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P R E F A C E

This volume of the Cooperative Research Report contains the reports of the Advisory Committee on Fishery Management in 1984.

ACFM held two meetings in 1984, 8-18 May and 30 October - 7 November.

From the first meeting were issued the complete report to the International Baltic Sea Fishery Commission (IBSFC), Part I of the report to the North-East Atlantic Fisheries Commission (NEAFC), and Part I of the report to the North Atlantic Salmon Conservation Organisation (NASCO). The second part of the reports to the NEAFC and NASCO was issued from the October-November meeting. In order to make the advice reach managers as fast as possible, the reports were 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 reports to IBSFC and NASCO.

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

Copenhagen, January 1985

Kjartan Hoydal
Secretary to ACFM

MEMBERS OF THE ADVISORY COMMITTEE ON FISHERY MANAGEMENT, 1983/84

Mr D de G Griffith	Chairman
Mr B Vaske	Chairman, Demersal Fish Committee
M A Maucorps	Chairman, Pelagic Fish Committee
Dr J Netzel	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
Mr D J Garrod
Dr J Guéguen/Alternate Dr J Dardignac
Dr W G Doubleday/Alternate Dr R G Halliday
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Mr Ø Ulltang/Alternate Mr O Nakken

Mr K Hoydal, ICES Statistician, Secretary to ACFM

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* Unable to attend the May 1984 Meeting.
** Participated in the May 1984 Meeting.

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Mr B Vaske	Chairman, Demersal Fish Committee
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REPORTS OF THE ICES ADVISORY COMMITTEE ON FISHERY MANAGEMENT, May and October/November 1984

INTRODUCTION

In 1982 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.

REPORT TO THE NORTH-EAST ATLANTIC FISHERIES COMMISSION

A. REVIEW OF NOMINAL CATCHES IN NEAFC AREA, 1973-83

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.

The assessments presented in this report are carried out using the best catch data available to the Working Groups and to ACFM. These data are not necessarily identical with the official statistics but, where appropriate, include estimates of unreported landings as well as corrections for misallocation of catches by area and species. Despite considerable effort exerted to this problem, there is no guarantee that all instances of misreporting were discovered.

B. NEACF REGION 1 STOCKS

B.1 North-East Arctic Cod and Haddock

B.1.1 North-East Arctic cod

Recommended TAC, total quotas and catches (in '000 tonnes) in recent years are shown in the following text table.

1981		1982		1983		1984		
Total quota	Actual catch	Total quota	Actual catch	Total quota	Actual catch1)	Rec. TAC	Total quota	Actual catch2)
300	399	300	364	300	290	150	220	279

1) Preliminary
2) Expected

Total landings by fishing areas and by countries are given in Tables B.1.1.1 and B.1.1.2. From 1982 to 1983, the catches declined in all areas both for trawl and other gears. The most significant reductions were observed in the Norwegian catches by conventional gears in Sub-area I and Division IIa and in the total USSR fishery.

Preliminary landing figures for the first half year of 1984 indicated that the total landings in 1984 will only be slightly less than in 1983.

Weights at age had increased in recent years, and this was taken into account in the assessment.

B.1.1.1 State of the stock

In the 1983 assessment, two sets of maturity ogives were applied resulting in two alternatives for the spawning stock. The deviations between the two alternatives were quite large. No further information on the rate of maturation in previous years had been made available since the 1983 assessment. For the years prior to 1982, the spawning stock was, therefore, taken to be fish of age 8 and older, which is in accordance with the procedure used in all assessments up to 1982. For 1982, 1983 and 1984, the spawning stock sizes were calculated on the basis of direct estimates of abundance of spawners.

Results from a series of surveys indicated that the years 1985-87 will be a period of very strong recruitment to the stock. The 1982, 1983 and 1984 year classes were estimated to 400, 1500 and 1500 million individuals respectively at age 3, the estimates for 1983 and 1984 year classes thus being at the same level as the abundance of the very strong 1963, 1964 and 1970 year classes. However, the figures for the 1983 and 1984 year classes are uncertain and should be used with caution.

Fishing mortalities for 1984 were estimated on the basis of catch data and information from Norwegian surveys. The computed stock numbers were compared with estimates from acoustic surveys for the period 1982-84.

The agreement is generally good for the age groups 5-7 with the exception of the 7-year olds in 1982, when the survey estimate tends to be too high. For the younger age groups, the survey estimates tend to be too low, while the older fish (age groups 8+) seem to be overestimated in the survey.

In previous assessments the fishing mortalities were checked against effort data from Norwegian trawlers. However, since the catchability in the trawl fishery has increased substantially during the past 4-5 years, such data are now of limited value as a check of the fishing mortalities used in the assessment.

The main results of the assessment are shown in Figure B.1.1.1.

B.1.1.2 Management advice

Owing to the uncertainties about the spawning stock size in previous years, a stock and recruitment relationship cannot yet be examined. Direct measurements of the spawning stock exist for the years 1982, 1983 and 1984. In these years, the spawning biomass were estimated to 400 000, 380 000 and 370 000 tonnes, respectively, and year classes of fair and very strong abundance were produced. It is, therefore, recommended that effort should be made to prevent the spawning stock falling below the 1985 level of 300 000 tonnes in 1986.

1984				Management option for 1985	1985				1986	
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.
735	374	0.56	279	F_{max}	730	303	0.33	170	1569	297
				$F_{1985}=F_{1984}$			0.56	269	1465	235
				TAC 1985 = 300			0.64	300	1432	216

*) Expected catch estimated by Working Group.

Weights in thousand tonnes.

The projections of stock biomass and catch are shown in the text tables on page 3 for alternative management strategies up to 1988. It is expected that the rich 1982-84 year classes will be more heavily exploited at age 3 and 4 than the preceding ones, and the exploitation pattern was adjusted accordingly. This, together with the altered weight at age data produced an F_{max} which was slightly higher than in last year's assessment.

For all alternatives of management strategy, the total stock size will increase strongly from 1985 to 1987 owing to the rich 1983 and 1984 year classes. The spawning stock will decline until 1986. The subsequent trend will depend on the rate of maturation of the 1983 and 1984 year classes. It is rather unlikely that these strong year classes will grow and mature at the same rate as the poor 1976-1981 year classes, and a certain delay in maturation is therefore to be expected. In that case, if the fishing mortality in 1985-87 is maintained at the 1984 level, the decline of the spawning stock may continue until 1988. In order to prevent such a decline, the fishing mortality ought to be reduced to F_{max}.

ACFM recommends that a TAC of 170 000 tonnes should be set for 1985.

North-East Arctic Cod. Projections of stock, spawning stock biomass and catch.

Management strategy	$\bar{F}_{max} = 0.33$				$\bar{F}_{84} = 0.56$			
Year	STB	SSB I	SSB II	Catch	STB	SSB I	SSB II	Catch
1985	730	303		170	730	303		268
1986	1569	297		314	1465	235		462
1987	2843	341	327	625	2575	231	218	893
1988		605	334			409	187	

Management strategy	TAC = 250				TAC = 300			
Year	STB	SSB I	SSB II	$\bar{F}$	STB	SSB I	SSB II	$\bar{F}$
1985	730	303		0.51	730	303		0.64
1986	1485	247		0.27	1482	216		0.35
1987	2819	309	295	0.12	2709	260	247	0.16
1988		681	378			604	307	

STB: Stock biomass. SSBI: Spawning stock biomass using maturity ogive for 1984.

SSB II: Spawning stock biomass as for SSB I except fish of the 1983–1985 year classes.

B.1.2 North-East Arctic Haddock

The catches continued to decline in all fisheries in 1983, the total catch being about 22 000 tonnes (Tables B.1.2.1 and B.1.2.2).

The expected catches for 1984 were estimated to about the same level as in 1983. However, since a significant portion of the catches are now taken in autumn, this estimate is not very precise.

During the last few years, weights at age in the catch have increased significantly, and this was taken into account in the assessment.

The rate of maturation was kept the same as in previous assessments.

B.1.2.1 State of the stock

The information from survey originated from the same sources as for cod. Regarding the abundance of the 1978-1981 year classes, the survey results were not very conclusive but indicated that these year classes at age 3 constituted 10-25 million specimens each. The 1982-1984 year classes are observed to be much stronger in all surveys, but the indicated levels of abundance vary considerably between the types of survey. On the bases of the bottom trawl and 0-group surveys, which are thought to give the most reliable information on recruitment, the 1982, 1983 and 1984 year classes were estimated to contribute to the stock with 200, 300 and 400 million 3-year old individuals, respectively, in 1985, 1986 and 1987.

The exploitation pattern for 1984 was slightly changed as compared to that for 1983. The fishing mortalities at age 3 and 4 were increased to give agreement with the survey results for the year classes 1980 and 1981. The assessment shows a sharp decline in fishing mortalities after 1982, the level in 1984 being only half that of 1980-82.

Normally a major part of the haddock is taken as by-catch in the cod fisheries. Therefore, comparisons between fishing mortalities, catch per unit of effort and biomass of the two species allow conclusions to be drawn for haddock based on the cod assessment. Such comparisons indicated that the figures arrived at for fishing mortality and biomass for haddock are acceptable.

The main results of the assessment are shown in Figure B.1.2.1.

B.1.2.2 Management advice

Projections of stock biomass and catch are given in the text table below.

1984				Management option for 1985	1985				1986	
Stock biom. (3+)	Spawn. stock biom.	$\bar{F}_{(4-7)}$ 1)	Catch (3+)		Stock biom. (3+)	Spawn. stock biom.	$\bar{F}_{(4-7)}$	Catch (3+)	Stock biom (3+)	Spawn. stock biom.
110	62	0.25	21	$F_{1984} = F_{1985}$	229	58	0.25	47	434	66

1) $F_{0.1} = 0.23$.

Weights in thousand tonnes.

This option is based on the weight at age in the catch series and the fishing pattern for 1984. These data did not given an F_{max} value on the yield per recruit curve (Figure B.1.2.2). A fishing mortality for 4-7 year old fish of 0.25, which is the same as in 1984 and close to $F_{0.1}$, will generate a catch in 1985 of 47 000 tonnes and keep the spawning stock at about the 1984 level.

Owing to assumptions about recruitment, growth and exploitation pattern, the medium-term projections are highly uncertain and only one option is presented. The total stock - and the spawning stock biomass - will certainly increase strongly in the years 1986-88, but the levels are difficult to predict. The rate of increase will also depend heavily on the fishing pattern which will be used.

<u>ACFM recommends that the TAC to be set for 1985 should not exceed 50 000 tonnes.</u>

North-East Arctic Haddock. Projections of stock and spawning stock biomass and catch.

Management strategy	$F_{84} = 0.25$ ($F_{0.1} = 0.23$)		
Year	SB	SSB	Catch
1985	229	58	47
1986	434	66	101
1987	737	109	181
1988		203	

B.2 Redfish in the North-East Arctic Region (Sub-areas I and II)

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

STOCK	1979		1980		1981		1982		1983		1984
	Rec TAC	Actual catch	Rec TAC	Actual catch	Rec TAC	Actual catch	Rec TAC	Actual catch	Rec TAC	Actual catch	Rec TAC
Golden redfish (S.marinus)	22	26	19	23	19	20	14	15	15 3)	18 1)	15 2)
Beaked redfish (S.mentella)	135	87	81	79	70	81	70	115	70 2)	99 1)	70 2)
Total	157	113	100	102	89	101	84	130	85	117	95

1) Preliminary
2) Catch level preferred by ACFM
3) Precautionary TAC

The redfish catches in Sub-areas I and II increased from 102 372 tonnes in 1981 to 131 527 tonnes in 1982. The preliminary catch figure for 1983 is 117 149 tonnes, which is 32 149 tonnes above the level recommended by ACFM for 1983 of 85 000 tonnes. The 1983 catch is close to the agreed TAC for 1983 of 117 000 tonnes.

In Sub-area I the total catch increased from 2 565 tonnes in 1982 to 4 821 tonnes in 1983 (Table B.2.1). In Division IIa the total catch increased from 79 151 tonnes in 1982 to 98 857 tonnes in 1983, and in Division IIb the catch decreased from 49 811 tonnes in 1982 to 13 471 tonnes in 1983.

Compared to 1982, the total landings in 1983 of S. marinus increased from 16 341 tonnes in 1982 to 18 128 tonnes in 1983, and those of S. mentella decreased from 115 186 tonnes to 99 021 tonnes in 1983. Thus, the TAC recommended by ACFM of 15 000 tonnes on S. marinus was exceeded by about 20%, while the recommended catch level for S. mentella of 70 000 tonnes was exceeded by about 40%.

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

In the absence of any effort data of fishery-independent data it was not possible to estimate the fishing mortality in 1983. ACFM therefore concluded, as last year, that an analytical assessment of the present state of the stock is not possible with the data available at present.

Given that it is unlikely that an analytical assessment can be made next year, ACFM recommends that a precautionary TAC be set for 1985 and 1986 of 15 000 tonnes, i.e., retaining the precautionary TAC of 1983 and 1984. The TAC for 1986 could be reviewed next year by ACFM.

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

Mean fishing mortalities on age groups 8-19 were low in the period 1965-74, fluctuating around 0.08. An increase to an average level of 0.50 was recorded for the period 1975-77, with a peak of 0.55 in 1976. From 1978 to 1982 the fishing mortality remained fairly stable at a level of 0.28. A decrease to 0.23 was observed in 1983 (Figure B.2.1).

However, since the minimum mesh size in the 'Mentella box' was decreased from 125 mm in 1982 to 100 mm in 1983, the total effort and subsequently the fishing mortality in 1983 might have been underestimated. The Working Group was, however, unable to assess the magnitude of this possible bias.

The total biomass increased steadily from about 300 000 tonnes in 1965 to about 1 million tonnes in 1975. It decreased continuously to about 670 000 tonnes by 1979 and remained fairly stable up to 1983 at about this level.

The spawning stock biomass shows a similar increase from about 120 000 tonnes in 1965 to about 300 000 tonnes in 1975. By 1979 it decreased to about 130 000 tonnes and then increased continuously to about 247 000 tonnes in 1983.

Due to the revision of the mean weight at age data on the older ages and a minor change in the exploitation pattern on the 6-9 years old, the yield per recruit was recalculated. The results of these calculations are $F_{0.1} = 0.11$ and $F_{max} = 0.18$.

The estimated mean fishing mortality in 1983 of 0.23 is above the F_{max} level on the Y/R curve.

Catch projections were made for 1985 and 1986 by applying the average recruitment (1965-79) of 437 million at age 6 in the stock projections for 1984-87. For 1984 it was assumed that a catch of 90 000 tonnes will be taken. This catch level corresponds to the TAC established by the countries responsible for the management of S. mentella in this area.

The results from the catch predictions are given in the text table below and in Figure B.2.1.

Sebastes mentella — ICES Divisions IIa and IIb

1984				Manage-ment	1985				1986			1987	
Stock biom. (6+)	Spawning stock biom.	F (8 - 19)	Catch (6+)	option for 1985 and 1986	Stock biom. (6+)	Spawning stock biom.	F (8 - 19)	Catch (6+)	Stock biom. (6+)	Spawning stock biom.	Catch (6+)	Stock biom. (6+)	Spawning stock biom.
690	256	0.21	90	$F_{0.1}$	709	266	0.11	51	771	302	58	821	335
				F_{max}			0.18	81	737	278	87	754	285
				$F_{1985} = F_{1984}$			0.21	93	724	269	96	729	267

Weights in '000 tonnes.

ACFM considered the assessment sufficiently reliable to recommend a TAC both for 1985 and 1986. ACFM prefers this stock to be fished close to the F_{max} level which corresponds to a TAC of 85 000 tonnes for 1985 and 1986.

B.2.4 The 'Mentella Box'

The limited material available suggested that by-catch of cod in the directed fishery for redfish in the 'Mentella box' might only marginally affect the cod stock.

ACFM considers that existing material should be fully analysed in order to give a better basis for an advice on optimum mesh size.

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

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

1979		1980		1981		1982		1983		1984
Rec TAC	Actual catch	Rec TAC	Actual catch	Rec TAC	Actual catch	Rec TAC	Actual catch	Rec TAC	Actual catch	Rec TAC
25	17	14	13	12	15	12	16	17	22 1)	17

1) Preliminary

The total catch in 1982 was 16 733 tonnes, i.e., 39% above the TAC of 12 000 tonnes for that year. In 1983, the total catch was 22 342 tonnes according to the preliminary catch figures, i.e., 5 342 tonnes (31%) above the TAC of 17 000 tonnes.

A new series of cpue data from the Norwegian freshfish trawlers was available from 1973 onwards. Compared to the old series the new series utilised the data from the whole year in the directed trawl fishery. The USSR and the Norwegian cpue data were similar, and an average series was established and used to estimate fishing mortality in 1983. Trends in fishing mortality and stock biomasses are shown in Figure B.3.1.

From the high level of about 0.5 in the 1975-78 period the fishing mortality decreased to 0.20 in 1979. From this level F increased somewhat to 0.24 and 0.27 in 1982 and 1983, respectively.

The total stock biomass decreased continuously from the high level of 300 000 tonnes in 1970 to 100 000 tonnes in 1978. Since then it increased slightly to about 140 000 tonnes in 1983.

Spawning stock biomass showed a similar trend, a decrease from 120 000 tonnes in 1970 to 27 000 tonnes in 1979 followed by a steady increase to 54 000 tonnes in 1983.

The catch projections for 1985 and 1986 were made assuming that the recruitment at age 3 becomes 32.8 million (1970-79 average) in the next few years. The catch in 1984 was assumed to be equal to 17 000 tonnes, which is the TAC set for that year. The results are given in the text table below.

Greenland Halibut ICES Sub-areas I and II

1984				Management option for 1985 and 1986	1985				1986			1987	
Stock biom. (3+)	Spawning stock biom.	F (7-11)	Catch (3+)		Stock biom. (3+)	Spawning stock biom.	F (7-11)	Catch (3+)	Stock biom. (3+)	Spawning stock biom.	Catch (3+)	Stock biom. (3+)	Spawning stock biom.
147	54	.18	17 *)	$F_{0.1}$	156	56	.12	14	168	69	16	181	79
				$TAC_{85} = TAC_{84}$			.15	17	165	66	17	175	75
				$F_{1985} = F_{1984}$			.18	19	162	64	21	168	70
				F_{max}			.20	22	159	62	23	163	66
				$F_{1985} = F_{1983}$			.27	28	152	57	28	150	56

Weights in thousand tonnes.
*) Expected catch estimated by the Working Group.

Except for one, all the options for 1985 and 1986 given in the text table above imply that the total stock and the spawning stock will continue its increasing trend since 1978 up to 1987. However, if the fishing mortality in 1985 and 1986 will be at the 1983 level, the prognosis predicts a stable situation or a slight downward trend in the total stock and the spawning stock in the period 1985-87.

In considering the above option table, ACFM prefers that the fishing mortality in 1985 and 1986 should not be allowed to rise which implies TAC for 1985 and 1986 of 20 000 tonnes.

