for the younger ones. On the basis of this year's assessment, the current level of fishing mortality ($F_{82} = 0.30$) is close to $F_{max} = 0.27$.

The high spawning stock built up by the 1966, 1967, 1968 and 1973 year classes has declined since the mid-1970s but has apparently stabilized at a level between 250 000 tonnes and 300 000 tonnes.

C.1.3.3 Management option

A reduction of F to 0.22 would be needed to keep landings at the level of the agreed TAC (= 131 000 tonnes), whereas $F_{83} = F_{82} = 0.30$ gives predicted landings in 1983 of 170 000 tonnes. Considering that quota allocations between member countries of EEC are not yet agreed (May 1983), and that a major part of the fishing has already taken place, the latter alternative is considered to be the most realistic assumption and has been taken as a basis for the catch and stock prediction.

North Sea SAI THE

Sub-area IV and Division IIIa

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	\bar{F} (3-6)	Catch		Stock biom.	Spawning stock biomass	\bar{F} (3-6)	Catch	Stock biom.	Spawning stock biomass
833	378	.30 = F_{82}	170	$F_{0.1}$	846	430	.15	97	938	556
				F_{max}			.27	159	860	491
				$F_{84} = F_{82}$.30	178	831	474

Weights in '000 tonnes.

The TAC preferred by ACFM for 1984 is 160 000 tonnes corresponding to the F_{\max} level of fishing mortality.

Considering the inappropriate fishing pattern in terms of yield per recruit, and in order to prevent any further escalation of catches of immature fish, ACFM recommends an increase of the minimum landing size, which is at present 30 cm. ACFM is unable to recommend a specific figure at present, and the question will be referred to the 1984 meeting of the Working Group.

C.2 Icelandic saithe (Division Va)

C.2.1 Fishery trends

Landings in 1982 increased by 10 000 tonnes to 69 000 tonnes, which is 7 000 tonnes more than the catch level preferred by ACFM. There is no evidence of large changes in fishing effort in recent years.

C.2.2 The 1983 assessment

Catch per unit effort were available for 1978-82 for those Icelandic trawlers whose catches consisted predominantly of saithe. From plots of \bar{F}_{4-8} versus effort and of cpue versus biomass (age 4-8) it could only be concluded that there had been little change in mortality rates in recent years. It was therefore assumed that fishing mortality and exploitation pattern in 1982 were the same as in 1977-79.

Although the 1980 year class appears to be above the recent average, the level of recruitment is still clearly below that of the year classes prior to 1968. Spawning stock biomass appears to have stabilized after a declining trend from 1969 to 1978. The current level of fishing mortality is 0.29. The yield per recruit curve is flat-topped. The catch in 1983 is assumed to be 72 000 tonnes. Management options are given in the text table below.

C.2.3 Management options

Icelandic SAI THE					Division Va					
1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	$\bar{F}_{(4-9)}$	Catch		Stock biom.	Spawning stock biomass	$\bar{F}_{(4-9)}$	Catch	Stock biom.	Spawning stock biomass
381	205	.29	72	$F_{0.1}$	372	194	.14	37	397	215
				$F_{84}=F_{82}$.29	69	362	184

Weight in '000 tonnes.

ACFM considers that fishing effort should not be increased and prefers a catch not exceeding 70 000 tonnes as a TAC in 1984.

C.3 West of Scotland Saithe (Sub-area VI)

C.3.1 Fishery trends

Landings were stable over the past four years; the 21 700 tonnes taken in 1982 is below the 25 000 tonnes given as the preferred catch level by ACFM. A reduction in effort in 1982 is indicated by French data.

C.3.2 The 1983 assessment

There have been some revisions of the data base which may now be considered more reliable for the years since 1976. Effort by French trawlers indicated a reduction in total effort of 45% compared to the 1972-77 level due to a decrease in the fishing fleet. To err on the side of the caution, a reduction of 30% in the exploitation level was assumed, compared with the average fishing mortalities of the 1972-77 period. The reduction in fishing mortality in 1982 compared to 1980-81 indicated by the effort indices, however, could not be confirmed by the VPA.

To approach consistency with the effort data for the most recent years, fishing mortalities on the younger age groups were reduced by about 35% compared to 1972-77 and by 20% on the older age groups. This is compatible with the increasing dominance of the French catches composed of older fish and the reduction of the Scottish fleet which exploits younger fish.

The stock can be considered stable, and the relative trends in spawning stock and recruitment prior to and after 1975-76 are mainly a consequence of the revision of the data base.

Fishing mortality is less than $F_{0.1}$. Assumed landings for 1983 ($F_{83} = F_{82}$) are 20 000 tonnes. Management options are given in the text table below.

C.3.3 Management options

SAITHE

WEST OF SCOTLAND

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	\bar{F} (3-6)	Catch		Stock biom.	Spawning stock biomass	\bar{F} (3-6)	Catch	Stock biom.	Spawning stock biomass
272	202	.16	20	$F_{0.1}$	271	206	.22	27	261	193
				$F_{84} = F_{82}$.16	20	269	200

Weights in '000 tonnes.

ACFM considers that fishing effort should not increase above a level corresponding to $F_{0.1}$; a catch not exceeding 27 000 tonnes is the preferred level for a TAC in 1984.

C.4 Faroe Saithe, Cod and Haddock

C.4.1 Faroe saithe (Division Vb)

C.4.1.1 Fishery trends

Landings in 1982 increased by 900 tonnes to 31 000 tonnes. The catch level preferred by ACFM was 30 000 tonnes. More than 99% of the landings were by Faroese vessels. More effort seems to have been directed towards saithe in 1982 than in earlier years, but the increase may have been restricted by bad weather in the latter half of the year.

C.4.1.2 The 1983 assessment

The catch data indicate that in 1982 greater effort may have been directed towards the younger age groups. The exploitation pattern was changed to approximate to the assumed shift in effort, but no effort data have been used for estimating the 1982 level of fishing mortalities.

ACFM considered that the analytical assessment made by the Working Group did not take sufficient account of the rapid increase of the fishing effort of the Faroese fleet in the most recent years. A comprehensive analysis of effort data has to be carried out to evaluate the actual level of fishing mortality. Even if the precise levels of recruitment and spawning stock biomass are not defined, there is no doubt about their generally decreasing trends since the early 1970s.

C.4.1.3 Management - Faroe saithe

ACFM therefore recommends a precautionary TAC in Division Vb of about 20 000 - 25 000 tonnes, in order to prevent any further escalation of the fishing effort which could endanger the future of the saithe stock.

C.4.2 Faroe Plateau cod (Sub-division Vb₁)

C.4.2.1 Fishery trends

Landings in 1982 decreased by 1 200 tonnes to 21 700 tonnes, where the catch level preferred by ACFM was 20 000 tonnes. More than 99% of the landings were by Faroese vessels. There was probably little change in fishing effort compared to 1981.

C.4.2.2 The 1983 assessment

An analytical assessment was carried out by the Working Group on the assumption of fishing mortalities in 1982 being at the same level as in 1981.

The number of 5-year olds from the VPA was plotted against cpue of the same age group from smaller long-liners 1974-82. The number of 5-year olds in 1982 was not inconsistent with the trend indicated.

The spawning stock biomass was declining from 1977 to 1980 but seems to have stabilized at a level of about 60 000 tonnes. The year classes 1978 and probably 1980 appear to be above average. The current level of fishing mortality is 0.31, which is close to the F_{max} level. Predicted landings in 1983 for $F_{83} = F_{82}$ are 24 000 tonnes. Predictions for 1984 are given in the text table below.

C.4.2.3 Management options

Faroe Plateau COD

Sub-division Vb₁

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	$\bar{F}(3-6)$	Catch		Stock biom.	Spawning stock biomass	$\bar{F}(3-6)$	Catch	Stock biom.	Spawning stock biomass
130	67	.31	24	$F_{0.1}$	132	78	.15	14	146	92
				F_{max}			.33	27	131	77
				$F_{84} = F_{82}$.31	25	132	78

Weights in '000 tonnes

Since the present level of fishing mortality is in the region of F_{max} , ACFM prefers that the fishery is stabilized at the present level.

C.4.3 Faroe Bank cod (Sub-division Vb₂)

Landings of Faroe Bank cod increased by 80% in 1982 to 2 200 tonnes. The precautionary TAC recommended by ACFM was 2 000 tonnes. Data were not adequate for an analytical assessment. Based on historical catches, a precautionary TAC of 2 000 tonnes is indicated.

C.4.4 Faroe haddock (Division Vb)

C.4.4.1 Fishery trends

Landings in 1982 declined to 11 900 tonnes which is the lowest recorded since 1960 and below the catch level of 14 000 tonnes preferred by ACFM. There may have been some increase in fishing effort on haddock although most of the additional fishing capacity in 1982 has been directed towards deeper water species such as saithe, redfish and blue ling.

C.4.4.2 The 1983 assessment

Input F_s chosen for the VPA were consistent with an increase in fishing effort compared to the period 1979-81. The stock numbers of age 4 and 5 from the VPA were plotted against cpue from smaller long-liners for these age groups. The stock numbers at age 4 and 5 in 1982 were consistent with these relationships.

Spawning stock biomass in 1982 is 60 000 tonnes and the declining trend from 1977 appears to have stopped. Recent year classes have generally been poor, but the 1980 year class seems to be at the same level as the strong 1972-74 year classes. Current fishing mortality is 0.26 compared to $F_{0.1} = 0.17$. Predictions for landings in 1983 for $F_{83} = F_{82}$ are 12 000 tonnes. Management options for 1984 are given in the text table below.

C.4.4.3 Management options

Faroe HADDOCK					Division Vb					
1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	\bar{F} (4-6)	Catch		Stock biom.	Spawning stock biomass	\bar{F} (4-6)	Catch	Stock biom.	Spawning stock biomass
110	81	.26	12	$F_{0.1}$	117	88	.18	11	125	96
				$F_{84}=F_{82}$.26	14	120	92

Weights in '000 tonnes

The present level of exploitation is in the region between $F_{0.1}$ and F_{max} . ACFM prefers that the fishery is stabilized at the present level of fishing mortality.

D. NEAFC REGION 2 STOCKS

D.1 Herring Stocks South of 62°N

Minimum landing size in herring fisheries in Sub-areas IV, VI and VII

In its 1983 report, the Herring Assessment Working Group for the Area South of 62°N drew ACFM's attention to the problem of considerable catches of juvenile herring being landed, which are above the current minimum landing size of 20 cm but below the size at first spawning. Such herring are frequently not marketable but it is profitable for fishermen to catch them because of EEC intervention marketing arrangements.

These herring will be predominantly 1-group and to gauge the extent of this problem ACFM has examined the proportion of landings of herring of this age group by the directed herring fisheries in different areas. In the years prior to the closure of the fisheries in Divisions IVa and IVb, in some years, 1-group herring contributed about 40-50% of the catch in numbers, in Division IVc about 15%, in the Celtic Sea up to 40%. They are known to be a considerable element in some national catches in Division VIa, although the data necessary to estimate the proportion there were not available to ACFM.

Catching these juvenile herring is undesirable both from total yield and spawning stock biomass consideration. To illustrate these effects, ACFM estimates that with the average exploitation rate and pattern in the Celtic Sea over the period 1972-79, the yield would be increased by about 10%, and the spawning stock biomass by about 20%, if catches of 1-group fish could be eliminated. The effects in other fisheries would be in the same direction, but would vary in size depending on the incidence of catches of 1-group, and the growth rates of the herring.

ACFM considers that the most straightforward way of reducing these catches of juvenile herring would be to increase the minimum landing size for herring to a length corresponding to the size at first maturity which is at least 23 cm in Sub-areas IV, VI and VII. The effect of increasing the minimum landing size would be to discourage fishermen from fishing in areas and at time periods when the herring are predominantly below the minimum size. A minimum landing size of 23 cm, if properly enforced, would largely eliminate catches of juvenile fish in all the stocks in the Sub-areas in question. ACFM therefore recommends that the minimum landing size of herring should be increased from 20 cm to 23 cm in Sub-areas IV, VI and VII.

It would be appropriate to also increase the minimum mesh size for herring trawls in NEAFC Region 2 to 40 mm from the present 16 mm. ACFM notes that for that part of Region 2 which is within the jurisdiction of the European Community, the European Commission has already made such a proposal.

D.1.1 North Sea herring

D.1.1.1

In 1982, a ban on directed herring fishing was in principle in force in the northern and central North Sea (Division IVa and IVb). Legal fishing for herring was restricted to the southern North Sea and was regulated by TAC and seasonal closure. A TAC of 72 000 tonnes was set for the period 1 October 1982 - 25 February 1983, whereas ACFM in May 1982 suggested that the fishing mortality should not increase above the $F_{0.1}$ level, which would have resulted in an overall catch of 60 000 tonnes.

The total North Sea catch in 1982 is estimated at almost 172 000 tonnes, of which about 55 000 tonnes were not officially reported (Table D.1.1). ACFM reiterates its warning on the vital need to have accurate catch statistics for meaningful analysis of the situation and for assessments of the various stocks.

- D.1.1.2 Despite the ban on directed herring fishing in Divisions IVa and IVb, fishing took place in both Divisions, with a total of about 5 000 tonnes of adult herring.

The main event in Division IVb was the dramatic increase in juvenile catches which reached over 89 000 tonnes in the first 3 quarters of 1982. This drastic increase must be considered in relation to previous years: about 15 000 tonnes in 1979 and 1980 and 78 000 tonnes (revised figure) for 1981. Catches at the level of the last 2 years (1981 and 1982) cannot be considered as by-catches in a sprat fishery but rather as the result of a directed fishery on 0-group herring.

In Divisions IVc and VIId, the overall estimated catch is about 72 000 tonnes. The opening of the fishery in that area gave the opportunity to misreport catches taken in other areas. From information supplied by Working Group members, some misreporting has been corrected for in the above-mentioned figures.

- D.1.1.3 In 1978, the lowest catch in number of juvenile fish was recorded since the beginning of industrial fishing for herring. Since then, there has been a rapid escalation of these catches, which reached 7 900 and 8 300 million of 0-ringed fish in 1981 and 1982, respectively, the latter value being the catch of only the first 3 quarters of the year. The 1981 juvenile catch figures have been comprehensively revised.

The contribution of 0- and 1-ringed fish, as a percentage of the total catch in number, reached the extreme levels of 92% and 94% of the overall catch of North Sea herring for the last two years.

- D.1.1.4 The final estimate of the 1980 year class from the IYFS is 3.8×10^9 1-ringers, which is the highest estimate obtained since the 1973 year class. The 1981 year class has been estimated as 5.7×10^9 1-ringers from IYFS and seems, therefore, to be even stronger than the 1980 year class. Taking into account the large 0-group catches of these year classes in 1981 and 1982, it is concluded that as 0-group they must have been at or above the mean level during the 1950s and 1960s.

- D.1.1.5 In Division IVa, both the larval surveys and acoustic surveys gave a spawning stock estimate of about 200 000 tonnes in 1982, indicating no significant change from 1981. Age compositions collected during the surveys indicated, however, a strong contribution by the recruiting 1979 year class in 1982, and this is therefore in conflict with the stable stock size estimates. Assuming that the age composition data were not heavily biased, the most likely explanation is one, or a combination of the following three explanations:

- a) Stock size was underestimated in 1982.
- b) Larval surveys in previous years have overestimated the stock.
- c) Catches from the Division IVa stock have been underestimated in 1981-82.

- D.1.1.6 Larval and acoustic surveys in Division IVb in 1982 gave spawning stock size estimates of about 70 000 tonnes. For reasons explained in the Working Group report, both of these are considered to be underestimates, and it was concluded that the spawning stock probably reached a level of about 100 000 tonnes in 1982. Age composition data showed a strong contribution by the recruiting 1979 year class. It is thus clear that a substantial recovery of this stock took place in 1982.

D.1.1.7 The acoustic survey carried out in February 1982 in Divisions IVc-VIId is considered to give the best estimate of spawning stock in that area, because of its superior coverage compared with the other acoustic surveys. Based on the results of that survey, the spawning stock biomass at the end of 1981 was calculated to have been about 150 000 tonnes. From catch and age composition data, the spawning stock at the end of 1982 was calculated to be at about the same level. The actual spawning stock biomass at spawning time must have been somewhat higher, taking into account catches made during December 1981 and December 1982. Thus, the further large increase in the spawning stock expected in last year's report did not occur. It seems clear that a larger part than expected of the 1979 year class recruited to Divisions IVa and IVb instead of to Divisions IVc-VIId.

D.1.1.8 If the 1980 year class is not fished as 2-ringers prior to the spawning season, it is expected to contribute about 400 000 tonnes to the spawning stocks in 1983. Based on the IYFS, the 1981 year class seems to have been even stronger than the 1980 year class as 1-group. If not fished to any significant extent as 1-ringers and 2-ringers before it recruits to the spawning stocks, this year class could contribute about 600 000 tonnes to the total North Sea spawning stock in 1984. It is thus clear that a significant rebuilding of the total North Sea spawning stocks is taking place despite the fact that the rebuilding is being seriously delayed by the illegal directed young herring fisheries, which have taken place in 1981 and 1982 as mentioned above.

D.1.1.9 In order to make stock projections for 1983 the Working Group attempted to estimate what proportion of the 1980 year class would recruit to the spawning stocks in the three divisions of the North Sea. For this purpose, they used length frequencies obtained from the IYFS in Sub-area IV in 1982. Two methods were used to separate the Downs component both of which gave estimates of about 60%. The Working Group, however, decided to reduce this proportion and assign 50% of the recruitment estimate to the Downs stock in view of the occurrence of North Sea recruits in the Skagerrak. The Working Group could not estimate how the remaining 50% should be divided between Divisions IVa and IVb.

ACFM, in the light of new estimates by a completely independent method of the Downs component made available to it, had some problems in accepting the technique used by the Working Group in splitting the recruiting year class into a Downs component and a residual which will recruit to the other two stocks. It therefore suggested that this problem needs further consideration than could be given during the ACFM meeting.

As an interim measure ACFM has split the total North Sea recruitment into stock components in the same proportions as the spawning stock biomasses in 1982. Although this approach may appear to have little logical justification, it is likely to be a more conservative approach than any other alternative, and is one which can be more readily corrected in subsequent years, when better data are available on the stock affinities of the 1980 year class.

D.1.1.10 At its July 1979 meeting, ACFM recommended that before re-opening the fisheries on North Sea herring certain criteria should be met: that there should be evidence that the spawning stock would recover to about 800 000 tonnes even under a limited fishery, and that there should also be evidence of improved recruitment. If the 1980 year class is not fished further before it recruits to the spawning stock in 1983, the total North Sea spawning stock will probably reach the target of 800 000 tonnes in that year. As discussed above, there is also firm evidence of improved recruitment. It is concluded that the criteria will probably be met in 1983, if one considers the total North Sea stock as one unit. It must be kept in mind, however, that the three main components of the population have recovered at different rates.

D.1.1.11 ACFM would stress the need for continued protection of all three spawning stocks in the North Sea herring population, as all of them are still at a relatively low level compared with earlier years. This is particularly true of the stocks in Divisions IVa and IVb. Moreover, these two stocks have not been subjected to legal directed fisheries since 1977 and, as a result, the available data on stock size and its age composition are less reliable. Accordingly, if re-opening of the adult herring fisheries in these two Divisions in 1983 is permitted, only very moderate fishing mortalities should be allowed. They should also only be permitted within area TACs, and with time restrictions, to prevent unduly high fishing effort being applied to any of the component spawning stocks.

For the Division IVa and Division IVb stocks, ACFM would suggest that, in the light of the uncertainties regarding the stock sizes in 1982 and the recruitment to them in 1983, both stocks should be fished below the $F_{0.1}$ level. Accordingly, for these stocks TACs have been estimated at fishing mortalities in 1983 of 0.10. In Divisions IVc and VIId, the TAC for 1983 has been estimated at fishing mortality rates 0.1, 0.125 and 0.27 (the level of exploitation in 1982). It should be noted that for this stock $F_{0.1}$ is 0.125. For the herring in Divisions IVa and IVb, $F_{0.1}$ is 0.15 because the growth rates are different.

In Division IVb, the speed of build-up of the spawning concentrations of virtually the entire Division IVb adult stock, and the way in which the spawning herring are densely aggregated over small areas, makes the IVb spawning stock highly vulnerable to fishing at this time. Furthermore, the precise time of the onset of these aggregations, and their exact location, varies from year to year but they occur within the period mid-August to the end of September and west of 3°E .

In Division IVb, therefore, ACFM recommends that the TAC should be taken west of 3°E and that the fishery should be closed from 15 August to 30 September. The area restriction will avoid an unduly high proportion of juvenile herring in the catches, and the time restriction will prevent concentration of the fishery on herring on the spawning grounds during the spawning season.

Catches taken in Division IVb will contain a component of Downs herring. In the period before the total North Sea closure in 1977, the Downs component taken in Division IVb before the onset of spawning was about 20% of the total annual catch of Downs adult herring. Accordingly, to the Division IVb TAC 7 000 tonnes of Downs herring have been added to give the total TAC to be taken in Division IVb west of 3°E outside the recommended closed season.

D.1.1.12 The resulting management options for each area are given below.

Species: HERRING, Division IVa

1982				Management option for 1983	1983		
Stock biom. (2+)	Spawn. stock biom. (2+)	\bar{F}_{2-8}	Catch		Stock biom. (2+)	Spawn. stock biom. (2+)	Catch
205	188	0.04	6	$F = 0.10$	391	342	35

Weights in '000 tonnes.

ACFM recommends that the Division IVa TAC in 1983 should not exceed 35 000 tonnes.

Species: HERRING, Division IVb

1982				Management option for 1983	1983		
Stock biom. (2+)	Spawn. stock biom. (2+)	\bar{F} 2-8	Catch		Stock biom. (2+)	Spawn. stock biom. (2+)	Catch
124	99	0.03	5	$F = 0.10$	221	179	20(27)

Weights in '000 tonnes

The catch figure for 1983 of 20 000 tonnes is stock TAC option. The figure in brackets is the corresponding area TAC derived by making allowance for the presence of Downs herring in Division IVb as described in a previous section. ACFM recommends that the Division IVb TAC in 1983 should not exceed 27 000 tonnes, to be taken in Division IVb west of 3°E outside the period 15 August to 30 September.

Species: HERRING, Divisions IVc + VIId

1982				Management option for 1983	1983		
Stock biom. (2+)	Spawn. stock biom. (2+)	\bar{F} 2-8	Catch		Stock biom. (2+)	Spawn. stock biom. (2+)	Catch
237	146	0.27	72	$F = 0.10$	295	234	35(28)
				$F = 0.125$ $= F_{0.1}$	295	227	43(36)
				$F_{83} = F_{82}$ $= 0.27$	295	187	84(77)

Weights in '000 tonnes.

Spawning stock biomass at 31 December.

The TACs for Divisions IVc and VIId in brackets are the remainder of the Downs TAC after deducting the 20% allocated to the Division IVb TAC. ACFM recommends that the Divisions IVc + VIId TAC for 1983 should not exceed 36 000 tonnes, to be implemented as a seasonal TAC during the period 1 October 1983 to 31 March 1984.

D.1.1.13 For several years recruitment to the North Sea stock was at a low level probably due to stock-recruitment failure. This is no longer the case. The North Sea herring have recently (1980-81) produced at least two strong year classes, which could have brought the North Sea herring stock to its former state of a highly productive resource. The 0-group fishery, which took place in Division IVb in 1981 and 1982, has, however, seriously reduced their potential recruitment to the spawning stock. In this context it must be noted that a large 0-group fishery also takes place in Division IIIa. This fishery is mainly based on 0-group fish of North Sea origin. It is, therefore, concluded not only that the young herring industrial catches in Divisions IVb and IIIa are a serious threat to the recruitment of the North Sea herring and are also contrary to any rational exploitation of this potentially largest fish resource in the North Sea.

D.1.1.14 Concerning the fishing of 0-group herring along the Danish coast, ACFM at its April meeting in 1982 recommended a closure of the sprat fishing in ICES statistical squares 42F7 and 41F7 from 1 July to 31 October. The fishing in 1981 and 1982 indicates that this area should be extended southwards and include ICES statistical squares 40F7 as well as the fishery taking place very close to the shore.

ACFM therefore recommends that no herring or sprat fishery should be allowed in the area from the shoreline of the Danish coast to 7°E longitude, and between 55°30'N and 57°N latitude during the period 1 July to 31 October.

ACFM is concerned about the failure to implement the already existing regulations to prevent or reduce by-catches of young herring in sprat fisheries, closure of areas where by-catches of herring are a major problem, and minimum size limits for herring.

D.1.2 Division IIIa Herring

D.1.2.1 The landings of herring during the last decade are given in Table D.1.2. Preliminary figures for 1982, partly based upon official figures, amounted to about 111 500 tonnes, which is slightly less than the revised figure for 1981. An increase of 6% in the Skagerrak was counterbalanced by an 11% decrease in the Kattegat. In last year's report, Denmark was not able to produce reliable data for the second half of 1981, and an indirect method was applied in order to estimate the likely level of this part of the landings. At the present meeting, figures based on a restricted number of samples were presented to the Working Group, and Table D.1.2 was revised accordingly. The main change occurs in the unallocated landings, which increased by 11 000 tonnes to 57 000 tonnes. In 1982, this part of the landings declined to about 35 300 tonnes. The total estimated landings thus show a decline from about 171 000 tonnes in 1981 to about 147 000 tonnes in 1982.

Catch in numbers at age data were available for the major fisheries in 1982 and for those landings in 1981, for which no data were available in last year's report. In both 1981 and 1982, the figures indicate the largest catches of 0-group herring on record in Division IIIa, and amount to over 60% of the total catch in number.

- D.1.2.2 In January 1983, a Workshop on Stock Components undertook a trial of separating Division IIIa herring into spring- and autumn-spawned components, using length distributions and meristic characters. The Workshop found that more than three components could be separated in Division IIIa on the basis of length frequency distributions. Of these, at least one could be referred to autumn spawners and one or more to spring spawners. Kattegat spring spawners, Skagerrak spring spawners, and North Sea autumn spawners have different pure stock characters and can be identified by these means. The Workshop was unable, however, to separate the Kattegat spring spawners from those in the western Baltic and the Belt Seas.
- For the time being, the broad outlines indicate that the major proportion in the catches of 0-groups in July-December and of 1-groups in January-March are referable to North Sea autumn spawners. 1-groups in July-December seem to be dominated by spring spawners, which are almost the sole component amongst 2-ringers and older fish.
- D.1.2.3 The catch of 0-group herring reached the highest level on record in 1981-82. The Workshop on Stock Components concluded that these young herring are from the northern and central North Sea. These catches undoubtedly reduce the recruitment to herring stocks mainly in the North Sea. Together with the 0-group catches in the North Sea itself, the total may equal the major part of a North Sea average year class.
- ACFM has already proposed a number of restrictions which, if enforced, would effectively cut 0-group catches, and it is difficult to imagine what further restrictions could be suggested. The real problem in Division IIIa thus appears to be the lack of enforcement of existing regulations and the failure to accept the additional proposals recommended by ACFM in November 1982. No improvement can be expected from any additional restrictions without effective enforcement.
- D.1.2.4 An acoustic survey carried out in Division IIIa in August-September 1982 gave a total herring biomass estimate of about 340 000 tonnes. About 87% of the estimated stock in number consisted of 0- and 1-group.
- D.1.2.5 For the adult part of the catch a VPA, based on 9 years' catch at age data, allowed comparisons with year class fluctuations in adjacent areas. A strong correlation was found between the numbers of 2-group calculated by this VPA for Division IIIa, and those calculated by VPA in Sub-divisions 22 and 24 (C.M.1982/Assess:16). A strong correlation between the catch of 3-ringers in Baltic Sub-divisions 22 and 24 in one year, and the catch of 2-ringers in Division IIIa in the year before, was also established. Further, an apparent conformity between year class strength measured as 0- and 1-group during acoustic surveys in Sub-divisions 22-24 and as 2-group during acoustic surveys in Division IIIa could be demonstrated, although the time series is too short to permit firm conclusions.
- D.1.2.6 The borderline between Division IIIa and Sub-divisions 22 and 23 cuts through a more or less continuous series of spawning sites which extends also along the west Baltic coast in Sub-division 24. The close relationship found above is therefore not surprising, but indicates that most of the adult herring caught in Division IIIa at present are spring spawners originating from these spawning sites. The situation may, however, be more complex in future as it should be borne in mind that North Sea adult herring were fished in winter in Division IIIa in the years prior to 1967 and there was also a fishery on adult autumn spawning Kobbergrund herring during that period.

D.1.2.7 With no reliable indication of the 2 group strength in 1983 and with some doubts about the strength of the 3 group, no reliable prognosis could be made at the May 1983 Meeting, even for 1983.

D.1.2.8 Evaluation of the August-September 1983 acoustic survey in Div. IIIa

In November 1983 ACFM was presented with a report on a Danish-Swedish acoustic survey carried out in Division IIIa in August-September 1983. The total biomass of herring was estimated to be 325 000 tonnes compared to about 340 000 tonnes in 1982.

The estimates of herring in numbers at age are given in the text table below.

Winter rings	Numbers at age (millions)				
	1979	1980	1981	1982	1983
0	577	482	1 840	6 171	1 605
1	611	477	698	2 349	3 559
2	1 065	434	1 260	999	1 125
3	93	473	44	221	400
4	13	84	22	31	79
5	4	28	2	8	6
6	-	3	0.6	0.8	
7	-	-	-	0.1	

D.1.2.9 Management considerations

Herring catches in Division IIIa for the period 1973-82 are given in Table D.1.2.

In its report of November 1982 (page 12) and May 1983¹⁾ ACFM gave a detailed account of problems in assessing the Division IIIa herring fisheries. They are summarised below:

- (1) The major part of the 0-group herring and a substantial part of the 1-group present and exploited in Division IIIa belong to the North Sea autumn spawners.
- (2) Large numbers of juveniles are caught despite existing regulations aimed at preserving these potential recruits to stocks both inside and outside Division IIIa. This may have been a major factor in delaying the recovery of the herring stocks in Divisions IVa and IVb.
- (3) The absence of sufficient biological data to identify the racial origin of the herring in Division IIIa prevents any estimate being made of recruitment to the indigenous stock.
- (4) The (indigenous) adult stock appears to be small and subject to a fishing pressure, which in other areas had resulted in a collapse of stocks.

1) This volume, page 48.

- (5) Rügen spring spawners are known to migrate from the Western Baltic to Division IIIa where they remain from June to February-March.

The sprat biomass was estimated to be about 13 000 tonnes, which is about half the 1982 estimate. It should be remembered, however, that these surveys did not cover either the shallower western parts of the Kattegat or the coastal areas of Division IIIa. This is likely to underestimate the sprat biomass.

The two acoustic surveys, 1982 and 1983, have estimated the sprat stock to be at a very low level and declining. The IYFS in 1983 resulted in a low index of sprat recruitment (2 809 in 1981, 1 841 in 1982 and 1 173 in 1983).

D.1.2.10 Management advice

Based on considerations for both the sprat and herring stocks, ACFM reiterates its recommendation that fishing and landing of sprat and herring in Division IIIa should be prohibited, when using trawls having a mesh size below 40 mm.

ACFM used the 1983 survey estimate to indicate a TAC for the adult fishery. A range of fishing mortalities applied on herring 2 years old and older on 1 September 1983 gave predicted catches as shown in the text table below.

F	Catches 1/9 83 - 31/8 84
0.15	32 000 tonnes
0.20	41 000 tonnes
0.30	58 000 tonnes
0.40	74 000 tonnes

In this calculation, the 1-group recruiting to the fishery as 2-group in 1984 are not taken into account, since an unknown proportion of them are North Sea herring. On the other hand, an unknown proportion of the adults are Baltic herring migrants. The fishery exploits a mixture of stocks and it is consequently difficult to precisely define appropriate biological reference points. However, it is clear that fishing mortality is far above such reference points, and a significant reduction needs to be made.

The $F_{0.1}$ value for Division IIIa herring is 0.13, assuming $M = 0.1$. The corresponding catch level would be 27 000 tonnes, when applying this fishing mortality to the acoustic stock estimate as at 1 September 1983.

Taking the uncertainty with regard to the present stock composition into account, ACFM recommends a TAC of 30 000 - 40 000 tonnes for the period 1 September 1983 to 31 August 1984.

D.1.3 Herring in the Celtic Sea and Division VIIj

- D.1.3.1 The herring stocks in the Celtic Sea and in Division VIIj were assessed separately by the 1982 Working Group. However, the Working Group examined the biological data of the stocks in both areas and the location of the fisheries, and concluded that consideration should be given to managing both areas as one unit. Accordingly, a combined assessment was carried out and presented to the July meeting of ACFM. ACFM considered this assessment and recommended that no catches should be allowed during 1982/83 from the combined areas. A modified version of this assessment was subsequently used by the November 1982 meeting of ACFM in making predictions about the effects of various catch levels on the stock size. Catches of 8 100 tonnes were permitted by the EEC from the area for the period October 1982 to March 1983.
- D.1.3.2 The total catch taken during the whole of the 1982/83 season amounted to approximately 13 000 tonnes which was over 4 000 tonnes less than that taken in 1981/82 (Table D.1.3). The catches were again taken almost exclusively by Irish pelagic trawlers and drifters. Over 70% of the total catch was taken in the third and fourth quarters of the season by boats fishing during the main spawning season. Quantities of herring were discarded at sea by boats whose catch had exceeded their nightly quota. It was not possible, however, to quantify the amounts discarded in this way. The catches throughout the season were dominated by the 1979 year class which during the third and fourth quarters constituted approximately 60% of the total. This year class had been noticeably abundant during 1981/82 as 1-winter-ring fish.
- D.1.3.3 Larval surveys were conducted for the fifth successive season. The total index for abundance of small-sized larvae showed a further increase compared to previous seasons.
- D.1.3.4 It has not been possible to calculate F for the 1982/83 season from catch per unit effort data because, as in the last few years, boats were working to nightly quotas. There is, however, indirect evidence that F was substantially lower than in the previous season. In 1982/83, market demand was lower resulting in lower nightly quotas than in the previous season. For a period of about six weeks in October/November 1982, there was virtually no fishing because of a protest by fishermen and severe weather. Because of the poor demand several vessels left the fishery before the end of the season.
- Trial VPAs showed that the increase in spawning stock biomass best matching the increase in the larval index over the last four seasons was derived from $F_{82/83} = 0.4$, and this was taken as the appropriate F for 1982/83. This implies a decrease in F from 1981/82 to 1982/83 of about 40%, but it is still about three times the level of 0.15 recommended by ACFM.
- D.1.3.5 The VPA with input $F = 0.4$ for 1982/83 showed that the spawning stock biomass has slowly increased in recent years from its lowest level of 23 500 tonnes in 1976 to about 39 000 tonnes at spawning time in 1982. Fishing mortality decreased from high levels in the early 1970s ($F = 0.70$) to about 0.45 during the years 1975-79 and has since increased slightly to about 0.50 from 1980-82. Recruitment of 1-winter ring fish from 1974 to 1980 averaged about 65 million, with the lowest level about 49 million. The 1979 year class (173 million) appears to

be the strongest since that of 1969. Assuming F on 1-ringers to be equal to 40% of that of an adult, the estimated strength of the 1980/81 year class is about 109 million fish at 1 April 1982. This is higher than the average level of 65 million fish during the 1974-80 period when the stock was at a very low level. The estimated strength of the 1980/81 year class must, however, be regarded as very preliminary since no independent recruitment estimates exist.

It should be pointed out that the results obtained from VPA, assuming $F = 0.4$ in 1982/83 give estimates of spawning stock and recruitment in 1982 and F values in 1981/82, which confirm the assessment carried out by ACFM in November 1982.

D.1.3.6

The Working Group examined the question of an appropriate target spawning stock biomass for the area. Based on VPA-estimated stock sizes back to 1958, two aspects were examined:

- 1) Stock/recruitment relationship
- 2) Yield/biomass ratio.

During the period 1958-80, considerable changes in stock composition took place from mainly winter spawners up to about 1970 to autumn spawners in later years. There does not appear to be any clear relationship between stock and recruitment over the whole time period, but the points fall into two well-defined groups each of which corresponds to different phases of the fishery. There is a period from 1973-80, when, with the exception of the 1979 year class, recruitment was low and stock was low. Recruitment during this period averaged 89 million fish. A second period from 1958-72 contained fluctuating stock sizes, which produced several good year classes averaging 162 million fish. The probability that the present spawning stock biomass will produce very strong year classes is considered to be small.

The relationship between yield and spawning stock biomass was also examined for 1958-80 to determine a desired stock level. Four periods can be defined as shown below and in Figure D.1.3.1:

- 1) 1958-64 - Stable stock - mainly winter spawners
- 2) 1965-69 - High stock - mainly winter spawners
- 3) 1970-76 - Declining stock - mixed autumn and winter spawners
- 4) 1977-82 - Low stock - mainly autumn spawners.

The average yield in each period has been expressed as a percentage of the spawning stock biomass and is 20%, 28%, 48% and 40%, respectively. The stock, therefore, was able to expand after the 1958-64 period during which yields were about 20% of the spawning stock biomass. During the period 1965-69, the yields increased to 28% of the biomass. The stock declined rapidly when yields averaged 48% during the period 1970-76. In the latest period, from 1977-82, the yield is approximately 40% of the biomass and the stock cannot produce sufficiently good year classes to effect a rapid recovery.

Therefore, to ensure rebuilding of the stock, the yield should not exceed 20% of the spawning stock biomass. It seems that if the yields are consistently allowed to exceed about 30% of the biomass then the stock will be in danger of collapsing.

D.1.3.7

Stock predictions were made with an assumed recruitment of 50 million fish (roughly the minimum value since 1958). Recruitment in 1984-85 was also taken as 50 million 1-ringers. The results are given in Figure D.1.3.2 and in the text table below.

1982/83			1983/84			1984/85		
SSB	\bar{F}_{2-9+}	Catch	SSB	\bar{F}_{2-9+}	Catch	SSB	\bar{F}_{2-9+}	Catch
39	0.4	13	42	0	0	50	0	0
			41	0.16(= $F_{0.1}$)	6	42	0.16(= $F_{0.1}$)	6
			39	0.4(= $F_{82/83}$)	14	33	0.4(= $F_{82/83}$)	12
			40	0.21	8	40	0.22	8

Weights in '000 tonnes

Spawning stock biomass refers to spawning time (1 October), when 20% of the fishing mortality has already occurred.

D.1.3.8 In the present situation, a catch/spawning stock biomass ratio of 0.2 (a catch of 8 000 tonnes in 1983/84) will not rebuild the stock. Even a catch of 6 000 tonnes (corresponding to the $F_{0.1}$ value will not allow any significant increase in spawning stock biomass and will achieve no more than a maintenance of the spawning stock size at about the present level of 40 000 tonnes. A continuation of recent catches will reverse the increasing trend in spawning stock biomass indicated by the assessment (see Figure D.1.3.2).

D.1.3.9 ACFM recommends that the TAC for 1983/84 should not exceed 6 000 tonnes.

Any improvement in recruitment above the 50 million fish assumed in the forecast should not be used to boost the catches, but should be allowed to further rebuild the stock. However, it must be repeated that the present spawning stock biomass is not likely to produce very strong year classes.

D.1.4 West of Scotland herring

D.1.4.1 Herring in Division VIa (North)

D.1.4.1.1 The catches reported by each country from this area in 1973-81 and the preliminary estimates of the catches in 1982 are given in Table D.1.4.1 (Clyde excl). The preliminary total catch of 49 100 tonnes in 1981, given in the previous report, has been increased by about 2 000 tonnes in the revised figure for that year. The preliminary total catch for 1982 is about 92 000 tonnes. This is considerably in excess of the catch in that year (70 000 tonnes) given as the preferred level by ACFM in its advice on management of this stock in April 1982.

The age composition of the catch in numbers in 1982 is in general agreement with the prediction made last year, with 2-ringers (1979 year class) being the predominant age group.

D.1.4.1.2 Larval surveys were carried out in this area throughout September and October 1982. The 1982 index of abundance for the smallest size category of herring larvae was only slightly higher than in 1981. Using the 1982 larval index in the regression equation of larval abundance and spawning stock biomass gave an estimate of spawning stock biomass in 1982 of about 380 000 tonnes. This value was used to initiate a VPA.

D.1.4.1.3 From the VPA outputs obtained in 1982 it appeared that the exploitation pattern on this stock was full recruitment to the fishery of fish older than 2-group and 0.8 on 2-group. This, however, was based on the results from the fishing pattern prior to the closure of the fishery and might not be applicable to the changed situation since the fishery was re-opened in 1981. It is not possible, with so few data points subsequent to the re-opening of the fishery, to resolve this problem reliably. But the preliminary VPA run, based on the assumption of the exploitation pattern used in last year's prediction, suggested that 2-group fish were fully recruited to the fishery in 1981. A new input F for 1982 was, therefore, estimated from the spawning stock biomass on the assumption that the recruitment to the fishery was complete at 2-rings. The final VPA was run on this basis.

As would be expected from the high level of catch taken in 1982, the fishing mortality in that year was about 30% above the preferred level of 0.15 advised by ACFM. The size of the 1979 year class at 1 January 1982 is in close agreement with that predicted in last year's report. The numbers of all other age groups, however, are somewhat lower than predicted due to the somewhat higher fishing mortality rate in 1981 than was estimated last year.

D.1.4.1.4 In last year's report on this stock, recruitment as 2-group in 1982 was estimated based on Scottish research vessel surveys carried out in February-March 1981-82. In these years the indices of abundance were of comparable size and the method used appears, from the 1982 catch data, to have given a rather good estimate of recruitment in that year. A similar survey was carried out in February-March 1983, and the results would suggest that the 1980 year class is much weaker than both the 1978 and 1979 year classes. However, with only three data points from these surveys, it would be very dangerous to assume that the relationship between index of abundance and stock size is a linear one over a very wide range of indices. Under these circumstances all that can be inferred from the 1983 survey is that the 1980 year class is a weak one. For prediction purposes this year class has been set at 205×10^6 fish, which is the lowest value at this age given in the VPA over the period since 1970.

D.1.4.1.5 The results of the assessments outlined above were used to predict yields and spawning stock biomasses in 1983 and 1984. The outputs of the predictions over a range of fishing mortality rates are shown in Figure D.1.4.1. Yield per recruit and spawning stock biomass per recruit curve are also shown in Figure D.1.4.1. The Y/R curve has no maximum. The yields at $F_{0.1}$ and some adjacent values in 1983 and 1984 are given in the text table below. The assumptions made throughout these predictions are a) that the same fishing mortality rate will be maintained in both years, and b) that recruitment will be at the same level in both years.

D.1.4.1.6 There are inconsistencies between the spawning stock biomasses since 1976 as derived from the larval surveys and those from the VPA, and this reduces the confidence which ACFM places in this assessment. While the reasons for these discrepancies are not clear, it is possible that unreported catches of herring were made in Division VIa and these could explain the conflict between the two sets of figures.

D.1.4.1.7 The assessment indicates the present level of exploitation as $F = 0.2$. The text table below indicates catches and spawning stock biomasses corresponding to various levels of fishing mortality in 1983 and 1984.

HERRING, Division VIa (North)

1982			Management option for 1983	1983			1984	
SSB	$\bar{F}(2-7)$	Catch		SSB	$\bar{F}(2-7)$	Catch	SSB	Catch
380	.20	92	F	371	0.1	38	355	37
			$F_{0.1}$	358	0.15	58	325	53
				347	0.20	73	302	64

Weights in '000 tonnes.

$$F_{1984} = F_{1983}$$

The predicted catches in 1983 are somewhat lower than those predicted last year at the same F values. This is principally due to the lower recruitment value assumed in the prediction than was assumed for 1983 in the previous one.

- D.1.4.1.8 The catch level preferred by ACFM is that corresponding to $F_{0.1} = 0.15$, that is 58 000 tonnes in 1983 and 53 000 tonnes in 1984.

D.1.4.2 Clyde Herring

- D.1.4.2.1 Landings in the years 1973-82 are given in Table D.1.4.2. The landings in 1982 of 2 506 t was almost exactly the recommended TAC for the year, but sampling suggests that approximately 10% more may have been landed due to overweight boxes. In addition, there were reports of discarding of immature fish and also reports of illegal landings from this fishery. Although no data are available to quantify this aspect, the quantities are not believed to be large. Reports of the fishery indicated that fishermen experienced difficulty achieving their quotas both at the beginning of the season in May and June and also at the end of August but quotas were more readily achieved during July and early August.

In 1982, 2-ringed herring made up approximately 50% of the total landed with 3-5 ringed herring making up another 30%.

- D.1.4.2.2 Based on recapture data from a tagging experiment in the Clyde in 1980, it was concluded in last year's report that most of the fishing mortality on the Clyde population appears to be generated in the Clyde. The 1982 recaptures supported this conclusion. On this basis, a VPA was carried out to estimate recent changes in F .

- D.1.4.2.3 No independent information is available to indicate the most likely value of F in 1982. If one assumes that fishing mortality has neither increased nor decreased over the period 1980-82, an input F of 0.3 is appropriate.

A VPA analysis based on this F in 1982 indicates that fishing mortality was reduced when a TAC regulation was introduced in 1979. Estimation of the fishing mortality in 1982 is impossible without some independent evidence, but in the absence of any indications of changes in fishing effort, it is likely to be around 0.3. If this is correct, and if recruitment remains at approximately the same level as in the past few years, then the TAC of 2 500 tonnes advised by ACFM for 1983 will result in a slight decrease in fishing mortality rate to about 0.27. As stated in the previous report, it is likely that a continuation of this level of TAC will result in a stable level of fishing mortality. Moreover, this population is a very complex one. Accordingly, ACFM can only recommend a precautionary TAC of 2 500 tonnes for 1984.

D.1.4.3 Herring in Divisions VIa (South) and VIIb,c

D.1.4.3.1 The catches of each country fishing in this area in the years 1973-81, and the preliminary estimates of catches in 1982 are given in Table D.1.4.3. The revision to the preliminary 1981 catches given in the 1982 report amounted to a reduction of about 1 000 tonnes. The preliminary total catch figure for 1982 is 18 000 tonnes, very predominantly taken by Ireland. This is the lowest catch taken from this area since 1971, partly reflecting the reduced stock size commented on in last year's report, and partly some reduction in fishing effort in 1982. The largest contribution to the catch in 1982 was made by the 1977 year class, reflecting the rather moderate recruitment to this stock in recent years. The catch of 1-ringers in 1982 was again very low, relative to earlier years.

D.1.4.3.2 Although the larval surveys in 1982 again extended south to Galway Bay and over a longer time period, the time series of comparable data on this basis is as yet too short to be used in predicting stock size. Accordingly, the index of larval abundance in 1982 has been estimated on the same basis as in the past.

The larval index for 1982 is somewhat higher than for 1981 but is again low relative to earlier years.

D.1.4.3.3 The spawning stock biomasses used in the 1982 report were calculated with the wrong mean weight at age. To initiate a VPA, it was, therefore, necessary to recalculate the spawning stock biomasses derived from last year's VPA, and a new regression equation between spawning stock biomass and larval abundance. This was then used to estimate the input F-value for 1982 to start the VPA. In this stock, recruitment to the fishery is complete at age 2 and an F of 0.208 gave a satisfactory fit to the larval data. The VPA with this input F would suggest a reduction of about 20% in F in 1982 compared with 1981 and a slight reduction in spawning stock biomass in 1982, compared with 1981, due to the reduced recruitment to the population in the last two years.

D.1.4.3.4 In this area, there are no satisfactory data available to give a fishery-independent index of recruitment to the stock in 1983. Young herring surveys designed to identify nursery grounds in this area, and to provide indices of recruitment, were carried out in 1981 and 1982 and will be continued in subsequent years. The surveys carried out to date indicate Galway and Donegal Bays as nursery areas. The time series of data is as yet too short to measure year class strengths quantitatively.

The only data which can give any indication of this are the catches of 1-ringers in 1982. As mentioned in para.D.1.4.3.1 these were very low in that year. If one takes the ratio of the F on 1-group to the mean F on fully recruited age groups in the years 1979-81 and takes the mean of these ratios as applying to 1982, one would get an estimate of F on 1-ringers in 1982 of 0.018. This, however, would estimate this year class as only 44×10^6 fish at 1 January 1982. This would be by far the poorest year class ever recorded in this stock. The Scottish recruit survey in Division VIa does not sample this area very well but the results of it would indicate that this 1980 year class in 1983 is only slightly less abundant than the 1978 year class was in 1981. On this basis, an F of 0.010 would seem an appropriate compromise, resulting in an estimate of 2-ringers in 1983 of 70×10^6 .

D.1.4.3.5 The results of the assessments outlined above were used to predict yields in 1983 and 1984. The outputs of the predictions over a range of fishing mortality rates, in terms of yields and spawning stock biomasses, are shown in Fig.D.1.4.3. Yield/recruit and spawning stock biomass

per recruit curves for this stock are also shown in Figure D.1.4.3. Y/R curve is flat-topped and, therefore, F_{max} is not relevant. The yields, at $F_{0.1}$ and some adjacent values, in 1983 and 1984, are given in the text table below.

HERRING, Divisions VIa (South) and VIIb,c

1982			Management option for 1983	1983			1984	
SSB	$\bar{F}(2-7)$	Catch		SSB	$\bar{F}(2-7)$	Catch	SSB	Catch
77	.208	18		75	0.10	8	75	8
			$F_{0.1}$	73	0.15	12	69	11
				71	0.20	15	64	14

Weights in '000 tonnes

$F_{1984} = F_{1983}$

These predictions for 1983 are reasonably consistent with those given for that year in the 1982 report.

TACs of 12 000 tonnes in 1983 and 11 000 tonnes in 1984 are the levels preferred by ACFM.

D.1.5 Irish Sea Herring (Division VIIa)

D.1.5.1 The TAC for the North Irish Sea for 1982 was set at 3 800 tonnes, the same as in 1981. The reported catch from the North Irish Sea was 4 855 tonnes (Table D.1.5.1). Actual catches were probably greater than this because many small fish were dumped at sea, boxes were often overweight, and some catches may not have been reported. 3 097 tonnes were allocated to Manx stock and 1 758 tonnes to Mourne stock (Table D.1.5.2). The two stocks are considered separately below, and general recommendations for the Irish Sea are also given.

D.1.5.2 The fishing pattern in the Isle of Man fishery was similar to that in 1981. Effort data are not available, but reports and observations suggest the effort was similar to that in 1981.

Most of the fishing took place to the west of the Isle of Man, and most of the fish were caught before September; it is likely that the fishing mortality on the 2-ringed fish was higher than on the older fish which tend to appear in quantity late in the season. The TAC was taken by 2 September without difficulty by a relatively small fleet.

Some fishing took place after the TAC was taken. There were persistent reports of discarding at sea of small herring; these reports were supported by the difference in length frequency distribution between samples of sorted and unsorted boxes of herring landed, but it was not possible to quantify the amount of young fish discarded.

D.1.5.3 There is no independent evidence on which to base a choice of input F for 1982. In view of the similarities between the fisheries of 1981 and 1982, the Working Group used the same reasoning to choose an input F in 1982 as was used for 1981 in last year's report.

D.1.5.4 Fig.D.1.5.1 shows that the decline in spawning stock biomass associated with high F started in 1971 and continued until 1979. This trend is independent of input F .

VPA estimates of stock sizes in 1980, 1981 and 1982 must be treated with caution, but the VPA suggests that the decline in spawning stock biomass may have been halted and a recovery may have started. Continuing recovery will be dependent on recruitment (which is likely

to be low since the spawning stock is relatively low) and a very moderate catch. The text table below gives projections based on an assumed recruitment of 30×10^6 1-ringed fish in 1983 and 1984, with F on 1-ringed fish at 0.07, and fishing mortality on fish 2-ringed and more equal at all ages and equal in 1983 and 1984. At F values less than 0.4 no further reduction in spawning stock biomass from the 1979 level is indicated.

Stock projection, Manx herring

1982					1983			
Stock	Sp. stock	Catch			Stock	Sp. stock	Catch	
biomass	biomass	F			Option	biomass	biomass	Catch
	at sp.time	Age	F		(F age 2-8)	1 Jan.	at sp.time	
16.3	8.4	1	0.07		F			
		2	0.4	3.1	0.1=	17.2	10.9	1.8
		>2	0.3		F=0.15			
					0	17.2	12.7	0
					0.1	17.2	11.5	1.2
					0.2	17.2	10.4	2.3
					0.3	17.2	9.4	3.3
					0.4	17.2	8.5	4.2

Catch and biomass in '000 tonnes.

- D.1.5.5 The total nominal catch of the Mourne stock in 1982 was 1 758 tonnes, made up of 490 tonnes selectively fished by gill nets over the Mourne spawning grounds and 1 260 tonnes taken as a component of the Isle of Man fishery outside the 12 mile Irish coast limit. The comparable data for 1981 were 1 146 tonnes in the mixed fishery and 295 tonnes selectively fished over the spawning grounds. There was, therefore, an increase of about 22% in the catch in 1982.

The catch is heavily dependent on 1- and 2-group fish; 2-ringers made up 46% of the catch in 1982 and 43% in 1981.

- D.1.5.6 The Working Group had little evidence on which to select the most appropriate value of input F in 1982 for a VPA. However, given that there was no increase in the number of boats participating in the fishery in 1982, only a moderate demand for herring and the low TAC, it was assumed that the fishing mortality rate in 1982 was probably lower than that in 1981.

The results of the VPA show that the spawning stock biomass reached a minimum in 1977 and some increase took place up to 1979. Further increase is indicated if the chosen levels of input F are realistic.

- D.1.5.7 The yield per recruit and spawning stock biomass per recruit curves dependent on the 1982 exploitation pattern are shown in Figure D.1.5.2. In making a prediction; recruitment in 1983 was taken to be 32 million 1-group fish.

Stocks and yields indicated by the projections are given in the text table below.

The resulting catches and spawning stock biomasses over a full range of Fs are illustrated in Figure D.1.5.2.

Mourne HERRING. Projection for management options.
Division VIIa, North Irish Sea.

1982 (from VPA)				1983			
Stock biomass	Spawn. stock biomass	F	Catch	Management option for 1983	Stock biomass	Spawn. stock biomass	Catch
9.1	5.1	Age 1	1.7	F=0.1	11.8	8.1	0.9
		0.13		F=0.15 = $F_{0.1}$		7.8	1.3
		Age 2-9+		F=0.20		7.4	1.7
		0.3		F=0.30		6.8	2.4

$$F_{1983} = F_{1984}$$

Units: '000 tonnes

It must be noted, that the stock in both years is heavily dependent on assumed value of initial strength for year classes 1980, 1981 and 1982. Thus, the predictions for 1984 must be considered as somewhat uncertain.

- D.1.5.8 The fishery in the North Irish Sea exploits a mixture of Manx and Mourne herring in the area west and southwest of the Isle of Man for a large part of the fishing season. Catches in this area cannot be allocated to stock until all relevant biological and statistical data are available after the end of the fishing season. ACFM therefore recommends that a single TAC be set for herring in the North Irish Sea, rather than separate TACs for Manx and Mourne stocks.

The impact on each stock will depend on the seasonal and spatial distribution of the fishing effort; it is important that the effort applied to take the TAC should not be concentrated on either the Mourne stock or the Manx stock.

If the fishing was concentrated on the early part of the season it would exploit the Manx stock and the Mourne stock with more or less equal F. If a major part of the TAC was taken late in the season the impact on Manx fish would be greater, and that on Mourne fish less.

ACFM considers that the progress on the recovery of the spawning stock biomass should be maintained. Present fishing mortality is certainly in excess of $F_{0.1}$, which would be the preferred level of fishing for the stock. Although ACFM recognized that some reduction in effort is likely to have taken place in 1982, ACFM cannot assess whether the estimated level of reduction in F from that of 1979 is appropriate. The current F values may well be higher. In view of this, ACFM recommends the TAC for herring in Division VIIa should be set at 3 000 tonnes in 1983.

Because of the major uncertainties surrounding these assessments, ACFM considers it inappropriate to advise on TACs for 1984 at present. If, however, it is essential to make a provisional recommendation, it is considered that the TAC for 1984 should be the same as that for 1983. In each year, the part of the TAC allocated to the selective directed herring fishery over the Mourne spawning ground should not exceed 600 tonnes.

- D.1.5.9 Management of the North Irish Sea fishery in the past has included measures to reduce fishing mortality on the spawning stock by closure of the fishery from the Saturday nearest to 21 September until the Monday nearest to 16 November, except for a small directed gill-net fishery on the Mourne spawning ground, prohibition of directed herring fishery in nursery areas, and a minimum size regulation. These measures should be continued in 1983 and 1984.

D.2 Industrial Fisheries in the North Sea and Adjacent Areas

D.2.1 Aspects of management

Management considerations were discussed in Sections 109 and 110 of the July 1982 report of ACFM.

D.2.1.1 A definition of 'industrial fisheries'

The usual definition of industrial fisheries is that these are fisheries for reduction purposes using small-meshed gear. Recommendation 2 of NEAFC lists the species, which can be fished by small-meshed trawl gear. This list includes the species usually taken for reduction purposes, e.g., Norway pout, sprat, blue whiting and sandeel, but also herring and mackerel, which were subject to important directed fisheries for reduction purposes at the time when the NEAFC Recommendation was first drafted.

Economically, the fisheries depend on catches of certain species of trash fish, and a by-catch. This by-catch consists of species, which are usually taken for human consumption. The by-catch can be split into two compartments, one consisting of undersized non-marketable specimens of the human consumption species, and one of marketable size groups, which are sorted out and landed for human consumption.

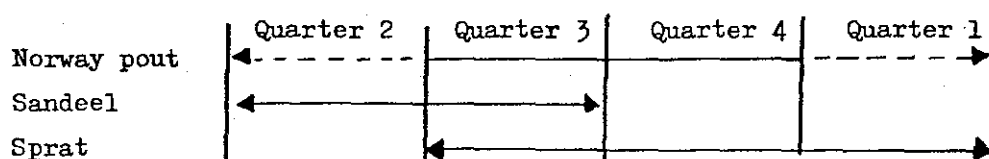
The term 'trash fish' includes those species for which - at least up to now - it has not been possible to find any profitable outlet for human consumption, e.g., Norway pout and sandeel. Others might be used for human consumption, but the markets are not always able to accommodate large amounts of the species, so with high catch rates and landings, a major part may go for reduction purposes. Sprat is an example here, and in some periods, herring and mackerel.

When switching from species to fishing fleets, the definition of industrial fisheries becomes easier. The Working Group report describes a number of fleets which, as their main operation, fish and supply raw material to fishmeal plants. Denmark, Faroes and Norway have full-time industrial fleets totalling between them 750 vessels, ranging in size up to 300 GRT. Other vessels from Denmark and Norway, and also from the United Kingdom, change their fishing in an opportunistic fashion between industrial and other fisheries.

Information concerning the landing capacity and other details of the fishmeal plants in Denmark, Faroes, Norway and the United Kingdom are given in the Working Group report.

D.2.1.2 The interrelation of fishing intensity on the three target species of the industrial fisheries

As summarized below, the three main target species of the industrial fisheries in the North Sea are exploited in rather definite seasons. Basically, the sandeel is caught during the second and third quarters of the year, while the Norway pout is exploited throughout the year, but most heavily in the third and fourth quarters. The sprat is most heavily exploited in the first, third and fourth quarters. The possibility for a complete transfer of effort, for example from sprat to sandeel, does not, therefore, exist, but some substitution of effort does seem to occur.



D.2.1.3 Description of the industrial fisheries

During the past ten years, total industrial landings from the North Sea have fluctuated between 1.0 million and 1.8 million tonnes (Table D.2.1). Following a sharp increase from 1973 to 1974, the annual landings remained at a fairly stable level up to 1980, but then decreased to 1.3 million tonnes in 1981. Preliminary data covering the first three quarters of 1982 are on the same level as the total for 1981.

The total landings of the target industrial species (Norway pout, sandeel and sprat), which determine the annual fluctuations, show the same trend as above, ranging from 0.9 million to 1.6 million tonnes over the years. It should be noted that despite comparatively large annual variations in landings of each species from 1974 to 1980 (Norway pout 200 000 - 700 000 tonnes, sandeel 400 000 - 700 000 tonnes, and sprat 300 000 - 600 000 tonnes), the total landings of target species remained fairly constant. This may suggest some flexibility of fishing effort diverting from one fishery to another, as the abundance and availability of the main stocks may change by time. Whereas the annual landings of Norway pout and sandeel tend to vary irregularly, mainly due to changes in recruitment, those of sprat dropped from 600 000 tonnes to 300 000 tonnes from 1976 to 1977. A further sharp decrease to 100 000 tonnes has taken place from 1980 to 1982, because of a decline in sprat abundance.

Total annual landings of by-catches for reduction purposes have fluctuated between 150 000 tonnes and 280 000 tonnes. Landings of blue whiting have mainly varied according to the abundance of young immature fish in the Norwegian Deep, ranging from 36 000 tonnes to 100 000 tonnes over the years. Annual landings of Recommendation 4 or protected species (haddock, whiting and saithe) were at a comparatively high level up to 1977, ranging from 130 000 tonnes to 220 000 tonnes, but decreased to 67 000 tonnes in 1978, mainly as a result of by-catch regulations, and have remained at this level. Herring by-catches, since first reported in 1976, were kept at a rather low level (7 000 - 15 000 tonnes) up to 1980. In 1981, they increased sharply to 84 000 tonnes and have been recorded at 92 000 tonnes up to the third quarter of 1982.

Fish caught during the course of the industrial fisheries and sold for human consumption are not included in these figures but should be regarded as a facet of the industrial fisheries.

D.2.2 Norway pout

D.2.2.1 Norway pout in Division IIIa

Landings of Norway pout in Division IIIa, which have been made predominantly by Denmark, are given in Table D.2.2.1. With the exception of 1974, when the catch was about 11 000 tonnes, and 1976 when it rose to 42 000 tonnes, catches remained relatively stable at an

average level of about 24 000 tonnes in the 1971-81 period. In 1982, however, preliminary catch figures indicate an increase to about 52 000 tonnes, i.e., by over 100% of the long-term average. This large increase in the Norway pout catch might be associated with the considerable reduction in sprat catches in Division IIIa during 1982. No data on age composition are available from this fishery and no assessment was possible.

D.2.2.2 Norway pout in the North Sea

D.2.2.2.1 Fishery trends

Landings of Norway pout for the years 1973-82 are given in Table D.2.2.2. Information on Danish landings in 1982 were only available for the first three quarters of the year. The 1981 catch was only half that of the previous year probably because of the weak 1980 year class. The preliminary and incomplete figures for 1982 indicate a higher catch level compared to 1981; it may reach a level of about 370 000 tonnes.

Catch in number at age data from 1974 onwards are available. For 1982, data on age compositions are provided by Norway and by Denmark for the first three quarters only. In the period 1974-80 the average relative contribution to the total catch (in numbers) of the different age groups was: 0-group 14%, 1-group 73%, 2-group 12% and 3-group 1%. Thus, under normal recruitment conditions the 1-group is the main contributor to the total catch. However, in 1981 the situation was quite different since as much as 80% of the total catch in numbers consisted of 0-group fish mainly taken in the fourth quarter. The contribution of 1-group fish was only 12% due to the poor 1980 year class.

The incomplete data for 1982, however, suggest that the age composition of the catch has reverted to the normal pattern in that year.

D.2.2.2.2 Assessments

The International Young Fish Survey (IYFS) provides independent estimates of the annual abundance of both adult stock and recruitment. From the Norwegian fishery for Norway pout, cpue data (tonnes per number of fishing days per GRT) are available by quarters from 1972-82. A fairly good relationship between these data and the IYFS indices indicates that the IYFS indices provide useful estimates of the expected yield of the Norway pout fishery during the same year as the survey is made. The Faroese series (kg/trawling hour) for the period 1978-82 is in very good agreement with the Norwegian data and shows the same high cpue level for the last half of 1982. Further analysis of cpue data, which should include data from the main fishing country on this stock, and IYFS data could be even more productive with regard to stock assessment.

For the years since 1975, when the IYFS has efficiently covered the major part of Division IVa, a close correlation exists between the annual catches of Norway pout and the combined abundance of 1- and 2-group in the IYFS. From this relationship and based on a preliminary 1983 index of 3 119 1-group and 2-group fish, it may be supposed that the 1983 total catch could be in the order of 300 000 tonnes, provided fishing mortality does not change dramatically.

In view of the uncertainties and lack of clear evidence, ACFM cannot comment on the present level of exploitation. Since fluctuation in recruitment largely determines the level of catch, 0-group estimates would improve the quality of forecasts.

D.2.2.3 Norway pout in Division VIa

A small fishery for Norway pout has existed in Division VIa for some years (Table D.2.2.3). Scottish vessels fish for this species almost entirely in the North Minch, while vessels from other nations fish south and west of the Outer Hebrides. Catches in the order of 20 000 tonnes were taken in 1976 and 1978-80. Landings decreased in 1981 to about 8 000 tonnes.

The preliminary and incomplete figures for 1982 indicate a further decrease to a likely total of about 2 000 tonnes.

No assessment was possible. ACFM recommends that data are collected so that the stock size changes can be monitored.

No data are available on the by-catches of human consumption species taken in the Norway pout fishery, and this may have implications for the assessment of other Division VIa stocks.

D.2.3 Sandeel

D.2.3.1 Sandeel in Divisions IIIa and VIa

Sandeel landings from Division IIIa, almost exclusively taken by Denmark, increased continuously from the 1977 level of 16 000 tonnes to over 40 000 tonnes in 1981. Preliminary figures indicate a drop in landings to about 22 000 tonnes in 1982.

In Division VIa, the new Scottish fishery in the Minch yielded about 6 000 tonnes in 1981 and about 11 000 tonnes in 1982.

No assessment could be made on the sandeel stocks in these areas.

D.2.3.2 Sandeel in the North Sea (Sub-area IV)

D.2.3.2.1 Fishery trends

Total landings of sandeel from the North Sea for the period 1971-82 are given in Table D.2.3.2. From the high level of 730 000 tonnes in 1980 the catch decreased to about 570 000 tonnes in 1981 followed by an increase to 611 000 tonnes in 1982 for the three main countries.

The proportion of landings taken in the second half of the year decreased to 15% compared to the average level of about 30% in the three preceding years. This was due to a closure of the Norwegian sandeel fishery in the second half of the year and reduced landings by Denmark during that time to 13% of the annual landings. The Shetland fishery maintained its previous seasonal pattern, i.e., about 50% of their annual catch was taken from July to December.

D.2.3.2.2 Assessments

Three separate population units have been considered in the North Sea: one in the Shetland area, a second in the remainder of the northern North Sea (north of 56°30'N), and a third in the southern part of the North Sea. The boundaries of these sandeel fisheries are shown in Figure D.2.3.1. Catch in number at age data were available up to 1982. The annual landings of sandeels from this assessment area are given in Table D.2.3.3 for the period 1973-82.

In the southern area there was a major increase in the catch of 0-group in 1981 to 58% (in numbers) of the total catch in that area. This was due to the good 1981 year class (as indicated by survey results) and the increase in landings in the second half of the year, particularly in area 2A.

In 1982, catches of 0-group reverted to a low level (7% in numbers), and 1-group made up the largest age component. In the northern area, catches during the second half of 1982 were almost entirely 0-group sandeels making up 51% of the total catch in numbers. At Shetland, the 0-group continued to make the largest contribution to the catches (69%).

The VPAs carried out for each area must be treated with considerable reservation because of lack of reliable estimates of natural mortality and of independent evidence of stock size or mortality rates. They nevertheless indicate little evidence of interdependence between the areas. For the Shetland area, the VPAs indicate that the sandeel stock may be increasing while for the offshore areas of the northeastern North Sea a significant decrease in the size of the sandeel stock is indicated. This is also indicated by the trend in the catches in recent years (Table D.2.3.3).

Fishing effort data including recent years were available only for the Shetland area but the correlation with fishing mortality is rather weak.

In the absence of reliable estimates of recruitment to any of the North Sea sandeel assessment areas, and in view of the considerable reservations on the VPA estimate of stock size at the beginning of 1983, projections of catch in 1983 at different levels of fishing mortality would be misleading.

D.2.3.2.3 Management advice

In all fishing regions large quantities of 0-group sandeels have been caught in the second half of the year (see text table below).

0-group catch in the second half of the year
as % of the total catch in numbers

<u>Year</u>	<u>Fishing area</u>		
	<u>Southern</u>	<u>Northern</u>	<u>Shetland</u>
1977	28	8	59
1978	33	43	46
1979	4	89	33
1980	1	25	80
1981	58	45	75
1982	6	51	69

High catches of 0-group sandeel in the second part of the year (particularly in July-August) appear to be a regular feature in the northern and Shetland regions. In the southern region high catches in the second half of the year might be associated with strong year classes.

Furthermore, in all three regions large quantities of 1-group sandeels of the same year class are caught in the following spring. Thus, a considerable part of a year class, in some cases up to and over 50%, is fished out during its first year of life.

Considerable gains in yield per recruit could be obtained by avoiding the exploitation of 0-group sandeels, particularly in the northern area.

In the 1982 report of ACFM it was pointed out that on biological grounds "the high catches of 0- and 1-group would reduce yield per recruit and increase the risks of stock depletion, and ACFM strongly recommends that action should be taken in order to reduce juvenile catches". The situation has not changed in 1982, although some action has been taken by Norway.

Also on biological grounds, the most effective way of reducing the catch of young fish would be a seasonal restriction. On these considerations, therefore, ACFM advises that if the fishery were to be confined to May and June it would effectively avoid the catch of 0-group fish and would also reduce the high level of exploitation of 1-group fish in March-April.

Even assuming that fishing effort cannot be moved to the months of such an open season from other months, in which fishing at present occurs, there would be no loss in annual yield in any of the three areas. In the northern area, significant gains can be expected.

D.2.4 Sprat

D.2.4.1 Sprat in Division IIIa

In November 1982 ACFM recommended that fishing and landing of sprat and herring should be prohibited in Division IIIa when using trawls with a mesh size below 40 mm. This recommendation was made both to protect the declining sprat stock and in order to prevent catches of 0- and 1-group herring. Although this recommendation has not yet been enforced, the reported landings of sprat from Division IIIa decreased in 1982 to about 50 000 tonnes, compared with about 105 000 tonnes in 1980 and 87 000 tonnes in 1981. (Table D.2.4.1.)

The acoustic survey, which has been carried out every year since 1979, although directed mainly on herring and not carried out in the shallow waters of the Kattegat, gives a stock biomass estimate of about 25 000 tonnes at 1 September 1982. Although this is an underestimate, a clear decline is seen within the survey area since 1979.

The indices of 1-group sprat from the 1983 IYFS were examined to see if an estimate of the likely 1983 catch could be obtained. Although a declining trend in the indices was seen (2 809 in 1981, 1 841 in 1982, and 1 173 in 1983); it was concluded, however, that the correlation with the reported catch figures was not sufficiently strong to enable any valid conclusions to be reached.

ACFM therefore decided to re-affirm the recommendation made in November 1982 that fishing and landing of sprat and herring in Division IIIa should be prohibited when using trawls having a mesh size less than 40 mm.

D.2.4.2 Sprat, North Sea

In 1982 ACFM recommended that fishing for sprat in the North Sea should be restricted to 150 000 tonnes because of the declining stock.

D.2.4.2.1 Landings 1981-82

Landings from 1973-82 are given in Table D.2.4.2. (In all cases except Denmark catches include by-catch.). Since 1980, landings have decreased from 323 000 tonnes to approximately 130 000 tonnes in 1982. The maximum catch during the period 1972-82 was 640 000 tonnes taken in 1975. Between 40-50% of the total landings come from Division IVb east during the period July-October.

The catch statistics appear to reflect both the apparent decline in the stock in the North Sea and the change in its distribution.

D.2.4.2.2 Environmental effects and interactions with other species

The Working Group discussed the possibility that the present decline in the sprat population may have been caused by factors other than the fishery. It might be possible that some environmental factors such as hydrographic conditions, food supply or predation may be responsible for the decline and also the change in the distribution of the population. It is important that more quantitative data should be collected to solve this problem, but in the present circumstances, sprat recruitment may remain low for a period to come. If the present decline is in fact the result of a combination of changing hydrographic conditions and high fishing rates it may be difficult to reverse the trend in stock biomass.

D.2.4.2.3 Assessments

Results from VPA carried out show that the total stock has declined from over 700 000 tonnes in 1975 to about 100 000 tonnes in 1982. The adult stock in 1982 was estimated to be around 75 000 tonnes.

The results from the acoustic surveys carried out by the United Kingdom in January 1983 indicated a sprat biomass of about 70 000 - 80 000 tonnes in the western part of the North Sea. Similar surveys carried out in 1981 and 1982 indicated sprat biomasses of 195 000 tonnes and 167 000 tonnes, respectively.

D.2.4.2.4 Catch prognosis

ACFM has examined the results from the 1983 IYFS and the international sprat acoustic surveys which are carried out in January and February to see if it was possible to make a realistic prognosis of likely catch levels.

The 1983 IYFS index of 1-group sprat from Division IVb is 285 fish per hour, which indicates a low level of recruitment.

Despite some technical reservations concerning the results of the international sprat acoustic surveys, it can be said that there has been a declining trend in the biomass of 1-group sprat in those areas where the surveys have been consistently carried out since their inception in 1978 (see text table below).

<u>Year</u>	<u>Divisions IVa west and IVb west</u>
1978	47.0
1979	40.9
1980	26.8
1981	37.0
1982	28.3
1983	19.0

Units: '000 tonnes

In 1983 no acoustic survey was carried out in Division IVb east. The IYFS in 1983 showed the highest densities of sprat from this area, thus indicating that a substantial part of the total sprat biomass was not covered by the acoustic survey in 1983. This survey cannot therefore be used to estimate the exploitable biomass or to make a prognosis of probable yields.

The available evidence indicates that the sprat stock in the North Sea is at a very low level, but it is not possible to give an accurate estimate. ACFM is thus unable to make a valid estimate of the likely 1983 catch, but a continuation of the declining trend is expected.

The present state of the North Sea sprat stock is such that any catches will speed up its decline. ACFM advises, that if the management objective is to halt this downward trend in the stock, then catches should be reduced to as low a level as practicable.

D.2.4.3 Channel Sprat (Divisions VIId-e)

No recommendations have previously been made about management measures for the sprat stock in Divisions VIId-e, because no assessments have been carried out. The Working Group, therefore, decided to review the available data for this purpose. No data are available to establish the relationship of the sprat populations in this area but as almost all the catches are taken in Division VIIe, it was decided to base the assessment on this area alone.

D.2.4.3.1 Landings

Landings for Divisions VIId-e are shown in Table D.2.4.3. The landings show an increase in recent years to 17 000 tonnes in 1980. Complete figures are not available for 1981 and 1982, but the total catch is not expected to exceed 20 000 tonnes.

D.2.4.3.2 Effort

Although accurate figures are available for the United Kingdom fleet working in the area, it has not been possible to calculate a standard measure of effort which could be used to give an indication of changes in stock size. However, it is believed that there has been a substantial increase in fishing effort in recent years.

D.2.4.3.3 Assessments

Biological data which can be used for assessment purposes are only available from the United Kingdom, which until 1978 took over 80% of the total catch. This shows that the exploited population in the area is considerably different from that on which the fisheries in the North Sea are based. The population contains a higher proportion of older fish, which have different growth parameters and a different recruitment mechanism.

An acoustic survey carried out by the United Kingdom in December 1981 indicated a minimum stock biomass of approximately 20 000 tonnes in the Lyme Bay area at that time. Tentative conclusions based on egg surveys in Division VIIe and fecundity data suggest a spawning stock biomass of 114 000 tonnes for the whole western Channel area, which must be considered as a minimum estimate.

ACFM would therefore advise a precautionary TAC of 20 000 tonnes for Division VIIe until a more accurate estimate of the spawning population can be carried out. The figure of 20 000 tonnes is about the level of catches in recent years and would stabilize the fishery at its present level.

D.2.5 Data requirements to improve assessments of the stocks exploited by industrial fleets

If the Working Group is to fulfill its terms of reference, data are required in a disaggregated form. In summary, these are:

- 1) Catch and effort data by statistical rectangle and month, sub-divided by different fleet components. (This is impossible for some countries to produce without logbooks, which still require implementation.)
- 2) Catch in number at age by Sub-area and month.
- 3) Original survey data, not only published mean values etc.
- 4) Weight at age data by month and Sub-area.

Since many of the data required exist, priority should be given to making them available, perhaps by provision of a computerized data base. Only when what already exists is available, will it be possible to assess the need for new types of data.

Furthermore, our poor knowledge of the value of natural mortality on these fish stocks makes it difficult to interpret data from the three target species. Investigations into what the natural mortality is, how it comes about, and whether it varies with time would be very beneficial.

A general lack of knowledge appears to exist concerning the importance, structure and fishing strategy of the industrial fisheries. ACFM consequently recommends that each nation undertaking such a fishery produce a detailed description including statistics on vessel categories, operational structure (target species, areas, periods), shore installations and other pertinent features for the next meeting of the Working Group.

The Working Group needs the following items of information urgently:

- 1) The results of the current year's IYFS.
- 2) A means for predicting sprat catches in the next season. In practice, this must be a reliable estimate of 1-group sprat abundance by the spring.
- 3) Some method to enable predictions of landings to be made for the next season, based on previous years' catches of 0- and 1-group fish, presumably based on fishing effort data.

D.3 Stocks in Division IIIa

The Working Group on Demersal Stocks in Division IIIa did not meet in 1983. It worked by correspondence and the Danish members prepared a short report for consideration by ACFM.

Attempts at an analytical assessment could only be made in case of cod and plaice in the Kattegat. A data base for cod, haddock and plaice in the Skagerrak is building up but covers too short a period (1978-82) to be of use in this context. A serious obstacle to the assessment work in Division IIIa is the lack of effort data. The situation may improve in 1983, when logbooks are supposed to be obligatory, but the present lack of longer-time series cannot be remedied.

Recent nominal catches, and recommended TACs, in '000 tonnes:

Stocks in Div.IIIa	1979		1980		1981		1982		1983
	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch ¹⁾	
Cod	26	32	30	41	34	47	32.6	42.3	31 ²⁾
Haddock	6.6	4.8	6.6	7.9	4.5	10	7	10.7	7 ²⁾
Whiting	22	18	22	23	22	25	22	31	22 ²⁾
Plaice	-	22	25	15	22	12	11	10	11 ²⁾

1) Preliminary.

2) Precautionary TAC.

D.3.1 Cod

D.3.1.1 Cod in the Kattegat

Landings decreased from 16 000 tonnes in 1981 to about 13 000 tonnes in 1982. Without effort data, it is not possible to ascertain whether this development is due to a reduction in fishing mortality. The stock composition indicates, however, that since the strong 1976 year class, recruitment has only been at or below average. The decline in landings, therefore, is most likely due to a reduction in the total stock biomass and the recent IYFS indicates that the 1982 year class is also close to average.

As a precautionary TAC for 1984, ACFM recommends a catch of 12 000 tonnes in order to avoid an increase in fishing mortality on a reduced stock.

D.3.1.2 Cod in the Skagerrak

Landings in 1982 decreased to 29 300 tonnes from the peak figure of 31 300 tonnes in 1981. The high figures in the recent years can partly be ascribed to the relatively good 1979 year class.

Without any analytical assessment, ACFM can only recommend a precautionary TAC of 1 600 tonnes for the Norwegian coastal area of Skagerrak, and 20 000 tonnes for the remainder of Skagerrak, being close to the averages for the 5-year period 1976-80.

D.3.2 Haddock

The landings in 1982 reached 10 700 tonnes, which was a slight increase from the 9 900 tonnes in 1981. There is still no basis for an analytical assessment, and abundance indices from IYFS cover a very short period only. Consequently, ACFM can only recommend a precautionary TAC for Division IIIa of 7 000 tonnes, corresponding to a level of average catches in the period 1975-80.

D.3.3 Whiting

Landings in 1982 increased to 31 200 tonnes from 24 500 tonnes in 1981.

There is no data base for an analytical assessment, and ACFM can only recommend that the precautionary TAC of 22 000 tonnes set for the last 5 years should be retained in 1984.

D.3.4 Plaice

D.3.4.1 Plaice in the Kattegat

The declining trend in landings since 1978 continued in 1982 with a total nominal catch of only 2 900 tonnes compared with 4 000 tonnes in 1981. This development is due to poor recruitment of all year classes since and including that of 1976, and 1-group surveys indicate that no improvement can be expected from the 1981 year class.

The consequent reduction in spawning stock biomass gives cause for concern, and ACFM recommends a precautionary TAC of 1 500 tonnes for 1984.

D.3.4.2 Plaice in the Skagerrak

Landings in 1982 reached 7 900 tonnes being a slight decline from 8 200 tonnes in 1981. The decline may be explained by the bad weather conditions in the last quarter of 1982.

Without any basis for an analytical assessment, ACFM can only recommend that the precautionary TAC of 7 000 tonnes set for 1983 should be retained in 1984.

D.3.5 If ACFM is expected to give any advice on these stocks in future, more data must be made available. As explained in the opening paragraph of Section D.3, the data series are, for most of the stocks, too short for an analytical assessment. However, to make full use of the data series in future, data on fishing effort and fishery-independent data on recruitment are urgently needed.

D.4 By-Catches in The Industrial Fisheries

D.4.1 Herring by-catches in the North Sea, 1981 and 1982

Revised estimates of herring by-catch taken in 1981 show a dramatic increase on the level in recent years. The new figure of approximately 75 000 tonnes was taken almost exclusively in Division IVb, with the main fishery in the third quarter of the year. The catch consisted mainly of 0-group herring.

Preliminary catch figures for the first three quarters of 1982 show a continuation of this very high catch level of 0-group herring in Division IVb. A more intensive sampling programme than in 1981 indicates 1982 catches to be about 89 000 tonnes. In practice, these catches must be considered the result of a directed fishery on 0-group herring rather than by-catches in an industrial fishery.

The catches are shown for Divisions (tonnes and numbers per age class) in Tables D.4.1.1, D.4.1.2, D.4.1.3.

D.4.1.1 Seasonal and geographical distribution of herring by-catches in the North Sea

In 1981 and 1982 over 90% of all herring taken came from the summer fishery carried out in the eastern part of Division IVb. This fishery took place along the Danish coast and extended from the border of the Federal Republic of Germany, up to the west coast of Jutland and into the Skagerrak. It started in July, reached a peak in

August and declined in September. During September 1982, Denmark closed this fishery in the 15 mile coastal zone between Hvide Sande and Hanstholm, but this measure was taken too late to prevent large catches of 0-group herring.

D.4.2

Herring by-catches in Division IIIa

Figure are not available about herring by-catches from the Danish and Swedish fisheries from this area. There were, however, reports that large numbers of 0-group herring were taken in the third quarter of 1982 from along the north coast of Jutland and around Skagen.

By-catches of undersized herring (<18 cm) are also taken in the Kattegat in the directed fishery for human consumption, which takes place in the final quarter of the year.

D.4.3

By-catches of other species

The Working Group on Industrial Fisheries was asked to examine the available data on by-catch of other species to see if they could be used by other Working Groups in their assessments. In the North Sea, the main 'target' species in the industrial fisheries are sprat, Norway pout, sandeel and blue whiting. Considerable data were available on the composition of the by-catch from Norwegian and Faroese Norway pout and sandeel landings. Whiting and haddock appear to be the most important of the protected species used for reduction purposes. Prior to 1977 saithe also formed a major component, while cod form an insignificant proportion. In recent years, the by-catch of protected species used for reduction declined because of by-catch regulations, but the by-catch of protected species used for human consumption has probably increased. At present, however, it is not possible to estimate the quantity of protected species which go for human consumption from the industrial fisheries.

D.5

Cod, Haddock and Whiting Stocks in the North Sea, Sub-area IV

The North Sea Roundfish Working Group meeting preceded the meeting of the International Young Gadoid Survey Working Group and therefore advice on recruit estimation from the latter Group was not available. This year, however, the problems associated with estimating year class strength were minimised because the survey indices for the 1982 year classes for all three stocks were low.

Recent Landings and TACs ('000 tonnes)

Year	1979		1980		1981		1982		1983
Species	TAC	Actual landings	Rec. TAC	Actual landings	TAC	Actual landings	TAC	Actual landings*	TAC
Cod	247	231	200	249	220	290	235	251	240
Haddock	83	87	90	104	140	133	180	181	181
Whiting	111	141	150	109	150	96	170	103	170

* Provisional

D.5.1 Cod in the North Sea (Sub-area IV)

As in the previous year the assessment is based on landings from the human consumption fishery and excludes discards and industrial by-catches. Landings in recent years increased to 290 000 tonnes in 1981 helped by the very abundant year classes of 1976 and 1979. Subsequent recruitment has been at a lower level and landings declined to 251 000 tonnes in 1982 exceeding the TAC of 235 000 tonnes. Latest estimates of recent year class strengths at age 1 (millions) are: 1980: 131; 1981: 290 and 1982: 110. For prediction purposes the 1983 year class has been assumed to be of average abundance at 202 million. The level of fishing mortality in 1982 was $\bar{F}(3-8) = 0.73$, and it has remained at about this level for about 10 years. In recent years the highest fishing mortality rates have been on age groups 2 and 3. For this stock $F_{max} = 0.18$.

Spawning stock biomass reached its lowest level in 1978 but subsequently recovered when the 1976 year class recruited to the spawning stock. However, since the 1979 year class reached maturity in 1982 a declining trend in spawning stock biomass began and is expected to continue up to at least 1985 unless fishing mortality rates are reduced.