B.4 Redfish in Sub-areas V and XIV

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

Stock	1979		1980		1981		1982		1983		1984
	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC
Golden redfish (S.marinus)	58	75	58	88	60	101	60	123	60 2)	106 1)	80
Beaked 4) redfish (S.mentella)	12	23	7	27	25	44	12 3)	46	12 3)	58 1)	25 3)
Total	70	98	65	115	85	145	72	169	72	164	105

1) Preliminary; 2) Catch level preferred by ACFM; 3) Precautionary TAC;

4) Catches from oceanic stock not included (i.e., 60 000 tonnes in 1982 and 1983).

The total catch from the Irminger Sea redfish stock complex increased from 145 000 tonnes in 1981 to 229 000 tonnes in 1982, and decreased slightly to 225 000 tonnes in 1983. The higher catches in 1982 and 1983 originated from the new fishery on the stock of S. mentella 'type oceanic'.

The total catch of redfish, excluding catch figures from the new fishery, decreased slightly from 169 000 tonnes in 1982 to 164 000 tonnes in 1983. The catches in Division Va increased by about 8 000 tonnes, whereas in Sub-area XIV, the catches decreased by about 12 000 tonnes. In Division Vb, the catch was almost the same as in 1982.

The fishery on the S. mentella 'type oceanic' stock took place outside the 200 nm zone in Sub-areas XII and XIV, and the catches amounted to 60 581 tonnes in 1982 and about 60 000 tonnes in 1983. These catches are not included in the present assessment.

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

Fishing mortality shows an increasing trend in recent years, following the trend in catches with a slight reduction in the 1983 estimate. Total biomass (7+) increased continuously from a stable level of about 0.8 million tonnes in the 1967-72 period to about 1.2 million tonnes by 1979 and remained at this level. Some stability might have been artificially introduced, however, by using average recruitment from 1980 onwards in the assessment.

In the catch projection, an average recruitment of 350 million 7 year old fish was used.

In the absence of any indication of the likely total catch level of S. marinus from the Irminger Sea stock complex in 1984, a catch of 110 000 tonnes was assumed to be taken in that year (excluding catches from the S. mentella 'type oceanic' stock).

Sebastes marinus — ICES Sub-areas V and XIV

1984				Management option for 1985 and 1986	1985				1986			1987	
Stock biom. (7+)	Spawning stock biom.	F (14-23)	Catch (7+) 1)		Stock biom. (7+)	Spawning stock biom.	F (14-23)	Catch (7+)	Stock biom. (7+)	Spawning stock biom.	Catch (7+)	Stock biom. (7+)	Spawning stock biom.
1125	423	0.30	110	$F_{0.1}$	1110	423	0.05	20	1190	500	26	1260	570
				F_{max}			0.10	40	1170	480	47	1220	530
				$F = F_{1983}$			0.28	104	1100	430	105	1090	430
				$F = 0.75 \times F_{1983}$			0.21	80	1130	450	84	1140	460

Weights in thousand tonnes.

1) Expected catch estimated by the Working Group.

The options in the text table on p.15 refer to a catch level in 1984 of 110 000 tonnes. The weights given in the table (and in Figure B.4.1) can be corrected by adding (if the catch is below 110 000 tonnes) or subtracting (if the catch is higher than 110 000 tonnes), the following percentages for each 10 000 tonnes deviation:

Catch:	3.6%
Spawning stock biomass:	2.3%
Total biomass (7+):	1.1%

Fishing at the 1983 level of exploitation in 1985 and 1986 would maintain the present catch level and would also maintain the total biomass and the spawning stock biomass.

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

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

The assessment of S. marinus was based on the estimated effort for this species in the Icelandic fishery. An attempt was made to apply the same approach to S. mentella, but the results were not sufficiently reliable to form the basis for management advice.

ACFM therefore recommends a precautionary TAC of 25 000 tonnes in 1985 and 1986, which is the same as the recommended TAC for 1984 and corresponds to the average catch in the period 1977-80.

B.4.4 Note on the Mentella 'Type Oceanic' Stock in Sub-areas V and XIV

ACFM appreciated that USSR data on this stock were submitted to this year's meeting. The documents include data from the fishery in 1982 and 1983. Some Icelandic data were also available. The time series, however, is too short to allow an assessment of this stock to be made at present. Hydroacoustic estimates in July indicated a stock size of 560 000 tonnes and 700 000 tonnes in 1982 and 1983, respectively.

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

B.5.1 Recent catches and TACs, in thousand tonnes:

1979		1980		1981		1982		1983		1984
Rec TAC	Actual catch	Rec TAC	Actual catch	Rec TAC	Actual catch	Rec TAC	Actual catch	Rec TAC	Actual catch	Rec TAC
15	24	15	31	15	20	19 2)	32	24 2)	30 1)	23 2)

1) Preliminary
2) Catch level preferred by ACFM

Of the total catch of 30 560 tonnes in 1983, 93% was taken by Icelandic vessels.

The pattern of the Icelandic Greenland halibut fishery in 1983 was completely different from that in the preceding years. For this reason, the cpue figures, on which the previous assessments were based, cannot be used to estimate fishery mortality in 1983. Therefore, the results of an analytical assessment attempted by the Working Group are not sufficiently reliable to form the basis of management advice.

The previous assessment, however, indicates an increasing trend in total stock biomass in the 1975-82 period to a level of about 275 000 tonnes. Spawning stock biomass increased continuously from 60 000 tonnes in 1975 to 120 000 tonnes in 1980 and remained at this level.

ACFM recommends a precautionary TAC to be set for 1985 and 1986 based on historic catch levels (Table B.5.1).

B.6 Stocks off East Greenland

B.6.1 Cod Stocks off East Greenland

At its November 1983 Meeting, ACFM recommended a preliminary TAC of 6 000 tonnes for this stock in 1984, based on preliminary results of the 1983 autumn groundfish survey carried out by the Federal Rèpublic of Germany in East Greenland waters. The Working Group on Cod Stocks off East Greenland met at ICES headquarters from 18-24 January 1984 to analyse the final results of this groundfish survey and review the preliminary assessment made during the last ACFM Meeting.

B.6.1.1 The Fishery in East Greenland Waters

Recent catches in '000 tonnes and recommended TACs:

1979		1980		1981		1982		1983		1984
Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC	Actual catch	Rec. TAC
	34 1)		12 4)		16 4)	12 2)	27 4)	3)	13	6

1) Including estimates by the Working Group of unreported catches.
2) Revised.
3) ACFM advised no directed cod fishery for the remainder of 1983 (June-December).
4) Including estimates of marketable discards.

The major part of cod catches from East Greenland waters are obtained by trawlers either from directed cod fishery or as by-catch in the redfish fishery. The fishery takes place on the offshore banks and along the slopes of the Greenland Shelf from Dohrn Bank southwards to Cape Farewell.

The total catches from Sub-area XIV (Table B.6.1) have fluctuated without trend during recent years. The catch in 1983 was 12 819 tonnes, which is half of the 1982 catch.

Due to directed cod fishery in 1983, discarding of marketable cod, which took place in the directed redfish fishery in 1980-82, ceased in 1983.

In 1983, about 80% of the trawler catches were taken during the first half of the year. Of the total catch, 300 tonnes were taken by long-lines as by-catch in an experimental fishery for tusk, and 41 tonnes were taken in pound-nets in the Angmagssalik district.

B.6.1.2 Groundfish Biomass Survey Results

The information available from the commercial fishery does not adequately reflect the situation and the development of the East and West Greenland cod stocks and hence does not allow valid assessments based on fishery data. Consequently, the existing groundfish survey programs off East and West Greenland conducted by the Federal Republic of Germany were continued in order to obtain reasonable estimates of the trawlable biomass of cod in both areas.

Due to the considerable and variable migration which takes place in the East Greenland area (Figure B.6.1), the survey stock cannot be used directly for projection purposes.

Tagging experiments carried out in Greenland and Iceland show that mature cod in West Greenland migrate to East Greenland and some of them further to Iceland. Also, mature cod migrate from East Greenland to Iceland. Migration of cod from Iceland to Greenland waters hardly occurs and, therefore, the migrations from Greenland waters to Iceland can be regarded as a one-way emigration.

There is also larval drift with currents from Iceland via East Greenland waters to 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.

In order to arrive at an estimate of population size, which could serve as the basis for a projection, it was assumed that 5% of the West Greenland stock emigrates to the East Greenland area, and that 25% of the stock in the East Greenland area emigrates to Iceland, and corrections were made for the partial recruitment to the stock of 4- and 5-year-old fish.

B.6.1.3 State of the Stock and Management Advice

The total stock estimated is shown in the text table below.

East Greenland Cod, Summary of the Assessments

Year	Total stock No.	Total stock biom.	Spawning stock No.	Spawning stock biom.	$\bar{F}$(5-10)	Catch No.	Catch weight
1980	25	67	20	59	0.21	3.7	12*
1981	23	71	17	64	0.21	3.9	16*
1982	15	54	11	49	1.40	7.7	27*
1983	13	34	8	27	0.53	4.5	13
1984	(9)	(30)	(6)	(26)			

Estimates of stock size refer to 1 January.
Weights in thousands of tonnes, numbers in millions.

* Including discards of marketable cod.

( ) Estimates depending on constant emigration coefficient of 0.05 in the West Greenland population of age 6 and older.

Total biomass and spawning stock biomass decreased continuously from the 1981 level up to 1983. This reduction was the result of both emigration to Iceland and fishing. The high fishing mortality estimated for 1982 has undoubtedly played a major role in the reduction of the total stock biomass by 37%, and of the spawning stock biomass by 45% in that year.

The estimated stock size for 1984 as given in the text table on the previous page is below the 1983 level and heavily dependent on the estimate of the number of immigrants from West Greenland by the use of a constant emigration factor (0.05) for age groups 6 and older.

The survey estimates indicate, however, that there is no reduction in stock size from the 1982 survey to the 1983 survey. After application of the survey correction factors, no reduction is indicated in stock size from the beginning of 1983 to the beginning of 1984.

It has been explained above that projections cannot be based directly on the survey stock because of the considerable and variable migration of cod in this area. In view also of the wide confidence limits on the survey estimates, and since there is no basis at present for a revision of the West Greenland emigration coefficient, ACFM considers that this apparent discrepancy does not affect the validity of the calculations of stock and catch for 1984 nor the projection of spawning stock size in 1985.

Assuming different levels of fishing mortalities for 1984, catches in 1984 and resulting spawning stock biomass estimates in 1985 are shown in Figure B.6.2. Management options are given in the text table below.

<u>Management Options for cod in Sub-area XIV</u>

1983				1984				1985
Total stock biom.	Spawn. stock biom.	$\bar{F}_{(5-10)}$	Catch	Total stock biom.	Spawn. stock biom.	Management options $\bar{F}_{(5-10)}$	Catch	Spawn. stock biom.
34	27	0.53	13	30	26	$\bar{F}_{84}=0.5\times\bar{F}_{83}=$ 0.27	6	26
						$\bar{F}_{84}=0.8\times\bar{F}_{83}=$ 0.42	9	23
						$\bar{F}_{84}=\bar{F}_{83}=0.53$	10	22

Estimates of stock size refer to 1 January.
Weights in thousands of tonnes.

Spawning stock biomass figures for 1985 include immigrants in 1985, which have been calculated on the basis of the NAFO assessment for the West Greenland cod stock assuming a catch of 62 000 tonnes in 1983 and 1984 and a constant emigration coefficient of 0.05 for age groups 6 and older. No projection is given for the total biomass, since this would require information on recruitment which is not available.

The size of the spawning stock since 1980 has been determined entirely by the strong 1973 year class, which is not expected to make a significant contribution to the catch or to the spawning stock in 1984. The only year class which at present is of some importance at East Greenland is the 1977 year class. However, it appears to be considerably smaller as compared to the 1973 year class.

By maintaining the 1983 exploitation level in 1984, the spawning stock biomass will be at a very low level in 1985. As a yield per recruit approach is not meaningful due to migration, the management objective is to maintain a viable spawning stock.

A further decline in the already low spawning stock biomass should therefore be prevented. By maintaining the preliminary 1984 TAC, a further decrease of the spawning stock can be halted.

<u>ACFM therefore recommends that the preliminary 1984 TAC of 6 000 tonnes should be the final TAC for 1984.</u>

No data were available to allow an extension of the catch projections to 1985. Assessment and management options for 1985 can therefore not be made until the results of the 1984 autumn groundfish survey are available.

B.6.1.4 <u>Interaction between Cod and Redfish Fisheries at East Greenland</u>

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.

<u>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.</u>

B.6.2 <u>Pandalus borealis in East Greenland Waters</u> (Denmark Strait, Div. XIVb - Va)

Recent catches (in tonnes):

1978	363
1979	1 285
1980	8 260
1981	4 792
1982	4 902
1983	4 129*

* Provisional data

This stock has been assessed by the Scientific Council of NAFO, and management advice for 1984 has been passed on to managing bodies in the Provisional Report of the Scientific Council, January 1984. The main fishing season is in April-June.

No firm conclusions about the trend in catch rates in recent years could be reached, but the Scientific Council of NAFO urges that a cautious approach to exploitation be maintained because little is known of the recruitment to this stock, and because this stock lives under extreme environmental conditions and may be very sensitive to overexploitation. It is, therefore, advised that the overall TAC for 1984 should not exceed the previously advised level of 4 200 tonnes.

ACFM endorses the NAFO recommendation and would like to repeat its concern, expressed in its 1983 report, that even this TAC might mean an increase in fishing mortality.

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 1983 was entirely based (99.7%) on Icelandic summer spawners.

The landings of summer-spawning herring from 1974-83 are given in Table B.7.1.1. The 1983 landings amounted to about 58 700 tonnes. Of these, about 18 300 tonnes were taken in drift nets, 900 tonnes by set nets and 39 500 by purse seines. The fishery took place during the last four months of the year. The text table below gives the catches, the TAC set and the TAC recommended during the last four years for this fishery.

Landings and TACs (in tonnes x 10^{-3}) of Icelandic summer-spawning herring in 1980-83

Year	Landings	TACs	Rec. TACs
1980	53.3	50.5	45.0
1981	39.5	42.5	40.0
1982	56.5	50.0	50.0
1983	58.7	52.5	50.0

In 1983, the age distribution is very much predominated by the strong 1979 year class. Out of 280 million herring caught in 1983, 80 millions were immature or about 30% by number. This is the highest proportion of immature herring in this fishery for several years and is associated with the recruitment of the very strong 1979 year class.

B.7.1.2 The state of the Icelandic summer-spawning herring has been monitored by acoustic abundance surveys since 1973.

During the period December 1983 - January 1984, large concentrations of herring were assembled at the head of one fjord at east Iceland. In addition, some concentrations had also assembled at the western south coast of Iceland. Repeated acoustic estimates were obtained on these concentrations, and the calculated biomass on the wintering grounds was about 310 000 tonnes of herring. Of these, about 250 000 tonnes were assembled at the head of one east coast fjord. Based on 6 trawl hauls, about 90% of the herring in that fjord belonged to 1, 2, and 3-ringers with very few older herring in the samples. In the trawl samples taken at the south coast the proportion of older herring was considerably higher. The acoustic estimates thus obtained and the catches in 1983 were used to calculate the fishing mortalities in 1983. On this basis the fishing mortality for the adult herring was F = 0.3.

B.7.1.3. Using the catch at age data and input Fs as described above, a VPA was run. The results of this assessment indicate that the fishing mortalities during the period 1978 to 1982 have been considerably higher than assessed previously and the spawning stock has correspondingly been about 25% lower than previously assessed for that period. With the recruitment of the strong 1979 year class there is, however, a sharp increase in the stock abundance in 1983 and 1984.

There may be several reasons for the difference between this assessment and the previous ones. During the acoustic surveys in the winter 1983/84 the major part of the herring was concentrated at the head of one narrow fjord. Sampling with pelagic trawl under these circumstances can be very difficult and it is possible that the younger year classes have been overestimated with a corresponding underestimate of the older year classes. In the VPA this would result in higher fishing mortalities on these year classes during the last four years or so. It is also possible that the older year classes were not present in the east coast fjords when the survey was carried out in December 1983.

According to the present assessment the spawning stock biomass increased from about 11 000 tonnes in 1972 to about 170 000 tonnes in 1978. During the period 1979-1982 it has remained between 170 000 and 200 000 tonnes. In 1984 the spawning stock is expected to increase to about 260 000 tonnes.

B.7.1.4. Projections of stock abundance and catches in thousands of tonnes for a range of values of Fs are given in the text table below.

1983			1984			1985
Spawning stock at 1 July	Catch	F	Spawning stock at 1 July	F	Catch	Spawning stock at 1 July
205	59	0.3	260	0.15	36	290
				$0.21 = F_{0.1}$	50	275
				$0.30 = F_{83}$	68	260

During the last five years (1979-83), the fishing mortality in the adult component of this stock has been about 0.3. This is well in excess of the $F_{0.1}$ level.

Despite this, the spawning stock abundance is increasing at present due to the recruitment of the strong 1979 year class. ACFM prefers that the exploitation rate of this stock in 1984 should be reduced to the $F_{0.1}$ level, corresponding to a TAC of 50 000 tonnes. There is no severe reduction in catches because of the relatively high level of recruitment at present.

B.7.2 Norwegian Spring Spawners

Recommended TACs, quotas and catches in recent years are given below ('000 tonnes):

1981			1982			1983			1984		
Rec. TAC	Nat. quota	Catch*)	Rec. TAC	Nat. quota	Catch*)	Rec. TAC	Nat. quota	Catch*)	Rec. TAC	Nat. quota	Catch
0	9.3	12.8	0	12.0	16.7	0	21.0	23.1	38.0	38.0	

*) 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 1981-83.

The commercial fishing season was restricted to 22 August 1983 - 1 March 1984. A minimum landing size of 25 cm, with allowance of 15% undersized fish (by weight) was in force. The reported catch in the autumn fishery in 1983 was 13 270 tonnes consisting predominantly of 4-year old herring (1979 year class).

By-catches of 0-group herring in the sprat fishery occur frequently. Catches containing up to 50% of 0-group herring can be landed in the sprat fishery. The by-catches increased in 1982, and particularly in 1983, compared to previous years. This is associated with the strength of the year classes, the 1983 year class being extraordinarily strong.

State of the Stock

As in previous years, data from tagging constitute the main basis for the assessment of the stock. The Norwegian tagging project started in 1975, and 25 000 - 40 000 herring have since then been tagged annually. In the winter of 1984, a catch of 7.5 million herring was effectively screened for tags and 304 tags were recovered.

Based on the tagging data, the total spawning stock biomass in 1984 is estimated at 640 000 tonnes. This is about the same size of spawning stock as estimated in 1983. The average annual total mortality in the period 1975-83 is estimated at 0.20.

The acoustic abundance estimates of 0-group herring obtained in November-December show that the 1983 year class is extraordinarily strong, about 30 times the average strength of the year classes 1975-82 and is comparable to the strength of the strong year classes before the collapse of the stock in the late 1960s.