A catch in 1983 equal to the agreed TAC of 240 000 tonnes corresponds to an increase in average F to 0.82. Catch and biomass predictions for a range of options for 1984 are given in the text table below and illustrated in Figure D.5.1.

North Sea COD. Landings in 1983 = 240 000 tonnes = TAC.

1983				1984					1985	
SB	SSB	$\bar{F}_{(3-8)}$ H.C.	Total landings	Management option for 1984	SB	SSB	$\bar{F}_{(3-8)}$ H.C.	H.C. landings	SB	SSB
465	255	.82	240 (= TAC)	$\bar{F}_{0.1}$	390	233	.12	37	611	378
				$\bar{F}_{84}=0.2\bar{F}_{83}$.16	49	592	360
				\bar{F}_{max}			.18	55	581	350
				$\bar{F}_{84}=0.5\bar{F}_{83}$.41	110	491	268
				$\bar{F}_{84}=0.8\bar{F}_{83}$.66	155	410	190
				$\bar{F}_{84} = \bar{F}_{83}$.82	182	376	165

Weights in thousands of tonnes.

Stock biomass = ages 1+.

Spawning stock biomass = ages 3+.

If the same level of fishing mortality is maintained into 1984, the spawning stock biomass is expected to fall to 165 000 tonnes in 1985, which would be below the lowest recorded level. The stock is over-exploited in terms of yield per recruit, and ACFM recommends a reduction in fishing mortality towards F_{max} .

D.5.2 Haddock in the North Sea (Sub-area IV)

Landings of haddock from the North Sea reached a low level of less than 90 000 tonnes in 1978 and 1979 but have subsequently recovered and in 1982 were 131 000 tonnes (provisional) of which 21 000 tonnes were landed as by-catches in the industrial fisheries. In addition, 41 000 tonnes were estimated to have been discarded in 1982.

Of recent year classes only that of 1979 has been of above average strength. The following year class strengths at age 0 have been used in catch predictions:

Year class	Abundance (millions) at age 0	Source of estimate
1979	3533	VPA
1980	840	VPA
1981	2278	IYFS
1982	1329	IYFS
1983	2695	Average

The overall level of fishing mortality has remained relatively constant for several years at about the 1982 level of $\bar{F}(2-6) = 1.03$ (total fishery). Spawning stock biomass reached a low level of less than 180 000 tonnes in 1978 but has since recovered with the recruitment of the strong 1979 year class to the spawning stock, and in 1983 this was about 350 000 tonnes. The prognosis up to 1985 is for a spawning stock fluctuating about 300 000 tonnes.

Catch predictions were made on the assumption that fishing mortality caused by industrial fisheries will remain constant and that the exploitation pattern in the human consumption fishery will be equal to the average for 1977-82. Catch predictions for 1984 are given for a range of values of fishing mortality in the human consumption fishery. If the fishing mortality in the human consumption fishery (landings and discards) in 1983 remains at the 1982 level, the expected landings will be equal to the agreed TAC. For 1984 the catch and biomass predictions are given in the text table below and are presented graphically in Figure D.5.2.

NORTH SEA HADDOCK - MANAGEMENT OPTIONS FOR 1984

1983				1984								1985	
Total Stock Biom.	Spawning stock biomass	$\bar{F}(2-6)$ H.C.	Total landings	Management Option for 1984	Total Stock Biom.	Spawning stock biomass	$\bar{F}(2-6)$ H.C.	Total landings	H.C. landings	Indust. landings	Discards	Total Stock Biom.	Spawning stock biom.
455	345	.97 (= \bar{F}_{82})	182	$\bar{F}_{84} = 0.2 \bar{F}_{83}$	450	259	.19	70	36	34	20	683	490
				$\bar{F}_{84} = F_{max}$.26	80	47	34	26	663	471
				$\bar{F}_{84} = 0.5 \bar{F}_{83}$.48	111	79	32	47	605	414
				$\bar{F}_{84} = 0.8 \bar{F}_{83}$.77	143	113	30	70	544	355
				$\bar{F}_{84} = 1.0 \bar{F}_{83}$.97	160	131	29	85	509	318

Weights in thousands of tonnes

Spawning stock biomass ages 2+

In terms of yield per recruit this stock could be managed more rationally by reducing the overall level of fishing mortality, and ACFM recommends a reduction in fishing mortality towards F_{max} . In addition, the exploitation pattern could be improved through an increase in the minimum mesh size as was recommended in 1981, or a reduction in the industrial by-catch (see para. D.5.5). The former would help to reduce the level of discarding (see Table D.5.2).

D.5.3 Whiting in the North Sea (Sub-area IV)

The provisional estimate of landings in 1982 is 103 000 tonnes (including 33 000 tonnes as industrial by-catch) which was well below the agreed TAC of 170 000 tonnes. In addition to landings, 29 000 tonnes were estimated to have been discarded. Recruitment in recent years was at an average level for year classes 1976-78, but the indications are that subsequent year classes are all below average abundance. There has been little change in the level of fishing mortality in the last three years; the value of F calculated for 1982 was $F_{2-6} = 1.18$ for the total fishery. Spawning stock biomass in 1982 was estimated to be 211 000 tonnes but this is expected to decline to 127 000 tonnes by 1984, which would be lower than any previously recorded value. The recovery indicated for 1985 is entirely dependent on the assumption that the 1983 year class is of average (or greater) abundance. No information on the strength of this year class will be available until March 1984.

For 1983, total landings are expected to be 93 000 tonnes on the assumption that fishing mortality remains at the 1982 level. These predicted landings are well below the agreed TAC of 170 000 tonnes. This TAC is at such an unrealistic level that no catch predictions for 1984 have been made on the assumption that the TAC would be taken.

Catch and biomass predictions for 1984 are given in the text table below and in Figure D.5.3. These are based on the assumption that F in 1983 will remain at the 1982 level, that the exploitation pattern in the human consumption fishery will be the average observed in 1977-82, and that fishing mortality in the industrial fisheries will remain constant.

NORTH SEA WHITING - MANAGEMENT OPTIONS FOR 1984

1983				1984								1985	
Total Stock Biom.	Spawning stock biomass	\bar{F} (2-6) H.C.	Total landings	Management Option for 1984	Total Stock Biom.	Spawning stock biomass	\bar{F} (2-6) H.C.	Total landings	H.C. landings	Indust. landings	Discards	Total Stock Biom.	Spawning stock biom.
285	176	.97 (= \bar{F}_{82})	93	$\bar{F}_{84} = 0.2 \bar{F}_{83}$ $\bar{F}_{84} = F_{max}$ $\bar{F}_{84} = 0.5 \bar{F}_{83}$ $\bar{F}_{84} = 0.8 \bar{F}_{83}$ $\bar{F}_{84} = \bar{F}_{83}$	303	127	.19 .41 .48 .77 .97	58 67 71 81 86	12 23 27 39 45	46 44 44 42 41	9 17 20 31 36	448 - 419 390 380	273 249 242 212 204

Weights in thousands of tonnes

Spawning stock biomass ages 2+

In view of the decline in spawning stock biomass, which is expected to occur (reducing it to levels at or close to the lowest on record) and the declining trend in recruitment since 1978, ACFM recommends that fishing mortality should be reduced towards F_{max} . The advantages to be obtained from an improvement in the exploitation pattern through a mesh increase, or a reduction in the industrial by-catch, are also applicable to the whiting stock.

D.5.4 Possibilities for improving the exploitation patterns other than by mesh regulation

For North Sea cod there have been suggestions that some fleets have been concentrating in areas or seasons where young fish predominate and are consequently taking a high proportion of young cod in their catches. One area that has been mentioned in this context is the Helgoland Bight. Figure D.5.4 shows the main areas of distribution of 0-, I- and II-group cod in the southern North Sea. These research vessel survey data show that young cod are concentrated in the German Bight at certain times of the year.

No data were available at the Working Group giving an area breakdown of quantities caught together with the associated age compositions. Consequently, it was not possible to estimate what proportion of young fish was taken in any particular area. Detailed data of this kind would be required for any quantitative assessment for cod. In addition, it would also be essential to have estimates of discards by area. Furthermore, any conservation measures which might be contemplated would also have implications for fisheries for other species, e.g., plaice and sole, which take place in the same area.

For haddock and whiting in the North Sea, the two major factors influencing the exploitation pattern are the catches of undersized fish taken with current human consumption fishery mesh sizes and subsequently discarded and the by-catches in the industrial fisheries. The first of these problems is probably best resolved by mesh regulation. The second problem is more a question of policy and economics relating to the co-existence of industrial and human consumption fisheries.

D.5.5 Minimum trawl cod-end mesh sizes in Sub-areas IV and VI

Attention is drawn to Tables D.5.1-3 which show numbers and weights of cod, haddock and whiting estimated to have been discarded or taken as by-catches in the industrial fisheries in the North Sea. In view of the serious loss in yield associated with the numbers of fish being discarded, ACFM reiterates its 1981 advice for the need to increase the minimum mesh size in the North Sea as soon as possible. In addition, in the North Sea the exploitation patterns for haddock and whiting could be improved by reducing the by-catches taken in the industrial fisheries.

For Division VIa the advice of ACFM is unchanged from that given in 1981. In 1982 about 10 000 tonnes of haddock were discarded in Division VIa, which supports the argument in favour of a mesh size increase.

D.6 Cod, Haddock and Whiting in Sub-area VI
Recent landings and TACs (thousands of tonnes)

Year	1979		1980		1981		1982	
Stock	Rec. TAC	Actual landings	Rec. TAC	Actual landings	Rec. TAC	Actual landings	Rec. TAC	Actual landings*
Cod VI	10.4	16.9	12.1	18.6	20.0	24.7	17.5	21.9
Haddock VIa	8.5	14.8	13.0	13.0	15.5	18.4	15.5	28.9
Haddock VIb	2.5	2.2	2.5	7.3	6.0	9.0	6.0	7.8
Whiting VI	12.0	17.4	13.0	14.7	16.4	18.5	13.0	13.5

* Provisional.

D.6.1 Cod in Division VIa

Landings followed an increasing trend from 1977 to 1981 when they reached 25 000 tonnes. Provisional landings for 1982 indicate a reduction to 22 000 tonnes. The increase in landings up to 1981 has been due largely to a succession of above average year classes but in addition there has been an increase in fishing mortality in the last four years.

In 1982 $\bar{F}_{3-4} = 0.84$; \bar{F}_{max} for this stock is 0.31. Spawning stock biomass has been increasing since 1978, as the more abundant year classes have recruited to the adult stock. The spawning stock biomass is expected to remain at about 30 000 tonnes up to 1985.

Catch predictions have been made for 1983 and 1984, using an exploitation pattern equal to the average for 1977-82. The strength of the 1981 year class is estimated to be 21.3 million from the application of average fishing mortality to the 1982 catch of 1 year olds. This is the largest year class on record, but the estimate is supported by cpue data from the Scottish fishery.

Although recruitment has shown a clear upward trend, this trend has not been extrapolated. For the predictions, the 1982 and 1983 year classes have been assumed to be equal to the 1967-79 average. Fishing mortality in 1983 has been assumed to remain unchanged at the 1982 level, and a catch of 22 600 tonnes is expected. Catch and stock biomass predictions for 1984 are given in the text table below and in Figure D.6.1.

COD in Division VIa - Management options for 1984

1983				1984					1985	
Stock Biomass	Spawning Stock Biomass	\bar{F}_{3-4}	Total Landings	Management Option for 1984	Stock Biomass	Spawning Stock Biomass	\bar{F}_{3-4}	Total Landings	Stock Biomass	Spawning Stock Biomass
56	29	.84 (= \bar{F}_{82})	23	$\bar{F}_{84}=0.2 \bar{F}_{83}=\bar{F}_{0.1}$	53	39	.17	6	68	55
				\bar{F}_{max}			.31	11	62	49
				$\bar{F}_{84} = 0.5 \bar{F}_{83}$.42	14	58	44
				$\bar{F}_{84} = 0.6 \bar{F}_{83}$.67	21	49	35
				$\bar{F}_{84} = \bar{F}_{83}$.84	23	44	31

Weights in thousands of tonnes

Stock biomass = ages 1+

Spawning stock biomass = ages 3+

Although this stock is not in a critical state, the level of fishing mortality is far above \bar{F}_{max} . ACFM therefore recommends that fishing mortality should be reduced towards \bar{F}_{max} .

D.6.2 Cod in Division VIb

Only small quantities of cod are normally taken in Division VIb. The TAC adopted on the basis of the assessment for Division VIa should be increased by 500 tonnes, to allow for Division VIb cod, and applied for the whole of Sub-area VI.

D.6.3 Haddock in Division VIa

Landings increased from 18 400 tonnes in 1981 to 28 900 tonnes in 1983 with the abundant 1979 year class making an important contribution to the catch.

Discard data have been reprocessed and were incorporated into the Working Group assessment for the first time. Large numbers of the 1979 year class were estimated to have been discarded as 2 year olds in 1981 and as 3 year olds in 1982. Predictions based on the assessment incorporating discard data gave a very high estimate for landings in 1983, which is considered unrealistic. ACFM accepted an alternative assessment, based on landings only.

Fishing mortality in 1982 was assumed to have remained at the average level for the period 1978-80. Recruitment of the 1981 year class in 1982 was estimated at 9.2 million on the basis of average \bar{F} at age 1. The 1982 year class at age 1 was estimated at 20 million from the VIa/IV recruitment relationship. The 1983 year class was assumed to be equal to the long-term average (48 million).

Spawning stock biomass and recruitment have both been fluctuating without trend.

If fishing mortality in 1983 remains at the 1982 level, and assuming the exploitation pattern will be the same as in 1977-82, landings in 1983 are expected to be 22 800 tonnes. Predictions for landings and stock biomasses in 1984 are given in the text table below and in Figure D.6.3.

F_{max} is half the present fishing mortality level and ACFM recommends that F be reduced towards this value.

West of Scotland HADDOCK. Management options for 1984.

1983				1984					1985	
Stock Biomass	Spawning Stock Biomass	$\bar{F}_{(2-6)}$	Total Landings	Management Option for 1984	Stock Biomass	Spawning Stock Biomass	$\bar{F}_{(2-6)}$	Total Landings	Stock Biomass	Spawning Stock Biomass
49	45	0.69 (= \bar{F}_{82})	22.8	$\bar{F}_{0.1}$	35	27	0.16	3.9	45	36
				\bar{F}_{max}			0.36	8.2	40	32
				$\bar{F}_{84} = \bar{F}_{83}$			0.69	13.5	34	26
				$\bar{F}_{84} = 0.2 \bar{F}_{83}$			0.14	3.5	45	37
				$\bar{F}_{84} = 0.5 \bar{F}_{83}$			0.34	7.9	40	32
				$\bar{F}_{84} = 0.8 \bar{F}_{83}$			0.55	11.5	36	28

Weight in thousands of tonnes
 Recruitment 1984, R_1 = 48 000
 Stock biomass = fish at age 1 and older
 Spawning stock biomass = age 2+
 Exploitation pattern 1983-84 based on 1977-82 average

D.6.4 Haddock in Division VIb

Landings in 1982 were 7 800 tonnes after 9 000 tonnes in 1981. No analytical assessment based on commercial catches has been possible because of the continuing practise of landing in countries other than those in which the vessels are registered, with the result that sampling of landings has not been possible.

English research ship surveys, comparable with that made in August 1981, were carried out in July 1982 and August 1983. The year classes of 1976, 1977, 1980 and 1981 are abundant, but other year classes are poor or virtual failures and make little contribution to the catches. No fish of the 1982 year class were taken on the 1982 survey and very few of the 1983 year class on the 1983 survey, and it seems likely that both these year classes are poor ones. Survey stock biomass estimates were 70 000 tonnes in 1981, 93 000 tonnes in 1982 and 70 000 tonnes in 1983. A further survey by the Federal Republic of Germany, which extended to a greater depth than the English ones, gave a stock estimate of 108 000 tonnes in January 1983.

On the basis of these surveys and the fact that both the 1982 and 1983 year classes appear poor ones, ACFM recommends that the TAC in 1984 should be set in the range 15 000 - 20 000 tonnes, which would result in a fishing mortality at about the $F_{0.1}$ level.

D.6.5 Whiting in Division VIa

Landings in 1981 were 17 500 tonnes but fell in 1982 to 13 500 tonnes, which is the lowest recorded in the last ten years. Poor recruitment appears to be the main contributory factor.

The level of fishing mortality in 1982 was $\bar{F}(2-4) = 0.88$. The Y/R curve is flat-topped and F_{max} was not determined; the value of $F_{0.1}$ is 0.22.

Current estimates indicate that the year classes 1980, 1981 and 1982 are of low abundance; the 1983 year class was assumed to be of average size. If the 1982 level of fishing is maintained in 1983, landings are expected to fall again to 8 200 tonnes. Predictions of landings and stock biomass in 1984 for a range of options are given in the text table below and are shown graphically in Figure D.6.5.

Whiting in Division VIa - Management options for 1984

1983				1984					1985	
Total Stock Biomass	Spawning Stock Biomass	$\bar{F}(2-4)$	Total Landings	Management Option for 1984	Total Stock Biomass	Spawning Stock Biomass	$\bar{F}(2-4)$	Total Landings	Total Stock Biomass	Spawning Stock Biomass
17	13	0.88 (= \bar{F}_{82})	8.2	$\bar{F}_{84} = 0.2 \bar{F}_{83}$	25	8	0.18	1.9	40	23
				$\bar{F}_{84} = \bar{F}_{0.1}$			0.22	2.4	40	23
				$\bar{F}_{84} = 0.4 \bar{F}_{83}$			0.35	3.6	38	21
				$\bar{F}_{84} = 0.6 \bar{F}_{83}$			0.53	5.1	37	20
				$\bar{F}_{84} = 0.8 \bar{F}_{83}$			0.70	6.4	35	18
				$\bar{F}_{84} = \bar{F}_{83}$			0.88	7.5	34	17

Weights in thousand tonnes

Spawning stock biomass ages 2+

In view of the declining trends in spawning stock biomass and in recruitment, ACFM recommends that fishing mortality should be reduced towards $F_{0.1}$.

Preliminary information on Scottish catch data for January-May 1983 suggested that catch rates have increased and that the final 1983 catch may be considerably higher than 8 200 tonnes. It was not feasible for ACFM to evaluate the possible implications of this for the assessment of this stock.

Landings of whiting from Division VIb are insignificant, and the TAC determined for Division VIa could apply to the whole of Sub-area VI.

D.6.6 Cod, haddock and whiting in Divisions VIIb,c,d,e

Analytical data were available only for whiting, but these data are not considered a sufficiently reliable basis for catch prediction purposes. ACFM therefore recommends that precautionary TACs should be set. Catch figures on which these could be based are given in Tables D.6.6.1 - D.6.6.6.

D.7 Irish Sea and Bristol Channel Demersal Stocks

D.7.1 Irish Sea cod

The 1982 catch fell by 8% to 13 768 tonnes and was once again within 1% of the figure predicted by the Working Group, based on unchanged fishing mortality. Spawning stock biomass is estimated to have declined slightly from the record level of 1982 and is expected to decline to a level closer to the long-term average in 1984 and 1985, because recruitment of the 1981 year class is below average.

The maximum of the Y/R curve is at 43% of the present F. The present level of exploitation on this stock is 5% above the average level for the period 1970-81.

There is no evidence that the continuing exploitation above F_{max} has reduced recruitment, but the exploitation pattern needs to be improved in order to obtain a higher yield from recruiting fish. Proper enforcement of the existing minimum size regulations would help towards this end. A reduction in fishing mortality would also give an increased cod biomass, catch rate and yield per recruit. If the management objective is to achieve these increases, then ACFM recommends that fishing mortality be reduced towards F_{max} .

Management options are given in the text table below.

COD - IRISH SEA

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	\bar{F} (1-7)	Catch		Stock biom.	Spawning stock biomass	\bar{F} (1-7)	Catch	Stock biom.	Spawning stock biomass
30 100	12 900	0.59	11 600	$F_{0.1}$	26 700	12 100	0.16	3 400	36 400	20 100
				F_{max}		11 500	0.26	5 300	33 600	17 000
				$F_{1984} =$ $0.8 \times F_{1983}$		10 200	0.47	8 800	28 400	11 900
				$F_{1984} =$ F_{1983}		9 500	0.59	10 400	26 000	9 700

Weight in tonnes.

D.7.2 Irish Sea whiting

New data provided to ACFM from an inshore Groundfish Survey in October, and VPA estimates of 1 year old abundance are shown below and indicate that the 1981 and 1982 year classes are poor.

<u>Year class</u>	<u>0-group index from survey</u>
1976	6 128
1977	560
1978	1 322
1979	6 418
1980	3 387
1981	436
1982	329

In recent years 1-3 year old whiting dominated the catches, so the 1984 catch will be reduced if the two recruiting year classes are low.

The assessment of this stock remains unsatisfactory because inconsistencies in the data base for past years have not been cleared up. Due to this the catch forecasts which were carried out were rejected as too unreliable to be used for setting TACs.

ACFM can therefore only recommend a precautionary TAC for this stock. Taking account of the evidence for recent poor recruitment, ACFM recommends a precautionary TAC of 10 000 tonnes for 1984.

D.7.3 Irish Sea plaice

The catch in 1982 fell by 17% to 3 237 tonnes and was considerably lower than either the TAC (4 500 tonnes) or the predicted catch (4 000 tonnes). The catch per unit effort also fell (-23% by Belgium, -26% by England).

The maximum of the Y/R curve is at 40% of the present F, and the level of exploitation has hardly changed since 1975, in spite of ACFM advice to reduce it. Spawning biomass is below the average for the period 1964-82 but is not expected to go below the lowest observed level.

Management options are given in the text table below.

PLAICE - IRISH SEA

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	\bar{F} (3-13)	Catch		Stock biom.	Spawning stock biomass	\bar{F} (3-13)	Catch	Stock biom.	Spawning stock biomass
10 700	3 800	.54	2 700	$F_{0.1}$	11 800	4 100	.11	800	14 800	6 600
				F_{max}		4 000	.22	1 500	14 100	5 900
				$0.8 F_{82}$		3 900	.44	2 600	12 800	4 800
				$F_{84} = F_{82}$		3 900	.54	3 100	12 300	4 300

ACFM recommends that fishing mortality should be reduced towards F_{max} .

D.7.4 Irish Sea sole

The catch in 1982 fell by 22% to 1 295 tonnes, partly due to a drop in fishing effort.

The present level of fishing mortality remains very close to F_{max} and the level of exploitation on the stock has remained virtually unchanged since 1970, but the spawning biomass is currently at its lowest observed level and may remain low in 1984 and 1985 if recruitment is below average. Recent Belgian and English data indicate that the 1980 year class is poor, and the catch forecast has been adjusted to take account of this.

Management options are given in the text table below.

SOLE - IRISH SEA

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	\bar{F} (3-10)	Catch		Stock biom.	Spawning stock biomass	\bar{F} (3-10)	Catch	Stock biom.	Spawning stock biomass
4 800	3 800	.29	1 100	$F_{0.1} = .46 F_{82}$ $F_{84} = F_{max} = 1.0 F_{82}$	4 800	3 900	.13	500	5 500	4 500
					4 800	3 900	.29	1 000	5 000	4 000

ACFM recommends that fishing mortality on this stock should not be allowed to rise.

D.7.5 Celtic Sea sole

The 1982 catch of 1 128 tonnes was 7% lower than in 1981. Belgian cpue remained unchanged and estimated total international effort fell by 4%.

The present level of F is 28% above F_{max} . The level of exploitation has been higher in 1980-82 than in the previous time period. Spawning biomass has been declining since 1980 and is expected to reach a historically low level in 1985. For this stock the level of recruitment per unit biomass required to sustain the stock at the present level of fishing is higher than any observed in the data.

Management options are given in the text table below.

SOLE - CELTIC SEA

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	\bar{F} (3-13)	Catch		Stock biom.	Spawning stock biomass	\bar{F} (3-13)	Catch	Stock biom.	Spawning stock biomass
4 500	3 400	.29	1 200	$F_{0.1} = .37F_{82}$	4 000	3 400	.11	450	4 500	3 800
				$F_{max} = .72F_{82}$		3 200	.21	800	4 100	3 300
				$F_{84} = .8 F_{82}$		3 200	.23	900	4 000	3 200
				$F_{84} = F_{82}$		3 150	.29	1 100	3 800	3 000

As with the Irish Sea sole, the forecast is very dependent on recruitments for which mean values have been assumed. The value of recruitment of the 1980 year class assumed in the assessment (i.e., the geometric mean) is supported by recent Belgian data.

In view of the low spawning stock biomass, ACFM recommends that fishing mortality on this stock should be reduced to F_{max} .

D.7.6 Celtic Sea cod

The catch in 1982 (6 553 tonnes) was 20% lower than in 1981. Catch per effort for France also fell by 17% and total international effort has remained steady over the last three years.

F_{max} occurs at 55% of the present level of F , and the level of exploitation has varied little over the past three years. The spawning biomass in 1982 is high, but poor recruitment, particularly the 1981 year class, could result in a marked decline in 1984 and 1985

COD - CELTIC SEA

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	\bar{F} (1-7)	Catch		Stock biom.	Spawning stock biomass	\bar{F} (1-7)	Catch	Stock biom.	Spawning stock biomass
10 500	7 800	0.50	4 400	$F_{84} = F_{83}$	8 600	5 400	0.50	3 700	8 200	5 100
				$F_{84} = 0.8F_{83}$		5 600	0.40	3 100	8 900	5 800
				$F_{84} = F_{max}$		5 700	0.28	2 300	10 000	6 900

Stock biomass 1+

ACFM recommends that fishing mortality on this stock should not be allowed to rise.

D.7.7 Celtic Sea whiting

Uncertainties with age determinations mean that no analytical assessment could be carried out on this stock. Landings and catch per effort have fluctuated very little over the past ten years and were both above the mean level in 1982. A precautionary TAC should be set for this area or for ICES Sub-area VII.

ACFM therefore recommends a precautionary TAC for this area for 1984. Catch figures on which this could be based are given in Table D.7.7.

D.7.8 Celtic Sea plaice

This year the only data on age distribution for this stock were supplied by Belgium. The limited sampling of this stock in England and Wales in previous years has now stopped due to low landings and switching of the available sampling manpower onto other species. Since it is only the fourth most important flatfish species in this area, it is unlikely that it will be sampled adequately in the future, and the need for assessments of the stock should be reconsidered.

The catch in 1982 (1 274 tonnes) was 7.5% lower than in 1981, but this is still well above the mean for the period 1972-81.

ACFM therefore recommends a precautionary TAC for 1984. Catch figures on which this could be based are given in Table D.7.8.

D.8 Plaice and Sole Stocks in the North Sea and English Channel

D.8.1 North Sea sole

Recent catches and TACs, in '000 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	Actual catch	Rec. TAC	Actual catch 1)
6.7	18.0	8.0	20.3	13.0	22.6	15.0	15.8	15.0	15.4	15.0	21.3

1) Preliminary

In 1982 the provisional total international catch was 21 286 tonnes, which was slightly above the 1982 TAC of 20 000 tonnes. About 24% of this catch consisted of the 1980 year class and 46% of the 1979 year class.

The catch per unit effort of Belgium and the Netherlands increased in 1982 by 22% and 40% respectively compared with 1981. The international effort in 1982 indicated a small reduction of 1.5 based on the Dutch cpue and an increase of 13% based on the Belgian cpue. The United Kingdom index indicating an increase of 140% was felt highly unrealistic and was therefore not considered further.

ACFM could not accept the result of the 'terminal populations' version of the separable VPA in which the 1982 calculated fishing mortality was felt to be too low on 3 year olds. The pattern from the 'terminal F' option of the separable VPA, as used by the Working Group for prediction, was taken for the new VPA run (see Table D.8.1).

Several methods were applied to obtain estimates of the present level of fishing mortality. Good correlations were obtained between indices of international effort based on Dutch data and unweighted mean fishing mortality for the most exploited age groups (2-8) for input values of 0.55 to 0.70.

The fishing mortality on the age group subject to maximum exploitation was agreed to be 0.55, corresponding to an $\bar{F}_{(2-8)}$ of 0.45.

The spawning stock biomass decreased from 110 000 tonnes in 1957 to a minimum level of 26 000 tonnes in 1981. The good 1979 year class caused an increase to 39 000 tonnes in 1982. The VPA indicates a year class 1979 of 170 million recruits, which is about twice the geometric mean recruitment.

The unweighted mean fishing mortality over the most exploited age groups increased gradually since 1957 from 0.099 to 0.450. However, during the last 10 years this fishing mortality remained fairly stable.

Assuming an unchanged fishing mortality, the expected catch for 1983 and 1984 will be respectively 21 000 tonnes and 22 000 tonnes. The spawning stock biomass in 1984 and 1985 will then be 45 000 tonnes and 43 000 tonnes respectively.

North Sea SOLE

1982		1983				Management option for 1984	1984				1985	
Tot. land.	$\bar{F}_{(2-8)}$	SB	SSB	$\bar{F}_{(2-8)}$	Tot. land.		SB	SSB	$\bar{F}_{(2-8)}$	Tot. land.	SB	SSB
21	0.45	61	41	0.45	21	$F_{0.1}$			0.15	8	70	55
						F_{max}			0.27	14	65	51
						$F_{84}=F_{82}$	60	45	0.45	22	57	43

Weights in '000 tonnes.

Tot.land.: total landings.

SB: stock biomass.

SSB: spawning stock biomass.

Although the Y/R curve (Figure D.8.1) is rather flat-topped, the present level of F is above any biological reference points. ACFM therefore recommends that the level of exploitation should be reduced to F_{max} as quickly as possible.

As spawning stock biomass is presently very low in comparison to historical levels, the Working Group will be asked to consider and advise on optimum levels of spawning stock size which could be used as a guideline for management.

D.8.2

North Sea plaice

Recent catches and TACs, in '000 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	Actual catch	Rec. TAC	Actual catch 1)
71	119	115	114	120	145	112	140	105	140	-	153

1) Preliminary.

The yield in 1982 increased by nearly 10% to a record catch of 153 000 tonnes, which again contained a high proportion (30%) of unreported catches.

The cpue increased for all fleets. International effort indices slightly increased. The United Kingdom and Belgian estimates indicated a slight increase in the index of international fishing effort, but the Netherlands' data gave a slight decrease.

The separable VPA indicated an increase in F on the younger age groups and some decrease in F on the older age groups.

The 1979 year class was estimated as 909 million, which is about twice the geometric mean recruitment. The weighted mean of the pre-recruit survey indices was 351 million for the 1980 year class. The 1981 year class also seems to be very strong as shown by the estimate of the pre-recruit indices amounting to 1 000 million. The fishing mortality at age 1 was adjusted for the 1980 and 1981 year classes in order to achieve the value of pre-recruit estimates.

Assuming the same fishing mortality in 1984 as in 1982, the expected catch will further increase from 164 000 tonnes in 1983 to 182 000 tonnes in 1984. Also the spawning stock biomass will increase to 481 000 tonnes in 1983, decrease slightly to 444 000 tonnes in 1984 and increase to 468 000 tonnes in 1985, at the same level of fishing mortality. These spawning stock biomasses are on the same high level as those at the end of the 1960s.

The record catches and high spawning stock are caused by the high level of recruitment since 1976.

A table of management options is given below.

North Sea PLAICE

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	$\bar{F}(2-10)$	Catch		Stock biom.	Spawning stock biomass	$\bar{F}(2-10)$	Catch	Stock biom.	Spawning stock biomass
688	481	0.319	164	$F_{83}=F_{0.1}$	649	444	0.12	80		570
				F_{max}			0.24	150		500
				$F_{84}=F_{82}$			0.319	182		468

Weights in '000 tonnes.

Assuming constant fishing mortality at the level of 1982, the equilibrium yield and spawning stock biomass will be 125 000 tonnes and 351 000 tonnes respectively. These are lower than the short-term predictions because of the above-average recruitment in recent years.

ACFM indicates a preference for fishing at F_{\max} which corresponds to a TAC for 1984 of 150 000 tonnes.

D.8.3

Sole in Division VIIId

Recent catches and TACs, in '000 tonnes:

1978		1979		1980		1981		1982
C	TAC	C	TAC	C	TAC	C	TAC	C
1.4	1.2	1.8	2.2	1.4	1.7	2.2	1.4	2.7 ¹⁾

1) Preliminary.

In 1982 the provisional total international catch reached 2 673 tonnes which was the highest on record and 30% higher than the recommended TAC.

The Belgian cpue remained stable since the peak level of 1979. The United Kingdom data show an increase in 1982, mainly due to a high proportion of the 1979 year class in their catch.

ACFM could not accept the results of the 'terminal populations' version of the separable VPA, and therefore decided to re-run the VPA with the pattern from the 'terminal F' option of the separable VPA used by the Working Group for the predictions. (Table D.8.3.)

From the traditional VPA it appears that total stock biomass and spawning stock biomass were at a high level in 1982, mainly due to the strong 1979 year class.

The 1980 and 1981 year classes are above average, as indicated by the French pre-recruit surveys. The data series from these years, however, is not long enough to quantify the strength of these year classes with any accuracy.

The cpue data from the 1983 Belgian catches indicated a strength of about 6 million recruits of the 1980 year class (Figure D.8.3.). From the regression between the North Sea and Division VIIId sole recruitments, the 1980 and 1981 year classes could be estimated as 13.5 and 15.0 million, respectively. As these high values could not be confirmed by the 1983 catch rates, ACFM decided to rely on the cpue estimate of about 6 million recruits for both these year classes.

ACFM points out that there are great similarities between the North Sea and eastern English Channel sole stocks in terms of growth rates and recruitment strengths. Therefore, management strategy should be similar for both stocks.

Spawning stock biomass has been relatively stable in the period up to 1980, because of the fact that fishing mortality was below or close to F_{\max} . Management options are given in the text table below.

ENGLISH CHANNEL - SOLE - DIVISION VIIId

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	$\bar{F}(3-8)$ H.C.	Total land- ings		Stock biom.	Spawning stock biomass	$\bar{F}(3-8)$ H.C.	H.C. land- ings	Stock biom.	Spawning stock biomass
7.8	6.5	0.43	2.4	$F_{0.1}$	6.7	5.1	0.15	0.6	7.3	5.7
				$F_{max}=0.7 = F_{82}$			0.30	1.4	6.7	5.1
				$F_{84}=F_{82}$			0.43	1.9	6.2	4.6

Although the Y/R curve is rather flat-topped, the present level of fishing mortality is above any biological reference points. ACFM therefore recommends that the level of exploitation should be reduced to F_{max} .

D.8.4 Sole in Division VIIe

Recent catches and TACs, in '000 tonnes:

1978		1979		1980		1981		1982		1983
C	TAC	C	TAC	C	TAC	C	TAC	C	TAC	TAC
0.9	0.4	1.2	0.5	1.3	0.8	1.2	1.0	1.4 ¹⁾		400

1) Preliminary

Provisional figures for landings in 1982 were 1 413 tonnes, which is the highest on record.

The effort by United Kingdom beam trawlers, which take the greatest proportion of the catch, increased substantially in 1982 but the catch per unit effort remained similar to the level of the previous years. The otter trawl catch per unit effort, however, increased in 1982.

Due to doubts concerning the assessment, mainly in the estimate of the terminal fishing mortality, ACFM recommends a precautionary TAC for 1984 of 900 tonnes, which is in the range of the 1975-82 catches.

D.8.5 Plaice in Divisions VIIId and VIIe

The catches in 1982 were almost at the same high level (6 309 tonnes) as in 1981, whereas in the ten years up to 1980 the catches fluctuated between 2 600 tonnes and 4 200 tonnes.

From the combined age composition it seems that the 1979 year class accounts for 55% of the catch, indicating a situation similar to the one observed in the North Sea stock.

The data base is, however, very poor, and consequently no analytical assessment was carried out.

Therefore, ACFM can only advise a precautionary TAC of 3 500 tonnes, which is the average catch of the ten years up to 1981.

D.8.6 Exemption from the proposed increase in minimum mesh size to 90 mm for boats less than 300 BHP

ACFM was asked by the European Commission to provide scientific advice on the effects of a possible exemption from the proposed increase in minimum mesh size to 90 mm for boats of less than 300 BHP. The Commission's Scientific and Technical Committee for Fisheries (STCF) advised in their fifth (1982) report that on the basis of the latest available technical data, small boats would have, on theoretical grounds, to use wider meshes to get a catch of sole of the same length composition as boats with stronger engines.

The STCF expressed the opinion that if the current derogation was allowed to persist, adverse conservation effects would probably be small since the proportion of the total sole catch taken by vessels of the type in question is believed to be correspondingly small. Since no definitive scientific advice was available on this topic, the Commission requested ICES to provide such advice.

ACFM regrets that catch data by fleets are not available to it in sufficient detail of either species composition or of fishing area to enable it to give scientific advice on the problem.

D.9 Shrimp Stocks in the Skagerrak-Kattegat and the North Sea

ACFM did not have any assessments available of the shrimp stocks in Division IIIa and Sub-area IV on which to base management advice.

The question has been referred to the Pandalus Assessment Working Group, which will meet in February 1984. ACFM will consider the findings of this Working Group at its May 1984 Meeting.

E. STOCKS IN NEAFC REGIONS 2 AND 3

E.1 Hake in Sub-areas IV and VI-IX

E.1.1 Northern Stock (Sub-areas IV, VI, VII and Divisions VIIIA,b)

Recent catches and recommended precautionary TACs are shown below (in thousands of tonnes):

	1977	1978	1979	1980	1981	1982	1983
Prec. TAC	-	-	43	30	30	30	30
Actual catch	51	48	50	58	57	57*	

* Preliminary.

ACFM welcomed the improvements which have been made in the data base for this stock. Before an analytical assessment can be made, however, the improvements in sampling level need to be maintained for some years more, and further advances are required in age reading and in the provision of age/length keys. The reliability of officially reported landing statistics continues to be poor.

ACFM noted that the mean age in the catches has been increasing since 1977 to approximately 3 years old, but that this is only about half the age of first maturity.

ACFM repeats its advice that the exploitation pattern needs to be improved and recommends 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.

Pending further ACFM advice on the appropriate minimum mesh size for Nephrops, the current legal minimum mesh size for Nephrops fisheries should be enforced.

In view of the unsatisfactory exploitation pattern, and in order to avoid possible increases in fishing effort which might occur if the industry attempts to compensate for losses due to effective enforcement of an 80 mm mesh size, ACFM recommends a precautionary TAC of 30 000 tonnes.

E.1.2 Southern Stock (Divisions VIIIC and IXa)

Recent catches and recommended precautionary TACs are shown below (in thousands of tonnes):

	1977	1978	1979	1980	1981	1982
Prec. TAC	-	-	20	10	8.5	8.5
Actual catch	16	15	18	22	19	20*

* Preliminary

It is still not possible to carry out an analytical assessment of this stock because of the lack of data. Some progress has been made in compiling age determinations, and while this is a welcome development it needs to be developed to a much wider extent. Sampling of landings and discards also need to be improved.

Although Portuguese groundfish surveys suggest that the level of hake abundance has been relatively stable during the period 1979-82, the year classes 1975, 1976, 1977 and 1979 are all poor ones. The first of these poor year classes recruited to the spawning stock in 1981, and a progressive reduction in spawning stock biomass is expected up to at least 1985.

The young fish in this stock are heavily exploited. The average age in the catch in recent years has been between 2 and 3, in contrast to the 8-9 years of age at which maximum biomass occurs in a virgin stock.

Management advice

The overall level of fishing mortality is undoubtedly too high for the current exploitation pattern, which is a consequence of the continued use of excessively small mesh sizes in the trawls.

ACFM repeats its advice of earlier years and recommends that a minimum mesh size of 80 mm be introduced and effectively enforced in all trawl fisheries.

In order to reduce the overall level of fishing mortality and taking into account the expected decrease in spawning stock biomass, ACFM recommends a TAC of 8 500 tonnes in 1984.

ACFM further recommends that the closures of nursery grounds, which have already been introduced since 1981 in parts of the southern stock area should be maintained.

E.1.3 Possible effects on hake of increased fishing on Southern Blue Whiting

Blue whiting in the Southern area are caught partly in a directed fishery and partly in a mixed hake and blue whiting fishery. In the latter case, there are potential problems for the enforcement of minimum mesh-size regulations. The mesh size required for blue whiting is lower than either the current legal or the optimum mesh size for hake. It is possible that a small-mesh fishery for hake will take place on the pretext that it is a fishery for blue whiting.

The main possibility for a substantial increase in the fishery for blue whiting would be a development of the directed fishery with the catch being utilized for reduction purposes. Such a fishery would tend to concentrate in the areas of highest abundance of blue whiting. Such areas tend to be in deeper waters where small hake are less abundant. No information is available on either the quantities or length compositions of hake taken as by-catches in the blue whiting fishery. Such information would be required to assess the effects on hake of an increased fishery for blue whiting.

F. STOCKS IN NEAFC REGION 3

F.1 Sea Bream, Monkfish and Flatfish

As last year the data made available for these stocks do not allow any assessments of the state of the stocks, and ACFM is consequently unable to give any advice.

F.2 Horse Mackerel

- F.2.1 For horse mackerel information is lacking about the relationship between Sub-areas VI, VII, VIII and IX. Results of otolith readings seem subject to caution, and fecundity needs more investigation.

No directed fishery exists in Sub-area VI, where the catch was about 5 000 tonnes in 1982.

In Sub-area VII catches amounted to 33 500 tonnes, which is about the same level as in 1982. In Sub-area VIII there has been a decrease from 40 100 tonnes in 1981 to 22 700 tonnes in 1982 (Tables F.2.1-F.2.4). In both Sub-areas the relevant data are too limited to be used in an assessment. The situation is similar in Sub-area IX.

F.3 Sardine in Divisions VIIIc and IXa

The text table below shows the catches in '000 tonnes, in Divisions VIIIc and IXa in the years 1976-82:

Years	1976	1977	1978	1979	1980	1981	1982
Portugal	80	80	84	80	90	113	97
Spain	62	46	56	62	85	101	103
Total	142	126	140	142	175	214	200

Since 1977 there has been an increase in catches, but in 1982 the catches decreased about 7%. The Spanish catch increased by about 3%, but the Portuguese catch decreased by about 14%. In both countries sardine is almost solely caught by purse-seiners and the highest catches are usually taken in the period July-November.

At ACFM's May 1983 Meeting no satisfactory data were available to give an index of recruitment to the stock. A joint acoustic survey was carried out for the first time by Portugal and Spain in August-September 1982. Although the survey was designed to provide indices of recruitment and stock abundance estimates off the Iberian coast, the coverage was not sufficient to give quantitative measurements of year class strength.

At the May 1983 meeting ACFM stressed that the 1983 TAC of 200 000 tonnes may be too high because of the evidence concerning poor recruitment.

F.3.1 Management advice for 1984

At its November meeting, ACFM had at its disposal the results of the August 1983 acoustic survey and catch in number for the period 1 January - 31 July 1983. The age distributions from these two sources were used to calculate the stocks as at 1 January 1983 as input for VPAs.

The 1983 survey gave an acoustic total biomass of about 1 million tonnes.

The results of the VPA based on this survey indicated a continuous increase in spawning stock biomass over the period 1976-82. However, a number of problems arise in relation to fishing mortalities obtained on 0- and 1-groups in 1982. In the VPA, the 1981 year class recruitment appears as average. This is in sharp contrast with its abundance in the January-July catches in 1983, where it is poorly represented. Catches of the 1981 year class in 1982 and during the first half of 1983 were very poor; in 1982, the catch of 1-year olds was only 39% of the 1976-81 average. This year class gave the highest catch of any as 0-group in the period 1976-82 and exceeded the catch of the year class as 1-group in 1982. In no other year class has this been observed. This implies that a change in exploitation pattern took place in 1981. The catch of the 1982 year class as 0-group is the lowest on record.

ACFM adopted an alternative VPA, which indicates the 1981 year class to be weak. This VPA was initiated by applying mean F values per age group from the period 1979-81 to the 1982 catch data. The spawning stock biomass under this scenario declines from 1981 to 1983.

On the basis of the catches between January and August for the years 1980-83, ACFM estimates that the total 1983 catch will be of the order of 150 000 tonnes. If the average 1979-81 exploitation pattern is carried on into 1983, then the 1983 2-group will be the lowest in the series since 1976.

A management option table is given below.

SARDINE

1982		1983				Management option for 1984	1984				1985		
Total land- ings	$\bar{F}(2-4)$	Stock biomass	Spawn. stock biom.	$\bar{F}(2-4)$	Total land- ings		Stock biom.	Spawn. stock biom.	$\bar{F}(2-4)$	Total land- ings	Stock biomass	Spawn. stock biom.	
200	.33	765	552	.33	150		$\bar{F}_{84}=0.4 \bar{F}_{82}$	699	486	.13	51	766	552
							$\bar{F}_{84}=0.8 \bar{F}_{82}$.27	97	725	512
							$\bar{F}_{84} = \bar{F}_{82}$.33	118	706	493

Weight in '000 tonnes

The biomass of 1 million tonnes estimated by the acoustic survey shows that the stock has remained fairly stable since 1979. The survey gives unreliable estimates of the relative strengths of different age groups, but the indications from the landings are that the 1981 and 1982 year classes are poor. The total annual catch is, therefore, expected to continue to decline below the 150 000 tonnes expected for 1983 to around 120 000 tonnes in 1984. This is at the lower end of the range of historic catches (120 000 - 250 000 tonnes) seen since 1960 (Table F.3.1).

Taking this into account together with the high level of natural mortality, ACFM recommends that fishing mortality should not be allowed to increase. The 1984 TAC preferred by ACFM is therefore 120 000 tonnes.

G. STOCKS IN NEAFC REGIONS 1, 2 AND 3

G.1 Mackerel

Allocation of catches to stocks

ACFM did not accept the method used by the Working Group which was based on age composition data. This method assumes that the age distribution of migrating fish is the same as that of the whole stock. ACFM did not consider that this was a valid hypothesis, since the age distribution varies throughout the stock's geographical range. Furthermore, most of the mixing factors "x" (the fraction of North Sea fish in the catch) estimated by the Working Group for the North Rona fishery lie outside the permissible range of 0 to 1.

Instead, ACFM agreed to use the evidence from the Norwegian tagging experiments. Although the number of recaptures from Division VIa was much lower in 1982 than in 1981, the proportions of recaptures from the North Sea and southwest Ireland releases were similar in both years, and in 1983. Catch numbers were re-allocated in the following percentages:

	<u>Division IIa</u>	<u>Winter fishery in the North Rona area of Division VIa</u>
1981: North Sea stock	10*	34
Western stock	90	66
1982: North Sea stock	10*	25**
Western stock	90	75**

* Rounded

** No change from Working Group figures; close to proportions indicated by tagging results.

For 1982, the percentages indicated for North Rona were applied to a total catch in that fishery of 39 800 tonnes. The allocation of catches taken in the North Sea (Sub-area IV and Division IIIa) remained unchanged at 100% North Sea stock in both years.

As stated in the July 1982 ACFM report, the accuracy of the stock assessments is limited by a number of factors:

- (a) Doubts about the total landing figures;
- (b) lack of accurate data on the number of mackerel caught but subsequently discarded (in the Western area);
- (c) lack of precise information about the rate of mixing between North Sea mackerel and Western mackerel in Divisions IIa, IVa and VIa.

G.1.1 The North Sea stock

The fishery in 1982

ACFM recommended a ban on mackerel fishing in Sub-area IV and Division IIIa in 1982 but a TAC of 25 000 tonnes was agreed between EEC and Norway.

Catches from the North Sea, Skagerrak and Kattegat amounted to 33 800 tonnes (Tables G.1.1 and G.1.2), and in the Norwegian Sea (Division IIa) catches reached the record level of 37 420 tonnes.

After allocating part of the catches in Divisions IIa and VIa to the North Sea stock, the total catch of the North Sea stock in 1982 was estimated at 46 400 tonnes.

State of the North Sea stock

In 1982 egg surveys were carried out by Norway, the Netherlands and Scotland. Using Norwegian and Dutch data the total egg production was estimated at 110×10^{12} eggs which is more than twice that estimated for 1981.

The spawning stock size corresponding to the 1982 egg production is 165 000 tonnes, and in carrying out the assessment the VPA was calibrated to this biomass level. It may be seen that fishing mortality has been around 0.3 for the years 1980-82.

This VPA indicates that total biomass and spawning stock biomass in 1982 were both at their lowest level since 1975 and have decreased by 16% and 24% respectively from the 1981 level.

This decrease is contradicted by the results of the egg survey in 1981 and 1982, but it should be noted that the coverage in the 1982 survey was better than the previous one.

Although dependent on the choice of the input F in the VPA, the recruitments of the 1980 and 1981 year classes seem to be somewhat higher than in the four preceding years, but they are still insufficient to rebuild the stock substantially.

No information was available on the strength of the 1982 year class. This was set at 20×10^6 fish. The level of catches in 1983 was estimated to be 50 000 tonnes.

Management advice

Management options are given below and in Figure G.1.1.

NORTH SEA MACKEREL

1983				Management option for 1984	1984				1985	
Stock biom.	Spawn. stock biom. Sp.time	$\bar{F}(3-13)$	Total land-ings		Stock biom.	Spawn. stock biom. Sp.time	$\bar{F}(3-13)$	Total land-ings	Stock biom.	Spawn. stock biom. Sp.time
168	147	0.38	50	$\bar{F}_{84} = 0$	117	104	0	0	113	100
				$\bar{F}_{84} = F_{0.1}$			0.15	14	99	86
				$\bar{F}_{84} = F_{82}$			0.30	27	87	73
				$\bar{F}_{84} = F_{83}$			0.38	33	81	67
				STABLE CATCH			0.66	50	64	43

Even with no fishing in 1984 the spawning stock biomass is forecast to decrease further by 1985, and ACFM therefore recommends that fishing on the North Sea stock should be closed.

G.1.2 The Western stock

The fishery in 1982

Catches in Sub-areas VI, VII and VIII amounted to 595 000 tonnes (Tables G.1.4 and G.1.5).

The TAC recommended by ACFM for the Western stock in 1982 was 270 000 tonnes but the likely catch was estimated to have been 631 000 tonnes.

As in 1981 about 20% of the catches in Sub-areas VI and VII could not be allocated to any particular country, and ACFM expressed their concern about the continuing deterioration of the official data.

80% of the catches were taken by the United Kingdom, the Netherlands, and Ireland, and 57% of the total catch were taken in Division VIa mainly in the fourth quarter.

State of the Western stock

Egg surveys were carried out in 1983 by England, the Federal Republic of Germany, France, the Netherlands and Scotland covering the entire spawning season and spawning area from east of the Cantabrian coast to northwest of Ireland at 54°N. Preliminary results of these surveys were available to the Working Group, and from these the annual egg production in 1983 was estimated to be 1.44×10^{15} eggs. Although these results were preliminary, it is not expected that the final figure will be markedly different when it becomes available to the next meeting of the Working Group. The coverage of the spawning area and spawning season by the 1983 survey is considered to be the most comprehensive since the series began in 1977.

This estimate of egg production for 1983 is about the same as that derived from the 1980 survey, which has been used previously to assess the size and exploitation rate of this mackerel stock.

The biomass estimate from the 1983 egg survey conflicts with ACFM's previous advice that the Western mackerel stock was declining rapidly, and that it would continue to do so if catches were maintained at the levels which have been taken. There are several possible explanations of this conflict:

- (a) The 1980 egg survey could have underestimated the spawning stock biomass in that year by more than 25%. One factor which probably played a major part in this underestimate was the very poor sampling coverage in the May survey in that year. This resulted in a very low estimate of egg production in that month, relative to adjacent surveys and the normal monthly pattern of egg production. The effect of this underestimation of spawning stock biomass in 1980 was that the fishing mortality rate was seriously overestimated from 1980 onwards. The stock, and the recruitment to it, were accordingly underestimated and the effects of future catches were overestimated.

- (b) It is certainly true that the confidence limits on these egg production estimates are wide, and these will be reflected in the accuracy of the stock estimates. Because, however, no other data are currently available to estimate stock size for this population, the results of the 1983 survey have been accepted for the assessment.
- (c) ACFM discussed the possibility that the apparent minor decline between the 1980 and 1983 spawning stock estimates was an artefact which resulted from the assumption that fecundity had remained at a constant level between the two years. It is possible that fecundity could have increased from 1980 to 1983 if the stock had in fact declined to the extent that was calculated by previous assessments. No evidence is available, however, to support this hypothesis.

ACFM reassessment

Using the same exploitation pattern as the Working Group but applied to the re-allocated catch numbers, ACFM ran a new VPA calibrated to the 1983 egg survey spawning stock of $7\,200 \times 10^6$ fish. Using a terminal $\bar{F}_{3-8} = 0.18$ in 1982 and 1983 gave a spawning stock at spawning time in 1983 of $7\,363 \times 10^6$ fish. This fishing mortality was therefore adopted.

The spawning stock at spawning time in 1980 derived from this VPA is $8\,200 \times 10^6$ fish which is 32% above the egg survey estimate of that year. Fishing mortality rose to 0.21 in 1979 and 1980. The spawning stock biomass has declined from 3.7 million tonnes in the early 1970s to the egg survey estimate of 2.2 million tonnes in 1983.

No estimate of the strength of the 1982 year class in 1983 was available but it does not appear to be a strong one. The 1982, 1983 and 1984 year classes were assumed to be $1\,000 \times 10^6$ fish. Although this may appear to be over-cautious, the strength of the 1983 and 1984 year classes has a negligible influence on the forecast of spawning stock biomass in 1985. The Working Group will be asked to review the appropriate recruitment levels to use in forecasts for this stock.

From the information already available on the fishery in 1983 and in the absence of effective management the 1983 catch was estimated at 650 000 tonnes.

Under the assumptions made, the spawning stock will continue to decrease in 1984 and 1985 at any level of F and the need for effective management is stressed.

Management advice

Management options are given below.

RECRUITMENT 1983-84
1 000 MILLION FISH

1983				1984					1985	
Stock Biomass	Spawning Stock Biomass Sp.time	\bar{F}_{3-8}	Total Landings	Management Option for 1984	Stock Biomass	Spawning Stock Biomass Sp.time	\bar{F}_{3-8}	H.C. Landings	Stock Biomass	Spawning Stock Biomass Sp.time
3 149	2 347	0.19	650	$\bar{F}_{84} = 0$	2 556	2 205	0	0	2 684	2 281
				$\bar{F}_{84} = F_{0.1}$		2 059	0.17	494	2 287	1 801
				$\bar{F}_{84} = \bar{F}_{83}$		2 049	0.19	541	2 249	1 757
				STABLE CATCH		2 010	0.23	650	2 162	1 618

RECRUITMENT 1983-84
1 000 MILLION FISH

ACFM recommends that the stock should not be exploited above the $F_{0.1}$ level, corresponding to a TAC in 1984 of 500 000 tonnes. The $F_{0.1}$ value of fishing mortality is 0.17 and not 0.15 as in earlier assessments. This is a consequence of the change in average weight at age made in 1982.

Catches in Division IIa and Sub-division V_b should be counted against the Western stock TAC.

G.1.3 Closed area in the Celtic Sea

Information on the composition of catches taken west of 7°W is still too limited to support the suggestion of a westward extension of the closed area (Figure G.1.3). Data from around Cornwall show that fish below 30 cm were still predominant in the area in 1982 and early 1983 and efforts to minimise catches of juvenile fish should therefore continue. On mackerel criteria alone ACFM recommends that the eastern boundary of the closed area should be maintained at its present position of 2°W .

G.1.4 Closed area for mackerel in Division VIa

ACFM confirms its advice from November 1982 and the closure in Division VIa north of 58°N should be continued in 1984.

G.1.5 Mackerel in Sub-area IX

From the limited information available it is evident that immature fish were still predominant in the catches in 1982.

This is a cause for concern and more biological data should be obtained in order that ACFM may provide appropriate advice.

G.1.6 Other deficiencies in data

The amount and quality of biological data are still far from satisfactory. For mackerel, information is urgently required about:

- stock separation in Divisions IIa, IVa and VIa;
- estimates of F in the most recent year;
- recruitment indices.

G.2 Blue Whiting

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

Stock	1978 Catch	1979 Catch	1980 Catch	1981 Catch	1982 Catch ¹ TAC ²	1983 Rec. TAC
Northern area	574	1 146	1 093	871	540 1 000	570 - 780
Southern area	34	27	30	39	34	

¹Preliminary

²Precautionary

As in the two previous years, ACFM recognised the possibility of at least two separate blue whiting stocks - one in the northern and one in the southern area.

G.2.1 Blue Whiting in the Northern Area

(ICES areas: I, II, IIIa, IVa-c, V, VIa,b, VIIb,c, XIV)

Total landings of blue whiting from the northern area decreased significantly in 1982 compared to 81. (Table G.2.1). This is the second year in succession in which landings have declined. The major part of the decrease is again accounted for by a reduction in the USSR landings from the Norwegian Sea*, although all countries fishing for blue whiting in the Norwegian Sea had lower catches in 1982 compared to 1981. The landings from the spawning and post-spawning fishery increased, as did the landings from the mixed industrial fishery in the North Sea.

Trends in Catch and Effort

Changes in the total stock biomass are likely to be best reflected in catch per effort indices from the Norwegian Sea fishery during the period July to September. In the text table below, the catch by the USSR vessels (GRT-class 2 000 - 3 999.9), which provide the most representative time series, is presented for the period 1979-82 together with the catch rates of the German Democratic Republic vessels of the same class.

* Throughout the Blue Whiting section of this report, the term Norwegian Sea means Sub-areas I and II, Divisions Vc, XIVa and XIVb.

Catch per unit effort (tonnes/hour) in the Blue Whiting fishery in Division IIa by USSR and German Democratic Republic vessels (GRT-class 2 000 - 3 999.9)

July - September 1979-1982*

	1979	1980	1981	1982
USSR	2.57	3.31	2.18	1.22
German Democratic Republic	3.03	3.58	2.36	1.47

*Total catch / total effort.

The marked decrease in the catch rates observed in 1982 compared to 1981 was seen in almost every month and most probably indicates a reduction in the stock, although some of the decrease in availability might be explained by changes in the hydrography in the Norwegian Sea (Schevchenko and Isaev, 1983).

Acoustic Surveys

A Norwegian survey in the spawning areas west of the British Isles in April 1983 estimated the stock to be 4.7 million tonnes, of which 4.4 million tonnes were adult fish (26 cm and larger). A USSR survey in the same area from mid-April to mid-May gave an estimate of the spawning stock of 3.6 million tonnes.

In August 1983 the second ICES-coordinated survey was carried out in the Norwegian Sea and adjacent waters by 8 vessels. The survey gave a total biomass estimate of 2.8 million tonnes, of which 0.2 million tonnes were 0-group fish (1983 year class), 1.5 million tonnes 1-group fish (1982 year class) and 1.1 million tonnes of the older year classes (27 cm and larger).

Surveys in the spawning area and in the Norwegian Sea in 1981 and 1982 gave fairly consistent values with each other taking into account that the whole area was not covered on some of the surveys. The estimates of the adult stock obtained during the August survey in 1983 (1.1 million tonnes), however, is very different from the estimates of the spawning stock obtained in April-May 1983 (3.6 - 4.4 million tonnes), and it is difficult to account for the discrepancy of 2.5 million tonnes. Some sources of error which might have introduced biases into the estimates were discussed. ACFM, however, was unable to conclude anything from the acoustic surveys other than that the size of the spawning stock is probably somewhere in between the estimates obtained from the spawning surveys and the August survey. It is too early to conclude anything about the 1983 year class, whereas the 1982 year class obviously is strong.

Management Advice

Due to conflicting evidence on abundance derived from the acoustic surveys in 1983, ACFM was not in a position to advice on a TAC for 1984. However, in view of the failure of the oceanic fishery on the adult stock to develop in 1983 caution is strongly advocated until further information becomes available.

G.2.2 Blue Whiting in the Southern Area

(ICES areas: Divisions VIId,e + VIIg-k, Sub-areas VIII, IX)

The total landings of blue whiting from the southern area decreased by 13% in 1982 compared to 1981.

Catch and effort data indicate slightly lower catch rates in the Spanish fishery. The catch per unit effort in the Portuguese fishery increased from 1980 to 1981 as the industry developed an interest in the blue whiting resource. This catch rate fell by 50% in 1982, but this is believed to reflect a shift in effort away from the blue whiting and not a real reduction in abundance.

Catch at age data were available only for the Spanish landings in 1982. Length distributions were provided for the catches of Spain for the years 1977-82, and by Portugal for the years 1980-82.

Until more reliable information is available, especially concerning age composition data, it is not possible to attempt an analytical, or any other type of assessment.

ACFM is therefore not in a position to give any advice on this stock at present.

Table A.1 Nominal catch (in '000 tonnes) by Sub-areas and main species in NEAFC Region 1, 1972-1981

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Total Nominal Catch in Region 1*	4 153	4 313	4 516	4 592	5 739	6 301	5 421	5 613	5 268	5 404
Sub-areas I & II (NE-Arctic)										
<u>Pelagic Fish</u>										
Herring	13	7	8	5	1	18	12	4	11	11
Capelin	1 593	1 336	1 147	1 416	2 546	2 940	2 036	1 829	1 693	2 103
Others	4	26	12	40	16	8	9	10	11	24
Total Pelagic Fish	1 610	1 369	1 167	1 461	2 563	2 966	2 057	1 843	1 715	2 138
<u>Demersal Fish</u>										
Cod	643	831	1 143	886	908	945	733	485	420	434
Haddock	188	294	231	182	139	112	97	110	93	82
Polar Cod	167	82	124	63	12	8	5	+	+	9
Saithe	214	212	264	233	242	183	154	164	145	176
Redfish	37	60	97	278	318	186	124	113	103	102
Flatfish	65	48	57	53	55	48	42	37	22	20
Others	68	79	92	77	66	105	246	775	826	552
Total Demersal Fish	1 382	1 606	2 008	1 772	1 740	1 587	1 401	1 684	1 609	1 375
Total Catch of all Species	2 992	2 975	3 175	3 233	4 303	4 553	3 458	3 527	3 324	3 513
Sub-area V (Iceland and Faroes)										
<u>Pelagic Fish</u>										
Herring	+	9	9	13	20	29	38	45	54	40
Capelin	277	442	462	461	430	761	833	868	651	582
Others	+	4	+	-	1	+	+	+	+	2
Total Pelagic Fish	277	456	471	474	451	790	871	913	705	624
<u>Demersal Fish</u>										
Cod	423	407	401	410	390	377	363	397	459	496
Haddock	56	64	57	66	69	65	63	68	66	76
Saithe	157	168	144	129	115	97	78	91	84	89
Redfish	81	79	77	79	75	69	45	77	82	103
Flatfish	23	19	17	14	16	26	21	26	38	23
Others	60	75	79	63	131	181	257	236	189	200
Total Demersal Fish	800	812	775	761	796	815	827	895	918	987
Total Catch of all Species	1 077	1 267	1 246	1 235	1 247	1 605	1 698	1 808	1 623	1 611
Sub-area XIV (East Greenland)										
Total Catch of all Species	56	33	49	53	148	97	219	230	267	152

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

+ less than 500 tonnes.

Table A.2 Nominal catch (in '000 tonnes) by Sub-area and main species in NEAFC Region 2, 1972-1981

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Total Nominal Catch in Region 2*	4 043	4 330	4 901	5 062	5 086	3 937	4 058	3 910	4 149	3 940
Sub-area IV (North Sea) and Div. IIIa (Skagerrak and Kattegat)										
<u>Pelagic Fish</u>										
Herring	715	740	427	416	255	157	108	79	91	153
Mackerel	188	327	298	263	306	259	153	155	88	66
Sprat	97	270	376	758	670	385	477	478	509	419
Horse Mackerel	8	42	31	10	9	4	5	2	2	7
Others	3	3	6	6	4	4	3	3	6	3
Total Pelagic Fish	1 011	1 382	1 138	1 453	1 244	809	746	717	696	648
<u>Demersal Fish</u>										
Cod	368	258	238	219	252	227	306	263	288	334
Haddock	216	199	198	180	214	160	96	91	112	143
Whiting	123	165	217	160	210	139	152	159	132	120
Norway Pout ¹⁾	510	461	833	662	575	455	347	390	549	334
Saithe	240	219	270	268	307	190	140	115	123	126
Sandeels	366	307	532	445	517	803	810	637	768	647
Plaice	144	144	128	124	132	144	124	132	118	110
Sole	21	20	18	19	15	15	11	12	16	15
Other Flatfish	24	27	28	28	26	29	30	33	31	31
Others	36	45	39	42	37	63	138	141	103	117
Total Demersal Fish	2 048	1 842	2 501	2 146	2 285	2 225	2 154	1 973	2 240	1 977
Total Catch of all Species	3 059	3 224	3 639	3 599	3 529	3 034	2 900	2 690	2 936	2 625
Sub-areas VI and VII (West and South of U.K. and Ireland)										
<u>Pelagic Fish</u>										
Herring	290	324	277	226	179	91	66	45	54	102
Mackerel	134	184	249	431	419	307	488	528	503	482
Sprat	13	19	19	16	21	21	32	21	34	24
Horse Mackerel	102	121	119	121	181	30	26	51	54	86
Others	13	9	7	14	16	21	21	22	17	14
Total Pelagic Fish	552	657	671	808	816	470	633	667	662	708
<u>Demersal Fish</u>										
Cod	33	29	33	33	39	31	36	38	42	56
Haddock	58	44	78	72	67	26	24	20	24	32
Whiting	30	38	45	53	59	46	43	46	49	59
Hake	18	21	45	44	41	17	17	20	17	20
Flatfish	35	34	37	40	43	33	33	32	41	45
Others	106	134	177	193	233	162	226	266	262	244
Total Demersal Fish	280	300	415	435	482	315	379	422	435	456
Total Catch of all Species	832	957	1 086	1 243	1 298	785	1 012	1 089	1 097	1 164

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

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

Table A.3 Nominal catch (in '000 tonnes) by main species in NEAFC Region 3, 1972-1981

Total Nominal Catch in Region 3*	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
	891	869	625	641	681	723	638	597	582	555
<u>Pelagic Fish</u>										
Pilchard	173	170	127	164	146	130	162	145	198	224
Mackerel ¹⁾	42	77	78	52	61	34	29	28	20	21
Horse Mackerel	156	190	130	134	181	191	114	91	80	62
Others	141	94	92	124	117	158	136	119	83	58
Total Pelagic Fish	512	531	427	474	505	513	441	383	381	365
<u>Demersal Fish</u>										
Hake	71	86	48	54	47	46	29	42	42	39
Others	142	88	57	77	94	135	138	105	137	126
Total Demersal Fish	213	174	105	131	141	181	167	147	179	165
Total Catch of all species	735	705	532	605	646	694	608	530	560	530

*Including non-teleost, unsorted and unidentified species

¹⁾ Catches of Chub (= Spanish) mackerel included in figures for 1972-1976.

Table B.1.1.1 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
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	168 671	12 450	199 313	380 434
1981	137 033	16 837	245 167	399 037
1982*	97 012	31 029	236 828	364 869

* Provisional figures.

EXPECTED CATCHES

1983	84 000	21 000	203 000	308 000
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Table B.1.1.2 North-East Arctic 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
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	1 705	233	1 921	232 242	3	10 366	115 194	8 789	380 434
1981	12 825	3 106	298	2 228	277 818	-	5 262	83 000	14 500	399 037
1982*	11 998	1 900	302	1 717	287 525	-	6 601	40 311	14 515	364 869

*) Provisional figures

¹⁾ Murman cod included

Table B.1.2.1 North-East Arctic HADDOCK. Total nominal catch (tonnes) by fishing areas. (Data provided by Working Group members.)

Year	Sub-area I	Division IIb	Division IIa	Total
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	54 205	68	33 616	87 889
1981	36 851	455	39 864	77 153
1982*	17 869	2	29 381	47 252

* Provisional figures.

EXPECTED CATCHES

1983	13 000	-	14 000	27 000
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Table B.1.2.2 North-East Arctic HADDOCK. Nominal catches (tonnes) by countries. (Sub-area I and Divisions IIa and IIb combined.) (Data provided by Working Group members.)

Year	Faroe Isls.	France	German Dem.Rep.	Germany, Fed.Rep.	Norway	Poland	U.K.	USSR	Others	Total
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	226	15	1 365	61 886	-	2 948	20 706	246	87 889
1981	381	414	22	2 398	58 856	-	1 682	13 400	-	77 153
1982*	496	350	-	1 258	41 421	-	827	2 900	-	47 252

* Provisional figures.

1) Murman haddock included.

Table B.2.1 Nominal catch of REDFISH (in tonnes) by countries (Sub-area I, Divisions IIa and IIb combined).
(As reported officially to ICES)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^{*)}
Belgium	-	30	28	2	1	-	-	-	-	
Faroe Isl.	32	6	67	137	8	1	-	-	206	
France	-	1 116	-	-	660	3 608	1 142	1 297	537	13
German Dem.Rep.	11 756	28 275	28 020	22 636	17 614	16 165	16 162	8 448	4 614	4 463
Germany, Fed.Rep.	3 479	6 597	5 182	7 894	7 231	11 483	11 913	7 992	4 683	3 039
Netherlands	-	-	-	127	-	-	-	-	-	
Norway	7 714	7 055	4 966	7 305	7 381	7 802	9 025	8 472	9 249	9 989
Poland	215	1 269	4 711	4 137	175	2 957	261	87	26	
Portugal	-	-	331	3 463	1 480	378	1 100	271	-	
Spain	-	-	1 194	3 398	-	-	1 375	1 965		
U.K.	4 791	3 509	2 746	4 961	6 330	3 390	1 756	1 307	470	365
USSR	31 829	48 787	230 950	263 546	144 993	78 092	70 451	72 802	81 652	112 545
Total	59 816	96 644	278 195	317 606	185 873	124 172 ^{**))}	113 620 ^{**))}	102 765 ^{**))}	101 442	130 414 ^{**))}

^{*)} Provisional figures

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

Table B.2.2 Nominal catch of Sebastes marinus and Sebastes mentella in
Sub-area I and Divisions IIa and IIb combined (in tonnes).

Year	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
<u>S. marinus</u>	21 436	27 272	39 125	48 584	39 508	31 695	26 475	23 411	20 206	15 477
<u>S. mentella</u>	38 380	69 372	239 070	269 022	146 365	92 477	87 145	79 354	81 236	114 937
Total	59 816	96 644	278 195	317 606	185 873	124 172	113 620	102 765	101 442	130 414

* Provisional figures.

Table B.3.1 GREENLAND HALIBUT. Nominal catch (tonnes) in Sub-areas I and II, 1973-82.
(Data for 1973-81 from Bulletin Statistique)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Faroe Isl.	-	-	-	2	21	-	24	-	8	-
German Dem.Rep.	3 954	5 914	8 472	8 955	8 176	4 611	3 488	2 080	1 358	1 153
Germany, Fed. Rep.	59	88	94	31	148	321	481	303	128	17
<u>Norway:</u>										
trawl catch	10 217	4 656	1 686	4 030	2 564	2 302	921	1 559	2 949	1 812
long-line catch and gill net	3 772	4 135	3 172	1 975	1 653	1 780	1 992	1 598	1 252	1 387
Poland	2 140	5 146	3 645	3 566	224	544	106	-	-	-
U.K. (England and Wales)	1 235	866	731	935	1 059	407	59	26	9	
USSR	8 561	16 958	20 372	16 580	15 045	14 651	10 311	7 670	9 276	11 900
Others	-	-	-	-	-	1	5	48	38	
Total	29 938	37 763	38 172	36 074	28 890	24 617	17 312	13 284	15 018	16 269

* Provisional figures.

Table B.4.1 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.
(As reported officially to ICES.)

Year	Division Va	Division Vb	Sub-area XIV	Total	<u>S. marinus</u>	<u>S. mentella</u>
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	64 310	12 674	20 918 ¹⁾	97 902	75 056	22 846
1980	72 249	10 039	32 609 ¹⁾	114 897	88 085	26 812
1981	95 517	7 145	42 999 ¹⁾	145 661	101 285	44 376
1982*	115 198	9 591 ²⁾	44 171 ¹⁾	168 960	122 386	46 574 ³⁾

* Provisional figures.

1) Catches updated for Sub-area XII included.

2) Catches updated for Sub-area VI included.

3) Including 598 tonnes from the oceanic stock not included in the assessments.

Table B.4.2 Nominal catch of REDFISH (1 000 tonnes) 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.Rep.	Iceland	Norway	Poland	United Kingdom	USSR	Total
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	-	-	69.8	+	-	-	-	72.3
1980 S.mar.	1.4	1.1	-	-	59.6	-	-	-	-	62.1
1980 S.ment.	-	-	-	-	10.2	-	-	-	-	10.2
1981 Total	.9	1.2	-	-	93.4	+	-	-	-	95.5
1981 S.mar.	.9	1.2	-	-	73.7	-	-	-	-	75.8
1981 S.ment.	-	-	-	-	19.7	-	-	-	-	19.7
1982 ^x Total	.3	-	-	-	114.9	+	-	-	-	115.2
1982 ^x S.mar.	.3	-	-	-	96.4	+	-	-	-	96.7
1982 ^x S.ment.	-	-	-	-	18.5	-	-	-	-	18.5

^x) Provisional figures

Table B.4.3 Nominal catch (1 000 tonnes) 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.Rep.	Netherlands	Norway	United Kingdom	Total
1973 Total	0.1	-	-	9.5	-	-	0.1	9.7
1973 S.mar.	0.1	-	-	-	-	-	0.1	0.2
1973 S.ment.	-	-	-	9.5	-	-	-	9.5
1974 Total	+	0.3	+	7.3	-	-	0.1	7.7
1974 S.mar.	-	0.3	-	-	-	-	0.1	0.4
1974 S.ment.	-	-	-	7.3	-	-	-	7.3
1975 Total	+	0.8	+	7.6	0.1	+	+	8.5
1975 S.mar.	-	0.8	-	-	0.1	-	-	0.9
1975 S.ment.	-	-	-	7.6	-	-	-	7.6
1976 Total	+	-	-	5.3	-	+	0.1	5.4
1976 S.mar.	-	-	-	-	-	-	0.1	0.1
1976 S.ment.	-	-	-	5.3	-	-	-	5.3
1977 Total	0.1	1.4	-	5.9	-	+	0.1	7.5
1977 S.mar.	0.1	0.6	-	-	-	-	0.1	0.8
1977 S.ment.	-	0.8	-	5.9	-	-	-	6.7
1978 Total	1.5	0.4	-	7.8	-	+	0.1	9.8
1978 S.mar.	1.5	0.4	-	-	-	-	0.1	2.0
1978 S.ment.	-	-	-	7.8	-	-	-	6.7
1979 Total	5.7	0.9	-	6.1	-	+	-	12.7
1979 S.mar.	4.8	-	-	-	-	-	-	4.8
1979 S.ment.	0.9	0.9	-	6.1	-	-	-	7.9
1980 Total	5.5	0.6	-	3.9	-	+	-	10.0
1980 S.mar.	4.9	-	-	-	-	+	-	4.9
1980 S.ment.	0.6	0.6	-	3.9	-	-	-	5.1
1981 Total	3.2	+	-	3.9	-	+	-	7.1
1981 S.mar.	2.5	-	-	-	-	+	-	2.5
1981 S.ment.	0.7	+	-	3.9	-	-	-	4.6
1982 ^x Total	4.0	0.2	-	5.4	-	+	-	9.6
1982 ^x S.mar.	1.7	0.2	-	-	-	+	-	1.9
1982 ^x S.ment.	2.3	+	-	5.4	-	-	-	7.7

x) Provisional

Table B.4.4 Nominal catch (1 000 tonnes) 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.Rep.	Iceland	Norway	Poland	United Kingdom	USSR	Total
1973 Total	-	-	+	0.8	4.5	2.1	-	0.3	0.1	0.1	7.9
1973 S.mar.	-	-	-	0.8	4.5	2.1	-	0.3	0.1	0.1	7.9
1973 S.ment.	-	-	-	-	-	-	-	-	-	-	-
1974 Total	-	-	+	1.3	2.6	9.8	-	+	0.1	0.1	13.9
1974 S.mar.	-	-	-	1.3	2.6	9.8	-	-	0.1	0.1	13.9
1974 S.ment.	-	-	-	-	-	-	-	-	-	-	-
1975 Total	-	-	+	4.5	5.0	5.6	0.1	0.3	0.1	9.8	25.4
1975 S.mar.	-	-	-	4.5	5.0	5.6	0.1	0.3	0.1	5.4	21.0
1975 S.ment.	-	-	-	-	-	-	-	-	-	4.4	4.4
1976 Total	0.4	0.1	+	-	4.4	7.4	+	-	0.3	101.0	113.6
1976 S.mar.	0.4	0.1	-	-	4.4	7.4	-	-	0.3	41.3	53.9
1976 S.ment.	-	-	-	-	-	-	-	-	-	59.7	59.7
1977 Total	-	+	+	-	13.3	0.1	0.1	-	0.6	0.3	14.4
1977 S.mar.	-	-	-	-	13.3	0.1	0.1	-	0.6	0.3	14.4
1977 S.ment.	-	-	-	-	-	-	-	-	-	-	-
1978 Total	-	+	-	-	20.7	0.2	+	-	+	-	20.9
1978 S.mar.	-	-	-	-	15.3	0.2	-	-	-	-	15.5
1978 S.ment.	-	-	-	-	5.4	-	-	-	-	-	5.4
1979 Total	-	-	+	-	21.1	-	-	-	-	-	21.1
1979 S.mar.	-	-	-	-	15.8	-	-	-	-	-	15.8
1979 S.ment.	-	-	-	-	5.3	-	-	-	-	-	5.3
1980 Total	-	-	-	-	32.5	0.1	-	-	-	-	32.6
1980 S.mar.	-	-	-	-	22.1	0.1	-	-	-	-	22.2
1980 S.ment.	-	-	-	-	10.4	-	-	-	-	-	10.4
1981 Total	-	-	+	-	43.0	-	-	-	-	-	43.0
1981 S.mar.	-	-	-	-	23.6	-	-	-	-	-	23.6
1981 S.ment.	-	-	-	-	19.4	-	-	-	-	-	19.4
1982 ^x Total	-	-	-	-	43.6	+	-	0.6 ¹	-	?	44.2
1982 ^x S.mar.	-	-	-	-	23.9	-	-	-	-	-	23.9
1982 ^x S.ment.	-	-	-	-	19.7	-	-	0.6	-	-	20.3

x) Provisional

1) Catches from the oceanic stock not included in the assessments.

Table B.5.1 GREENLAND HALIBUT. Nominal catch (tonnes) in Sub-areas V and XIV, 1973-82.
(Data for 1973-81 from Bulletin Statistique)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Faroe Isl.	188	48.	8	375	1 251	258	150	1 042	767	863
France	-	-	-	-	-	12	70	51	8	-
German Dem. Rep.	9 126	25 801	16 963	-	-	-	-	-	-	-
Germany, Fed.Rep.	1 120	1 949	1 388	2 219	5 207	2 726	6 461	2 318	3 007	2 532
Greenland	4	2	1	1	4	6	-	-	+	9
Iceland	2 118	2 843	1 212	1 689	10 090	11 319	16 934	27 838	15 455	28 322
Norway	-	-	7	7	7	19	1	3	2	-
Poland	3 131	1 542	1 072	-	-	-	-	-	-	-
U.K.(Engl. and Wales)	3 710	2 323	1 209	1 680	19	9	-	-	-	-
USSR	1 066	1 772	1 634	74	-	-	-	-	-	-
Total	20 463	36 280	23 494	6 045	16 578	14 349	23 616	31 252	19 239	31 726

* Provisional figures.

Table B.6.1.1 Nominal catches (in tonnes) of COD in Sub-area XIV, 1973-82.

(Data for 1973-81 broken down by countries are from Bulletin Statistique)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981 c)	1982*
Canada	-	-	-	2	-	-	-	-	-	-
Faroe Isl.	167	652	581	440	1 407	6	-	-	103	-
German Dem. Rep.	8	15	326	-	-	-	-	-	-	-
Germany, Fed. Rep.	9 262	2 309	1 552	7 075	3 564	3 936	1 062	9 447 ^{d)}	9 246 ^{a,d)}	8 964
Greenland	191	68	224	372	1 833	1 347	2 755	1 367	1 442	892
Iceland	1 446	3 009	785	3 133	25	13	3	9	-	-
Norway	-	-	1 864	364	537	17	-	-	-	-
Poland	17	1	18	-	-	-	-	-	-	-
U.K. (Engl. and Wales)	661	499	575	1 514	1 393	41	-	-	-	-
U.K. (Scotl.)	-	-	-	-	-	2	-	-	-	-
USSR	-	-	-	127	16	-	-	-	-	-
Total	11 752	6 553	5 925	13 027	8 775	5 362	3 820	10 823	10 791	9 856
Working Group Total including estimates of unreported catches					18 000	26 000	34 000	12 000 ^{b)}	16 000 ^{b)d)}	27 000 ^{b)d)}

* Provisional figures.

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

b) Including estimated discards.

c) From Data Form 5.

d) Including catches reported from ICES Sub-area XII and Division Vb.

Table B.6.1.2 Monthly COD catches (tonnes) by the Federal Republic of Germany in 1982 in areas XIV, XII and Vb.

<u>Month</u>	<u>XIV</u>	<u>XII</u>	<u>Vb</u>	<u>Total</u> ^{x)}
January	521	1 382	0	1 903
February	131	4 102	905	5 138
March	375	1 036	297	1 708
April	1 686	127	0	1 813
May	1 551	774	100	2 425
June	1 511	1 024	160	2 695
July	360	636	3	999
August	132	75	0	
September	92	429	0)
October	141	0	122)
November	346	332	0) 4 201
December	2 118	414	0	
<hr/>				
Total	8 964	10 331	1 587	20 882
Jan-May total	4 264			12 987
% Jan-May	47.6			62.2

x) Assumed by the Working Group as taken in Sub-area XIV.

Table B.7.1.1 Landings of Icelandic summer-spawning HERRING
1973-82 in tonnes x 10⁻³.

<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
0.2	1.2	12.8	17.8	28.7	37.3	45.1	53.3	39.5	53.8

Table B.7.2.1 Catches north of 62°N of Norwegian spring-spawning
HERRING (tonnes) since 1972.

Year	Catches of adult herring in winter ¹⁾	Mixed herring fishery in autumn ²⁾	By-catches of 0- and 1-group herring in the sprat fishery	Total
1972	0	9 895	3 266 ³⁾	13 161
1973	139	6 602	276	7 017
1974	906	6 093	620	7 619
1975	53	3 372	288	3 713
1976	0	247	189	436
1977	374	11 834	498	12 706
1978	484	9 151	189	9 824
1979	691	1 866	307	2 864
1980	878	7 634	65	8 577
1981	844	7 814	78	8 736
1982	983	10 447	225	11 655
1983	3 370 ⁴⁾			3 370

1) Mostly experimental fishing.

2) Includes also by-catches of adult herring in other fisheries.

3) In 1972 there was also a directed herring 0-group fishery.

4) Preliminary 1 January - 30 June 1983.

Table B.8.1 International catch of Barents Sea capelin
(in 1 000 tonnes) in the years 73-82.

Year	Norway	USSR	Other	Total
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
1981	1 238	721	28	1 987
1982	1 158	596	5	1 759

Table B.8.2 The total annual and seasonal catch of capelin
in the Iceland, E-Greenland, Jan Mayen area.

Year	Winter season		Summer and autumn season				Total
	Iceland	Faroes	Iceland	Norway	Faroes	EEC	
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	24.4	14.3	916.5
1981	156.0		484.6	91.4	16.2	20.8	769.0
1982	13.0						13.0
1983	0.0						

Table C.1.2.1 Nominal catch (tonnes) of SAITHE in Sub-area I and Divisions IIa and IIb, 1973-82.

(Data for 1973-1981 from Bulletin Statistique)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^{*)}
Belgium	-	5	47	1	-	-	-	-	-	-
Faroe Islands	7	46	28	20	270	809	1 117	532	236	319
France	11 320	7 119	3 156	5 609	5 658	4 345	2 601	1 016	194	-
German Dem. Rep.	12 015	29 466	28 517	10 266	7 164	6 484	2 435	-	-	-
Germany, Fed. Rep.	30 338	33 155	41 260	49 056	19 985	18 190	14 823	12 511	8 413	7 221
Netherlands	-	-	-	64	-	-	-	-	-	-
Norway	148 789	152 699	122 598	131 675	139 705	121 069	141 346	128 878	166 139	166 600
Poland	23	2 521	3 860	3 164	1	35	-	-	-	-
Portugal	-	-	6 430	7 233	783	203	-	-	-	-
Spain	2 115	7 075	11 397	21 661	1 327	121	685	780	-	-
Sweden	-	-	8	-	-	-	-	-	-	-
U.K. (England & Wales)	6 503	3 001	2 623	4 651	6 853	2 790	1 170	794	395	716
U.K. (Scotland)	248	103	140	73	82	37	-	-	-	1
USSR	2 411	28 931	13 389	9 013	989	381	3	43	121	15
Total	213 769	264 121	233 453	242 486	182 817	154 464	164 180	144 554	175 498	174 872

^{*)} Preliminary

Table C.1.3.1 Nominal catch (tonnes) of SAITHE in Sub-area IV and Division IIIa, 1973-1982.
(Data for 1973-1981 from Bulletin Statistique)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^{*)}
Belgium	55	33	81	127	107	44	14	13	12	1
Denmark	10 100	8 388	10 149	15 111	17 334	10 372	10 461	10 370	6 454	10 052
Faroe Islands	552	581	287	425	318	213	407	1 020	614	143
France	32 961	28 619	24 396	32 552	41 022	38 122	40 983	37 306	42 649	49 548
German Dem.Rep.	7 668	5 816	5 882	2 088	2 430	2 404	1 504	925	-	-
Germany, Fed.Rep.	12 003	20 589	18 622	38 698	26 860	25 982	18 780	11 095	8 246	13 520
Iceland	23	5	1	-	-	-	-	-	-	-
Ireland	-	-	-	119	126	88	-	-	-	-
Netherlands	9 232	14 504	8 917	6 101	7 270	5 135	1 466	245	123	100 ^{c)}
Norway ^{b)}	15 219	9 246	12 483	17 856	14 949	17 627	17 575	47 959	55 882	61 000
Poland	7 512	22 203	35 304	35 819	12 378	5 661	6 104	2 404	698	793
Spain	108	308	249	-	-	-	-	-	-	-
Sweden	1 876	1 187	913	1 271	1 275	990	211	342	156	320
UK (Engl. & Wales)	3 378	4 353	3 472	6 300	6 822	8 382	6 256	4 879	4 309	5 029
UK (Scotland)	10 834	10 956	8 898	13 034	11 366	14 330	8 257	6 525	6 529	8 149
USSR	83 333	104 500	110 743	83 669	46 385	10 161	2 015	-	-	-
Sub-total	194 854	231 288	240 397	253 170	188 642	139 511	114 033	123 083	125 672	148 655
By-Catch from Industrial Fisheries:										
Denmark ^{a)}	24 400	38 800	27 800	53 684	1 805	72	493	-	-	-
Norway ^{a)}	6 517	3 469	9 878	13 082	4 392	2 494	1 142	363	1 280	5 003
TOTAL	225 771	273 557	278 075	319 936	194 839	142 077	115 668	123 446	126 952	153 658

*) Preliminary

a) Data from national laboratories

b) In 1973 and 1974 estimates of industrial by-catches were included in the Norwegian catches reported to ICES. These estimates have later been revised and the sum of industrial by-catch and human consumption landings therefore deviate somewhat from the Bulletin Statistique figures.

c) Working Group estimate

Table C.2.1 Nominal catch (tonnes) of SALTHE in Division Va, 1973-1982.

(Data for 1973 to 1981 from Bulletin Statistique)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^{*)}
Belgium	2 131	2 371	1 638	1 615	1 448	1 092	980	980	532	203
Faroe Islands	1 467	1 712	1 366	3 267	3 013	4 250	5 457	4 930	3 545	3 685
France	-	94	32	51	-	-	-	-	-	-
Germany, Fed. Rep.	38 565	18 627	13 820	13 785	10 575	-	-	-	-	-
Iceland	56 567	65 169	61 430	56 811	46 973	44 327	57 066	52 436	54 880	64 908
Norway	-	-	6	5	4	3	1	1	3	1
U.K. (England & Wales)	11 874	8 845	8 643	6 024	13	-	-	-	-	-
U.K. (Scotland)	509	731	1 021	443	-	-	-	-	-	-
Total	111 113	97 549	87 956	82 001	62 026	49 672	63 504	58 347	58 960	68 797

^{*)} Preliminary

Table C.3.1 Nominal catch (tonnes) of SAITHE IN Sub-area VI, 1973-1982.

(Data for 1973-1981 from Bulletin Statistique)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^{*)}
Belgium	191	209	21	95	-	-	1	2	2	-
Denmark	-	-	-	3	-	-	-	-	-	4 ¹⁾
Faroe Islands	4	6	6	7	11	-	14	4	3	4
France	18 970	22 802	19 946	29 216	19 686	21 519	15 662	15 427	16 654	16 833
German Dem.Rep.	-	-	8	3	-	-	-	-	-	-
Germany, Fed.Rep.	52	16	481	511	254	604	131	49	581	566
Ireland	-	-	-	375	240	266	246	295	250	250 ¹⁾
Iceland	+	-	+	-	-	-	-	-	-	-
Netherlands	67	124	702	547	531	623	256	91	-	-
Norway	2	22	10	17	91	122	20	62	25	15
Poland	394	125	164	91	-	-	-	-	-	-
Spain	1 980	1 862	1 882	1 012	346	-	-	-	-	-
UK (Engl. & Wales)	2 138	1 333	1 571	1 560	2 758	3 193	1 765	1 594	1 361	1 970
UK (N. Ireland)	14	3	12	13	9	27	11	9	10	10 ¹⁾
UK (Scotland)	11 330	9 527	6 131	5 807	4 628	5 181	3 602	2 902	3 117	2 064
USSR	670	269	15	2 550	-	-	-	-	-	-
TOTAL	35 812	36 298	30 949	41 807	28 554	31 535	21 708	20 435	22 003	21 716

^{*)} Preliminary.

¹⁾ W.G. Estimate

Table C.4.1 Nominal catch (tonnes) of SAITHE in Division Vb, 1973-1982.
(Data for 1973 to 1981 from Bulletin Statistique)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^{*)}
Belgium	-	-	-	6	-	-	-	-	-	-
Faroe Islands	2 973	3 726	2 517	2 560	5 153	15 892	22 003	23 810	29 682	30 810
France	22 676	20 457	23 980	15 367	17 038	8 128	2 974	1 110	258	153
German Dem.Rep.	-	130	26	-	-	-	-	-	-	-
Germany, Fed.Rep.	9 329	6 661	5 229	2 605	3 086	1 088	581	197	20	20
Netherlands	-	-	491	232	58	-	-	-	-	-
Norway	355	1 660	486	2 232	1 279	1 124	1 137	62	134	11
Poland	4 050	1 925	815	1 007	-	-	-	-	-	-
Spain	390	500	654	117	-	-	-	-	-	-
UK (Engl. & Wales)	7 527	3 827	2 428	3 063	2 613	557	190	13	-	-
UK (Scotland)	10 131	8 302	4 950	5 860	5 608	1 349	361	38	9	1
USSR	-	-	-	16	-	-	-	-	-	-
TOTAL	57 431	47 188	41 576	33 065	34 835	28 138	27 246	25 230	30 103	30 995

^{*)} Preliminary

Table C.4.2 Faroe Plateau COD. Nominal catches by countries, 1973-1982 (tonnes).
(Data for 1973-1981 from Bulletin Statistique).

Year	Faroe Islands	France	Germany Fed.Rep.	Norway	Poland	UK England	UK Scotland	Others	Total
1973	10 434	1 472 ^{*)}	310	115	419 ^{*)}	3 935	5 675	21	22 381
1974	12 541	567 ^{*)}	292	446	320	2 879	7 516	20	24 581
1975	22 608	1 531	408	1 353	432	2 538	7 815	90	36 775
1976	28 502	1 535	247	1 282	496	2 179	5 491	67	39 799
1977	28 177	1 450	332	864	-	811	3 291	2	34 927
1978	24 076	213 ^{*)}	71 ^{***)}	245	-	518	1 460	2	26 585
1979	21 774	117 ^{*)}	23 ^{***)}	274	-	263	661	-	23 112
1980	19 966	40 ^{*)}	- ^{***)}	127	-	13	367	-	20 513
1981	22 616	47	- ^{***)}	240	-	-	60	-	22 963
1982 ^{**)}	21 525	-	-	106 ^{*)}	-	-	99	-	21 730

^{*)} Vb₂ included

^{**)} Preliminary

^{***)} Working Group data

Table C.4.3 Faroe Bank COD. Nominal catches by countries, 1973-1982 (tonnes).
(Data for 1973-1981 from Bulletin Statistique).

Year	Faroe Islands	France	Germany Fed.Rep.	Norway	Poland	UK England	UK Scotland	Others	Total
1973	2 842	*	-	-	*	1 144	1 081	34	5 101
1974	696	*	-	-	-	829	503	40	2 068
1975	378	81	50	-	-	749	804	55	2 117
1976	457	72	+	1	-	877	912	11	2 330
1977	851	219	-	99	-	9	780	-	1 958
1978	4 194	*	-	183	-	2	1 071	-	5 450
1979	1 273	*	-	33	-	-	677	-	1 983
1980	724	*	-	54	-	85	340	-	1 203
1981	975	-	-	120	-	-	134	-	1 229
1982 ^{**)}	2 184	-	-	*	-	-	54	-	2 184

* Catches included in Vb₁

**) Preliminary

Table C.4.4 Faroe Plateau HADDOCK. Nominal catches by countries, 1973-1982 (tonnes).
(Data for 1973-1981 from Bulletin Statistique).

Year	Faroe Islands	France	Germany Fed.Rep.	Norway	Poland	UK England	UK Scotland	Others	Total
1973	4 931	3 535 ^{*)}	46	-	1 190 ^{*)}	1 510	3 665	-	14 887
1974	4 538	1 461 ^{*)}	70	5	685	1 044	5 572	30	13 405
1975	8 625	2 173	120	56	544	1 505	4 896	383	18 302
1976	12 670	2 472	22	20	448	1 551	6 671	181	24 035
1977	19 806	623	49	46	5	707	3 278	26	24 540
1978	15 539	71 ^{*)}	8	91	-	48	367	-	16 124
1979	11 259	50 ^{*)}	2	39	-	35	212	-	11 597
1980	13 633	31 ^{*)}	4	9	-	6	434	6	14 123
1981	10 891	113	+	20	-	-	85	-	11 109
1982 ^{**)}	10 314		1 ^{*)}	13 ^{*)}	-	-	36	-	10 364

^{*)} Catches including Vb₂

^{**)} Preliminary

Table C.4.5 Faroe Bank HADDOCK. Nominal catches by countries, 1973-1982 (tonnes).
(Data for 1973-1981 from Bulletin Statistique).

Year	Faroe Islands	France	Germany Fed.Rep.	Norway	Poland	UK England	UK Scotland	Others	Total
1973	1 087	*	-	-	*	916	1 123	22	3 148
1974	273	*	-	-	-	573	500	22	1 368
1975	132	125	53	-	-	921	1 182	-	2 413
1976	44	70	+	-	-	733	1 329	-	2 176
1977	273	77	-	11	-	4	650	-	1 015
1978	2 643	*	-	39	-	-	394	-	3 076
1979	716	*	-	-	-	-	105	-	821
1980	690	*	-	8	-	152	43	-	893
1981	1 103	*	-	7	-	-	14	-	1 124
1982 ^{**})	1 553	-	*	*	-	-	16	-	1 569

*. Catches included in Vb₁

**.) Preliminary

Table D.1.1 HERRING. Catch in tonnes 1973 - 1982 North Sea (Sub-area IV and Division VIId) by country

(National catches 1973-81 officially reported to ICES. Unallocated catches provided by Working Group members).

Year Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	2 160	603	2 451	2 451	57	-	-	-	-	10 306
Denmark	174 254 ^{a)}	61 728	115 616	34 841	12 769	4 359	10 546	4 431	21 146	72 116
Faroe Islands	54 935 ^{b)}	26 161 ^{b)}	25 854	14 378	8 070	40	10	-	-	-
Finland	-	-	-	1 034	-	-	-	-	-	-
France	22 235	12 548	20 391	14 468	1 613	2 119	2 560	5 527	15 099	15 616
German Dem. Rep.	1 728	3 268	2 689	2 624	2	-	-	-	-	-
Germany, Fed. Rep.	10 634 ^{c)}	12 470	6 953	1 654	221	24	10	147	2 300 ^{c)}	349 ^{c)}
Iceland	23 742 ^{d)}	29 017	16 286	9 412	-	-	-	-	-	-
Netherlands	34 070	35 106	38 416	20 146	4 134	18	-	509	7 700	11 967
Norway	99 739	40 975	34 183	27 386	4 065	1 189	3 617	2 165	70	680
Poland	5 738	9 850	7 069	7 072	2	-	-	-	-	-
Sweden	4 222 ^{e)}	3 561	6 858	4 777	3 616	-	-	-	-	-
U.K. (England)	2 268	5 699	6 475	9 662	3 224	2 843	2 253	77	303	3 730
U.K. (Scotland) ^{f)}	16 012	15 034	8 904	15 015	8 159	437	-	610	45	1 780
USSR	30 735	18 096	20 653	10 935	78	4	162	-	-	-
Total North Sea	484 012	275 116	312 798	174 834	46 010	11 033	19 158	13 466	46 663	116 544
Total including unallocated catches							25 148	60 994	140 972	171 481

*) Preliminary

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

b) Supplied by Fiskirannsóknarstofnan

c) From Federal Republic of Germany national statistics compiled by Federal Research Board for 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

Table D.1.2 HERRING in Division IIIa. Landings in tonnes, 1973-82.
(Data mainly provided by Working Group members.)

	Country/Year	1973	1974	1975	1976	1977	1978	1979	1980	1981 ^{x)}	1982 ^{xx)}
SKAGERRAK	Denmark	42 098	35 732	29 997	7 326	19 889	6 425	5 153	5 180	18 001	22 881
	Faroe Islands	5 265	7 132	8 053	1 553	10 064	1 041	817	526	990	715
	Germany, Fed. Rep.	-	36	108	6	32	28	181	-	199	43
	Iceland	15 938	231	1 209	123	-	-	-	-	-	-
	Norway (Open Sea)	836	698	196	-	-	1 860	2 460	1 350	6 330	10 140
	Norway (Fjords)	1 680	1 720	1 459	2 304	1 837	2 271	2 259	2 795	950	1 560
	Sweden	20 429	11 683	12 348	6 505	8 109	11 551	8 104	10 701	30 274	24 859
	Total	86 246	57 232	53 370	17 817	39 931	23 176	18 974	20 552	56 744	60 198
KATTEGAT	Denmark	78 125	54 540	48 974	41 749	38 205	29 241	21 337	25 380	18 721	12 366
	Sweden	40 418	39 779	23 769	30 263	37 160	35 193	25 272	18 260	38 871	38 892
	Total	118 543	94 319	72 743	72 012	75 365	64 434	46 609	43 640	57 592	51 258
Division IIIa Total		204 789	151 551	126 113	89 829	115 296	87 610	65 583	64 192	114 336	111 456
Unallocated								8 117	20 053	57 000	35 344
GRAND TOTAL								73 700	84 245	171 336	146 800

x) Revised

xx) Preliminary

Table D.1.3. Celtic Sea and Division VIIj HERRING by season (1 April to 31 March).
(Data provided by Working Group members.)

Season	France	German Dem.Rep.	Germany Fed.Rep.	Ireland	Netherlands	Poland	United Kingdom	USSR	Unallocated	Total
1973/74	4 143	7	294	15 185	5 834	1 139	-	334	-	26 936 ^{a)}
1974/75	2 150	-	435	13 939	2 462	954	-	-	-	19 940
1975/76	2 451	-	399	8 640	2 441	579	24	1 054	-	15 588
1976/77	1 317	147	36	5 864	1 324	257	-	826	-	9 771
1977/78	95	-	96	6 264	1 378	-	-	-	-	7 833
1978/79	8	-	220	8 239	1 002	-	-	-	-	7 559
1979/80	584	-	20	7 932	850	-	-	-	935	10 321
1980/81	9	-	2	9 024	292	-	-	-	3 803	13 130
1981/82	123	-	-	15 830	1 150	-	-	-	-	17 103
1982/83*)	+	-	-	13 042	-	-	-	-	-	13 042

*) Provisional

a) Including 123 tonnes for Bulgaria.

Table D.1.4.1. HERRING. Catch in weight. Division VIa (North) 1973-1982

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Denmark	932	-	374	249	626	128	-	-	1 580	-
Faroes	10 003	5 371	3 895	4 017	3 564	-	-	-	-	-
France	2 441	411	1 244	1 481	1 548	1 435	3	2	1 243	2 084
G.D.R.	251	200	600	279	-	-	-	-	-	-
Germany, Fed.Rep.	9 663	8 687	5 582	4 084	-	26	-	256	3 029	8 569
Ireland	2 532	9 566	2 633	3 273	-	-	-	-	-	-
Nether- lands	27 892	17 461	12 024	16 573	8 705	5 874	-	-	5 602	30 275
Norway	32 557	26 218	509	5 183	1 098	4 462	-	-	3 850	13 018
Poland	2 062	334	376	390	-	-	-	-	-	-
Sweden	-	-	-	2 206	261	-	-	-	-	-
UK, (Engl.)	-	45	125	20	301	134	54	33	1 094	90
UK (Scot.)	120 800	107 475	85 395	53 351	25 238	10 097	3	15	30 389	38 381
USSR	1 137	2 392	1 244	2 536	-	-	-	-	-	-
Unallo- cated	-	-	-	-	-	-	-	-	4 633	-
TOTAL	208 270	178 164	114 001	93 642	41 341	22 176	60	306	51 420	92 417

* Preliminary

Table D.1.4.2 Monthly landings (tonnes) of HERRING from the Firth of Clyde (all fishing methods combined). (Data provided by the Working Group)

Month	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
January	*	*	*	*	*	4*	4*	6*	15*	2*
February	71*	91*	68*	7*	*	6*	8*	3*	15*	16*
March	36*	168*	85	69*	*	7*	13*	8*	14*	1*
April	316	398	369	521	530	246	12*	4*	32*	2*
May	385	280	283	436	544	245	4*	2*	25*	615
June	468	607	203	281	640	238	336	114	429	850
July	688	690	354	332	494	376	466	656	982	757
August	593	543	240	473	601	587	450	645	511	262
September	668	310	515	541	559	581	374	559	106	-*
October	711	451	811	598	556	653	263	79	-*	-*
November	464	245	571	595	560	647	1*	3*	2*	-*
December	248	91	120	236	328	272	-*	2*	4*	1*
Not known	67	189	44	50	35					
Total	4 715	4 053	3 663	4 139	4 847	3 862	1 951	2 081	2 135	2 506

* Subject to closure of directed fishery

Table D.1.4.3 HERRING. Estimated catches in weight in Divisions VIa (south) and VIIb,c, 1973-82.

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*)
Belgium	-	-	-	12	-	-	-	-	-	-
France	-	145	68	47	-	-	-	-	-	353
German Dem.Rep.	2 256	1 833	1 394	890	-	-	-	-	-	-
Germany, Fed.Rep.	7 785	5 667	4 431	924	221	100	5	-	2 687	265
Ireland	16 912	16 395	12 465	10 895	15 916	19 128	18 910	27 499	19 443	15 726
Netherlands	5 228	2 225	15 208	16 546	4 423	481	1 939	1 514	2 790	1 735
Poland	3 623	6 034	2 558	2 778	6	-	-	-	-	-
U.K. (N.Ireland)	-	28	6	1	1	6	2	1	2	-
USSR	915	4 262	2 634	674	-	-	-	-	-	-
Unspecified	-	-	-	-	-	-	1 752	1 110	-	-
Total	36 719	36 589	38 764	32 767	20 567	19 715	22 608	30 124	24 922	18 079

*) Provisional data.

Table D.1.5.1 HERRING.

Total catches (tonnes) in North Irish Sea (Division VIIa), 1973-82 (includes industrial catch).

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
France	254	3 194	813	651	85	174	455 ²⁾	1	-	-
Ireland	3 614	5 894	4 790	3 205	3 331	2 371	1 805	1 340	283	300
Netherlands	143	1 116	630	989	500	98	-	-	-	-
U.K.	18 587	27 489	18 244	16 401	11 498	8 432 ¹⁾	10 078 ³⁾	9 272	4 094	3 375
USSR	-	945	26	-	-	-	-	-	-	1 180 ⁴⁾
Total	22 598	38 638	24 503	21 246	15 414	11 075	12 338	10 613	4 377	4 855

*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. ⁴⁾ Unallocated.

Table D.1.5.2. HERRING.

Total catch in North Irish Sea, 1973-1982

Country	1973		1974		1975		1976		1977		1978		1979		1980		1981		1982*	
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
France	254	-	3 194	-	813	-	651	-	85	-	87	87	-	-	1	-	-	-	-	-
Ireland	-	3 614	1 783	4 111	2 406	2 384	1 816	1 389	2 009	1 322	610	1 761	748	1 054	762	578	100	183	198	102
Netherlands	-	143	1 116	-	630	-	989	-	500	-	98	-	-	-	-	-	-	-	-	-
U.K.	13 071	5 516	23 639	3 850	15 408	2 836	12 831	3 570	9 837	1 661	7 663	700	9 382	696	7 897	1 375	2 837	1 257	2 120	1 255
Unallocated	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	779	401
Total Manx	13 325		29 732		19 257		16 287		12 431		8 458		10 130		8 660		2 937		3 097	
Total Mourne	9 273		7 961		5 220		4 959		2 983		2 548		1 750		1 953		1 440		1 758	

1 - Manx stock, 2 - Mourne stock, *Preliminary.

Table D.2.1 Total industrial landings (tonnes x 10⁻³) from the North Sea, 1973 - 1982.

Year	Target industrial species				By-catch for reduction ⁶⁾				Total ⁴⁾
	Norway pout	Sandeel	Sprat	Sub-total	Blue Whiting ¹⁾	Protected Species ²⁾	Herring ³⁾	Sub-total	
1973	345.9	296.9	262.3	905.1	56.8	131.8		188.6	1 093.7
1974	735.8	524.8	313.6	1 574.2	62.2	220.4		282.6	1 856.8
1975	559.7	428.2	641.2	1 629.1	42.0	127.8		169.8	1 798.9
1976	437.4	487.6	621.5	1 546.5	36.0	198.0	12.0	246.0	1 792.5
1977	389.9	785.6	304.0	1 479.5	38.4	147.3	9.5	195.2	1 674.7
1978	270.1	786.8	378.3	1 435.2	99.9	67.6	7.8	175.3	1 610.5
1979	319.8	577.8	379.6	1 272.2	63.3	78.0	15.3	156.6	1 433.8
1980	470.4	728.5	323.4	1 522.3	75.1	71.3	7.3	153.7	1 676.0
1981	273.9	588.9	209.1	1 071.9	80.2	89.4	84.2	235.8	1 307.7
1982 ⁵⁾	289.8	610.9	113.1	1 014.0	54.0	56.8	92.2	203.0	1 217.0

1) C.M.1983/Assess:3

2) C.M.1982/Assess:8 and 9 (Haddock, whiting, saithe)

3) C.M.1982/Assess:7

4) Does not include other species which on an average range between 20 000 and 40 000 tonnes

5) Incomplete

6) By-catches do not include fish landed for human consumption

Table D.2.2.1 NORWAY POUT. Annual landings (tonnes) in Division IIIa
(For 1973-81 data officially reported to ICES)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ³⁾
Denmark	23 152	10 669	15 666	40 144	20 694	23 922	23 951	26 235	29 273	51 023 ⁴⁾
Faroes	643									
Norway		62 ^{*)}	925 ^{*)}	50 ^{*)}	104	362	1 182	141	752	704
Sweden	1)	1)	3 272	2 255	318	591 ²⁾	32	39	60	101 ⁵⁾
Total	23 795	10 731	19 863	42 449	21 116	24 875	25 165	26 415	30 085	

*) Including by-catch.

1) Included in the North Sea.

2) Includes North Sea.

3) Preliminary.

4) Landings in foreign ports July-December not included.

5) Data from Data Form 5.

Table D.2.2.2 NORWAY POUT. Annual landings (in thousand tonnes) by countries. North Sea, 1973-82.

Year	Denmark	Faroes	Norway	Sweden	UK (Scotland)	Others	Total
1973	215.2	51.2	63.0	2.9	13.0	0.6	345.9
1974	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
1976	244.9	64.6	108.9	+	17.3	1.7	437.4
1977	232.2	50.9	98.3	2.9	4.6	1.0	389.9
1978	163.4	19.7	80.8	0.7	5.5	-	270.1
1979	219.9	21.9	75.0		3.0		319.8
1980	366.2	34.1	69.5		0.6		470.4
1981	206.0	16.6	51.3		+		273.9
1982 ¹⁾	187.1 ²⁾	15.4	87.3		0		-

1) Preliminary

2) January-September only

Table D.2.2.3 NORWAY POUT. Annual landings (tonnes) in Division VIa.
(Data from 1973-81 as officially reported to ICES)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 [*]
Belgium	-	-	-	-	-	-	-	-	-	-
Denmark	42	-	193	-	-	4 443	15 609	13 070	2 877	751 ⁴⁾
Faroes	1 743	1 581	1 524	6 203	2 177	18 484	4 772	3 530	3 540	
Germany, Fed.Rep	-	179	-	8	-	-	-	-	-	-
Netherlands	-	-	322	147	230	21	98	68	182	
Norway	-	144 ³⁾	-	82 ³⁾	-	-	-	-	-	-
Poland	-	75	-	-	-	-	-	-	-	-
UK(Scotland) ²⁾	9 282	4 702	6 614	6 346	2 799	302	23	1 202	1 158	586
USSR	-	40	2	7 147	-	-	-	-	-	-
Total	11 067	6 721	8 655	19 933	5 206	23 250	20 502	17 870	7 757	

1) Included in the North Sea.

2) Amended using national data.

3) Including by-catch.

4) Landings in foreign ports July-December not included.

*) Preliminary.

Table D.2.3.2 Landings of SANDEEL from the North Sea, 1971-82 (in thousand tonnes).

Year	Denmark	Germany, Fed. Rep.	Faroes	Netherlands	Norway	Sweden	U.K.	Total
1971	371.6	0.1	0	0	2.1	0	8.3	382.1
1972	329.0	+	0	0	18.6	8.8	2.1	358.5
1973	273.0	0	1.4	0	17.2	1.1	4.2	296.9
1974	424.1	0	6.4	0	78.6	0.2	15.5	524.8
1975	355.6	0	4.9	0	54.0	0.1	13.6	428.2
1976	424.7	0	-	0	44.2	-	18.7	487.6
1977	664.3	0	11.4	0	78.7	5.7	25.5	785.6
1978	647.5	0	12.1	0	93.5	1.2	32.5	786.8
1979	449.8	0	13.2	0	101.4	0	13.4	577.8
1980	542.2	0	7.2	0	144.8	0	34.3	728.5
1981	482.9	0	4.9	0	52.6	0	46.7	587.1
1982	506.9	0	4.9	0	46.5	0.4	52.2	610.9

- No information

+ Less than half unit

Table D.2.3.3 Annual landings of SANDEELS by Assessment areas of the North Sea (Denmark, Norway, United Kingdom/Scotland) (in '000 tonnes)

Year	Shetland Area	Northern Area	Southern Area	Total
1973	0	107.6	132.4	290.0
1974	7.4	386.6	117.7	511.1
1975	12.9	253.7	156.5	423.1
1976	20.2	135.0	350.6	485.8
1977	21.5	348.4	392.3	762.2
1978	28.1	163.0	577.2	768.3
1979	13.4	203.4	355.9	572.7
1980	25.4	292.0	401.2	718.6
1981	46.7	138.0	378.9	563.6
1982	52.0	74.4	479.2	605.6

Table D.2.4.1 Landings of SPRAT in Division IIIa and in Norwegian fjords in Division IVa (10⁻³ tonnes).
(Data provided by Working Group members)

Year	SKAGERRAK				KATTEGAT			IIIa TOTAL	Fjords of Western Norway (IVa E)	GRAND TOTAL
	Denmark	Sweden	Norway	Total	Denmark	Sweden	Total			
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	2.9	105.3
1981	26.4	13.4	4.6	44.4	23.8	15.8	39.6	84.0	3.1	87.1
1982**	9.6	6.7	1.8	18.1	13.8	4.8	18.6	36.7	6.0	42.7

* Sweden: 20 124 tonnes in Div. IIIa. Included in total but allocation to Skagerrak and Kattegat not possible.

** Preliminary figures. Danish landings in October-December not included.

Table D.2.4.2 SPRAT catches in the North Sea ('000 tonnes), 1973-82.

(Data provided by Working Group members)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^{a)}
Belgium	0.2	+	+	+	+	+	+	+	-	-
Denmark	140.9	165.6	326.2	306.6	179.9	205.1	268.3	232.2	188.2	77.2 ^{x)}
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.	11.0	17.5	0.5	1.7	5.3	-	3.8	6.2	4.8	1.5
Netherlands	+	+	0.2	+	+	-	-	-	-	-
Norway	3.4	9.5	147.2	109.9	22.2	87.6	78.6	68.6	0.4	19.5
Poland	+	-	9.4	10.5	+	-	-	-	-	-
Sweden	1.0	2.2	11.0	7.9	1.5	-	-	0.6	-	-
UK(England)	35.6	28.9	35.4	50.4	52.1	53.9	14.3	6.7	14.0	14.9
UK(Scotland)	52.3	49.8	14.3	30.8	37.8	31.7	11.8	6.3	1.7	0.2
USSR	17.9	33.9	49.1	51.8	1.6	-	-	-	-	-
Total	262.3	313.6	641.2	621.5	304.0	378.3	379.6	323.4	209.1	113.3

a) Preliminary figures as reported.

x) First 9 months only.

Table D.2.4.3 Nominal catch (tonnes) of SPRAT in Divisions VIIId,e (data for 1973-81 as officially reported to ICES).

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^{*)}
Belgium	13	-	-	-	-	-	-	-	-	-
Denmark	-	-	-	447	74	1 796	9 981	7 483	2 545	286 ^{a)}
Faroe Islands	-	-	-	6	-	-	-	-	-	-
France	1 269	520	147	115	120	225	2 373	1 867	146	-
German Dem.Rep.	37	-	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	4	-	-	-	-	34	6	52	1	-
Netherlands	11	16	109	49	115	826	441	1 401	1 015	1 000
Norway	-	-	-	-	-	-	-	65	-	-
Poland	-	1	-	-	-	-	-	-	-	-
U.K. (Eng. & Wales)	1 990	3 256	1 315	3 107	2 928	2 118	2 032	6 864	10 183	4 500
Total	3 324	3 793	1 571	3 724	3 237	4 999	14 833	17 732	13 890	

^{*)} Preliminary

^{a)} Landings in foreign ports Jul-Dec not included.

Table D.3.1.1 COD landings from the Kattegat 1973-82 (tonnes).

Year	Denmark	Sweden	Federal Republic of Germany ¹⁾	Total
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	10 096	4 206	38	14 302
1981	11 469	4 380	284	16 133
1982	9 897	3 087	58	13 042

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

Table D.3.1.2 COD landings from the Skagerrak 1973-82 (tonnes)

Year	Denmark	Sweden	Norway ^{*)}	Others	Total
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	22 729	1 712	1 982	341	26 764
1981	26 120	2 835	2 073	294	31 322
1982	25 122	2 378	1 730	41	29 271

*) Mainly landings from Norwegian fjords.

Table D.3.1.3 COD landings from Division IIIa - the Kattegat and the Skagerrak.

(Danish and Swedish landings from national sources, other countries from Bulletin Statistique)

Year	Denmark	Norway ^{*)}	Sweden	Others	Total
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	32 825	1 982	5 918	379	41 104
1981	37 589	2 073	7 215	378	47 255
1982	35 019	1 730	5 465	58	42 272

*) Mainly landings from Norwegian fjords.

Table D.3.4.1 Plaice landings from the Kattegat (tonnes)

Year	Denmark	Sweden	Total
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
1981	3 803	232	4 035
1982	2 717	201	2 918

Table D.3.4.2 Plaice landings from the Skagerrak (tonnes)

Year	Denmark	Sweden	Total
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
1981	8 115	123	8 238
1982	7 789	140	7 929

Table D.3.4.3 PLAICE landings in Division IIIa. The Kattegat and Skagerrak combined. (Data produced by Working Group members).

Year	Denmark	Sweden	Other Countries	Total
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	15 096	381	56	15 533
1981	11 918	355	316	12 589
1982 ^{x)}	10 506	345	8 ^{xx)}	

x) Preliminary

xx) Federal Republic of Germany

Table D.4.1.1 HERRING by-catch in tonnes by year and Division

Division	1976	1977	1978	1979	1980	1981	1982*
Div.IVa West	4 105	502	27	443	705	7 933	301
Div.IVa East	-	186	-	2	48	-	500
Div. IVb	7 847	8 790	7 545	14 882	6 008	75 533	89 764
Div.IVc and VIId	-	-	223	1	494	702	1 675
Total	11 952	9 478	7 795	15 328	7 255	84 168	92 240

* Preliminary

Table D.4.1.2 HERRING by-catch in numbers at age (millions) for 1981

[illegible]

Table D.4.1.3 HERRING by-catch in numbers at age (millions) for 1982

[illegible]

Table D.5.1 COD. North Sea. Numbers ('000) and weight (tonnes) in each category.

Year	Human consumption		Discards		Total	
	Number	Weight	Number	Weight	Number	Weight
1973	125 133	227 787	46 620	8 196	171 753	235 983
1974	102 367	202 269	4 588	950	106 955	203 219
1975	109 863	184 974	35 390	6 045	145 253	191 019
1976	128 536	209 914	8 201	2 050	136 737	211 964
1977	140 359	181 121	99 474	16 573	239 833	197 694
1978	212 729	260 890	100 786	27 874	313 515	288 764
1979	170 706	248 051	236 295	67 490	407 001	315 541
1980	192 691	250 766	660 066	170 675	852 757	421 441
1981	249 276	310 599	164 776	47 132	414 052	357 731
1982*)	183 263	255 934	**))	**))		

*) Preliminary.

**) Insufficient data.

Table D.5.2 HADDOCK. North Sea. Numbers ('000) and weight (tonnes in each category).

Year	Industrial		Human consumption		Discards		Total	
	Number	Weight	Number	Weight	Number	Weight	Number	Weight
1973	170 412	11 267	449 107	178 610	659 515	114 719	1 279 034	304 596
1974	936 218	47 777	357 011	149 617	1000 667	166 782	2 383 896	364 176
1975	734 412	41 380	362 239	146 616	1862 031	260 427	2 958 681	448 423
1976	446 767	48 204	397 743	165 624	788 037	154 289	1 632 547	368 117
1977	350 521	34 993	319 991	137 372	225 974	44 369	896 486	216 734
1978	425 714	9 659	192 021	85 981	422 631	77 681	1 040 366	173 321
1979	1 099 865	17 414	190 414	83 249	286 968	41 834	1 577 247	142 497
1980	768 645	25 154	218 392	98 860	541 779	94 910	1 528 816	218 924
1981	815 192	17 615	244 100	130 009	299 417	60 290	1 388 709	207 914
1982*	577 653	20 988	309 824	165 475	191 907	41 308	1 079 384	227 771

*) Preliminary

Table D.5.3 WHITING. North Sea. Numbers ('000) and weight (tonnes) in each category.

Year	Industrial		Human consumption		Discards		Total	
	Number	Weight	Number	Weight	Number	Weight	Number	Weight
1973	1 273 007	89 614	234 405	66 479	658 852	110 128	2 166 264	266 221
1974	1 841 153	130 293	254 114	74 561	477 271	84 753	2 572 538	289 607
1975	1 019 586	86 376	251 761	78 722	698 963	134 698	1 970 310	299 796
1976	1 395 318	149 759	243 201	74 231	633 359	134 176	2 271 878	358 166
1977	1 657 167	106 104	267 023	74 374	555 515	107 186	2 479 705	287 664
1978	1 163 125	55 274	322 834	88 475	241 670	35 442	1 727 629	179 191
1979	887 889	59 021	351 613	99 321	651 877	78 371	1 891 379	236 713
1980	644 159	45 747	313 565	92 534	547 726	86 940	1 505 450	225 221
1981	932 530	66 595	258 430	80 018	293 714	45 560	1 484 674	192 173
1982*)	333 574	32 990	240 768	72 881	189 004	29 004	763 346	134 375

* Preliminary

Table D.5.4 Nominal catch (in tonnes) of COD in Sub-area IV, 1973-82 (data for 1973-81 as officially reported to ICES).

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	11 741	10 253	7 566	7 483	10 346	17 473	12 576	9 630	8 744	6 604
Denmark	47 950	54 207	46 344	53 277	42 582	41 858	48 509	56 404	68 252	63 975
Faroe Islands	803	416	732	448	260	56	113	150	38	45
France	13 247	7 275	8 667	8 079	7 511	11 944	12 559	10 910	11 369	8 846
German Dem.Rep.	343	132	223	69	21	75	84	63	-	-
Germany, Fed. Rep.	21 410	17 089	16 457	24 445	22 663	37 040	20 411	26 343	29 741	19 045
Ireland	-	-	-	98	136	174	1	-	-	-
Netherlands	25 758	24 029	23 263	21 835	29 903	48 817	34 752	45 400	51 281	36 179
Norway ^{a)}	454	324	1 528	1 877	1 449	2 747	3 575	4 506	6 766	6 992
Poland	1 551	4 750	2 991	2 961	381	115	142	28	7	62
Spain	90	80	63	14	-	-	-	-	-	-
Sweden	2 534	2 071	900	597	36	... ^{b)}	298	293	321	438
UK(Engl.&Wales)	47 327	39 857	33 615	46 475	35 424	59 127	54 923	49 951	59 856	53 556
UK(Scotland)	48 844	39 887	37 308	39 597	34 406	41 984	42 811	45 044	53 921	55 619
USSR	2 497	2 667	6 796	6 187	-	17	17	-	-	-
Total IV	224 549	203 037	186 453	213 442	185 118	261 427	230 771	248 722	290 296	251 361
Total IVa	59 640	64 152	58 343	68 352	55 623	43 357	41 118	48 467	55 109	53 267
Total IVb	134 953	114 087	107 227	126 218	100 191	164 388	147 313	161 767	197 567	187 834
Total IVc	29 956	24 798	20 883	18 872	29 304	53 682	42 340	38 488	37 620	10 260

*) provisional figures

a) Figures from Norway do not include cod caught in Rec. 2 fisheries

b) Included in IIIa

Table D.5.5 Nominal catch (in tonnes) of HADDOCK in Sub-area IV, 1973-82 (data for 1973-81 as officially reported to ICES).

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	2 385	1 137	2 209	2 166	2 293	1 295	732	1 414	1 217	966
Denmark	13 118	44 342	32 930	46 899	20 069	8 093	8 248	12 928	13 198	32 159
Faroe Islands	1 198	435	267	183	385	12	7	27	46	15
France	4 695	4 020	4 646	5 500	6 914	5 122	7 208	7 407	12 344	15 989
German Dem.Rep.	22	8	44	20	8	37	12	36	-	-
Germany, Fed. Rep.	4 587	3 478	2 396	3 433	3 744	2 589	2 549	2 354	3 387	4 861
Ireland	-	-	-	31	53	101	-	-	-	-
Netherlands	3 185	3 035	1 901	1 728	1 598	857	955	1 557	2 279	1 121
Norway ^{a)}	454	324	331	367	374	609	968	1 191	2 283	1 782
Poland	2 553	3 001	1 485	1 155	485	62	106	59	31	317
Spain	101	210	-	-	-	-	-	-	-	-
Sweden ^{b)}	4 550	3 098	2 083	2 455	113	- ^{d)}	907	1 165	1 301	1 856
UK(England+Wales)	16 586	10 798	11 499	17 238	17 167	12 200	10 774	12 195	14 570	16 108
UK(Scotland)	88 132	71 679	64 686	80 576	89 465	58 406	54 119	64 058	82 798	105 875
USSR	49 356	42 234	49 686	42 852	8 010	54	18	-	-	-
Total IV	190 922	187 799	174 163	204 603	150 678	89 437	86 603	104 391	133 454	181 049
Total IVa	126 662	122 977	110 848	138 591	116 577	57 886	51 741	64 886	83 374	106 154
Total IVb	62 288	63 695	62 761	65 594	34 030	31 457	34 361	39 072	49 197	74 738
Total IVc	1 972	1 127	554	418	71	94	501	433	833	157
WG total catch ^{c)}	287 099	307 689	401 053	334 888	219 953	170 804	140 635	218 924	207 914	227 771

*) Provisional. a) Figures from Norway do not include haddock caught in Rec. 2 fisheries. For 1973-74 Rec. 2 fisheries were officially reported but have been deducted in the figures given here to make a consistent data series.

b) 1973-74 includes Div. IIIa. c) Includes discards. d) Included in Division IIIa.

Table D.5.6 Nominal catch (in tonnes) of WHITING in Sub-area IV, 1973-82.
(Data for 1973-81 as officially reported to ICES.)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^{x)}
Belgium	3 387	3 156	3 279	2 640	3 275	3 304	3 941	3 153	2 623	2 277
Denmark	73 928	109 654	61 941	116 973	46 479	15 741	41 965	17 916	16 430	31 103
Faroe Islands	1 453	1 126	764	1 262	472	42	581	21	12	9
France	20 353	19 825	20 079	19 557	17 592	22 525	27 590	23 626	24 744	24 261
German Dem. Rep.	5	-	3	18	-	22	5	-	-	-
Germany, Fed. Rep.	403	454	446	302	461	348	1 280	1 267	601	228
Ireland	-	-	-	4	9	38	-	-	-	-
Netherlands	8 811	12 057	14 078	12 274	9 406	11 030	13 417	14 389	14 600	11 220
Norway ^{a)}	39	58	55	71	33	64	49	27	27	15
Poland	7	1 002	888	509	445	8	3	1	-	-
Spain	119	110	65	18	-	-	-	-	-	-
Sweden ^{b)}	2 328	2 440	255	153	341	...	31	16	9	11
UK(England & Wales)	4 592	5 519	5 246	5 112	6 185	7 542	7 581	6 778	5 964	4 723
UK (Scotland)	20 756	25 274	27 969	26 167	33 017	42 779	44 841	42 218	31 399	28 796
USSR	3 522	2 978	5 098	5 612	2 413	-	-	-	-	-
Total Sub-Area IV	139 703	183 653	140 166	190 672	120 128	103 443	141 284	109 412	96 409	102 638
Total Div. IVa	29 616	76 761	75 444	100 001	61 499	42 837	48 554	42 529	33 799	35 015
Total Div. IVb	96 678	87 842	41 930	69 908	42 911	40 943	68 775	41 156	40 145	55 791
Total Div. IVc	13 409	19 050	22 792	20 763	15 718	19 663	23 955	25 727	22 465	11 832
WG total catch ^{c)}	364 740	351 266	290 589	345 951	294 635	178 773	234 947	225 221	192 173	134 375

x) Provisional figures.

a) Figures from Norway do not include whiting caught in Rec.2 fisheries. For 1973 and 1974 Rec.2 fisheries were officially reported, but have been deducted from the figures given here to make a consistent time series.

b) 1973-74 include Div. IIIa, 1978 included in Div. IIIa.

c) Include discards.

Table D.6.1 Nominal catch (in tonnes) of COD in Division VIa, 1973-1982.
(Data for 1973 - 1981 as officially reported to ICES)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	75	174	49	71	-	-	4	57	30	35
Denmark	-	-	7	-	-	-	-	27 ^{a)}	-	3
Faroe Islands	7	13	3	39	43	-	40	3	-	-
France	3 445	3 678	3 546	5 611	3 583	4 499	4 590	5 495	7 601	7 237
German Dem. Rep.	-	-	2	-	-	-	-	-	-	-
Germany, Fed. Rep.	15	6	12	1	3	31	40	1	21	... ^{b)}
Ireland	583	883	1 141	1 341	984	1 214	2 237	2 331	2 725	3 527
Netherlands	4	5	5	11	5	3	20	1	-	-
Norway	13	14	17	22	29	40	32	48	40	183
Poland	184	175	68	18	-	-	-	-	-	-
Spain	208	137	180	15	20 ^{a)}	108 ^{a)}	-	-	-	-
Sweden	-	-	-	-	-	-	-	-	-	1
U.K. (England+Wales)	2 074	2 467	2 217	2 742	2 434	2 082	2 348	2 302	3 187	2 784
U.K. (Scotland)	5 645	6 084	5 806	7 475	5 513	5 539	6 929	7 603	10 339	7 741
U.K. (N. Ireland)	3	3	3	13	5	5	2	2	7	33
USSR	7	13	107	46	-	-	-	-	-	-
Total VIa	12 263	13 652	13 163	17 405	12 619	13 521	16 242	17 870	23 950	21 544

*) Provisional.

a) Includes Division VIb.

b) Included in Division VIb.

Table D.6.2 Nominal catch (in tonnes) of COD in Division VIb, 1973-1982.

(Data for 1973-1981 as officially reported to ICES).

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	-	-	-	1	-	-	-	-	-	-
Denmark	-	-	-	-	-	-	-	... a)	-	-
Faroe Islands	-	5	3	22	40	10	92	75	2	77
France	320	1 128	4	4	3	1	2	1	4	27
Germany, Fed.Rep.	-	-	-	-	-	-	111	136	443	13 ^{a)}
Ireland	-	-	-	-	-	3	-	-	-	-
Norway	-	3	-	8	3	69	138	80	134	40
Poland	8	-	-	-	-	-	-	-	-	-
Spain	-	-	-	-	... a)	... a)	-	33	-	-
U.K. (Engl.&Wales)	1	-	28	77	89	285	129	1	67	3
U.K. (Scotland)	128	39	98	61	33	384	198	370	143	157
USSR	26	-	110	1 398	-	-	-	-	-	-
Total	483	1 175	243	1 571	168	752	670	696	793	317

*) Provisional

a) Included in Division VIa

Table D.6.3

Nominal catch (in tonnes) of HADDOCK in Division VIa, 1973-1982
(Data for 1973 - 1981 as officially reported to ICES).

COUNTRY	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	45	98	23	45	-	-	2	3	1	2
Denmark	-	-	-	13	-	-	37	-	-	-
Faroe Islands	2	1	-	-	-	-	2	-	-	-
France	5 141	3 979	2 328	3 026	3 401	4 255	4 786	2 808	3 403	3 789
German Dem.Rep.	-	-	9	-	-	-	-	-	-	-
Germany, Fed. Rep.	15	18	3	30	+	20	2	3	7	75 ^{a)}
Ireland	2 631	1 715	599	1 115	616	441	877	726	1 891	4 402
Netherlands	169	63	19	30	28	13	2	2	3	-
Norway	-	-	-	3	7	13	9	16	29	38
Poland	402	97	20	-	-	-	-	-	-	-
Spain	497	540	-	-	-	-	-	-	-	-
UK (Engl. and Wales)	2 187	1 512	1 214	1 971	3 827	2 805	1 654	1 279	1 052	2 035
UK (Scotland)	17 631	9 583	8 973	11 992	11 422	9 629	7 459	8 198	12 051	18 541
UK (N. Ireland)	-	-	-	-	-	-	-	+	-	1
USSR	110	364	495	533	-	-	-	-	-	-
Total VIa	28 830	17 970	13 683	18 758	19 301	17 176	14 830	13 035	18 437	28 883
WG Total incl. discards	40 198	33 342	46 635	34 071	23 657	19 510	27 147	17 470	33 278	39 318

*) Provisional

a) Includes VIb

Table D.6.4 Nominal catch (in tonnes) of HADDOCK in Division VIb, 1973 - 1982.
(Data for 1973-1981 as officially reported to ICES)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	-	-	-	33	-	-	-	-	-	-
Faroe Islands	-	2	1	8	3	11	20	5	1	21
France	600	353	21	4	4	3	4	1	10	39
Germany, Fed. Rep.	-	-	-	-	-	-	-	17	-	... ^{a)}
Ireland	-	-	-	-	-	61	-	-	-	-
Norway	-	-	-	-	+	4	16	2	10	3
Poland	54	-	-	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-	6	-	-
U.K. (Engl.&Wales)	1	-	5	2 111	2 694	2 365	1 654	6 261	9 005	7 692
U.K. (Scotland)	72	22	71	640	297	2 060	548	1 051	27	5
U.S.S.R.	3 291	48 911	49 830	40 474	-	-	-	-	-	-
Total VIb	4 018	49 288	49 928	43 243	2 998	4 504	2 242	7 343	9 053	7 760

*) Provisional.

a) Included in Division VIa.

Table D.6.5 Nominal catch (in tonnes) of WHITING in Division VIa, 1973-1982.

(Data for 1973-1981 as officially reported to ICES)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	5	10	1	14	-	-	-	+ 32 ^{a)}	-	2
Denmark	121	-	-	-	-	119	92	-	-	-
Faroe Isl.	5	1	30	2	-	-	770	-	-	-
France	2 777	2 983	2 763	3 655	3 395	3 610	2 779	2 609	1 637	1 803
German Dem.Rep.	-	-	-	31	-	-	-	-	-	-
Germany Fed.Rep.	127	80	62	1	1	2	4	1	49	100 ^{a)}
Ireland	2 117	2 431	2 429	3 255	2 752	2 080	2 791	4 407	8 148	3 040
Netherlands	57	23	85	255	78	23	17	2	6	-
Norway	-	-	-	1	-	-	-	-	-	-
Poland	10	9	-	-	-	-	-	-	-	-
Spain	1 540	1 479	1 871	821	763 ^{a)}	-	-	-	-	-
UK(Engl. & Wales)	91	112	132	244	520	669	320	227	118	166
UK(Scotland)	9 796	9 929	12 668	16 658	9 873	8 174	10 613	7 386	8 519	8 422
UK(N.Ireland)	-	-	-	-	-	-	-	-	-	7
Total VIa	.6 646	17 057	20 041	24 937	17 382	14 677	17 386	14 664	18 477	13 540

*) Provisional.

a) Includes Division VIb.

Table D.6.6.1 Nominal catch (in tonnes) of COD in Division VIIb, c and VIIg-k, 1973-1982
(Data for 1973-1981 as officially reported to ICES)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	323	167	116	159	85	52	51	110	198	97
Denmark	-	-	-	-	-	-	18	... ^{b)}	-	-
Faroe Islands	256	-	-	-	-	-	-	-	-	-
France	2 791	2 302	2 877	3 196	1 972	2 192	2 918	4 475	5 947	5 782
Germany, Fed. Rep.	1	-	-	-	-	3 ^{a)}	-	7	-	-
Ireland	568	283	474	506	315	323	552	1 028	1 542	1 780
Netherlands	14	9	54	46	291	279	-	5	-	-
Norway	-	-	1	-	+	-	-	-	-	-
Poland	75	39	19	40	6	-	2	-	-	-
Spain	301	232	588	1 140	51	11	-	17	-	-
UK(England+Wales)	60	26	73	44	33	28	33	83	230	306
UK(Scotland)	-	-	-	-	-	2	1	12	+	-
USSR	10	72	134	203	-	-	-	-	-	-
Total VIIb,c, g-k	4 399	3 130	4 336	5 234	2 753	2 890	3 575	5 737	7 917	7 965

*) Provisional.

a) Catch in Division VIIg only.

b) Included in Division VIIe.

Table D.6.6.2 Nominal catch (in tonnes) of COD in Divisions VIId and VIIE,
1973-82.
(Data for 1973-81 as officially reported to ICES)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	93	67	59	65	53	435	699	163	363	293
Denmark	-	-	2 718	1 506	1 120	2 160	2 052	660 ^{a)}	-	-
France	1 425	3 099	2 143	1 646	5 185	8 044	4 848	4 001	4 480	3 234
Netherlands	2	4	+	2	1	+	-	-	4	-
Poland	13	6	-	-	-	-	-	-	-	-
U.K. (England & Wales)	499	260	159	142	581	654	485	365	422	564
U.K. (Scotland)	-	-	-	-	-	-	+	-	-	-
U.S.S.R.	45	-	3	4	-	-	-	-	-	-
Total VIId,e	2 077	3 436	5 082	3 365	6 940	11 293	8 084	5 189	5 270	4 091

*) Provisional.

a) Includes Divs. VIIb,c.

Table D.6.6.3 Nominal catch (in tonnes) of HADDOCK in Divisions VIIb,c and VIIg-k, 1973-82.
(Data for 1973-81 as officially reported to ICES)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	65	35	33	19	13	5	2	2	3	3
Denmark	-	-	-	-	-	-	1	-	-	-
Faroe Isl.	3	-	-	-	-	-	-	-	-	-
France	5 524	6 057	4 583	3 726	2 244	1 479	1 931	2 219	2 070	1 271
Germany, Fed.Rep.	1	-	+	3	-	-	-	-	-	-
Ireland	1 348	829	507	287	153	111	155	274	679	853
Netherlands	12	2	4	14	1	-	16	-	-	-
Poland	62	143	-	-	-	-	-	-	-	-
Spain	890	1 100	-	-	294	-	-	5	-	-
UK(England & Wales)	24	39	46	24	18	13	19	50	92	122
UK(Scotland)	-	-	-	-	-	8	22	56	4	-
USSR	24	456	1 290	183	-	-	-	-	-	-
Total VIIb,c and VIIg-k	7 953	8 661	6 463	4 256	2 273	1 616	2 146	2 606	2 848	2 249

*) Provisional

Table D.6.6.4 Nominal catch (in tonnes) of HADDOCK in Divisions VIId and VIIe, 1973-1982.
(Data for 1973-1981 as officially reported to ICES)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	1	+	+	+	1	-	1	+	2	1
Denmark	-	-	-	-	2	22	21	15	-	-
France	208	487	868	405	438	356	333	298	420	365
Germany, Fed.Rep.	-	-	+	-	-	-	-	-	-	-
Ireland	-	-	-	-	4	-	-	+	-	-
Netherlands	1	-	1	-	-	-	-	-	-	-
Poland	12	-	-	-	-	-	-	-	-	-
UK(England & Wales)	135	113	99	45	29	22	51	59	119	60
USSR	2	33	3	-	-	-	-	-	-	-
Total VIId,e	359	633	971	450	474	400	406	372	541	426

*) Provisional

Table D.6.6.5. Nominal catch (in tonnes) of WHITING in Divisions VIIb,c and VIIg-k in 1973-82.
(Data for 1973-1981 as officially reported to ICES.)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^{*)}
Belgium	124	75	83	97	60	37	26	31	61	28
France	4 035	4 331	3 637	4 731	3 962	3 868	4 127	5 603	5 442	4 673
Germany, Fed.Rep.	+	-	2	-	1	45	-	+	-	-
Ireland	1 894	1 641	2 562	1 980	1 201	1 172	2 674	3 710	3 612	4 076
Netherlands	2 080	915	66	112	86	63	3	4	21	-
Poland	14	-	-	-	-	-	-	-	-	-
Spain	1 121	1 367	2 974	2 772	-	-	-	-	-	-
U.K. (Eng. & Wales)	21	15	61	21	26	38	23	60	217	146
U.K. (Scotland)	-	-	-	-	2	1	1	80	1	-
USSR	16	-	64	2	-	-	-	-	-	-
Total VIIb,c and g-k	9 305	8 344	9 449	9 715	5 338	5 224	6 854	9 488	9 354	8 923

^{*)} Provisional

Table D.6.6.6 Nominal catch (in tonnes) of WHITING in Division VIIId and VIIe in 1973-1982
(Data for 1973-1981 as officially reported to ICES)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	38	39	70	103	36	85	92	85	102	101
Denmark	-	-	-	18	-	1	2 585	6	2	-
France	5 050	7 917	10 060	8 390	8 886	8 010	5 352	7 690	8 842	7 317
Germany, Fed.Rep.	-	25	1	-	-	-	-	-	-	-
Ireland	-	-	-	-	11	12	-	13	-	-
Netherlands	42	12	14	5	1	2	1	2	2	-
UK (Engl. & Wales)	498	579	1 255	1 504	1 342	1 038	930	839	1 136	1 222
USSR	19	-	-	-	-	-	-	-	-	-
Total VIIId,e	5 647	8 572	11 400	10 020	10 276	9 148	8 960	8 635	10 084	8 640

*) Provisional

Table D.7.1 Nominal catch (tonnes) of COD in Division VIIa, 1973-1981 as officially reported to ICES, 1982 preliminary figures

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Belgium	276	409	282	257	135	144	174	246	395	269
Denmark	-	-	-	-	-	-	-	-	6	-
France	2 507	2 601	2 623	1 938	1 370	1 022	1 125	1 009	1 178	1 117
Ireland	4 224	3 276	3 477	4 815	3 862	3 128	3 755	4 421	6 552	4 537
Netherlands	35	113	53	87	32	15	11	36	94	48
UK (Eng. + Wales)	3 158	2 463	2 132	1 815	1 186	875	980	1 918	2 712	2 761
UK (Isle of Man)	-	-	-	-	-	-	297	232	221	161
UK (N. Ireland)	1 537	1 279	1 153	1 175	1 409	1 064	1 898	2 591	3 360	3 852
UK (Scotland)	50	49	70	91	60	79	118	286	376	573
Total	11 787	10 190	9 790	10 178	8 054	6 328	8 358	10 739	14 894	13 318
Total figures used by Working Group for stock assess- ment	11 819	10 251	9 863	10 247	8 054	6 271	8 371	10 776	14 907	13 768

Table D.7.2. Nominal catch (tonnes) of WHITING in Division VIIa, 1973-1982.
(Data for 1973-81, human consumption, as officially reported to ICES)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 [*]
Belgium	102	94	99	68	63	51	42	45	85	45
France	3 101	2 700	2 784	2 985	1 952	2 098	1 897	1 616	1 254	1 375
Ireland	3 414	4 184	3 946	5 055	4 821	4 562	3 847	5 546	5 362	4 207
Netherlands	12	52	52	56	24	12	11	10	12	14
UK (England + Wales)	1 224	685	617	635	1 008	1 105	842	1 000	816	1 195
UK (N. Ireland)	2 437	2 045	2 280	3 290	2 692	3 089	2 946	3 954	9 052	10 306
UK (Scotland)	47	52	54	104	161	152	154	251	102	189
UK (Isle of Man)	372	243	346	268
USSR	-	7	-	-	-	-	-	-	-	-
Total human consumption	10 337	9 819	9 832	12 193	10 721	11 069	10 111	12 665	17 029	17 599
Total human consumption figures used by the Working Group for stock assessment	9 972	9 364	9 275	11 651	10 204	10 404	9 892	12 665	17 029	17 599
Estimated industrial catches (Ireland only)	744	283	353	425	760	927	-	-	-	-
Estimated discards from <u>Nephrops</u> fishery	3 400	2 020	3 348	1 823	4 082	1 917	2 019	3 302	3 577	893

^{*}Preliminary

Table D.7.3. Nominal catch (tonnes) of PLAICE in Division VIIa, 1973-1982.
(Data for 1973-1981 as officially reported to ICES.)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^{*)}
Belgium	221	247	248	136	110	109	151	214	231	130
France	500	132	134	126	141	110	152	104	51	49
Ireland	1 079	891	884	1 032	953	1 025	1 032	1 086	1 243	923
Netherlands	42	47	75	73	24	15	18	60	40	38
U.K. (England & Wales)	3 002	2 240	2 544	1 945	1 422	1 792	1 817	2 139	2 117	1 875
U.K. (Isle of Man)	52	20	27	13
U.K. (N. Ireland)	142	104	125	120	165	173	161	139	132	161
U.K. (Scotland)	73	54	53	52	89	89	106	141	64	48
USSR	-	1	-	-	-	-	-	-	1	-
Total	5 060	3 716	4 063	3 484	2 904	3 313	3 489	3 903	3 906	3 237
Total figures used by Working Group for stock assessment	5 060	3 715	4 063	3 473	2 904	3 231	3 428	3 903	3 906	3 237

*) Preliminary

Table D.7.4 Irish Sea SOLE. Nominal catches (tonnes) 1973-82. (Data for 1973-81 as officially reported to ICES)

COUNTRY	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	793	664	805	674	566	453	779	1 002	892	669
Denmark	-	-	-	-	-	-	-	-	15	-
France	12	54	59	72	39	65	48	41	13	14
Ireland	27	28	24	74	84	127	134	229	151	114
Netherlands	281	320	234	381	227	177	247	176	186	136
UK (Engl.and Wales)	258	218	281	195	160	189	290	367	311	277
UK (N.Ireland)	46	23	24	49	49	57	47	44	41	31
UK (Scotland)	11	...	15	18	21	30	42	68	45	44
UK (Isle of Man)	30	18	7	10
Total	1 428	1 307	1 442	1 463	1 146	1 098	1 617	1 945	1 661	1 295

*) Preliminary

Table D.7.5 Celtic Sea SOLE (Divisions VII_f and VII_g). Nominal catch (tonnes) 1973-1982 by country.

COUNTRY	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	822	914	663	1 054	779	506	693	985	941	819
France	435	75	133	181	80	160	153	141	91	100
Ireland	2	2	5	10	2	2	7	14	8	3
Netherlands	4	15	2	7	7	-	-	-	-	-
UK (Engl. and Wales)	128	99	116	99	93	112	101	178	175	206
Total	1 391	1 105	919	1 351	961	780	954	1 318	1 215	1 128

*) Preliminary

Table D.7.6 Nominal catch (tonnes) of COD in Divisions VIIIf and VIIg, 1973-82.

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^x
Belgium	524	197	377	226	107	88	110	172	285	168
France	2 229	1 770	2 472	3 351	2 088	2 567	3 244	5 036	7 473	5 942
Germany, Fed.Rep.	-	-	-	-	-	-	-	7	-	-
Ireland	64	24	15	13	17	30	72	246	108	141
Netherlands	-	-	-	-	-	-	-	-	-	302
UK (Engl. & Wales)	196	153	127	92	59	67	81	199	299	302
USSR	30		30	1	-	-	-	-		
Total	3 043	2 144	3 021	3 683	2 271	2 752	3 507	5 660	8 165	6 553

* Preliminary

Table D.7.7 Nominal catch (tonnes) of whiting in Divisions VIIg and VIIg (1973-1982)

VIIg	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^a
Belgium	91	60	60	65	52	37	26	31	61	28
Ireland	17	9	23	27	10	12	85	211	62	38
France	3 449	3 060	3 033	4 226	3 626	3 449	3 683	4 947	5 406	4 416
Netherlands	2 080	914	54	21	61	63	2	3	0	0
U.K. (England and Wales)	21	13	57	21	25	38	23	60	190	104
Total VIIg	5 658	4 056	3 227	4 360	3 774	3 599	3 819	5 252	5 719	4 586
VIIIf ^{b)}										
Belgium	99	12	156	97	45	29	74	41	41	42
France	1 065	1 491	1 488	1 655	2 111	3 171	1 983	2 986	2 587	2 727
Netherlands	0	0	1	4	4	1	2	0	0	0
U.K. (England and Wales)	187	121	107	109	141	143	124	141	119	72
Total VIIIf	1 351	1 624	1 752	1 865	2 301	3 344	2 183	3 168	2 747	2 841
Total VIIIf + g	7 009	5 680	4 979	6 225	6 075	6 943	6 002	8 420	8 466	7 427

a) preliminary

b) data for 1974-1981 as officially reported to ICES

Table D.7.8 PLAICE in Divisions VIIg and VIIf. Nominal catches (tonnes) 1973-1982

COUNTRY	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	309	270	195	307	214	196	171	372	365	341
France	185	218	413	360	365	527	467	706	697	539
Ireland	39	20	50	49	28		49	61	64	198
Netherlands	16	-	2	-	-	-	-	-	-	-
UK (England and Wales)	398	214	227	153	150	152	176	227	251	196
Spain	-	-	-	-	-	-	-	7	-	-
U.S.S.R.	4	-	1	-	-	-	-	-	-	-
Total	951	722	888	869	757	875	863	1 373	1 377	1 274

* Preliminary

DIVISION	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
VIIg	408	358	420	555	424	483	478	769	798	757
VIIIf	543	364	468	314	333	392	385	604	579	517
VIIIf + g	951	722	888	869	757	875	863	1 373	1 377	1 274

* Preliminary

Table D.8.1 Nominal catch (tonnes) of SOLE in Sub-area IV.

Country \ Year	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982**
Belgium	1 483*	1 130	1 392*	1 456	1 671*	1 727*	2 044*	1 378	1 363	1 927.4
Denmark	957	705	682	574	348	465	313*	710*	720	521.6
France	250	195	297	598	308	346	309*	232*	144	395.0
Germany, Fed.Rep.	336	173	233	192	310	467	242*	338*	346	289.5
Netherlands	15 883	15 434*	15 242	11 044	10 873	6 749	7 646*	12 695*	12 400	17 748.8
United Kingdom (Engl.+Wales)	386*	340	426	455	491*	625*	649	452*	381	402.0
Other countries	14	12	-	7	2	1	40	2	-	2
Total	19 309	17 989								
Unreported landings			2 500	3 000	4 000	9 900	11 354			
Grand Total			20 772	17 326	18 003	20 281	22 597	15 807	15 405	21 286.3

*Figures revised by ad hoc Flatfish Working Group 1982, otherwise from Bulletin Statistique

**Provisional Working Group estimates

Table D.8.2 North Sea PLAICE. Nominal catch (tonnes) in Sub-area IV. * = figure revised by ad hoc Flatfish Working Group 1982, otherwise from Bulletin Statistique.

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ¹⁾
Belgium	6 111*	6 198*	6 162*	5 286*	7 321*	6 231*	7 687*	7 005*	6 346*	6 755
Denmark	23 266	19 814	22 731	25 612	20 900	21 285	27 497	27 057	22 026	23 948
Faroe Isl.	1	-	1	-	1	-	-	-	-	-
France	1 355	519	536	497	598	750	856	711*	586*	558
Federal Republic of Germany	5 734*	3 231*	4 041*	3 649*	5 414*	4 595*	4 315*	4 319*	3 449*	3 408
Ireland	-	-	-	-	-	-	19	-	+	-
Netherlands	57 948	54 438	51 293	46 457	42 307	28 219	38 295	39 782	40 049	50 000
Norway	15	13	13	20	16	13	13	15	18	13
Poland	1	-	153	40	-	-	-	-	-	-
Sweden	432	431	35	28	-	-	7	7	3	5
UK(Engl.&Wales)	30 354*	23 855*	20 291*	23 772*	27 625*	27 862	25 825	18 687*	17 129*	16 385
UK (Scotland)	4 815	4 002	3 230	3 310	3 622	3 877	4 126	4 345	4 390	4 259
USSR	397	39	50	-	-	-	-	-	-	-
Total	130 429	112 540	108 536	108 671	107 804	92 832	108 640	101 928	93 996	105 331
Unreported catches	-	-	-	4 999	11 384	21 152	36 707	38 023	45 751	47 827
GRAND TOTAL	130 429	112 540	108 536	113 670	119 188	113 984	145 347	139 951	139 747	153 159

1) Preliminary

Table D.8.3 English Channel SOLE. Nominal catch (in tonnes) in Divisions
VIIId and VIIe, 1973-82

Year	Belgium		Denmark	France		Netherl.	Ireland	U.K.		Total	
	VIIId	VIIe	VIIe	VIIId	VIIe	VIIId,e	VIIe	VIIId	VIIe	VIIId	VIIe
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	302	45	-	1 075	447	-	13	279 ²⁾	764	1 656	1 269
1981	491	16	-	1 513 ¹⁾	415 ¹⁾	-	-	210 ²⁾	784	2 214 ¹⁾	1 215 ¹⁾
1982	526	97	-	1 839	303	-	-	308 ²⁾	1 013	2 673	1 413

Figures for 1982 supplied by Working Group members are provisional.

1) Revised from Bulletin Statistique

2) Official figure and unreported landings 1980: 120 tonnes
1981: 50 tonnes
1982: 62 tonnes

Table D.8.5 English Channel PLAICE. Nominal catch (in tonnes) in Divisions
VIId and VIIe, 1973-82.

Year	Belgium		Denmark		France		Netherlands	U.K. (England & Wales)		Total	
	VIId	VIIe	VIId	VIIe	VIId	VIIe	VIId, VIIe	VIId	VIIe	VIId	VIIe
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	12)	-	1 439	323	-	376	312	1 963	640
1977	149	3	812)	-	1 714	336	-	302	363	2 246	702
1978	161	3	-	1563)	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
1981	850		-	-		3 968		1 643		6 461	
1982	818					3 841		1 650*		6 309	

*Raised for under-reporting

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

2) Includes VIIe

3) Includes VIId

NOTE: All figures up to 1979 are from *Bulletin Statistique*

All others from national statistics

Table E.1.1 Nominal HAKE landings (in thousand tonnes) as reported to ICES for statistical areas combined, 1973-82.

Years	Catch
1973	109.4
1974	98.3
1975	102.9
1976	91.7
1977	66.7
1978	49.6
1979	66.4
1980	63.6
1981	62.9
1982 ¹⁾²⁾	-

1) Spanish landings not reported.

2) Preliminary; not reported to ICES.

Table E.1.2 Nominal HAKE landings (in thousand tonnes) as reported to ICES
by country and area, 1973-82.

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
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	61.6	24.1	2.8	8.5	12.8	-	6.3	26.6	0.9	2.8	15.1	7.8	2.5	1.9	0.6	2.1	1.2	0.9
1981	62.9	24.3	2.2	9.2	12.9	-	5.4	25.2	0.7	2.6	16.3	5.6	5.6 ³	2.6	2.6	2.4	1.3	1.1
1982 ^{1,2}		22.8	1.6	9.3	11.9	-	6.8						4.6	1.8	2.8	2.2	1.1	1.1

1) Preliminary.

2) Spanish landings not reported.

3) Includes Sub-area VIII = 0.4

Table F.2.1 Landings of HORSE MACKEREL in Sub-area IV, by country (in tonnes)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	34	23	15	14	15	9	8	34	7
Denmark	-	-	-	63	1 543	496	199	3 576	1 616
Faroe Islands	772	156	116	130	3	-	260	-	2 327
France	582	140	147	325	182	221	292	2	570
German Dem. Rep.	-	-	4	-	-	-	-	-	-
Germany Fed. Rep.	686	696	162	2	1 993	376	+	139	30
Iceland	203	-	-	-	-	-	-	-	-
Ireland	-	-	-	-	-	-	1 161	412	-
Netherlands	576	173	82	223	106	88	101	355	559
Norway	20 713	2 174	4 842	450	1 037	199	119	2 292	7
Poland	62	-	11	6	-	-	-	-	-
Spain	-	-	-	-	-	-	-	-	-
Sweden	2 ^{a)}	+	-	-	... b)	+	-	-	-
U.K. (Engl. & Wales)	5	3	11	22	36	23	11	15	6
U.K. (Scotland)	1 222	2	+	4	5	+	-	-	-
U.S.S.R.	5 894	6 566	3 278	87	-	-	-	-	-
TOTAL	30 751	9 933	8 668	1 326	4 920	1 412	2 151	6 825	5 122

*) Preliminary

a) Includes IIIa

b) Included in IIIa

Table F.2.2 Landings of HORSE MACKEREL in Sub-area VI, by country (in tonnes)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	-	-	+	-	-	-	-	-	-
Denmark	-	-	-	-	-	443	734	341	2 785
Faroe Islands	342	2	2	-	-	-	-	-	-
France	-	-	293	113	91	151	45	454	4
Ireland	-	-	-	-	59	-	-	-	-
Germany, Fed. Rep.	209	263	5	-	-	155	5 550	10 212	2 114
Netherlands	-	106	69	19	114	6 910	2 385	100 ^{a)}	50 ^{a)}
Norway	627	869	90	-	-	-	-	5	-
Poland	1 067	479	48	-	-	-	-	-	-
Spain	400	150	175	147	91	20	-	-	-
U.K. (Engl. & Wales)	14	6	37	40	44	73	9	5	+
U.K. (Scotland)	41	187	85	105	9	39	1	17	83
U.S.S.R.	780	1 210	3 390	246	-	-	-	-	-
TOTAL	3 521	3 379	4 299	670	408	7 791	8 724	11 134	5 036

* Provisional

a) Estimated from biological sampling

Table F.2.3 Landings of HORSE MACKEREL in Sub-area VII, by country (in tonnes)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	3	4	2	1	1	3	+	1	1
Denmark	-	-	-	-	2 104	4 287	5 045	3 099	877
France	2 466	2 443	3 800	2 448	3 564	4 407	1 983	2 800	2 314
German Dem. Rep.	8	-	92	45	-	-	-	-	-
Germany, Fed.Rep.	825	521	3	308	2 923	5 333	2 289	1 079	12
Ireland	-	-	-	1 133	3 388	-	-	16	-
Netherlands	-	41	280	2 088	10 556	25 174	23 002	25 000 ^{a)}	27 500 ^{a)}
Norway	16	-	-	-	29	959	394	-	-
Poland	4 643	1 869	2 967	640	61	-	-	-	-
Spain	12 315	10 890	17 124	483	516	676	50	234	104
U.K.(Engl.&Wales)	675	438	2 014	1 343	2 918	2 686	12 933	2 520	2 670
U.K.(Scotland	-	-	-	-	-	-	1	-	-
U..S.S.R.	95 650	101 393	150 728	20 366	-	-	-	-	-
TOTAL	116 601	117 599	177 010	28 855	26 060	43 525	45 697	34 746	33 478

* Provisional

a) Estimated from biological sampling

Table F.2.4 Landings of HORSE MACKEREL in Sub-areas VIII and IX, by country (in tonnes)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982* **
<u>Sub-area VIII</u>									
Denmark	-	-	-	-	-	127	-	-	-
France	2 477	2 386	3 380	4 881	3 643	4 240	3 361	3 711	3 073
German Dem.Rep.	-	-	14	-	-	-	-	-	-
Netherlands	-	-	-	-	19	-	-	-	-
Spain	62 836	72 916	95 401	104 812	80 139	42 766	34 134	36 362	19 610
U.K. (Engl.&Wales)	-	-	-	-	-	22	-	+	1
U.S.S.R	925	11 436	30 763	15 213	3	-	-	-	-
TOTAL	66 238	86 738	129 558	124 906	83 804	47 155	37 445	40 073	22 684
<u>Sub-area IX</u>									
Poland	-	-	-	168	-	-	-	-	-
Portugal	48 071	43 491	49 041	51 341	32 043	26 977	25 132	26 032	29 494
Spain	2 954	1 882	3 339	981	14 787	12 880	11 679	12 120	8 840
U.S.S.R.	-	422	644	14 898	381	250	-	-	-
TOTAL	51 025	45 795	53 024	67 388	47 211	40 107	36 811	38 152	38 334

**) Provisional

Table F.3.1 Nominal catch (tonnes) of SARDINE
in Divisions VIIIc and IXa, 1973-82.

(Data provided by Working Group
members)

UNIT: tonnes

YEARS	PORTUGAL	SPAIN			Total VIIIc and IXa
	Div. IXa	Div. VIIIc	Div. IXa	TOTAL	
1973	100 825	44 768	18 523	63 291	164 116
74	75 071	34 536	13 894	48 430	123 501
75	95 877	50 260	12 236	62 496	158 373
76	79 649	51 901	10 140	62 041	141 690
77	79 819	36 149	9 782	45 931	125 750
78	83 553	43 522	12 915	56 437	139 990
79	79 806	18 271	43 876	62 147	141 953
1980	90 094	35 787	49 593	85 380	175 474
81	113 338	35 550	65 330	100 860	214 218
82	96 535	31 756	71 889	103 645	200 180

(-) unknown data

Table G.1.1 Nominal catch (tonnes) of MACKEREL in the North Sea, Skagerrak and Kattegat (IV and IIIa) 1973-1982 (Data for 1973-1976 as officially reported to ICES. Data from 1977 onwards were submitted by Working Group members).

Country \ Year	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Belgium	78	145	134	292	49	10	10	5	55	102
Denmark	7 459	3 890	9 836	27 988	21 833	18 068	19 171	13 234	9 982	2 027
Faroe Islands	11 202	18 625	23 424	63 476	42 836	33 911	28 118	14 770	-	-
France	636	2 254	2 749	2 607	2 529	3 452	3 620	2 238	3 755	2 420
Germany, Dem.Rep.	214	234	141	259	41	233	-	-	-	-
Germany, Fed.Rep.	563	270	276	284	-	284	211	56	59	73
Iceland	3 079	4 689	198	302	-	-	-	-	-	-
Ireland							-	738	733	-
Netherlands	2 339	3 259	2 390	2 163	2 673	1 065	1 009	853	1 706	390
Norway	277 304	248 314	206 871	197 351	180 800	82 959	90 720	44 781	28 341	27 612
Poland	561	4 520	2 313	2 020	298	-	-	-	-	-
Sweden	2 960	3 579	4 789	6 448	4 012	4 501	3 935	1 666	2 446	654
UK (England & Wales)	31	61	33	89	105	142	95	76	6 520	16
UK (Scotland)	2 943	390	578	1 199	1 590	3 704	5 272	9 514	10 575	44
USSR	17 150	8 161	9 330	1 231	2 765	488	162	-	-	-
Unallocated							500		3 216	450
Total	326 516	298 391	263 062	305 709	259 531	148 817	152 823	87 931	67 388	33 788

*) Preliminary

Note: In contrast to the corresponding tables in Working Group reports for years prior to 1982, the catches do not include catches taken in Sub-area IIa.

Table G.1.2. Nominal catches (tonnes) of MACKEREL in the Norwegian Sea
(Division IIa), 1973-1982.

Year Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ³⁾
Denmark ²⁾								-	801	1 008
Faroe Isl. ¹⁾	-	-	-	-	-	283	6	270	-	-
France ²⁾	-	-	7	8	-	2	-	-	6	-
German, Dem. Rep. ²⁾	-	11	-	-	-	-	-	-	51	-
Germany, F.R. ²⁾	-	-	-	-	-	53	174	2	-	-
Netherlands ²⁾	-	-	-	2	-	-	-	-	-	-
Norway ¹⁾	21 573	6 818	34 662	10 516	1 400	3 867	6 887	6 618	12 941	34 540
Poland	-	-	-	-	-	-	-	-	-	231
UK(Engl. & Wales) ¹⁾	-	+	+	+	+	1	-	-	255	-
UK(Scotland) ²⁾				-	-	-	-	296	968	-
USSR ³⁾	-	-	-	-	-	-	5	1 450	3 640	1 641
Total	21 573	6 829	34 669	10 526	1 400	4 206	7 072	8 340	18 662	37 420

1) Data provided by WG members.

2) Data reported to ICES.

3) Preliminary.

Table G.1.4 Nominal catch (tonnes) of MACKEREL in the western area (VI, VII and VIII).
(Data for 1973-77 as officially reported to ICES)

Country \ Year	1973	1974	1975	1976	1977	1978**	1979**	1980**	1981 **)	1982 ⁺ **)
Belgium	3	7	17	10	1	1	3	-	-	+
Denmark	-	-	-	3	698	8 677	8 535	14 932	13 464	15 100
Faroe Islands	635	8 659	1 760	5 539	3 978	15 076	10 609	15 234	9 070	11 100
France	41 664	37 824	25 818	33 556	35 702	34 860	31 510	23 907	14 829	9 500
Germany, Dem.Rep.	1 733	2 885	9 693	4 509	431	-	-	-	-	-
Germany, Fed.Rep.	559	993	1 941	391	446	28 873	21 493	21 088	29 221	11 500
Iceland	52	-	21	10	-	-	-	-	-	-
Ireland	8 314	8 526	11 567	14 395	23 022	27 508	24 217	40 791	92 271	109 700
Netherlands	7 785	7 315	13 263	15 007	35 766	50 815	62 396	91 081	88 117	67 200
Norway	34 600	32 597	1 907	4 252	362	1 900	25 414	25 500	21 610	19 000
Poland	10 536	22 405	21 573	21 375	2 240	-	92	-	1	-
Spain	25 677	30 177	23 408	18 480	21 853	19 142	15 556	15 000	11 469	15 600
Sweden	-	-	-	38	-	-	-	-	-	-
UK (England & Wales)	13 081	21 132	31 546	57 311	132 320	213 344	244 293	150 598	75 722	82 900
UK (N. Ireland)	93	75	30	95	97	46	25	-	4 153	9 600
UK (Scotland)	5 170	8 466	16 174	28 399	52 662	103 671	103 160	108 372	109 153	130 000
USSR	65 202	103 435	309 666	262 384	16 396	-	-	-	-	-
Unallocated							54 000	98 258	140 322	114 700
Total, ICES members	215 104	284 496	468 384	465 754	325 974	503 913	601 303	604 761	609 402	595 900
Bulgaria	4 341	13 558	20 830	28 195	-	-	-	-	-	-
Rumania	-	-	2 166	13 222	-	-	-	-	-	-
Grand Total	219 445	298 054	491 380	507 178	325 974	503 913	601 303	604 761	609 402	595 900

* Preliminary
 ** Working Group estimate
 + Includes S. japonicus

Table G.1.5 Nominal catch (tonnes) of MACKEREL in Sub-area IX - 1973-1982

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 [#]
Portugal	1 635	2 329	2 224	2 595 ^{##}	1 743 ^{##}	1 555 ^{##}	1 071 ^{##}	1 921 ^{##}	3 108 ^{##}	3 600
Spain	2 334	3 264	3 345	2 520	2 935	6 221	6 280	2 719	2 111 ^{##}	796
France	-	-	1	-	-	-	-	-	-	-
Poland	-	-	-	-	8	-	-	-	-	-
USSR	-	-	44	466	2 879	189	111	-	-	-
Total	3 969	5 593	5 614	5 581	7 565	7 965	7 462	4 640	5 219	4 396

Preliminary

Working Group estimate

Table G.2.1 Landings (tonnes) of BLUE WHITING from the main fisheries 1973-82.

Area	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
Norwegian Sea Fishery (Sub-areas I + II and Divisions Va, XIVa + XIVb)	878	146	6 746	3 336	56 999	235 226	741 074	766 858	520 738	111 001
Spawning Fishery (Divisions Vb, VIa, VIb and VIIb,c)	15 027	15 207	30 335	81 362	136 787	229 228	284 547	250 693	288 316	322 772
Icelandic Industrial Fishery (Division Va)	2 833	4 230	1 294	8 220	5 838	9 484	2 500	-	-	-
Industrial Mixed Fishery (Divisions IVa-c, IIIa)	56 826	62 197	41 955	36 024	38 389	99 874	63 333	75 129	61 754	106 560
Southern Fishery (Sub-areas VIII + IX, Divisions VIIId,e + VIIg-k)	27 452	25 733	31 715	35 035	30 723	33 898	27 176	29 944	38 749	33 796
Total	103 016	107 513	112 045	163 977	268 736	607 710	1 118 630	1 122 624	909 557	574 129

*Preliminary

Figure B.1.1.1 NORTH EAST ARCTIC COD

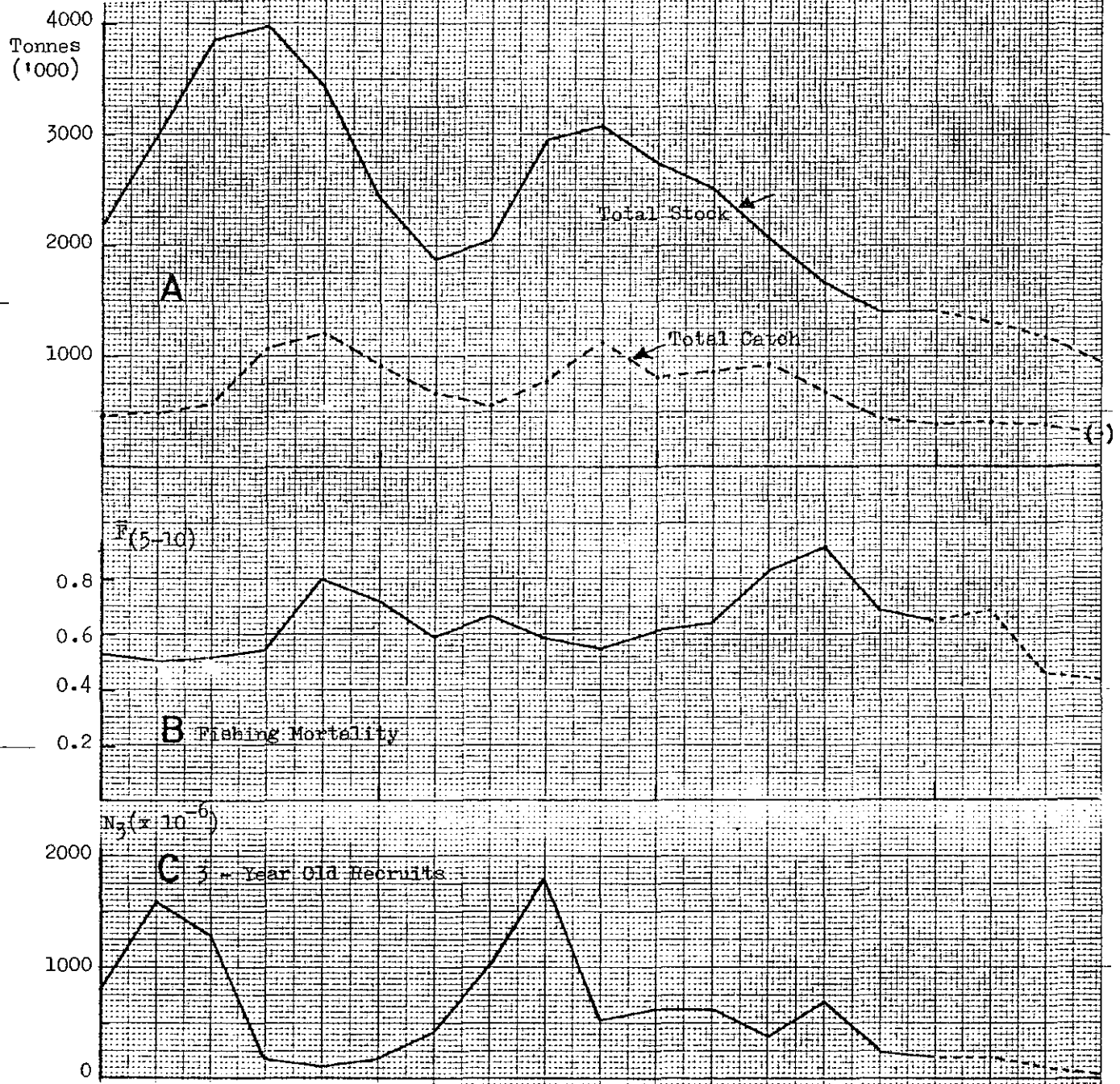


Figure B.1.1.2 NORTH-EAST ARCTIC COD. Y/R. Yield 1984, total recruited biomass (age 5+) and spawning stock biomass at beginning of 1985 for different levels of fishing mortality in 1984.