The results of the 1984 international 0-group survey indicated that the 1984 year class is also above the 1975-82 average in strength but much less abundant than the 1983 year class.

Management Advice for 1985

Management options for 1985 are given in the text table below ('000 tonnes):

1984				1985				1986	
SB	SSB	F_{4+}	C	SB	SSB	F_{4+}	C	SB	SSB
926	616	.05	37	1 376	595	0	0	1 831	734
						.03	24	1 810	717
						.06	48	1 788	702
						.10	79	1 762	677
						.15	117	1 729	650

SB = stock biomass
SSB = spawning stock biomass
C = catch

The results of the projection are in agreement with those from last year. The spawning stock will not change to any appreciable level from 1984 to 1985, but both the total stock biomass and the spawning stock biomass will increase in 1986, largely because of the presence of the 1982 and 1983 year classes. The 1983 year class is very strong and should greatly improve the recruitment to the spawning stock in the years 1986-88. However, since this is the first year class within a period of 20 years which seems strong enough to increase the stock size to a level comparable to that observed before the collapse, caution should continue to be exerted to ensure the year class is not to be exploited before it is mature.

In accordance with the objective of rebuilding the stock, ACFM considers that the fishery should be maintained close to its recent level until the 1983 year class has recruited to the adult stock. ACFM therefore recommends that the TAC in 1985 should not exceed 50 000 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 North-East 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 (Figure B.7.2). However, if the 1983 year class is not fished as juveniles, the spawning stock could be rebuilt rapidly in 1986-88.

ACFM, therefore, repeats the recommendation from last year that a minimum landing size of 27 cm be introduced for herring in 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 from 1980-84 ('000 tonnes) are given in the text table below.

1980			1981			1982			1983			1984		
Rec. TAC	TAC	Catch	Rec. TAC	TAC	Catch	Rec. TAC	TAC	Catch	Rec. TAC	TAC	Catch	Rec. TAC	TAC	Catch
1 600	1 600	1 649	1 900	1 900	1 987	1 600	1 700	1 759	2 300	2 300	2 309	1 100	1 400	

These TACs have been recommended by a bilaterial USSR/Norwegian assessment group. For the year 1984, ACFM recommended a TAC of 1.1 million tonnes and USSR and Norway agreed to limit their total catch to 1.4 million tonnes.

State of the Stock

The assessment of the Barents Sea capelin is based on acoustic surveys carried out jointly between USSR and Norway in September-October each year. The 1984 survey gave the following abundance estimated by year classes:

Year class	Number x 10^{-9}	Mean weight (g)	Biomass (tonnes x 10^{-6})
1983 (1982)	145 (515)	3.7 (3.1)	0.54 (1.61)
1982 (1981)	184 (200)	7.4 (9.5)	1.37 (1.89)
1981 (1980)	48 (38)	18.2 (18.9)	0.87 (0.72)
1980 (1979)	3 (+)	27.1 (19.4)	0.09 (0.01)

The estimates of the same age groups in 1983 are shown in parentheses for comparison. The abundance of the 1-year olds is about 25% of that of the 1-year olds measured last year. The abundance of the 2-year olds is only slightly less than last year's measurement, but due mainly to a considerable drop in the mean weight for this age group, the biomass is 25-30% lower as compared to last year. The 3-group is about 25% more abundant than the 3-group measured last year.

The total stock biomass is estimated to be 2.9 million tonnes, compared to 4.2 million tonnes in 1983.

The low 2-group growth observed in 1984 is probably caused by a great shift in the distribution of capelin this year compared to the distribution of capelin observed in the early 1980s.

Management Advice for the Winter Fishery in 1985

A capelin model using data for the period 1973-80 (Hamre and Tjelmeland, 1982) yielded a value for the optimal spawning stock of about 400 000 tonnes.

A model based on long-term averages should be used with caution in situations of great variability in the population parameters, which has been the case since 1980.

Nevertheless, the results from the model should be taken into account when the TAC for the winter fishery is assessed. Based on an updated model, the following correspondence between winter 1985 catch and spawning biomass is obtained ('000 tonnes):

Catch	231	404	534	631
Spawning biomass	605	449	332	246

Based on these calculations and taking into consideration the present uncertainties concerning the dynamics of the stock, ACFM advises that a cautious approach should be taken when the TAC is set for the winter fishery in 1985. ACFM recommends that the TAC for the winter fishery in 1985 should not exceed 500 000 tonnes.

Management Advice for the Autumn Fishery in 1985

ACFM points out, as in 1983, that the prognosis 1½ years ahead of time in order to give TAC advice on the autumn fishery involves highly uncertain predictions of growth and recruitment.

The autumn catch in 1985 is expected to consist mainly of the 1982 and 1983 year classes.

It is difficult to judge whether the extremely low abundance of 1-year old capelin observed in 1984 is reliable. It may indicate, however, that the biomass which will be the basis for the autumn fishery in 1985 and the winter fishery in 1986 could be considerably lower than in previous years. The catch in the autumn 1983 was about 1 200 000 tonnes and the agreed quota for autumn 1984 is 800 000 tonnes.

In view of the above considerations, ACFM recommends that the TAC for the autumn season 1985 should not exceed 500 000 tonnes.

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

Catches and TACs (in '000 tonnes) are shown for recent years in the text table below:

1980/81			1981/82			1982/83			1983/84		
Pred. TAC	Agreed TAC	Catch	Pred. TAC	Agreed TAC	Catch	Pred. TAC	Agreed TAC	Catch	Rec. TAC	Agreed TAC	Catch
775	450	680	700	-	626	-	0	0	375	640	570

B.8.2.1 Advice from the May 1984 ACFM Meeting

On the basis of the results of the Icelandic-Norwegian acoustic survey in October 1983, ACFM recommended at its November 1983 meeting that a TAC of 375 000 tonnes be set for the autumn 1983/winter 1984 season. The October survey data also indicated a TAC of about 100 000 tonnes for the autumn 1984/winter 1985 season. However, in view of the very low abundance of this stock in recent years as well as the extremely low 1982 0-group index, the Working Group recommended that a preliminary TAC of 50 000 tonnes be set for the autumn fishery in 1984. It was stated that this TAC should be re-assessed and adjusted if necessary when a new stock abundance estimate became available.

In January/February 1984 Iceland carried out an acoustic survey of the Icelandic capelin stock. The TAC recommendation for the 1984/85 season in this ACFM report is based entirely on this survey.

The Autumn 1983/Winter 1984 Fishery

The total international catch from 1964 onwards is shown in Table 1.

In the autumn of 1983, the first catches were made in the 2nd week of November off the central N-coast of Iceland. From there the fishery gradually shifted eastwards, the December catches mainly being taken off the northern E-coast. The total catch in November-December 1983 was about 133 000 tonnes.

In January 1984, capelin recordings off E-Iceland were scattered and mostly below purse-seining depth. The situation did not improve until in the beginning of February in the area south of Stokksnes on SE-Iceland. Fishing was extremely good in February but somewhat restricted in March by frequent spells of bad weather. The catch in the period January - April 1984 was just under 440 000 tonnes. The total catch for the autumn 1983/winter 1984 season thus amounts to 573 000 tonnes.

The January/February Stock Abundance Estimate

In the time period 11 January - 9 February 1984, Iceland carried out an acoustic survey of 2-4 group capelin (year classes 1980-1982). In this survey, the abundance of the 1984 spawning stock was assessed in February off S- and SE-Iceland, while the immatures were recorded in January off E-, N- and NW-Iceland.

On 21 February, a meeting of scientists from the European Commission, Denmark, Norway and Iceland was held in Reykjavik to consider the state of the Icelandic capelin stock in view of the findings of this survey. Their findings were passed on to ACFM.

The total biomass of the 1984 spawning stock was estimated to be 893 000 tonnes, while the abundance estimate of juvenile capelin of the 1982 and 1981 year classes amounted to 51.8 and 16.2 x 10^9 fish, respectively.

The Icelandic winter 1984 spawning stock biomass estimate is approx. 30% in excess of the prognosis based on the Icelandic-Norwegian survey carried out in October 1983, when account has been taken of the catch and natural mortality during the intervening period.

Comparing the present results to the input data of the October prognosis it appears that the difference between the autumn 1983 and winter 1984 estimates has two main causes.

1) The observed average individual weight in the spawning stock is higher than expected (20.2 g as against 17.5 g).

2) A larger proportion of the stock has matured to spawn than was forecast on the basis of data from the October survey.

Using the accepted criteria for natural mortality of mature capelin of M = 0.08/month for February and March and allowing 400 000 tonnes to spawn in 1984, the Icelandic winter survey estimate of the capelin spawning stock biomass corresponds to a catch of 400 000 tonnes from 9 February to the end of the 1984 winter season (April).

This represents an increase of 265 000 tonnes from the TAC of 375 000 tonnes previously recommended for the 1983/84 season or a total of 640 000 tonnes.

TAC for the Autumn 1984/Winter 1985 Season

The main contributor to the 1985 spawning stock will be the 1982 year class. In addition, a proportion of the 1981 year class will not mature in 1984 and, therefore, also contribute to the 1985 spawning stock.

Using the data on these year classes obtained in the October 1983 survey, ACFM indicated that it would be possible to fish about 100 000 tonnes in the period August 1984 - March 1985 and allowing 400 000 tonnes to spawn.

During the Icelandic acoustic survey in January 1984, new estimates of the 1982 and the immature proportion of the 1981 year classes were obtained. The new estimate is substantially higher for the 1982 year class but somewhat lower for the 1981 year class than obtained in the October 1983 survey. It should be noted that there exist no comparable abundance estimates of juvenile capelin in winter.

However, on the basis of the new estimate and using the same assumptions for natural mortality as in previous ACFM reports (M = 0.04/month, April-December), as well as the mean weight at age obtained in the October surveys in 1973-83 (2-group = 17.3 g; 3-group = 24.3 g) it is calculated that the maturing stock will be about 900 000 tonnes in the autumn of 1984.

The above stock abundance estimate allows a preliminary TAC of about 300 000 tonnes for the 1984/85 season. This preliminary TAC should be re-assessed and adjusted if necessary when a new stock abundance estimate becomes available in autumn 1984.

B.8.2.2 Advice from the November 1984 ACFM Meeting

The 1983 autumn/1984 winter season opened in early November with a TAC of 375 000 tonnes. This catch quota was revised and increased to 640 000 tonnes after a new abundance estimate became available in early 1984.

Using data obtained during an Icelandic acoustic survey in January/February 1984, ACFM recommended at its May 1984 meeting that a preliminary TAC of 300 000 tonnes could be set for the 1984/85 season. ACFM advised that this TAC should be re-assessed and adjusted if necessary when a new stock abundance estimate becomes available in the autumn of 1984.

State of the Stock

The acoustic survey usually carried out in October did not take place this year due to unforeseen circumstances. However, new information on the abundance of the two maturing year classes, i.e., the 1981 and 1982 year classes, was obtained during the 0-group survey in the Iceland-Greenland area south of 69°N in August 1984.

Using these data, it is calculated that the maturing stock in October 1984 would be about 1 million tonnes.

During August 1984, a summer fishery of about 120 000 tonnes took place in the Jan Mayen area north of 69°N, i.e., outside the survey area.

Management Advice for the Fishery in Autumn 1984 - Winter 1985

Experience has shown that acoustic estimates derived from August surveys are underestimates and cannot be used for calculating the final TAC for this capelin stock. There are, however, strong indications, e.g., from 1-group estimates, that this stock is rapidly recovering, and the 1984 August survey results indicate that the preliminary TAC of 300 000 tonnes could be increased by some 50-100% without reducing the spawning stock below the target level of 400 000 tonnes.

Any TAC decisions taken on this basis should be reconsidered when a new stock abundance estimate becomes available later in the year or early in 1985.

Management Advice for the Autumn Fishery in 1985

In the absence of the results of the autumn 1984 and 1985 winter surveys, the ACFM was unable to provide advice on a preliminary TAC for the 1985 autumn season. The results from the above-mentioned surveys should be made available to the May 1985 ACFM Meeting, when a preliminary TAC for the 1985 autumn season can be recommended.

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

Recent catches and recommended TACs ('000 tonnes) are given in the text table below (SA = Sub-area).

Species	Stock	1981		1982		1983		1984
		Rec. TAC	Actual catch	Rec. TAC	Actual catch	TAC	Actual catch *	TAC
Saithe	NE Arctic (SA I & II)	123	175	130 1)	178	130 3)	158	103 3)
Saithe	North Sea (SA IV & Div.IIIa)	127	127	100 1)	160	97 3)	166	160 3)
Saithe	Iceland (Div. Va)	72	59	62 1)	69	66 1)	58	70 1)
Saithe	W.of Scotland (SA VI)	27	24	25 2)	24	23 4)	26	27 4)
Saithe	Faroe (Div.Vb)	29	30	29 1)	31	26 1)	39	20-25 2)
Cod	Faroe Plateau Sub-Div.Vb_1)	14	23	20 1)	21	23 3)	38	25 1)
Cod	Faroe Bank (Sub-div.Vb_2)	2	1.2	2 2)	2.3	2 2)	2.3	2 2)
Haddock	Faroe (Div. Vb)	15	11	14 1)	10	10 1)	12	14 4)

* Preliminary. 1) Catch level preferred by ACFM. 2) Precautionary TAC.
3) F_{max} 4) $F_{0.1}$ level

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

C.1.1 North-East Arctic Saithe

Quota restrictions on non-Norwegian trawlers resulted in an important decrease of landings in 1976-77, followed by a period of relative stability (150 000 - 180 000 tonnes/year) from 1978 onwards. Landings amounted to 178 000 tonnes in 1982, 158 000 tonnes in 1983 (the recommended TAC was 130 000 tonnes in both years).

The Norwegian fleet is not restricted by quotas but subject to technical measures (mesh size for trawlers and minimum landing sizes depending on area), the effects of which are not yet clear in terms of fishing mortality.

Immature fish (less than age 6) still make up a predominant part (91% in 1983) of the catch in number.

The revised data base has been used and updated. Effort and cpue data by different fleet categories from Norway were available (although part of them was missing for 1983 due to the early timing of the meeting). These were inconclusive for the determination of fishing mortalities in 1983, since some of the fleets are subject to different constraints (market restrictions, quotas on other species), which result in changes in the directivity of effort, although their respective level of effort is rather stable.

Trends in yield, fishing mortality, recruitment and stock size are given in Figure C.1.1.

In 1983, there were marketing problems which may have caused a reduction in purse-seine fishing effort. Since the assessment assumed unchanged fishing mortality in 1983, the strength of age groups 2 and 3 in the stock might be underestimated.

The assessment indicates a shift in effort towards larger fish by both trawlers and purse seiners in recent years.

The need to improve the exploitation pattern by reducing the catches of young saithe has repeatedly been stressed by ACFM since 1980, and any significant improvement implies a reduction in the purse-seine fishery. Such a reduction can most effectively be obtained either by increasing the minimum landing size or by imposing quota regulations on the purse-seine fishery.

With the present exploitation pattern, the average fishing mortality on ages 3-8 (0.55) exceeds F_{max} (0.30).

Management options are given in the text table below and in Figure C.1.1

Species: Saithe   Area: North-East Arctic

1984				Management option for 1985	1985				1986	
Stock biomass	Spawn. stock biom.	$\bar{F}_{(3-8)}$	Total landings		Stock biom.	Spawn. stock biom.	$\bar{F}_{(3-8)}$	Total landings	Stock biomass	Spawn. stock biom.
521	141	0.55	126	$\bar{F}_{0.1}$	574	112	0.17	49	748	123
				$\bar{F}_{max}$			0.30	85	702	108
				$\bar{F}_{85}=\bar{F}_{83}$			0.55	137	634	87

Weights = t x 10^3
Recruitment = 1960-79, R_1 = 318 x 10^6
Stock biomass = 1+ fish
Spawning stock biomass = 6+ fish
Exploitation pattern = 1980-82 average.

<u>ACFM recommends that the exploitation level should be reduced towards F_{max} as quickly as possible.</u>

C.1.2 North Sea Saithe (Sub-area IV and Division IIIa)

Landings of saithe from the North Sea amounted to 162 000 tonnes in 1982 and 165 000 tonnes (WG estimate) in 1983, exceeding in both years the recommended TACs (the agreed TAC for 1983 was 158 000 tonnes). These figures include by-catches in industrial fisheries of 5 000 tonnes in 1982 and 1 400 tonnes in 1983.

Human consumption landings show a further increase from the 1979 level, following the very sharp decrease in 1976-78. Industrial by-catches were somewhat higher than in recent years, but much lower than in the years prior to 1979.

Trends in yield, fishing mortality, recruitment and stock size are given in Figure C.1.2.

As compared to the previous 3 years, the proportion of immature (less than 5 years old) fish in the catches in number decreased to 64%. This is partly due to the recruitment of the adult stock of the good 1978 year class, which contributed to the large catch of young fish.

Use was made of effort and cpue data available for French trawlers (based on a new index of effective effort) and Norwegian side- and stern trawlers. All three data sets indicate a further reduction in total fishing effort in 1983, but an increase in cpue as compared to 1980-82.

The current level of fishing mortality ($\bar{F}_{3-6}$ = 0.25) is close to F_{max}(0.24) under the assumed exploitation pattern.

The assumed strength of the 1982 year class may be rather optimistic, but this will have only a minor effect on predictions of spawning stock biomass. The estimate of total stock biomass in 1986, however, is less reliable as a consequence of this assumption.

Following a sharp decrease between 1973 and 1978, the spawning stock biomass has been increasing as a result of lower fishing intensity and is expected to increase further as a result of the recruitment of recent good year classes.

Management options are given in the text table below and in Figure C.1.2.

Species: Saithe Area: North Sea (SA IV and Div.IIIa)

1984				Management option for 1985	1985				1986	
Stock biomass	Spawn. stock biom.	$\bar{F}_{(3-6)}$	Total land-ings		Stock biom.	Spawn. stock biom.	$\bar{F}_{(3-6)}$	Total land-ings	Stock biomass	Spawn. stock biom.
1 030	510	0.25	185	$F_{0.1}$	1 053	536	0.14	117	1 141	713
				F_{max}			0.24	190	1 050	639
				$\bar{F}_{85} = \bar{F}_{83}$			0.25	195	1 045	634

Weight in thousand tonnes
Recruitment 1982-86 = R_1 = 210 million
Stock biomass = fish at age 1+
Spawning stock biomass = fish at age 5+
Exploitation pattern: as for 1983.

ACFM prefers that the 1985 TAC be not greater than 195 000 tonnes, which approximates to the F_{max} level of exploitation.

C.2 Icelandic Saithe (Division Va)

Landings continue to fluctuate between 50 000 tonnes and 70 000 tonnes since 1977 with catches of 69 000 tonnes in 1982 decreasing to 59 000 tonnes in 1983, well below the recommended TAC of 66 000 tonnes. Icelandic vessels account for 97% of these catches (about 1/3 by gill-net vessels on mature fish and 2/3 by trawlers on age groups 4-8).