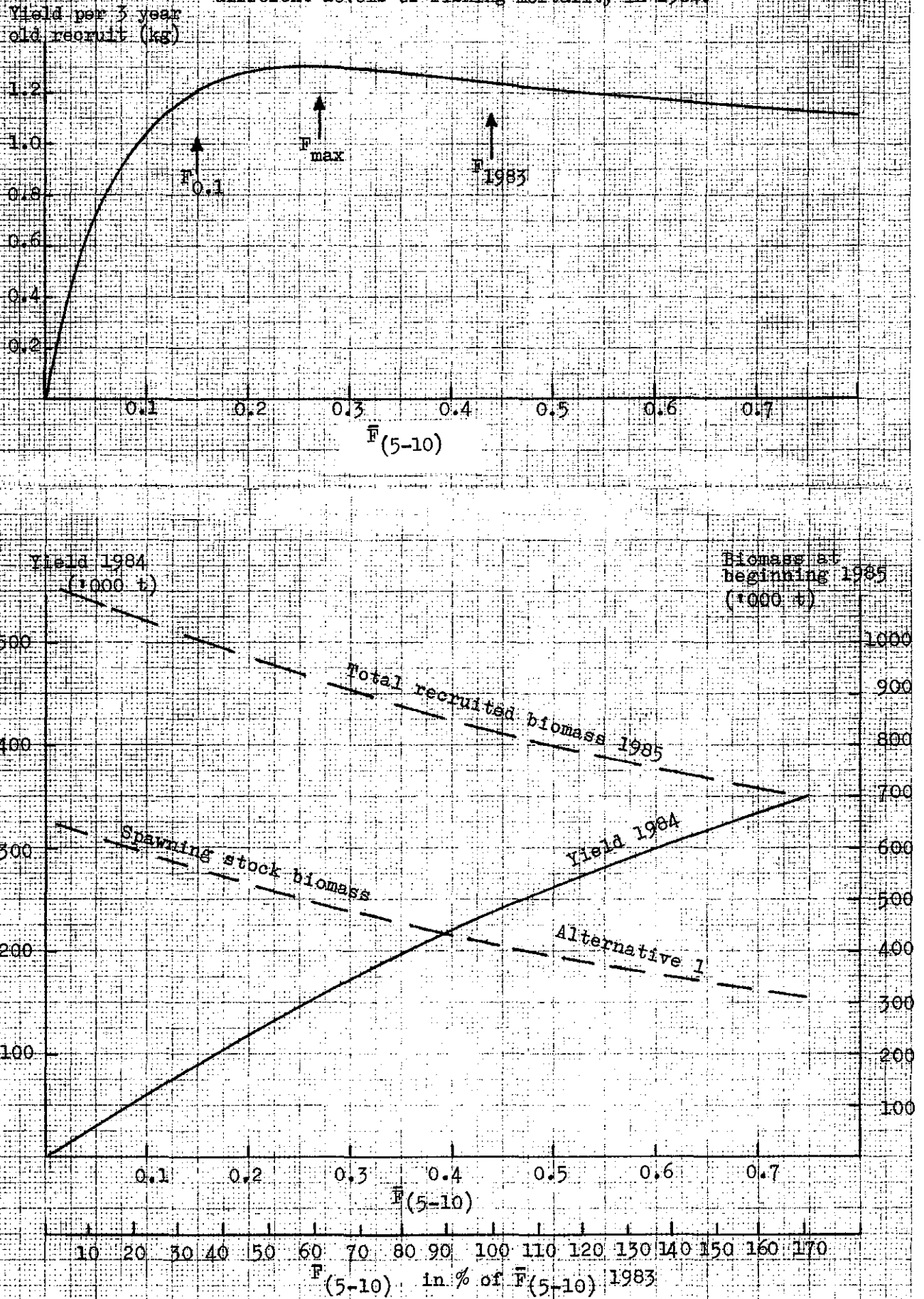


Figure B.1.2.1 NORTH-EAST ARCTIC HADDOK

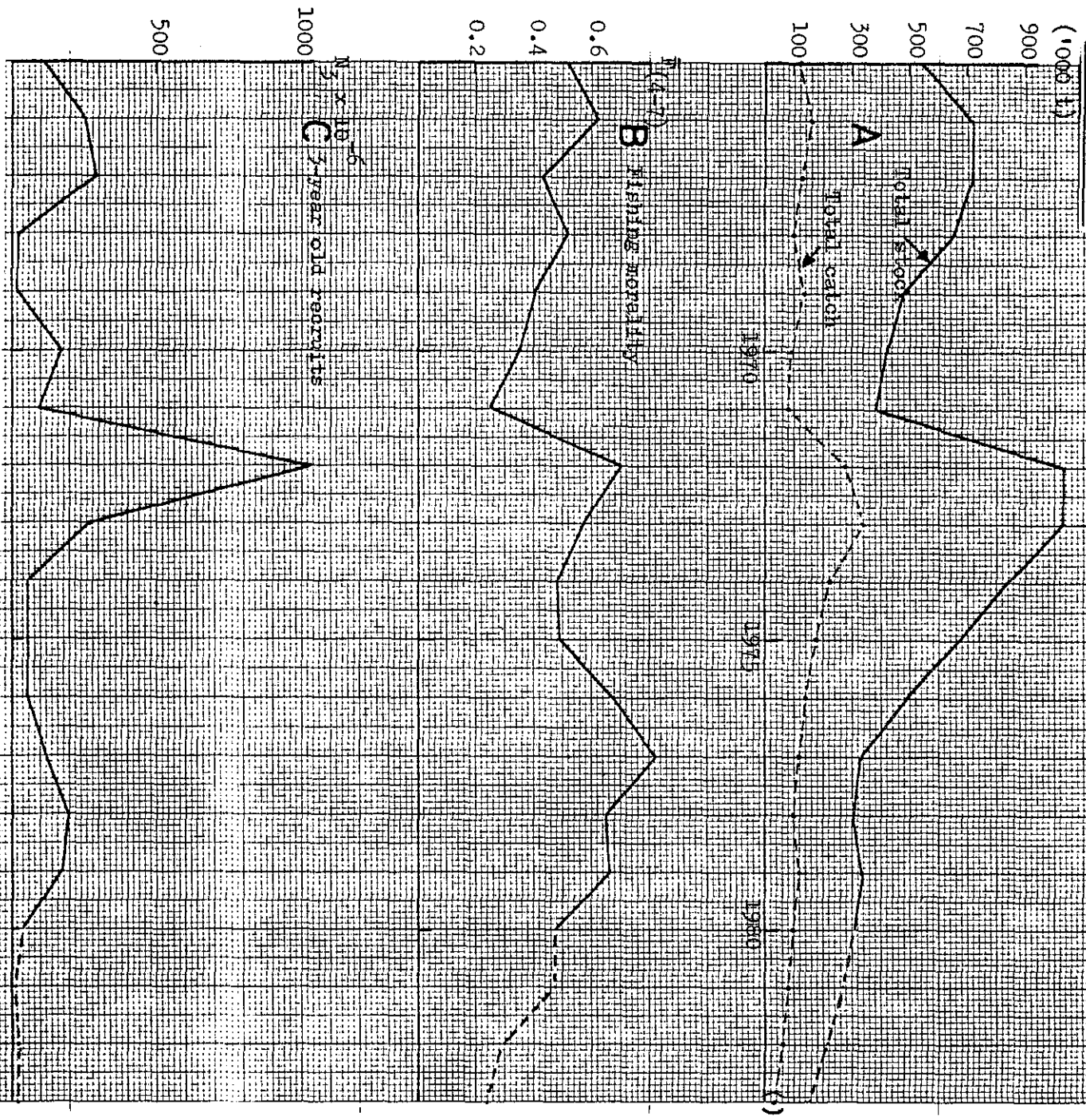


Figure B.1.2.2

North-east Arctic Haddock, Y/R, yield 1984, total recruited biomass (age 5+) and spawning stock biomass at beginning of 1985 for different levels of fishing mortality in 1984.

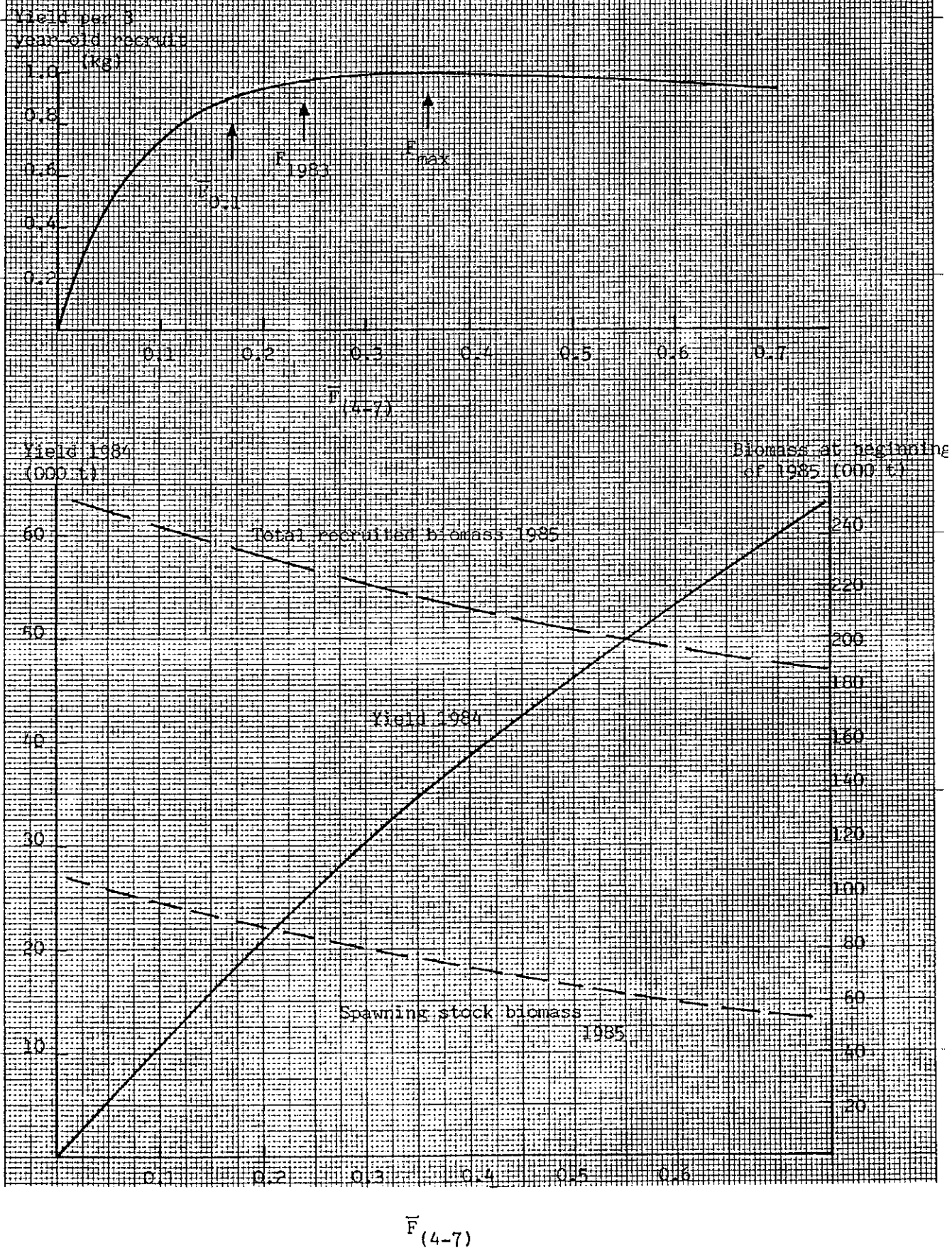


Figure B.2.1

Sebastes mentella in Divisions IIa and IIb.

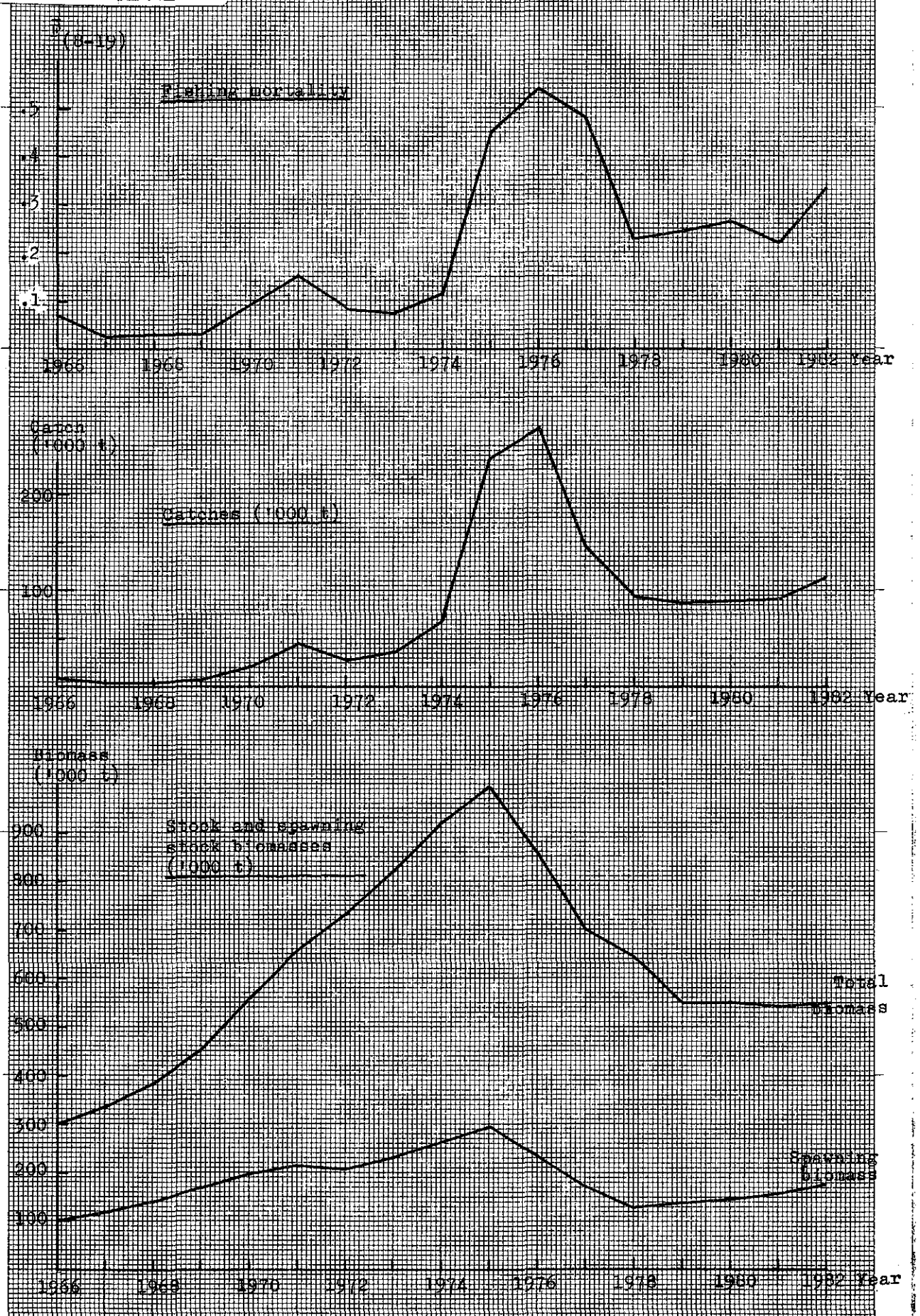


Figure B.2.2

Sebastes mentella in Divisions IIa and IIb.

Yield and spawning stock biomass per 6-year old recruit curves for the present exploitation pattern ($M = 0.1$)

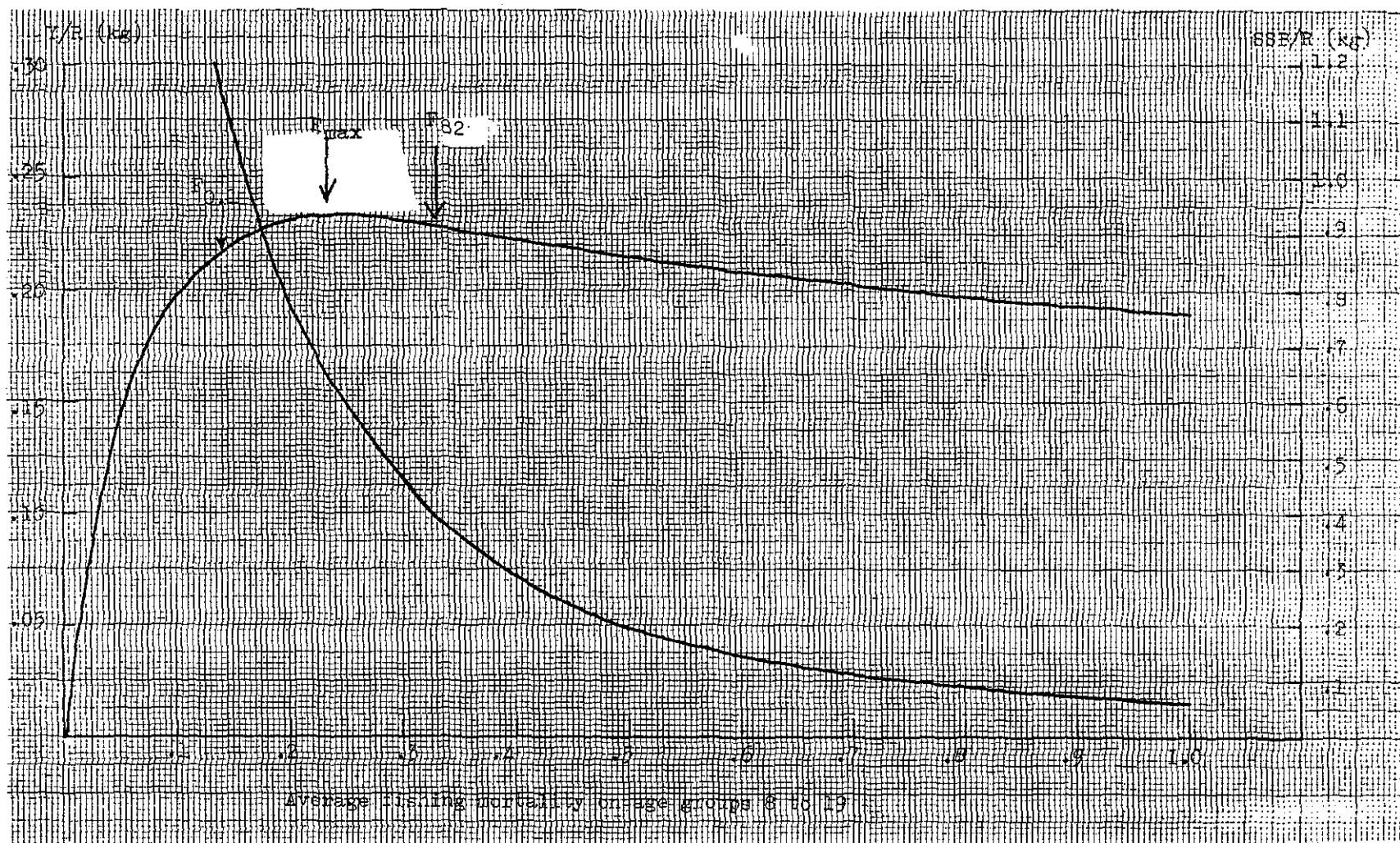


Figure B.2.3

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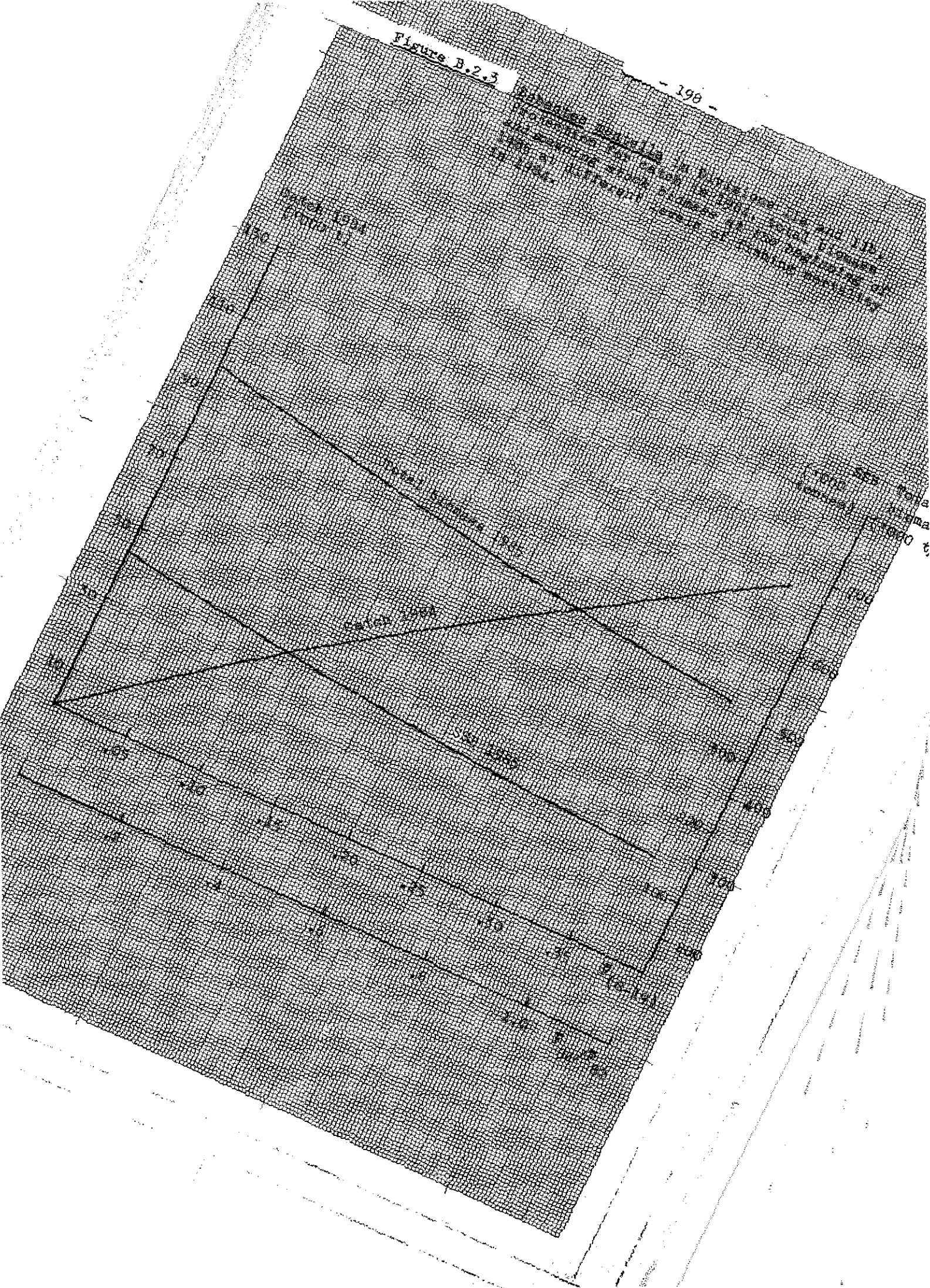


Figure B.3.1

GREENLAND HALIBUT in Sub-areas I and II. The fishing mortality, catch and development of the stock from 1970-82.

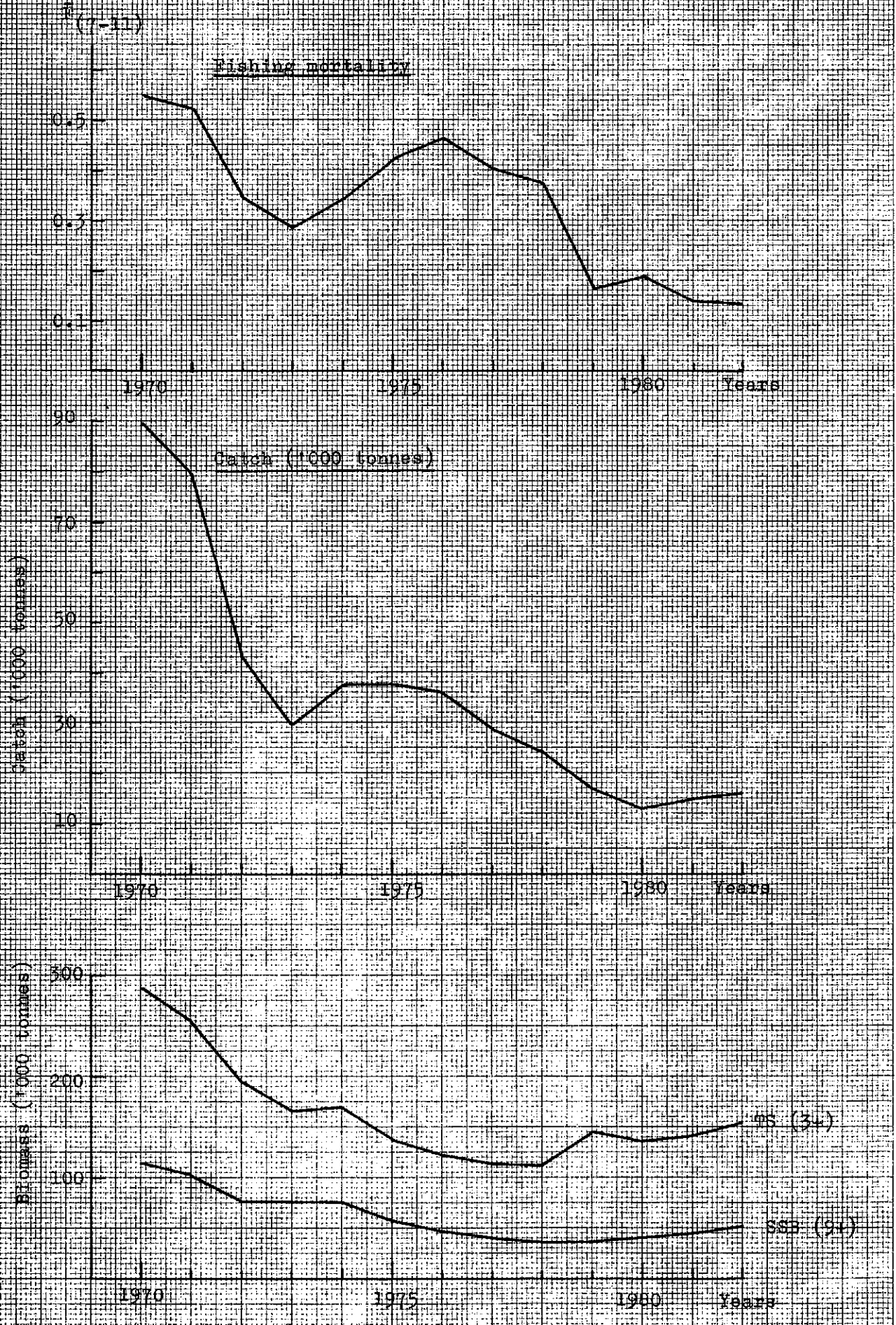


Figure B.3.2 Greenland HALIBUT in Sub-areas I and II.
Yield per recruit and spawning stock biomass
per recruit.

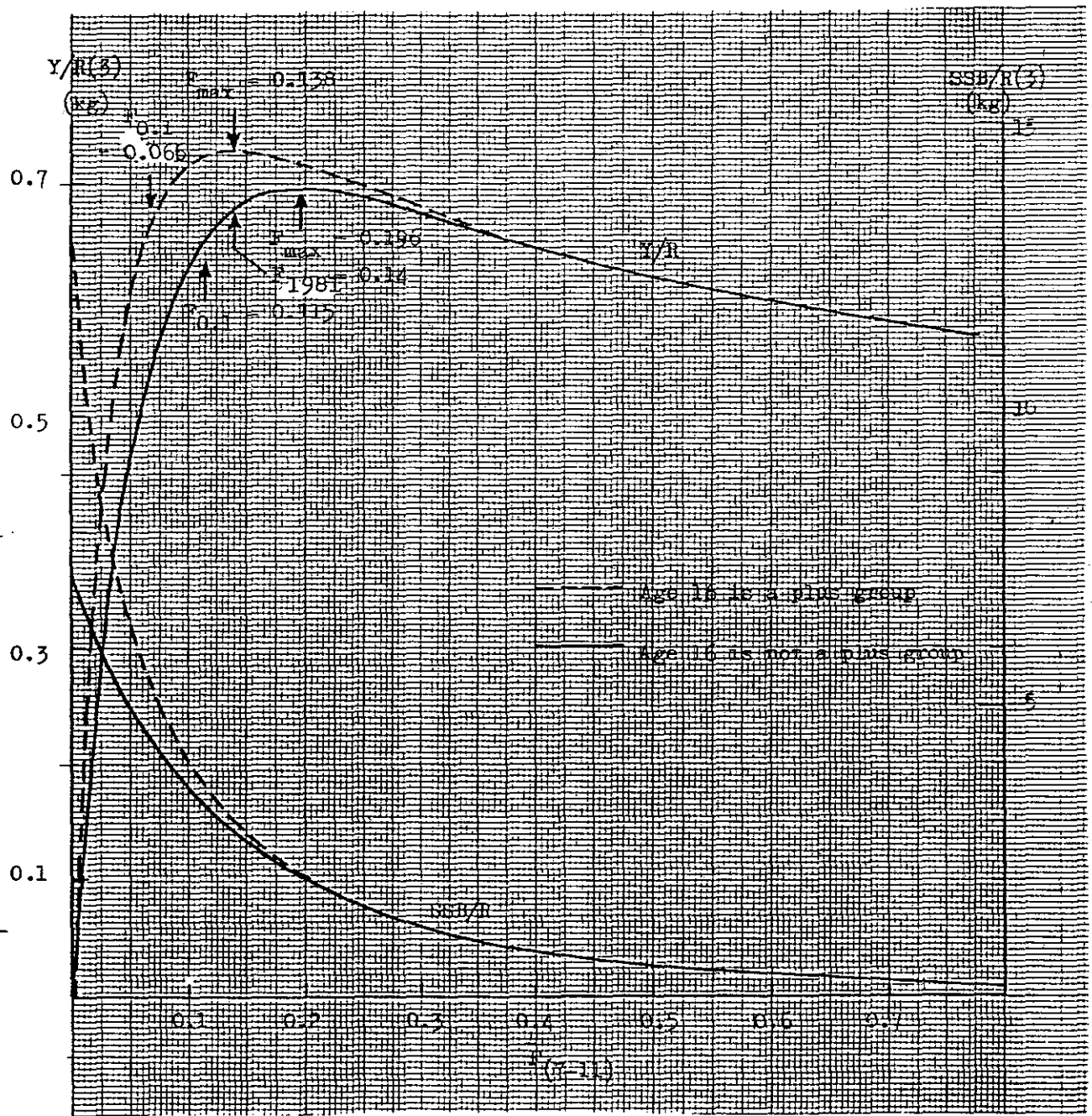


Figure B.3.3

GREENLAND HALIBUT in Sub-areas I and II.

Predictions for catch in 1984, and the biomass of the spawning stock (SSB), and the biomass of the total stock (TSB) at the beginning of 1985.

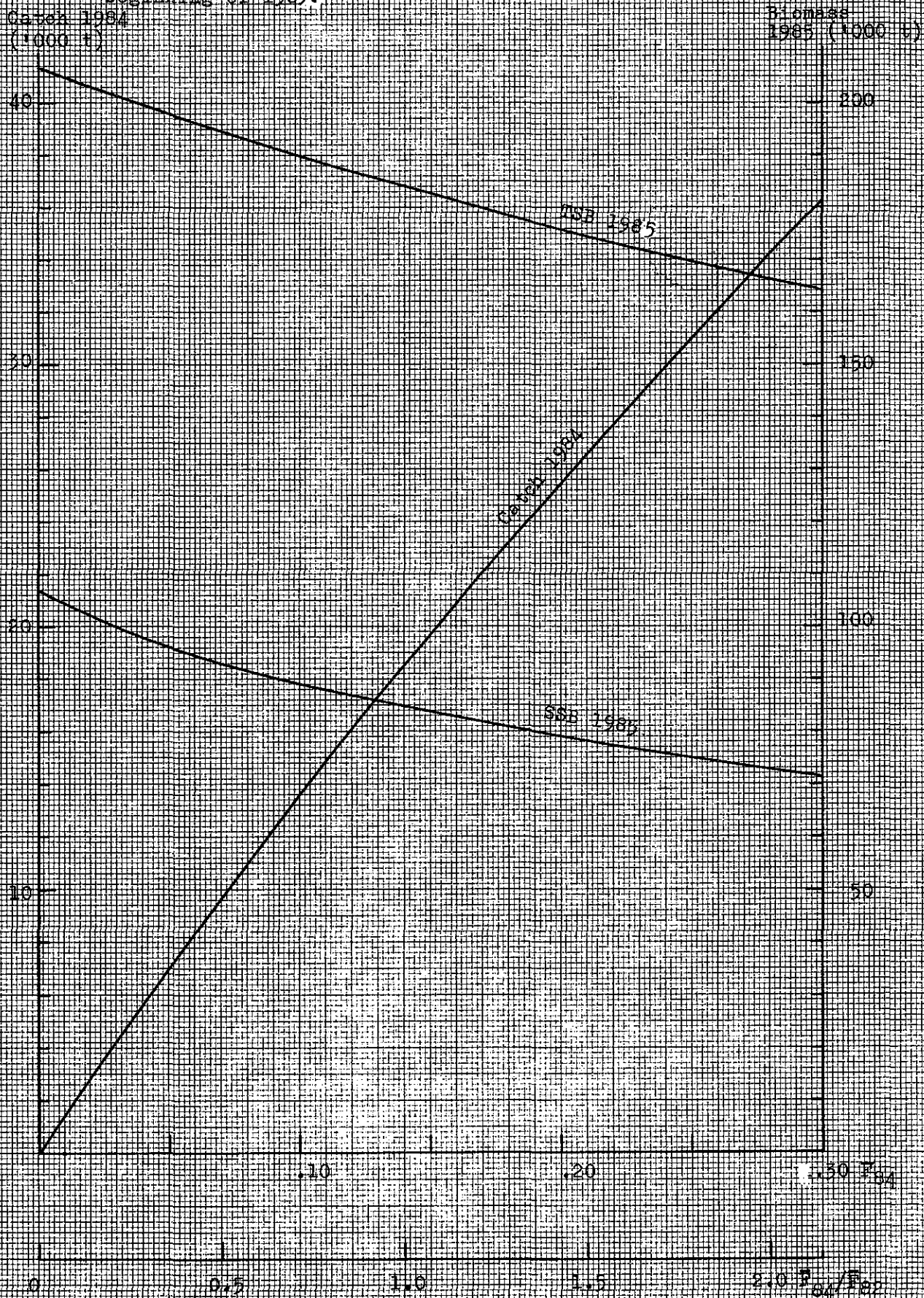


Figure B.4.1 *Sebastes marinus* in Sub-areas V and XIV.

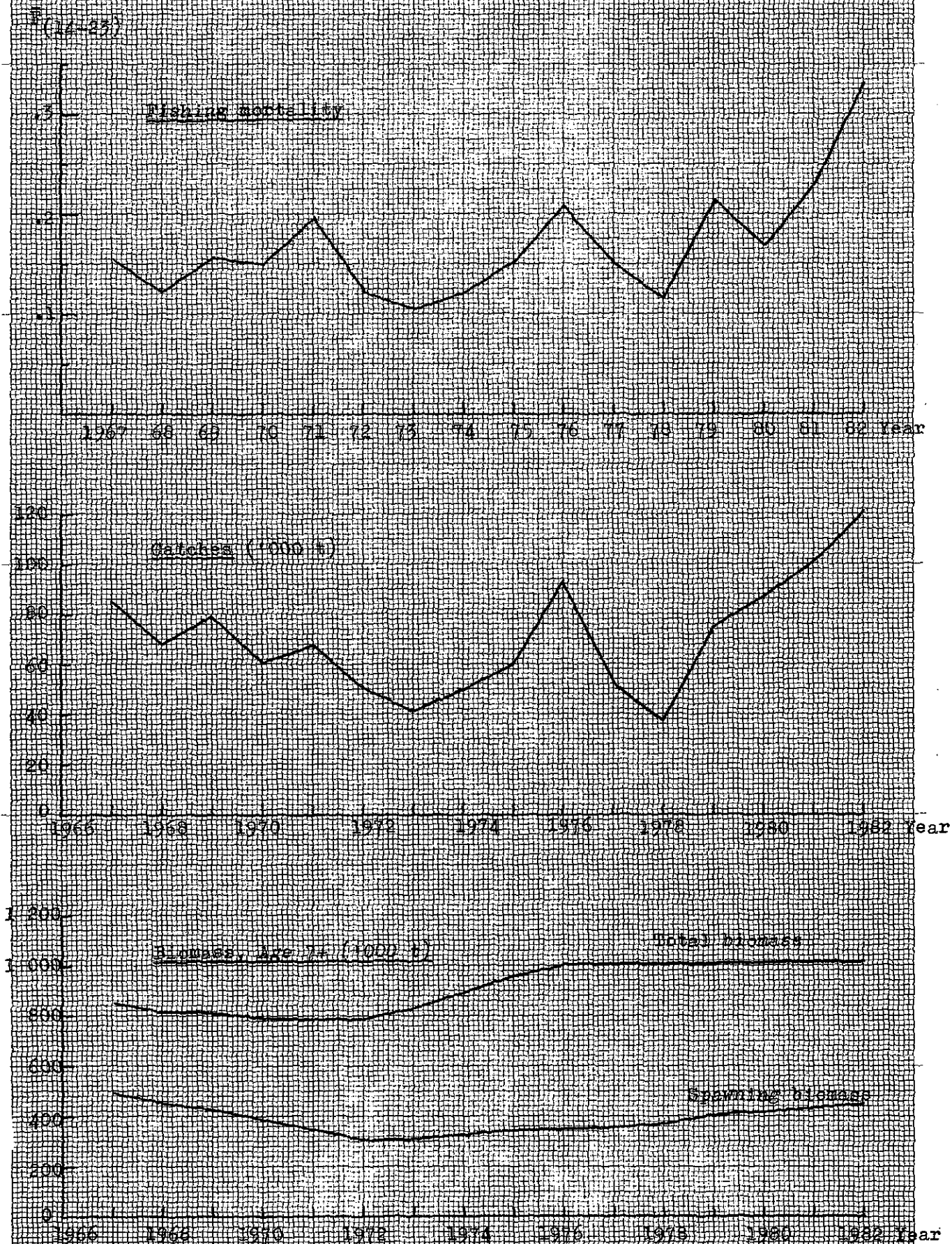


Figure B.4.2

Sebastes marinus in Sub-areas V and XIV.
Yield per recruit and spawning stock
biomass per recruit.

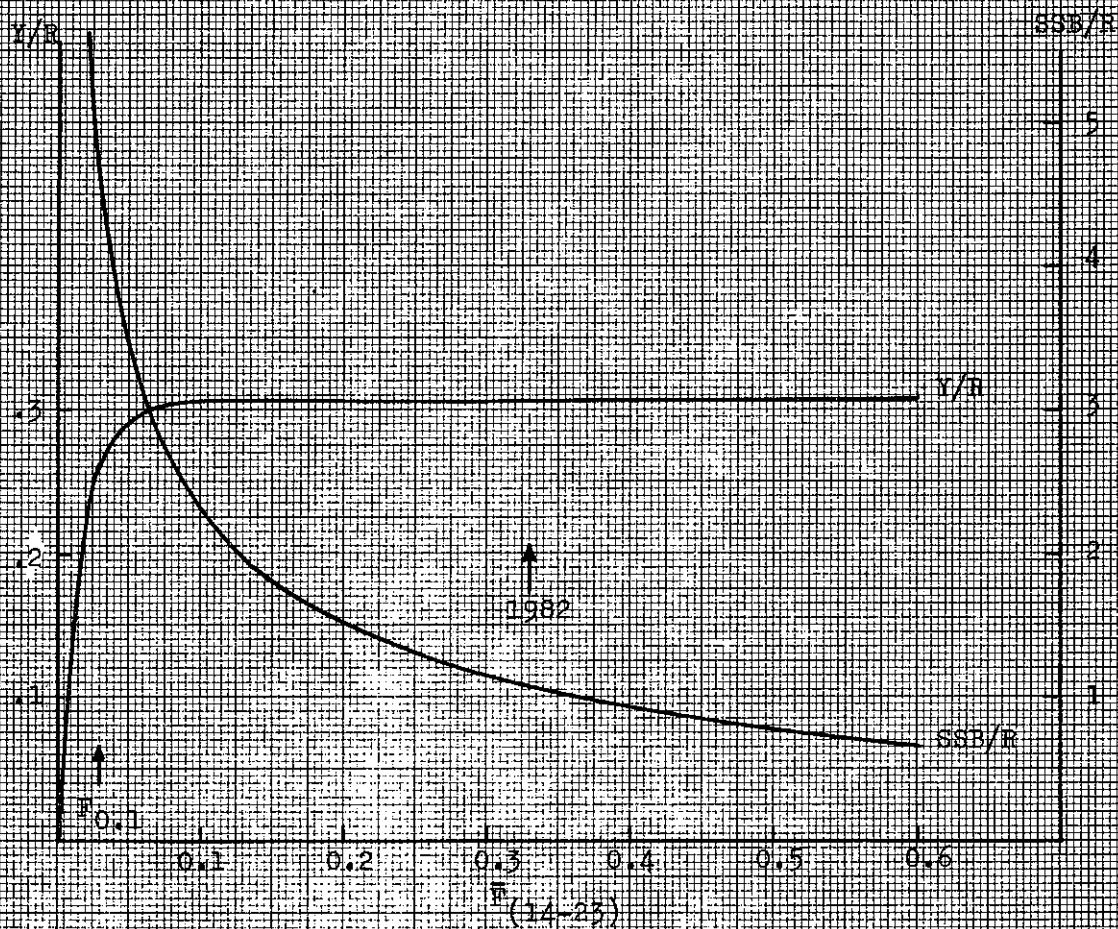


Figure B.4.3 *Sebastes marinus* in Sub-areas V and XIV.

Projections of catch in 1984, total biomass and spawning stock biomass at the beginning of 1985 for different levels of fishing mortality in 1984 and assuming a catch of 120 000 tonnes in 1983 (see note on the option table, p.9).

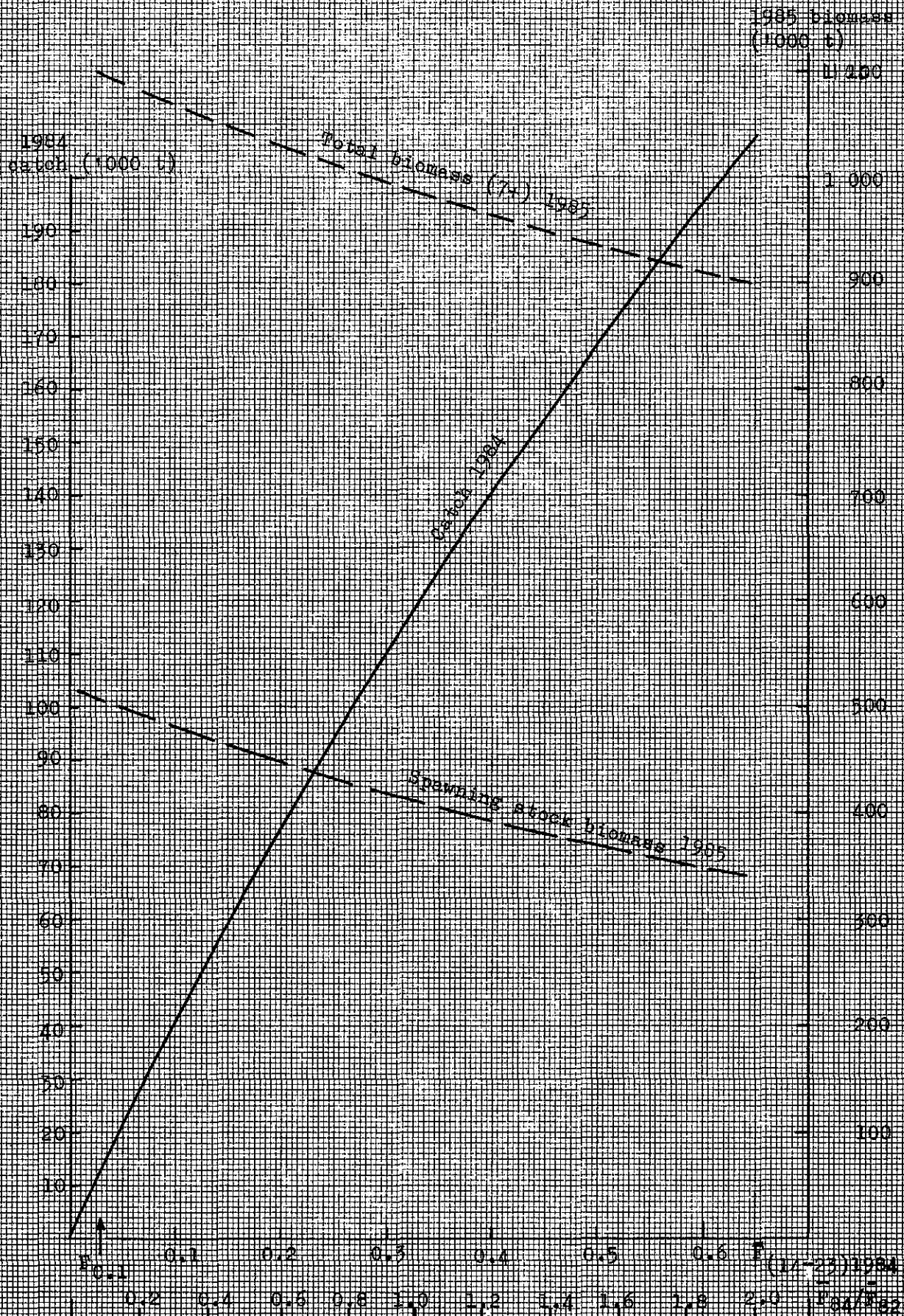
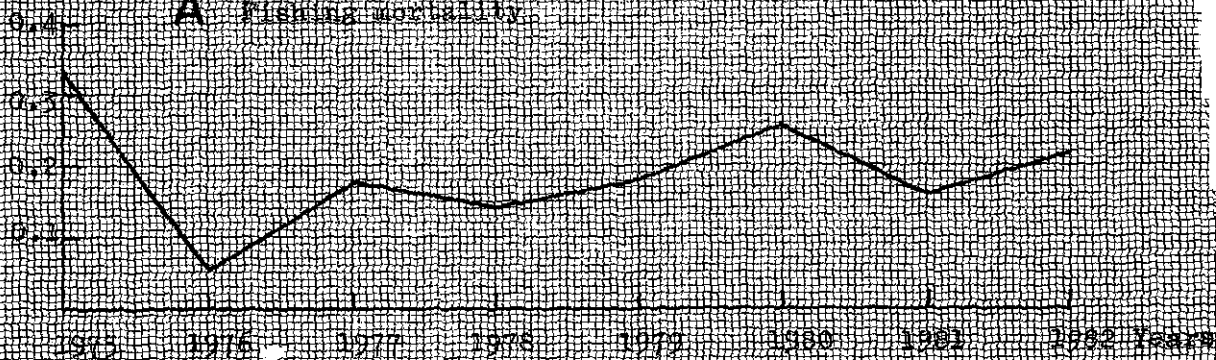


Figure B.5.1

GREENLAND HALIBUT in Subareas V and VII.

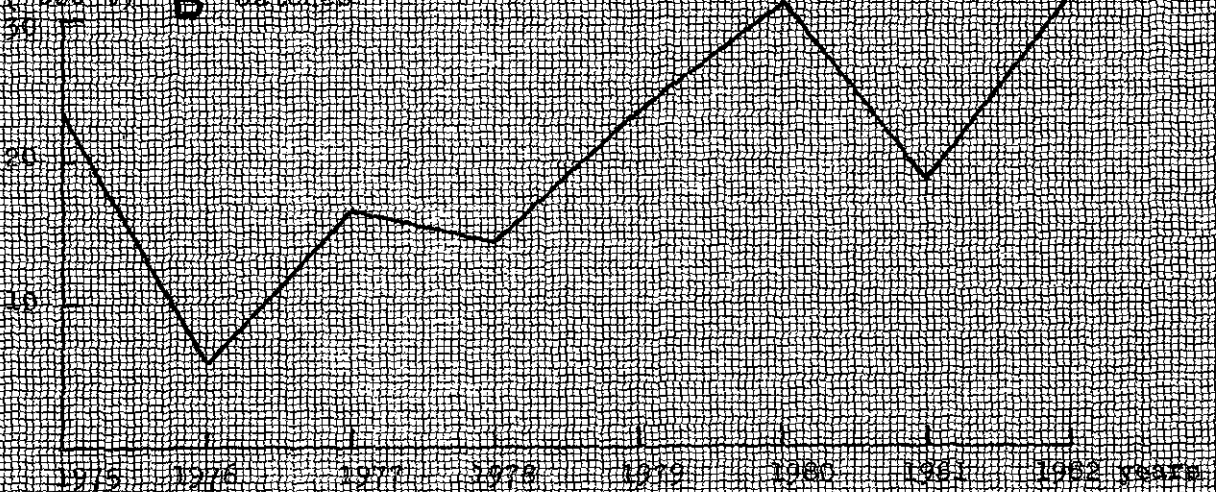
$F(8-13)$

A Fishing mortality



Catch
(1000 t)

B Catches



Biomass
(1000 t)

C Stock and spawning stock biomass

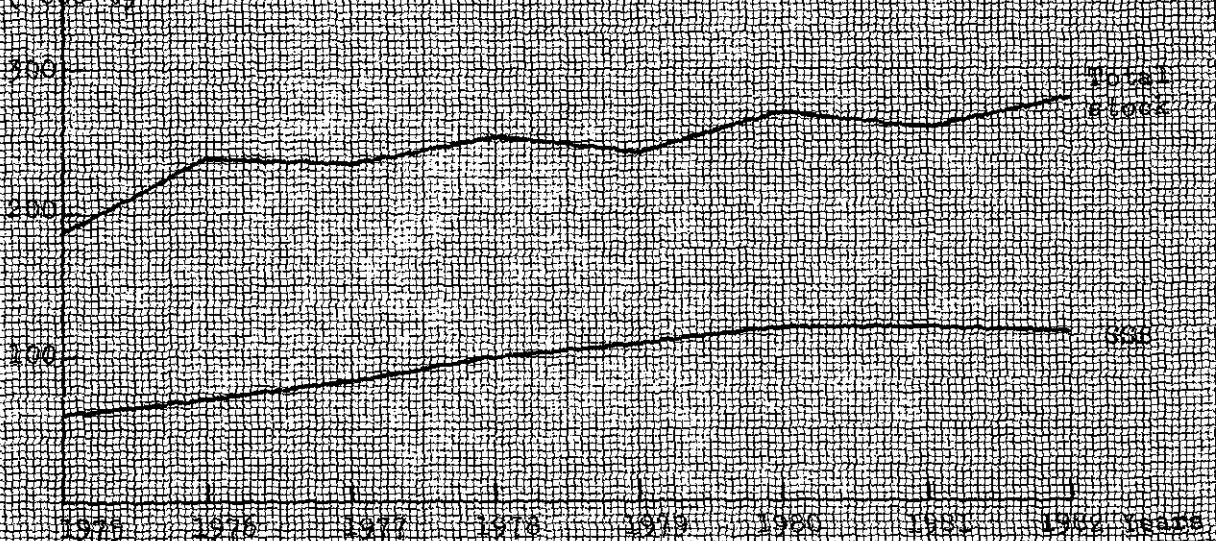


Figure B.5.2 **CHUM AND HALIBUT IN SUB-AREAS V AND ABV.**
Yield and spawning stock biomass per recruit.

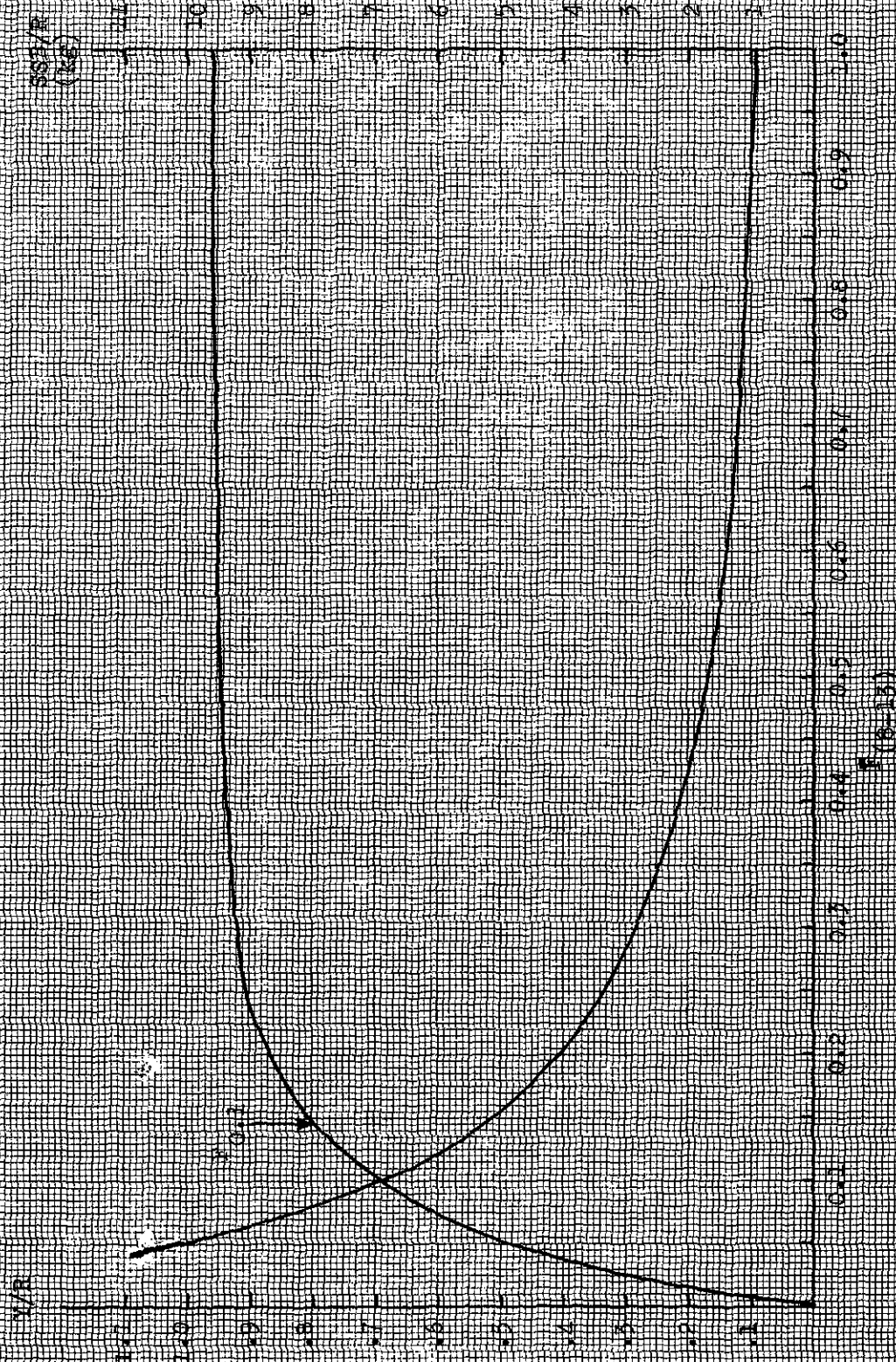


Figure B.5.3 Greenland HALIBUT in Sub-areas V and XIV

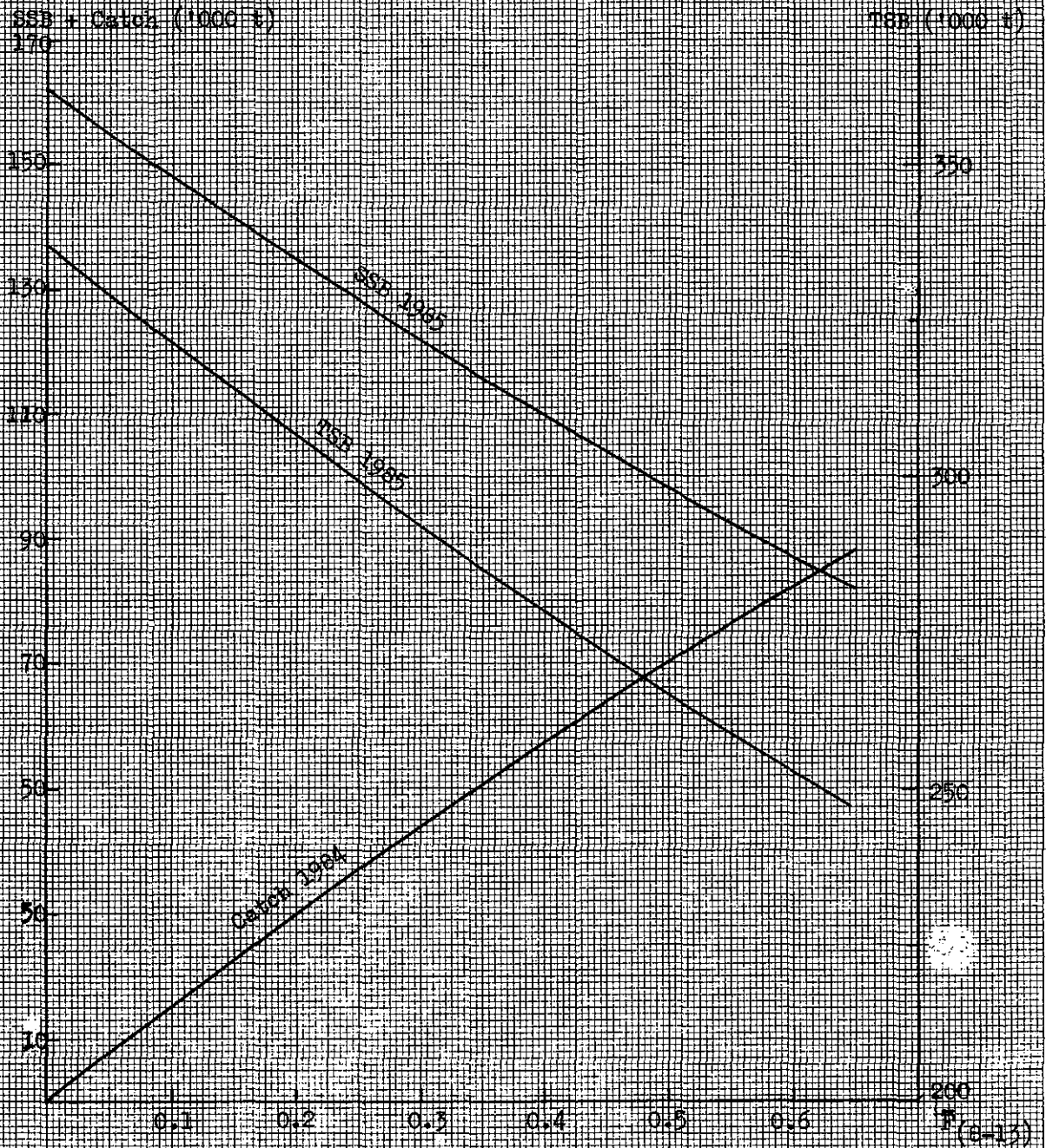


Figure B.6.1.1 COD, East Greenland. Catch 1983 and spawning stock biomass at beginning of 1984 (immigrants 1984 not included) for different levels of fishing mortality in 1983.

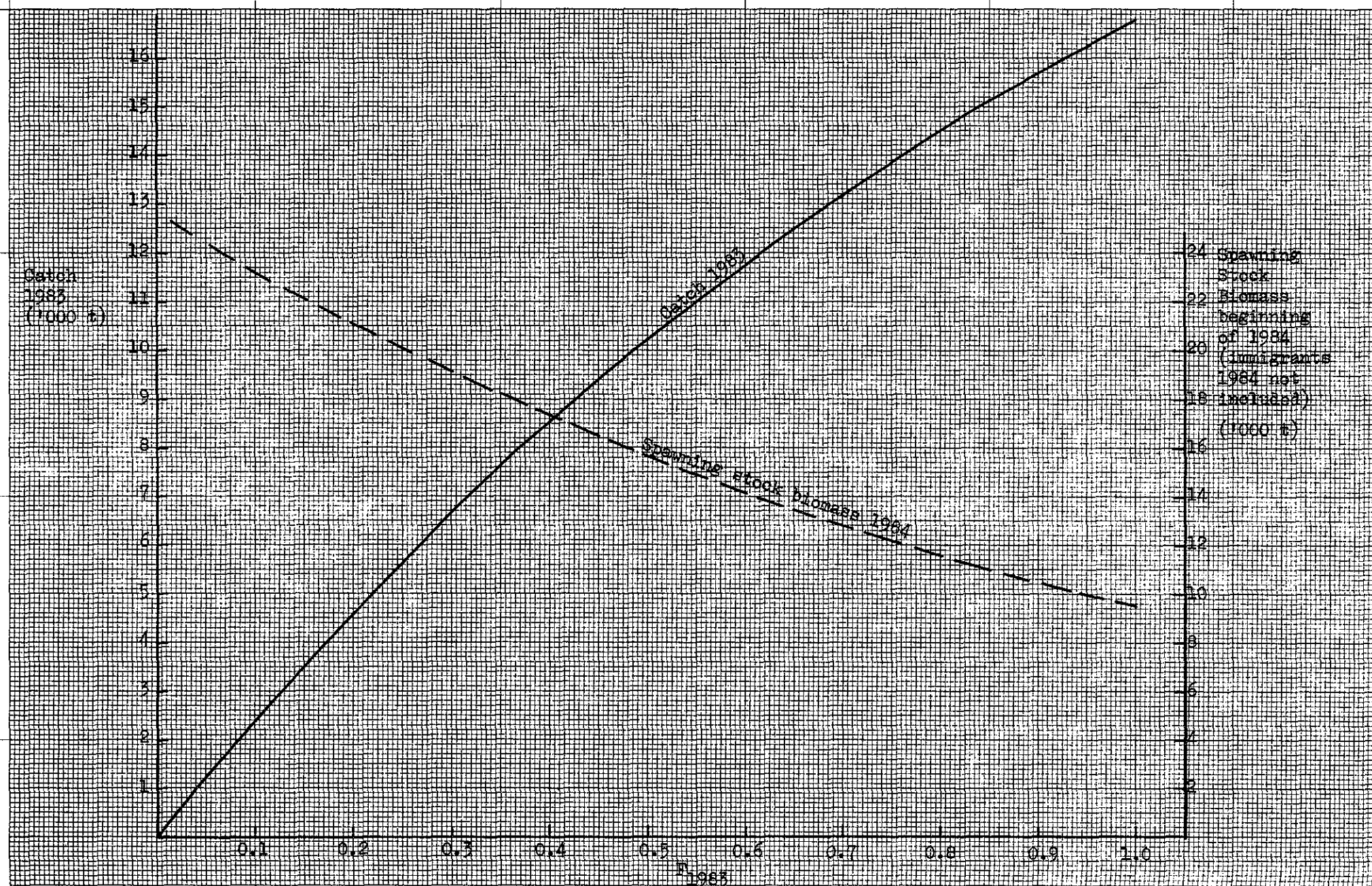


Figure B.6.1.2

Main spawning grounds, migrations of mature fish and larval drift of the cod stocks at West Greenland, East Greenland and Iceland.

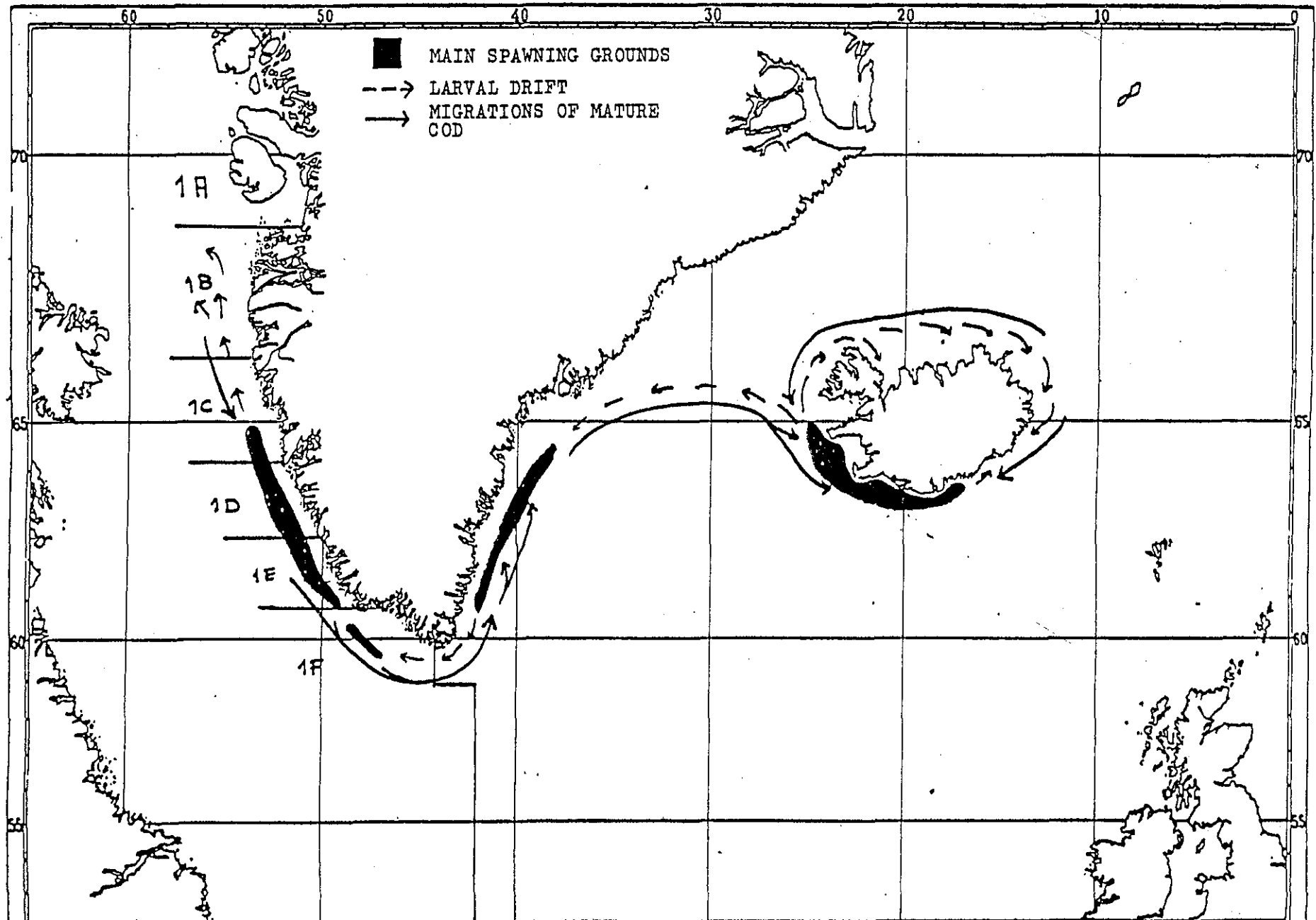
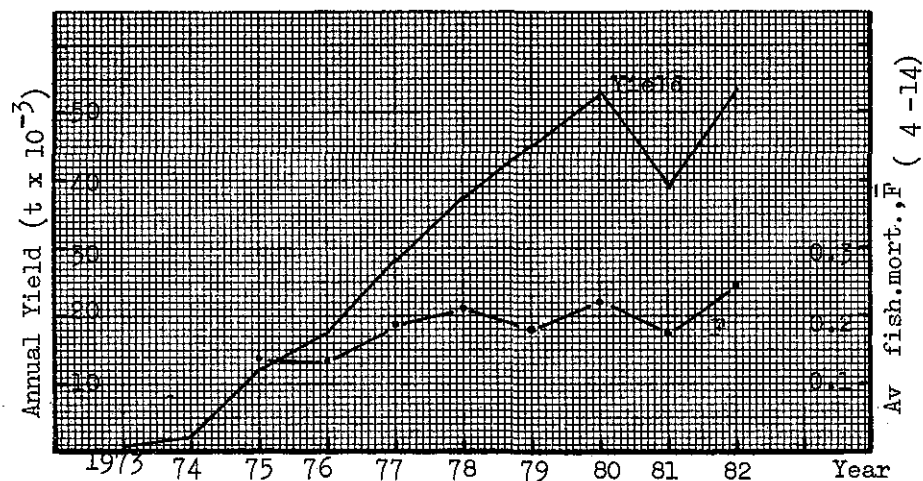


Figure B.7.1.1

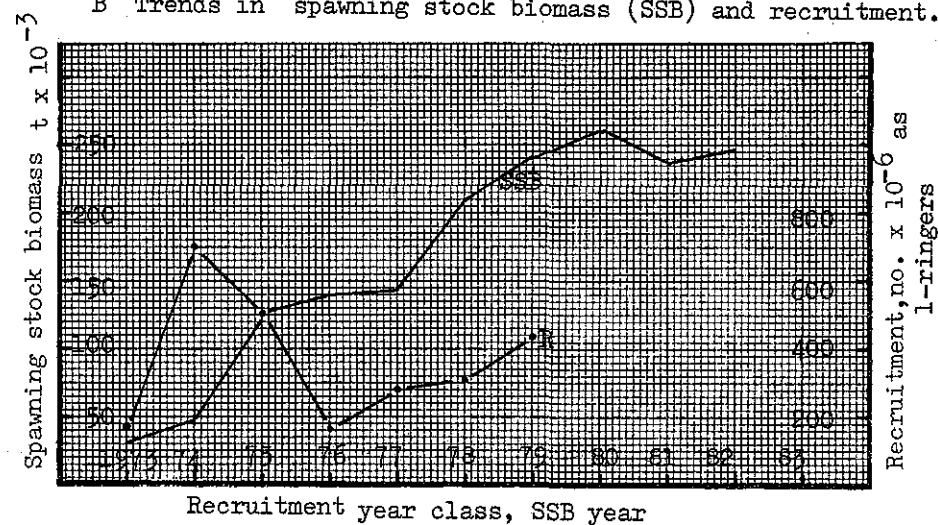
FISH STOCK SUMMARY

Icelandic Summer Spawning Herring
.....
(stock)

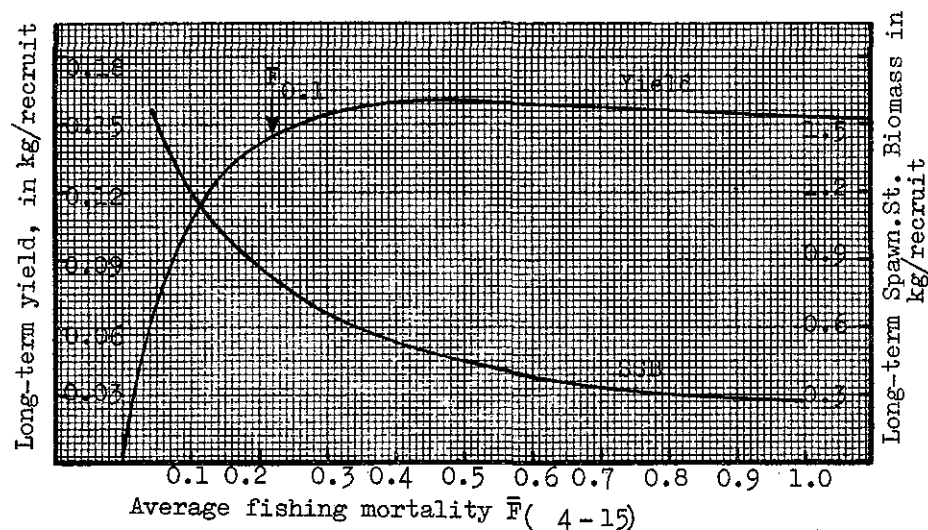
A Trends in Yield and fishing mortality (\bar{F})



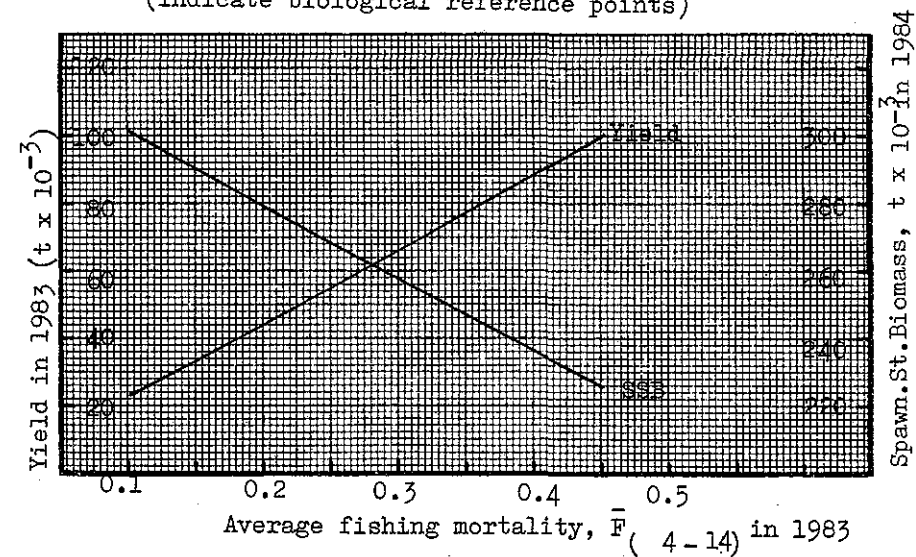
B Trends in spawning stock biomass (SSB) and recruitment.



C Long-term yield and spawning stock biomass (indicate biological reference points)



D Short-term yield and spawning stock biomass (indicate biological reference points)



A CATCHES

Catches
(tonnes $\times 10^3$)

2 000

1 800

1 600

1 400

1 200

1 000

800

600

400

200

SS3 (tonnes
 $\times 10^{-6}$)

9

8

7

6

5

4

3

2

1

B SPawning Stock Biomass (SSB) and number of recruits (R) as age 3

From VPA

SSB

9

8

7

6

5

4

3

2

1

2 000

1 800

1 600

1 400

1 200

1 000

800

600

400

200

9

8

7

6

5

4

3

2

1

2 000

1 800

1 600

1 400

1 200

1 000

800

600

400

200

9

8

7

6

5

4

3

2

1

2 000

1 800

1 600

1 400

1 200

1 000

800

600

400

200

9

8

7

6

5

4

3

2

1

2 000

1 800

1 600

1 400

1 200

1 000

800

600

400

200

9

8

7

6

5

4

3

2

1

2 000

1 800

1 600

1 400

1 200

1 000

800

600

400

200

9

8

7

6

5

4

3

2

1

2 000

1 800

1 600

1 400

1 200

1 000

800

600

400

200

9

8

7

6

5

4

3

2

1

2 000

1 800

1 600

1 400

1 200

1 000

800

600

400

200

9

8

7

6

5

4

3

2

1

2 000

1 800

1 600

1 400

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800

600

400

200

9

8

7

6

5

4

3

2

1

2 000

1 800

1 600

1 400

1 200

1 000

800

600

400

200

9

8

7

6

5

4

3

2

1

2 000

1 800

1 600

1 400

1 200

1 000

800

600

400

200

9

8

7

6

5

4

3

2

1

2 000

1 800

1 600

1 400

1 200

1 000

800

600

400

200

9

8

7

6

5

4

3

2

1

2 000

1 800

1 600

1 400

1 200

1 000

800

600

400

200

9

8

7

6

5

4

3

2

1

2 000

1 800

1 600

1 400

1 200

1 000

800

600

400

200

9

8

7

6

5

4

3

2

1

2 000

1 800

1 600

1 400

1 200

1 000

800

600

400

200

9

8

7

6

5

4

3

2

1

2 000

1 800

1 600

1 400

1 200

1 000

800

600

400

200

9

8

7

6

Figure 0.1.2.1 Northeast Arctic SAITPS

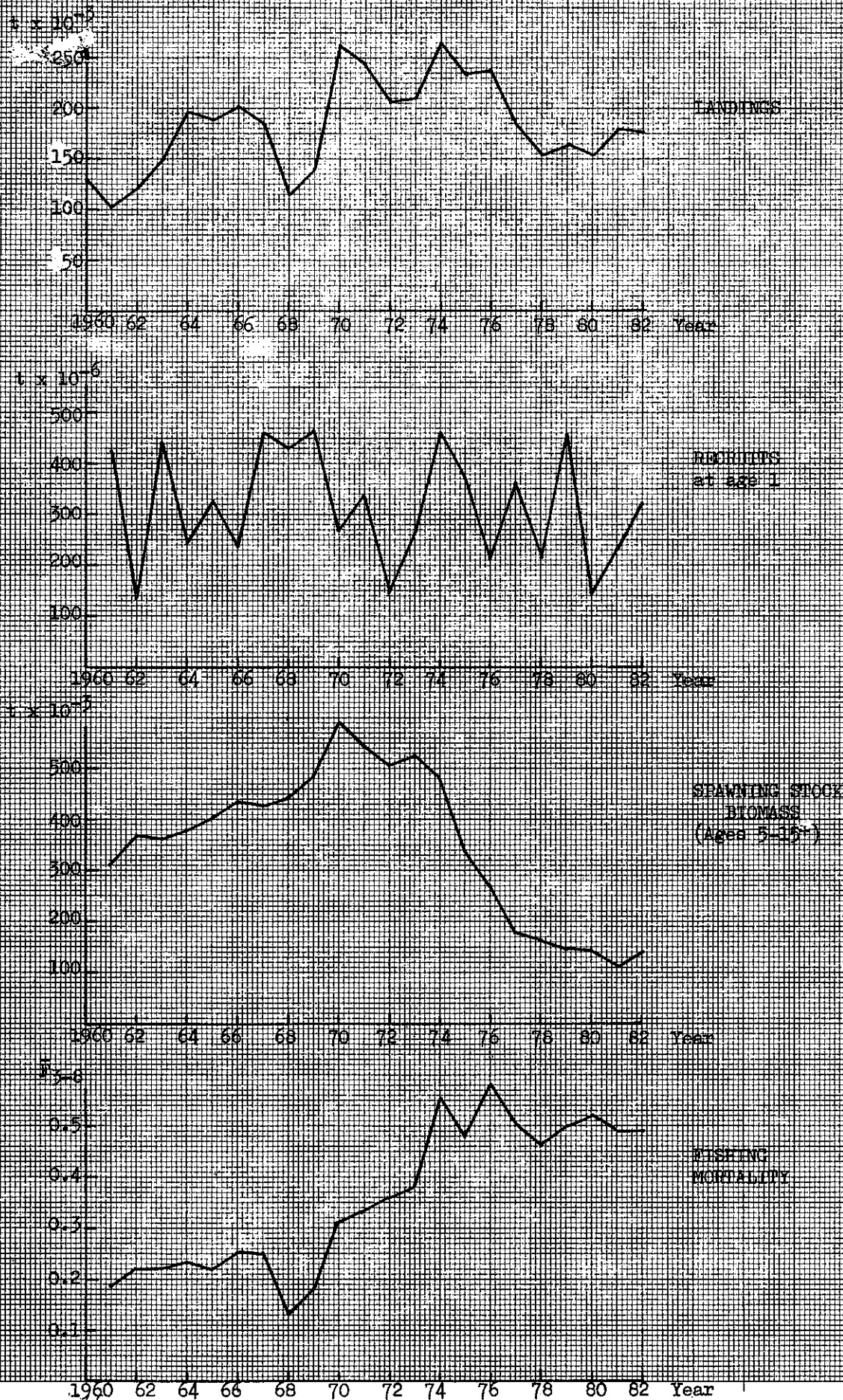


Figure 0.1.2.2 Northeast Arctic SALPES

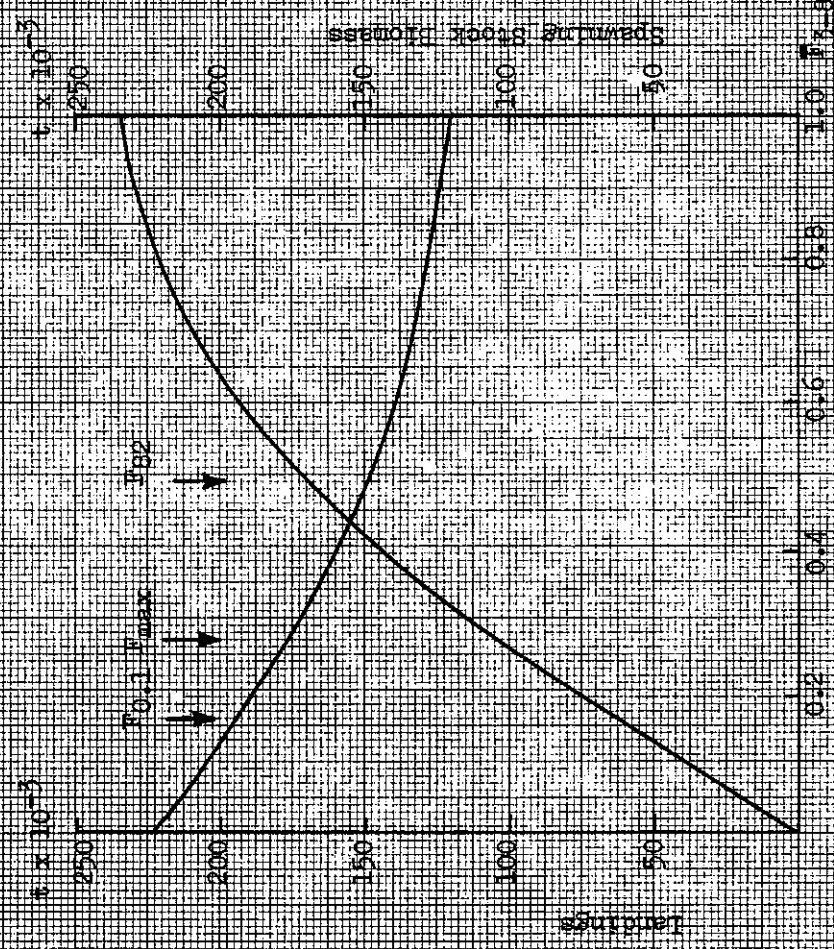
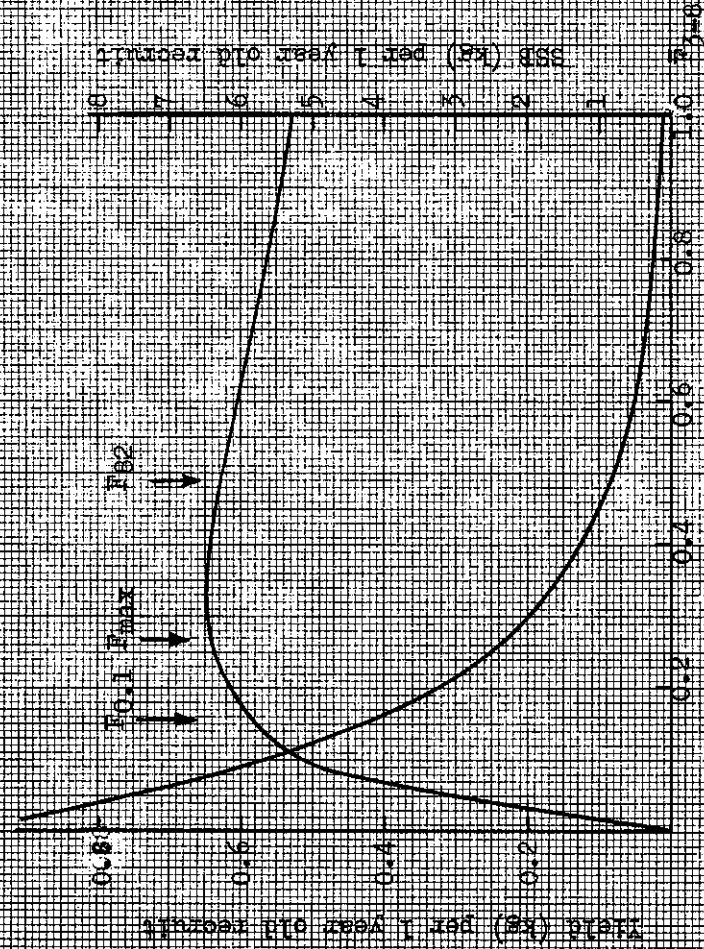
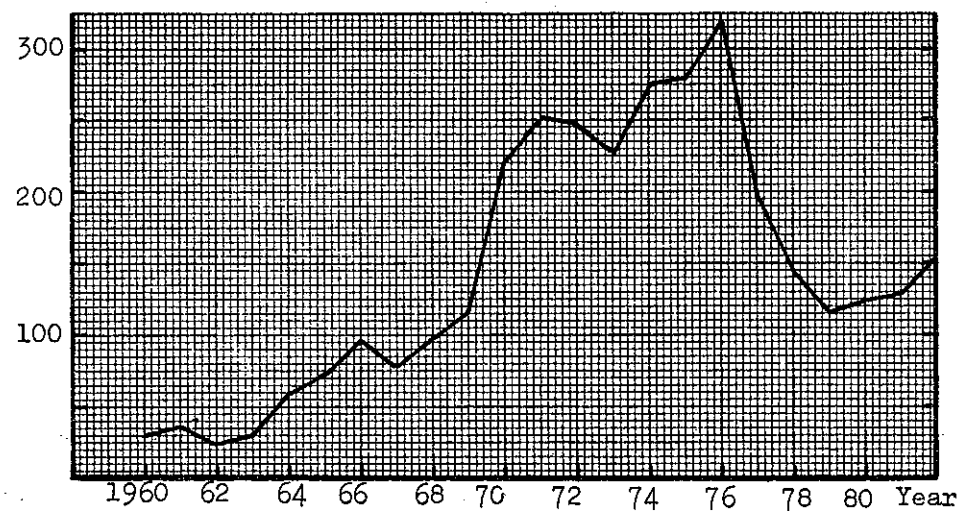


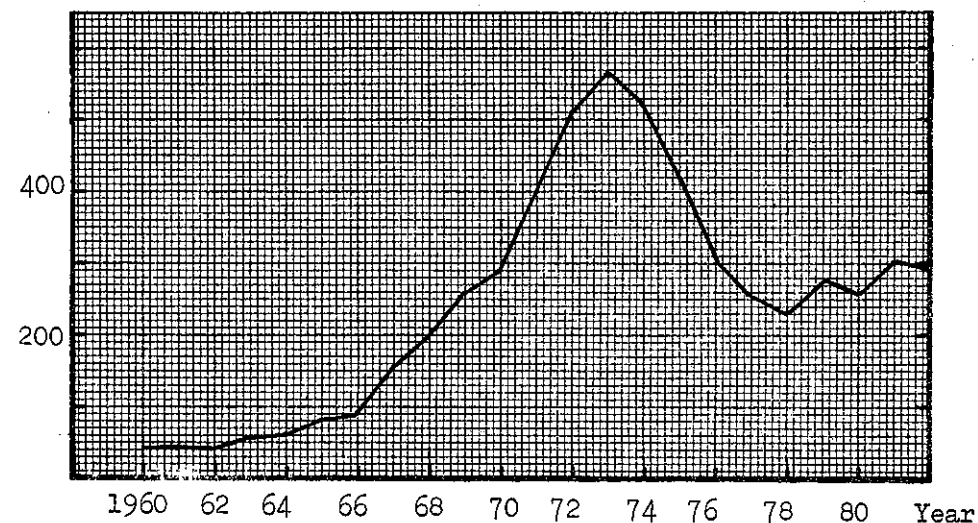
Figure C.1.3.1 FISH STOCK SUMMARY

North Sea SAITHE (Sub-area IV and Div.IIIa)
.....
(stock)

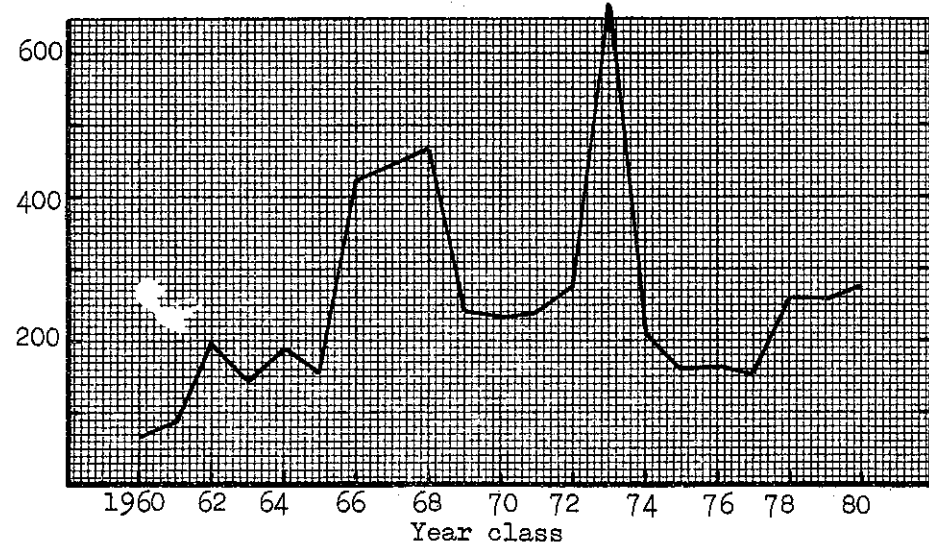
A Landings
'000 t



B Spawning stock biomass (age groups 5-15+)
'000 t



C Recruits at age 1
Millions



D Fishing mortality

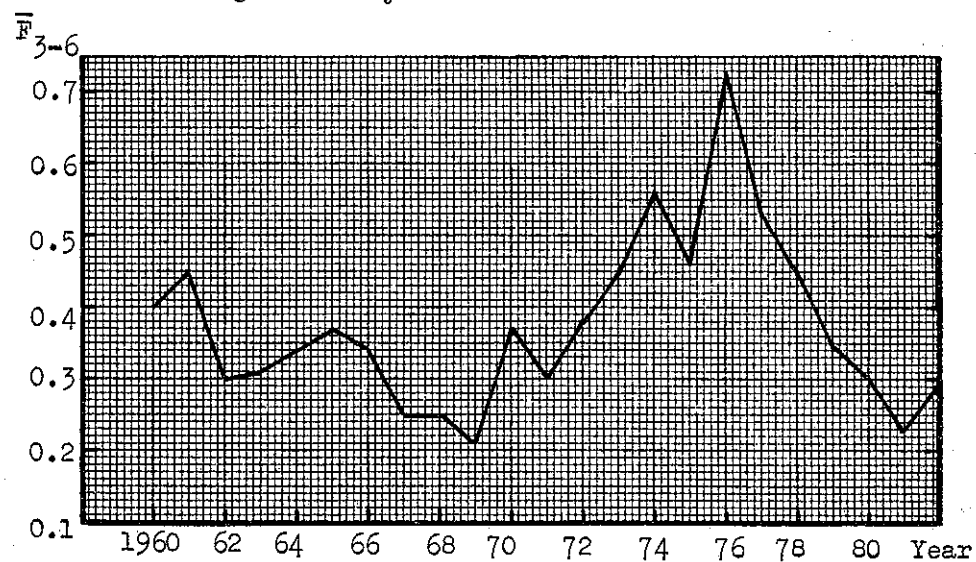


Figure C.1.3.2 North Sea SAITHE.
Yield and spawning stock biomass per recruit.