Data on effort by trawlers were available, but their effort can be directed towards saithe, cod or redfish depending on the availability of these species, and this effect is very difficult to take into account in fishing effort/fishing mortality relationships. In addition, total effort by this fleet shows limited variations with time.

On the other hand, a satisfactory relationship was obtained between catch per unit of effort directed towards saithe and the biomass of age groups 5-8 incorporating 50% of the 4-year old to account for partial availability of these fish on the trawling grounds. Using the exploitation pattern in recent years, fishing mortalities in 1983 were determined according to this relationship.

Trends in yield, fishing mortality, recruitment and stock size are shown in Figure C.2.1.

At present, the fishing mortality level ($\bar{F}_{4-9}$ = 0.34) lies between F_{max} = (0.42) and $F_{0.1}$ = (0.16).

The spawning stock biomass declined continuously from 1969 to 1980, since when it seems to have been stabilised.

Except for year classes 1975 and 1976, recruitment is at quite low levels since 1969 as compared to the early 1960s year classes. The 1981 year class might be of above average abundance.

Management options are given in the text table below and in Figure C.2.1.

Species: Icelandic Saithe — Area: Division Va

1984				Management option for 1985	1985				1986			
Stock biomass 3+	Spawn. stock biom.	$\bar{F}_{(4-9)}$	Total landings		Stock biom. 3+	Spawn. stock biom.	$\bar{F}_{(4-9)}$	Total landings	Stock biomass 3+	Spawn. stock biom.	$\bar{F}_{(4-9)}$	Catch
296	156	0.37	60	$F_{0.1}$	300	143	0.16	25	346	182	0.16	31
				$F_{85} = F_{84}$			0.37	54	315	156	0.37	55
				F_{max}			0.42	59	309	151	0.42	58
				TAC 60 000			0.43	60	308	150	0.44	60

Weights in thousands of tonnes.

The 1984 catch is expected to be not greater than 55 000 - 60 000 tonnes, implying that fishing mortality will, therefore, be lower than the value of 0.46 which corresponds to the 1984 TAC (70 000 tonnes). A maintenance of F at about 0.4 is the appropriate level at which to exploit this stock, and ACFM therefore prefers that the TAC in 1985 and 1986 is not more than 60 000 tonnes.

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

Landings of saithe from Sub-area VI amounted to 24 000 tonnes in 1982 and 26 000 tonnes in 1983 (WG estimate). This is a small increase over recent years, and catches are much lower than in the early 1970s.

Effort and cpue data (based on a new index of effective fishing effort) by French trawlers indicate a continued decrease of effort in this area, and this was also experienced by the Scottish fleet.

Trends in yield, fishing mortality, recruitment and stock size are given in Figure C.3.1.

At present, the level of fishing mortality ($\bar{F}_{3-6}$ = 0.21) lies between F_{max} (0.29) and $F_{0.1}$ (0.18).

ACFM did not alter the assumed value of natural mortality (M = 0.2) since there is no supporting evidence for such a change.

Species: Saithe   Area: West of Scotland (SA VI)

1984				Management option for 1985	1985				1986	
Stock biomass	Spawn. stock biom.	$\bar{F}_{(3-6)}$	Total landings		Stock biom.	Spawn. stock biom.	$\bar{F}_{(3-6)}$	Total landings	Stock biomass	Spawn. stock biom.
195	131	0.21	25	$F_{0.1}$	191	130	0.18	21	192	129
				$\bar{F}_{85} = \bar{F}_{83}$			0.21	24	188	127
				F_{max}			0.29	32	178	119

Weights in thousands of tonnes
Recruitment 1984-86, R_1 = 26 000 tonnes
Stock biomass: fish at age 1+
Spawning stock biomass: fish aged 5+
Exploitation pattern 1984-86 based on 1983.

The present level of fishing mortality lies between the $F_{0.1}$ and F_{max} values, and therefore a catch of 25 000 tonnes, corresponding to a maintenance of this level of F, is the preferred level for a TAC in 1985.

At present, the apparent stability of the stock suggests that the maintenance of current catch levels would be appropriate for 1986 as well as 1985. ACFM, therefore, indicates a level of 25 000 tonnes as a preliminary 1986 TAC and will re-evaluate this advice in May 1985.

C.4 Demersal Stocks at the Faroes

In view of the mixed fisheries nature of exploitation of saithe, cod and haddock at the Faroes, an attempt was made to analyse catch and effort data for the various categories of Faroese vessels, taking the three species together.

There is no doubt that the effort by these vessels has increased since 1977, especially by virtue of the increased number of single boat and pair trawlers. In addition, technical improvements and improved knowledge of the grounds by new skippers are assumed to have increased the fishing power of the trawling fleets. Depending on the relative abundance of the species and on the market prices, however, the total effort may be directed towards the different species without any regular pattern. Such changes in directivity are quite difficult to handle in the interpretation of effort data, even for each given fleet category.

Despite difficulties in splitting the effort between the three species, it is evident that a major built up of overall fishing effort, especially in the trawl fisheries, has taken place in the demersal fisheries at the Faroes. This has led to an exploitation beyond the (biological) reference point, at least for saithe and cod.

C.4.1 Faroe Saithe (Division Vb)

Catches of Faroe saithe increased by more than 8 000 tonnes between 1982 (31 000 tonnes) and 1983 (39 000 tonnes). Faroese vessels account for 99% of the landings.

The analysis of effort data indicates a 52% increase of fishing effort by the demersal fleet between the reference period 1979-81 and 1983. Fishing mortalities in 1983 were adjusted accordingly, although an inspection of the cod/saithe cpue ratios for some categories in 1982 and 1983 (that also depend on relative recruitments) suggest that the 1983 fishing mortality may be overestimated.

Trends in yield, fishing mortality, recruitment and stock size are shown in Figure C.4.1.

The present level of $\bar{F}_{4-8}$ (0.45) is much higher than the $F_{0.1}$ value of 0.19. The spawning stock biomass has been decreasing slowly since 1972. Recruitment has had a downward trend in the 1970s, but apparently the 1978 and 1980 year classes are of the same order as the year classes in the late 1960s.

Management options are given in the text table below and in Figure C.4.1.

Species: Saithe Area: Faroes

1984				Management option for 1985	1985				1986	
Stock biomass	Spawn. stock biom.	$\bar{F}_{(4-8)}$	Total landings		Stock biom.	Spawn. stock biom.	$\bar{F}_{(4-8)}$	Total landings	Stock biomass	Spawn. stock biom.
172	80	0.45	42	$F_{0.1}$	164	98	0.19	19	178	110
				$\bar{F}_{85}=0.8\ \bar{F}_{83}$			0.36	33	162	95
				$\bar{F}_{85} = \bar{F}_{83}$			0.45	39	145	88

Weights in thousands of tonnes
Recruitment 1983-86 R_1 = 27.2 millions
Stock biomass: fish at age 1+
Spawning stock biomass: fish aged 5+
Exploitation pattern 1984-86 based on 1983.

The present level of F is far above any management reference point. ACFM therefore recommends that the level of exploitation should be reduced towards $F_{0.1}$.

C.4.2 Faroe Plateau Cod (Sub-division Vb_1)

Landings of Faroe Plateau cod increased more than 16 000 tonnes (77%) between 1982 (21 000 tonnes) and 1983 (38 000 tonnes), where the recommended TACs were 20 000 tonnes and 23 000 tonnes, respectively. More than 99% of the landings are by Faroese vessels.

As for saithe, the fishing mortalities in 1983 were adjusted according to the trends indicated by effort data. There is a possibility that the increase in fishing mortalities between 1982 and 1983 was under-estimated, no account being taken of changes in directivity.

Trends in yield, fishing mortality, recruitment and stock size are shown in Figure C.4.2.

A decline in spawning stock biomass in 1977-80 followed the recruitment of the poor 1975 year class. The 1978 and 1980 yearclasses are both of above average strength, and the spawning stock biomass is now increasing.

Management options are given in the text table below and in Figure C.4.2.

Species: COD Area: Faroe Plateau

1984				Management option for 1985	1985				1986	
Stock biomass	Spawn. stock biom.	$\bar{F}_{(3-6)}$	Total land-ings		Stock biom.	Spawn. stock biom.	$\bar{F}_{(3-6)}$	Total land-ings	Stock biomass	Spawn. stock biom.
145	90	0.42	37	$F_{0.1}$	137	82	0.13	12	155	98
				F_{max}			0.26	23	142	86
				$\bar{F}_{85} = 0.8\ \bar{F}_{83}$			0.33	29	136	80
				$\bar{F}_{85} = \bar{F}_{83}$			0.42	35	129	73

Weight in thousands of tonnes
Recruitment 1983-86 R_1 = 22.7 millions
Stock biomass: fish at age 1+
Spawning stock biomass: fish aged 4+
Exploitation pattern 1984-86 based on 1983.

Since the present level of fishing mortality ($\bar{F}_{3-6} = 0.42$) exceeds F_{max} (0.26) ACFM recommends a reduction of F towards this level.

C.4.3 Faroe Bank Cod (Sub-division Vb_2)

Landings amounted to 2 300 tonnes in 1982 and 1983 and were reasonably close to the precautionary TAC of 2 000 tonnes based on historic catches.

No data were available for carrying out an analytical assessment.

C.4.4 Faroe Haddock (Division Vb)

Landings amounted to about 13 000 tonnes in 1983 (12 000 tonnes in 1982). In recent years they have been stable at a low level, although they are close to the historical average. The recommended TACs were 14 000 tonnes in 1982 and 10 000 tonnes in 1983.

Trends in yield, fishing mortality, recruitment and stock size are shown in Figure C.4.4.

Data for Faroese vessels indicate a 22% increase of effort towards haddock in 1983 compared to the reference period, although a 12% decrease seems to have occurred between 1982 and 1983. Fishing mortalities in 1983 were scaled accordingly. The present level of fishing mortality (0.28) is slightly above $F_{0.1}$ (0.20).

After a period of stability, the spawning stock biomass has increased in 1974-77 following above average recruitments of the 1972-74 year classes. A declining trend is apparent since 1977, and is probably correlated with a series of poor recruitments. The1977 year class, in particular, has failed completely. The 1980 year class seems to be above average.

Management options are given below in the text table below and in Figure C.4.4.

Species: HADDOCK Area: Faroe area

1984				Management option for 1985	1985				1986	
Stock biomass	Spawn. stock biom.	$\bar{F}$ (4-6)	Total land-ings		Stock biom.	Spawn. stock biom.	$\bar{F}$ (4-6)	Total land-ings	Stock biomass	Spawn. stock biom.
83	58	0.28	12	$\bar{F}_{0.1}$	88	63	0.20	9	97	72
				$\bar{F}_{85} = \bar{F}_{83}$			0.28	12	94	69

Weights in thousands of tonnes
Recruitment 1983-86 R_1 = 37.2 millions
Stock biomass: fish at age 1+
Spawning stock biomass: fish aged 3+
Exploitation pattern 1984-86 based on 1983.

ACFM prefers that the exploitation rate should not rise above its present value, corresponding to catches not exceeding 12 000 tonnes in 1985.

D. NEAFC REGION 2 STOCKS

D.1 Herring Stocks South of 62°N

Introduction

The assessment and management of herring stocks was reviewed in great detail at the Aberdeen Symposium in 1978 (Saville, ed. 1980)*. The main conclusion of that thorough examination was that the experience throughout the two preceding decades had shown that herring stocks are more susceptible to collapse under excessive fishing pressure than most demersal ones. Therefore it is imperative that they be exploited at a relatively low rate of fishing mortality. This is especially important while stocks are being rebuilt and their assessment is subject to large uncertainties. This management policy would not only safeguard against future collapse of these stocks but would also reduce the likelihood of excessive fluctuations in catch and the need for frequent radical changes in management action.

On this basis, fishing at or near the $F_{0.1}$ level of fishing mortality is the preferred option by ACFM for herring stocks in general, at least until they are firmly re-established and stabilized.

D.1.1. North Sea herring

D.1.1.1. In 1983, herring fishing was allowed in all parts of the North Sea for the first time since 1977. The total catch of herring in 1983 was about 308 000 tonnes and the revised total catch in 1982 is 235 569 tonnes.

In both 1982 and 1983, approximately half of the catches were not officially reported (48% in 1982 and 57% in 1983). ACFM again stresses that the lack of accurate catch statistics is reflected in the reliability of the assessments for the various stocks. The catches and TACs for 1982 and 1983 are given in the text-table below for the three fishing areas in the North Sea.

	1982			1983		
	Catch	TAC	Rec. TAC	Catch	TAC	Rec. TAC
IVa	8.4	0	0	62.4	42.8	35
IVb	158.5	0	0	181.4 1)	29.2	27
IVc-VIId	68.7	72	60	64.4	73.0	36
Total	235.6	72	60	308.2	145.0	98

1) 160 000 tonnes juveniles plus 21 400 tonnes adults.

The total TAC agreed for the entire North Sea by Norway and the EEC was approximately 50% higher in 1983 than that advised by ACFM. In the event, however, agreement within the EEC was reached so late in the year that national quotas by divisions were not in all cases reached.

*) Rapp. P.-V. Réun.Cons.Int.Explor.Mer, 177, 1980.

The catches in Division IVa were 80% higher than advised by ACFM, and 45% higher than agreed by the management bodies. In Division IVc, the catch was 80% higher than advised by ACFM, although a strict comparison is not possible because the TAC was advised for the period October 1983 to March 1984. In Division IVb, by contrast, the catch of adults was significantly lower than either the TAC advised by ACFM or the TAC agreed by the management bodies.

Catches of juvenile herring increased very significantly from 78 000 in 1981 to 153 000 tonnes in 1982, taken in Division IVb. In 1983, they increased again to 160 000 tonnes, which is close to the maximum level recorded in 1972. In addition to the TAC agreement, the ban on directed fisheries for herring for industrial purposes was continued in 1983. A by-catch derogation of 10% herring was allowed in landings of sprat, and 5% by-catch of herring in small-mesh fisheries for other species of fish. Finally, the 20 cm minimum landing size regulation was also applicable in the North Sea in 1983.

D.1.1.2. 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 9 577 millions and 10 030 millions of 0-ringed fish in 1982 and 1983, respectively. The contribution of 0 and 1-ringed fish as a proportion of the total catch in number remained at the unprecedented level of 1981 (1981 = 95%, 1982 = 95%, 1983 = 92%). The effect of this fishery on the adult stock is dealt with in paragraph D.1.1.9.

D.1.1.3. From the commercial catches in 1983, it appears that year class 1980 contained an important component of southern North Sea herring, as predicted by the Working Group in its 1983 report on the basis of the length distribution of 1-group herring during the IYFS. The 1981 year class was estimated as 5.7×10^9 1-ringers from IYFS. Taking into account a catch of 1.147×10^6 1-ringers in 1983, the stock size of 2-ringers in 1984 is estimated as 4×10^9. The strength of the 1982 year class as 1-ringers is estimated at 7.5×10^9. Assuming that the fishing mortality on this year class as 1-ringers will be the same as for the preceding year classes (i.e. 0.24), the stock size as 2-ringers in 1985 should be 5.3×10^9. From these estimates, it is clear that two very strong year classes are about to recruit to the North Sea herring. Using the abundance of larvae in the IKMT surveys to obtain a first indication of recruitment for the central and northern North Sea stocks, it is clear from the 1984 survey that there is some optimistic indication for the recruitment to the central and northern North Sea stock for 1986, resulting from the 1983 year class.

D.1.1.4. Using the relationship (Wood, 1983) between the recruitment of 2-ringed fish to the southern North Sea spawning stock (Downs) and estimates of indices of year class abundance as 0-group fish on the East Anglian coast, it was estimated that the 1981 and 1982 year classes would recruit to the Downs stock as 1.2×10^9 and 1.1×10^9, respectively. In order to get a further estimate of the recruitment to the various North Sea spawning stocks, the length distributions from the IYFS were subjected to analysis by the Cassie method (Burd, C.M.1984/H:4). It was decided that the component extracted by the method would not be used to predict recruitment to the Divisions IVa and IVb spawning stocks, respectively. Only the lower length group (13.0 cm) associated with the Downs regression could be accepted. Based on this method, the estimated number of 2-ringers (1981 year class) recruiting to the Downs stock is 0.74×10^9. This was taken as a confirmation of the order of magnitude of the 1981 year class as recruiting fish to the Downs stock as derived from the 0-group surveys. For prediction purposes, a recruitment of 1×10^9 has been chosen as number of 2-ringers recruiting to the Downs stock of both the 1981 and 1982 year classes.

Because of the failure to quantify recruitment to the stocks in Divisions IVa and IVb separately, it proved necessary to combine the two areas for prediction and the estimate of the 1981 year class was set at 3.1×10^9 by subtraction of the Downs estimate from the total North Sea. A similar method was used to estimate the recruitment of 2-ringers from the 1982 year class in 1985.

D.1.1.5. In recent years, the state of the three North Sea herring stocks has been monitored by acoustic and larval surveys. During the last two years (1982-83) there has been no increase in the larval production in the Shetland - Orkney area. The larval production has on the other hand increased sharply both in the central and the southern North Sea. The larval production in the central North Sea has in recent years mainly been based on herring spawning off the north-east English coast. Some minor spawning has also taken place in the Buchan area off the Scottish coast. In 1983, there was a major increase in larval production in the Buchan area. These were old spawning grounds much used by the herring stock in the northern North Sea in earlier years, but have only been revisited on a large scale in 1983. Since the Buchan component is likely to be fished mainly in Division IVa, and to a much lesser degree in Division IVb, it was considered more appropriate to include the Buchan spawning component with the Orkney - Shetland one, and thus the herring spawning off the north-east English coast is the true central North Sea herring stock (Bank herring).

D.1.1.6. Based on estimates from the ICES coordinated acoustic surveys in the Orkney - Shetland areas, the spawning stock in Division IVa was estimated to be about 250 000 tonnes in 1983, using the weight data obtained during the survey. The population in number was somewhat arbitrarily increased by 20% to account for fish known to be in the Buchan area (the northern part of Division IVb) at the time of the acoustic survey. The resulting stock in number data and the catches in number of herring in Division IVa were then used to calculate an input F for a VPA analysis of the recent history of the stock. The results of this VPA indicate that a progressive growth has taken place in the Division IVa and Buchan stocks, due to increments from the 1979 and 1980 year classes.

Based on larval survey results, the spawning stock in the central North Sea, as now defined, was 62 000 tonnes. The acoustic survey on the spawning schools gave a stock of about 40 000 tonnes. The latter is bound to be an underestimate as the survey was restricted both in time and area. The stock estimate as derived from the larval surveys and the catch in number data were used to calculate the fishing mortalities, which were in turn used to initiate a VPA for this stock. The stock sizes differ between this assessment and that made in 1983 because of the removal of the Buchan element. According to this assessment, there has been a rapid recovery of this stock since 1981, when the spawning stock was assessed to have been 18 000 tonnes, to the 63 000 tonnes estimated in 1983.