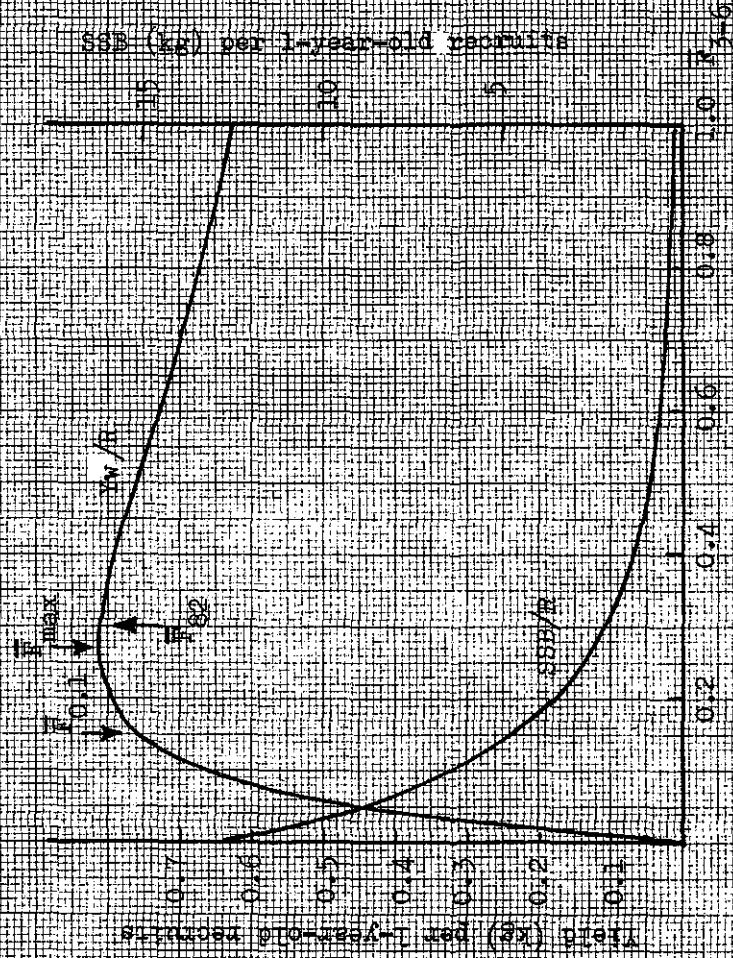


Figure C.1.3.3 North Sea SATIIB.
Predictions for landings in 1984 and spawning stock biomass at 1 January 1985.

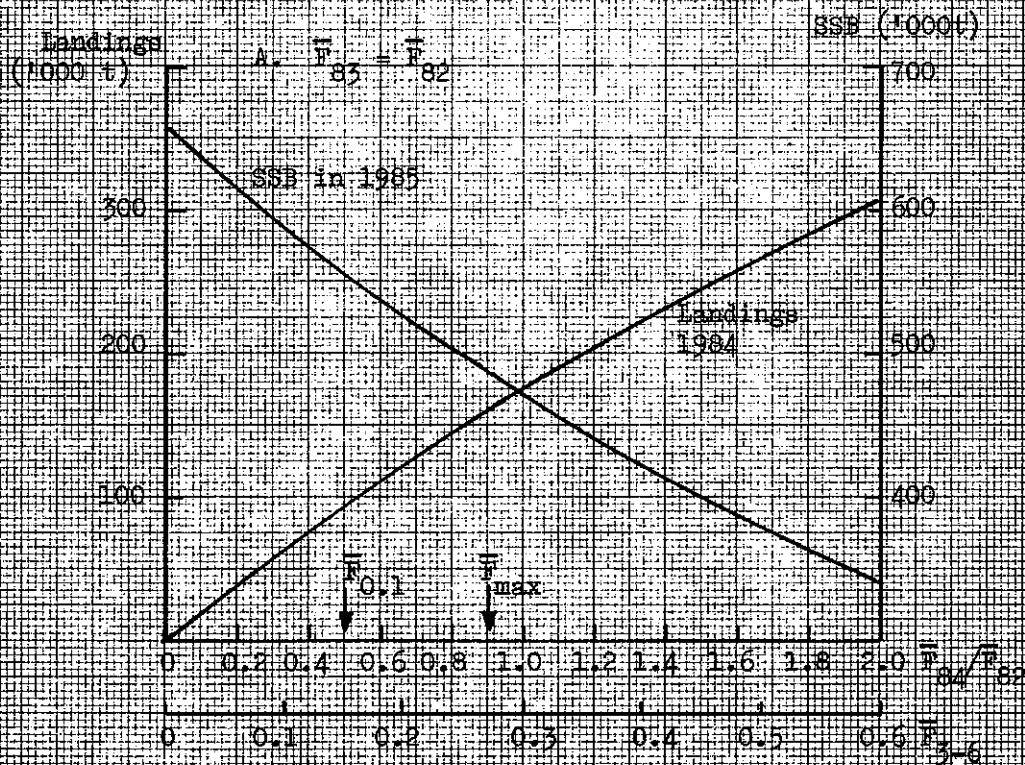
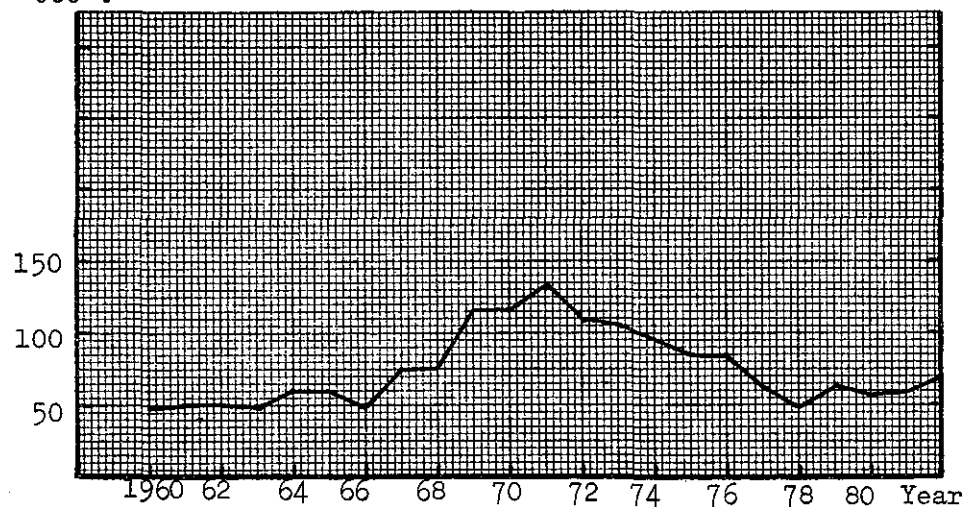


Figure C.2.1

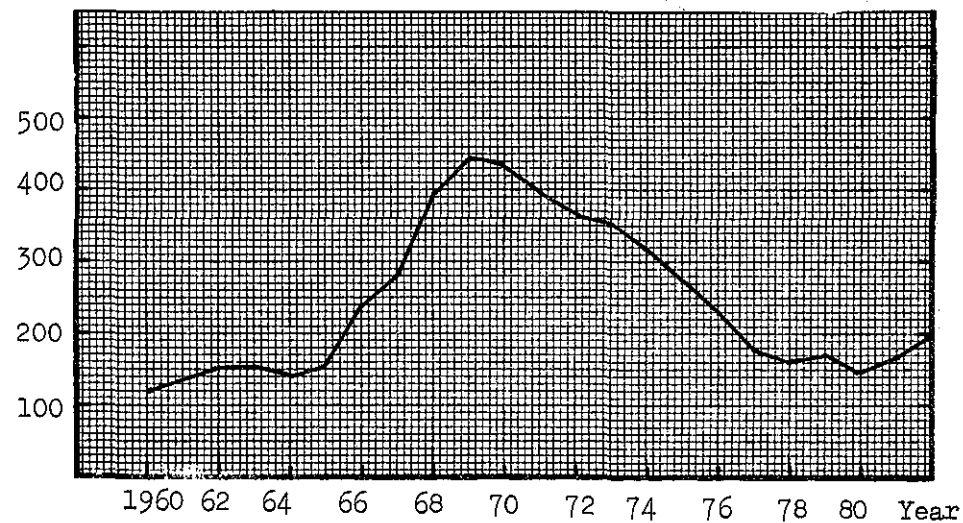
FISH STOCK SUMMARY

Icelandic SAITHE
.....
(stock)

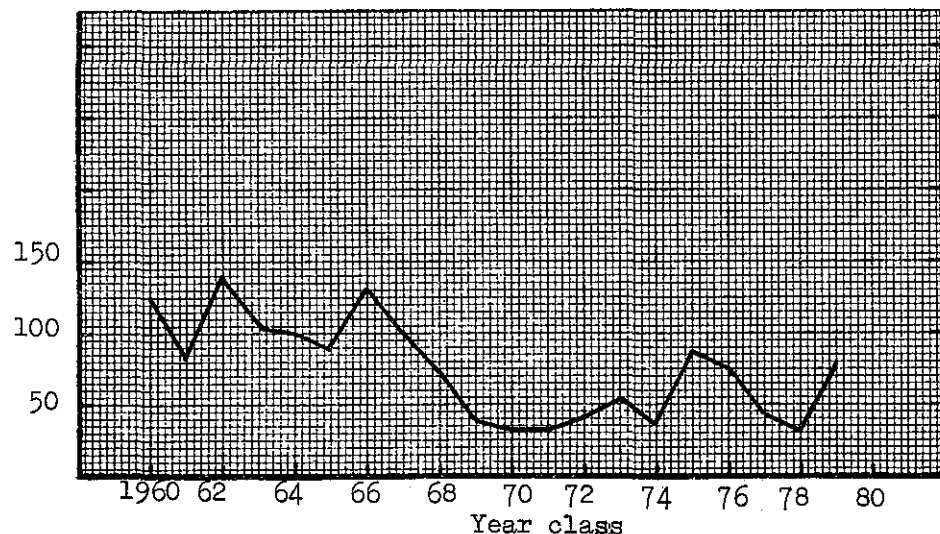
A Landings
'000 t



B Spawning stock biomass (age groups 6-15+)
'000 t



C Recruits at age 1
Millions



D Fishing mortality
 \bar{F}_{4-9}



Figure C.2.2

Islandic SAITHE.

Yield and spawning stock biomass per recruit.

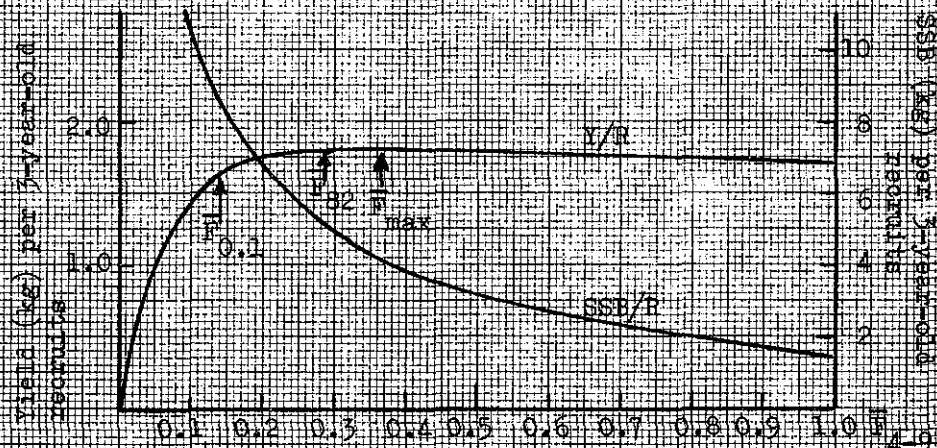


Figure C.2.3

Islandic SAITHE.

Predictions for landings in 1984 and spawning stock biomass at 1 January 1985.

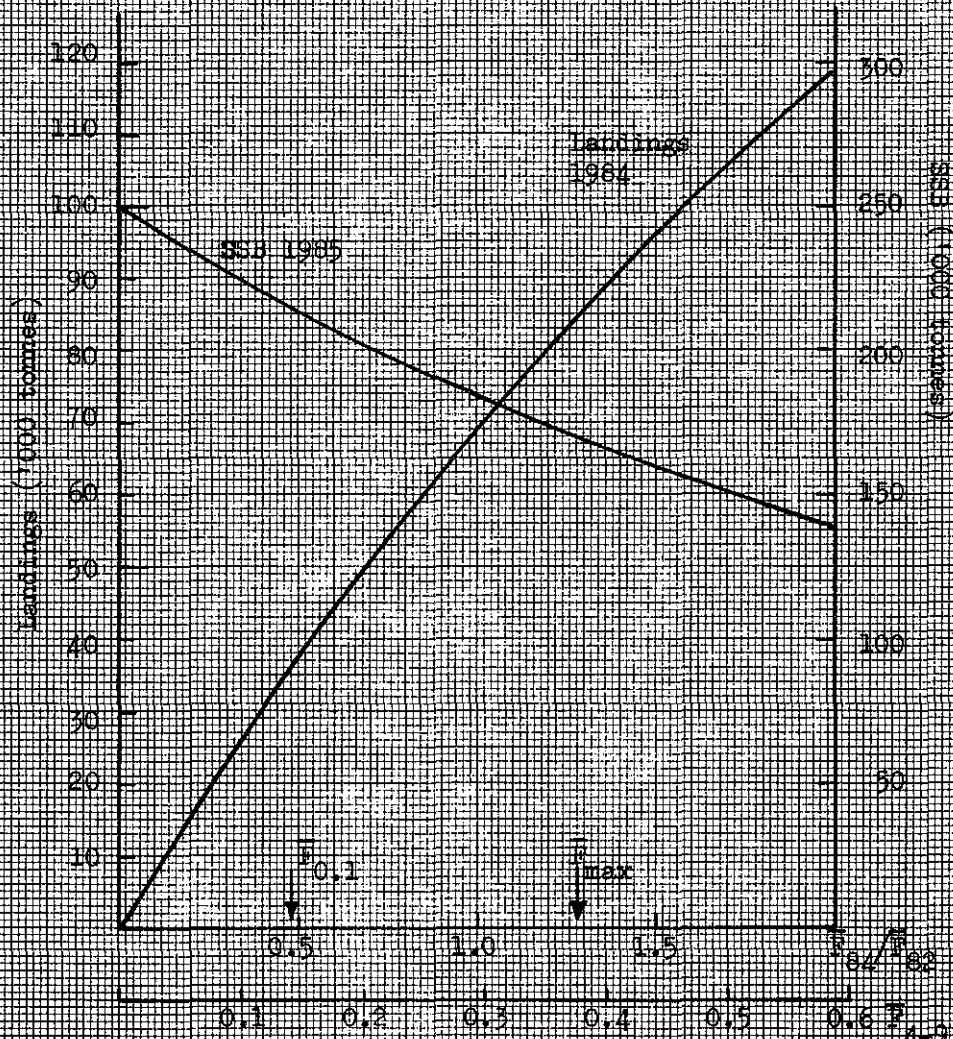
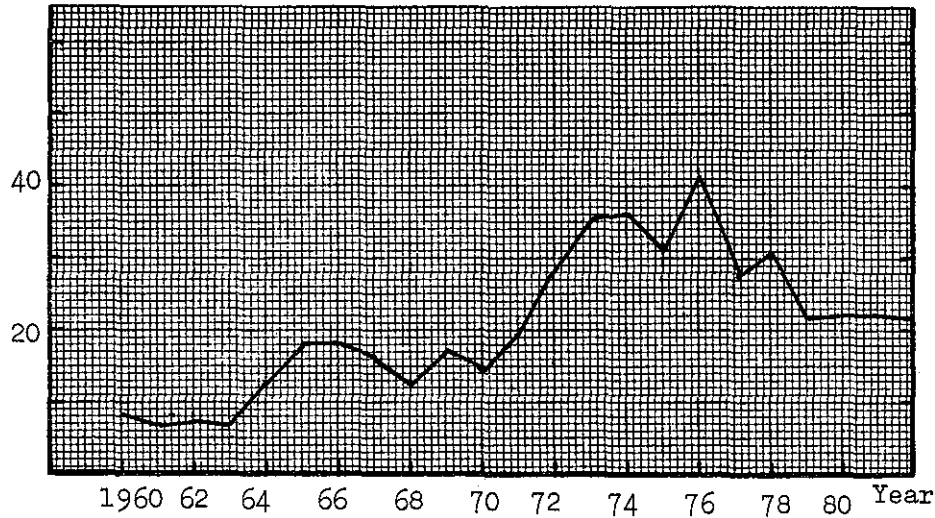


Figure C.3.1

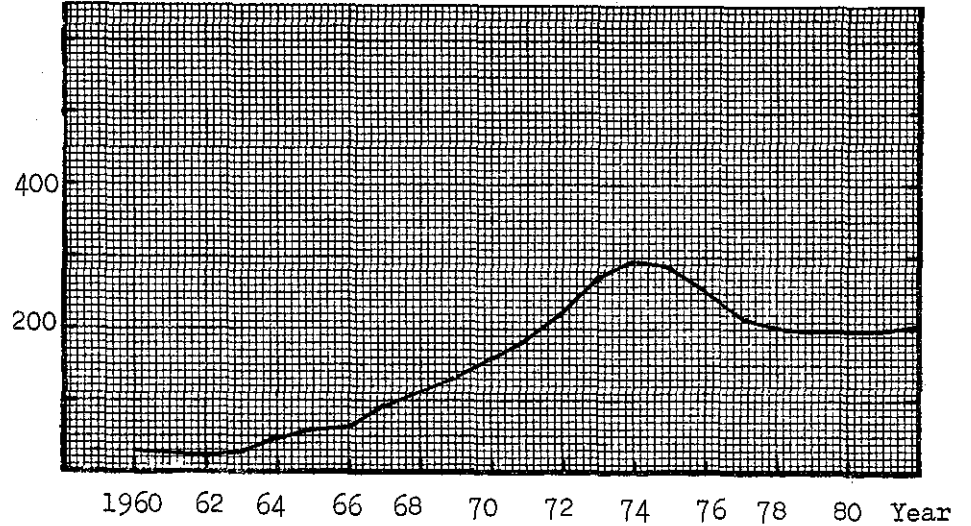
FISH STOCK SUMMARY

West of Scotland SAITHE
.....
(stock)

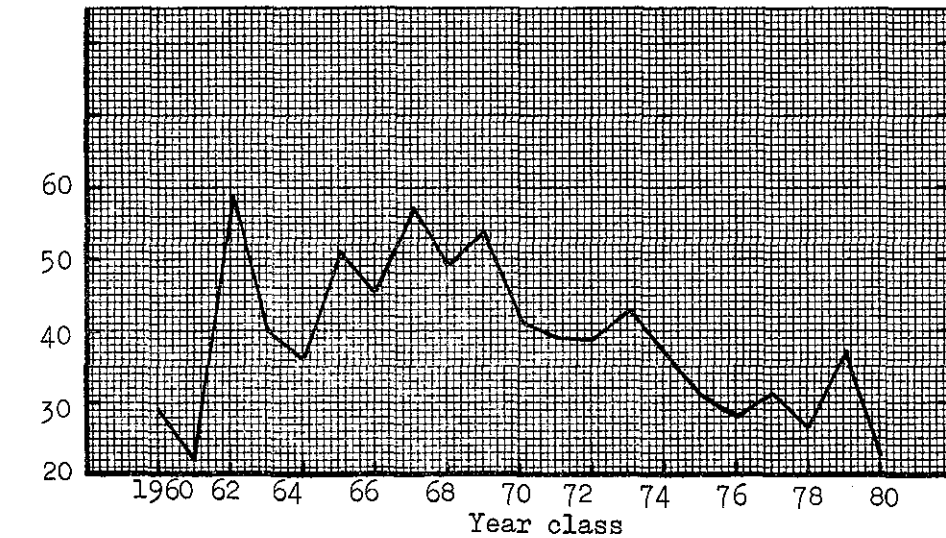
A Landings
'000 t



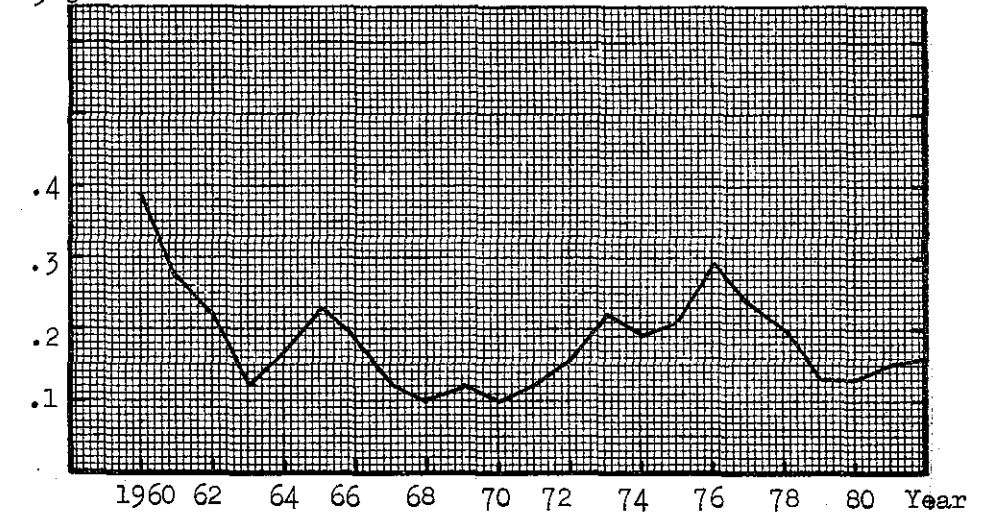
B Spawning stock biomass (age groups 5-15+)
'000 t



C Recruits at age 1
Millions



D Fishing mortality
 \bar{F}_{3-6}



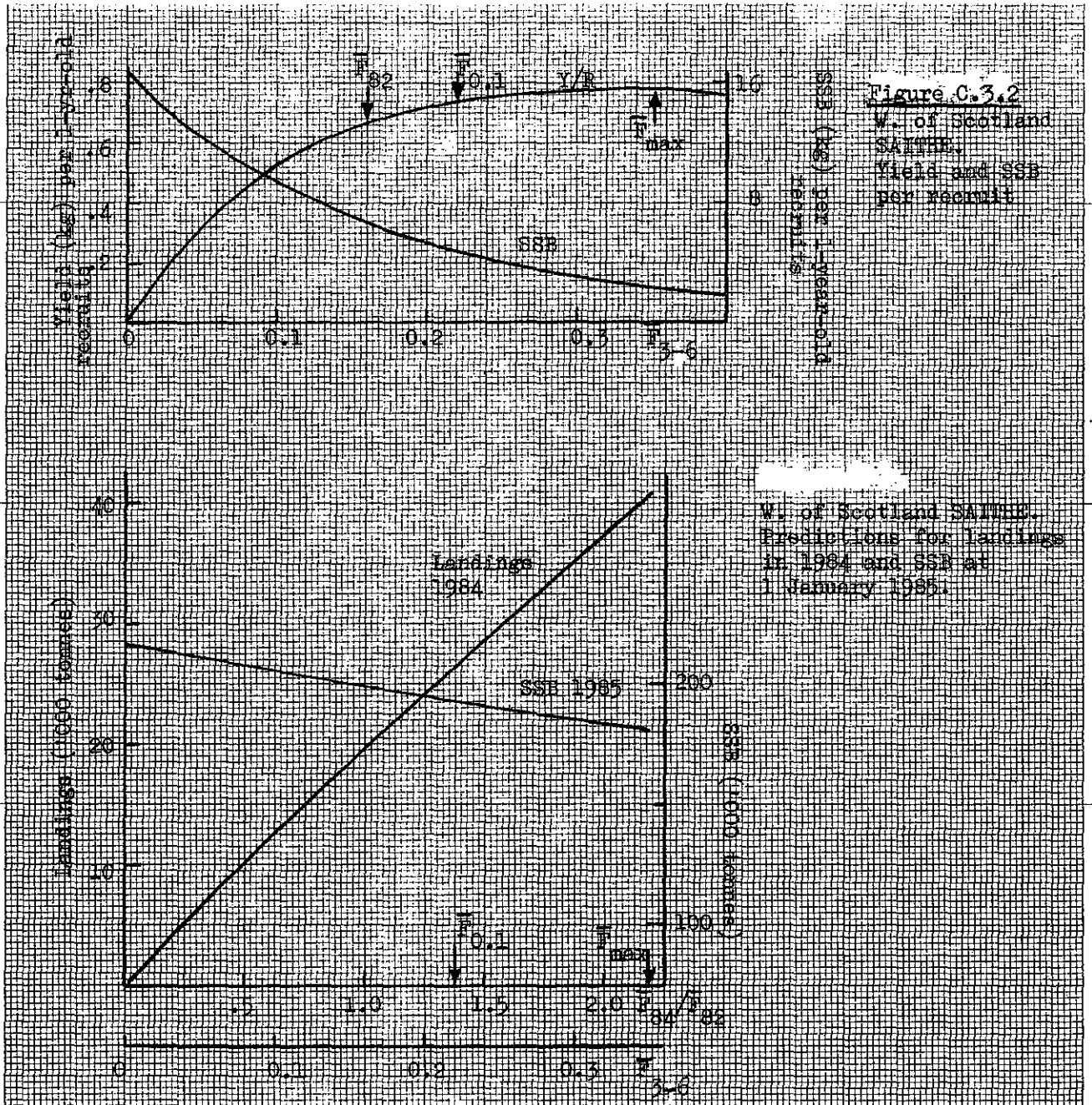


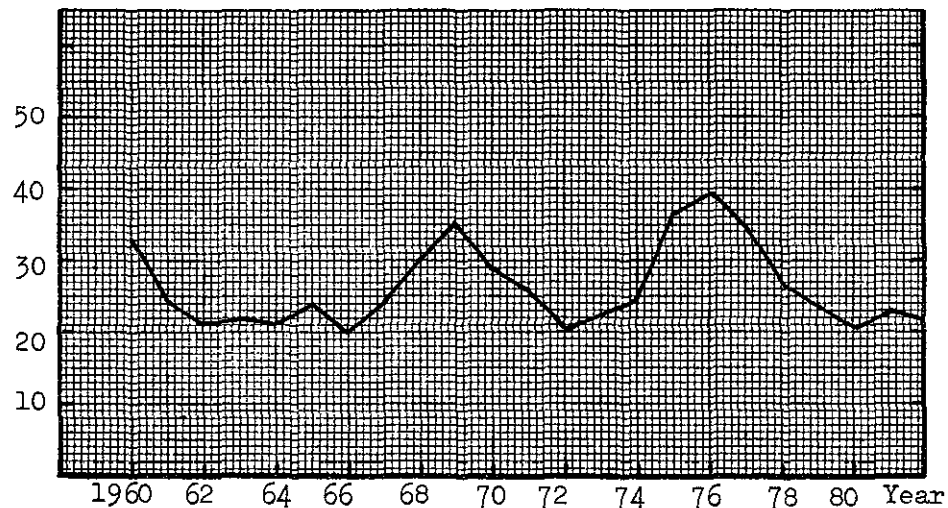
Figure C.4.2.1

FISH STOCK SUMMARY

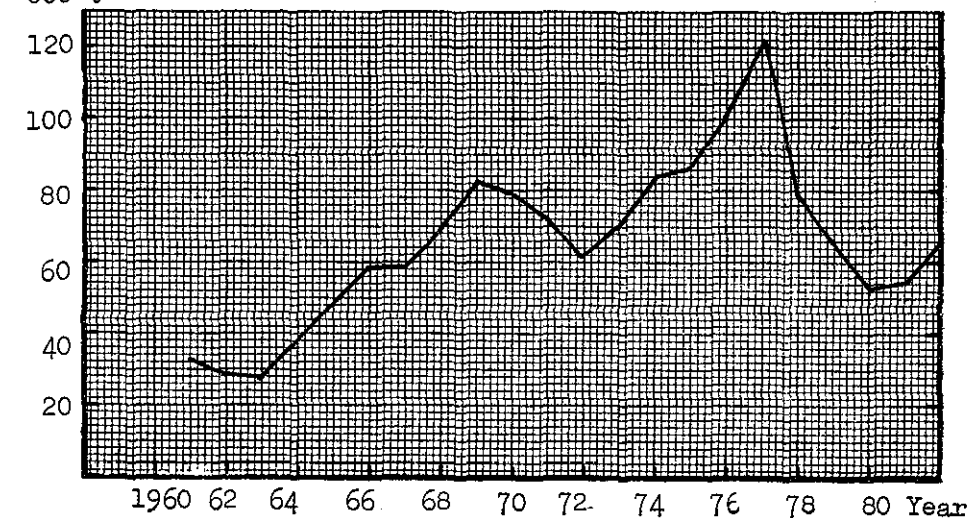
Faroe Plateau COD

(stock)

A Landings
Tonnes $\times 10^{-3}$

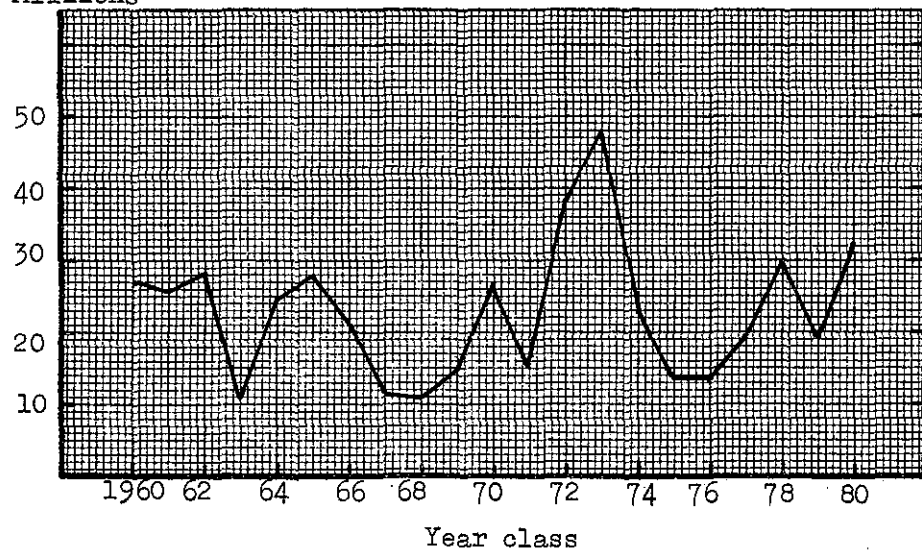


B Spawning stock biomass (age groups 4-10+)
'000 t



C Recruits at age 1

Millions



D Fishing mortality

\bar{F}_{3-6}

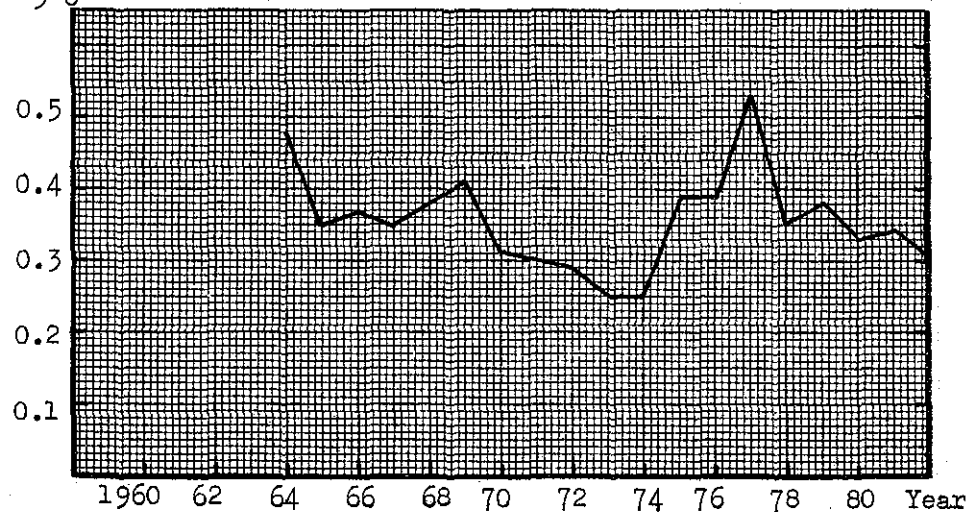


Figure C.4.2.2

Faroe Plateau COD.

Yield and spawning stock biomass per recruit.

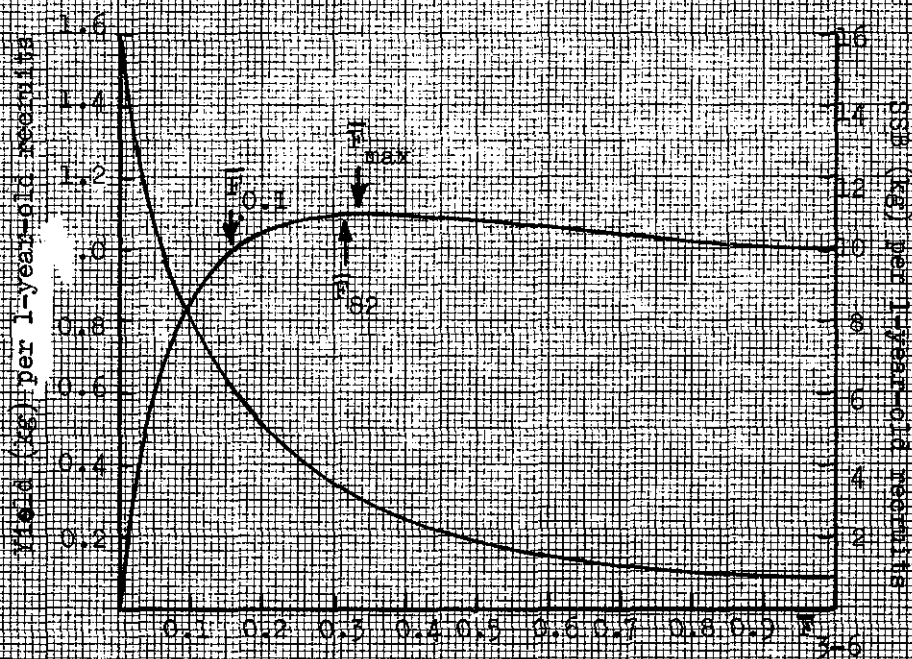


Figure C.4.2.3

Faroe Plateau COD.

Predictions for landings in 1984 and spawning stock biomass at 1 January 1985.

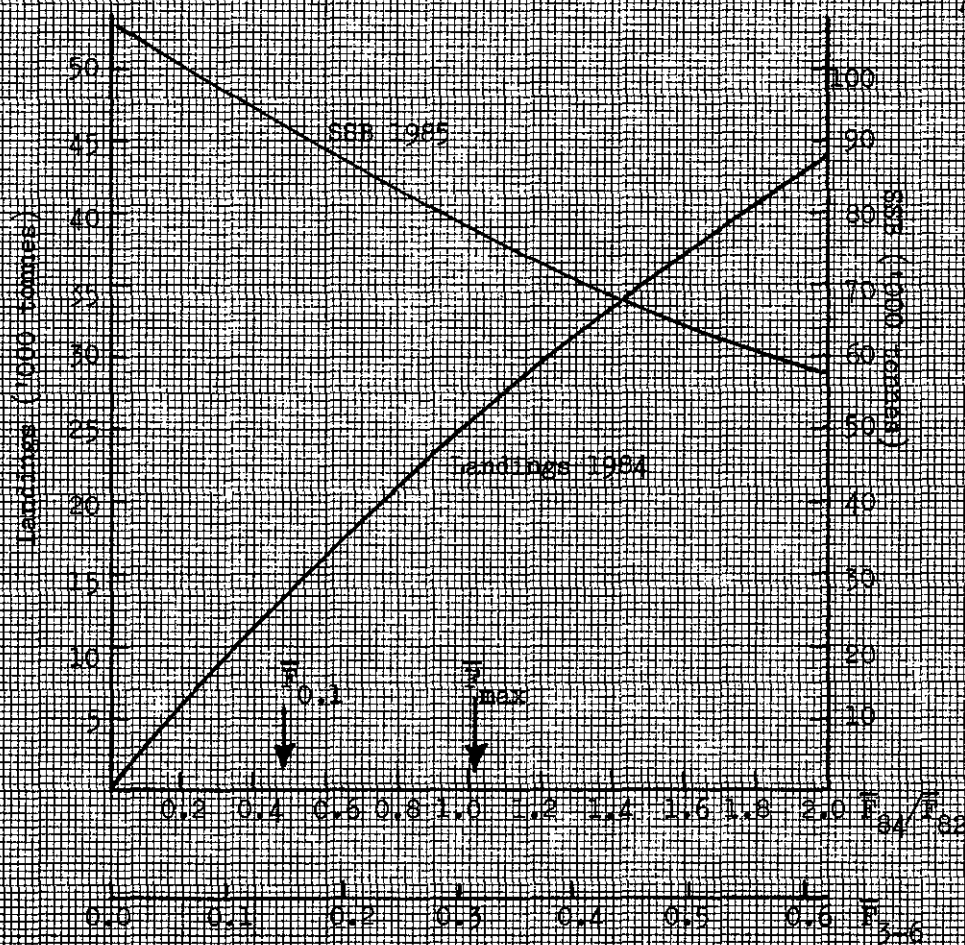
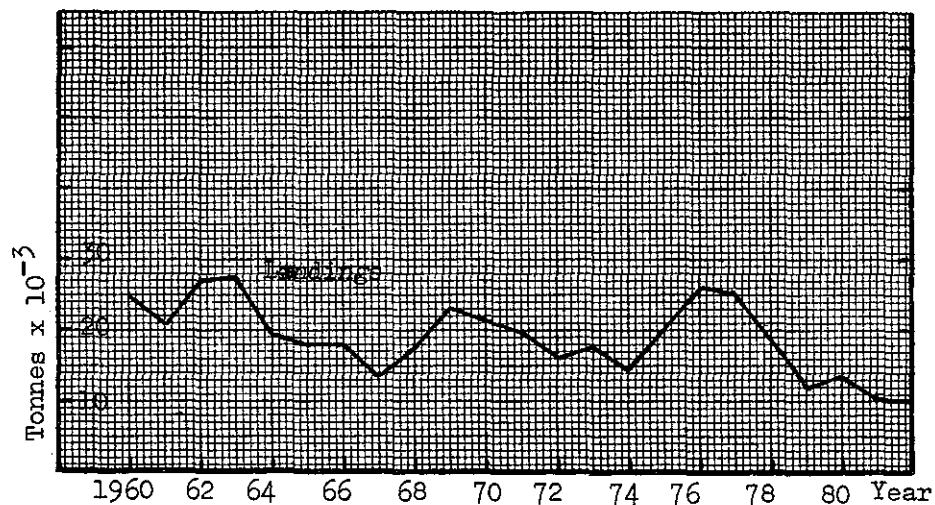


Figure C.4.4.1

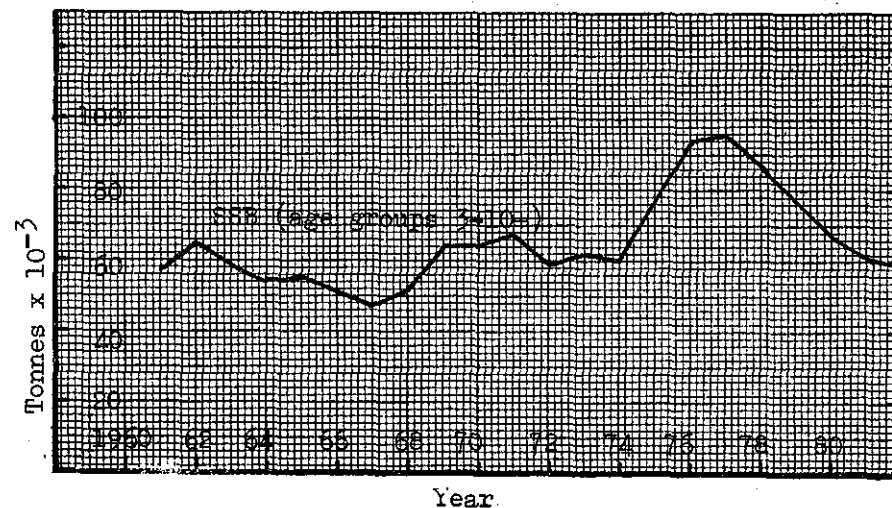
FISH STOCK SUMMARY

Faroe Haddock
.....
(stock)

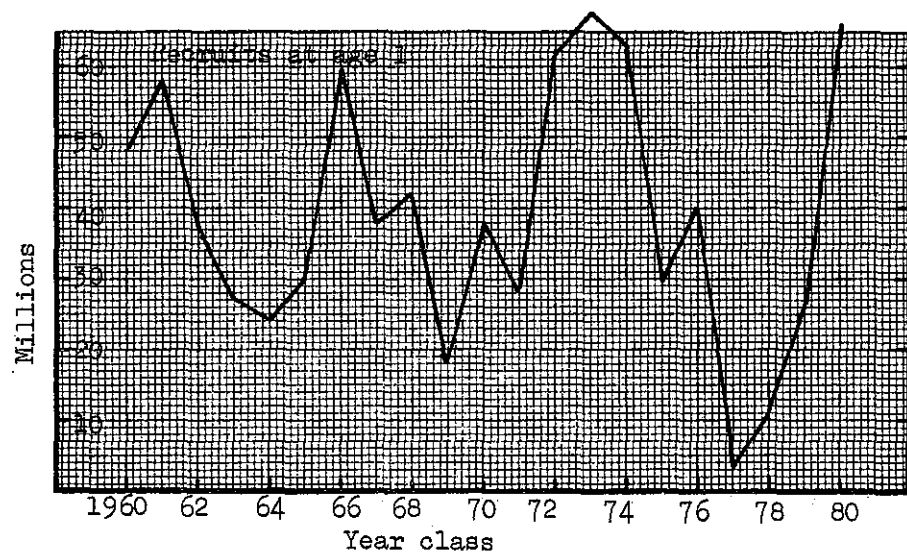
A Landings



B Spawning stock biomass (age groups 3-10+)



C Recruits at age 1



D Fishing mortality

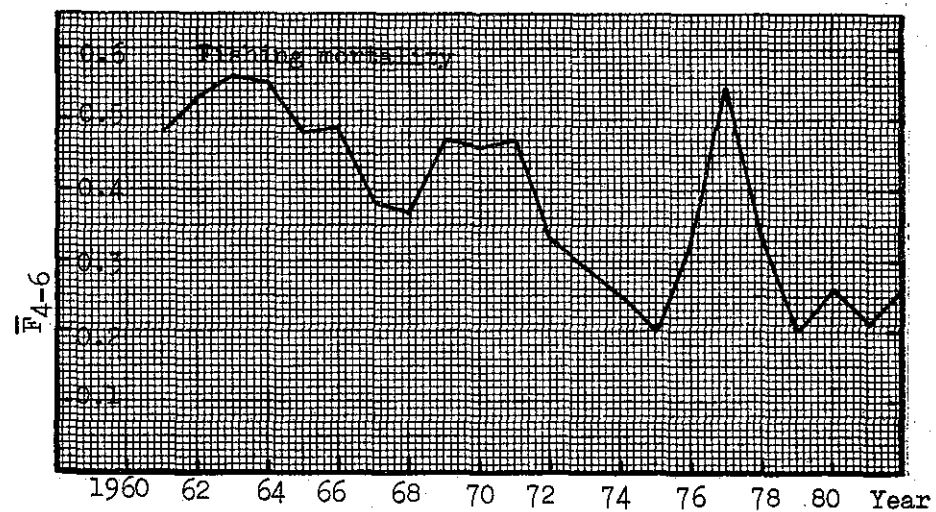


Figure C.4.4.2

Three Haddock.

Yield and spawning stock biomass per recruit.

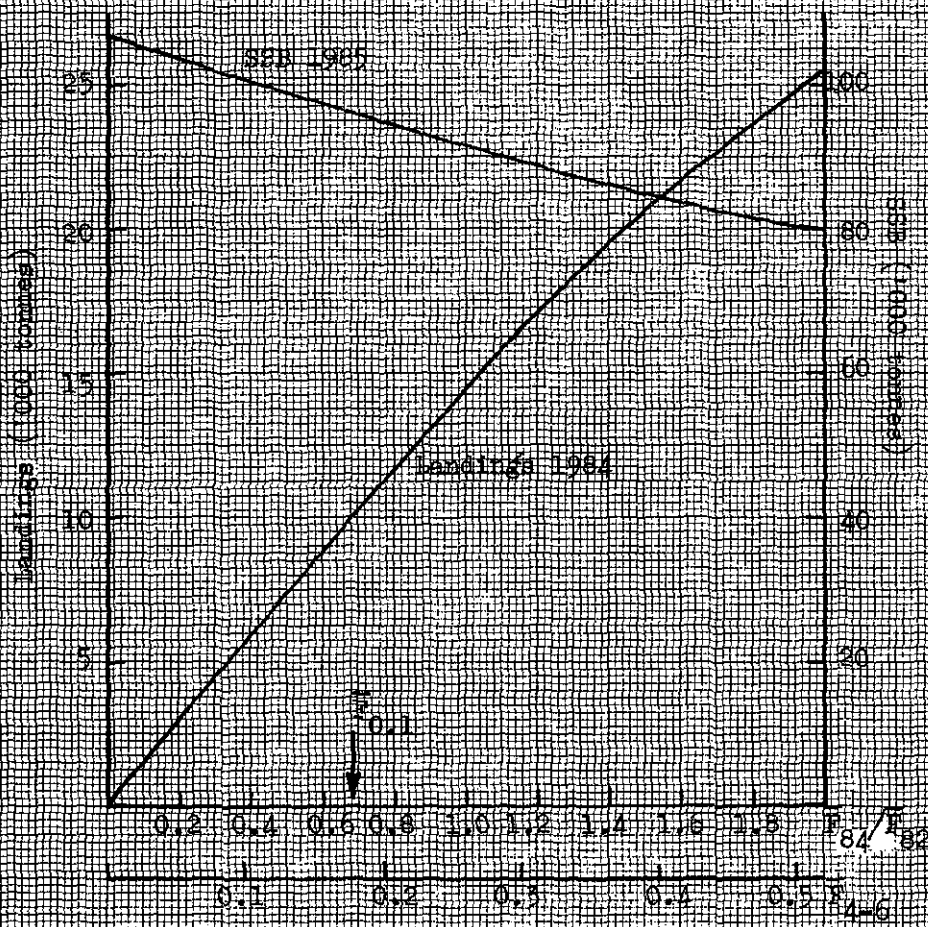
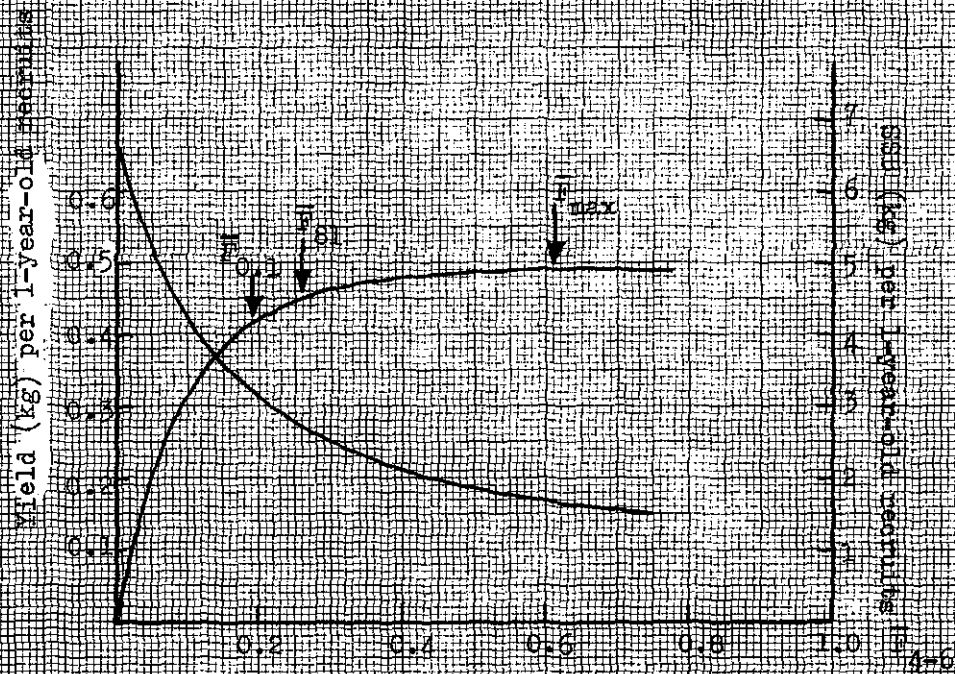


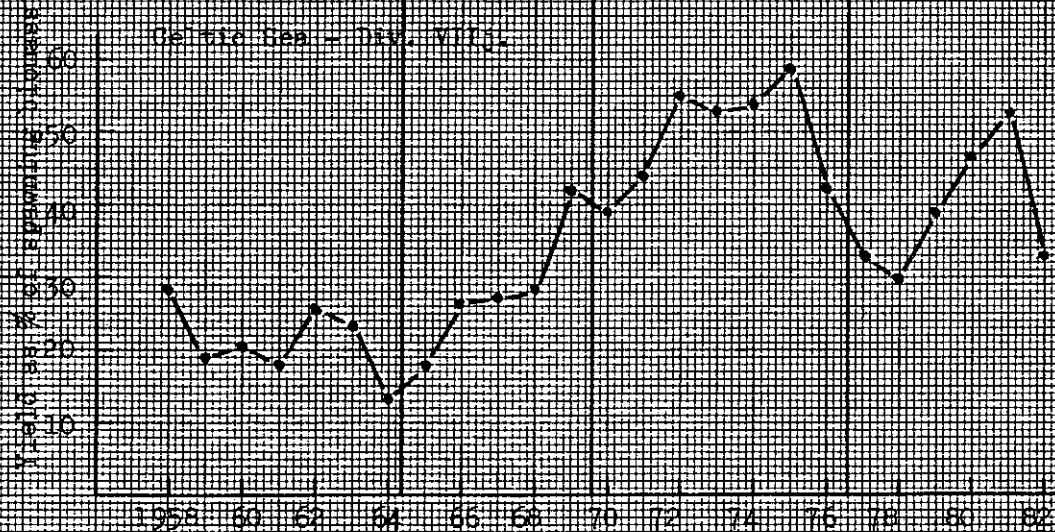
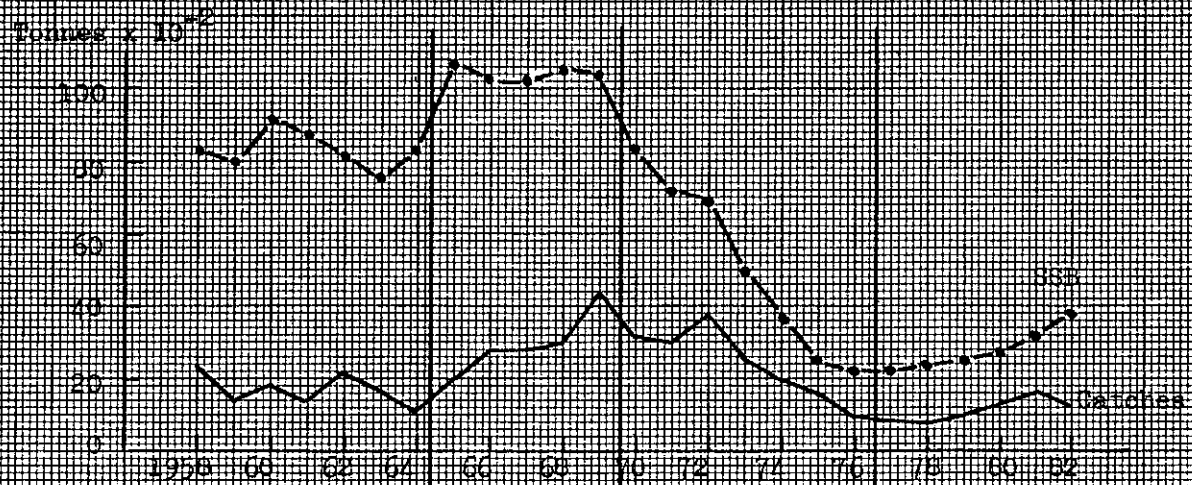
Figure C.4.4.3

Three Haddock.

Predictions for landings in 1984 and spawning stock biomass at 1 January 1985.

Figure D.1.3.1 Celtic Sea HERRING.

Trend in spawning stock biomass, catches and yield as % of SSB.

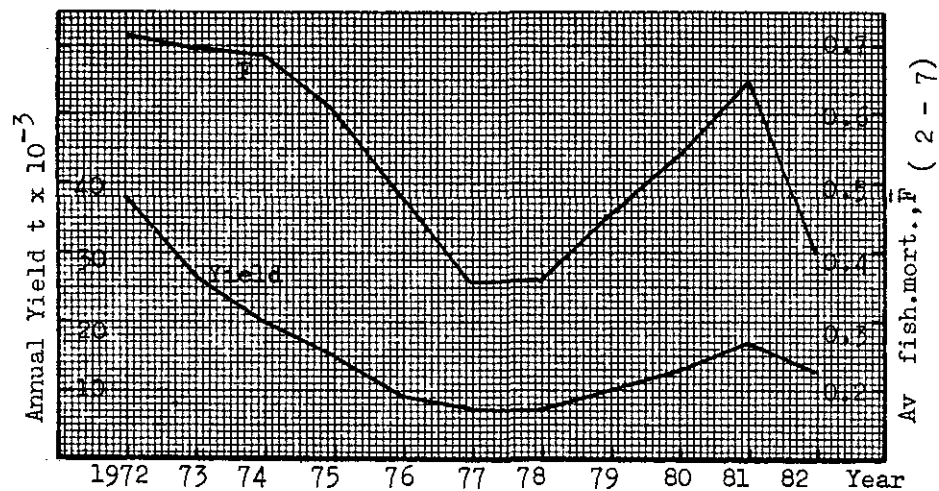


Period	SSB	Yield	%	
1958-64	83,000	17,000	20	Stable stock (winter sp.)
1965-69	106,000	30,000	28	High stock (winter sp.)
1970-76	51,500	24,300	48	Declining stock (mixture)
1977-82	29,000	11,500	40	Low stock (mainly autumn)

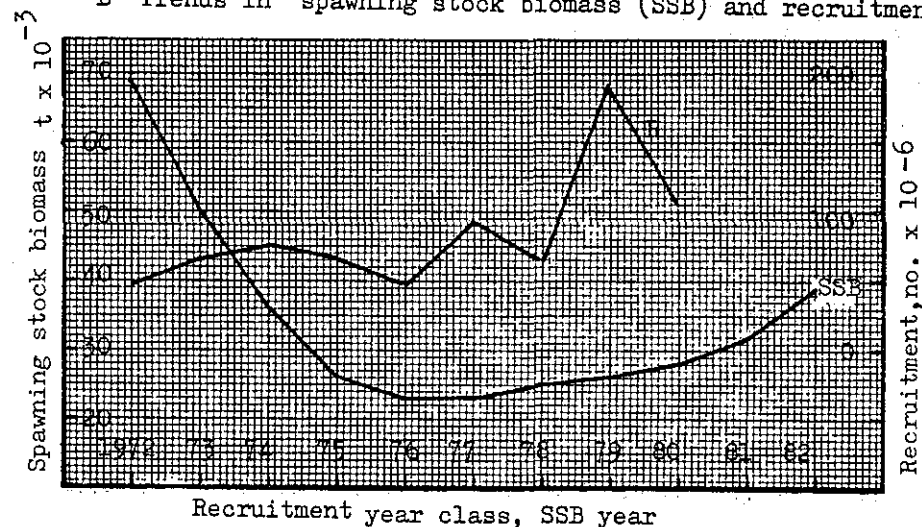
Figure D.1.3.2 FISH STOCK SUMMARY

HERRING -Celtic Sea and Division VIIj
.....
(stock)

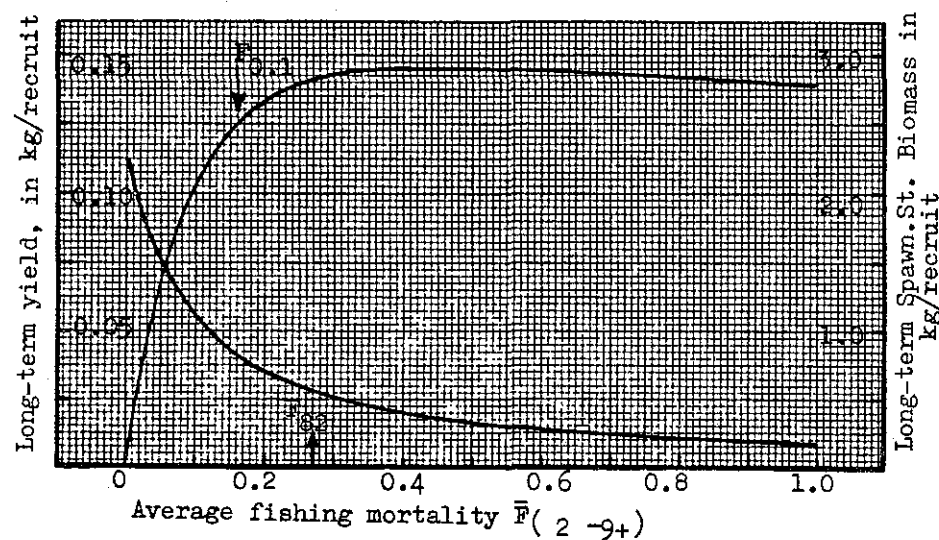
A Trends in Yield and fishing mortality (\bar{F})



B Trends in spawning stock biomass (SSB) and recruitment.



C Long-term yield and spawning stock biomass (indicate biological reference points)



D Short-term yield and spawning stock biomass (indicate biological reference points)

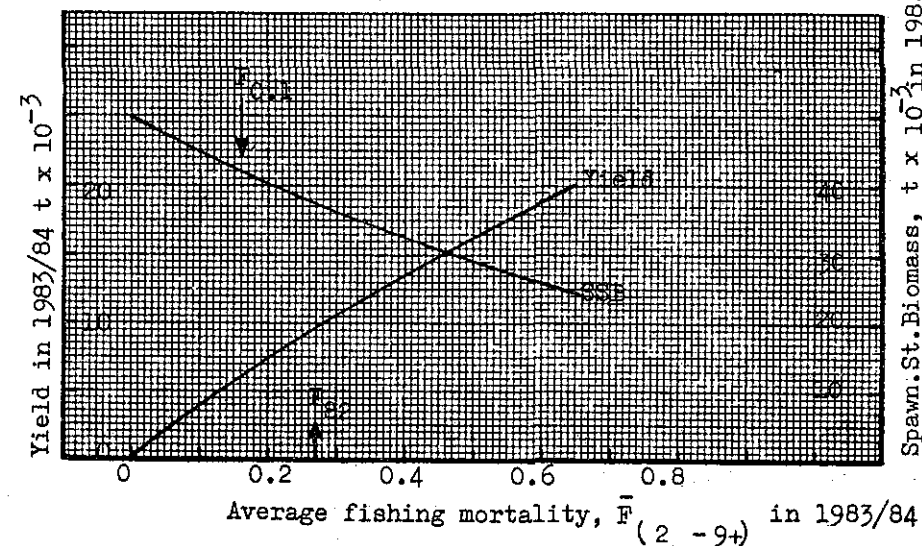
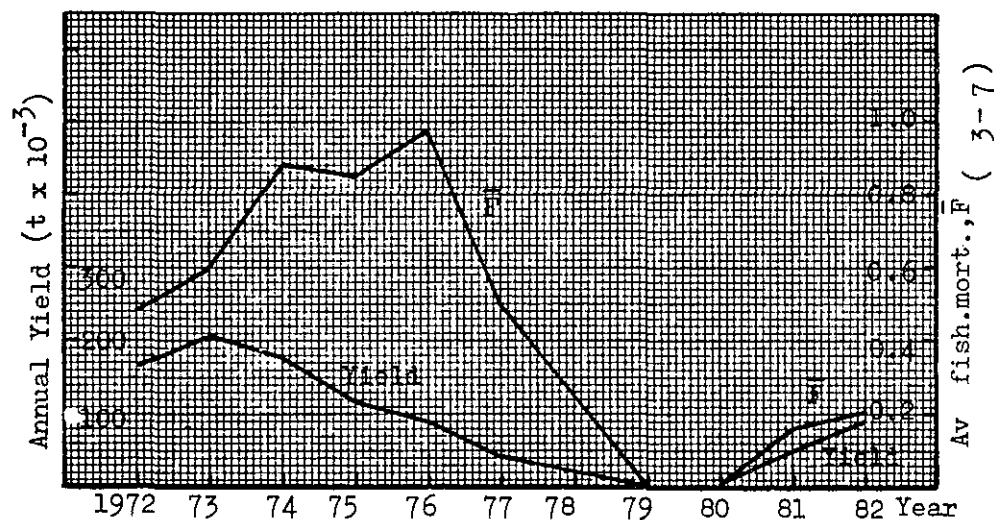


Figure D.1.4.1

FISH STOCK SUMMARY

...Herring in Div.VIa.(North)...
(stock)A Trends in Yield and fishing mortality (\bar{F})

B Trends in spawning stock biomass (SSB) and recruitment.

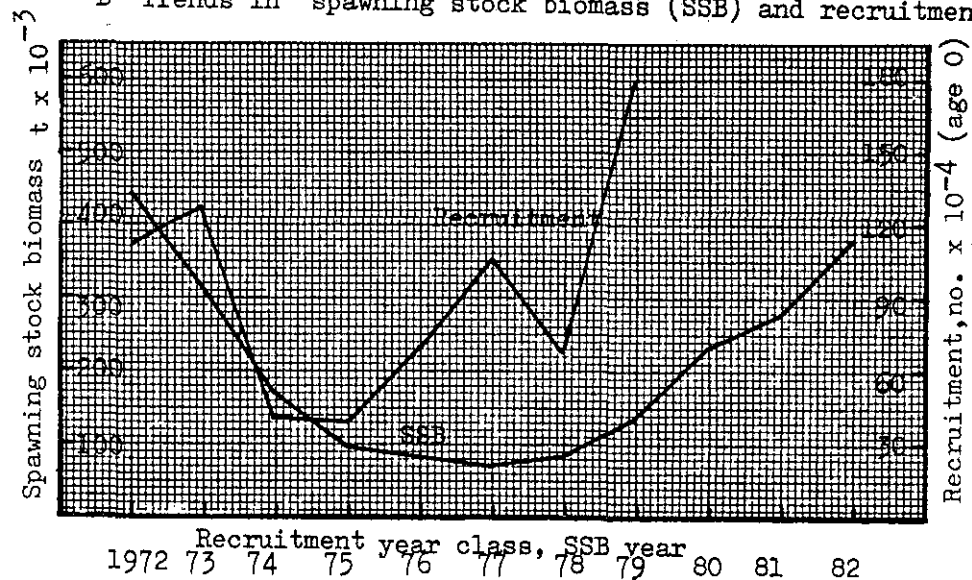
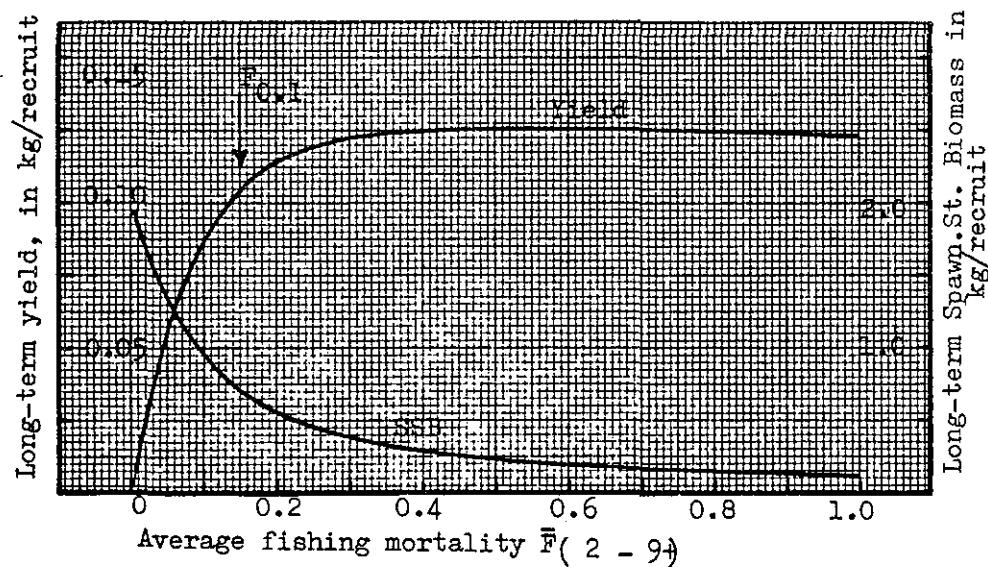
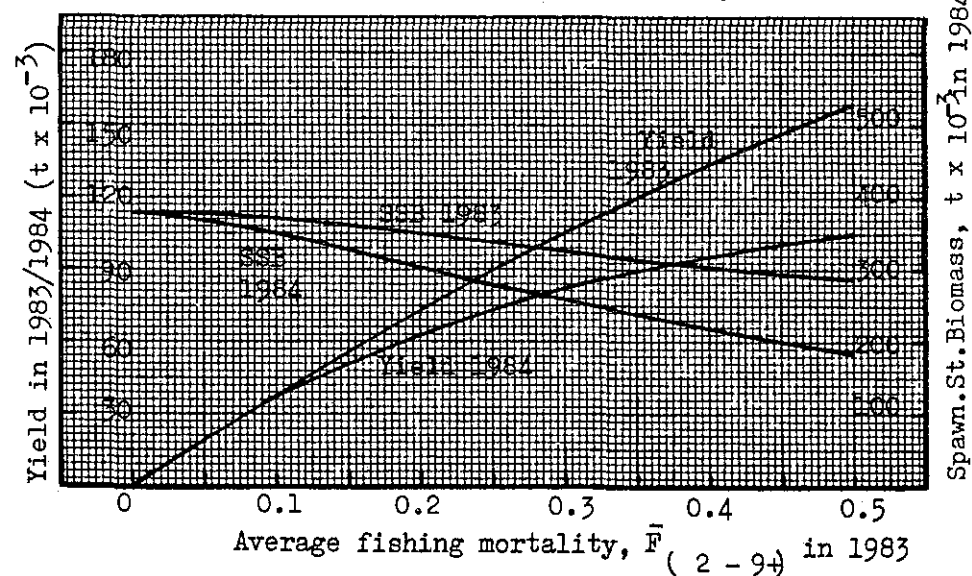
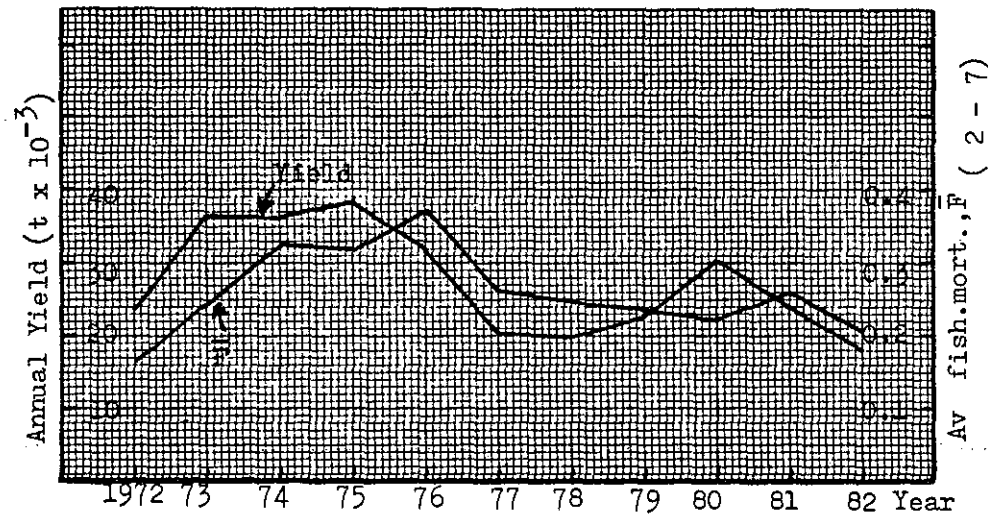
C Long-term yield and spawning stock biomass
(indicate biological reference points)D Short-term yield and spawning stock biomass
(indicate biological reference points)

Figure D.1.4.3

FISH STOCK SUMMARY

Herring in Divs. VIa(south) and VIIb,c
(stock)A Trends in Yield and fishing mortality (\bar{F})

B Trends in spawning stock biomass (SSB) and recruitment.

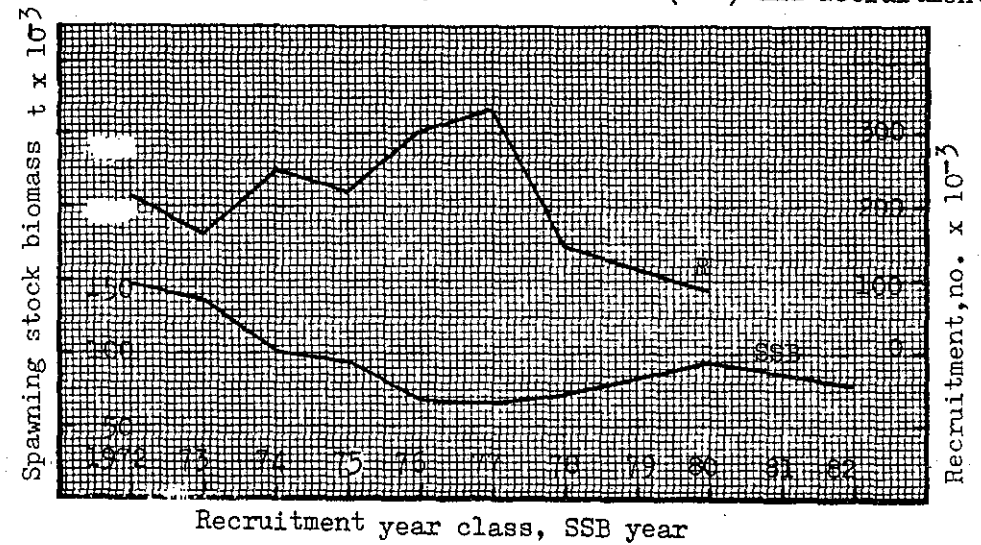
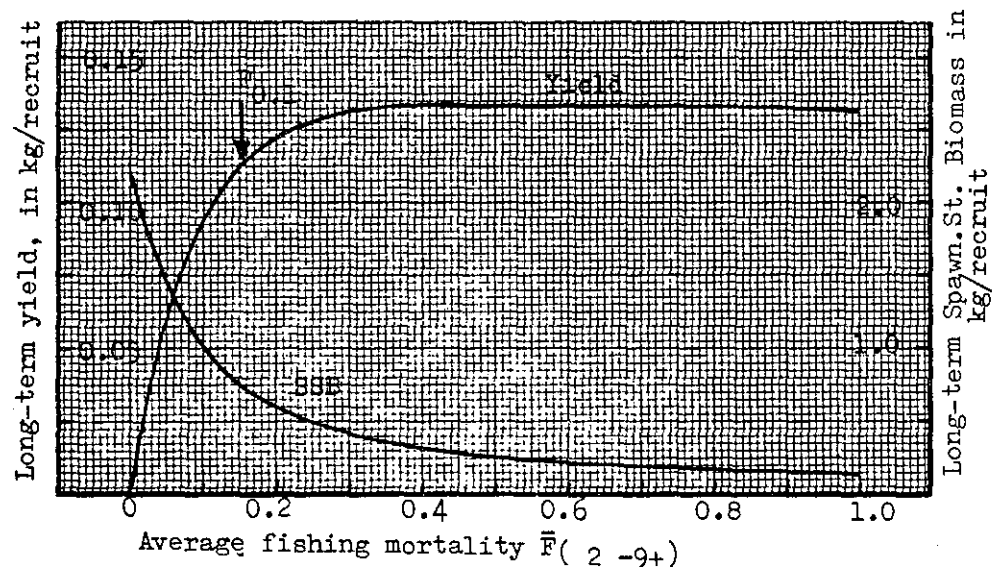
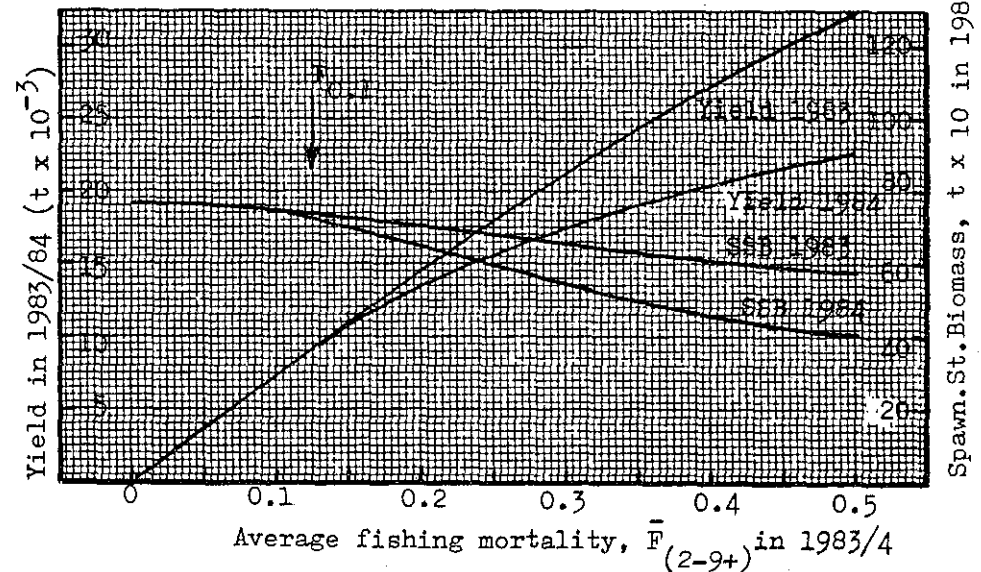
C Long-term yield and spawning stock biomass
(indicate biological reference points)D Short-term yield and spawning stock biomass
(indicate biological reference points)

Figure D.1.5.1 FISH STOCK SUMMARY

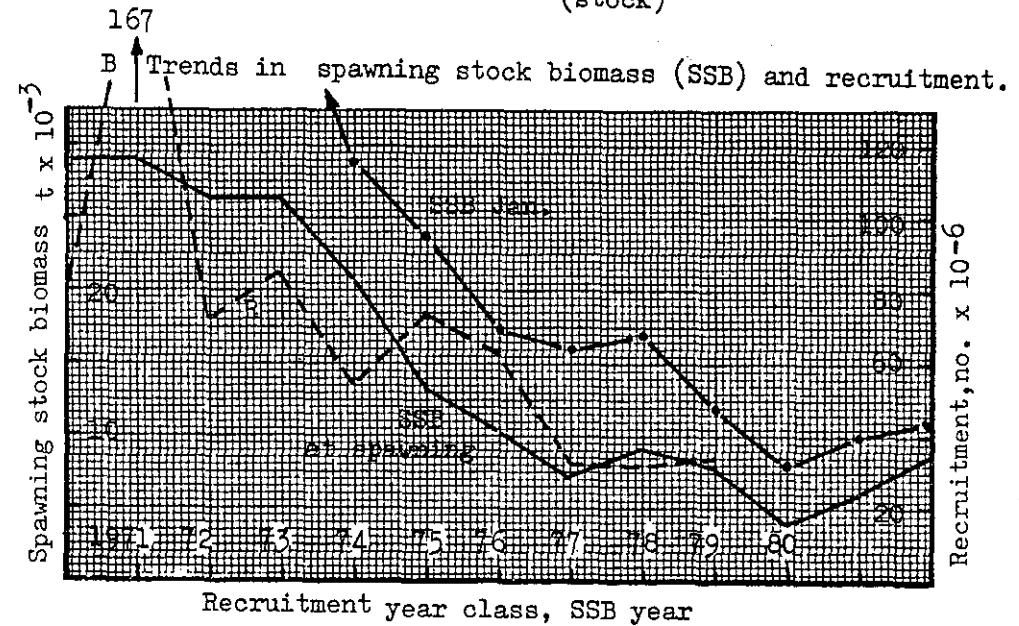
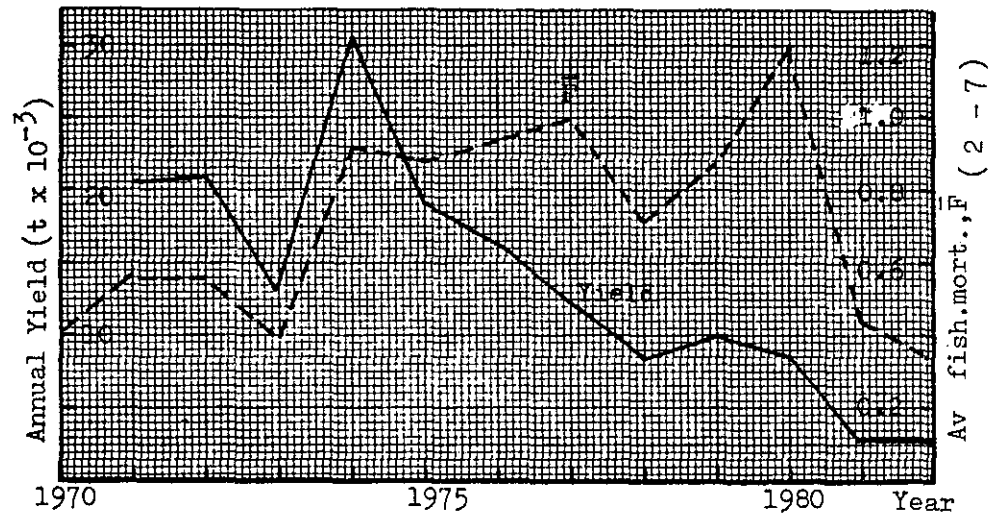
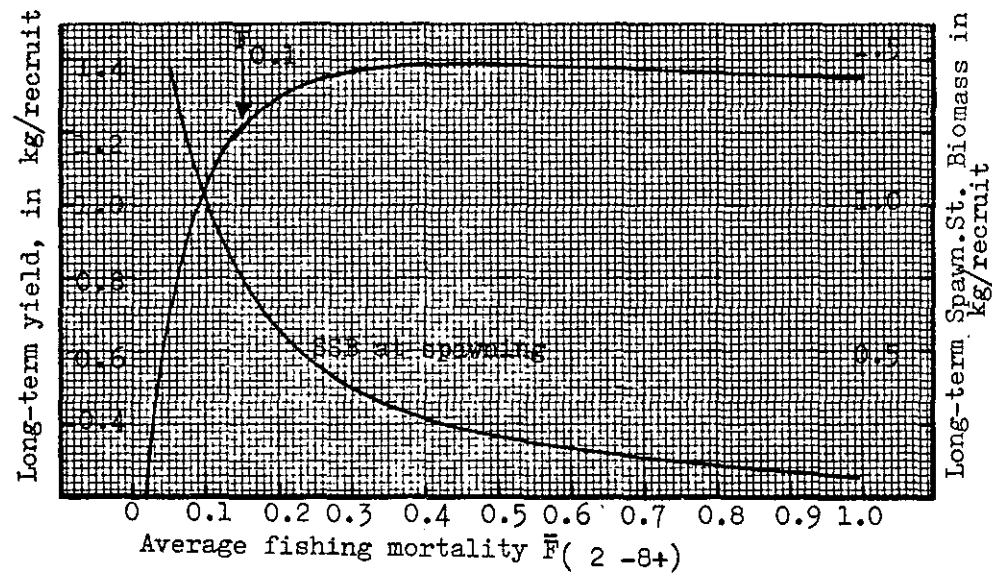
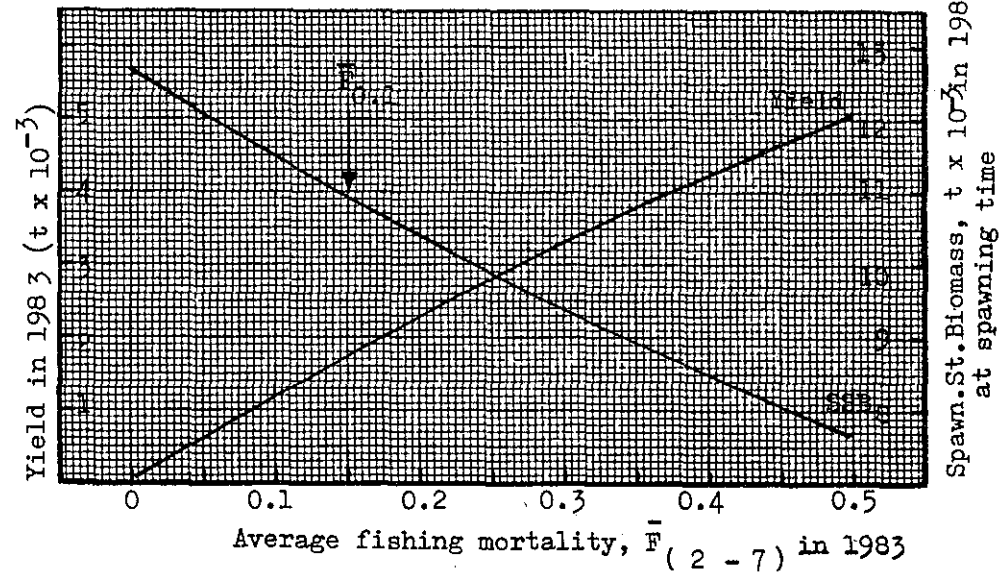
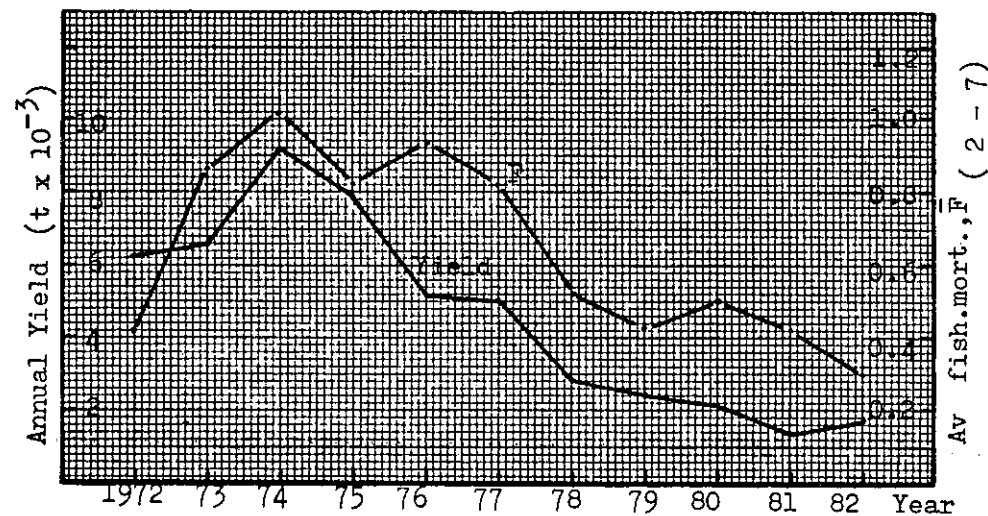
Manx Herring in Div. VIIa
(stock)A Trends in Yield and fishing mortality (\bar{F})C Long-term yield and spawning stock biomass
(indicate biological reference points)D Short-term yield and spawning stock biomass
(indicate biological reference points)

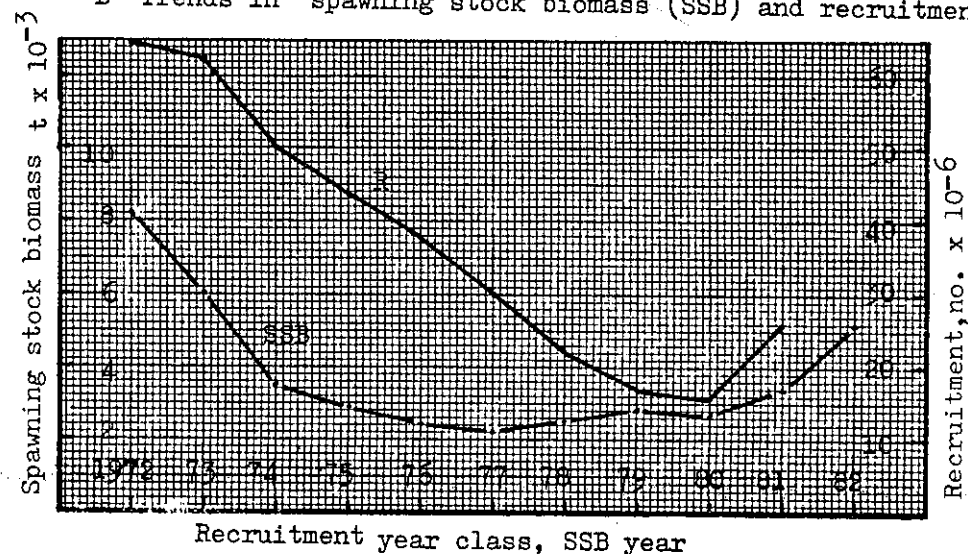
Figure D.1.5.2

FISH STOCK SUMMARY

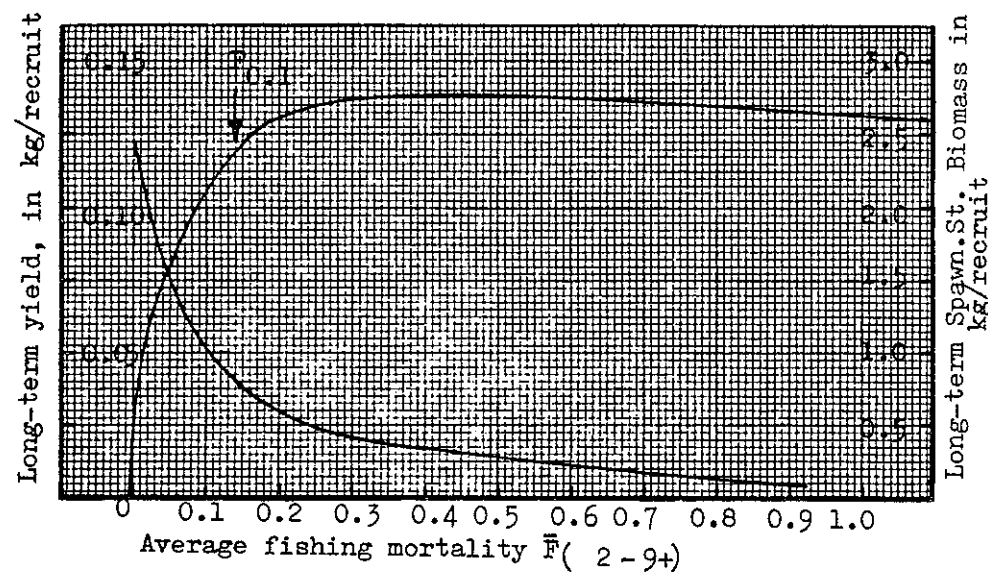
Mourne Herring - Div.VIIa
.....
(stock)

A Trends in Yield and fishing mortality (\bar{F})

B Trends in spawning stock biomass (SSB) and recruitment.



C Long-term yield and spawning stock biomass (indicate biological reference points)



D Short-term yield and spawning stock biomass (indicate biological reference points)

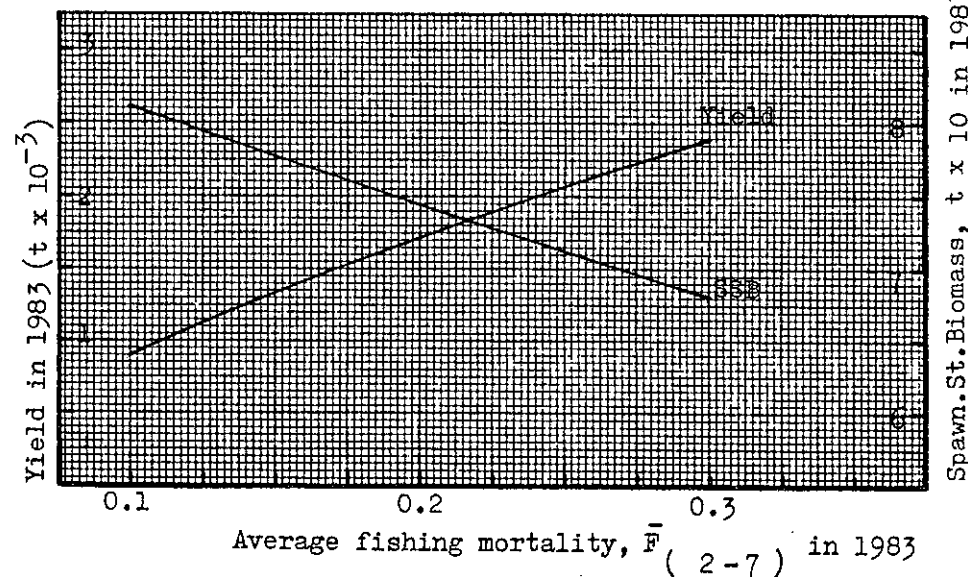


Figure D.2.3.1 Danish SANDEEL areas.

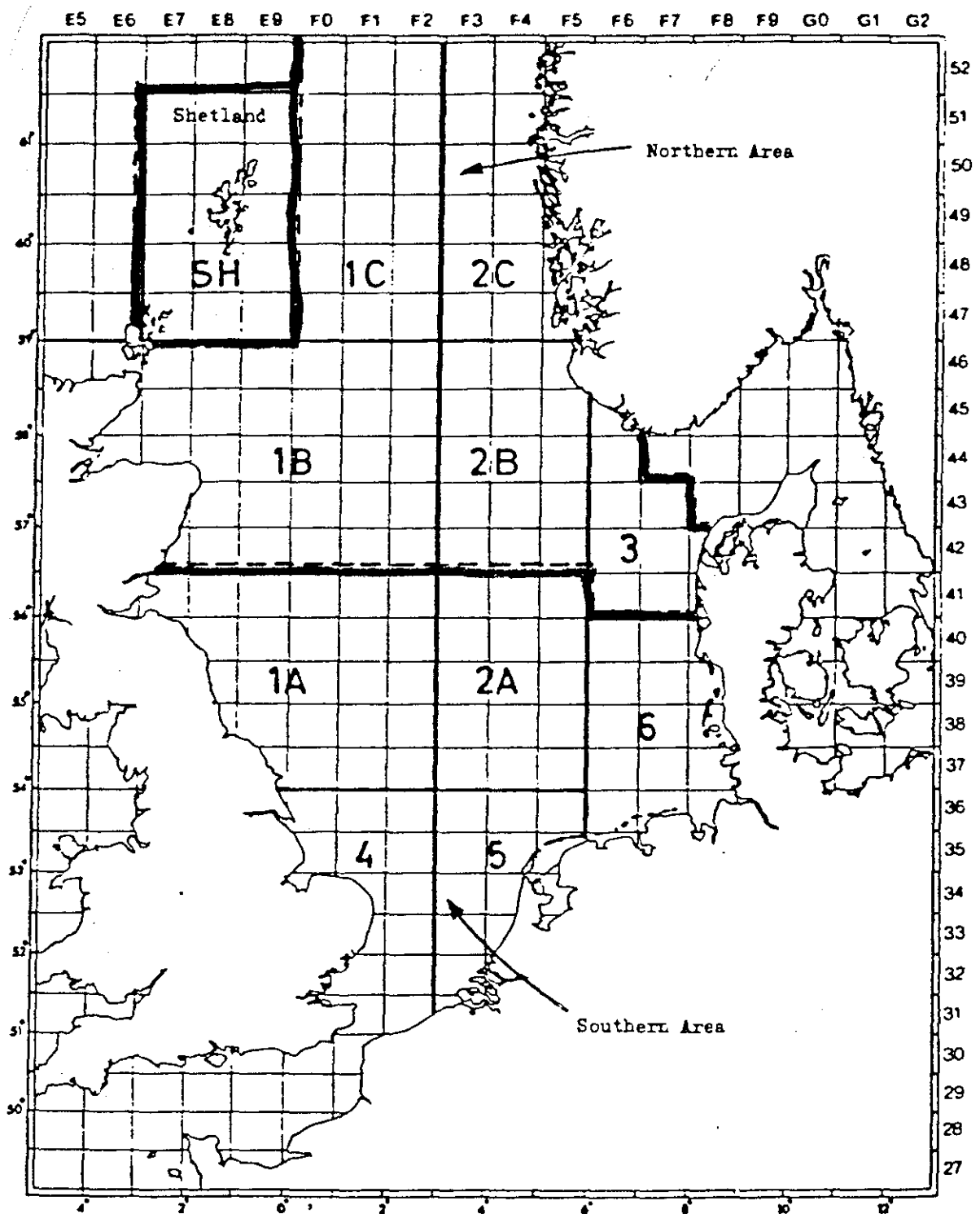
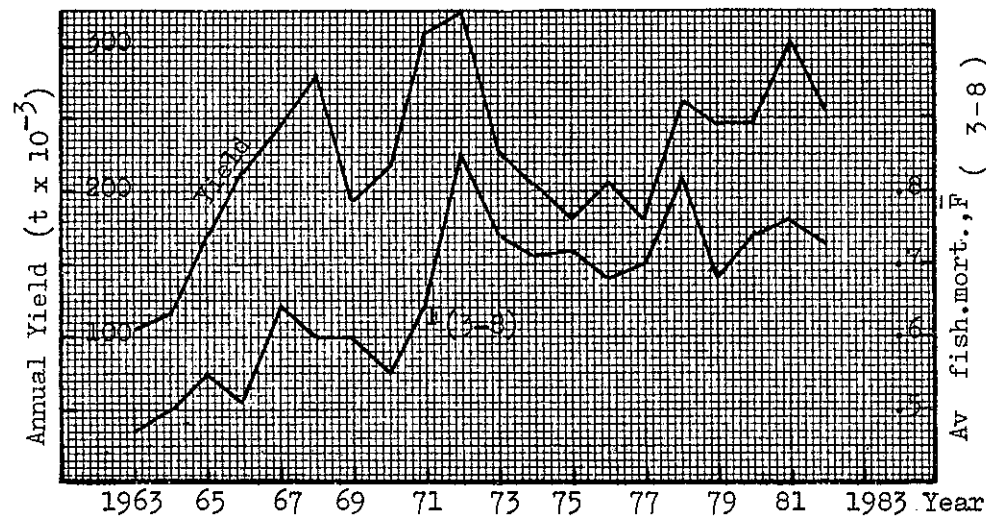


Figure D.5.1

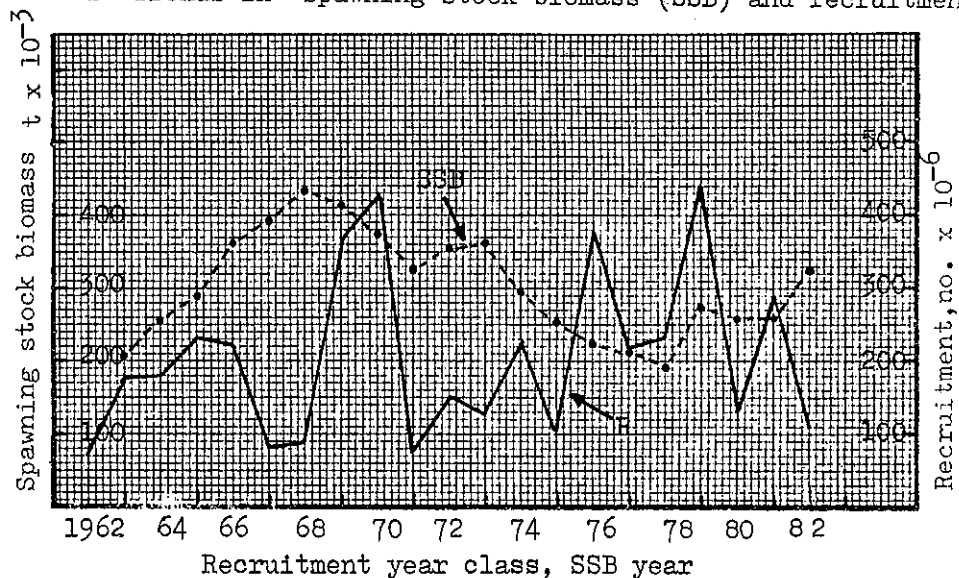
FISH STOCK SUMMARY

COD Sub-area IV
.....
(stock)

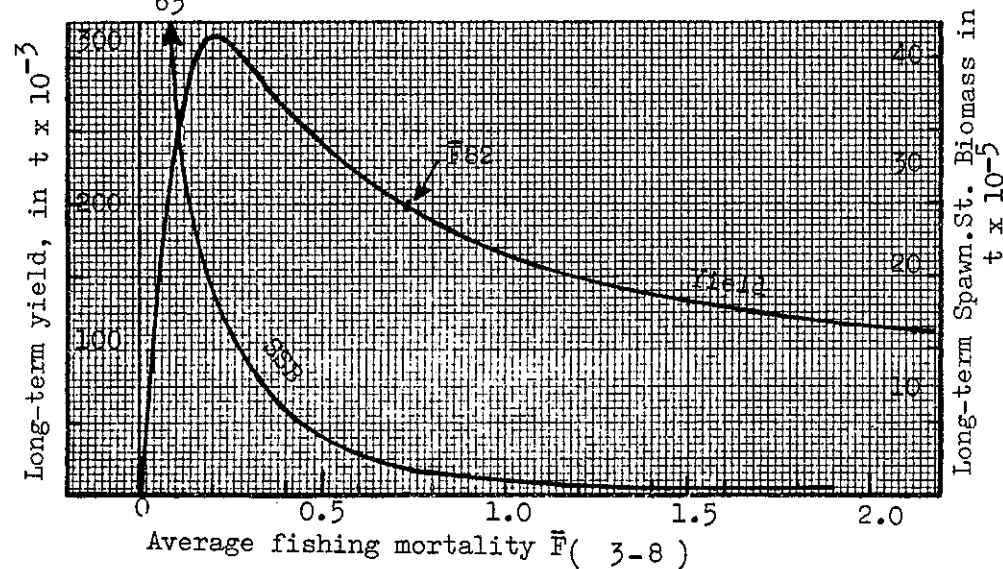
A Trends in Yield and fishing mortality (\bar{F})



B Trends in spawning stock biomass (SSB) and recruitment.



C Long-term yield and spawning stock biomass
(indicate biological reference points)



D Short-term yield and spawning stock biomass
(indicate biological reference points)

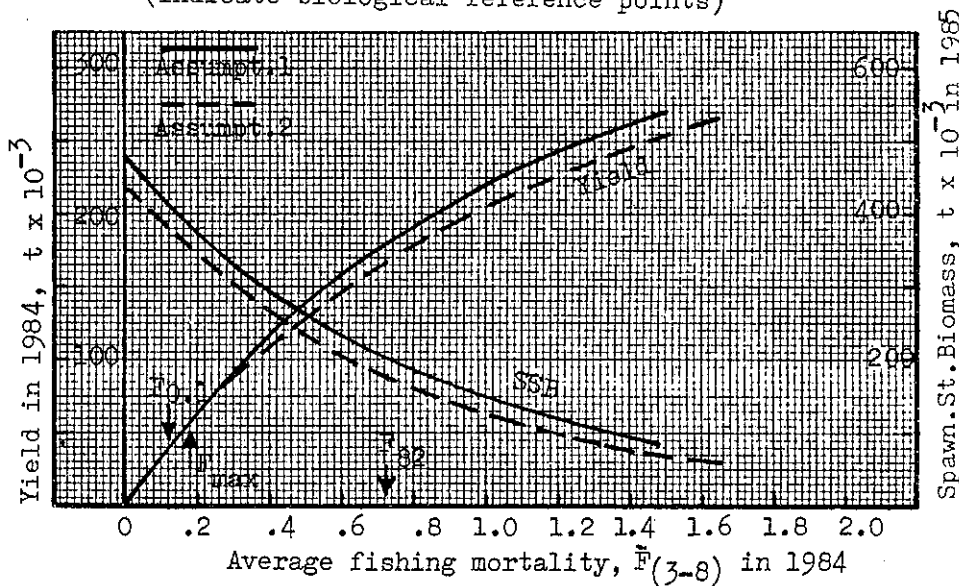
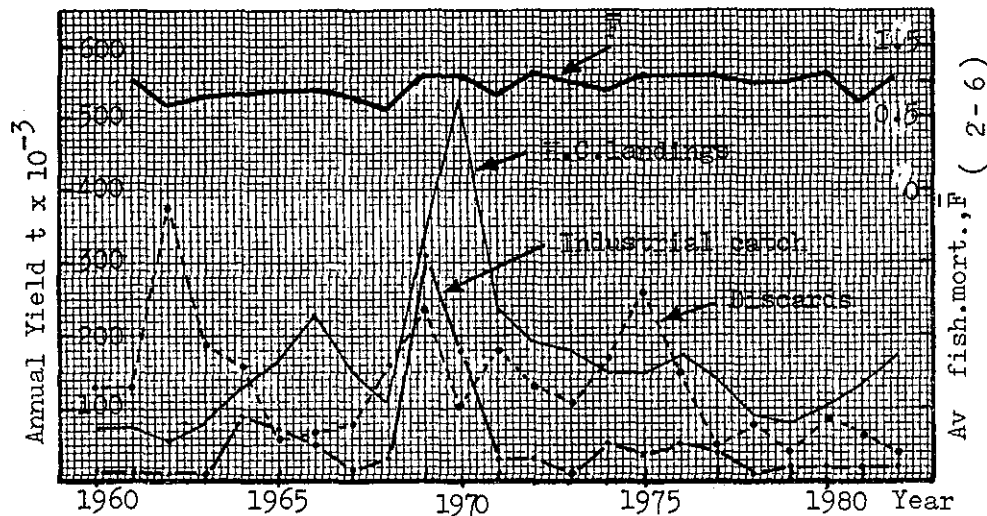


Figure D.5.2

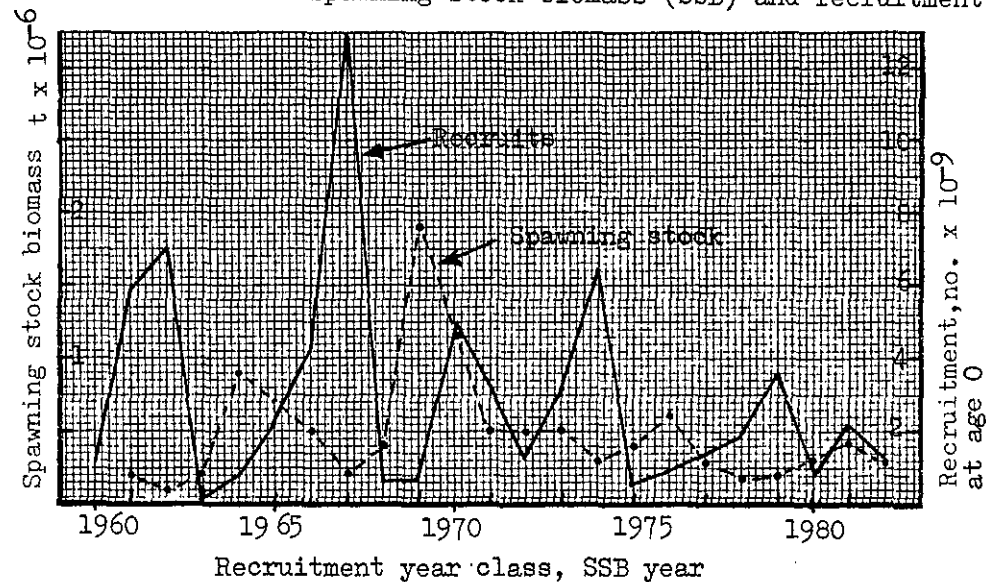
FISH STOCK SUMMARY

HADDOCK Sub-area IV
.....
(stock)

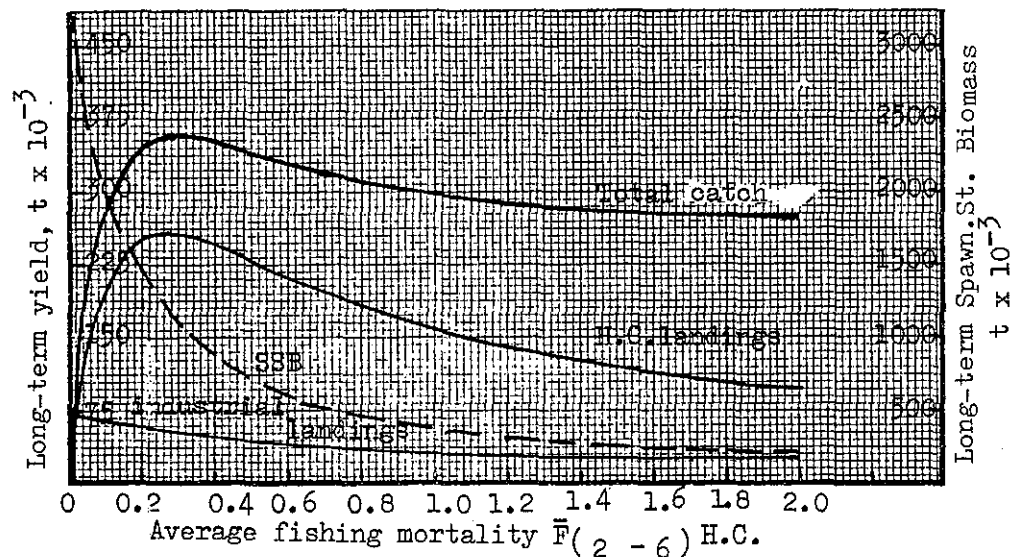
A Trends in Yield and fishing mortality (\bar{F})



B Trends in spawning stock biomass (SSB) and recruitment.



C Long-term yield and spawning stock biomass (indicate biological reference points)



D Short-term yield and spawning stock biomass (indicate biological reference points)

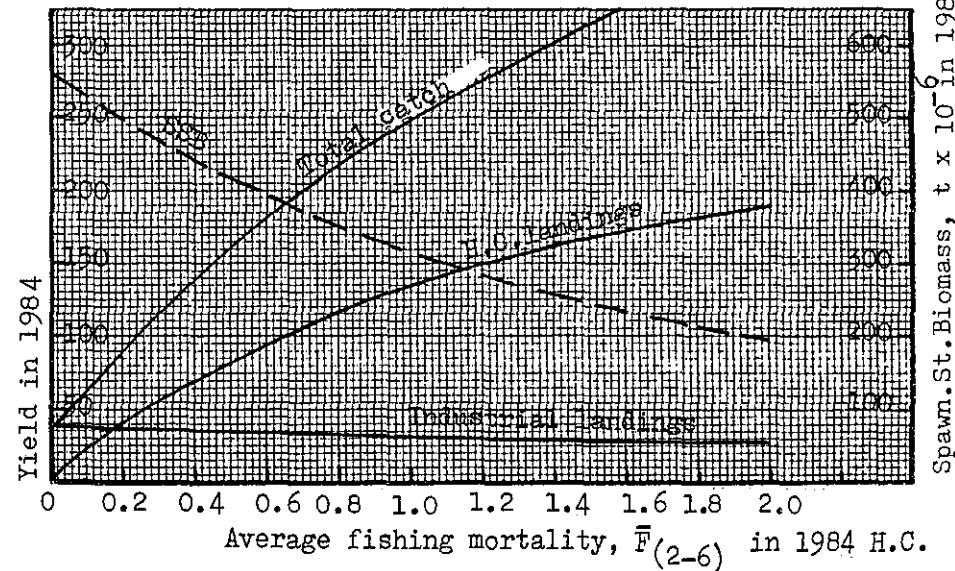
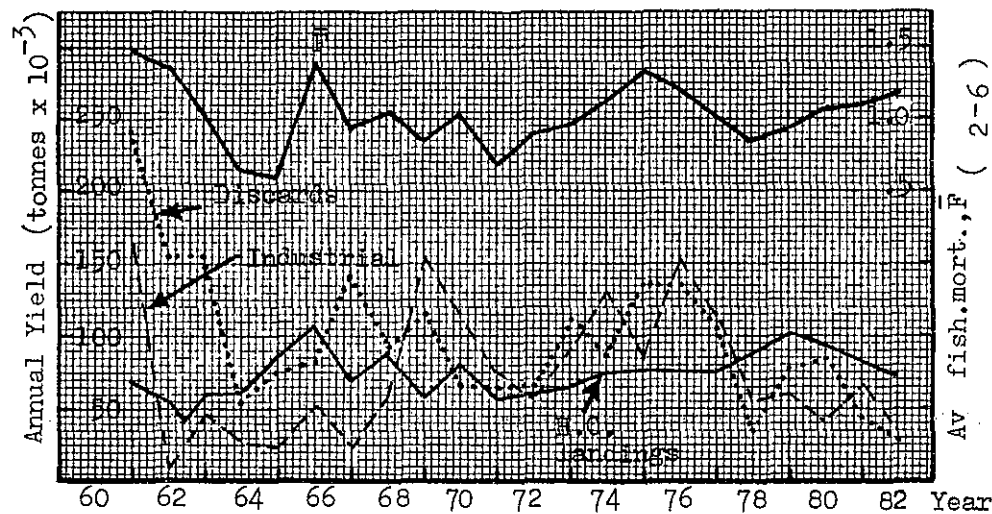


Figure D.5.3

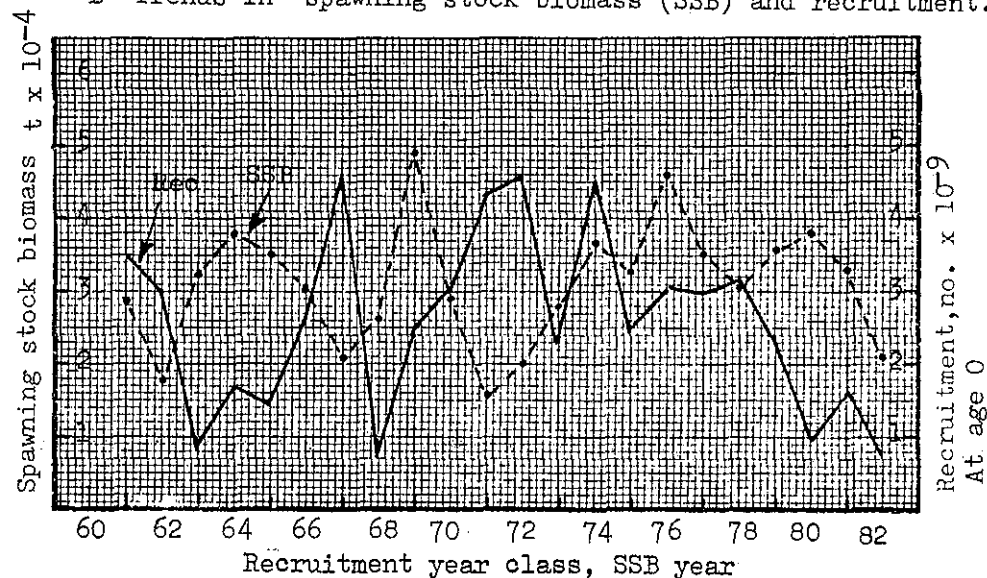
FISH STOCK SUMMARY

North Sea WHITING
.....
(stock)

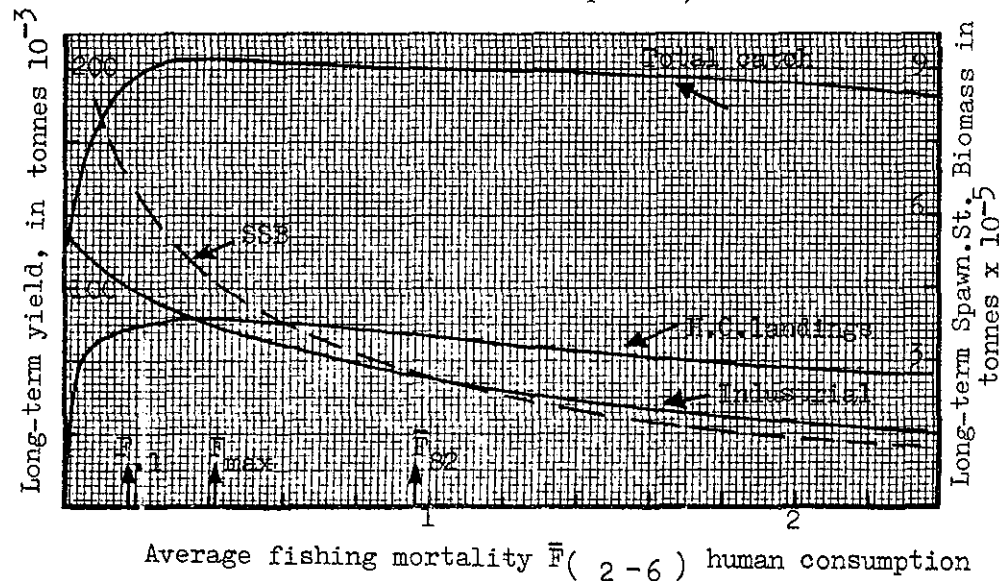
A Trends in Yield and fishing mortality (\bar{F})



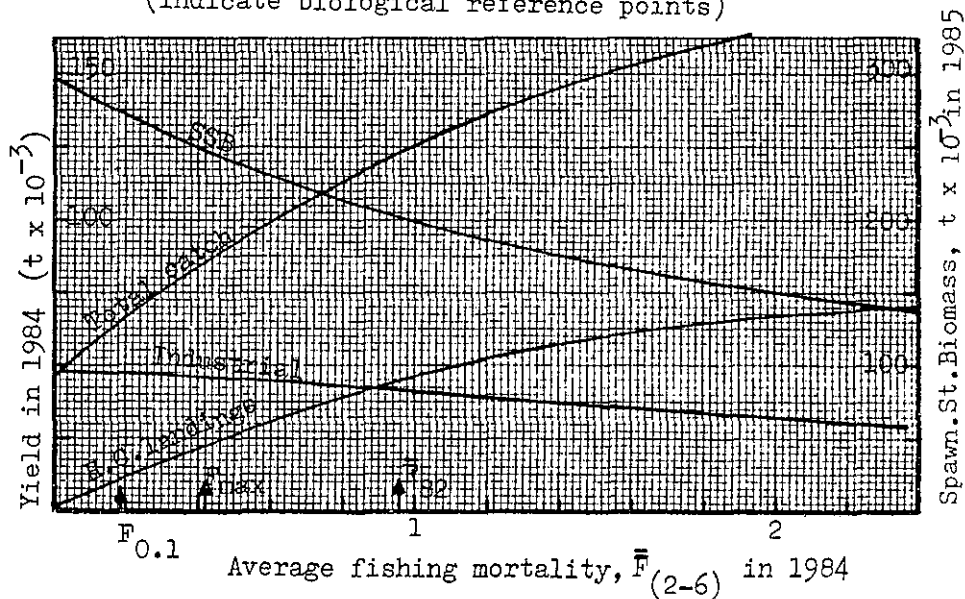
B Trends in spawning stock biomass (SSB) and recruitment.



C Long-term yield and spawning stock biomass (indicate biological reference points)



D Short-term yield and spawning stock biomass (indicate biological reference points)



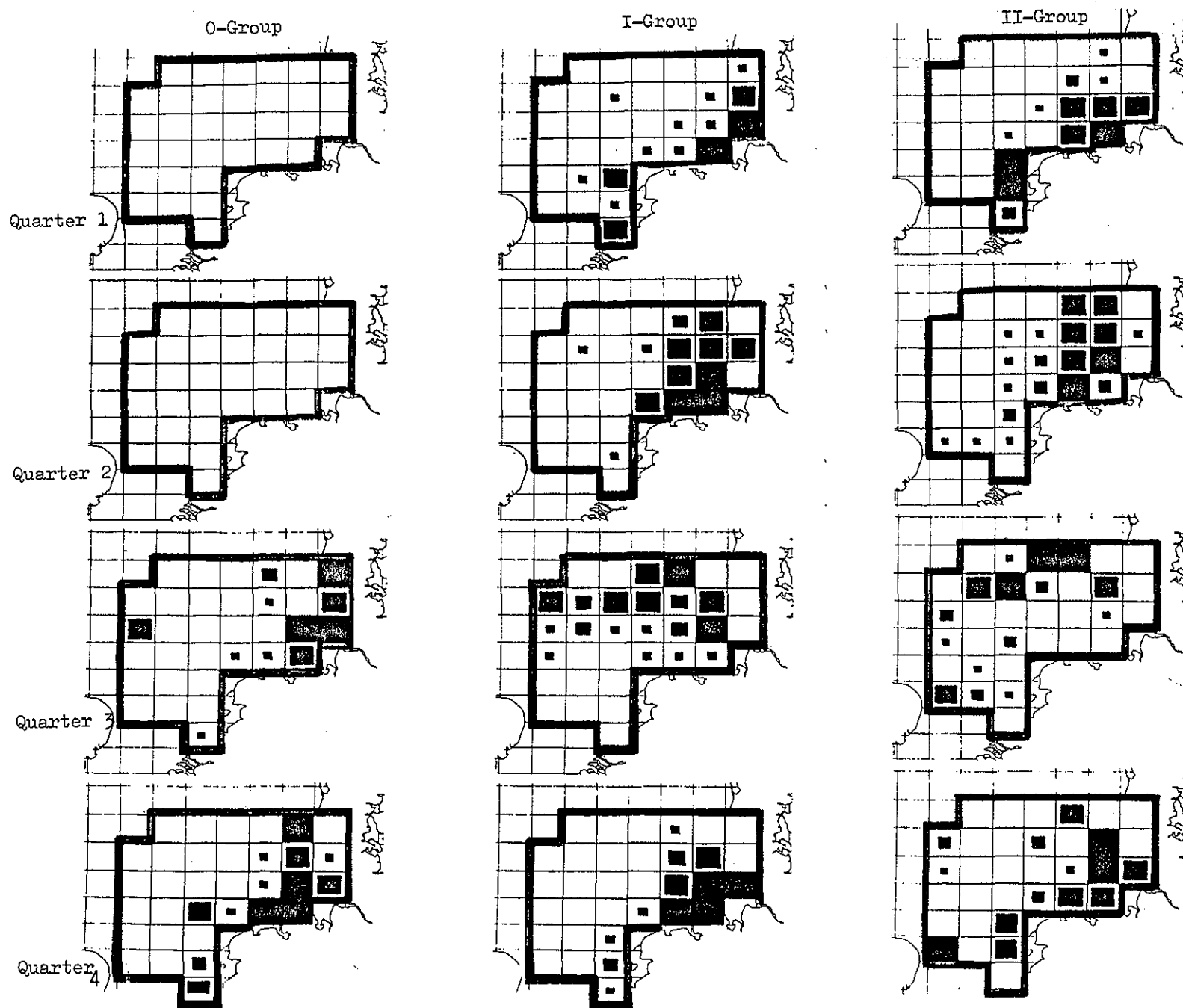


Figure D.5.4 COD
Average relative abundance of O-group, I-group and II group COD in the southern North Sea during the period 1980-82 according to re-search vessel surveys (1st quarter: IYFS; other quarters: Dutch GOV surveys).

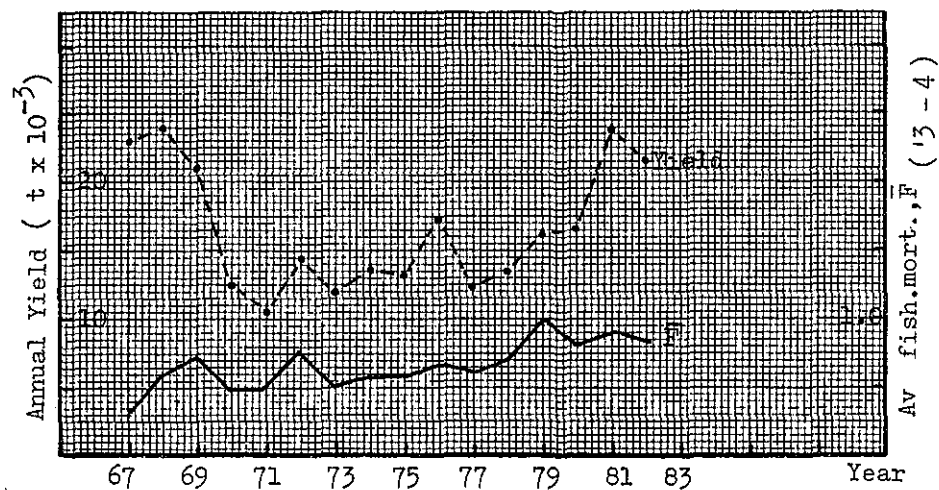
Symbols of increasing size indicate increasing percentage of total catch in the delineated area taken within an individual square.

Figure D.6.1

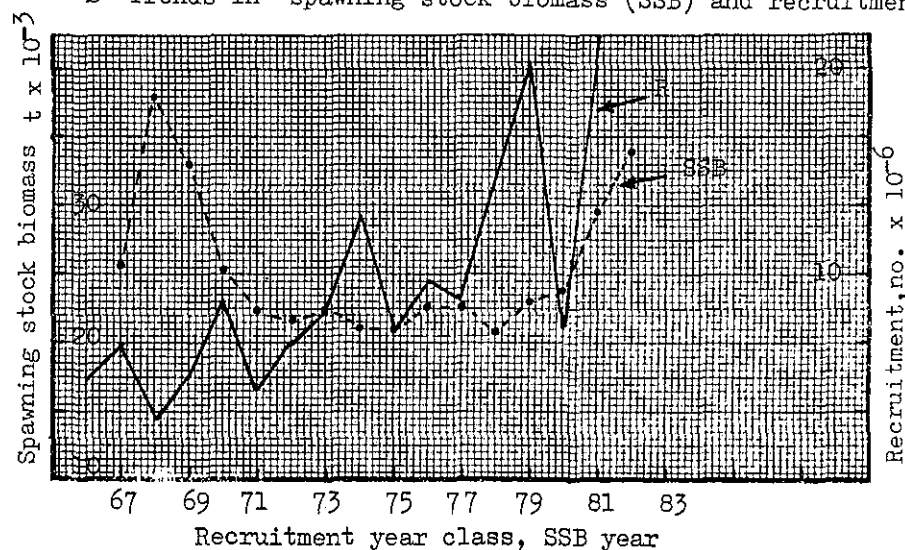
FISH STOCK SUMMARY

COD Division VIa
.....
(stock)

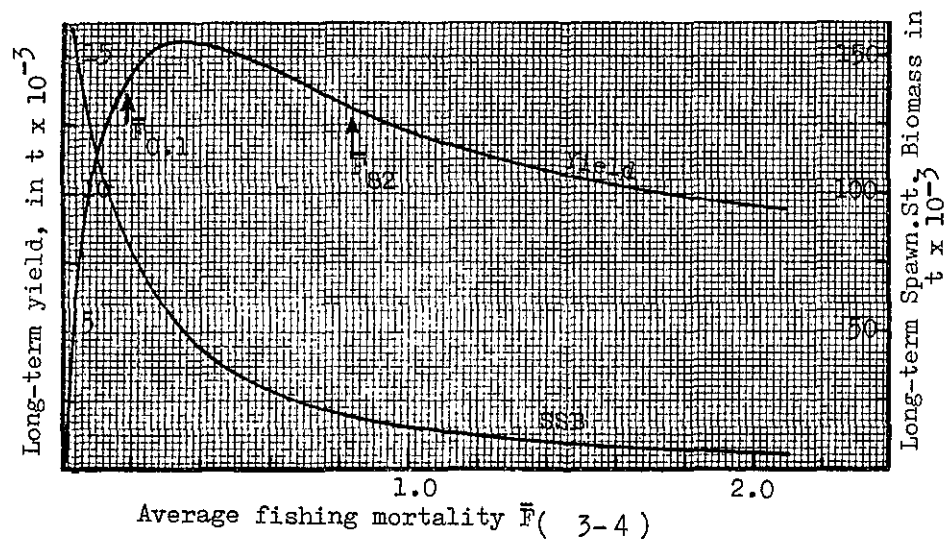
A Trends in Yield and fishing mortality (\bar{F})



B Trends in spawning stock biomass (SSB) and recruitment.



C Long-term yield and spawning stock biomass (indicate biological reference points)



D Short-term yield and spawning stock biomass (indicate biological reference points)

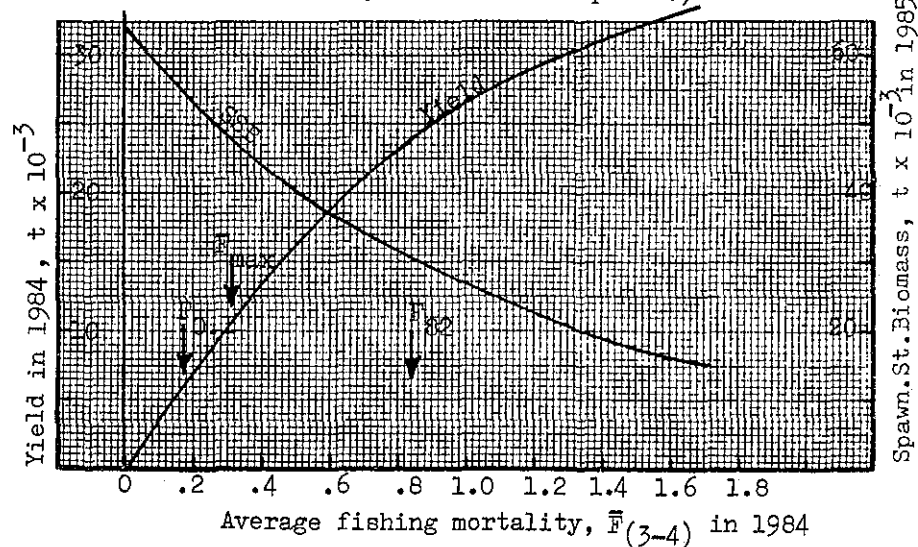


Figure D.6.3

FISH STOCK SUMMARY

(Stock) HADDOCK Division VIa

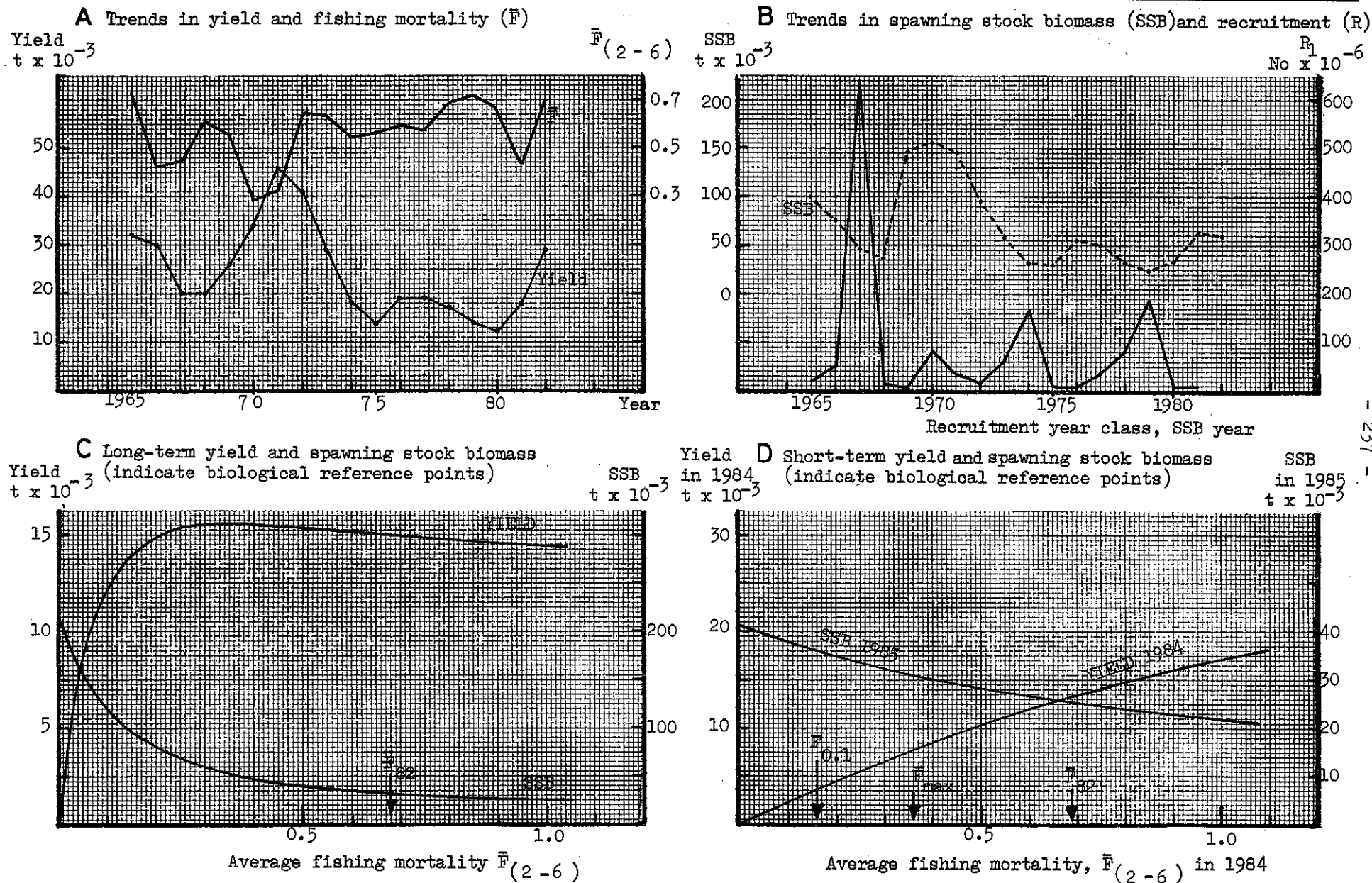
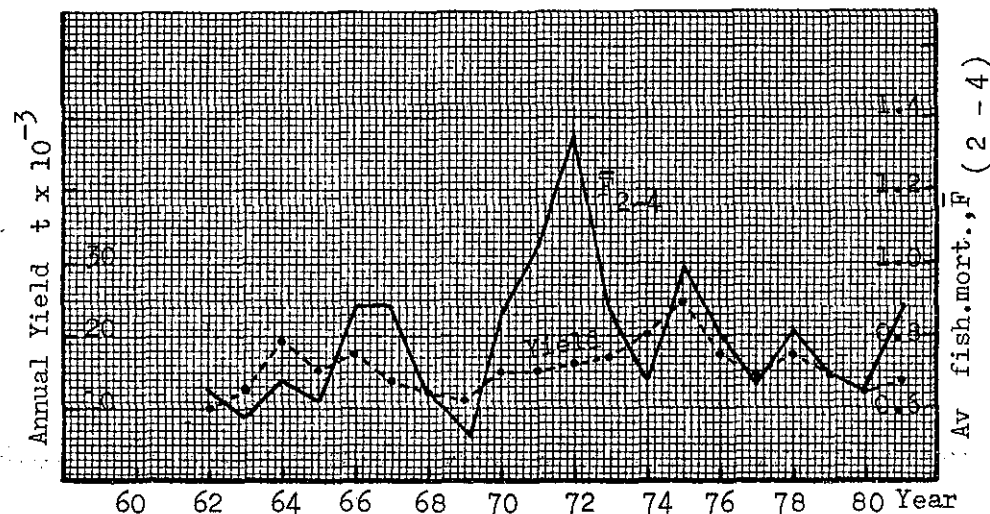


Figure D.6.5

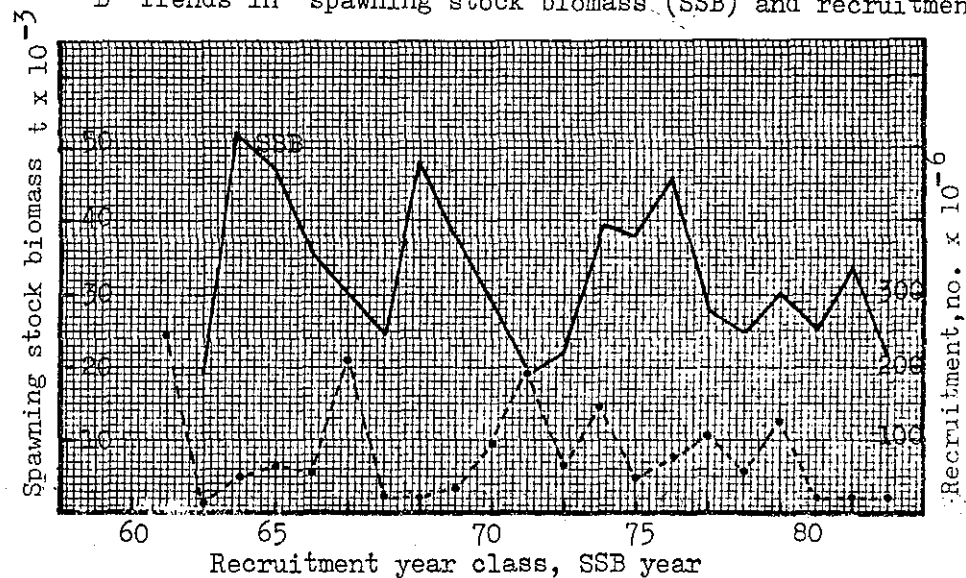
FISH STOCK SUMMARY

WHITING Division VIa
.....
(stock)

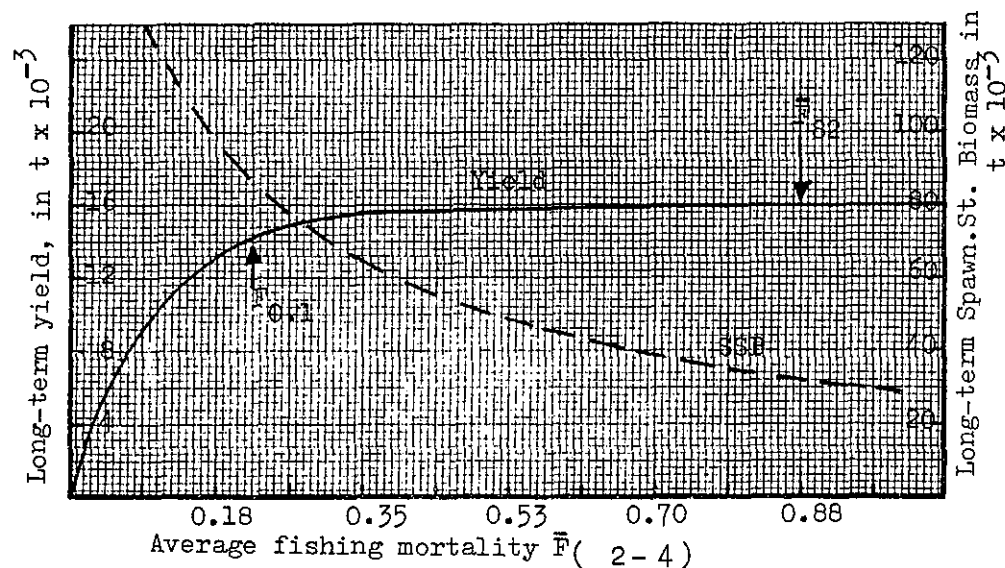
A Trends in Yield and fishing mortality (\bar{F})



B Trends in spawning stock biomass (SSB) and recruitment.



C Long-term yield and spawning stock biomass (indicate biological reference points)



D Short-term yield and spawning stock biomass (indicate biological reference points)

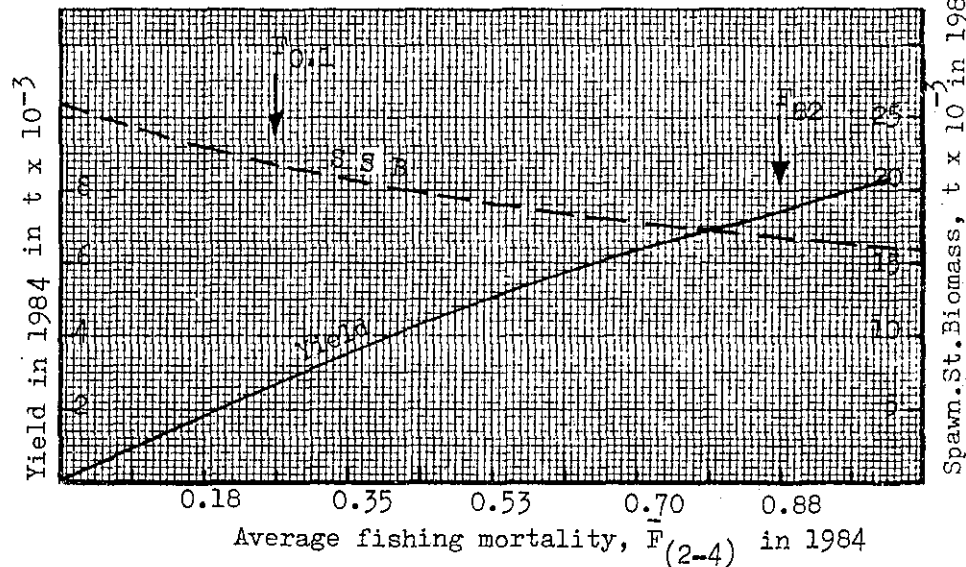
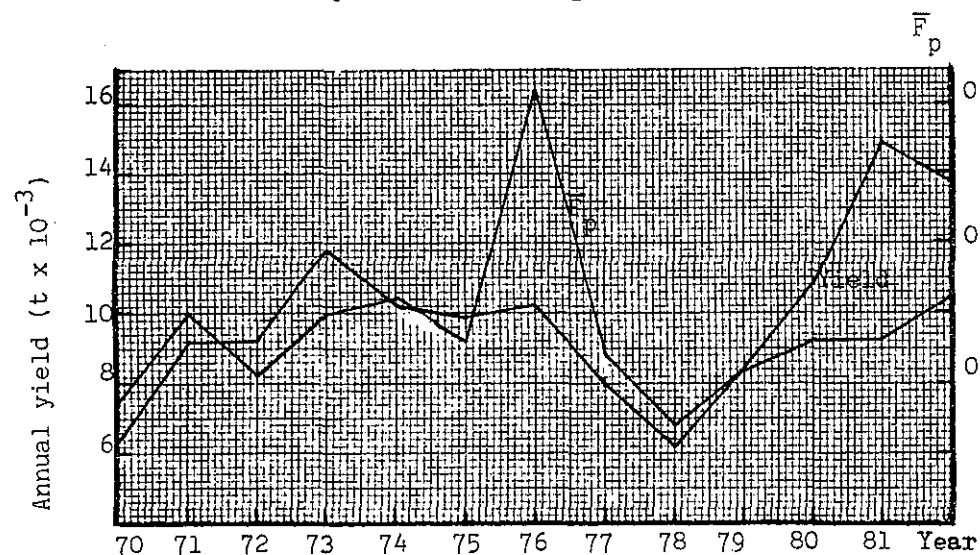


Figure D.7.1

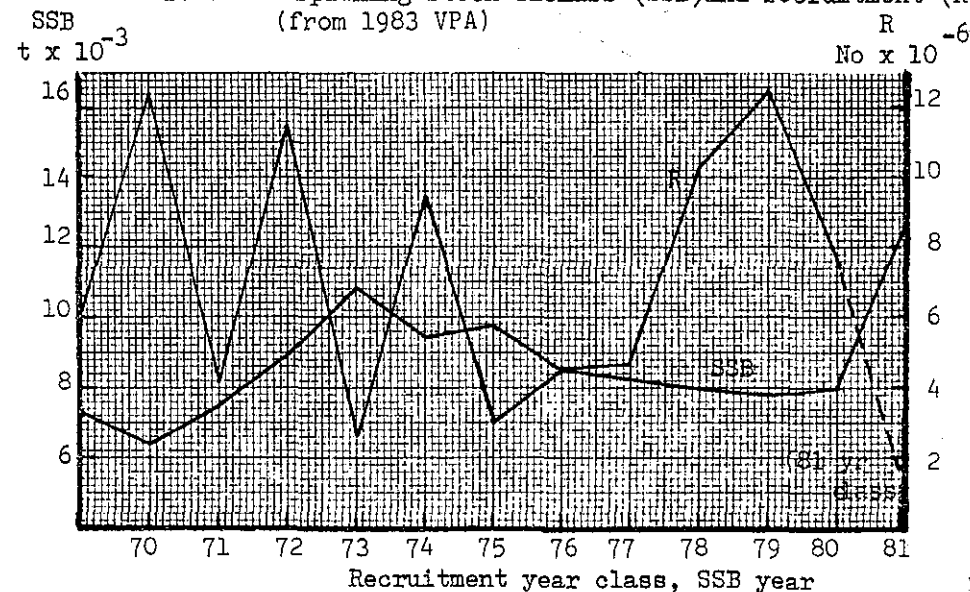
FISH STOCK SUMMARY

(Stock) Irish Sea COD (Division VIIa)

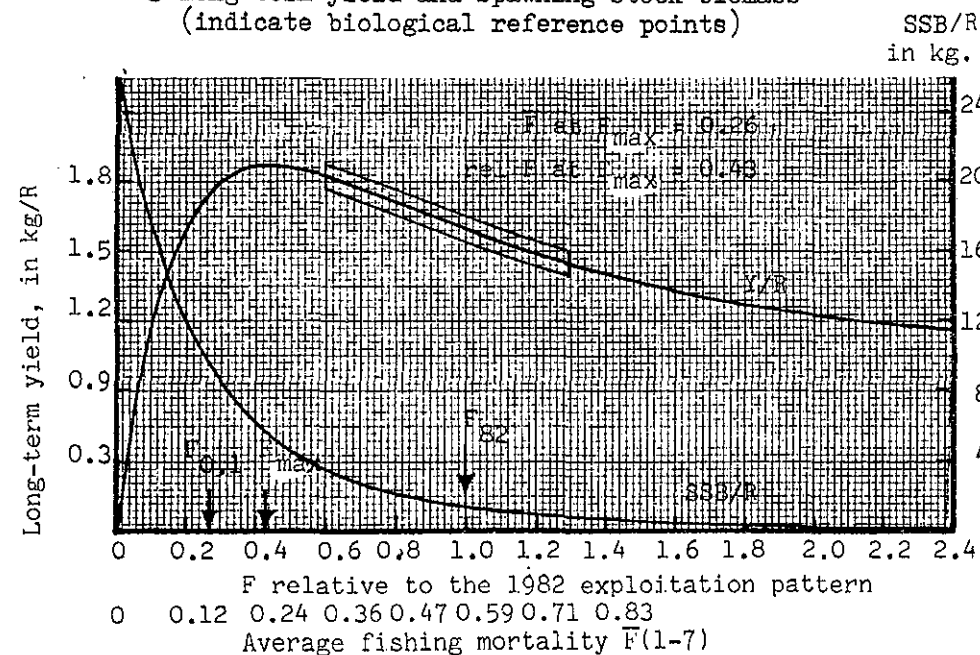
A Trends in yield and fishing mortality



B Trends in spawning stock biomass (SSB) and recruitment (R) (from 1983 VPA)



C Long-term yield and spawning stock biomass (indicate biological reference points)



D Short-term yield and spawning stock biomass (indicate biological reference points)

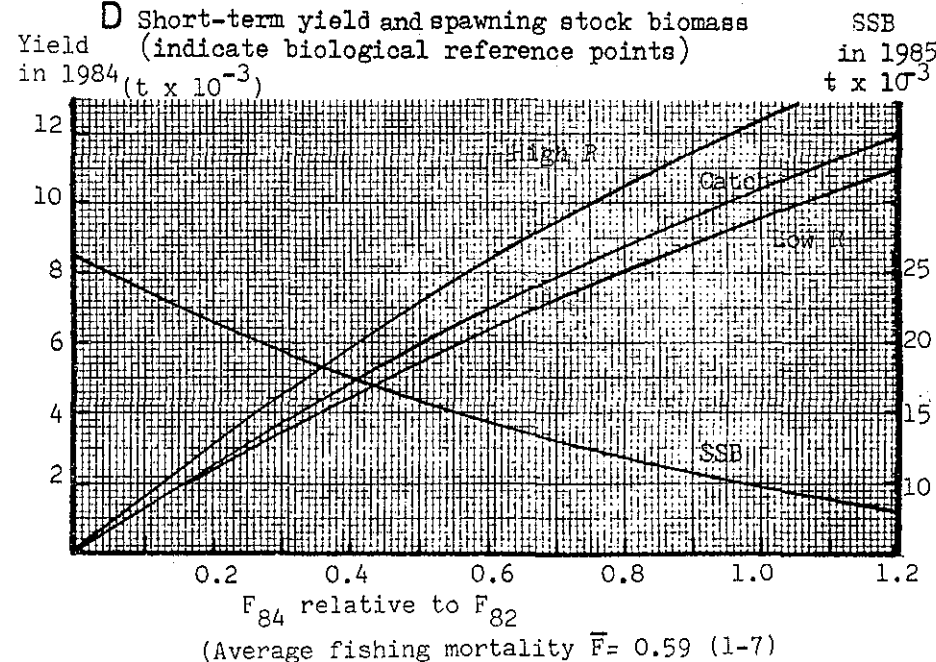
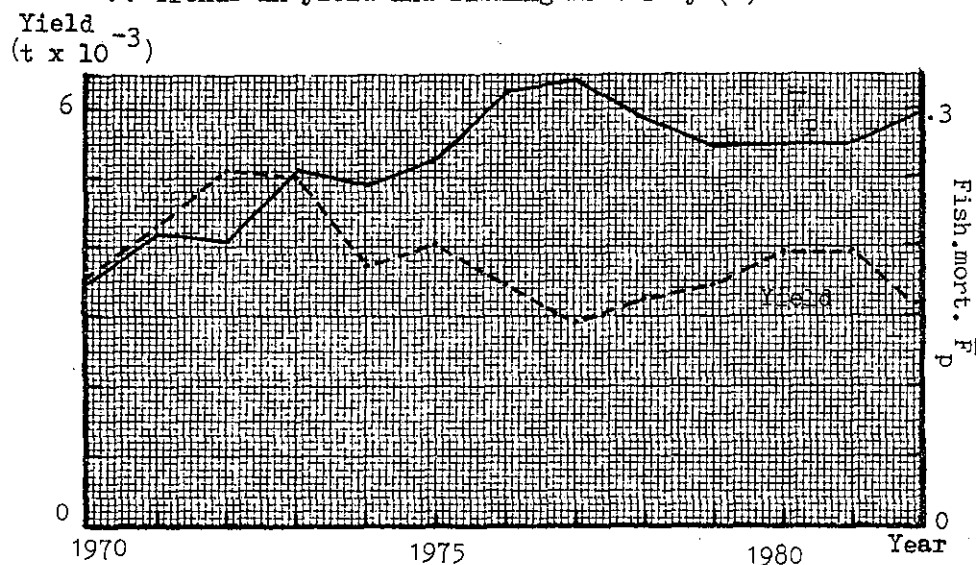


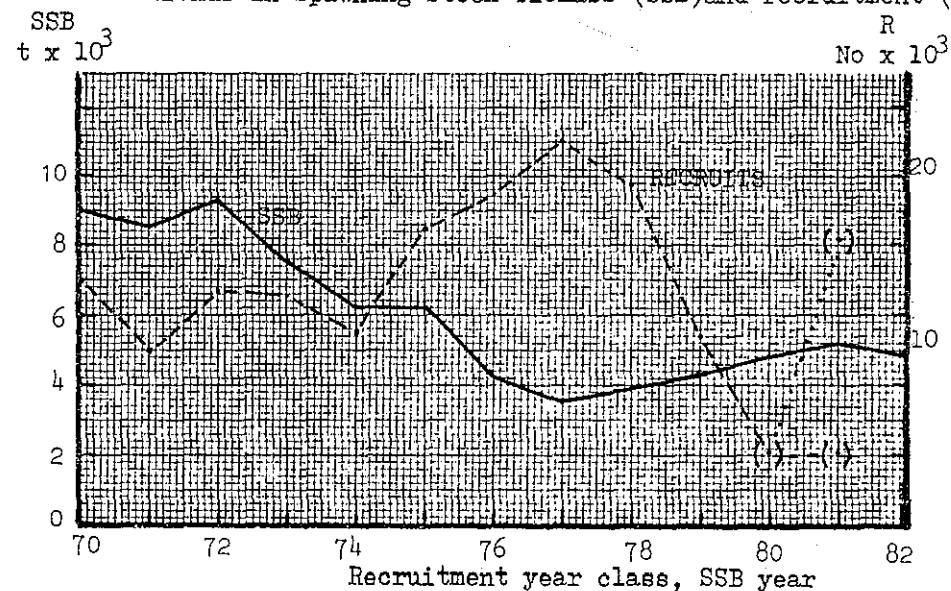
Figure D.7.3

FISH STOCK SUMMARY

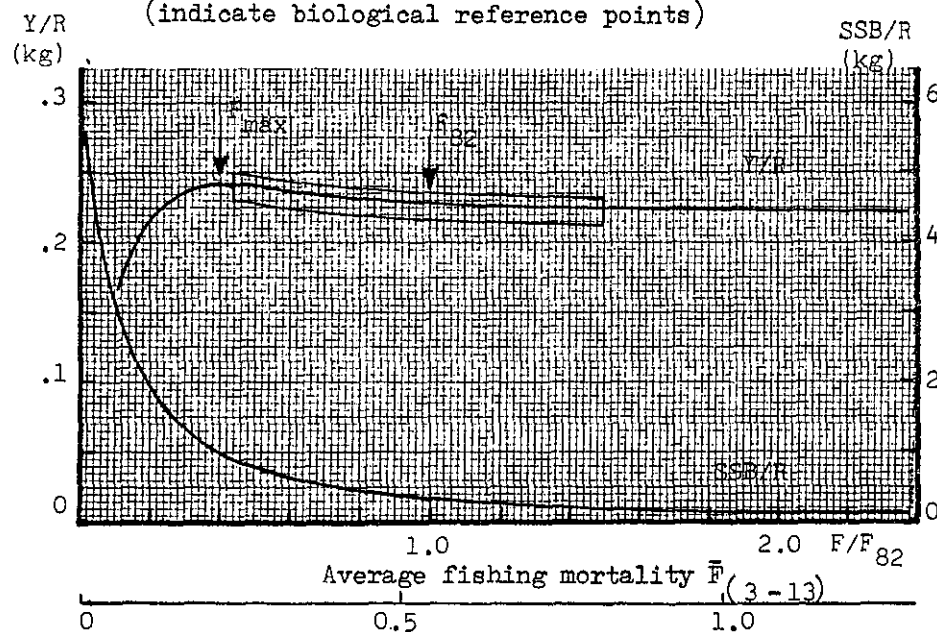
(Stock) IRISH SEA PLAICE

A Trends in yield and fishing mortality (\bar{F})

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



C Long-term yield and spawning stock biomass (indicate biological reference points)



D Short-term yield and spawning stock biomass in 1984 (indicate biological reference points)

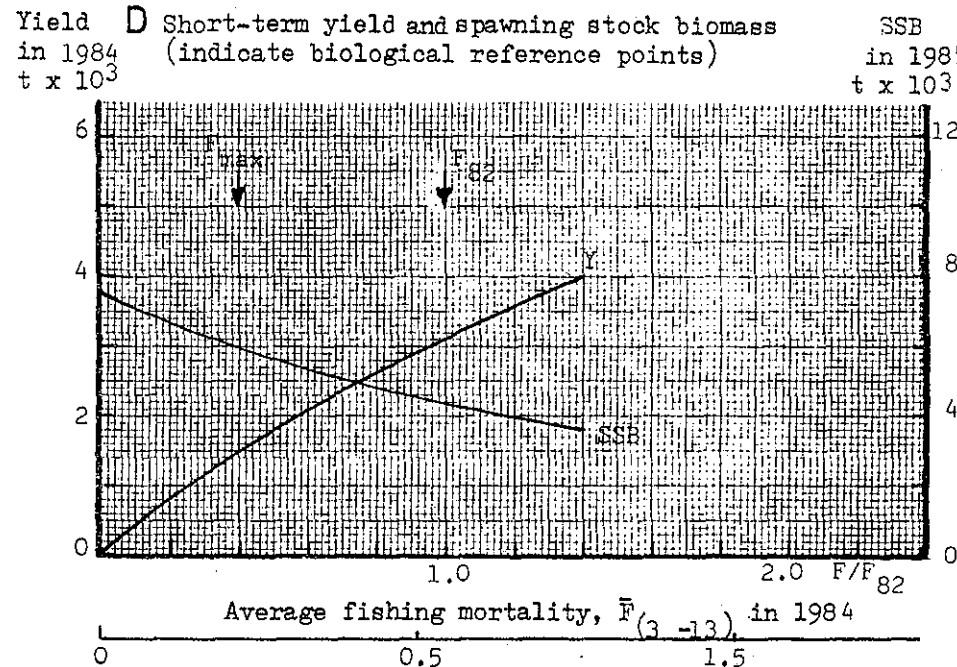


Figure D.7.4

FISH STOCK SUMMARY

(Stock) Irish Sea SOLE

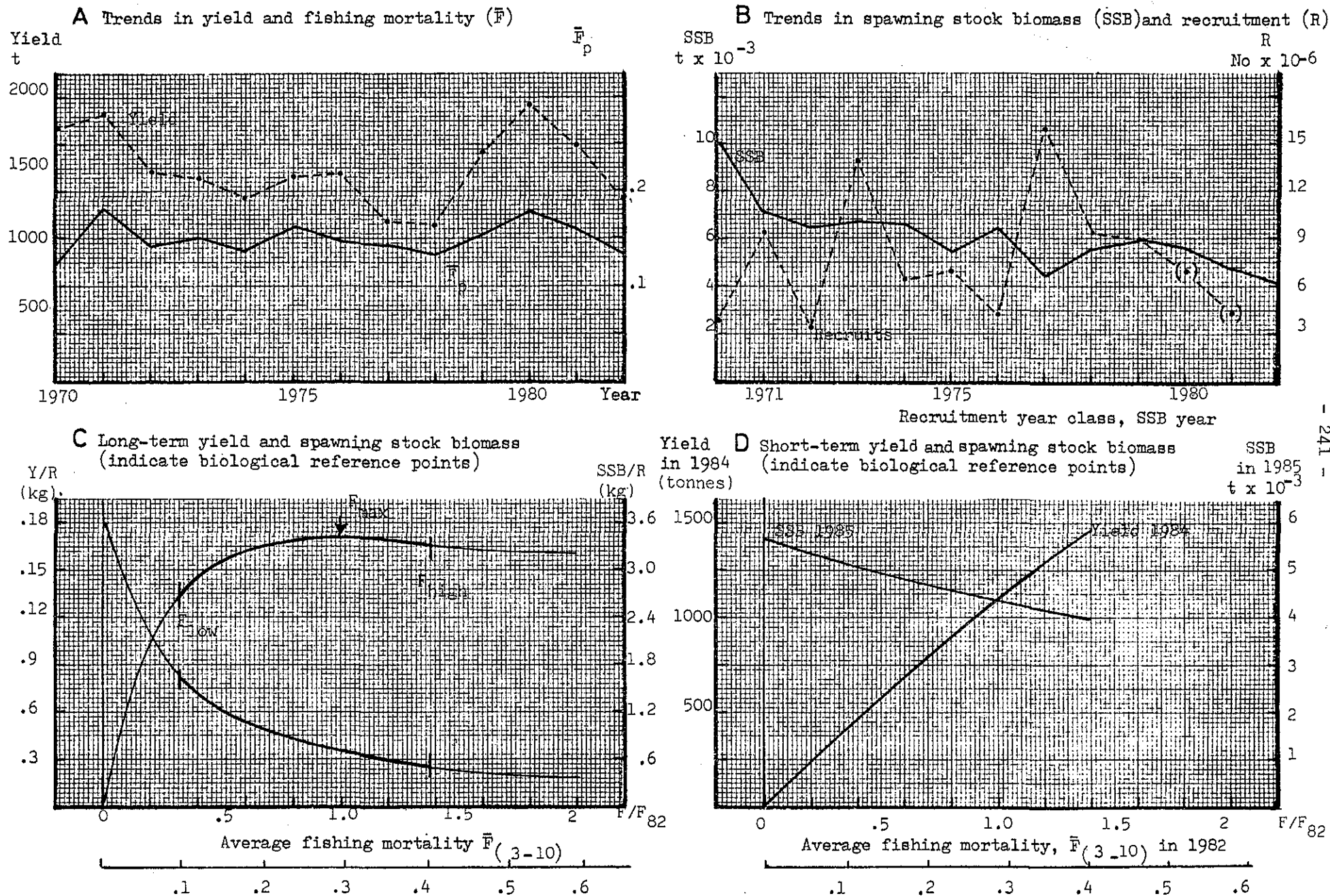
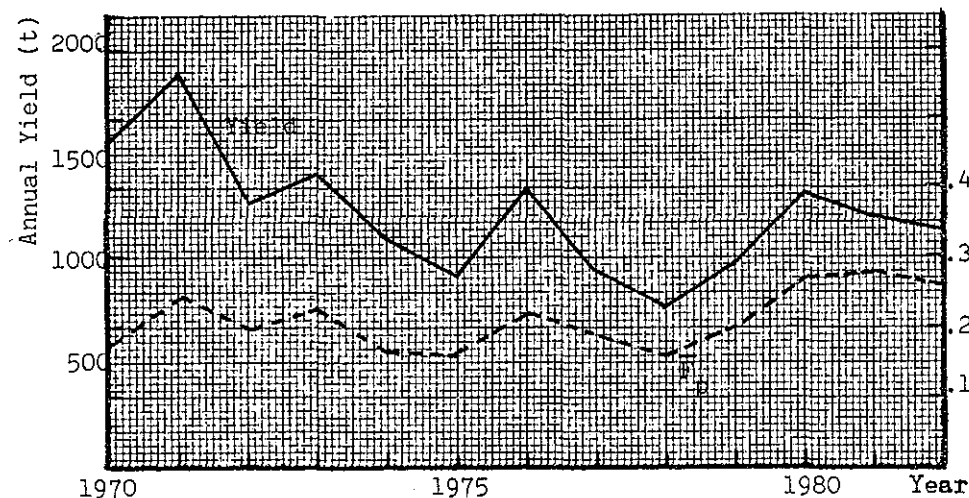


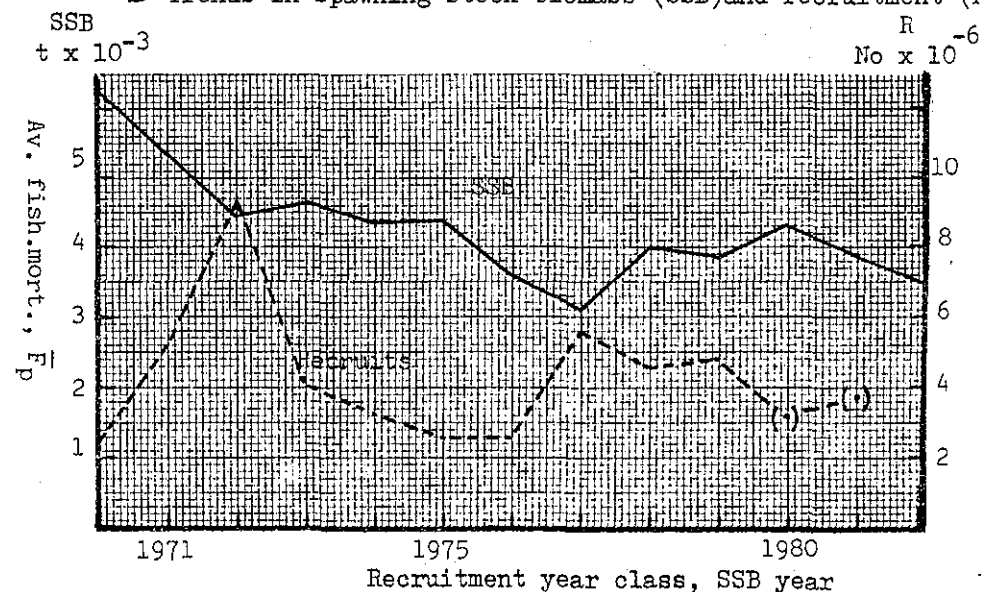
Figure D.7.5

FISH STOCK SUMMARY

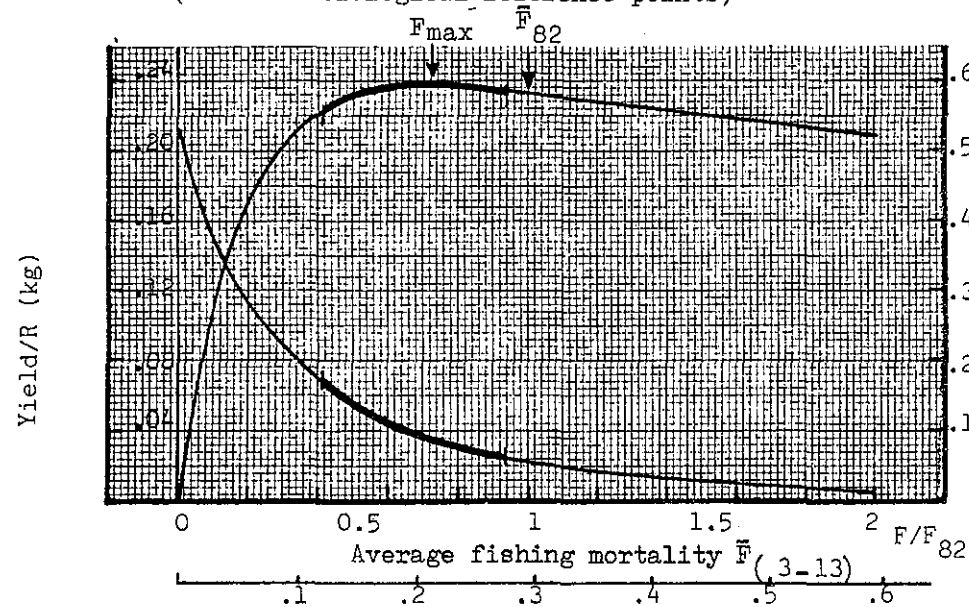
(Stock) Celtic Sea Sole

A Trends in yield and fishing mortality (\bar{F})

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



C Long-term yield and spawning stock biomass (indicate biological reference points)



D Short-term yield and spawning stock biomass (indicate biological reference points)

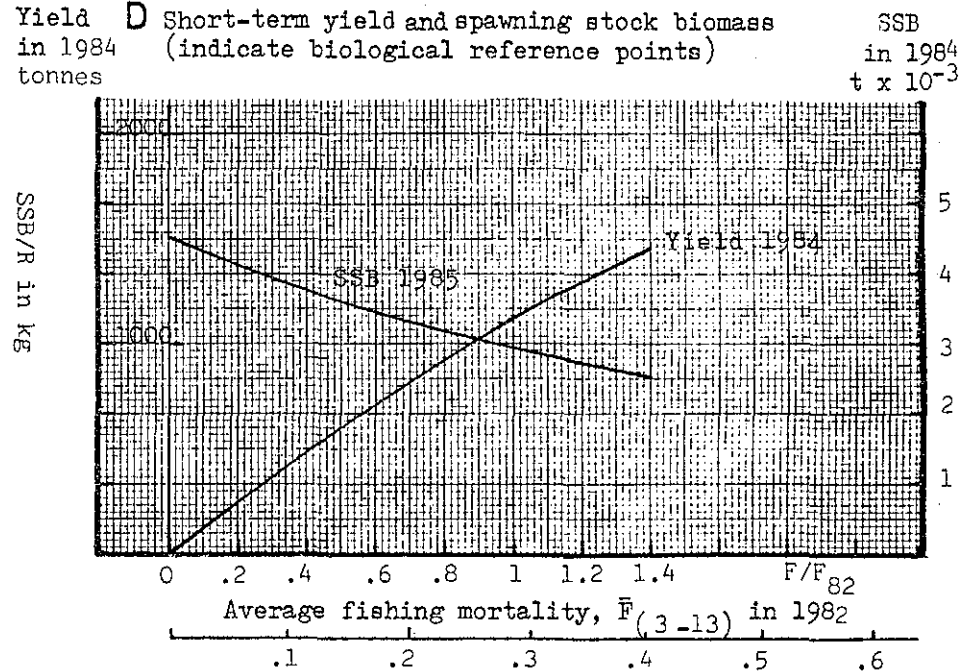
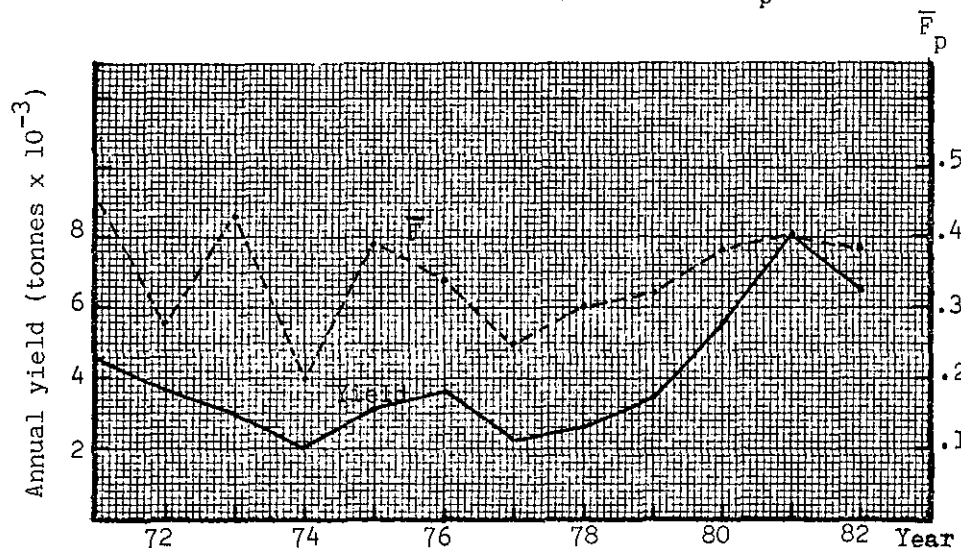