The larval production increased sharply in Divisions IVc and VIId. Biomass estimates from English acoustic surveys were available for November 1983 and February 1984. The November 1983 estimate was accepted as the best one for this stock. This was used to estimate fishing mortality in 1983. The recruitment of the 1980 year class has resulted in an increase of the spawning stock by a factor of 1.7. This is approximately matched by the increase in the larval indices between those two years. In 1980, the continuous growth of the stock has been associated with a decrease in fishing mortality.

In addition, the seasonal assessment was carried out for this stock. The principal difference relates to variations in fishing mortality before 1977, whereas yields, spawning stock and recruitment are similar. In monitoring the effects of fishing on recruiting year classes, there are some advantages in the use of seasonal VPA if important catches are taken in the first three months of a calendar year. While this fishing pattern occurred in earlier years, there is no such fishery at present. If such a fishery develops, then it might be necessary to re-examine the need for a seasonal assessment.

D.1.1.7. The present assessment shows that large increases are expected in the North Sea herring stock in 1984 and 1985 due to the recruiting two strong year classes, i.e., the 1981 and 1982 year classes. It is estimated that about 1 x 10^9 2-ringed herring (about 120 000 tonnes) will recruit to the Downs herring stock in 1984. In 1985, the recruitment would also be on the same level assuming an F = 0.24 on 1-ringers in 1984. ACFM was not able to split the remainder of the recruitment of the 1981 and 1982 year classes between the herring stocks in the central and northern North Sea. A combined assessment had therefore to be carried out for the herring in Divisions IVa and IVb. The estimated recruitment of 2-ringers to these stocks combined in 1984 is 3.1 x 10^9 herring (about 400 000 tonnes).

Assuming that the fishing mortality on 1-ringers in 1984 is the same as in 1983, the number of 2-ringers recruiting to these stocks in 1985 would be 4.2 x 10^9 herring, i.e., about half a million tonnes.

By limiting the juvenile herring fishery, the rate of recruitment could be increased even further, as explained in the following section. This high level of recruitment in 1984 and 1985 provides an excellent opportunity to rebuild the North Sea herring stocks, by exploiting them at only low levels of fishing mortalities.

Management options for the herring stocks in the central and northern North Sea combined, as well as for the Downs stock, are given in the text-tables (see page 42) and shown in Figures D.1.1.1. and D.1.1.2. These include all herring catches taken in the North Sea, irrespective of whether they are by-catches or directed herring fishing.

Herring in Divisions IVa and IVb

1983			1984				1985				1986
$\bar{F}$ (2+)	Catch	SSB[a)]	Biom.[b)] (2+)	$\bar{F}$ (2+)	Catch	SSB[a)]	Biom.[b)] (2+)	$\bar{F}$ (2+)	Catch	SSB[a)]	Biom.[b)] (3+)
0.27	34	294	714	0.05	33	640	1 320	0.05	62	1 202	1 434
			$F_{0.1}$ =	0.15	95	604	1 254	0.15	166	1 061	1 231
				0.25	150	505	1 186	0.25	250	936	1 058

Weights in thousand tonnes.
a) Spawning stock biomass is calculated for the time of spawning, i.e., 1 September.
b) Biomass is calculated for 1 January.

Fishing at $F_{0.1}$ is the preferred level of fishing mortality by ACFM corresponding to a TAC in 1984 of 95 000 tonnes, and in 1985 of 166 000 tonnes for Divisions IVa and IVb combined.

Herring in Divisions IVc and VIId

1983			1984				1985				1986
$\bar{F}$ (2+)	Catch	SSB[a)]	Biom.[b)] (2+)	$\bar{F}$ (2+)	Catch	SSB[a)]	Biom.[b)] (2+)	$\bar{F}$ (2+)	Catch	SSB[a)]	Biom.[b)] (3+)
0.24	64	210	374								
			$F_{0.1}$ =	0.15	49	291	463	0.15	62	361	420
				0.20	65	277	447	0.20	77	331	385
				0.25	79	263	431	0.25	91	304	354

Weights in thousand tonnes.
a) Spawning stock biomass is calculated for the time of spawning, i.e., 31 December.
b) Biomass is calculated for 1 January.

Fishing at $F_{0.1}$ is the preferred level of fishing mortality by ACFM corresponding to a TAC in 1984 of 49 000 tonnes, and in 1985 of 62 000 tonnes in Divisions IVc and VIId.

It is recommended that in 1984 and 1985 the North Sea herring should be treated as two management units, i.e., the Downs stock on the one hand and the herring in Divisions IVa, b on the other. ACFM is, however, aware of the fact that Downs herring are present in Division IVb outside their spawning season. Therefore, fishing in Division IVb will cause some additional fishing mortalities on the Downs stock to that estimated on the basis of Divisions IVc - VIId catches alone.

Since ACFM was not able to forecast the level of catch during summer in Division IVb, it was not able to estimate the likely fishing mortality on the Downs herring and the associated catch from that stock taken in Division IVb.

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. On this basis, the likely catch of Downs herring at $F_{(0.1)}$ level is assumed to be in the order of 10 000 tonnes in 1984 and 1985.

This estimate is derived from catches in a period when the Downs stock was considerably smaller than estimated at present, and the relative sizes of the two stocks were different compared to the present situation. The extent to which the Downs component in Division IVb catches is dependent on these facts is unknown.

Since the herring stock in Divisions IVa and IVb does not migrate to Division IVc, no transfer of the Divisions IVa, b TAC is suggested.

In order to prevent herring fishing on the spawning herring and to encourage a continued recovery of the Bank stock for the reasons given in the 1983 ACFM Report, para. D.1.1.11, it is <u>recommended that a closure of herring fishing be implemented in the 6-12 mile zone off the United Kingdom east coast between 54°10'N and 54°45'N during the period 15 August to 30 September, and in the area of the 6-12 mile zone off the United Kingdom east coast between 55°30'N and 55°45'N during the period 15 August to 15 September</u>.

ACFM does stress that the rate of recovery of the stock components in the North Sea has varied considerably. It would be prudent for fishery managers to ensure that the fishery for the combined TAC for Divisions IVa and IVb is not dominated by catches in only one or the other Division.

D.1.1.8. In last year's report, ACFM expressed its concern about the catches of 0-group herring taken in the eastern part of the North Sea and Division IIIa. It was stated that the large catches of juvenile herring were a threat to the recruitment of North Sea herring, and that they were contrary to a rational exploitation of this resource. Consequently, the ACFM advised a closure of the industrial (sprat) fishery in the area between 55°30'N and 57°00'N and between 7°E and the Danish coast, from 1 July to 31 October.

Catch data presented at this year's meeting show that catches of 0-group herring in 1982 have even been higher ($9\ 557 \times 10^6$) than they were assumed to be during the previous meeting, and that there was a further increase to $10\ 030 \times 10^6$ in 1983. This shows that the protection measures advised by the Working Group last year have either not been enforced, or alternatively applied to a too small area and/or period.

Attention is also drawn to the catches in Division IIIa, which appear to have contained large numbers of 0 and 1-group herring in recent years (Table D.1.2.2) and also mainly from North Sea origin.

In the light of these catch figures, it is surprising to note that recruitment of the 1981 and 1982 year classes, measured as 1-ringers during the IYFS, was still above average. This can only be explained by assuming that both year classes must originally have been of a very large size.

D.1.1.9. The first results of the ICES stomach sampling program in 1981 have now become available. It is clear that the main predator on herring is whiting and the second important predator is cod. The herring are mainly eaten as 0 and 1-group by these predators. Thus the whiting start to eat herring as 0-group in the second quarter of the year and continue to do so until the end of the first quarter in the following year. At that time, the herring have reached a length of about 15 cm and attained a more pelagic behaviour, thus no longer forming an important prey for the more demersal species. These first results of the ICES stomach sampling program in 1981 should be treated with caution and used as an indication of the order of magnitude rather than as accurate estimates of natural mortalities. It is beyond doubt, however, that the value of M = 0.1, used for 0 and 1-group herring until now, is unrealistic and should be replaced by values more in line with the outcome of the stomach sampling project. It was therefore decided to adopt as a first approximation a value of M = 1.0 for 0-group herring and a value of M = 0.8 for 1-group herring in order to illustrate the effect of the young herring catches upon recruitment to the adult stocks in the North Sea. The M values were based on estimates of numbers consumed by predators, and in the illustrative text-table below it has been assumed that M on 0 and 1-group herring in Division IIIa is the same as for North Sea herring.

Numbers in million	North Sea			Division IIIa		
Year Class	1980	1981	1982	1980/81	1981/82	1982/83
Catch as 0-group	7 889	9 557	10 030	3 624	3 334	4 876
Catch as 1-group	840	1 147		985	2 603	
Additional recruitment as 2-group if no catch of 0- and 1-group had been taken	1 681	2 095	1 658+	1 042	1 721	806+
Actual recruitment as 2-group	2 574	4 086	5 307			

+ Only based on no 0-group catch.

It should be noted that most of the gain from saving 0-group herring in Division IIIa should go to recruitment in North Sea Divisions IVa, b and not to Division IIIa, as suggested in the above table. A much smaller proportion of the 1-group herring in Division IIIa would recruit to the North Sea. Despite the increased values of M used in the above calculation, it is obvious that a large proportion of potential recruitment to the adult stocks was lost, due to catches of juvenile herring.

It is clear that the level of juvenile catches in recent years has greatly reduced the potential harvest of adult herring, and delayed the recovery of the spawning stock. <u>ACFM therefore reiterates its recommendation from last year 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.</u> ACFM considers that there remains an urgent need for the effective implementation of these measures if the management objective is to maximize the yield of North Sea herring. In relation to the high catches of 0 and 1-group herring in Division IIIa, see section D.1.2.4.

D.1.2. <u>Division IIIa herring</u>

D.1.2.1. The landings of herring during the last decade are given in Table D.1.2.1. The preliminary figures for 1983 of about 197 000 tonnes are the highest since 1973 and indicate an increase of about 30% as compared to 1982. The landings in 1983 were all allocated to countries and areas except about 5 000 tonnes, which were thought to be misreported and consequently subtracted from the total.

Catch in number and age data were available for all major fisheries. These data are given in Table D.1.2.2. and show a further escalation in the number of 0 and 1-group caught.

D.1.2.2. From analyses of the Danish industrial by-catches, it was estimated that about 67% of the 0-group belonged to non-spring-spawning components and about 25% of the 1-group belonged to that component. It should be noted that the percentage of non-spring-spawning fish among the 1-group is not applicable to the total number caught at this stage in this area. A certain number are caught in the consumption fisheries and since they are appreciably larger than the 1-group in industrial landings, they could contain a higher percentage of autumn spawners.

D.1.2.3. An acoustic survey carried out in Division IIIa in August-September 1983 gave a total herring biomass estimate of about 325 000 tonnes as compared to an estimate in 1982 of 340 000 tonnes. Due to coastal distribution of the 0-group in August-September, this age group was probably underestimated in that survey while a better estimate was obtained of the 0-group abundance in this area during a survey which was carried out in December 1983. This gave an estimate of 0-group strength in the area of 5.1×10^9. The annual young fish survey was carried out in Division IIIa during February. The index of 1-group herring derived from this survey was 4 600, which is the highest on record. The 1-group herring was evenly distributed over the surveyed area and high numbers were also caught in the western part of the Skagerrak. The 1-group IYFS indices have been found to be highly correlated with the catches of 1-group herring in the same year.

D.1.2.4. The catch of 0-group herring reached its highest level on record in 1983. The proportions of autumn-spawned herring of the North Sea spawning stocks in the catches of 0 and 1-group fish were in the order of 2/3 and 1/4, respectively, in 1983. The present high catches of juvenile herring in the Skagerrak and Kattegat therefore considerably reduces the recruitment both to adult stocks in the North Sea and to Division IIIa itself. ACFM has in the past proposed a number of restrictions and the management bodies consequently have agreed on several of these regulatory measures to reduce the catch of juvenile herring, but there has been no effective enforcement and therefore no improvement. In order to achieve an improvement based upon the existing mesh regulation in Division IIIa, ACFM recommends that fishing by trawl for herring and sprat with mesh sizes less than 32 mm should be prohibited in the whole of Division IIIa from 1 July to 30 September for all vessel categories. Additional gains in recruitment for the North Sea and the western Baltic herring stocks would be obtained if the period of prohibition was extended to cover the second half of the year.

ACFM also points out that if existing regulations, i.e.,

- a ban on directed herring fishery for industrial purposes
- limits on allowed by-catches in both the sprat fishery and other fisheries
- a minimum landing size on herring

were properly enforced throughout the North Sea, Division IIIa and the other fishing areas to which they apply, the catch of juvenile herring would be minimized.

D.1.2.5. Evaluation of the September 1984 Acoustic Survey in Division IIIa

Advice on the Division IIIa herring fishery was given by the ACFM in its May 1984 report (Section D.1.2) with the objective of reducing the mortality on juvenile herring. The TAC advice on the stock in Division IIIa has in previous years been based on the acoustic survey carried out in September each year since 1979.

A preliminary report from the 1984 acoustic survey was presented to ACFM. The survey was extended this year to cover both Division IIIa and Sub-divisions 22-24 in order to cover the whole area of distribution of the stock fished in these areas.

The total biomass of herring was estimated to be about 911 000 tonnes; with about 533 000 tonnes in Division IIIa and about 377 000 tonnes in Sub-divisions 22-24. The figure for Division IIIa can be compared with 340 000 tonnes in 1982 and 325 000 tonnes in 1983.

D.1.2.6. Management Considerations

ACFM found it difficult to give a biologically meaningful TAC for Division IIIa alone, since it cannot quantify the migration rates for adult herring spawning in the SW Baltic and feeding in Division IIIa. The only way ACFM found to indicate a split of the total TAC for 1985 between the areas was to base it on the distribution of the stock at the time of the acoustic survey, thus following the same assessment procedure as in earlier years.

Consequently, a range of fishing mortalities was applied to the stock estimate per 1 September 1984 for Division IIIa and this gave the predicted catches as shown below (in '000 tonnes):

F	Catch 1 Sep.1984 - 31 Aug. 1985
0.15	64
0.20	78
0.30	111

In this calculation, the 0-ringers were omitted. The 1-ringers are known to contain both indigenous spring spawners and autumn spawners from the North Sea. The Herring Assessment Working Group for the Area South of 62°N estimated that 46% of the 1-ringers caught during the IYFS in 1984 were spring spawners, but the length frequency distribution obtained during the acoustic survey indicated that about 33% of the 1-ringers in Division IIIa were spring spawners. A mean of these estimates (40%) was used in the calculations. All the 2-ringers and older fish were included.

With no data presented on catch levels for 1984, ACFM could not estimate the present level of exploitation. The biological reference points on the yield per recruit curve have not been precisely calculated for the total stock in Division IIIa and Sub-divisions 22-24.

The $F_{0.1}$ level calculated for separate stocks appear as 0.13 for Division IIIa and 0.21 for Sub-divisions 22-24.

Taking these uncertainties into account, ACFM recommends that the catch of adult herring should be in the range of 60 000 to 80 000 tonnes for 1985.

D.1.3 Herring in the Celtic Sea and Division VIIj

D.1.3.1 The total catch taken during the 1983/84 season was about 21 000 tonnes, which was the highest catch recorded since 1973/74 and represented an increase of over 8 000 tonnes on the 1982/83 figure. ACFM recommended in May 1983 that the TAC for 1983 should not exceed 6 000 tonnes, but the TAC subsequently agreed by the EEC was 8 100 tonnes for the period 1 October 1983 to 31 March 1984. Over 9 000 tonnes, i.e., about 43% of the total catch, could not be attributed to any country. Difficulties in marketing throughout the season restricted the fishery and undoubtedly prevented an even larger catch being taken. About 68% of the total catches were composed of 2-winter ring herring (1980/81 year class), while the 1979/80 year class contributed about 18%.

D.1.3.2 Larval surveys were conducted for the sixth successive season. The index for abundance of small-size larvae was almost three times the 1982-83 value (the previous maximum). Thus, there has been a striking increase in larval indices during the last two years.

D.1.3.3 As has been the position in recent years, catch per effort data cannot be used to obtain estimates of F for this fishery. The number of boats partaking in the fishery remained about the same as in the previous season, and thus the increased catches were probably mainly the result of an increased abundance of schools during the season and not because of any increase in effort. Using the same methods of selecting F in 1983/84 as those used in the 1983 assessment (i.e., a comparison between the average spawning stock biomasses, obtained from different input F values, and the average larval indices), the appropriate F value for 1983/84 was taken as 0.40.

D.1.3.4. The resulting VPA showed that the fishing mortalities declined from 0.7 in 1972/73 to less than 0.4 for 1977-79, during which time the fishery was supposed to be closed. Subsequently the fishing mortality increased again to over 0.8 in 1981-82 and then decreased again during the last 2 years. According to this assessment, the spawning stock biomass has increased rapidly from 1979 and is estimated to be about 64 000 tonnes at spawning time in 1983.

D.1.3.5. The VPA also indicates that recruitment has also improved considerably in recent years, and the 1979/80 and 1980/81 year classes are now estimated at 179 and 322 million fish as 1-ringers, respectively. These are the strongest year classes to recruit to the stocks since the 1969 year class recruited in 1971. The estimated strength of the 1982 year class of 122 millions was derived from the results of 0-group surveys in the Irish Sea. Based on these assumptions, stock predictions were made with three different values of fishing mortalities in 1984/85 and 1985/86 using 40% adult F on the 1-ringers. The results are shown in the text-table below.

1983/84			1984/85			1985/86		
SSB	$\bar{F}_{2-9+}$	Catch	SSB	$\bar{F}_{2-9+}$	Catch	SSB	$\bar{F}_{2-9+}$	Catch
64 000	0.4	21 000	58 600	0.40	20 700	54 600	0.40	19.300
			61 300	$F_{0.1}$=.16	9 200	68 500	$F_{0.1}$=.16	10 300
			60 500	0.23	13 000	64 000	0.22	13 000

The TAC preferred by ACFM is that corresponding to the $F_{0.1}$ level of fishing mortality - 9 000 tonnes in 1984/85, 10 000 tonnes in 1985/86. As explained in the May 1983 ACFM report (section D.1.3.6), however, an examination of the annual yield/biomass ratios from 1956 to 1982 showed that the stock remained stable during the 1958-64 period when yields were about 20% of the spawning stock biomass. In 1984/85 and 1985/86, this corresponds to TACs of 13 000 tonnes in both seasons. Although ACFM would prefer a lower TAC (corresponding to the $F_{0.1}$ level), ACFM recommends that catches should not exceed 13 000 tonnes in 1984/85 and 1985/86.

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 1973-82, and the preliminary estimate of the catches in 1983, are given in Table D.1.4.1. The total catch of 92 360 tonnes in 1982 differs by only 57 tonnes from the preliminary figures in the previous assessment.