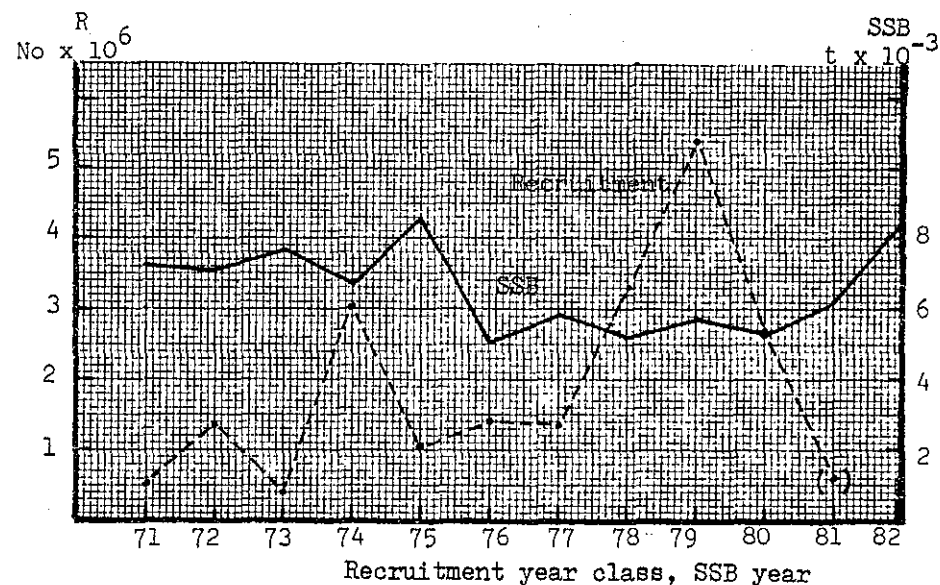
Figure D.7.6

FISH STOCK SUMMARY

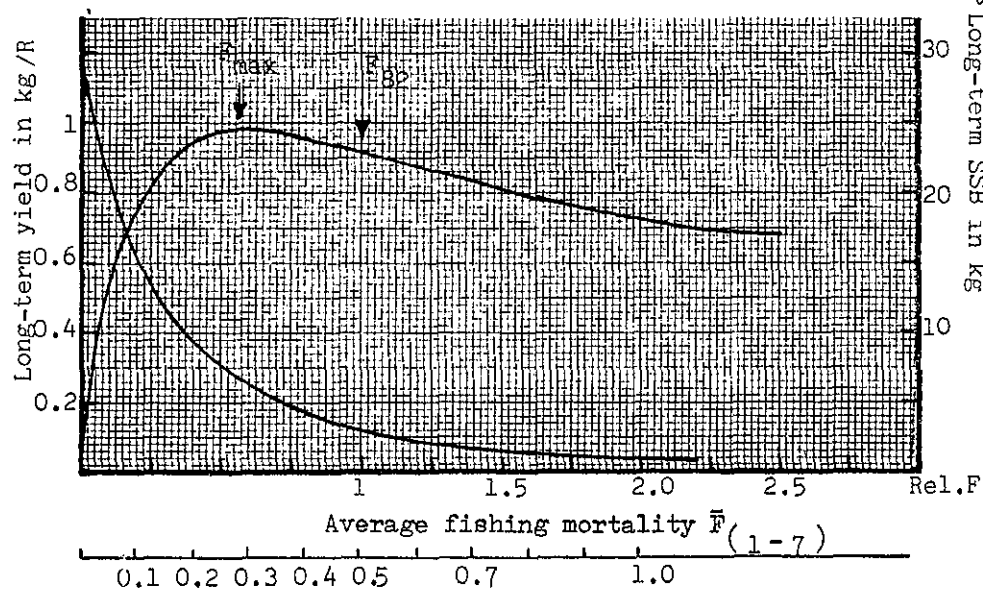
(Stock) Celtic Sea COD

A Trends in yield and fishing mortality (\bar{F}_p)

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



C Long-term yield and spawning stock biomass (indicate biological reference points)



D Short-term yield and spawning stock biomass (indicate biological reference points)

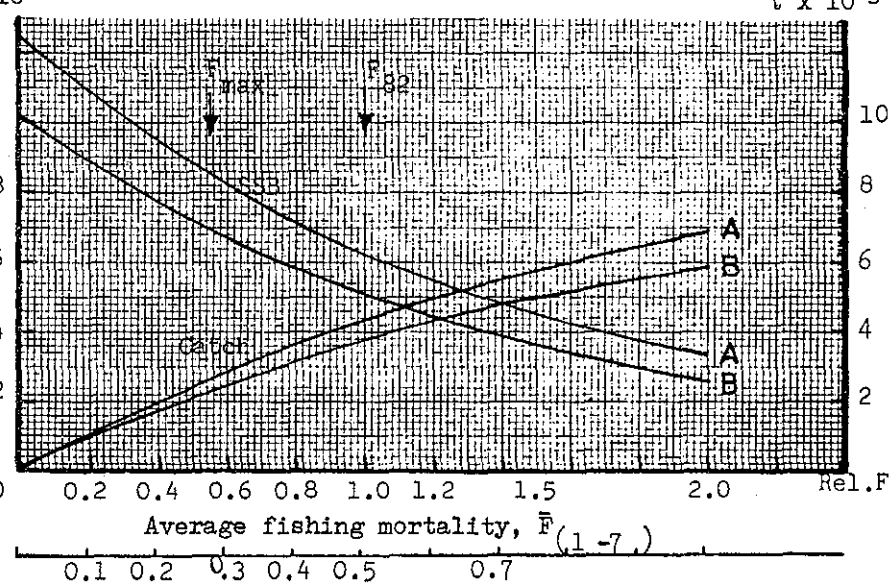
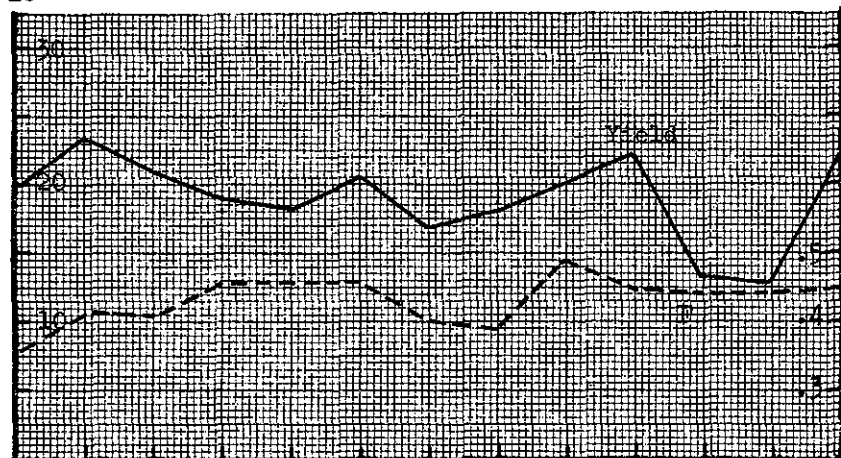


Figure D.8.1. FISH STOCK SUMMARY

(Stock) North Sea SOLE

A Trends in yield and fishing mortality (\bar{F})

Yield
 $t \times 10^{-3}$

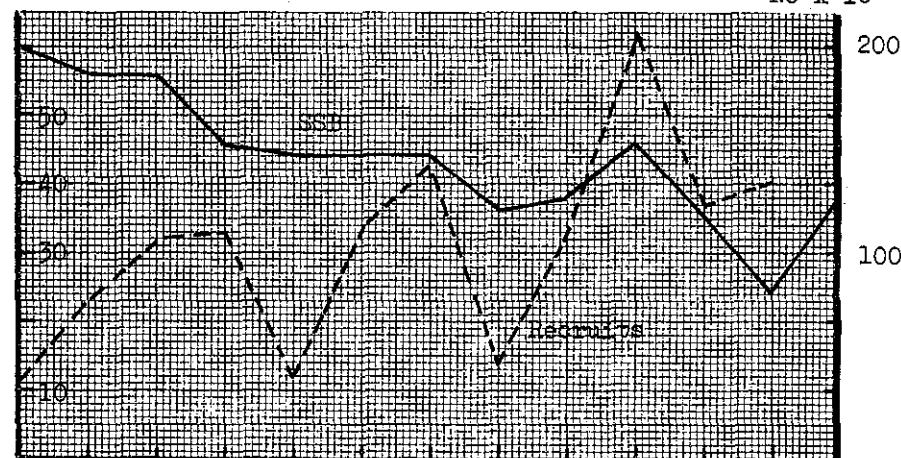


1970 71 72 73 74 75 76 77 78 79 80 81 Year

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

$\bar{F}(2-8)u$ SSB
 $t \times 10^{-3}$

R
No $\times 10^{-6}$

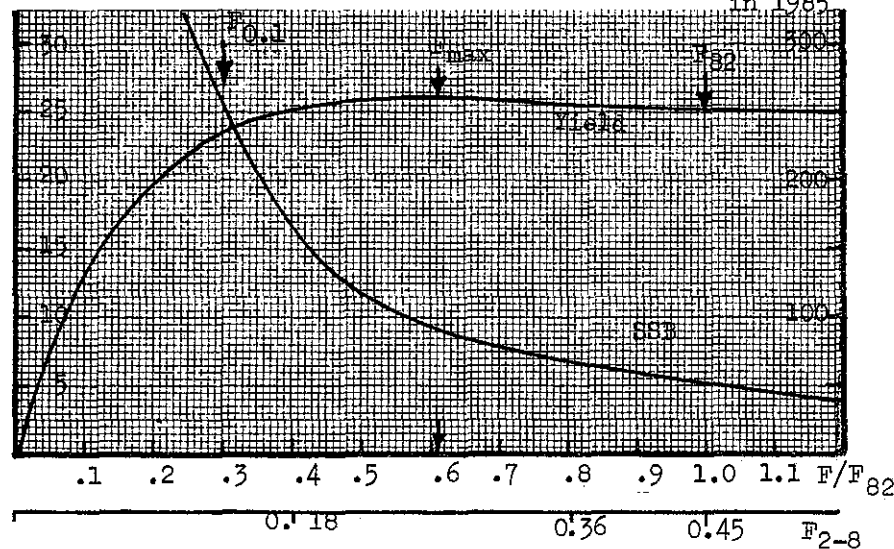


1971 72 73 74 75 76 77 78 79 80 81
Recruitment year class, SSB year

C Long-term yield and spawning stock biomass

Yield $t \times 10^{-3}$ in 1984
(indicate biological reference points)

SSB $t \times 10^{-3}$ in 1985



D Short-term yield and spawning stock biomass

Yield $t \times 10^{-3}$ in 1984
(indicate biological reference points)

SSB
in 1985
 $t \times 10^{-3}$

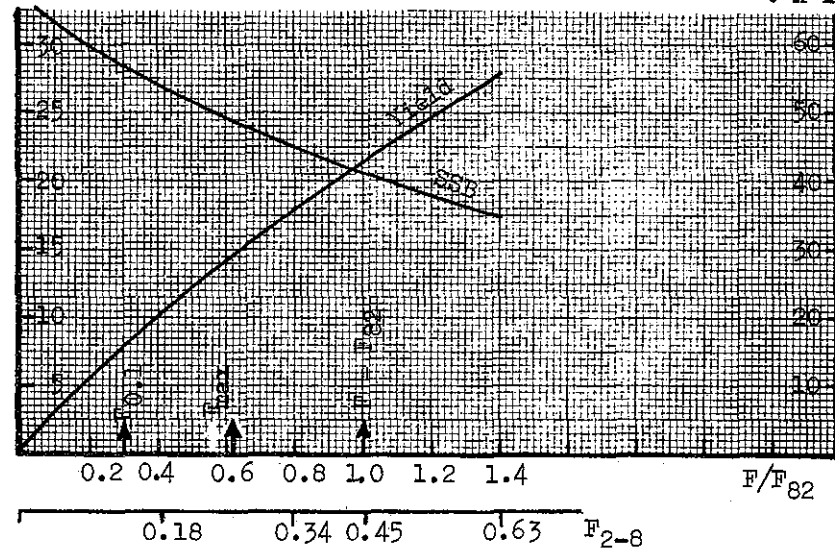
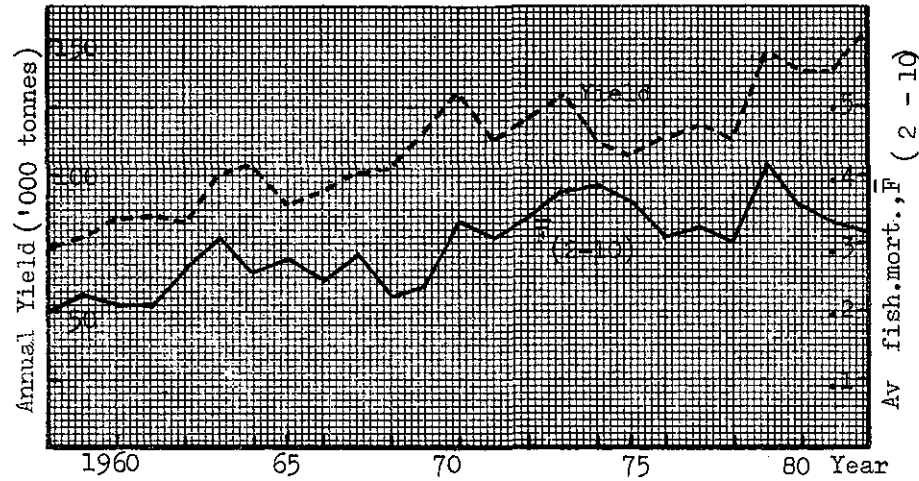


Figure D.8.2

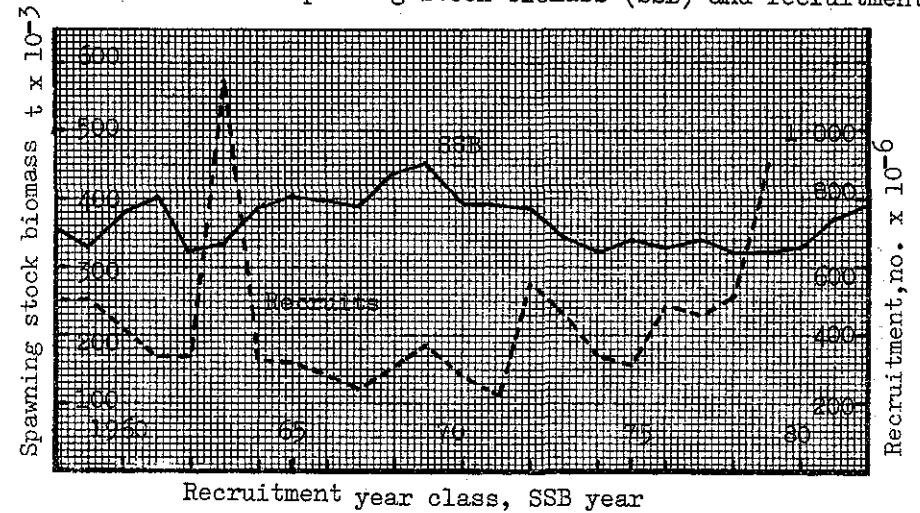
FISH STOCK SUMMARY

North Sea PLAICE
.....
(stock)

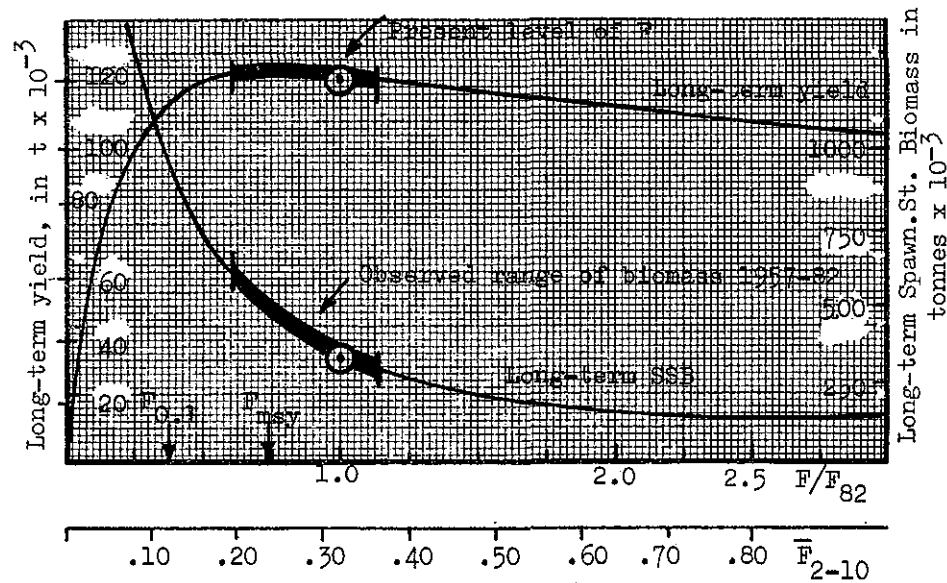
A Trends in Yield and fishing mortality (\bar{F})



B Trends in spawning stock biomass (SSB) and recruitment.



C Long-term yield and spawning stock biomass (indicate biological reference points)



D Short-term yield and spawning stock biomass (indicate biological reference points)

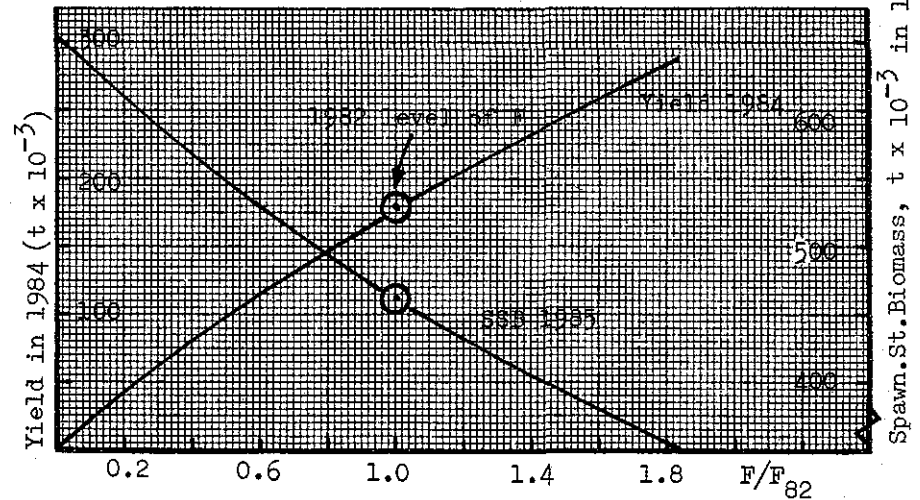
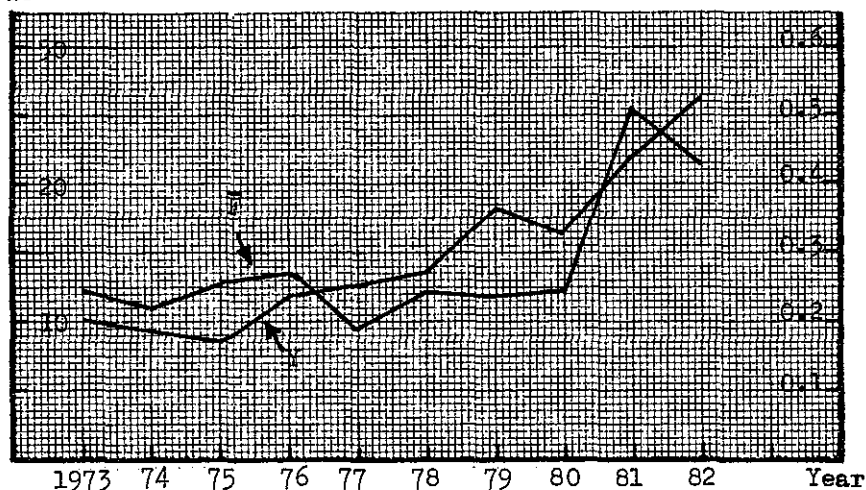


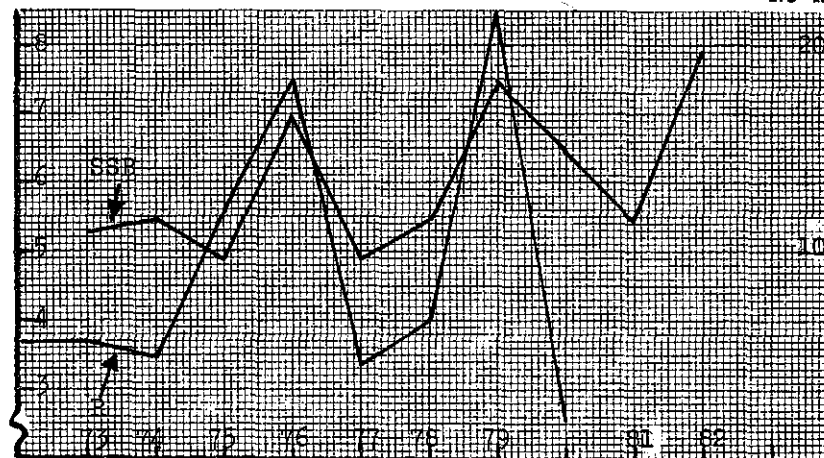
Figure D.8.3

FISH STOCK SUMMARY

(Stock) SOLE in Division VIId

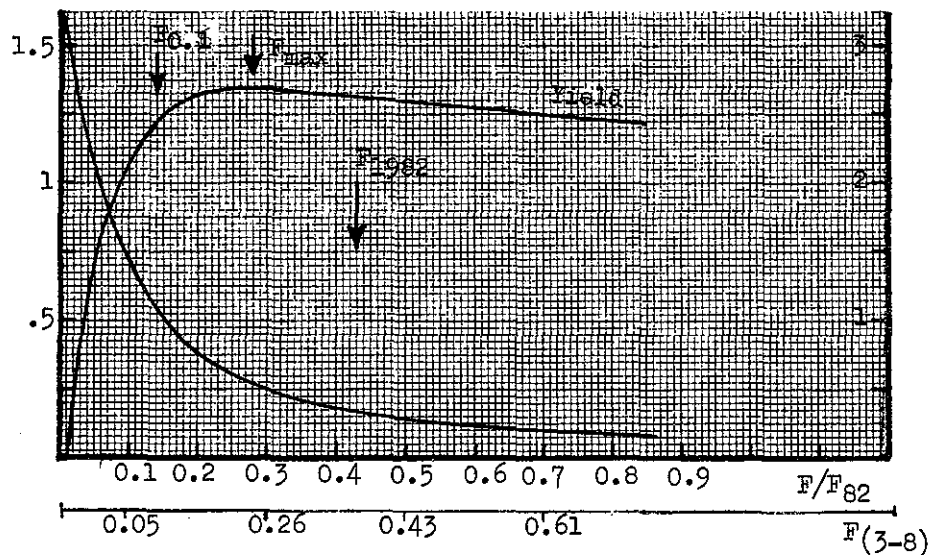
A Trends in yield and fishing mortality (\bar{F})Yield
 $t \times 10^{-2}$ $\bar{F}(3-8)$ SSB
 $t \times 10^{-3}$ 

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

R
No x 10⁻³

1973 Recruitment year class, SSB year

C Long-term yield and spawning stock biomass

Yield (indicate biological reference points)
 $t \times 10^{-2}$ SSB
 $t \times 10^{-3}$ 

D Short-term yield and spawning stock biomass

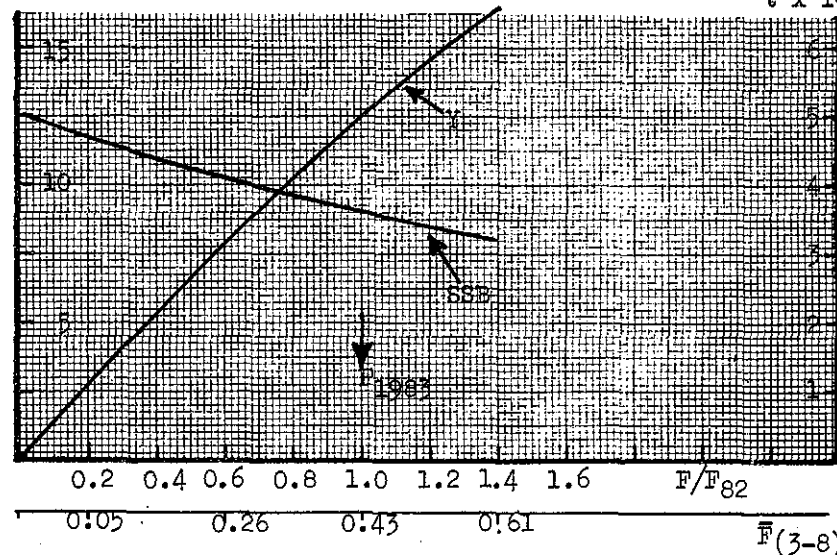
Yield in 1984 (indicate biological reference points)
 $t \times 10^{-2}$ SSB in 1985
 $t \times 10^{-3}$ 

Figure G.1.1

FISH STOCK SUMMARY

(Stock) Mackerel North Sea Stock

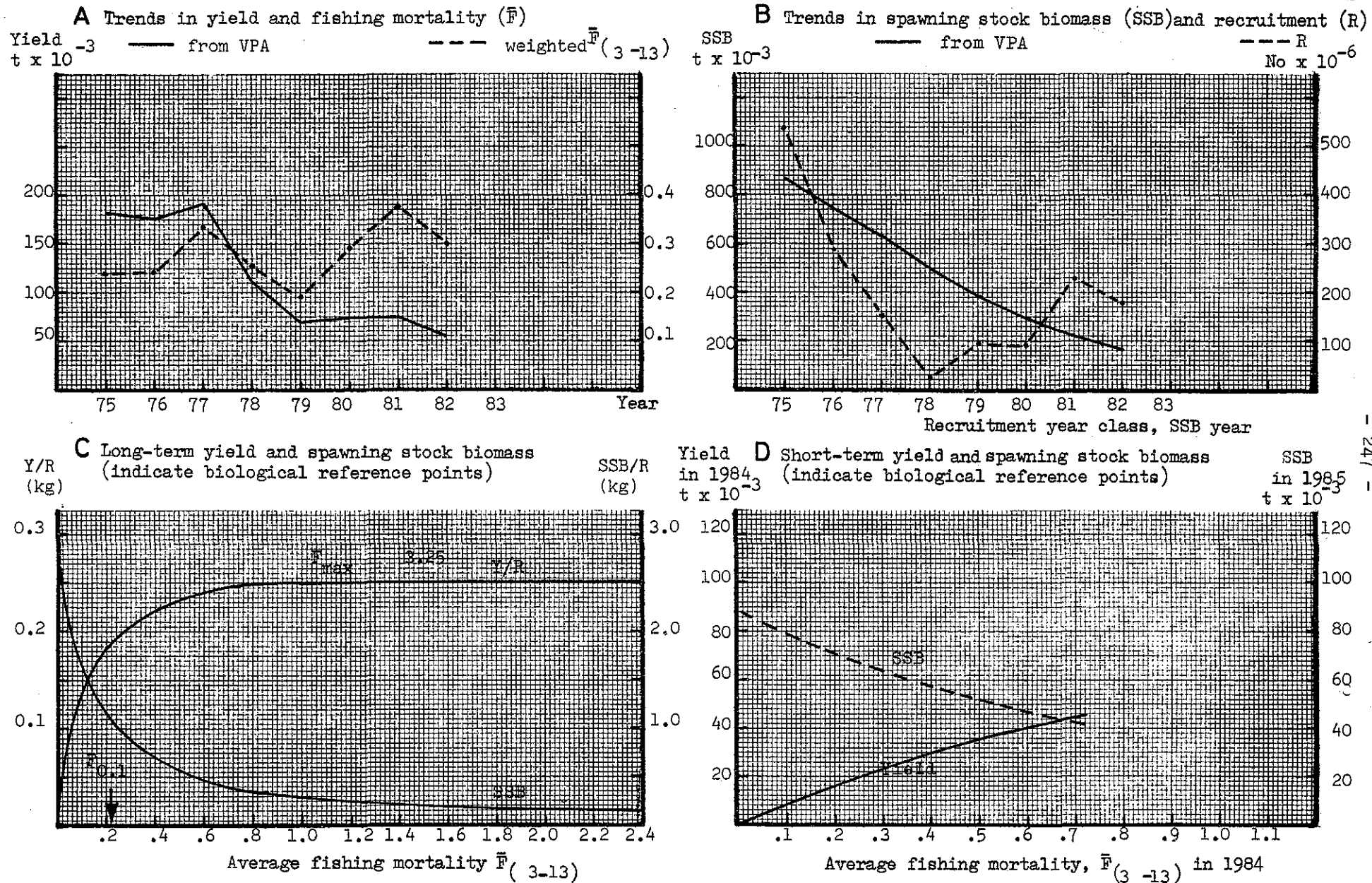
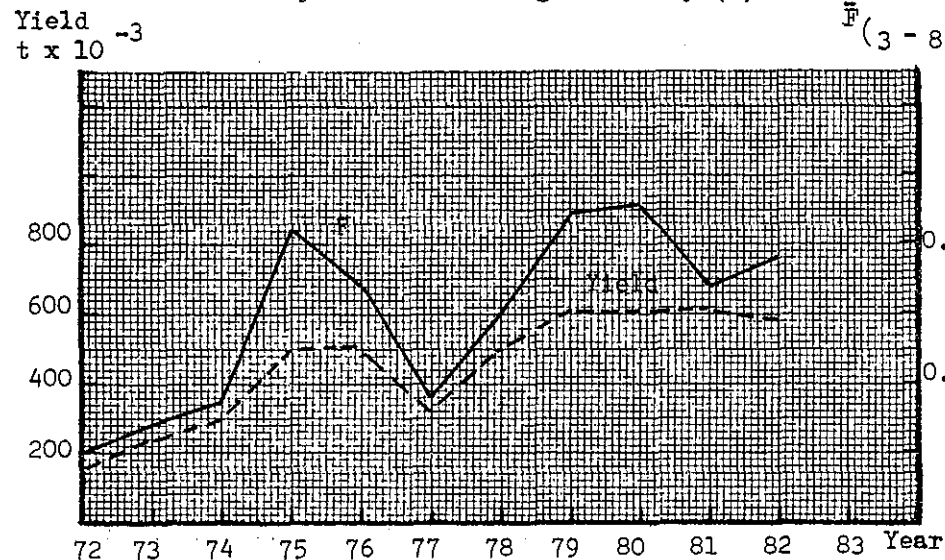


Figure G.1.2

FISH STOCK SUMMARY

(Stock) Mackerel western

A Trends in yield and fishing mortality (\bar{F})

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

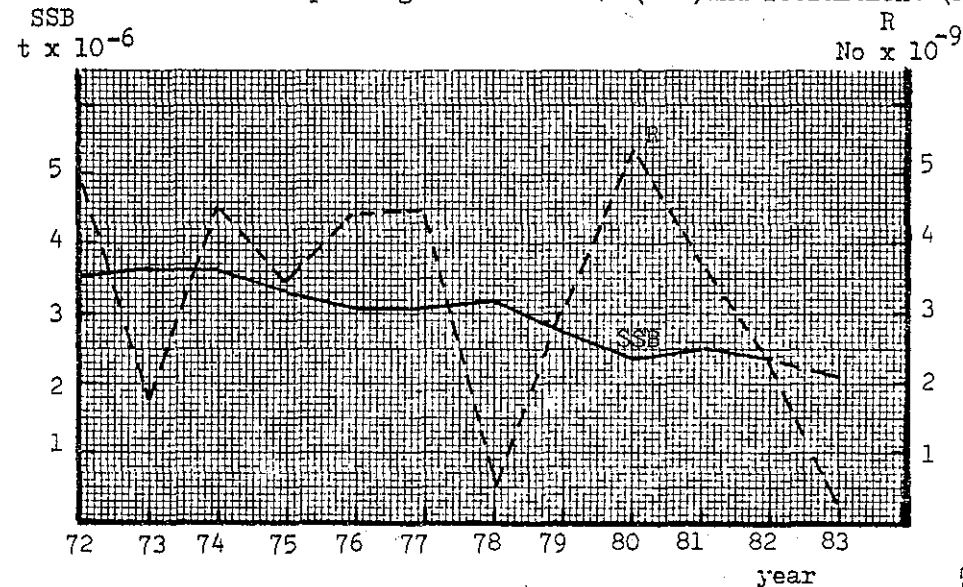
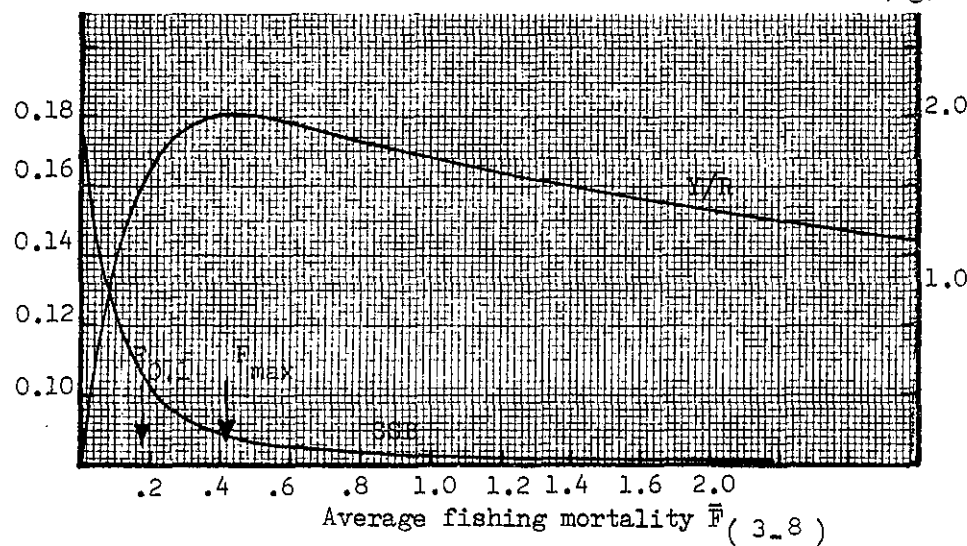
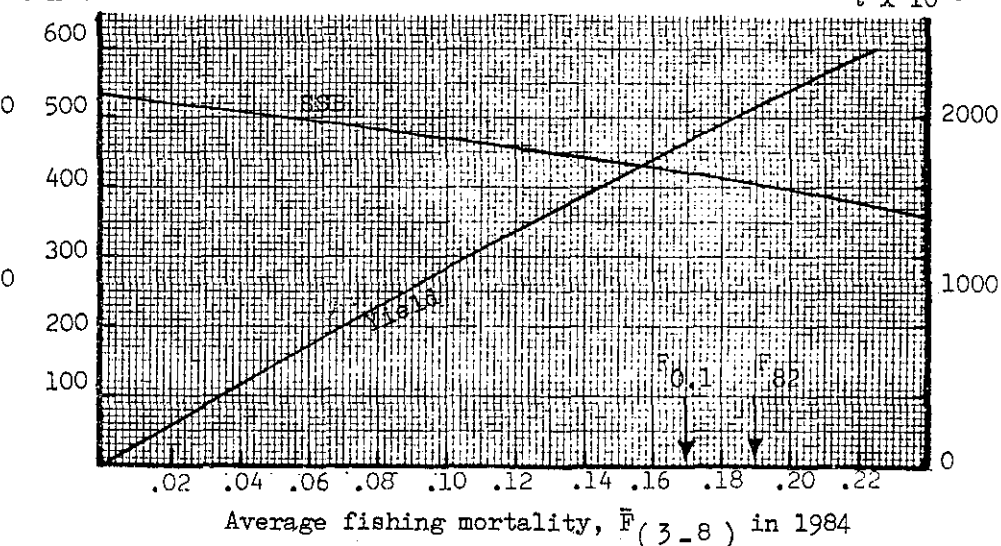
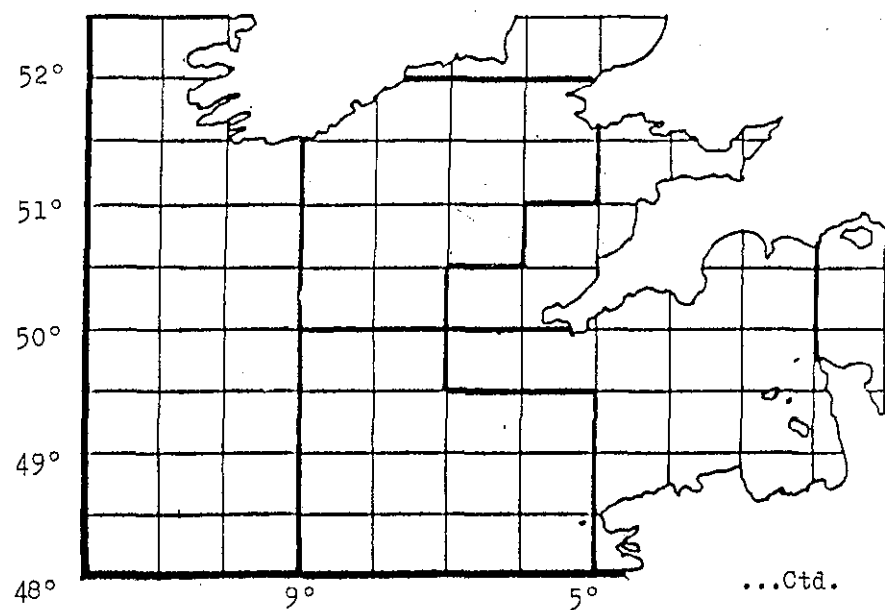
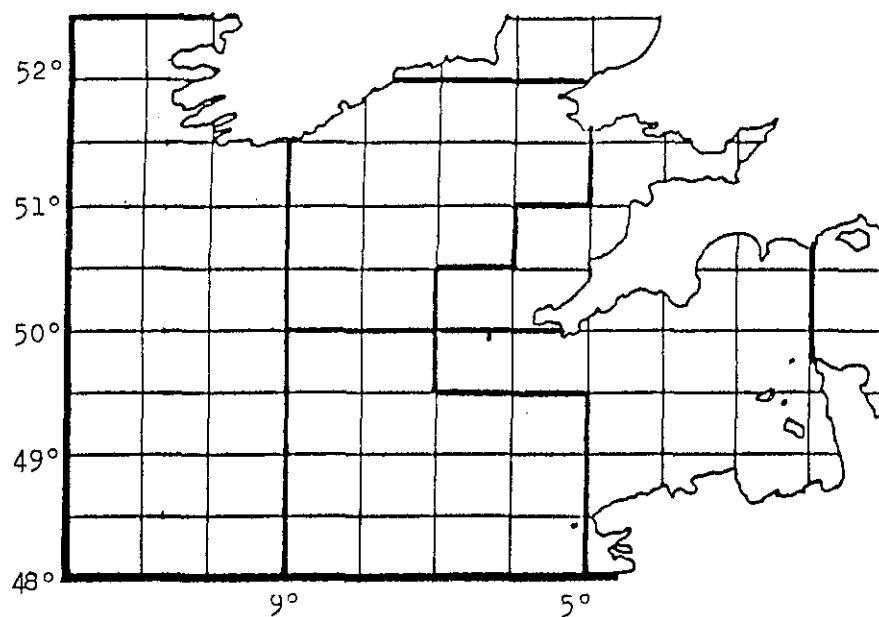
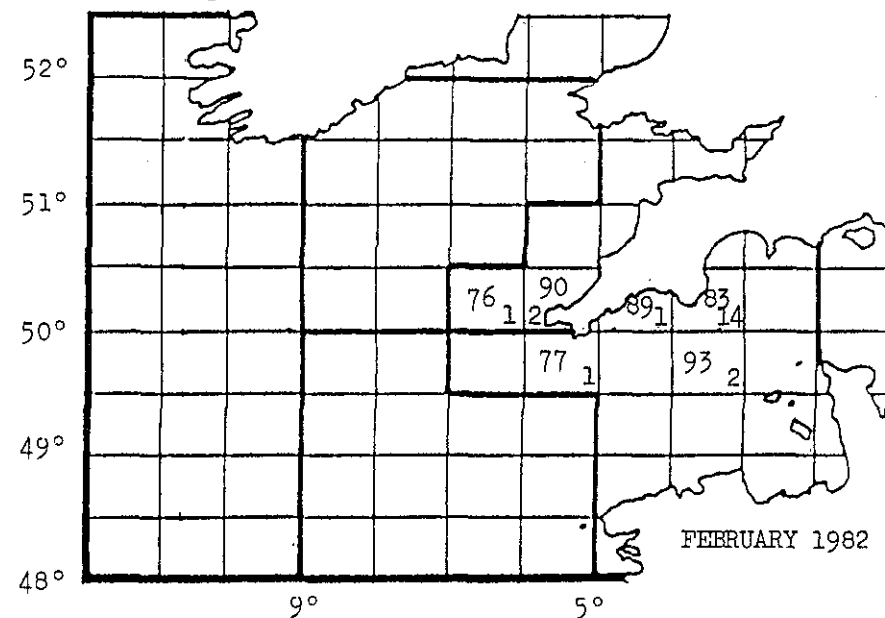
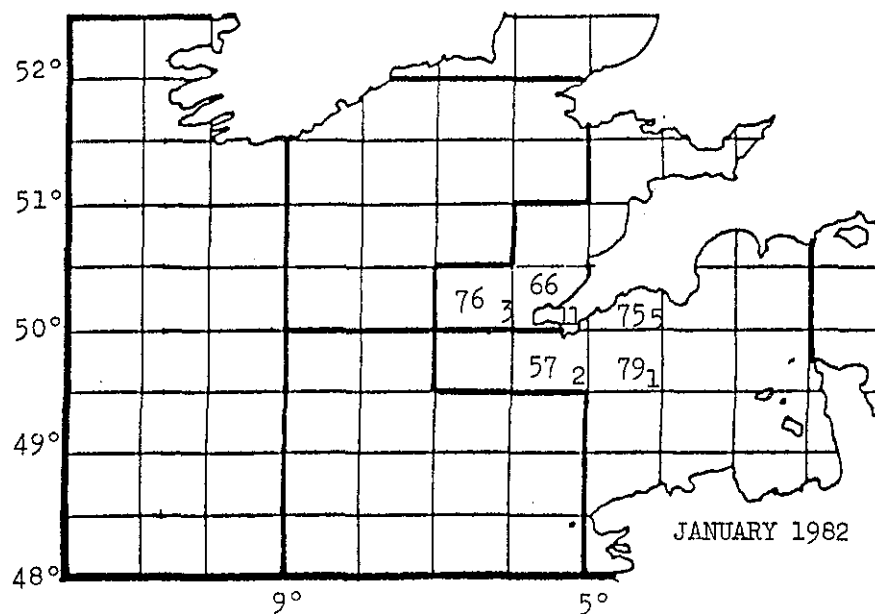
C Long-term yield and spawning stock biomass
Yield/R (indicate biological reference points)
(kg)D Short-term yield and spawning stock biomass
(indicate biological reference points)

Figure G.1.3 The percentage frequency of MACKEREL less than 30 cm total length in the Celtic Sea fisheries January 1982 -February 1982. The small digits in the corner of each statistical rectangle give the number of samples taken in the rectangle.



...Ctd.

Figure G.1.3 contd. The percentage frequency of MACKEREL less than 30 cm September 1982-December 1982.
The small digits in the corner of each statistical rectangle give the number of samples taken in the rectangle.

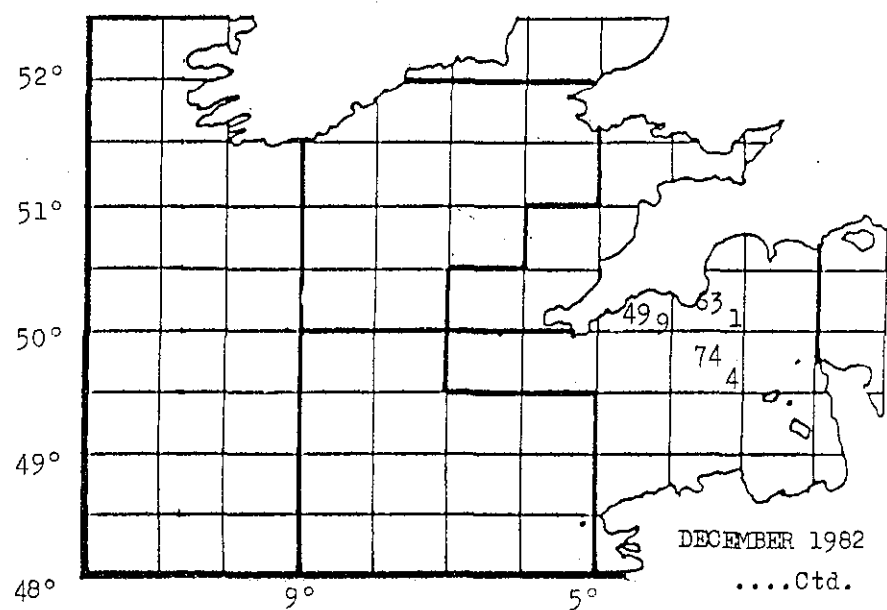
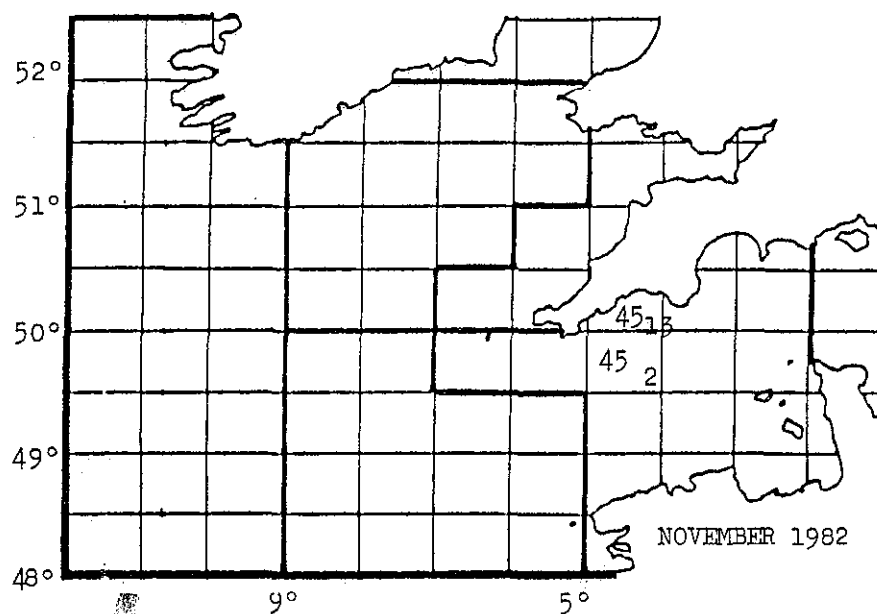
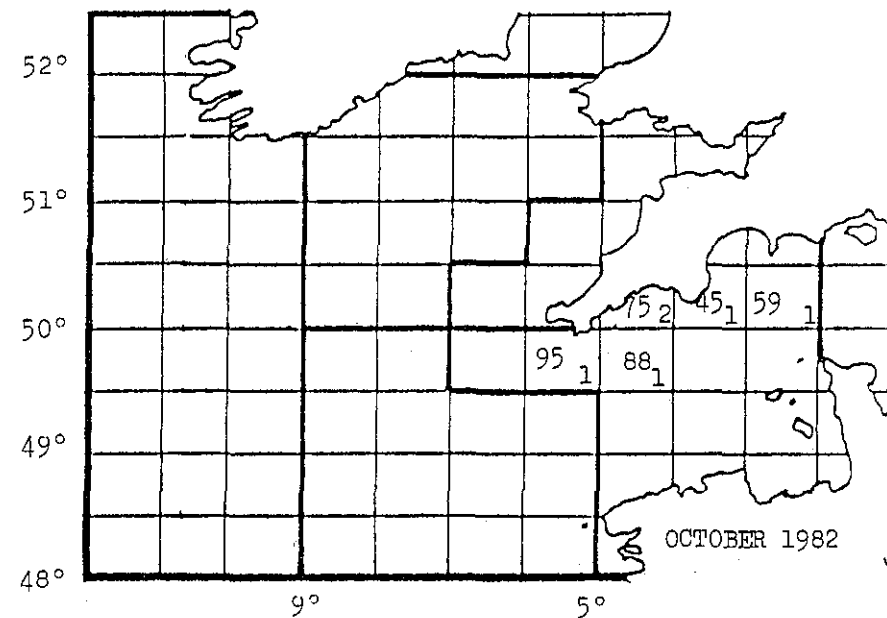
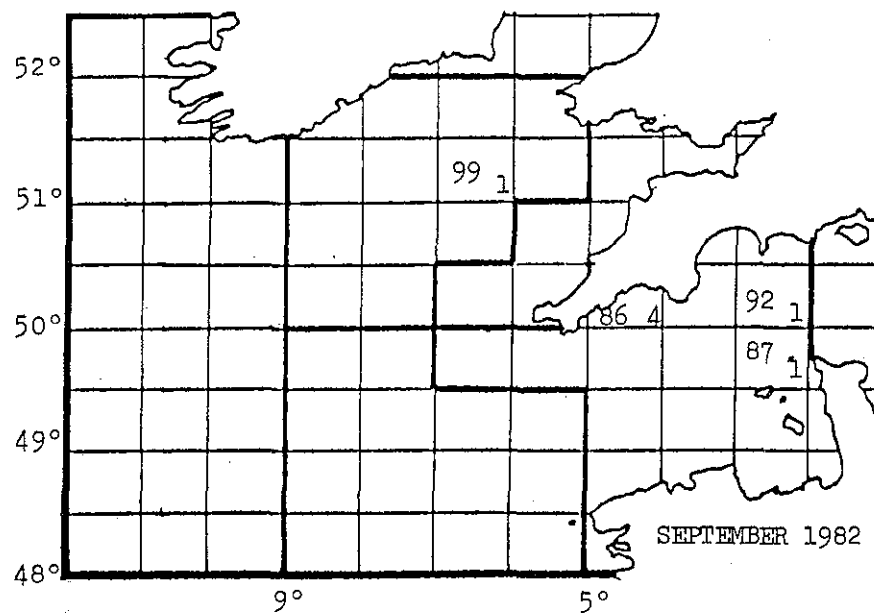
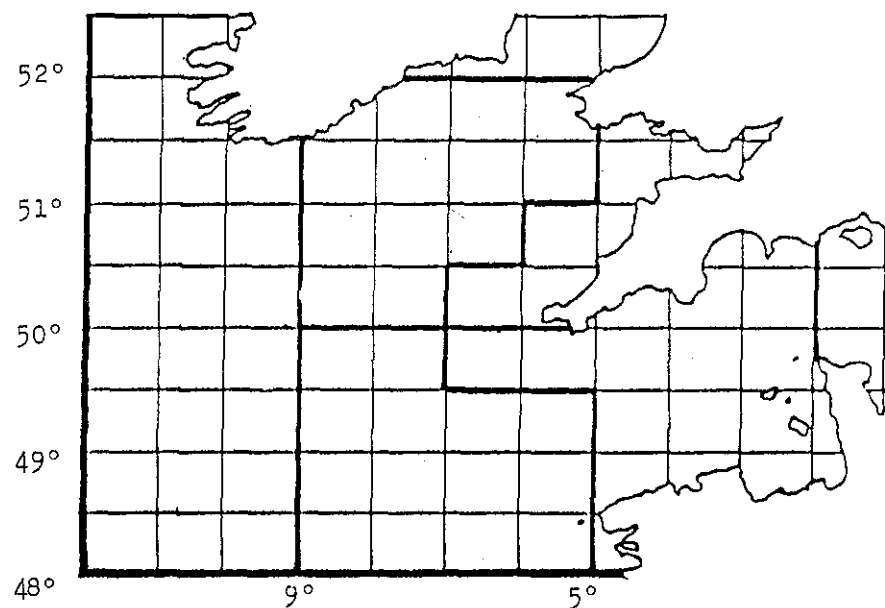
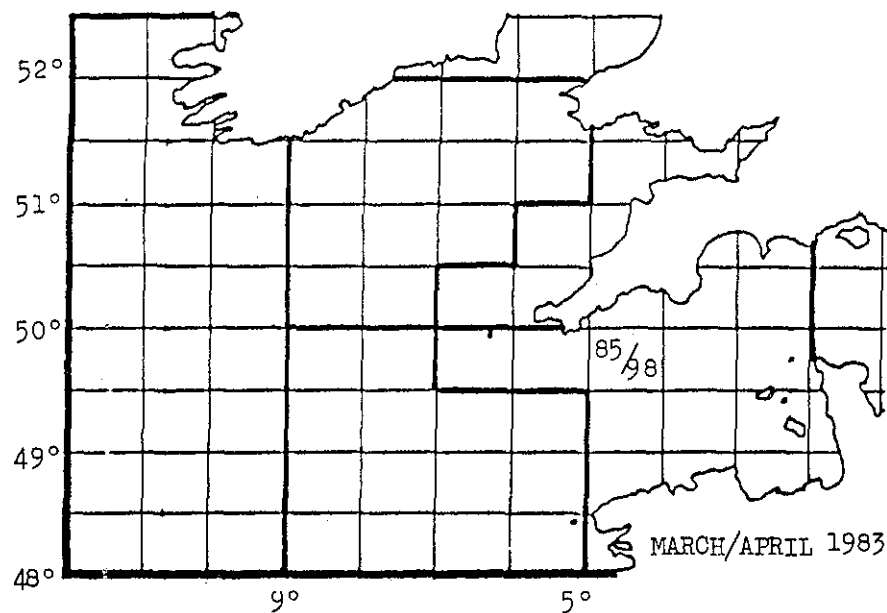
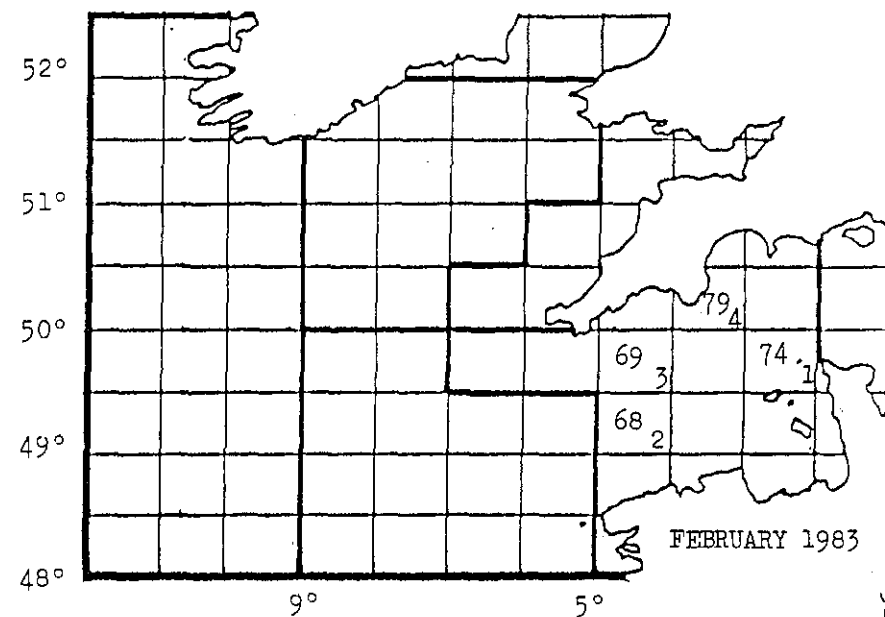
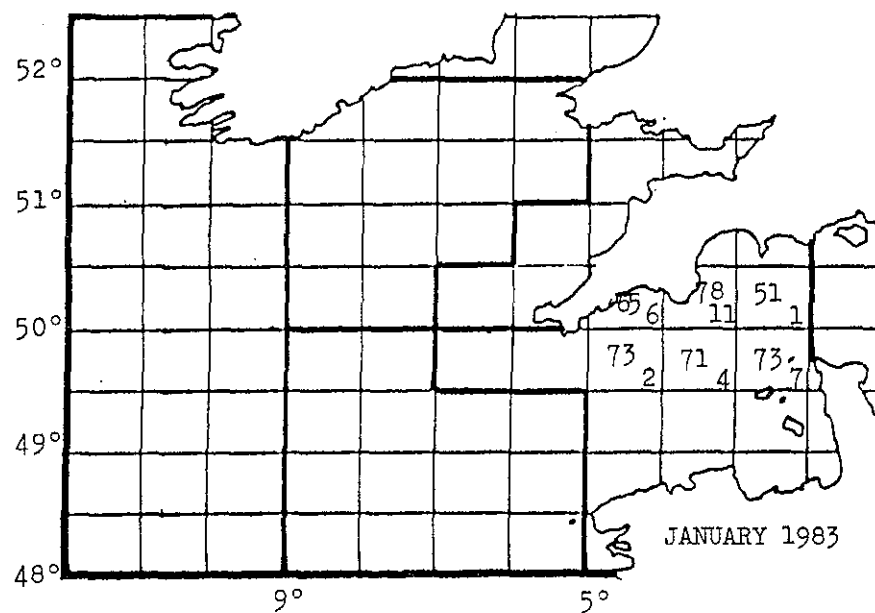
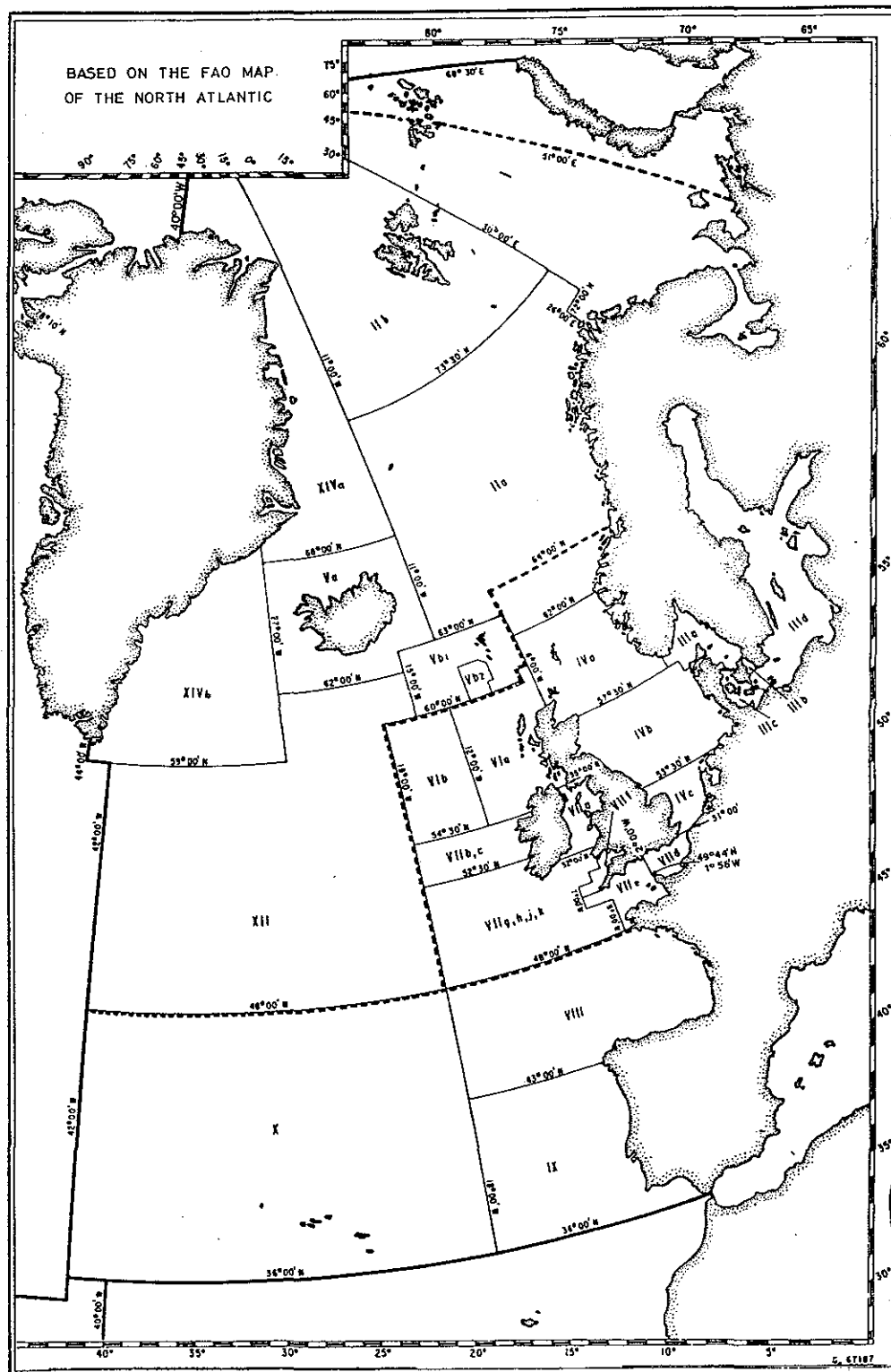


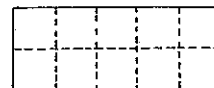
Figure G.1.3 contd. The percentage frequency of MACKEREL less than 30 cm January - April 1983.
The small digits in the corner of each statistical rectangle give the number of samples taken in the rectangle.



DECEMBER 1977

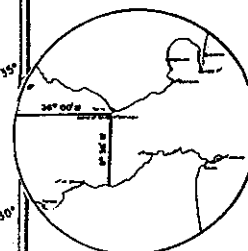
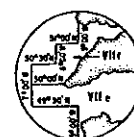
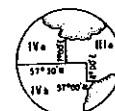
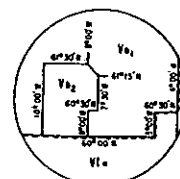


AREAL SCALE



100 000 SQUARE
NAUTICAL MILES

MEAN LINEAR SCALE



ICES FISHING AREAS

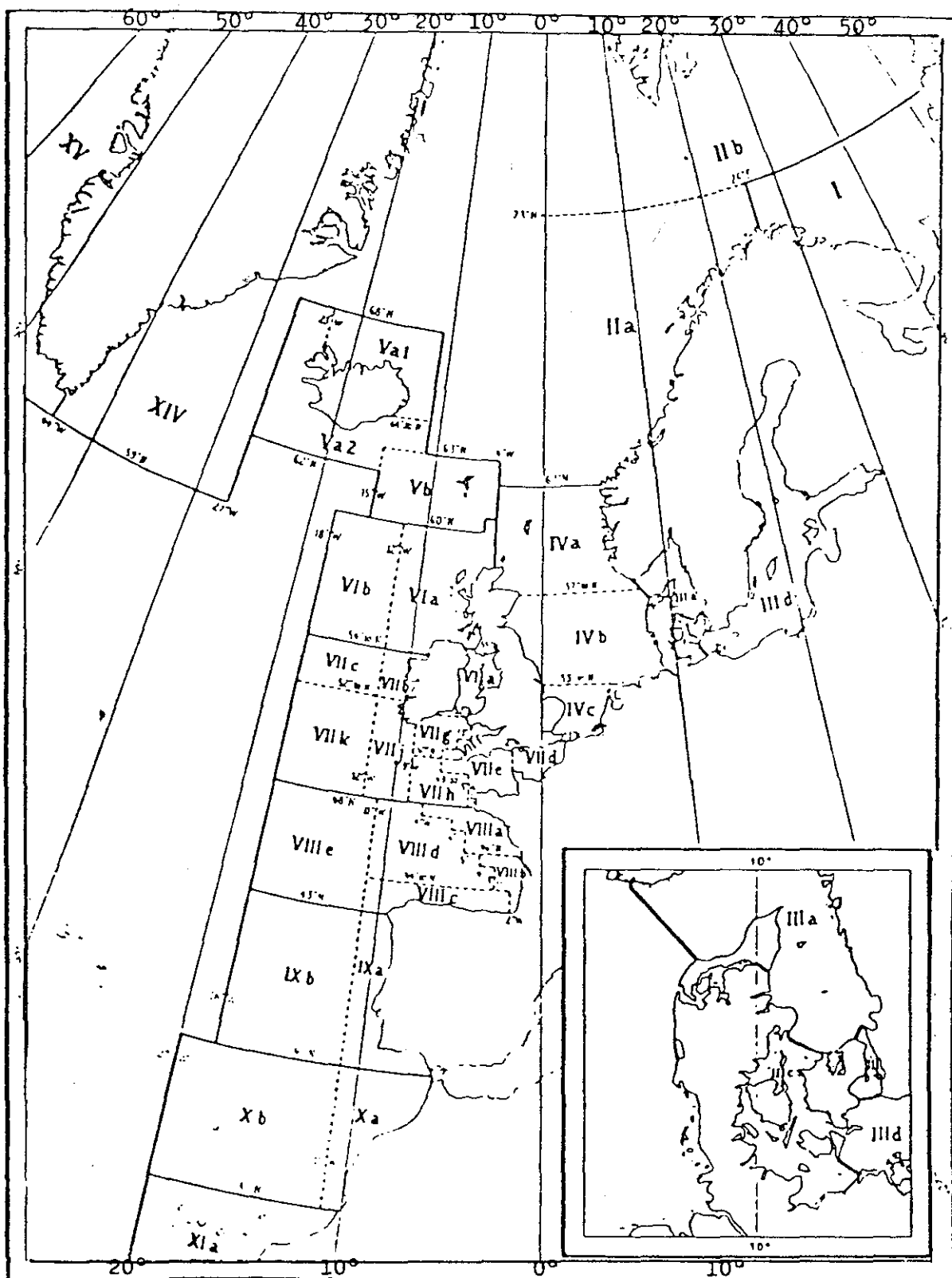


CHART OF FORMER ICES DIVISIONS

REPORT TO THE INTERNATIONAL BALTIC SEA FISHERY COMMISSION

A. REVIEW OF NOMINAL CATCHES IN THE BALTIC AREA, 1972-82

1. A general review of officially reported catches in the Baltic from 1972-81 is given in Tables A.1 - A.5. These are the catches officially reported to ICES by national statistical offices for publication in ICES "Bulletin Statistique".
2. In the assessments, the Working Groups try to estimate discards, landings which are not officially reported, and the composition of by-catches. These amounts of different species, which have to be included in the estimates of what has been taken from a given stock, if assessments are to be correct, thus appear in the tables and figures produced by the Working Groups. These estimates vary very much between different stocks and fisheries, being in some cases negligible, in others constituting important parts of the total removals from the stock. Further, the catches used by the Working Groups are broken down into Sub-divisions, where the officially reported figures are reported by the larger Divisions IIIb, c and d.
3. The trends in Tables A.1 - A.5 may not, therefore, correspond with those on which the assessments have been based, and are presented for information to managers only, without any comment from ACFM.
4. The catch data used in the assessments are given in the table section on pages 276-283.

B. THE BALTIC PELAGIC FISHERIES

Assessment of Herring and Sprat Stocks

ACFM made some use of the 1982 acoustic survey carried out in October 1982 by R/V "Argos" and R/V "Dana". The results of this survey will be fully reported to the 1983 ICES Statutory Meeting.

B.1 Herring Stocks

B.1.1 General

Data on herring landings presented to the Working Group for 1981 and 1982 include landings from mixed fisheries and exclude landings of sprat in the directed herring fisheries.

Compared with the maximum catches obtained in 1980, the landings in 1981 were about 32 000 tonnes less. However, the preliminary catch figures indicate a new increase to about 459 000 tonnes in 1982. In 1982 in most Sub-divisions the catches were higher than in previous years or remained on that level; only in the central and southeastern Baltic (Sub-divisions 26, 27 and 28) did they decrease.

Both in 1981 and 1982, the catches considerably exceeded the TACs recommended by ICES, and they were also higher than the TACs agreed by IBSFC.

Due to the low percentage of autumn-spawning herring in the stocks, its catches have been added to the spring herring and treated together with them.

Assessment of herring stocks has been carried out by the following units: Sub-divisions 22-24, Sub-divisions 25+26+27, Sub-division 28 (excluding Gulf of Riga) +29S, Gulf of Riga, the eastern parts of Sub-divisions 29N+30, the eastern part of Sub-division 31, the western part of Sub-divisions 29N+30+31, Sub-division 32. The Working Group has prepared data necessary for separate assessment of coastal herring of Sub-divisions 25 and 26, and the open sea herring of Sub-division 27 (partly caught in Sub-divisions 25 and 26).

The natural mortality coefficients (M) of herring units in 1982 were taken as being equal to the values in the previous year: in Sub-divisions 22+24 M = 0.3; in Sub-divisions 25+26+27 M = 0.2; in Sub-divisions 28 +29S (excluding Gulf of Riga) M = 0.3; in the Gulf of Riga M = 0.25; in the eastern part of Sub-divisions 29N+30 M = 0.2; in the eastern part of Sub-division 31 M = 0.15, and in Sub-division 32 M = 0.2.

For VPA maturity ogives of stocks were applied (excluding Sub-divisions 25+26+27, where a knife-edge maturity at the age of 3 years was assumed).

Recent catches¹⁾ of herring and TACs in thousand tonnes:

Year Sub divs	1977			1978			1979			1980		
	Rec. TAC	IBSFC TAC	Actual Catch	Rec. TAC	IBSFC TAC	Actual Catch	Rec. TAC	IBSFC TAC	Actual Catch	Rec. TAC	IBSFC TAC	Actual Catch
22-24			75			78	68		94	68		109 ⁴⁾
25, 26			152			142	115		168	118		145 ⁴⁾
27, 28 ³⁾ , 29S			68	290		73	65		63	61		71
Gulf of Riga			24			17	16		17	15		15
29N, 30, 31			65	74		73	78		70	73		77
32			50	33		53	44		46	40		43
Total	400	422	434	397	444	436	386	405	458	374	420.2	460

Year Sub divs	1981			1982		
	Rec. TAC	IBSFC TAC	Actual Catch	Rec. TAC	IBSFC TAC	Actual Catch ²⁾
22-24	71		100 ⁴⁾	70 ⁶⁾		112
25, 26, 27	115		165 ⁴⁾	130 ⁷⁾		176
28 ³⁾ , 29S	28		35	28 ⁷⁾		44
Gulf of Riga	15		17	12 ⁸⁾		13
29N, 30(E)	62 ⁵⁾		49	63 ⁷⁾		55
31(E)			8			9
29N, 30, 31(W)			8	8 ⁶⁾		8
32	50		45	54 ⁷⁾		44
Total	341 ⁵⁾	418.6	427	356	445.1	461

1) Working Group data.

2) Preliminary

3) Excluding Gulf of Riga

4) Danish catches in Sub-divisions 24-25 are included in Sub-div.25

5) Without the areas 29N, 30, 31(W)

6) Precautionary TAC

7) Catch level preferred by ACFM

8) Recommended TAC

B.1.2 State of the stocks and management advice

B.1.2.1 Sub-divisions 22, 23 and 24

In 1982, the total catch amounted to 112 000 tonnes. This is more than in 1972-81. The increase from 100 000 tonnes in 1981 is partly due to the fact that the Danish catches from Sub-division 24 (which have previously been combined with the catches in Sub-division 25) have been reported separately. The VPA has been calculated on the basis of the age composition of the catches in Sub-division 22 and 24. The size of the 1982 year class ($2\ 179 \times 10^6$ fish) was estimated from the Young Fish Survey made by the German Democratic Republic. The input F in 1982 for ages 0-4 was chosen to give the best fit between the VPA stock size as 0-group and the indices from the Young Fish Survey for these year classes. The average input F for ages 4-9 was assumed to be the same as that used in last year's assessment, i.e. 0.7. The 1983-84 year classes were taken at the 1977-82 average value ($3\ 417 \times 10^6$ fish).

At present, the herring spawning stock is on a high level. The very strong 1979 year class has made up an important part of the catches and is still contributing a considerable amount to the catches in 1983. This influence, however, will cease in 1984. The year classes 1980-82 are below average. The F values are far beyond the $F_{0.1}$ point on the yield curve. Taking the stock structure and the high exploitation level into account, ACFM recommends that the fishing mortality on this stock is reduced towards the $F_{0.1}$ level.

The assessment given does not include the Sound (Sub-division 23). An additional catch for this area should be included when setting the TAC for the western Baltic herring stock. The present catch level in the Sound is around 10 000 tonnes.

As is shown by the results of tagging experiments, the infestation rate by Anisakis etc., 2 year old and older herring migrate from the western Baltic in Division IIIa. Assessing the herring in Division IIIa and the western Baltic separately might involve double counting some part of the stocks. ACFM will request the Working Group on Pelagic Stocks in the Baltic and the Herring Assessment Working Group for the Area South of 62°N to examine this problem.

HERRING

Sub-divisions 22+24

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	\bar{F} (3-9)	Catch		Stock biom.	Spawning stock biomass	\bar{F} (3-9)	Catch	Stock biom.	Spawning stock biomass
329	163	0.7	101	$F_{0.1}$	306	135	0.31	41	361	162
				$\bar{F}_{84} = 0.8 \times \bar{F}_{82}$			0.56	74	322	132
				$\bar{F}_{84} = \bar{F}_{82}$			0.70	88	305	120

B.1.2.2 Sub-divisions 25, 26 and 27

The reported landings for 1982 were 176 000 tonnes, which is 7% more than in 1981. The abundance of the 1981 ($2\ 914 \times 10^6$ fish) and of the 1982 ($2\ 756 \times 10^6$ fish) year classes was calculated on the basis of the Polish young herring abundance estimates. The 1983 year class was assumed to be of long-term (1972-81) average strength ($6\ 235 \times 10^6$ fish). The input F values were re-calculated by ACFM on the basis of catch in numbers and the stock size estimates found in the acoustic survey in October 1982.

Taking into account the TAC set for 1982 by IBSFC and the traditional distribution of catches between countries and Sub-divisions, the most likely catch for 1983 was assumed to be about 176 000 tonnes (equal to the 1982 catch figure).

The acoustic survey points to a level off of the stock size during the last 3 years, and the new VPA confirms this.

As the problems with separating catches and the acoustic stock estimate into coastal and open sea stock are not fully solved at present, ACFM advises that a cautious approach should be adopted concerning this stock complex. ACFM therefore recommends a reduction of the catch level to not more than 150 000 tonnes, in 1984.

Further material is needed by the Working Group in order to be able to make the assessments on a stock basis at their next meeting.

B.1.2.3 Sub-divisions 28 and 29S

Open sea stock

Catches increased from 35 000 tonnes in 1981 to 44 000 tonnes in 1982. This was presumably due to an increased exploitation rate. Also, in connection with the decrease of abundance of the rich 1975 year class, there was an obvious shift to the exploitation of younger age groups. Therefore, in 1982 the F values were increased by roughly 20% as compared to the 1981 and 1972-80 mean values. The 1982 year class ($2\ 704 \times 10^6$ fish) was taken on the level of the medium 1972 and 1973 year classes. The 1983 and 1984 year classes were put on the long-term average level ($2\ 666 \times 10^6$ fish).

For that stock ACFM preferred the level of TAC not to exceed 32 000 tonnes in 1983. Assuming that in 1983 the distribution of the herring fishery in the Baltic Sea will be similar to the 1982 pattern (11% of herring catches of the Baltic proper and the Gulf of Finland was taken from the sea herring stock in Sub-divisions 28 and 29S), and that the IBSFC TAC of 385 900 tonnes for the Baltic Sea (without the Gulf of Bothnia) will be realised, the 1983 catch from that stock will be about 43 500 tonnes.

To take that catch in 1983, the F values will be about 93% of the corresponding values in 1982.

Owing to the year classes hatched in 1979-81, the abundance of the sea herring has increased. At present the stock is exploited above the $F_{0.1}$ level.

HERRING

Sub-divisions 28 and 29S

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	\bar{F} (4-7)	Catch		Stock biom.	Spawning stock biomass	\bar{F} (4-7)	Catch	Stock biom.	Spawning stock biomass
263	165	0.35	44	$\bar{F}_{84} = \bar{F}_{82}$ (abt. $\bar{F}_{0.1}$)	252	161	0.375	45	238	150
				$\bar{F}_{84} = 0.8 \times \bar{F}_{82}$			0.30	37	247	158
				$\bar{F}_{84} = 1.2 \times \bar{F}_{82}$			0.45	53	230	143

For all three years in which the acoustic surveys have been performed, a very different picture has been given of the biomass of this stock. ACFM used the catches for 1982, together with the 1982 acoustic stock estimate, to estimate fishing mortalities for 1982. These were used as input F s in a VPA. (Figure B.1.2.3.1.)

The traditional VPA has been based on catches, most of which are taken in the eastern half of Sub-division 28 and 29. The acoustic survey, which covers the whole area, shows that the stock is rather more abundant in the western part, at least in October (when the survey was made).

ACFM has no possibility at present to decide which of the two assessments is the most realistic, and therefore advises a precautionary TAC for 1984 of 40 000 tonnes, which is close to the catch level of recent years.

Gulf of Riga herring

The catches of the Gulf of Riga herring decreased from 16 800 tonnes in 1981 to about 12 800 tonnes in 1982. The fishing mortality in 1982 was taken to be at the 1981 level. The 1982-84 year classes were assumed to be equal to the average year class for the period of 1976-80 (964×10^6 fish). At present, the F value for the Gulf of Riga herring is far beyond the $F_{0.1}$ level and the biomass has been declining.

HERRING

Gulf of Riga

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	$\bar{F}(4-7)$	Catch		Stock biom.	Spawning stock biomass	$\bar{F}(4-7)$	Catch	Stock biom.	Spawning stock biomass
45	29	0.7	12	$\bar{F}_{84} = \bar{F}_{0.1}$	46	28	0.26	5	55	37
				$\bar{F}_{84} = \bar{F}_{max}$			1.03	15	43	25
				$\bar{F}_{84} = \bar{F}_{82}$			0.7	12	47	30

ACFM recommends that the fishing mortality is reduced as far as possible towards the $\bar{F}_{0.1}$ level.

B.1.2.4 Sub-divisions 29N and 30(East)

The catch in 1982 was about 55 000 tonnes. Catches have been at the level of 48 000 - 59 000 tonnes since 1976. An estimate of the size of the 1982 year class, based on abundance indices of numbers per size group of herring larvae and on abundance indices of larval food organisms (plankton), resulted in $4\ 010 \times 10^6$ fish, which is 80% of the average year class strength for 1973-81. The 1983 and 1984 year classes were both assumed to be of average strength ($5\ 013 \times 10^6$ fish). The fishing mortality in 1982 was assumed to be the same as in 1981. A continuation of the 1982 exploitation rate would give a catch of about 55 000 tonnes in 1983.

The spawning stock biomass appears to be fairly stable according to this assessment, and an increase in the exploitation level towards the $\bar{F}_{0.1}$ level would be justified.

HERRING

Sub-divisions 29N and 30(E)

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	$\bar{F}(3-7)$	Catch		Stock biom.	Spawning stock biomass	$\bar{F}(3-7)$	Catch	Stock biom.	Spawning stock biomass
522	363	0.15	55	$\bar{F}_{0.1}$	521	367	0.19	67	508	347
				$\bar{F}_{84} = \bar{F}_{82}$			0.15	56	520	359

ACFM therefore advises that this stock should be managed close to the $F_{0.1}$ level, which in 1984 would be the level preferred by ACFM.

The acoustic survey which was carried out in 1982 resulted in a stock estimate of about 120 000 tonnes for the whole of Sub-divisions 29N and 30. ACFM, however, considered this to be an underestimate and accepted the explanation offered that most of the herring stock was distributed in the coastal waters, skerries in the upper 10 m water layer, and was therefore not available for acoustic estimation.

B.1.2.5 Sub-division 31 (East)

In 1978-81 the catches amounted to 8 000 - 10 000 tonnes. On the basis of the abundance of larvae and their food organisms, the 1982 year class was assumed to be 518×10^6 or 80% of the average for 1973-81. The 1983 and 1984 year classes were taken as long-term average (648×10^6 fish). Due to the relatively high abundance of the 1979 year class, in 1982 the spawning stock biomass has increased. The landings and fishing mortality have been rather stable in 1978-82. However, the catch per trap-net on the spawning grounds has decreased. The stock is fished slightly above the $F_{0.1}$ level.

HERRING

Sub-division 31 (East)

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	$\bar{F}(3-7)$	Catch		Stock biom.	Spawning stock biomass	$\bar{F}(3-7)$	Catch	Stock biom.	Spawning stock biomass
72	52	0.22	10	$F_{0.1}$	72	51	0.19	9	73	50
				$\bar{F}_{84} = \bar{F}_{82}$			0.22	10	71	49
				$\bar{F}_{84} = 1.2 \times \bar{F}_{82}$			0.27	12	69	47
				$\bar{F}_{84} = 1.8 \times \bar{F}_{82}$			0.40	17	64	41

ACFM advises that a continued management of the stock close to the $F_{0.1}$ level in 1984 would be the level preferred.

B.1.2.6 Sub-divisions 29N, 30 and 31 (W)

The landings in 1982 amounted to 7 500 tonnes. In 1974-82 the catches have fluctuated between 6 500 tonnes and 9 400 tonnes.

On that stock, catch in numbers data have been presented only for 1978-82. A catch curve analysis shows that the herring is not fully recruited to the fishery until the age of about 6 years. The total mortality for age groups 6-10 was estimated to be 0.37 and the mean F 0.20 - 0.25.

The short time-series of catch at age data and the late presentation of the results of the 1982 acoustic survey precluded ACFM from undertaking an analytical assessment of the stock. In order to prevent misreporting from this area, ACFM reiterates its earlier advice and recommends a precautionary TAC of 8 000 tonnes for 1984.

B.1.2.7 Sub-division 32

In 1970-82 the fluctuation of catches shows no obvious trend and from 1979 onwards they have been practically constant. In recent years, pelagic trawls have become more important in the fishery, and this has increased the exploitation of the younger age groups.

Based on the results of Finnish and USSR investigations of larval abundance, the 1982 year class was taken to be 75% of the average year class strength over the 1970-81 period.

Since no evidence was presented to allow the 1982 level of fishing mortality to be determined, ACFM has reservations about the validity of the VPA on this stock. Taking into account the apparent change in the exploitation pattern towards the younger age groups, ACFM recommends a precautionary TAC of 40 000 tonnes, which is below the level of recent annual catches.

B.1.3 Assessment of short- and long-term effects resulting from changes in the mesh sizes in the herring fishery in the western Baltic

The assessment was carried out on the basis of trawl herring length compositions supplied by the German Democratic Republic and the Federal Republic of Germany. The method presented by Hoydal et al. (1982) was used. The effects from increasing the legal mesh size in the trawl fisheries from 32mm to 40 mm were calculated as the ratios between the expected catch and spawning stock biomass respectively, using 40 mm and 32 mm mesh, assuming unchanged exploitation level and stock composition by the end of 1982, and average recruitment thereafter. The results given in the text table below indicate that the increase in mesh size from 32 mm to 40 mm will result in a gain in yield beginning with the fourth year (the long-term gain is 7%) and a gain in spawning stock biomass beginning with the second year after the increase in mesh size (the long-term gain is 16%). Meshing was not taken into account in this analysis, but was considered to be of negligible importance in observations on German Democratic Republic commercial vessels using 40 mm legal mesh.

Year	1	2	3	4	5	6	∞
Change in yield (%)	-5	-6	-2	+3	+5	+6	+7
Change in SSB (%)	0	+2	+7	+12	+14	+15	+16

B.2 Sprat Stocks

B.2.1 General

In both 1981 and 1982 the total landings of sprat were at a level of 49 000 tonnes. Compared with 1981, the 1982 distribution of sprat catches in the Baltic Sea changed somewhat. Landings increased in Sub-divisions 23, 24, 25, 26 and 27, whereas in Sub-divisions 22, 28, 29 and 32 they decreased.

Recent catches¹⁾ of sprat and TACs in thousand tonnes:

Year Sub-divisions	1977			1978			1979		
	Rec. TAC	IBSFC TAC	Actual catch	Rec. TAC	IBSFC TAC	Actual catch	Rec. TAC	IBSFC TAC	Actual catch
22, 24, 25			36			22	34		17
26, 28			85			73	80		32
27,29-32			60			38	41		31
Total	240	275	181	210	184.3	133	155	161	80

Year Sub-divisions	1980			1981			1982			1983	
	Rec. TAC	IBSFC TAC	Actual catch	Rec. TAC	IBSFC TAC	Actual catch	Rec. TAC	IBSFC TAC	Actual catch	Rec. TAC	IBSFC TAC
22, 24, 25	17		13	15		14			14		
26, 28	46		26	31		18			24		
27, 29-32	14		20	14		17			11		
Total	77	80.5	59	60	60	49	0	47.9	49	0	47.9

1) Working Group data.