The preliminary total catch for 1983 is about 63 500 tonnes. This is only 10% higher than the catch of 58 000 tonnes given as the preferred level by ACFM in its advice on management of this stock in 1983. It will be noted that a negative unallocated catch is ascribed to this area in 1983. This has arisen because the official catches of two countries contained this quantity which was taken in other areas and it has been added to the unallocated catches there.

The age composition of the catch in numbers in 1983 is dominated by the 1, 2 and 3-ringers.

D.1.4.1.2. Larval surveys were carried out in Division VIa (North) in September and October. In 1983, the index of abundance for the smaller size category of larvae was very much lower than in the preceding two years. Using the larval index derived from the 1983 survey and the spawning stock biomass regression given in last year's report, the estimated 1983 spawning stock was about 100 000 tonnes instead of the 350 000 tonnes predicted in last year's report. That prediction was primarily based on the results of the 1982 larval survey. In view of this conflicting evidence, ACFM was not able to make an analytical assessment of this stock on which to base a TAC recommendation for 1985. Therefore ACFM recommends a preliminary TAC of about 30 000 tonnes for 1985. This will be reassessed and revised if necessary at the 1985 May meeting of ACFM. At that time, the data from the 1984 fishery as well as the results from fishery-independent investigations in 1984/85 will be available and the main fishery in 1985 will not have taken place.

D.1.5. Clyde herring

D.1.5.1. The reported landings from the Firth of Clyde in Scottish ports in 1983 were 2 530 tonnes, slightly in excess of the precautionary TAC of 2 500 tonnes. In addition, an estimated 273 tonnes were landed in Northern Ireland and the Isle of Man during July and August. The fishery in 1983 was limited by nightly quotas and extended over a longer season than in the previous three years. Reports on the fishery indicate that fishermen found no difficulty in catching their quotas at any time during the season. In addition to the reported landings, significant discarding of "small and medium" herring (defined approximately as fish weighingless than 250 g) took place. These are estimated to have amounted to approximately 50% of the recorded landings. The total reported landings plus discards in the Clyde in 1983 are therefore estimated on this basis to be just over 4 000 tonnes, excluding some unquantifiable unreported landings which were known to have taken place.

D.1.5.2. Small numbers of tag recoveries were made in 1983 from earlier tagging experiments, all within the Firth of Clyde.

D.1.5.3. No information is available to indicate the most likely value of F in 1983. Accordingly, ACFM can only recommend a precautionary TAC which should be based on the level of catches in recent years.

ACFM still lacks sufficient information on which to carry out a proper assessment of this stock.

D.1.6. Herring in Division VIa (South) and Divisions VIIb,c

D.1.6.1. The preliminary total catch for 1983 is about 33 000 tonnes, which is the highest catch recorded since 1976. The TAC recommended by ACFM for this area for 1983 was 12 000 tonnes. As in recent years, the largest catches from this area are taken by Ireland. Considerable catches, approximately 10 000 tonnes, were placed in the unallocated category.

D.1.6.2. The index of abundance for the smaller size group of larvae was calculated as in preceding years for the standard area as covered by the Scottish and Irish surveys. This gave an index for 1983 of about 25% lower than that for 1982. Using the same regression equation as last year, this corresponds to a spawning stock biomass estimate of 72 600 tonnes in 1983. Based on these results, the values of F appear to have been very constant in recent years varying from 0.27 in 1977 to 0.19 in 1982. The spawning stock biomass also appears to have been constant during this period and since 1976 has ranged from 66 000 to about 89 000 tonnes. Recruitment of 1-winter-ring fish has been very stable since 1973, apart from the 1976 and 1977 year classes which appear to have been somewhat stronger.

An average recruitment level of 182 million fish, which is the geometric mean from 1973 to 1982 (excluding the 1976 and 1977 year classes), was used in the following predictions.

1983			1984			1985		
Catch	$\bar{F}_{2-7}$	Spawn. stock	Catch	$\bar{F}_{2-7}$	Spawn. stock	Catch	$\bar{F}_{2-7}$	Spawn. stock
33 000	0.40	74 300	28 700	0.40	63 800	25 800	0.40	57 900
			12 400	0.155 $= F_{0.1}$	75 200	13 600	0.155	82 900
			11 000	0.122	76 100	11 000	0.122	86 000

In previous years, TACs have had no restraint on the fishery and continuation of the 1983 level of fishing will result in a decline of the spawning stock in 1984, and in 1985 the stock will be at the lowest level recorded. ACFM therefore prefers a TAC corresponding to the $F_{0.1}$ level in 1984 and 1985, which will yield catches of 12 000 and 14 000 tonnes, respectively, and which will allow the spawning stock to increase.

D.1.6.3. The assessment of the herring stock in this area is based on the assumption that the stock spawns in the autumn. However, it has become clear that in recent years at least non-autumn-spawning fish constitute an important part of the catches. Herring are known to spawn along the west and northwest Irish coast from December to March using the same spawning grounds as the autumn-spawning component. These winter-spring spawners constitute about 25% of the total annual catches. The inclusion of winter and spring spawners in the VPA may have considerable effect on the relationship between the larval indices and stock size. This effect may become more important if these non-autumn spawners continue to increase in the catches. Information should therefore be collected about larval abundances during December to March and the racial composition of the catches throughout the year. This would make it possible to carry out separate assessments on the two stocks.

D.1.7. <u>Irish Sea herring (Division VIIa)</u>

D.1.7.1. The TAC recommended by ACFM for herring in Division VIIa for 1983 was 3 000 tonnes. The TAC actually agreed by EEC was a roll-over from the 1982 recommendation of 3 800 tonnes. The reported catch from the North Irish Sea was 3 881 tonnes. The actual catch was greater because many small fish were sorted and dumped.

Despite the evidence for some long-standing anatomical differentiation among North Irish Sea spawning components, population dynamic variables and biochemical characters failed to support the recognition within the North Irish Sea for more than one stock unit. In addition, the location of the fishery has changed considerably in recent years and at present little fishing takes place on the actual spawning grounds. The major portion of the catches is taken in the months prior to spawning, and fish from both components are mixed on the feeding grounds to the west of the Isle of Man.

It was therefore decided to combine the catches for both components and present a joint assessment. It was considered that this would produce a more meaningful and accurate estimate of the total stock biomass in the North Irish Sea.

There are no data independent of the fishery from which stock size and fishing mortality may be estimated. The only effort data available are the numbers of landings by trawlers in North Ireland and the Isle of Man.

Taking the local quota system into account, an examination of the effort data indicated a value of $F = 0.2$ for 1983.

For the purposes of prediction, an estimate of the stock of 1-ringed fish was derived from a stock/recruitment relationship.

According to the present assessment, the spawning stock biomass in 1981 is estimated to have been at 7 000 tonnes and increased to 17 000 tonnes by 1983.

Management options for 1985

1983			1984				1985			
Stock biom. at 1 Jan	Sp.stock biom. at sp.time	F	F	Stock biom. at 1 Jan	Sp.stock biom. at sp.time	Catch	F	Stock biom. at 1 Jan	Sp.stock biom. at sp.time	Catch
27	17	0.2	$F_{0.1}$ = 0.15	33	22	4	$F_{0.1}$ = 0.15	41	28	5
							0.2		27	6
							0.3		24	9

Catch and biomass in '000 tonnes.

At its May meeting in 1983, ACFM made a provisional recommendation for a TAC in 1984 of 3 000 tonnes. This is lower than the catch derived from exploitation at the reference point of $F_{0.1}$. Projections to 1984 and 1985 indicate that $F_{0.1} = 0.15$ would result in a catch in 1984 of 4 000 tonnes and in 1985 of 5 000 tonnes and allow a continued increase in the spawning stock biomass. Accordingly, ACFM would prefer that a TAC for 1984 be set at 4 000 tonnes for the Irish Sea and 5 000 tonnes for 1985.

Management of the North Irish Sea fishery in the past had included measures to limit 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, selective gill-net fishery on the Mourne spawning ground, prohibition of directed herring fishery in the nursery areas, and a minimum size regulation of 20 cm. Gill-net catches on the Mourne spawning ground should not exceed 600 tonnes. The catch taken should count against the total TAC for the North Irish Sea. These measures should be continued.

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

D.2.1 Recent Trends in the Industrial Fisheries

Recent trends in the fisheries are shown in Table D.2.1.1. Since 1973, the total industrial landings have fluctuated between 1.1 and 1.9 million tonnes annually. The figures for the period 1981-83 were somewhat lower than the average of 1.6 million tonnes.

D.2.1.1 By-catches in the industrial fisheries in the North Sea and Division IIIa

The main revision has occurred in the central North Sea, where the preliminary 1982 herring by-catch figure of 90 000 tonnes for the period January to September, given in last year's report, has now been updated to 153 000 tonnes for the whole of 1982.

The report gives the annual catch figures by area, which last year, 1983, saw a continuation of the 1982 situation with a relatively high by-catch (160 000 tonnes) taken in the central North Sea. This catch again consisted mainly of 0-group herring.

Considering the sprat catches taken in this area at the same time of the year, it is clear that herring was not a by-catch but the prime target species for the fishery.

Herring by-catches in Division IIIa: see Section D.1.2, page 45.

The most predominant species other than herring occurring as by-catch in the fisheries are recorded in Table D.2.1.1. Blue whiting forms the most important by-catch in the Norway pout landings from the Norwegian Deeps and the annual landings have been at a comparatively high level in recent years, exceeding 100 000 tonnes in 1982 and being close to 90 000 tonnes in 1983. Recent trends for haddock and whiting are decreasing, the estimated 1983 landings being 15 000 tonnes and 23 000 tonnes, respectively. Reported by-catch of saithe has been at low levels since 1977, being approximately 1 500 tonnes in 1983.

Problems with by-catch regulations

The question was raised of problems caused to some industrial fishermen by current by-catch restrictions of 10% of protected species, by weight, in industrial catches. ACFM, therefore, considered this problem in broad terms.

By-catch regulations were introduced in the past because it is not always possible to harvest resources of Norway pout, sprat and other industrial species without taking an unavoidable catch of protected consumption species. A by-catch derogation can be seen as having three main purposes, which are:

1. to allow the industrial fishery to be conducted with small-meshed gear;
2. to prevent damage to the consumption fishery thus providing a measure of equity between the industrial fishermen and the consumption fishermen, who are subject to other constraints;
3. to direct the industrial fishermen's efforts towards the target industrial fish.

The balance between the two types of fishery involved in objectives 2) and 3) is a matter of overall management policy.

It is expected that the level of unavoidable by-catch will depend on the relative abundance of the industrial stocks and of protected species within the area of the industrial fishery, and on the patchiness of their distributions.

The North Sea sprat fisheries and the Norway pout fisheries both generate significant by-catches of protected species. The North Sea sprat fishery has had a very considerable by-catch of herring and other species in recent years. For the last two years, the annual percentage by-catch for herring alone has been more than 50%. With the current low abundance of sprat, clearly a problem of this size cannot be resolved by even a doubling of the by-catch derogation, even if this approach were seen to be desirable in relation to the herring stock.

The Norway pout fishery takes by-catches of haddock, whiting and saithe. Unfortunately, by-catch of these species are only documented relative to the total industrial fishery catch (less sandeels). Even on this basis, by-catches of haddock and whiting exceeded 10% in a number of areas and times in 1982 and 1983. It appears that the by-catch problem has a seasonal aspect, being most acute at the beginning and at the end of the Norway pout season.

Considering these figures, it should be kept in mind that they indicate overall percentages, while the 10% by-catch regulations refer to single landings, i.e., an overall percentage just below 10 would suggest that an appreciable number of landings must have exceeded the legal level. It should also be kept in mind that the by-catch considered here refers only to that part of the landings, which is delivered to the fishmeal plants. A certain amount of marketable fish is sorted from the catches and landed for human consumption but this has not been quantified. The by-catch figures will consequently tend to be underestimates of the actual ones and would thus indicate that the 10% rule has not been generally enforced or strictly adhered to, even in the most recent years.

If henceforth the existing regulations were vigorously enforced, then it seems likely that the Norway pout fishery would in most years be forced to change from the previous pattern of fishing. The extent to which this would affect the industrial fisheries is difficult to determine, since it would depend upon the extent to which the fishermen could re-distribute their effort onto purer concentrations of Norway pout.

Before ACFM can give proper advice on the industrial fisheries, detailed and extensive by-catch figures need to be made available. These should be in as disaggregated a form as possible.

D.2.2 Norway Pout

Landings of Norway pout from the North Sea are shown in Table D.2.2.1. They rose from 359 000 tonnes in 1982 to 421 000 tonnes in 1983.

Landings from Divisions VIa and IIIa by country are given in the Working Group report. The provisional 1983 landings were about 7 000 tonnes and 20 000 tonnes, respectively.

The stock size, with the exception of that in 1981, has been relatively stable around 1 000 000 tonnes in the last 8 years, although the stock fluctuates within a year because of the rapid growth. The spawning stock has in the same period varied between 300 000 - 700 000 tonnes without any trend.

In 1983, ACFM gave a catch prediction for that year based on results from the IYFS. The catch of Norway pout in a given year was correlated with the sum of IYFS 1-group plus IYFS 2-group indices. The IYFS 2-group indices for 1983 and 1984 were not available this year, and a new method for prediction was investigated. This is described in Appendix A to the Industrial Fisheries Working Group Report and gives a predicted catch of 390 000 tonnes in 1984, assuming fishing levels to be similar to recent years.

D.2.3 Sandeel

Table D.2.3.1 shows sandeel catches from the North Sea, which decreased from 611 000 tonnes in 1982 to 536 000 tonnes in 1983, the lowest level since 1976.

The text table below shows that catches from the Shetland area declined from 52 000 tonnes to 37 000 tonnes. Catches from the northern area remained at the low level of less than 80 000 tonnes, while in the southern area the 1983 catch of 419 000 tonnes was about the average for the period since 1976.

Sandeel catches from the North Sea ('000 tonnes)

		Assessment Area	
Year	Shetland	Northern	Southern
1975	12.9	253.7	156.5
1976	20.2	135.0	330.6
1977	21.5	384.4	392.3
1978	28.1	163.0	577.2
1979	13.4	195.3	355.9
1980	25.4	292.0	401.2
1981	46.7	138.1	378.9
1982	52.0	74.4	479.2
1983	37.0	78.2	419.0

Landings from Division VIa increased from 10 900 tonnes in 1982 to 13 000 tonnes in 1983. According to data reported to ICES, landings in Division IIIa increased from 22 000 tonnes in 1982 to 34 000 tonnes in 1983.

Insufficient effort data were available to enable an analytical assessment to be made for the stocks in the northern and southern areas. Although sufficient effort data were available for the Shetland area, a comparison between predation mortality and the previously assumed level of natural mortality (M = 0.5 per year) indicates that this level of M may be a substantial underestimate.

Furthermore, since a variable proportion of the landings are formed by 0-group sandeels, it is not possible to make firm predictions of likely catches over the year as a whole in any of the sandeel fisheries.

In its May 1983 report, ACFM advised that considerable gains in yield per recruit could be obtained by avoiding the exploitation of 0-group sandeels, particularly in the northern area. In the same report, ACFM further advised 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. In recent years, about 70% of the annual sandeel catches have been taken in the May-June period.

ACFM repeats this advice, which is given on a biological basis, since ACFM is not in a position to evaluate the economic aspects of the problem. The differences in possible benefits between areas suggest that there may be advantage in adopting an area-based management policy for sandeel stocks.

Improved management advice may be formulated in the future by ACFM in the light of reports from the Multispecies Working Group, since the yield per recruit calculations to a large extent depend on predation mortality.

D.2.4 Sprat

D.2.4.1 Sprat in Division IIIa (Table D.2.4.1)

Landings of sprat from Division IIIa were about 37 000 tonnes in 1983, the lowest total since 1972. There are no effort data for sprat in this region, and the catch at age data available are somewhat questionable. Consequently, a VPA was not run this year. A prediction of yield based on IYFS indices indicates that catches in 1984 could be double those of 1983 and, if the recent history of this fishery is any guide, the potential catch of juvenile herring might increase accordingly.

D.2.4.2 North Sea Sprat

Landings of North Sea sprat are given in Table D.2.4.2 for the years 1974-83. The declining trend observed since 1979 continued.

No effort data were available. Catch at age data were available by quarter to the end of 1983. Quarterly VPAs were run and indicated that the natural mortality of 0.8 per year adopted was in broad agreement with predation deaths.

A catch prediction based on the landings in 1983 and the provisional IYFS index of 1-group sprat in 1984 indicates landings of 115 000 tonnes in 1984, assuming the same level of fishing in 1984 as in 1983.

The catch, biomass and spawning stock biomass of North Sea sprat have all declined since the high levels of the mid-1970s. It is not possible to decide whether the recently low level of spawning stock has influenced recruitment itself, or whether the decline is primarily the consequence of poor recruitment following adverse environmental conditions. Whatever the cause, all available evidence indicates that the spawning stock of North Sea sprat is now relatively small. Recovery is heavily dependent on the occurrence of a new strong year class, which recent records suggest may occur only once, and sometimes twice, in five years.

Until this happens, the North Sea sprat stock must remain a cause for serious concern, and ACFM recommends that the fishery in 1984 should be restricted to a level of catch below the 115 000 tonnes predicted on the assumption that fishing mortality in 1984 remains at the 1983 level. This is to protect any new recruiting year class.

D.2.4.3 Sprat in Division VIa

In Division IVa, landing data were reported only by Scotland. They show an increase of catches by Scottish vessels, largely as a result of the continued growth of a fishery in the Firth of Clyde, which accounted for 1 150 tonnes in 1983. The preliminary total catch is about 2 000 tonnes.

D.2.4.4 Channel Sprat (Divisions VIId-e)

The provisional catch for Division VIId-e for 1983 was about 4 000 tonnes. No consistent fishing effort data exist for this stock. Catch at age data are available from the United Kingdom Lyme Bay fishery alone, and a VPA has been carried out on these. They, and the acoustic results, both indicate a reduction in the biomass of the Lyme Bay sprat.

Having regard also for the recent weaker year classes, ACFM recommends a precautionary TAC of 10 000 tonnes.

D.3 Demersal Stocks in Division IIIa

As noted in the 1983 ACFM report, the lack of effort data for the fleet in this area is a serious obstacle to the assessment of the demersal stocks. Logbooks containing information on catch and effort data were obligatory in 1983. It is likely that this information could form the basis of an analytical assessment in the future. For 1985, however, ACFM can only recommend a precautionary TAC for the demersal stocks in Division IIIa.

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

Stocks in Div. IIIa	1980		1981		1982		1983		1984
	Rec. TAC	Catch	Rec. TAC	Catch	Rec. TAC	Catch	Rec. TAC	Catch	Rec. TAC
Cod	30	41	34	47	32.6	42.3	31	37.8	32
Haddock	6.6	7.9	4.5	10	7	10.7	7	9.5	7
Whiting	22	23	22	25	22	31	22	26.4	22
Plaice	25	15	22	12	11	10	11	12.8	8.5

D.3.1 Cod

D.3.1.1 Cod in the Kattegat

Landings in 1983 remained at the same level as in 1982, being 13 800 tonnes and 13 000 tonnes, respectively. Compared to the catch level in the period 1971-77, a slight decrease in landings has been observed in recent years. The lack of effort data makes it difficult to explain this fully, but an analysis of the available information suggests that the recruitment in recent years has been lower than average and the biomass has been moderately declining.

On this basis, ACFM recommends a precautionary TAC of 12 000 tonnes in 1985 in order not to increase fishing mortality on a reduced stock.

D.3.1.2 Cod in the Skagerrak

The landings decreased from 29 000 tonnes in 1982 to 24 000 tonnes in 1983. However, the landings in 1983 are 9% higher than the average landings in the last 10 years. 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 the average for the period 1974-83.

No data which could indicate the existence of a coastal cod stock along the coast of Sweden are available. A tagging programme or genetic investigations would have to be carried out before a separate cod stock could be identified.

D.3.2 Haddock

Landings in 1983 were 9 500 tonnes, which is a 10% reduction from 1982. There is no basis for an analytical assessment, and ACFM can only advise a precautionary TAC. The catch data in Table D.3.2 show an average of around 8 000 tonnes for the period 1974-83.

D.3.3 Whiting

Landings decreased from 31 000 tonnes in 1982 to 26 000 tonnes in 1983. There is no basis for an analytical assessment and only a precautionary TAC can be recommended. Table D.3.3 gives the annual catches for the period 1972-83. During the years 1974-83, the average was 23 000 tonnes.

D.3.4 Plaice

D.3.4.1 Plaice in the Kattegat

Landings in 1983 were 3 600 tonnes compared with 2 700 tonnes in 1982. The decline in landings observed in the period 1978-82 has now ceased. However, the landings in 1983 are very low compared to the average landings of 12 000 tonnes in the 1970s.

Although no analytical assessment is possible, a tentative assessment indicates that a slight increase in biomass may have occurred in 1983, since surveys suggest improved recruitment in that year.

ACFM, therefore, recommends a precautionary TAC of 4 000 tonnes in order to prevent an increase in fishing mortality.

D.3.4.2 Plaice in the Skagerrak

Preliminary data for the Skagerrak indicate an increase in landings to 9 200 tonnes in 1983 from 7 900 tonnes in 1982. There is no basis for an analytical assessment, and ACFM therefore recommends a precautionary TAC. Table D.3.4.2 shows annual catch figures from 1972 to 1983, during which time the average was 9 000 tonnes.

D.3.5 Pandalus borealis in the North Sea and Division IIIa

D.3.5.1 The Pandalus borealis fisheries on the Fladen Ground in Division IVa are, with the present knowledge on stock identity, regarded as exploiting a stock different from that in Division IIIa and the eastern part of Division IVa (the Norwegian Deep). The reported landings from Division IVa had consequently to be split between these two fisheries. This was done by the Working Group, based on the limited information available. The split of the reported Danish landings for the most recent years is particularly uncertain.

D.3.5.2 Division IIIa and Division IVa (eastern part)

Landings have increased markedly since 1979. From a level of about 6 000 tonnes they exceeded 10 000 tonnes in 1981 and decreased to about 8 000 tonnes in 1983. In 1983, Denmark reported 4 900 tonnes from the North Sea. All of this was, however, assumed to have been taken on the Fladen Ground.

Catch per unit of effort was also comparatively high during 1979-82 but seems to have fallen off in 1983.

Indices of total effort indicate a substantial increase from 1979 to 1983.

Information on age composition of the catches is almost completely lacking. Hence, the level of the current exploitation rate could not be estimated.

The observed variability in catch composition, as judged from the proportion of commercial size groups in the Norwegian and Swedish landings, indicates that good year classes are heavily fished, even as pre-spawners.

An increase of the present minimum mesh size would dampen the variation in catch rate. It would also decrease the amount of juvenile shrimps caught and discarded.

A mesh assessment made in 1977 indicated that in order to adjust the size at first capture to the size of first maturity (as female), a minimum mesh size of 45 mm is needed. ACFM was unable, however, to calculate the effect of different mesh sizes on the yield.

D.3.5.3 Division IVa - the Fladen Ground

The reported landings from this area fluctuated during the last decade between 300 and 3 500 tonnes. The preliminary figure for 1983 is given as 6 700 tonnes, but this is on the assumption that all Danish landings reported from the North Sea are fished on the Fladen Ground.

Approximate age distributions (juvenile-adult shrimps) show that juvenile shrimps constitute a high proportion of the catches.

A minimum mesh size of 30 mm was introduced by EEC in 1981. Since no data on the age/length composition of catches have been presented from 1982 nor 1983, ACFM has no possibility of evaluating the effect of this regulation. Neither have sufficient data been made available to enable ACFM to estimate the present exploitation level nor the stock size.

D.3.5.4 By-catches in the fisheries for Pandalus borealis

New information on composition and levels of by-catch, covering parts of the fisheries for Pandalus in both the North Sea and in Division IIIa, was presented to the Working Group. The data can be found in Tables 5.1-11 in the Working Group report.

D.5 Cod, Haddock and Whiting Stocks in the North Sea, Sub-area IV

Recent Landings and TACs (in '000 tonnes)

Year / Species	1980		1981		1982		1983		1984
	Rec. TAC	Actual landings	TAC	Actual landings	TAC	Actual landings	TAC	Actual landings*	TAC
Cod	200	240	220	290	235	251	240	232	215
Haddock	90	104	140	133	180	181	181	168	170
Whiting	150	109	150	96	170	103	170	99	145

* Provisional

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

This assessment is based on human consumption landings only and excludes discards and industrial fishery by-catches. Provisional landings reported for 1983 were 232 000 tonnes which is midway between the predicted landings of 223 000 tonnes for an unchanged fishing mortality and the agreed TAC of 240 000 tonnes.

The 1979 year class was about double the average abundance, but subsequent year classes have been of average abundance or below. The problem in interpreting IYFS data for 1-group fish is still unresolved and year classes 1983 and later are assumed to be of average abundance for prediction purposes. ACFM was concerned with the estimate of the 1982 year class in 1983. The size of this year class is very important to the estimates of overall abundance in 1985 and 1986.

There has been a general trend of increasing fishing mortality over the last 20 years, and the value for 1983 was estimated at 0.91. Spawning stock biomass had been steadily declining since the early 1970s apart from a temporary increase following the recruitment to the spawning stock of the 1976 and 1979 year classes.

At the 1984 meeting of the Roundfish Working Group, no data were available on the basis of which to estimate accurately the abundance of recent year classes of North Sea cod. For this reason, the Working Group assumed that the year classes of 1983 and 1984 are of average abundance (214 millions at age 1).

At the November 1984 ACFM Meeting, ACFM reviewed a number of indices of abundance of 0- and 1-group cod which had later been derived, and which had been made available to ACFM.

English groundfish survey data for age group 1 correlate well with VPA estimates of abundance. According to this set of data, the abundance of the 1983 year class at age 1 is about 420 millions. A corresponding set of indices derived from data on cod by-catch in the Federal Republic of Germany's shrimp fishery in the German Bight indicated an abundance of 460 millions. Data from a Dutch survey were also presented which indicated that the 1983 year class is of average abundance. However, this series commences only in 1979, and it is not yet possible to determine whether it is well correlated with VPA results. On the basis of this information, ACFM decided to revise the estimate of abundance of the 1983 year class at age 1. A value of 400 millions was chosen as a somewhat conservative estimate in view of the Dutch results. However, this estimate still implies that the 1983 year class is one of the most abundant on record.

English groundfish survey results also give an indication of the abundance of the 1984 year class at age 0. The survey results are such that the estimate of abundance is not very precise, but it appears that the 1984 year class is of very low abundance. This possibility is supported by indices of 0-group abundance from the Dutch surveys. However, the predicted values of catch in 1984 and 1985 are not greatly influenced by the abundance of the 1984 year class, and for this reason ACFM decided to assume average abundance (214 millions) in the catch predictions.

Catch predictions for 1984 and 1985 are given in the text table on the following page. The predicted catch for 1984 is now 215 000 tonnes, which is equal to the agreed TAC. Of this predicted catch, 20% (42 000 tonnes) derives from the 1983 year class.

Effects of different levels of fishing mortality on catch, stock biomass and spawning stock biomass.

Species: COD Area: North Sea (Sub-Area IV)

1984				Management option for 1985	1985				1986	
Stock biom.	Spawn. stock biom.	$\bar{F}_{(3-8)}$	Catch		$\bar{F}_{(3-8)}$	Stock biomass	Spawn. stock biomass	Catch	Stock biom.	Spawn. stock biom.
524	120	0.91	215	$F = 0$	0	521	106	0	911	264
				$F = F_{max}$	.20			73	784	217
				$F = 0.4\ F_{84}$	.37			134	680	179
				TAC 85 = TAC 84	.70			215	520	125
				$F = F_{84}$	.91			259	471	101
				$F = 1.2\ F_{84}$	1.10			288	424	84

Catches and biomasses in tonnes.
Spawning stock biomass at 1 January.

ACFM recommends that the 1985 catch should be smaller than that corresponding to unchanged fishing mortality (i.e., less than 259 000 tonnes). This would bring about a reduction in fishing mortality towards the F_{max} level. Furthermore, if the 1984 year class is in fact of very low abundance, then catches in 1986 can be expected to be much lower than the 259 000 tonnes predicted for 1985 under the assumption of unchanged fishing mortality. By taking a catch of less than 259 000 tonnes in 1985, managers could, at least to some extent, reduce any such decline in the 1986 catch.

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

Total landings provisionally reported for 1983 were 168 000 tonnes (TAC 181 000 tonnes) after 184 000 tonnes in 1982. The 1983 landings included 16 000 tonnes taken as by-catch in the industrial fisheries and, in addition, 65 000 tonnes are estimated to have been discarded. The fishery in the last few years has benefitted from the recruitment of the abundant year class of 1979. Year classes 1980-82 have been of below average abundance but early indications are that the 1983 year class is a strong one.

Fishing mortality in 1983 was estimated to be 1.13. Average F in the last decade has been about 1.0 with the exception of 1981-82 when F was estimated at about 0.7. Spawning stock biomass has been increasing from a low level in 1979 and the upward trend is expected to be maintained as the 1983 year class recruits to the spawning stock from 1985.

At the May 1984 Meeting ACFM did not accept the estimated recruitment of the 1981 year class in 1982 as produced by the Working Group. The relationship between the IYFS index and recruitment as estimated from VPA indicated that the year class was about 1200 million fish at age 1, rather than 829 million fish estimated by the Working Group. This required a change in fishing mortality at age 2 in 1983 from 0.99 to 0.45. The maturity ogive, as calculated by the Working Group, had not been used in calculating predictions of spawning stock biomass in 1985 and 1986. The ogive indicated that 32% of age 2 haddock are mature while the Working Group had assumed that 100% of this age group were mature. ACFM incorporated the maturity ogive in the basic data along with the change in estimated recruitment of the 1981 year class, and ACFM re-calculated the projections.

Following an exchange of correspondence between members of the Roundfish Working Group and the ACFM Chairman, it was decided to carry out a revision of the North Sea haddock assessment taking into account the apparent decline in catchability of haddock in recent years.

This re-assessment was carried out in advance of the meeting using programs not available at ICES. The VPA was tuned for age groups 2 to 7 in accordance with recent trends in catchability in the Scottish demersal seiner fleet. The values of fishing mortality in 1983 for ages 0 and 1 were not changed from those used by the Working Group, and fishing mortality at ages 8 to 11 were set at 0.75 to be in reasonable agreement with values for ages 6 and 7 which emerged from the tuning method. Because the method used estimates catchability in the last data year as the average of the three previous years, it is possible that, given the recent declining trend in catchability, the values of fishing mortality estimated for the last data year are too high, Any such overestimation will, however, be far less than that which had been incurred by the Working Group by not fully taking into account the recent trends in catchability.

The set of fishing mortalities estimated by the methods described above can be compared with the results obtained by the Working Group and by ACFM in May in the text table below:

Age	Working Group March 1984	ACFM May 1984	ACFM Nov. 1984
0	.19	.19	.19
1	.41	.41	.41
2	.99	.45	.72
3	1.38	1.38	.94
4	1.18	1.18	1.10
5	1.08	1.08	.60
6	1.01	1.01	.74
7	1.46	1.46	.73
8	.70	.70	.75
9	.98	.98	.75
10	.90	.90	.75
11+	.90	.90	.75

The current estimates of fishing mortality for ages 3 to 11 are all lower than those derived by the Working Group in March or by ACFM at its May Meeting. The reduction in fishing mortality on the 1981 year class at age 2 overcomes the previous concern of ACFM that the abundance of this year class had been underestimated by the Working Group.

Predictions of catch and biomass were made on the assumption that the exploitation pattern in 1984 and 1985 will be the same as that estimated for 1983.

Effects of different levels of fishing mortality in catch, stock biomass and spawning stock biomass.

Species : Haddock Area: North Sea (Sub-area IV)

1984				1985								1986	
Tot. bio.	Spawn. bio.	$\bar{F}_{(2-7)}$	Tot. land.	Management option 1985	Tot. bio.	Spawn. bio.	$\bar{F}_{(2-7)}$	Tot. land.	H.C. land.	Ind. land.	Discard	Tot. bio.	Spawn. bio.
543	203	.82	172	F=0	656	244	0	34	0	34	0	987	530
				$F=F_{max}$			.350	116	85	31	52	795	415
				$F=0.8xF_{84}$			.410	138	108	30	79	743	369
				$F=F_{84}$			.820	209	182	27	140	569	258
				$F=1.2xF_{84}$			1.230	257	233	24	188	444	182

Discards, landings and biomass in 1 000 tonnes.
Spawning stock biomass as at 1 January.

The TAC for 1984 is 170 000 tonnes and this is the predicted value of the landings (140 000 human consumption, 32 000 industrial by-catch).

Data on Scottish landings for the first six months of 1984 indicate that, with the exception of January, landings have been lower than in 1983 and it is therefore likely that total international landings are currently also lower than the 1983 level. The total international landings in 1983 were about 170 000 tonnes and thus current catch data suggest that the catch now predicted for 1984 may be too high.

However, landings in the latter half of 1984 may reasonably be expected to increase in comparison with the corresponding period of 1983, because the abundant 1983 year class will begin to make significant contributions to the human consumption landings from September onwards. ACFM therefore believes that the TAC will be taken.

The level of fishing mortality at F_{max} is about 40% of the present level of fishing mortality, and ACFM therefore recommends a reduction in fishing mortality in 1985 towards F_{max}.

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

Landings reported for 1983 were 99 000 tonnes which were virtually the same as in the previous three years. Included in the landings were 24 000 tonnes taken as by-catch in industrial fisheries. In addition 49 000 tonnes were estimated to have been discarded. Since 1980 the TACs have been set at unrealistically high levels and in the last four years the proportion of the TACs actually landed has been between 58% and 73%.

Year classes 1979-82 have all been below average abundance, but the indications from the International Young Fish Surveys are that the 1983 year class is of above average strength and the best year class to be recruited since that of 1974. This is supported by observations of this year class in the 1983 German and Dutch shrimp fisheries. The succession of poor year classes has resulted in a declining trend in spawning stock biomass but this is expected to be reversed when the 1983 year class recruits to the adult stock in 1985. It should also be remembered that the spawning stock biomass at the beginning of 1984 was the lowest in history except for the year 1971. Fishing mortality on this stock has remained relatively constant in recent years at 0.9.

As in previous years the TAC for 1984 appears to be unrealistically high and, accordingly, management options for 1985 are given only for the assumption that fishing mortality in 1984 will be unchanged at the 1983 level (text table p. 66, Figure D.5.3). Catch predictions also assume that fishing mortality due to the industrial fisheries will be unchanged. Since the spawning stock biomass for 1985 is expected to increase, maintaining the fishing mortality in 1985 as in 1984 would produce an increase in landings (118 000 tonnes in 1985) as well as an increase in spawning stock biomass in 1986. A management option table is given below.

1984				Management Option for 1985	1985							1986	
Stock biomass	Spawn. stock biomass	$\bar{F}$ (2-6) H.C.	Total land-ings		Stock biomass	Spawn. stock biomass	$\bar{F}$ (2-6) H.C.	Total land-ings	H.C. land-ings	Indust. land-ings	Dis-cards	Stock biomass	Spawn-stock biomass
405	191	0.79	102*	$F = 0.2\ F_{84}$	481	297	0.16	72	17	55	15	638	451
(*Includes Indust. Land-ings = 38)				$F = F_{max}$			0.41	93	41	52	36	588	403
				$F = F_{84}$			0.79	118	69	49	66	526	342

Weights in '000 tonnes
Recruitment R_o = 2700 million 1984-1986
Stock biomass = fish of age 0 and older
Spawning Stock Biomass = fish of age 2 and older
Exploitation pattern 1984-85 based on 1978-83 average
F values relate to human consumption fishery (landings + discards) only.

If the management objective is to maximize the yield of whiting, then ACFM recommends that the fishing mortality be reduced toward F_{max}. It was noted by ACFM, however, that whiting prey heavily on other species, so this objective may be influenced by future ICES advice on possible multi-species approach to management.

D.5.4 North Sea Mesh Assessment

Since the available advice concerning the introduction of a 90 mm minimum mesh size in the North Sea dated from 1977, and was therefore based on an assessment of an alteration from 70 mm to 90 mm, the European Commission requested a new assessment (specifically for whiting), which took into account the introduction since then of an 80 mm minimum mesh size. The European Commission had given this task to its Scientific and Tecnical Committee, but with the agreement of the Commission and ICES, the request was passed to the ICES North Sea Roundfish Working Group for action.

Mesh change assessments were made for both whiting and haddock in the North Sea since both species are likely to be affected. For cod, the effect of an increase to 90 mm would be expected to be negligible.

ACFM draws attention to the fact that 90 mm has already been implemented as a minimum mesh size in the Norwegian zone of the North Sea.

Mesh assessments require estimates of the composition of landings and discards, the exploitation rate, and the effective mesh size in current use. Information is available on the first three (though incomplete for discards and age rather than length composition of landings) but only one country provided records of the effective mesh size in use. The present effective mesh size in North Sea fisheries is therefore not known, but it is believed to be closer to 70 mm than the agreed minimum of 80 mm. The assessment could only be carried out by applying the selection pattern of a 90 mm mesh to the age composition of the current catches. The results probably reflect more closely the effect of a 10 mm increase on present effective mesh sizes than the implementation of 90 mm. The age composition of Scottish discards of haddock as well as Scottish and Dutch discards of whiting were applied to the discards of all other nations.

Given the limitations of the data the results confirm previous estimates that, for the haddock and whiting stocks in the North Sea as a whole there would be immediate losses in the human consumption fisheries of around one third for whiting and about one sixth for haddock. The major part of these losses would be offset by the third year following effective implementation, and thereafter ACFM would expect a longer term gain of the order of 10% for whiting and 20% for haddock associated with the improved exploitation pattern. Discards in the first year of implementation would be reduced by 40% - 50% for both species and by about one third in the long run.