B.2.2 State of the stocks and management advice

The acoustic estimates of sprat biomass indicates that the stock is still on a very reduced level: 1980: 198 000 tonnes, 1981: 230 000 tonnes, and in 1982: 276 000 tonnes for Sub-divisions 24-29N. Until there is evidence of a more substantial increase of the stock biomass, ACFM would advise a cautious approach in the management of Baltic sprat and recommends that the catch level in 1984 is not increased above the 1981-82 level of 50 000 tonnes.

C. THE BALTIC DEMERSAL FISHERIES

C.1 Cod in Sub-divisions 22 and 24

C.1.1 Stock identity

Cod populations in Sub-divisions 22 and 24 are intermixed, as was explained by ACFM in its July 1982 report to IBSFC, and they were therefore treated as a stock unit in the assessment.

C.1.2 Recent catches¹⁾ and recommended TACs in thousand tonnes

Sub-div.	1979		1980		1981		1982	
	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch ²⁾
22	29	26	19	23	17	26	17	22
24	10	16	14	15	10	25	123)	25

1) Working Group data. 2) Preliminary. 3) Precautionary TAC (including 2 000 tonnes for Sub-div.23).

The 1982 landings of cod at 49 000 tonnes (including 2 000 tonnes in Sub-division 23) were only slightly below the 1981 level and 20 000 tonnes higher than the recommended TACs (Table C.1.3). These high landings, and particularly those taken in Sub-division 24, seem to have been influenced by immigration of cod from Sub-division 25 due to poor oxygen conditions in all deep-water layers east of Bornholm, which slightly improved only late in the year.

All countries fishing for cod in Sub-division 22 provided age composition data. No such data have been provided by Denmark, however, for catches taken in the northern part of the Sub-division and neither by Denmark nor Sweden for catches taken in Sub-division 24.

Investigation of discarding practices continued in 1982. Estimates were derived for Denmark by a sampling procedure and for the Federal Republic of Germany from logbook entries and samples. The estimated quantities of cod discarded in Sub-division 22 are given in Table C.1.4. However, in view of doubts about the accuracy of these data, as explained in the July 1982 ACFM report to IBSFC, and the very short relevant time-series (of source data), it was concluded that any current assessments of the Baltic cod stocks should be based on human consumption landings alone, not including the discard figures, as was previously the case. The findings on discarding practices, nevertheless, have been useful for the mesh assessments, referred to in Section C.3.

C.1.3 The 1983 assessment

Effort and cpue data were available from the German Democratic Republic and Sweden, accounting for about 40% of the landings. According to the data, the average effort seems to have increased by about 20% with a nearly constant catch per hour. However, as the effort in the fleets of Denmark and the Federal Republic of Germany in Sub-division 22 seems to have been reduced, the Working Group assumed that the total effort was unchanged compared to 1981.

Recruitment estimates for 0-group cod in Sub-division 22 were provided by the German Democratic Republic and the Federal Republic of Germany. The German Democratic Republic recruitment estimates for 1-group cod in Sub-division 24 were also available. All indices indicated the 1979 year class to be strong. 0-group indices indicated the 1978 year class to be poor, and the 1981 year class only marginally more abundant, whereas the 1980 year class appeared to be an abundant one.

The Working Group tried a VPA based on the above assumptions. However, because of some inconsistencies in the VPA and the lack of information on the methods by which the strength of incoming year classes was derived, ACFM considered that the results of the analytical assessment of this cod stock were inconclusive.

C.1.4 Management advice

Since there is evidence that the stock is exploited far above the levels indicated by the biological reference points, ACFM recommends that fishing mortality on this stock ought to be reduced.

ACFM also feels obliged to draw attention to the unsatisfactory current exploitation pattern with higher mortality levels on the younger age groups and to indicate that in order to improve the state of the stock the fishing mortality levels on the younger age groups should be brought down. As has been stated in previous reports to the Commission, one of the ways to achieve this objective would be to increase the minimum mesh size in the cod fisheries in the Baltic. The short- and long-term effects resulting from increasing minimum mesh size are illustrated in Section C.3.

C.2 Cod in Sub-divisions 25-32

C.2.1 Recent catches¹⁾ and recommended TACs in thousand tonnes

Sub-div.	1979		1980		1981		1982	
	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch ²⁾
25-32	136	224	179	346	170	329		315

1) Working Group data.

2) Preliminary.

The total landings from Sub-divisions 25-32 (Table C.2.1 and Figure C.2.1) decreased by 4% from 328 877 tonnes in 1981 to 314 896 tonnes in 1982. This decrease was mainly due to a marked drop in the Polish landings in Sub-divisions 25 and 26 in 1982 compared to 1981.

The landings of Denmark, the Federal Republic of Germany and Finland increased by 11%, 97% and 15%, respectively, while the landings of Sweden, USSR and the German Democratic Republic were at about the same level as in 1981.

Data on discards in 1982 were presented by Denmark (bottom trawl: January 120.6% and May 16.2% of landings, pelagic trawl: January 2.6% and March 0.5% of landings) and by the Federal Republic of Germany (annual 0.7%).

In January the Danish discards were dominated by the 1980 year class (72%), in May by the 1979 year class (66%). In the pelagic trawl catches the 1979 year class was dominant (61%).

C.2.2 The 1983 assessment

Cpue data for recent years, including 1982, were submitted by the Federal Republic of Germany, the German Democratic Republic, Sweden and the USSR. Finland and Poland presented effort index and cpue figures up to 1981. Catch per unit effort data were used to calculate national effort corresponding to total landings per year. Furthermore, the ratio of effort in 1982 to that in 1981 was calculated. The Finnish, Danish and Polish members estimated the increased effort of 1982 to 1981 to be in the order of 1.1, 1.2, and 0.93 for the respective fleets.

All nations except Poland and the German Democratic Republic experienced an increase in effort (representing 70% in 1982 and 62% in 1981 of the total landings). The mean ratio increase of effort 1982/81 weighted by fleet landings in 1982 was estimated to be 1.18.

Data on recruitment were obtained from trawl surveys by Denmark, Poland and USSR. Relative abundance of year classes recruiting to the fishery, according to samples taken from by-catches in herring trawls, was submitted by Finland.

The Danish survey carried out in March 1983 showed that year class 1980 was dominant in Sub-divisions 25, 26, 28 and 29S, being particularly strong in Sub-divisions 29S, 28 and 25. The 1981 year class was found to be poor. A Polish Young Fish Survey in January 1983 in the Gdańsk Bay (Sub-division 26) yielded similar results, but Soviet surveys in Sub-division 28 showed the 1981 year class to be well above average, and indicated the 1982 year class to be poor. The Finnish data indicated the 1980 year class to be strong and the 1981 year class to be poor.

On the basis of a regression of the USSR recruitment indices (average numbers of 1- and 2-groups from a year class) against numbers of 2-groups from VPA for the 1968-79 year classes, the following year class strengths were predicted:

1980 year class 634×10^6 at age 2

1981 year class 589×10^6 at age 2.

Average number of 2-groups from VPA for the 1968-79 year classes was 502×10^6 fish.

For VPA, therefore, F on 1-group fish was calibrated to produce 589×10^6 2-group fish in 1983, and F on 2-group fish was calibrated to produce a stock number of 634×10^6 in 1982. Fishing mortalities on ages 3-9 in 1982 were calibrated to produce an $\bar{F}_{82}/\bar{F}_{81}$ ratio about 1.18, corresponding to the effort ratio estimated.

Projections of catches in 1984, total biomass and the spawning stock biomass for 1984 and 1985 were calculated on the assumption that fishing mortality in 1983 will remain at the 1982 level and the exploitation pattern will not be changed.

C.2.3 Management advice

COD

Sub-divisions 25-32

1983				Management option for 1984	1984				1985	
Stock biom.	Spawning stock biomass	\bar{F} (4-9)	Catch		Stock biom.	Spawning stock biomass	\bar{F} (4-9)	Catch	Stock biom.	Spawning stock biomass
907	642	0.92	283	$\bar{F}_{0.1}$	848	615	0.217	83	1019	786
				F_{max}			0.47	164	921	688
				$0.9 \times \bar{F}_{82}$			0.83	255	811	579
				$\bar{F}_{84} = \bar{F}_{83} = \bar{F}_{82}$			0.92	274	788	555

Under no option is the spawning stock biomass expected to be reduced below 400 000 tonnes, which was regarded by ACFM as a safe level in its 1981 report. If, however, assumptions used in the analytical assessment about the strength of the 1980-82 year classes proved to be overoptimistic and all these year classes turned out to be actually poor, that level of spawning stock biomass could have been reached at the beginning of 1985 at the current fishing mortality level. Furthermore, in recent years the stock was fished at levels largely in excess of those indicated by biological reference points and this would normally call for a recommendation on an option based on the reference points of the yield per recruit curve.

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

C.3 Changes in Minimum Mesh Size

Effects of an increase in a minimum mesh size in the cod fisheries in the Baltic were assessed by the method developed by Hoydal et al., which has been successfully employed by ICES for similar assessments for other stocks and areas. The assessment involves two steps: 1) estimation of effective mesh sizes for each of the fleets exploiting the stock, and 2) estimation of effects of an increase in these effective mesh sizes.

Assessments for Sub-division 22 (applicable also to Sub-division 24) were carried out on the basis of the average length composition of the trawl catches for 1977-82 of Denmark, the Federal Republic of Germany and the German Democratic Republic. Since the estimated effective mesh sizes ranged from 90 mm to 97 mm, effects of an increase in these sizes to 100 mm, 110 mm and 120 mm were estimated. Effective mesh sizes estimated for Sub-divisions 25-32 on the basis of length composition data on the catches by trawlers of Denmark, the Federal Republic of Germany, Poland and USSR ranged from 100-105 mm. For these Sub-divisions, therefore, the effects of an increase in the effective mesh sizes were calculated for the values of 110 mm and 120 mm only. Reported data on national discarding practices were used in these assessments, but because these were incomplete, certain assumptions had to be made as well.

Summarized results of these assessments are given in the text table below.

Long-term changes from an increase to:	Sub-division 22		Sub-divisions 25-32	
	Landings	Discards	Landings	Discards
100 mm	+9%	-24%	-	-
110 mm	+21%	-50%	+8%	-21%
120 mm	+31%	-78%	+18%	-54%
Short-term changes ¹⁾ from an increase to:				
100 mm	-2%	-17%	-	-
110 mm	-8%	-41%	-15%	-48%
120 mm	-14%	-50%	-30%	-67%

¹⁾ The first year after a change

The results of the assessment indicate that although all fleets are estimated to experience short-term losses in landings the first year after the introduction of an increase in minimum mesh sizes, the long-term gains will be substantial. There is another advantage in the minimum mesh increase, i.e., that any mesh increase is estimated to greatly reduce the number of discarded cod. The numbers entered into the 'discards' columns in the above text table indicate the estimated reduction in the weight of discarded catches for the given range of mesh increases in comparison with the situation, when trawling for cod is carried out by gear with unchanged minimum mesh sizes. Since discards are made up of small-sized cod of the younger age groups, any mesh increase will contribute to reducing the fishing mortality on these young age groups, thus improving the current exploitation pattern and the state of the stocks.

D. BALTIC SALMON STOCKS

D.1 Sub-divisions 24-31

Catches are reported in tonnes as follows:

<u>Year</u>	<u>Tonnes</u>
1971	1 920
1972	2 024
1973	2 466
1974	2 817
1975	2 931
1976	2 966
1977	2 561
1978	1 965
1979	2 067
1980	2 437
1981	2 578
1982 ^{x)}	2 118

x) Preliminary

The decrease in 1982 is mainly caused by the decrease of the Danish catch in the Main Basin (838 tonnes in 1981, 583 tonnes in 1982), and the decrease of the Swedish catch in the Gulf of Bothnia (268 tonnes in 1981, 136 tonnes in 1982). While the Danish cpue increased in the fishing season 1981/82, the decreased catch was mainly caused by decreased effort.

The recruitment in 1982 was 4 215 000 artificial smolt units (a.s.u.). Hatchery-reared fish have been released as follows (1 000 a.s.u.):

1979	2 720
1980	2 930
1981	2 667
1982	2 957
1983 ^{x)}	2 988

x) Estimated

Wild production from 25-30 rivers in 1983 is estimated to be about 600 000 smolts (1.2 million a.s.u.). Investigations carried out in 9 rivers in 1982 revealed a decrease of parr densities in 6 rivers compared to 1981, and an increase in 2 rivers. In River Mørrum, the parr densities were at the same level as in 1981.

Fishing for breeding fish in Swedish rivers shows no clear trend in recent years. In Rivers Lule, Indal and Dalälven, the catch of females has increased. In Rivers Ume, Skellefte and Ångermanälven a decrease has taken place.

D.1.1 State of the stocks and management advice

ACFM's reference point for stocks in Sub-divisions 24-31 is to secure maximal wild production. In the 1980 report of ACFM, the desired escapement (i.e., the level of survival from smolt to spawners) for these stocks was calculated to be 2.4%. This estimate is based on an evaluation of the River Torne, which has the highest total wild production and the lowest recorded production per spawner of all rivers left for salmon spawning. When managing a stock complex like this as one unit, the least productive river sets the target of desired escapements, as the major part of the fishing is non-discriminating between the stocks. Although maximal production in some single rivers may be reached at an early stage, the figure of 2.4% is still accepted by ACFM as being the only estimate available of the necessary escapement for filling the available spawning sites.

The biological justification for this objective is to maximize the genetic variability in the wild stock. An escapement of 2.4% in 1984 would be achieved by restricting the catch in Sub-divisions 24-31 to 353 400 salmon, equal to 1 550 tonnes.

A catch of 2 450 tonnes in 1984, which is about the level of recent annual yield, will give an escapement of only 1%. Although the calculations indicate that catches of about 2 450 tonnes could be maintained in the long term at this level of escapement and present stocking levels, the biological objective outlined above would not be achieved and the genetic variability of the stock may become impaired.

Catch options and corresponding escapement percentages are given in the text table below.

Yield 1984 (tonnes)	Escapement 1985 (%)	Long-term yield (tonnes)	Long-term escapements (%)
1 544	2.5	2 006	3.1
1 940	2.0	2 389	2.3
2 329	1.3	2 444	1.4
2 450	1.0	2 450	1.0

If the management objective is to maximize genetic variability, then ACFM recommends that catches be reduced in order to increase the present escapement.

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

The salmon stock in the Gulf of Finland is well separated from the stocks in the Gulf of Bothnia and the Main Basin (Sub-divisions 24-31), and is, therefore, assessed as a separate stock unit.

The reported landings from Sub-division 32 are given below (in tonnes):

<u>Year</u>	<u>Tonnes</u>
1975	74
1976	95
1977	88
1978	75
1979	70
1980	69
1981	73
1982x)	65

x) Preliminary

There is very little natural production in the Gulf of Finland and the catch is almost entirely dependent on artificial stocking. Hatchery-reared fish have been released as follows (1 000 a.s.u.):

1978	203
1979	241
1980	150
1981	212
1982	265
1983 ^x)	350

x) Estimated

As stated in last year's report, if the stocking is kept above 270 000 a.s.u., a catch of 135 tonnes may be taken with the present exploitation level (escapement about 1%), without endangering the stock.

D.3 Additional Data and Sampling Programmes Necessary to Increase the Accuracy of the Assessments

- cpue data should be collected and prepared uniformly to enable comparison of the national sets of data.
- results from electro-fishing rivers with natural salmon and sea trout reproductions should be collected for a number of years to enable more precise estimates of natural smolt production.
- the sampling of scales from salmon in the catches from the whole Baltic area should continue in order to increase the knowledge about the proportions of wild/hatchery-reared salmon and possible differences in their behaviour.
- data on A.0+ salmon from (for example) taggings and catch statistics (discards) should be collected to increase knowledge about their behaviour and growth. This would increase the possibility of giving advice on how to minimize the discards.
- the abundance of sea trout and rainbow trout in the salmon catches should be investigated.
- the possible difference in efficiency between monofilament and multifilament nets and their proportional use in the salmon fishery should be investigated, since the new multifilament nets are claimed to be much more efficient and this would affect the cpue data.
- the effect of using different lengths of gangings in the long-line fishery on the size of salmon caught and on the by-catches of cod should be investigated.

D.4 The Effect of a Change of the Hooks with a Gap of 19 mm to Hooks with a Gap of 16 mm

The experiments made with hooks having gaps of 13.5 mm, 15 mm and 19 mm did not show statistically significant differences as to selectivity of the hooked salmon below the minimum size, about 45% were already dead when hauled onboard, probably regardless of the hook size in question. The annual total number of undersized salmon in the long-line fishery in 1974-78 is estimated to have been 9 000 individuals, and in 1979-81 about 13 000 (2.4%).

No information is available on the dependence of the size of salmon hooks on by-catches of cod. Information on catchability of cod hooks in relation to hook size cannot be expected to be relevant in this connection since the hooks in salmon and cod long-lining are operated differently. Statistical data on the abundance of cod as by-catches in the salmon long-line fishery have not been available.

D.5 The Origin of Salmon (Wild or Reared) in the Catches

Samples from Sub-divisions 29-32 indicate that the proportions of salmon of wild origin in the offshore fishery was below 20%. In the Finnish coastal fishery 66% (Sub-division 31) and 40% (Sub-division 30) were of wild origin. On the Swedish side of Sub-division 30 only 16% were of wild origin. This may be explained by higher numbers of reared smolts released on the Swedish side. Also in the Gulf of Finland, where stocks are mainly based on rearing, the proportion of wild salmon in the Finnish coastal catches was higher than offshore. On the Finnish side of the Gulf of Finland there is no natural smolt production. Spawning migration routes to the USSR spawning sites thus seem to follow the Finnish side of the Gulf.

Feeding fish are a mixture of all stocks, both wild and reared. The data presented, however, do not cover the entire Baltic. No assessment could thus be presented on the basis of proportions of salmon of wild and reared origin.

D.6 The Distribution of the Baltic Salmon Stocks and Fishing Effort between and within National Fishing Zones

The distribution cannot be evaluated due to lack of information. Cpue data should be collected and prepared uniformly to enable comparison of the national sets of data.

F. ESTIMATION OF DISTRIBUTION OF STOCKS AND THE DISTRIBUTION OF FISHING EFFORT WITHIN AND BETWEEN THE FISHING ZONES OF THE MEMBER COUNTRIES

The data presented to the Working Groups are not sufficient for detailed analysis of distribution of stocks and fishing effort in the Baltic. Sporadic data from 1980-82 show that only a few areas are reasonably covered as to Sub-division and country. The material presented shows large differences between the areas in trawling effort and catch per trap-net. For a proper analysis, detailed data for all fisheries should be presented to the Working Group.

G. DEFICIENCIES IN THE DATA REQUIRED FOR ASSESSMENTS

- (i) Effort and catch per unit effort data should be presented for all fisheries.
- (ii) Better data for the evaluation of recruitment abundance in the herring and sprat assessment units should be presented to the Working Group.

Reference

Hoydal, K, Rørvik C J and P Sparre. Estimation of effective mesh sizes and their utilisation in assessment. Dana, Vol.2, 1982.

Table A.1. Nominal fish catches in the Baltic from 1972-81 (in '000 tonnes).
(Data as officially reported to ICES.)

Species	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Cod	186	189	189	234	255	213	196	273	392	383
Herring	345	404	407	415	393	413	420	459	465	432
Sprat	207	213	242	201	195	211	132	78	58	47
Flatfishes	20	18	21	24	19	22	23	24	19	17
Salmon	2.2	2.7	2.9	2.9	3.1	2.4	2.0	2.3	2.5	2.4
Freshwater species	20	23	21	20	21	22	22	20	21	19
Others	47	55	54	60	46	42	44	47	29	31
Total	827	905	937	957	932	925	839	903	987	931

Footnote: Anadromous species, except salmon, not included.

Table A.2. Nominal catch (tonnes) of HERRING in Divisions IIIb,c,d, 1963-81.
(Data as officially reported to ICES.)

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	29 350	87 240	59 187	9 873	68 614	92 923	118 074	465 261
1981	28 424	78 049	56 643	9 124	64 005	84 500	110 782	431 527

a) Including Division IIIa.

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

Table A.3. Nominal catch (tonnes) of SPRAT in Divisions IIb,c,d, 1963-81.
(Data as officially reported to ICES.)

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	4 714	2 311	151	706	16 033	2 388	31 359	57 662
1981	8 415	1 847	78	505	11 205	1 510	23 881	47 441

a) Including Division IIIa.

Table A.4. Nominal catch (tonnes) of COD in Divisions IIIb,c,d, 1963-81.
(Data as officially reported to ICES.)

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	76 015	5 962	7 406	16 363	123 486	34 089	124 359	391 831 ^{b)}
1981	93 155	5 681	12 938	15 082	120 942	44 300	87 746	382 609 ^{c)}

a) Including Division IIIa.

b) Includes catches by the Faroe Islands of 1 250 tonnes and United Kingdom (England and Wales) of 2 901 tonnes.

c) Includes catches by the Faroe Islands of 2 765 tonnes.

Table A.5. Nominal catches (tonnes) of FLATFISHES in Divisions IIb,c,d, 1963-81.
(Data as officially reported to ICES.)

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
1980	8 276	428	3 286	460	3 429	427	2 305	18 611
1981	6 674	418	3 031	704	2 958	434	2 323	16 542

a) Including Division IIIa.

b) Excluding subsistence fisheries.

Table B.1.1 HERRING catches in the Baltic Sea by countries and Sub-divisions, 1981 and 1982 (tonnes)
By-catch of sprat in directed herring fisheries excluded and by-catch of herring in sprat fisheries included.

Country and Year	Total Catch	Sub-Divisions											
		22	23	24	25	26	27	28	29S	29N	30	31	32
<u>1981</u>													
Denmark	27 997	5 806	8 098		14 093 ²⁾								
Finland	74 049	-	-	-	-	-	-		30	33 774	14 701	8 352	17 192
German Dem. Rep.	56 645	1 799	-	52 702	1 133	1 001	10	-	-	-	-	-	-
Germany, Fed. Rep.	9 274	6 675	-	1 625	974	-	-	-	-	-	-	-	-
Poland	64 520		2 000	13 366	37 654	13 500	33 460	-					
Sweden	84 400			7 600	26 980	160	962	5 350	940	6 000	1 290	620	-
USSR	110 782			586	4 334	30 337		28 448	17 125	971			28 019
Total	427 667	14 280	10 098	75 879	85 168	44 998	34 432	33 798	18 095	40 745	15 991	8 972	45 211
<u>1982</u>													
Denmark	40 157	11 603	5 778	11 070	11 706								
Finland ¹⁾	84 000	-	-	-	-	-	-	-	-	38 800	16 200	8 800	20 200
German Dem. Rep. ¹⁾	50 838	2 205	-	47 627	1 006	-	-	-	-	-	-	-	-
Germany, Fed. Rep.	9 462	6 576	-	1 566	1 320	-	-	-	-	-	-	-	-
Poland	77 872			14 869	42 374	20 629							
Sweden ¹⁾	97 070	-	2 460	8 420	39 550	340	32 150	7 380	570	3 800	1 730	670	
USSR ¹⁾	99 175				8 958	18 006	-	21 435	27 187				23 589
Total	458 574	20 384	8 238	83 552	104 914	38 975	32 150	28 815	27 757	42 600	17 930	9 470	43 789

¹⁾ Preliminary

²⁾ Includes catches in Sub-divisions 24-25

Table B.2.1 SPRAT catches in the Baltic Sea by countries and Sub-divisions, 1981 and 1982 (tonnes).
By-catch of HERRING in directed SPRAT fisheries excluded and by-catch of SPRAT in HERRING fishery included.

Country and Year	Total catch	Sub - divisions										
		22	23	24	25	26	27	28	29	30	31	32
<u>1981</u>												
Denmark	8 359	8 359										
Finland	5 850	-	-	-	-	-	-	-	3 799	-	-	2 051
German Dem.Rep.	78	-	-	78	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	564	564	-	-	-	-	-	-	-	-	-	-
Poland	8 891				4 300	4 591						
Sweden	1 550		76	245	426		637	87	79			
USSR	23 881				2	8 495		4 597	4 916			5 871
Total	49 173	8 923	76	323	4 728	13 086	637	4 684	8 794	-	-	7 922
<u>1982</u>												
Denmark	6 662	2 969	899		2 794 ²⁾							
Finland ¹⁾	5 000	-	-	-	-	-	-	-	3 200	-	-	1 800
German Dem.Rep. ¹⁾	1 022	-	-	1 022	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	632	628	-	4	-	-	-	-	-	-	-	-
Poland ¹⁾	14 209	-	-	50	4 389	9 770	-	-	-	-	-	-
Sweden ¹⁾	2 750	-	-	280	1 180	5	1 105	115	65	-	-	
USSR ¹⁾	18 866				3	12 032		1 586	2 377			2 868
Total	49 141	3 597	899	1 356	8 366	21 807	1 105	1 701	5 642			4 668

1) Preliminary 2) Includes catches from Sub-divisions 24-25

Table C.1.1 Total catch of COD by countries, Sub-divisions 22-32, 1973-82.

Country	Denmark	Finland	German Dem.Rep.	Germany, Fed.Rep. of	Poland	Sweden	USSR	Total
1973	66 050	95	14 408	28 706	49 790	18 389	20 083	197 521
1974	57 810	160	10 970	22 224	48 650	16 435	38 131	194 386
1975	62 524	298	14 742	24 880	69 318	17 965	49 289	239 016
1976	77 570	287	8 552	26 626	70 466	20 188	49 047	252 736
1977	73 505	310	10 967	30 706	47 702	18 127	29 680	210 997
1978	50 611	1 437	9 345	15 122	64 113	16 793	37 200	194 621
1979	59 714	2 938	8 997	19 375	79 754	23 093	75 034	268 905
1980	75 529	5 962	7 406	17 637	123 486	33 201	124 350	387 571
1981	92 648	5 681	12 936	18 281	120 901	44 330	87 746	382 523
1982*	98 154	6 510	11 368	21 860	92 541	46 548	86 906	363 887

* Provisional data.

Table C.1.2 Total catch of COD in Sub-divisions 22 - 32

Area Year	DENMARK				FINLAND				FEDERAL REPUBLIC OF GERMANY					GERMAN DEMOCRATIC REPUBLIC						
	22	23	24	25-28	29	30 ^{***}	31	32	22	24	25	26	28	22	24	25	26	27	28	29
1973	21 400		9 195	35 455		95			12 833	900	9 100	5 200	673	4 004	4 370	4 065	1 912		57	
1974	18 300		7 482	32 028		160			9 998	395	5 242	5 769	820	3 028	5 431	1 469	996		52	
1975	15 981		7 500	39 043	270	8		20	12 415	497	8 809	1 975	1 184	3 471	2 571	3 320	5 250	50	60	20
1976	19 764	712	9 682	47 412	81	24		182	12 312	581	7 526	4 490	1 717	1 292	3 290	800	3 150	10	10	
1977	17 726	1 166	10 213	44 400	85	26		199	10 807	879	3 649	13 803	1 668	977	2 471	324	5 996	73	1 119	7
1978	12 641	1 177	6 527	30 266	249	323	6	859	9 972	880	2 178	1 793	299	1 619	5 466	414	1 714	1	131	-
1979	16 093	2 029	7 232	34 350	787	518	16	1 697	8 910	688	7 616	2 149	12	1 024	6 570	54	1 301	1	46	1
1980	16 033	2 425	7 367	49 704	2 163	880	45	2 874	5 968	689	10 985	673	92	880	4 700	5	1 818	-	3	
1981	15 502	1 473	7 152	68 521	3 036	684	11	1 950	9 095	2 165	7 021	-	-	1 743	9 916	2	1 275	-	-	-
1982*	12 856	1 822	7 565	75 911	3 913	817	15	1 765	7 394	666	13 069	662	69	1 787	8 828	-	728	-	25	-

Contd.

Area Year	POLAND		SWEDEN									USSR						TOTAL
	25	26	23	24	25	26	27***	28	29	30	31	25	26	27	28	29	32	
1973	29 010	20 780		1 655	15 224		971	485		54		-	8 768	1	11 250	50	14	197 521
1974	25 221	23 429		1 937	11 950		1 682	825		41		811	18 633	-	17 677	1 010	-	194 386
1975	35 373	33 945		1 932	12 511		2 052	1 367	103	-		946	17 884	3	28 677	1 735	44	239 016
1976	26 082	44 384	-	1 800	14 109		1 979	2 180	115	5		8 855	25 302	126	14 645	106	13	252 736
1977	18 172	29 530	550	1 516	11 775		2 584	1 560	120	22		390	17 880	4	11 304	91	11	210 997
1978	31 161	32 952	600	1 730	9 017	26	3 207	1 740	417	55	1	12	18 010	78	18 623	166	311	194 621
1979	40 146	39 608	700	1 800	13 628	50	3 458	2 665	641	145	6	13	30 776	-	39 875	1 575	2 795	268 905
1980	50 832	72 654	1 300	2 610	18 694	88	6 014	3 185	790	516	4	7	45 734	-	59 892	4 575	14 142	388 341
1981	50 698	70 203	900	5 700	24 600	260	7 200	4 450	712	500	8	2	44 254	-	32 195	3 733	7 562	382 523
1982*	41 830	50 711	140	7 933	20 429	2 279	4 109	9 264	687	1 669	38	5	33 221	-	40 876	3 308	9 496	363 887***

* Provisional

** Finland 1973-1974 Sub-divisions 29-32 combined

*** Sweden 1973-1974 Sub-divisions 27 and 29 combined

**** Sum of figures used in assessments

Table C.1.3 Total catch of COD in Sub-divisions 22, 23 and 24, 1973-82.

Year	DENMARK			GERMAN DEM.REP.		GERMANY FED.REP.		SWEDEN		TOTAL		
	22	23	24	22	24	22	24	23	24	22	23	24
1973	21 400		9 195	4 004	4 370	12 833	900		1 655	38 237		16 120
1974	18 300		7 482	3 028	5 431	9 998	395		1 937	31 326		15 245
1975	15 981		7 500	3 471	2 571	12 415	497		1 932	31 867		12 500
1976	19 764	712	9 682	1 292	3 290	12 312	581		1 800	33 368	712	15 353
1977	17 726	1 166	10 213	977	2 471	10 807	879	550	1 516	29 504	1 716	15 079
1978	12 641	1 177	6 527	1 619	5 466	9 972	880	600	1 730	24 232	1 777	14 603
1979	16 093	2 029	7 232	1 024	6 570	8 910	688	700	1 800	26 027	2 729	16 290
1980	16 033	2 425	7 367	880	4 700	5 968	684	1 300	2 610	22 881	3 725	15 361
1981	15 502	1 473	7 152	1 743	9 916	9 095	2 165	900	5 700	26 340	2 373	24 933
1982*	12 856	1 822	7 565	1 787	8 828	7 394	666	140	7 933	22 037	1 962	24 992

* Provisional data.

Table C.1.4

Discards of COD in Sub-division 22

Year	Estimated weight (t)	% of total landings	Age distribution (number x 10 ⁻⁶)				
			1	2	3	4	Total
1978	3 000	12.6	12.2*				12.2
1979	1 000	3.9	4.2*				4.2
1980	1 900	8.3	3.0	2.6	0.6		6.2
1981	4 700	18.3	1.1	10.3	0.7		12.1
1982	2 750	12.0	3.3	3.8	1.2	0.3	8.6

* Discards in 1978 and 1979 are assumed to consist of age group 1 only

Table C.2.1 Total catch of COD in Sub-divisions 25-32.

Year	DENMARK	FINLAND	GERMAN DEM.REP.	GERMANY FED.REP.	POLAND	SWEDEN	USSR	TOTAL
	25-32	25-32	25-32	25-32	25-32	25-32	25-32	25-32
1973	35 455	95	6 034	14 973	49 790	16 734	20 083	143 164
1974	32 028	160	2 517	11 831	48 650	14 498	38 131	147 815
1975	39 043	298	8 700	11 968	69 318	16 033	49 289	194 649
1976	47 412	287	3 970	13 733	70 466	18 388	49 047	203 303
1977	44 400	310	7 519	19 020	47 702	16 061	29 680	164 692
1978	30 266	1 437	2 260	4 270	69 319	14 463	37 200	154 009
1979	34 360	2 938	1 403	9 777	79 754	20 593	75 034	223 859
1980	49 704	5 962	1 826	10 985	123 486	29 291	124 350	345 604
1981	68 521	5 681	1 277	7 021	120 901	37 730	87 746	328 877
1982*	75 911	6 510	753	13 800	92 541	38 475	86 906	314 896

* Provisional data.

Table D.1 Annual nominal catches in tonnes of Baltic SALMON in 1973-1982. S = Sea, C = Coastal, R = River

Sub-division Nation	Baltic Main Basin 24-29							Gulf of Bothnia 30-31						Gulf of Finland 32				Total
	Denmark S	Finland S	Fed.Rep. Germany S	Poland S	Sweden S	USSR S	C/R	Denmark S	Finland S C	Sweden S C	R			Finland S C	USSR S C/R			
1973	1 107	190	107	17	407	-	122	12	191	13	166	134		135	-			2 601
1974	1 224	282	52	20	403	21	155	0	310	15	180	155		111	-			2 928
1975	1 112	211	67	10	352	43	194	98	412	33	272	127		74	-			3 005
1976	1 372	181	58	7	332	84	123	38	271	155	22	229	80	81	-	-	14	3 061
1977	951	134	77	6	317	68	96	60	348	142	49	240	60	75	-	-	13	2 649
1978	810	191	22	4	252	90	48	0	127	145	18	212	40	68	1	-	6	2 040
1979	854	199	31	4	264	167	29	0	172	121	20	171	35	63	3	-	4	2 137
1980	886	305	40	22	325	303	16	0	162	148	23	172	35	51	2	9	7	2 506
1981	838	302	43	45	401	299	-	0	190	157	26	242	35	65	1	-	7	2 651
1982 ^{x)}	583	295	20	39	375	300	-	0	186	154	-	136	30	60	5	-	-	2 183

x) Preliminary data: total catches of USSR stated as 300 tonnes. 6-7% of the Swedish catches stated for the Baltic Main Basin have been taken in Sub-division 30.

(See notes on next page).

Notes to Table D.1

Data from Denmark, Federal Republic of Germany, Poland and Sweden have been converted from gutted to ungutted weight by the factor 1.1, an approximation to the equation $W_{\text{ungutted}} = 1.0972 W_{\text{gutted}}$ estimated by Thurow (1965).

Data from Denmark, Federal Republic of Germany, Finland and the USSR include sea trout of an order of 3%, 7%, 10% and 3% respectively.

The catches in the Main Basin consist almost exclusively of feeding salmon fished offshore by drifting gear.

About 50% of the Swedish and, since 1971, about 20% of the Finnish catches in the Gulf of Bothnia are fished in the northern part of the Gulf, generally on the coast and exclusively with fixed gear. Of the Finnish catches in the southern part about 2/3 are taken by drifting gear, the remaining part in fixed gear.

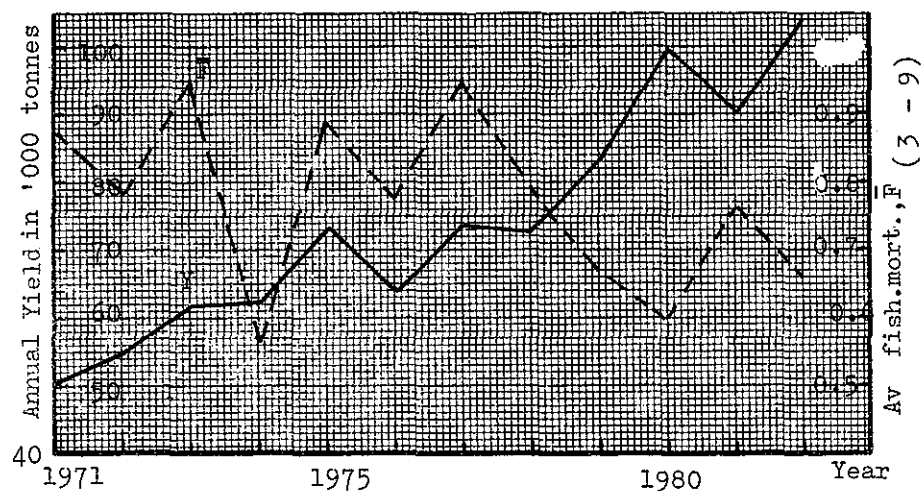
In the Gulf of Finland the Finnish catches are practically without exception obtained by drifting gear, while the USSR catches are exclusively coastal.

The main part of the coastal river catches of Baltic salmon by the USSR are made in the Gulf of Riga by fixed gear in the estuaries and river mouths, only 6-10% enter the proper river fishery.

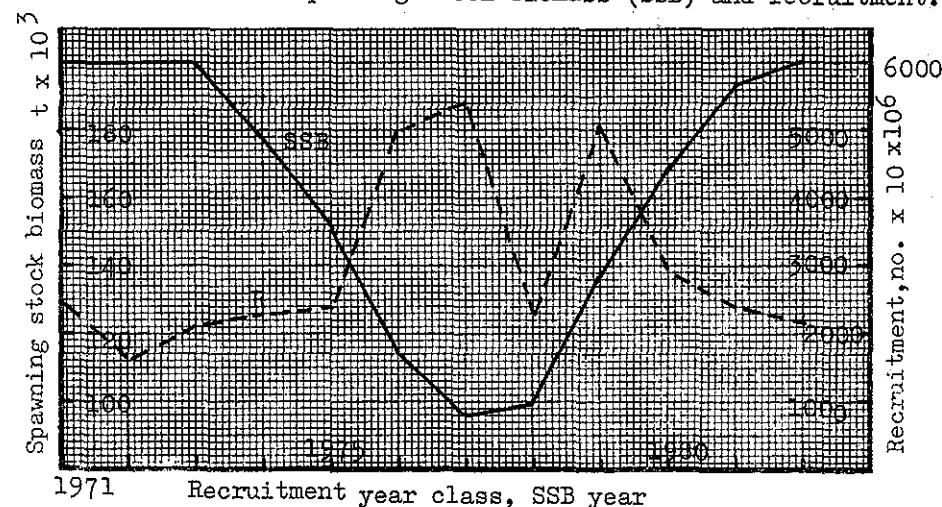
The Finnish landings from the Gulf of Botnia and the Main Basin include 6% non commercial catches. In the Gulf of Finland such catches comprise about 50% of the total yield.

Figure B.1.2.1

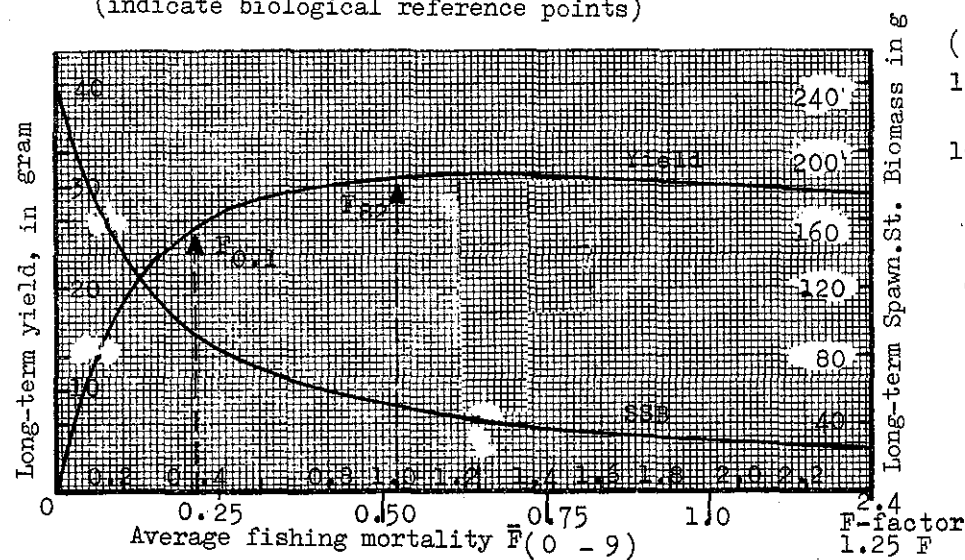
FISH STOCK SUMMARY

HERRING, Sub-divisions 22 and 24
(stock)A Trends in Yield and fishing mortality (\bar{F})

B Trends in spawning stock biomass (SSB) and recruitment.



C Long-term yield and spawning stock biomass (indicate biological reference points)



D Short-term yield and spawning stock biomass (indicate biological reference points)

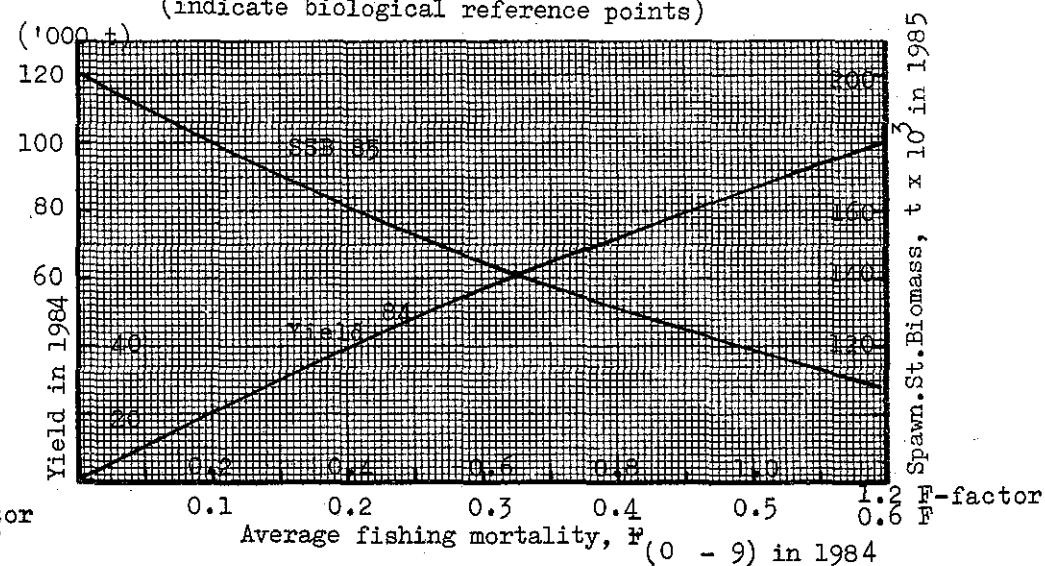


Figure B.1.2.3.1

HERRING in Sub-divisions 28, 29S
(excl. Gulf of Riga). Spawning stock
biomass at 1 January, according to the
traditional VPA and to the acoustic stock
estimate.

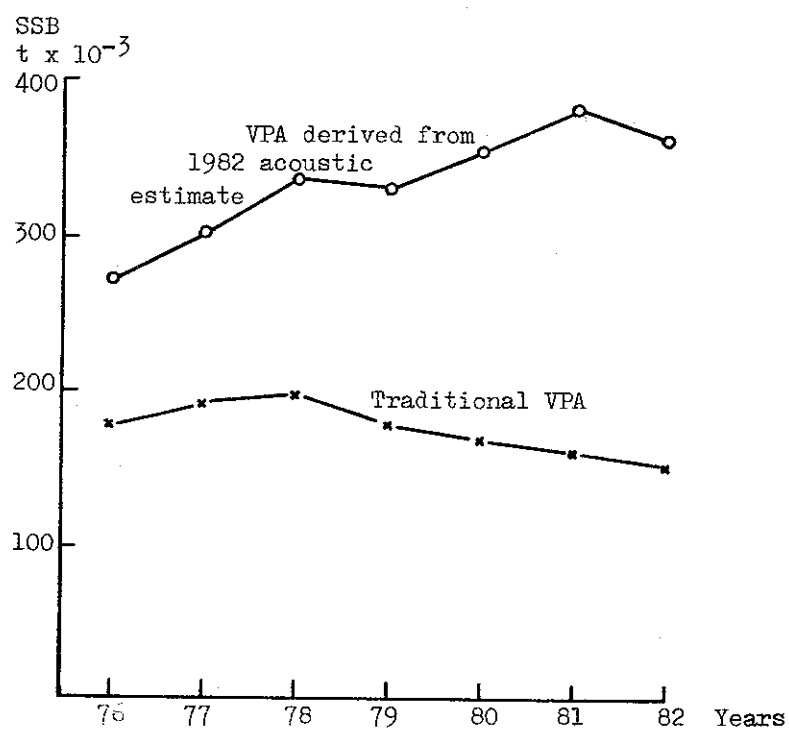
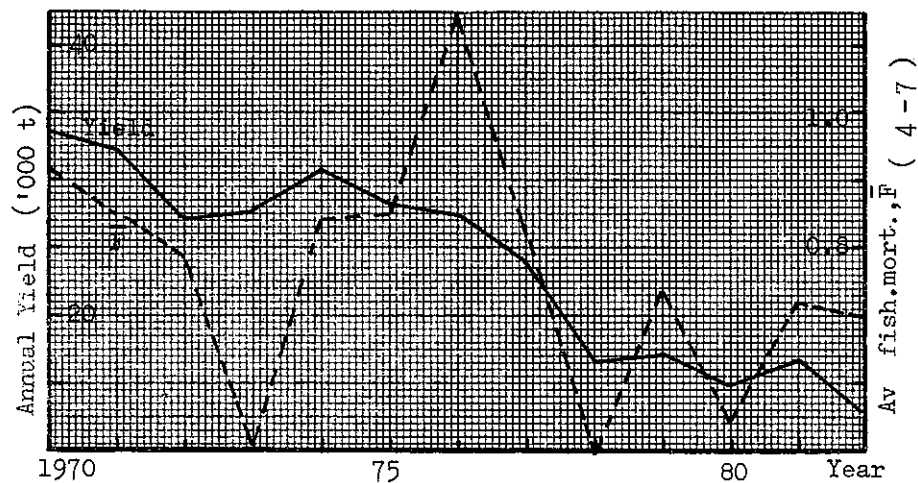


Figure B.1.2.3.2

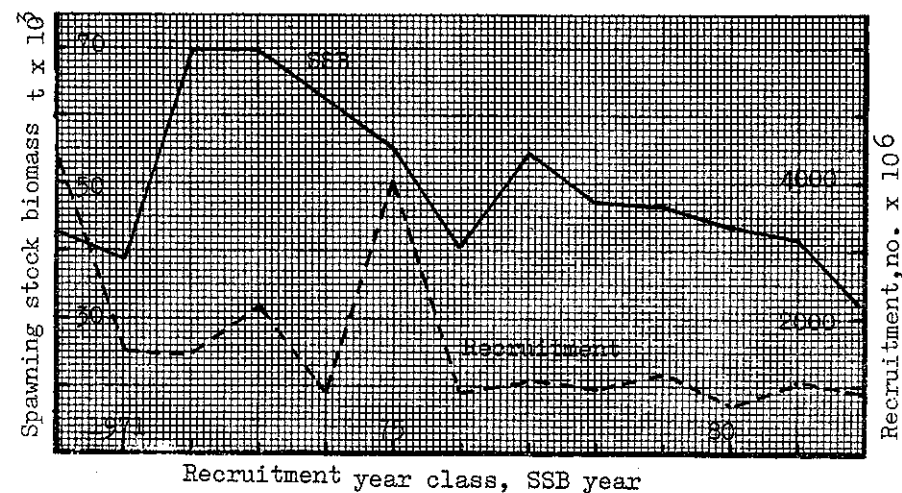
FISH STOCK SUMMARY

Herring in the Gulf of Riga
.....
(stock)

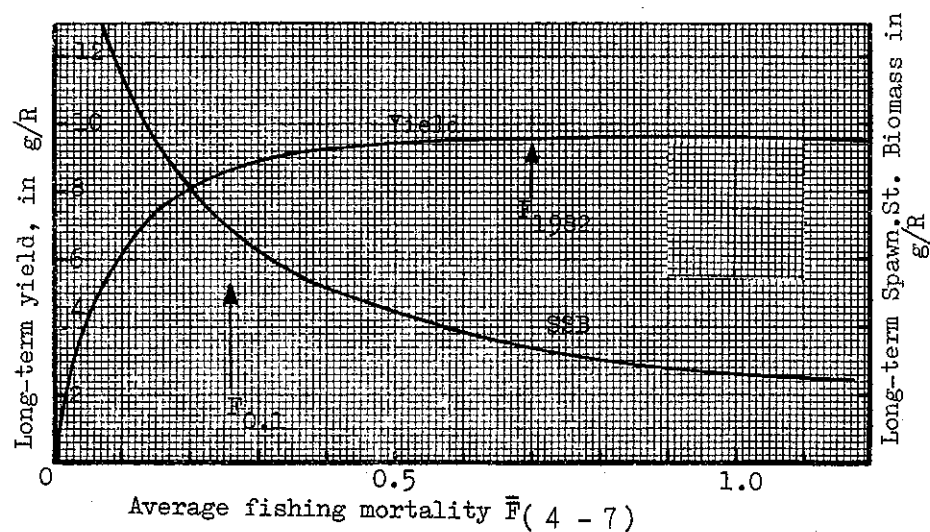
A Trends in Yield and fishing mortality (\bar{F})



B Trends in spawning stock biomass (SSB) and recruitment.



C Long-term yield and spawning stock biomass
(indicate biological reference points)



D Short-term yield and spawning stock biomass
(indicate biological reference points)

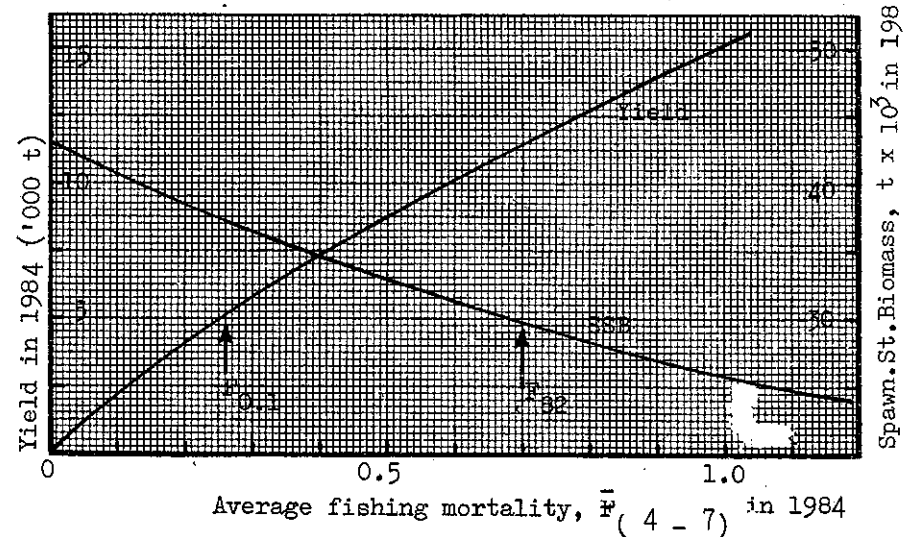
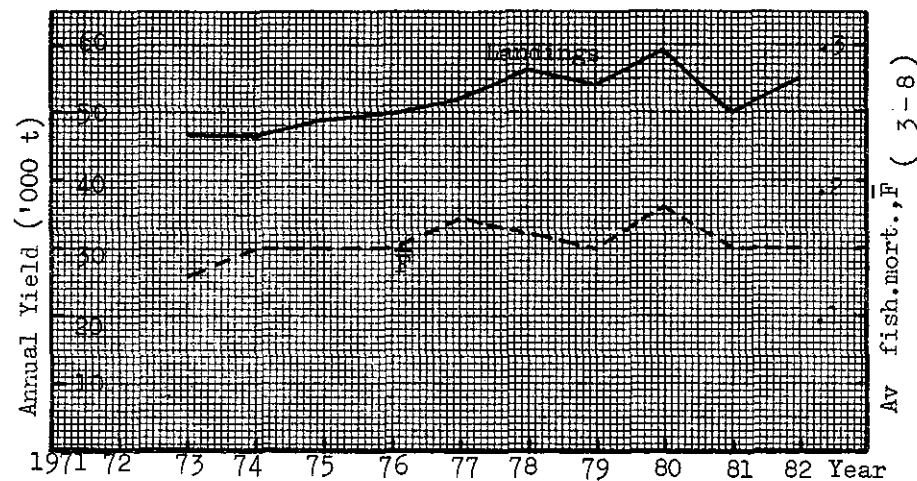


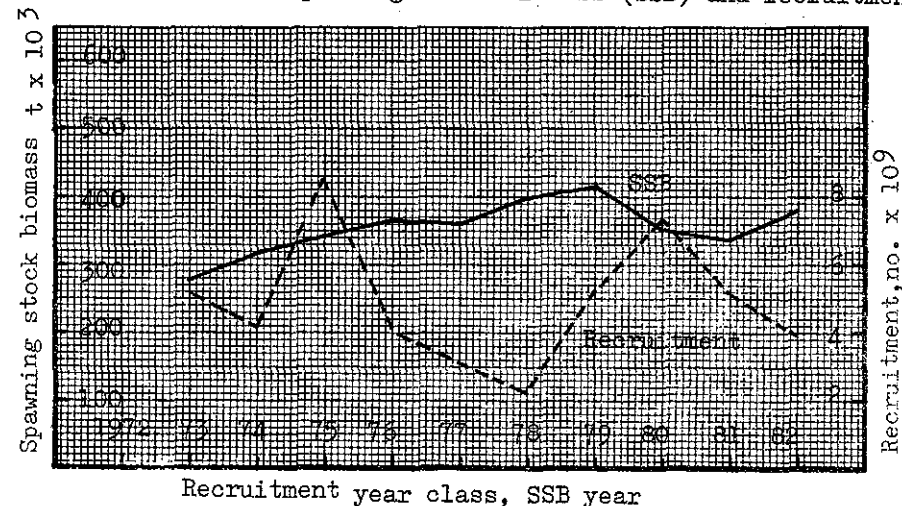
Figure B.1.2.4 FISH STOCK SUMMARY

HERRING - Archipelago Sea and Bothnian
Sea(E) (29N - 30E)

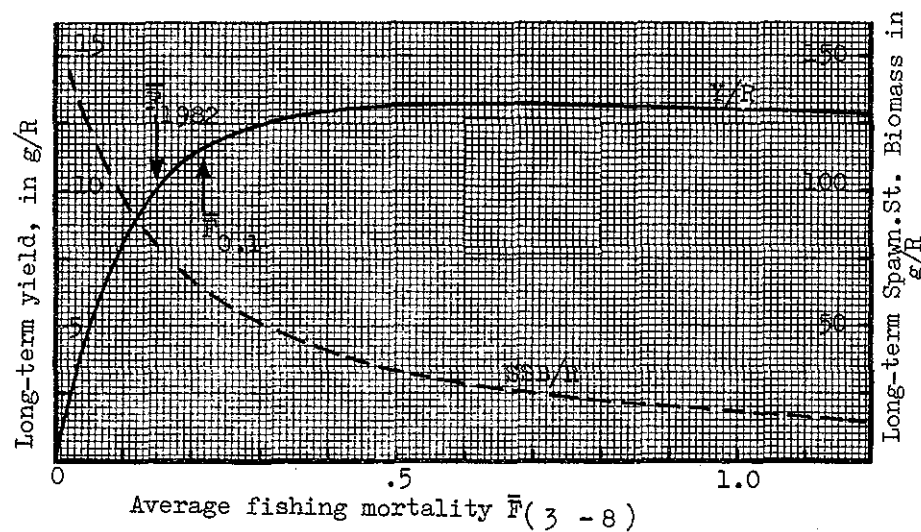
A Trends in Yield and fishing mortality (\bar{F})



B Trends in spawning stock biomass (SSB) and recruitment.



C Long-term yield and spawning stock biomass
(indicate biological reference points)



D Short-term yield and spawning stock biomass
(indicate biological reference points)

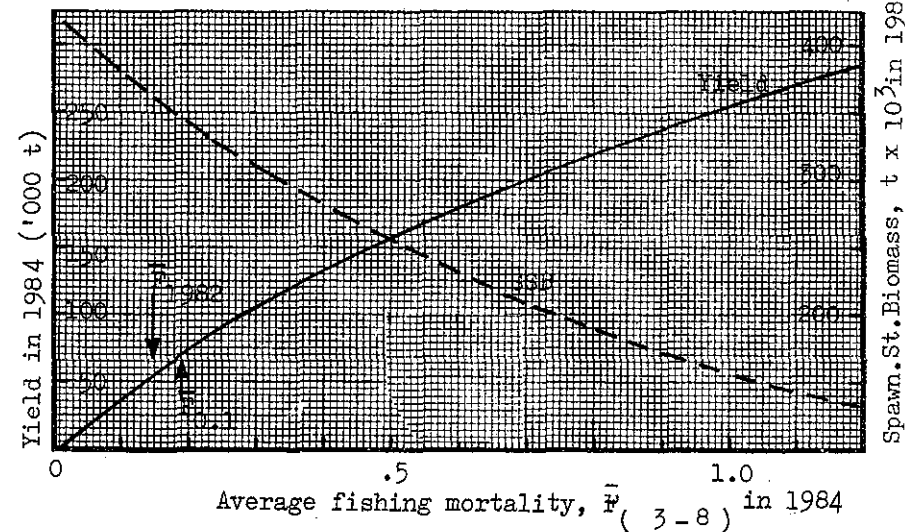
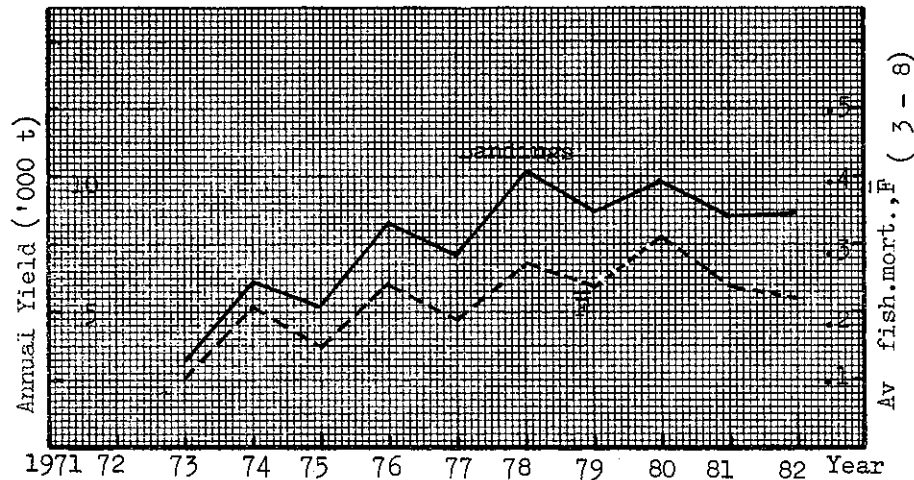


Figure B.1.2.5

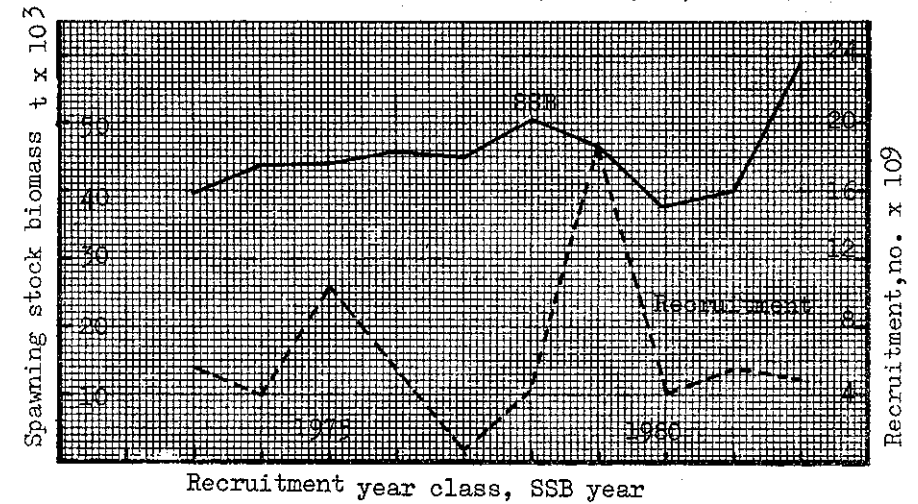
FISH STOCK SUMMARY

Herring - Bothnian Bay(E)(31E)
.....
(stock)

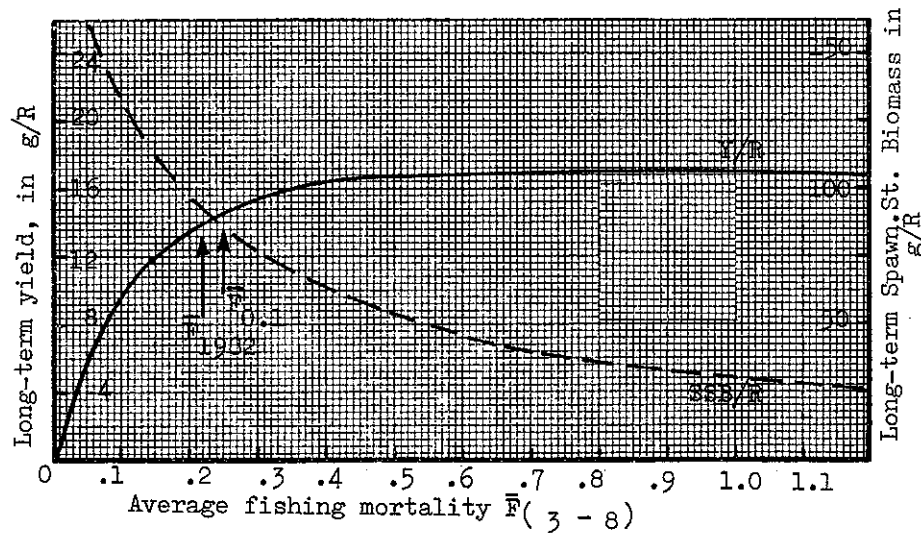
A Trends in Yield and fishing mortality (\bar{F})



B Trends in spawning stock biomass (SSB) and recruitment.



C Long-term yield and spawning stock biomass (indicate biological reference points)



D Short-term yield and spawning stock biomass (indicate biological reference points)

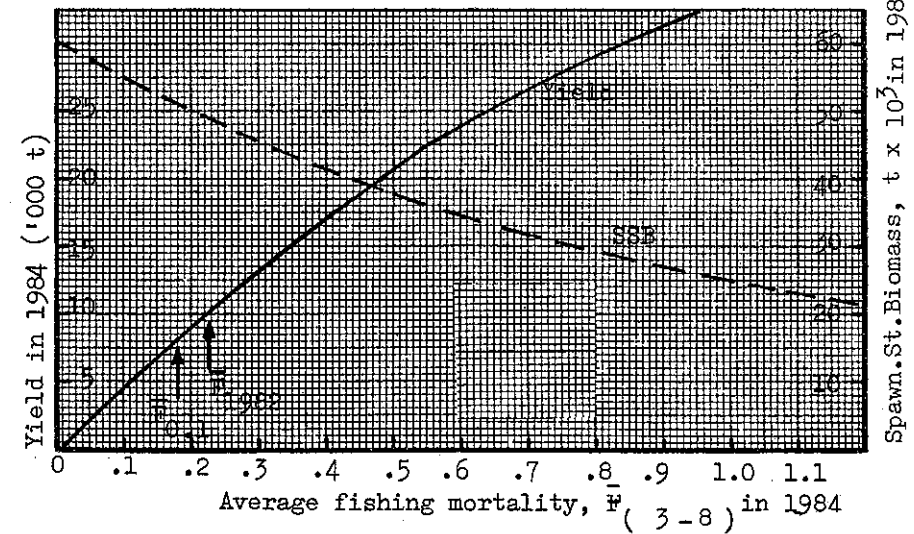
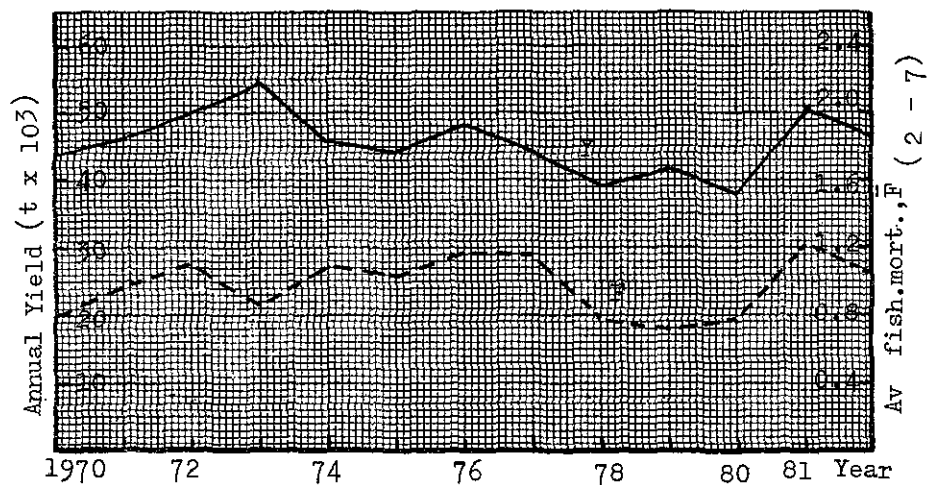


Figure C.1.1

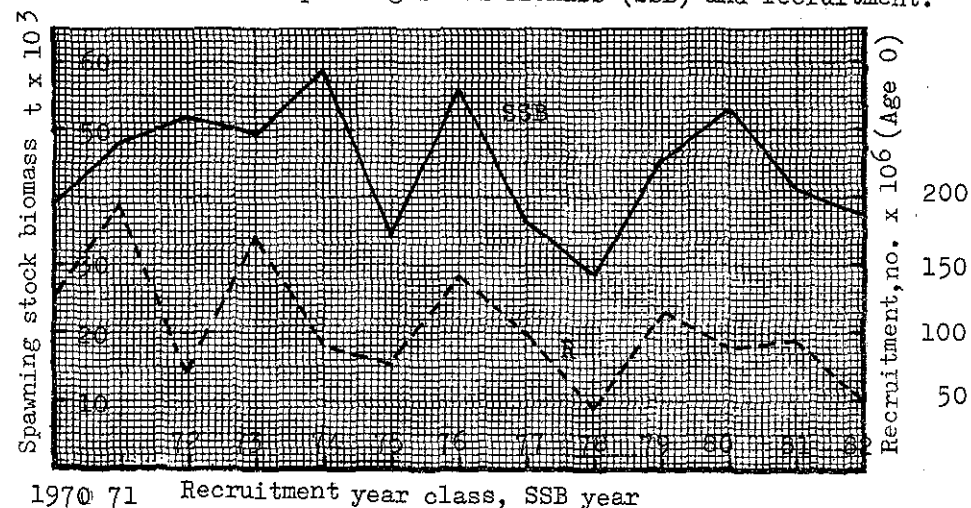
FISH STOCK SUMMARY

COD. Sub-divisions 22 and 24
.....
(stock)

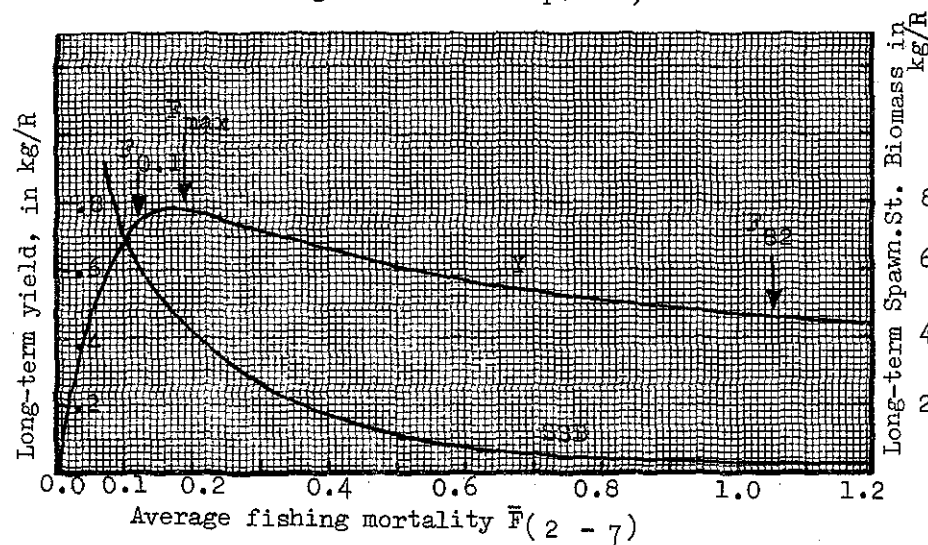
A Trends in Yield and fishing mortality (\bar{F})



B Trends in spawning stock biomass (SSB) and recruitment.



C Long-term yield and spawning stock biomass
(indicate biological reference points)



D Short-term yield and spawning stock biomass
(indicate biological reference points)

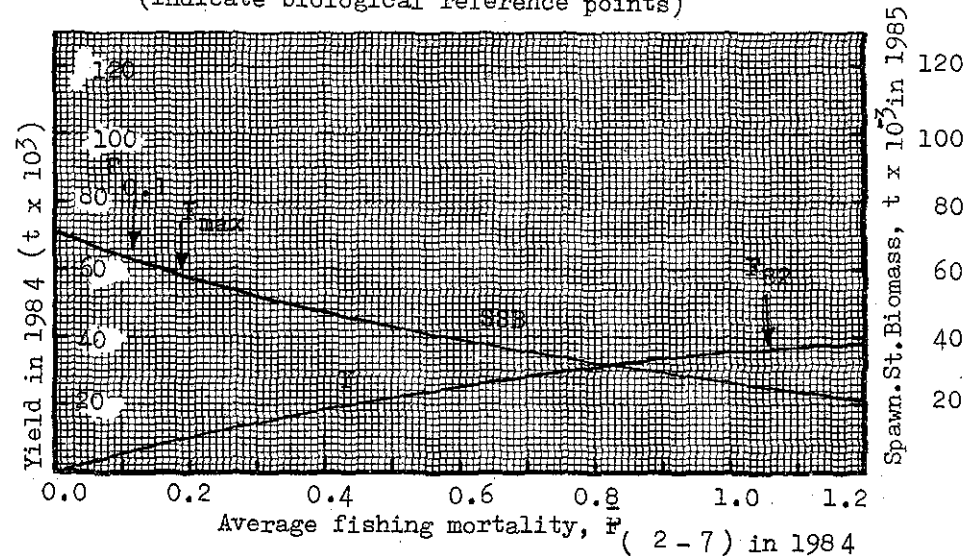
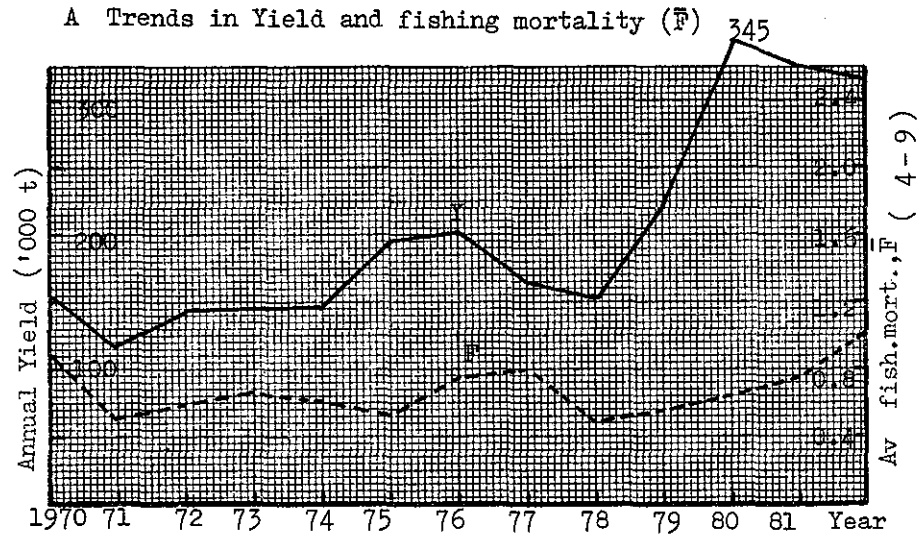


Figure C.2.1.A&B

FISH STOCK SUMMARY

COD in Sub-divisions 25-32
.....
(stock)

A Trends in Yield and fishing mortality (\bar{F})



B Trends in spawning stock biomass (SSB) and recruitment.

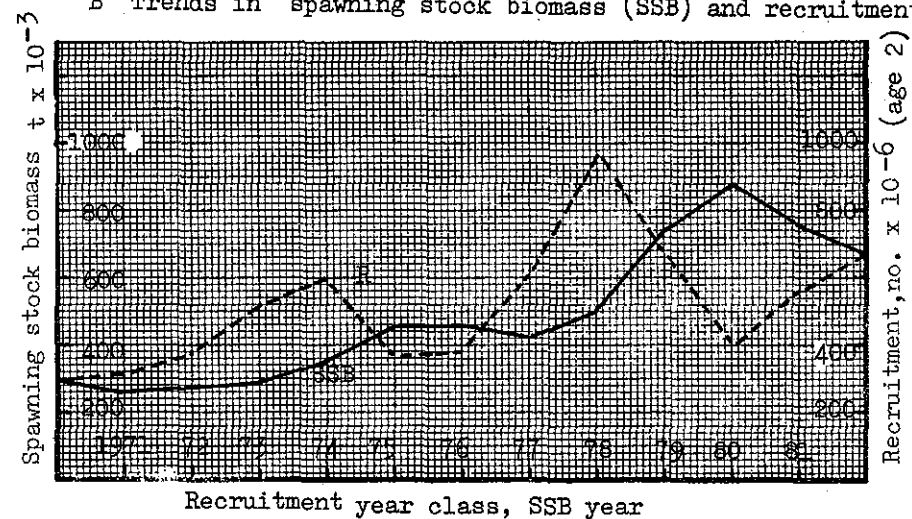


Figure C.2.1.C

COD.

Yield per recruit in Sub-divisions 25-32.

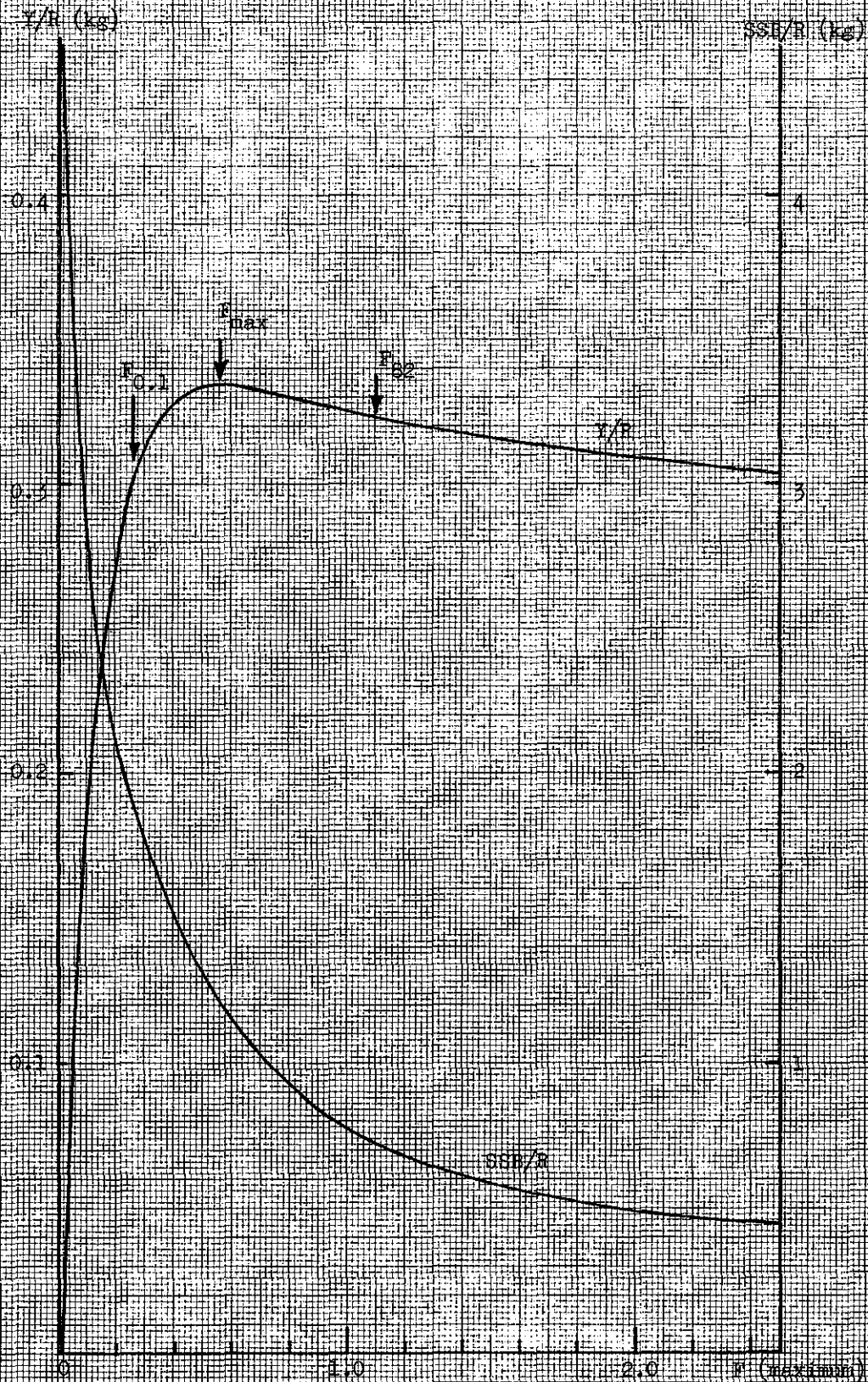
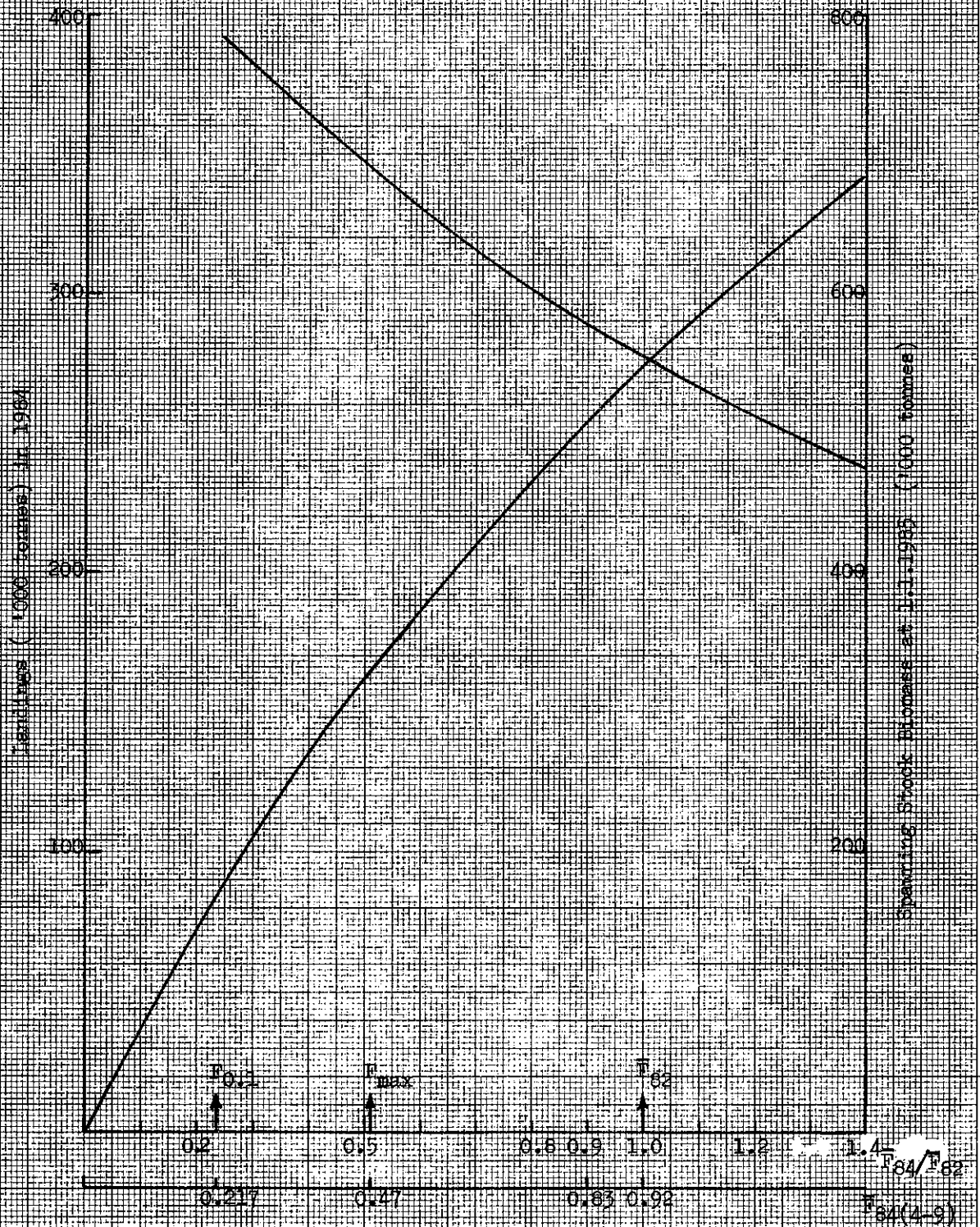
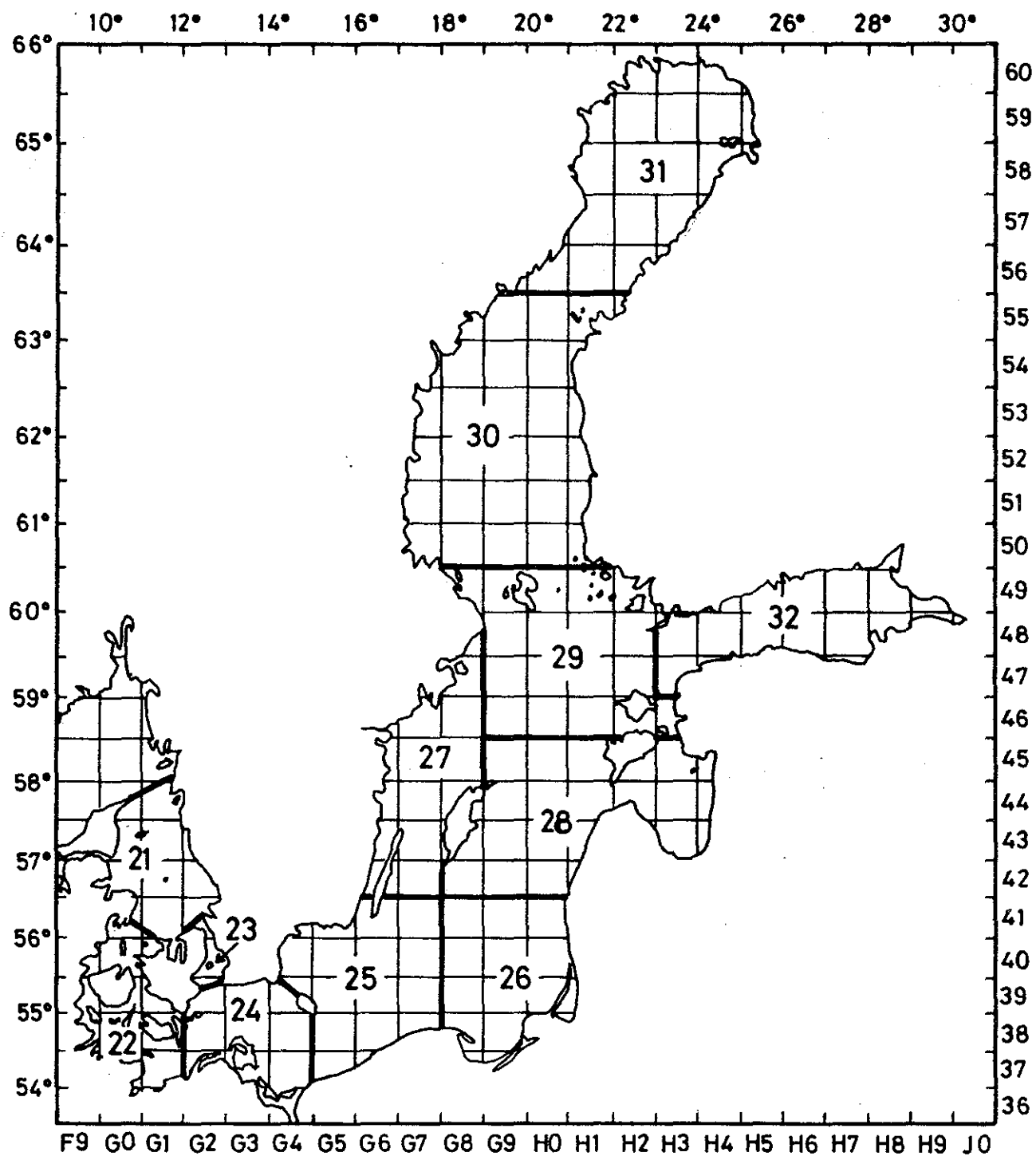


Figure C.2.1.D

COD in Sub-divisions 25-32. Predictions for catches in 1984 and Spawning Stock Biomass (2 age-group 3) at 1 January 1985





ICES 27.3.03.00 (Baltic)