The effects on fisheries of individual countries are more variable and reflect differences in national fishery practice and areas fished. The assessment cannot take into account any change in the distribution of the fishery or future changes in fishing mortality that might follow either a mesh change or associated aspects of the management policy. It is possible that long-term gains could be larger than those given in Tables D.5.7 and D.5.8 if the fishery distribution shifted to areas with improved stocks of the larger haddock and whiting vulnerable to the new mesh size.

In this respect a change in mesh size should not be seen in isolation but as one aspect of a management policy, in which the change is associated with the intended level of fishing mortality and the minimum landing size appropriate to the mesh in question.

D.6 Cod, Haddock and Whiting Stocks in Sub-area VI

Recent Landings and TACs ('000 tonnes)

Year / Species	1980		1981		1982		1983		1984
	Rec. TAC	Actual landings	TAC	Actual landings	TAC	Actual landings	TAC	Actual landings*	TAC
Cod VI	12.1	18.6	20.0	24.7	17.5	22.2	27.0	22.8	24.5
Haddock VIa	13.0	13.0	15.5	18.4	15.5	29.5	45.0	29.4	40.0
Haddock VIb	2.5	7.3	6.0	9.0	6.0	7.8		0.3	
Whiting VI	13.0	14.7	16.4	18.5	13.0	13.8	16	15.0	16.4

*Provisional

D.6.1 Cod in Division VIa

Landings reported for 1983 were 22 000 tonnes which maintained the high level of recent years. The improved yields from this fishery have resulted from an increasing trend in recruitment. In recent years average year class strength has been about double that of ten years ago. The spawning stock has also benefitted from increased recruitment and is now at a high level. There is no satisfactory method of estimating pre-recruit year class strengths and therefore, for prediction purposes, the year classes of 1982 and later have been taken to be equal to a higher average observed in recent years, i.e., 12.5 million at age 1 (average 1976-80). This can be compared with the long-term average of 8.7 million (1967-80).

Fishing mortality in 1983 is estimated to be 0.76 which is the same as in the last three years. In the catch and stock projections given in the text table below it has been assumed that the 1984 TAC of 24 500 tonnes will be taken, thereby reducing fishing mortality in 1984 to 0.6.

1984					1985				1986	
Stock biomass	Spawn. stock biomass	$\bar{F}$ (3-4) H.C.	Total landings	Management Option for 1985	Stock biomass	Spawn. stock biomass	$\bar{F}$ (3-4) H.C.	Total land-ings	Stock biom.	Spawn. stock biom.
74	33	0.60	24.5 (= TAC)	$F_{0.1}$	77	43	0.17	9	98	64
				F_{max}			0.30	15	90	56
				$F_{85} = 0.6\ F_{84}$			0.35	18	86	53
				$F_{85} = 0.8\ F_{84}$			0.48	23	80	48
				$F_{85} = F_{84}$			0.60	27	74	43

Weights in '000 tonnes
Recruitment R_1 = 12 500 (Y.C. 1983 and later)
Stock Biomass = fish of age 1 and older
Spawning Stock Biomass using maturity ogive
Exploitation pattern 1984-85 based on 1978-83 average

The expected fishing mortality rate in 1984 is still greatly in excess of F_{max}, and ACFM recommends a continuation in reduction of fishing mortality in 1985 toward F_{max}. Such a management policy could be implemented without drastic reductions in catch, by taking advantage of the increased stock biomass.

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 catches from Division VIb, and applied to the whole of Sub-area VI.

D.6.3 Haddock in Division VIa

TACs for 1983 and 1984 have been set at 45 000 and 40 000 tonnes respectively for the whole of Sub-area VI. The haddock stock at Rockall is very variable and the amount of fishing unpredictable. It is recommended, therefore, that TACs should be set for Divisions VIa and VIb separately as the present arrangement provides no effective regulation for Divison VIa.

Last year the Working Group included estimates of discards in their assessments for the first time. Catch predictions based on this assessment indicated landings for 1983 of 38 000 tonnes which were considerably larger than recently recorded landings. ACFM had doubts about the reliability of this assessment and as a result its advice was based, as in previous years, on an assessment which excluded discards. This assessment predicted landings in 1983 of 22 800 tonnes. The landings actually reported in 1983 were 29 400 tonnes, midway between the two predictions. This year the Working

Group again produced an assessment including discards but it produced predictions for 1985 which are only slightly higher than those with discards excluded. ACFM now has more confidence in basing its advice on this assessment procedure.

Landings in 1983 of 29 400 tonnes were at the same level as in 1982 but appreciably higher than in the preceding years. An additional 6 900 tonnes were estimated to have been discarded in 1983. The abundant 1979 year class has made an important contribution to catches in the last two years. The following year classes of 1980-82 have been poor but the 1983 year class is expected to be of above average abundance. Spawning stock biomass increased following the recruitment of the 1979 year class to the adult stock in 1981 and 1982, and current levels (1984) are expected to be maintained or improved as the 1983 year class reaches maturity in 1985 and 1986.

Fishing mortality in the last decade has been relatively constant at 0.7 except for 1980-82 when fishing mortality was somewhat lower. Catch predictions for 1985 assume that the 1983 level of fishing mortality will be maintained in 1984, and that landings of 27 000 tonnes will be taken. Management options for 1985 are given in the text table below.

1984					1985					1986	
Stock biomass	Spawn. stock biomass	$\bar{F}$ (2-6) H.C.	Total land-ings	Management Option for 1985	Stock biomass	Spawn. stock biomass	$\bar{F}$ (2-6) H.C.	Total land-ings	Dis-cards	Stock biomass	Spawn-stock biomass
107	54	0.70	27		105	72					
				$F = 0.2\ F_{84}$			0.14	6	3	138	105
				$F = F_{max}$ H.C.			0.35	14	6	123	90
				$F = F_{84}$			0.70	25	12	102	70

Weight in '000 tonnes
Recruitment R_o = 165 million 1984-1986
Stock Biomass = fish of age 0 and older
Spawning Stock Biomass = fish age 2 and older
Exploitation pattern 1984-85 based on 1978-83 average

The level of fishing mortality at F_{max} is about one third the present level, and ACFM, therefore, recommends a reduction in fishing mortality in 1985 toward this level.

D.6.4 Haddock in Division VIb

The amount of fishing for haddock at Rockall is very variable (Table D.6.6) reflecting, to some extent, big fluctuations in stock size resulting from big variations in recruitment. In the mid-1970s catches of 40 000 - 50 000 tonnes annually were reported, but by 1977 catches were down to 3 000 tonnes. Some interest in the fishery was rekindled in the period 1980-82 when catches averaged 7 000 tonnes, but in 1983 minimal fishing took place and only 300 tonnes were reported to have been landed.

The stock has been monitored in the last three years by groundfish surveys which provide the basis of the assessment. Year classes 1980 and 1981 were very abundant but those of 1982 and 1983 appear to be virtual failures as were those of 1975, 1978 and 1979. The stock has been declining rapidly since 1982. The total stock biomass was 94 000 tonnes in 1982 and 54 000 tonnes in 1983. The fishery through 1984 and 1985 will continue to depend on the survivors of the 1980 and 1981 year classes.

Although the stock biomass is greatly reduced at present as a result of poor recruitment, catches have also been low in the last two years and could be allowed to rise. <u>ACFM recommends that the catch in 1985 could be increased to 8 000 tonnes (corresponding to the $F_{0.1}$ value) without the stock being further depleted</u>.

D.6.5 <u>Whiting in Division VIa</u> (Table D.6.9)

Landings reported for 1983 were 15 000 tonnes after 13 800 tonnes in 1982. Discard data were not used, and therefore the assessment is based on landings only. Recruitment is correlated with that in the North Sea and on that basis the 1982 and 1983 year classes at age 1 were estimated at 30 and 80 million respectively which compare with an average value of 95 million over the period 1963-1980. The last year class to exceed average abundance was that of 1979. Both the 1980 and 1981 year classes were poor with abundance levels estimated at 38 and 30 million, respectively. The assessment assumed abundance levels for 1984 and 1985 year classes at 95 million which ACFM thought to be optimistic.

Spawning stock biomass has tended to fluctuate over a wide range. The current level is about average and is not expected to change very much during 1985. If fishing mortality in 1984 remains at the 1983 level, landings of 13 000 tonnes are expected in 1984. Since the spawning stock biomass is at a very low level, the fishing mortality on this stock should not be increased. The present level of fishing mortality (0.68) is, in fact, too high, according to long-term yield considerations. <u>ACFM, therefore, recommends that the TAC for 1985 reflects a reduction in fishing mortality from the 1984 level</u>. Management options for 1985 are given in the text table below, and in Figure D.6.3.

1984					1985				1986	
Stock biomass	Spawn. stock biomass	$\bar{F}$ (2-4) H.C.	Total landings	Management Option for 1985	Stock biomass	Spawn. stock biomass	$\bar{F}$ (2-4) H.C.	Total landings	Stock biom.	Spawn. stock biom.
37	21	0.68	13		41	23				
				$F = F_{0.1}$			0.17	4	55	37
				$F = 0.4\ F_{84}$			0.27	6	53	34
				$F = 0.6\ F_{84}$			0.41	8	50	32
				$F = 0.8\ F_{84}$			0.55	10	48	30
				$F = F_{84}$			0.68	12	46	28

Weight in '000 tonnes
Recruitment R_1 = 95 million (Y.C. 1984-85)
Stock Biomass = fish of age 1 and older
Spawning Stock Biomass = fish of age 2 and older
Exploitation pattern 1984-85 based on 1978-83 average.

D.6.6 Whiting in Divisions VIId,e

Landings reported for 1983 were 5 700 tonnes which represents a big reduction from the preceding 10 years when landings ranged between 8 000 and 11 000 tonnes.

No analytical assessment was attempted since age-composition data were incomplete.

ACFM, therefore, recommends that precautionary TACs should be set for 1985. Catch figures on which these could be based are given in Table D.6.11.

D.7. Irish Sea and Bristol Channel (Celtic Sea) Stocks

Review of the Application of a Multispecies Model for Cod and Nephrops in the Irish Sea

A large amount of information has become available on the feeding relationships of cod on Nephrops in the Irish Sea from which it is clear there is a very strong biological interaction between these two species. The broad conclusion of the multispecies model of this interaction is that the cod stock is exerting a predation mortality on Nephrops which is only slightly lower than the present fishing mortality on Nephrops.

The possibilities for managing the Nephrops fishery are therefore influenced by the interactions with the cod and its fishery. In particular, a reduction in fishing mortality in the cod fishery to increase the yield per recruit of cod and hence cod biomass could be expected to increase predation and lower the biomass of Nephrops. Since the Nephrops fishery is considerably more valuable than the cod fishery in this area, the management strategy adopted for cod should not ignore the consequences for the Nephrops stock. The long-term strategy for both should be reviewed when the results from the multispecies model have been fully examined and accepted as a better representation of the dynamics of these two species.

D.7.1. Irish Sea Cod

The international catch fell by 28% to 9 700 tonnes in 1983 and was considerably below the catch predicted assuming unchanged fishing mortality. The 1982 year class appears to be smaller than previously expected and fishing effort may have declined, although not uniformly.

The forecast for 1985 is heavily dependent on the level of fishing in 1984 and on estimates of recruitment for the 1983 and 1984 year classes which will contribute some 40% of the catch in 1985. Available information indicates the 1983 year class to be about average and the 1984 year class is assumed also to be average.

The spawning stock has fallen from the high level recorded in 1983 but is expected to remain close to the 1974-82 average in 1985 and some 25% higher than the low level of 8 000 tonnes recorded in 1980.

1984				Management option for 1985	1985				1986	
Stock biom.	Spawn. stock biom.	$\bar{F}_{(1-6)}$	Catch		Stock biom.	Spawn. stock biom.	$\bar{F}_{(1-6)}$	Catch	Stock biom.	Spawn. stock biom.
24200	10 200	0.51	8 500	$F_{0.1}$	25100	11 500	0.16	3 300	34600	18 000
				F_{max}		10 800	0.26	5 200	31800	15 000
				$F_{85}=0.8\ F_{84}$		10 000	0.41	7 400	28600	11 700
				$F_{85}=F_{84}$		9 400	0.51	8 800	26600	9 800

Weight in tonnes.
Spawning stock at spawning time.

The maximum of the yield-per-recruit curve is at 50% of the estimated level of fishing mortality in 1983 and this should therefore not be allowed to rise, but the long-term management strategy should take into account the interaction between cod and Nephrops referred to in the first paragraph. The long-term yield of the cod stock could be increased by reducing F, but the effect of this on the Nephrops stock cannot be quantified at present.

D.7.2. Irish Sea Whiting

The international catch fell by 40% to 10 120 tonnes in 1983. Although some progress has been made, the assessment of this stock remains unsatisfactory because of inconsistencies with weight-at-age data for earlier years, poor information on discarding and inability to estimate recruitment.

Recruitment appears to have been low between 1980 and 1982, and the spawning stock has declined since 1981 to its lowest level in the series. The maximum of the yield per recruit curve is at 50% of the estimated 1983 F value.

Catches in 1985 will be heavily dependent on the strength of the 1983 and 1984 year classes for which there are no estimates. ACFM can therefore only recommend a precautionary TAC for this stock. Catch figures on which this can be based are given in Table D.7.2.

D.7.3. Irish Sea Plaice

The international catch rose by 8% to 3 500 tonnes in 1983 and was just below the average of the previous ten years. This is 30% higher than predicted by last year's assessment, assuming unchanged fishing mortality and mean recruitment. The majority of the increase is accounted for by an increase of 46% in the Irish catch, which is taken in the western Irish Sea and for which there are no effort data. Recruitment of the 1981 and 1982 year classes also appears to be above the assumed mean level.

As a consequence of the improved recruitment, the spawning biomass has recovered to 5 600 tonnes in 1984. This is almost double the lowest level recorded in 1977 and is expected to be maintained if fishing mortality remains unchanged.

Catch options for 1985 are as follows:

1984				Management option for 1985	1985				1986	
Stock biom.	Spawn. stock biom.	$\bar{F}_{(3-12)}$	Catch		Stock biom.	Spawn. stock biom.	$\bar{F}_{(3-12)}$	Catch	Stock biom.	Spawn. stock biom.
16100	5 600	0.45	3 800	$\bar{F}_{85} = \bar{F}_{83}$	15800	6 100	0.45	4 200	15200	6 000
				$0.8\ F_{83}$	15800	6 200	0.36	3 500	15900	6 600
				$F_{0.1}$	15800	6 600	0.12	1 300	18000	8 900

Weight in tonnes.
Spawning stock at spawning time.

The yield-per-recruit curve for this stock is "flat-topped" and indicates the long-term yield could be maintained with a modest reduction in fishing mortality from the present level. This would at the same time improve biomass of the stock and therefore catch rates in the fishery.

ACFM recommends that the TAC in 1985 should not exceed 4 000 tonnes.

D.7.4. Irish Sea Sole

The international catch fell by 13% to 1 159 tonnes in 1983 and was very close to the catch predicted, assuming no change in effort.

Fishing mortality on this stock has been fairly steady since 1970 and the present level is close to the maximum of the yield-per-recruit curve. Spawning stock biomass decreased from 8 300 tonnes in 1970 to 4 800 tonnes in 1977. It then increased to 6 500 tonnes in 1979 due to good recruitment from the 1975 and 1976 year classes, but since 1979 it has declined again and is estimated to be 4 700 tonnes in 1984.

Information that has become available since the Irish Sea and Bristol Channel Working Group assessed the situation indicates the 1981 year class is above average. Assuming average recruitment for the more recent year classes, leads to the following catch options:

1984				Management option for 1985	1985				1986	
Stock biom.	Spawn. stock biom.	$\bar{F}_{(4-12)}$	Catch		Stock biom.	Spawn. stock biom.	$\bar{F}_{(4-12)}$	Catch	Stock biom.	Spawn. stock biom.
5 700	4 700	0.27	1 100	$F_{85} = F_{0.1}$	5700	4 800	0.13	600	6400	5 400
				$F_{85} = F_{84}$ ($F_{max} = 0.28$)		4 700	0.27	1100	5800	4800

The data unit of the biomass and the catch is tonnes.
The spawning stock time is given for the time of spawning.
The spawning stock biomass for 1986 has been calculated with the same fishing mortality as for 1985.

Weight at age used in these calculations was the average 1970-82. Some small upward revision may be required if further studies confirm increased weight at age of year classes at present in the stock.

If fishing mortality remains constant, the improvement of recruitment in the 1981 year class will lead to a slight increase in spawning stock size from the low level of 1984. Accordingly, ACFM recommends that fishing mortality on this stock should not be allowed to increase.

D.7.5. Celtic Sea Sole

The international catch rose by 18% to 1 329 tonnes in 1983 with increases of 6% and 60%, respectively, in the Belgian and United Kingdom catches. The 1983 catch was also 15% higher than predicted assuming unchanged fishing mortality, and it appears that this was because the total international effort increased by 13% and the 1980 year class was above average The spawning stock biomass declined from 7 000 tonnes in 1970 to 3 100 tonnes in 1977. It rose again to 4 100 tonnes in 1980, but has since again decreased and is estimated to be 3 700 tonnes in 1984.

The maximum of the yield-per-recruit curve is at 82% of the estimated 1983 F value. This stock is exploited more heavily than the Irish Sea sole stock, but less heavily than the North Sea stock.

The most recent surveys indicate the 1980 and 1981 year classes to be higher than had to be assumed by the Working Group when it met in July 1984. The appropriate adjustments lead to the following revised catch options and estimates of stock size:

1984				Management option for 1985	1985				1986	
Stock biom.	Spawn. stock biom.	$\bar{F}$ (4-9)	Catch		Stock biom.	Spawn. stock biom.	$\bar{F}$ (4-9)	Catch	Stock biom.	Spawn. stock biom.
4 700	3 700	0.33	1300	F_{85}= 0.0	4400	3 900	0.00	0	5500	5 000
				F_{85}= $F_{0.1}$		3 800	0.12	500	5000	4 300
				F_{85}=F_{max}		3 600	0.25	1000	4500	3 700
				F_{85}=F_{84}		3 500	0.33	1200	4200	3 300

The data unit of the biomass and the catch is tonnes.
The spawning stock biomass is given for the time of spawning.
The spawning stock biomass for 1986 has been calculated with the same fishing mortality as for 1985.

Weight at age used in these calculations was the average 1970-82. Some small upward revision may be required if further studies confirm increased weight at age of year classes at present in the stock.

A fishery in 1985 at the 1983/84 levelof mortality will lead to a slight reduction in catch and the spawning stock which in 1986 will be only slightly above its lowest recorded level (3 100 tonnes in 1977). There is no evidence that recruitment would be reduced at these lower stock sizes, but ACFM considers it prudent to avoid the risks associated with it and <u>recommends that fishing mortality should not be increased</u>.

D.7.6. <u>Celtic Sea Cod</u>

The international catch fell by 12% to 5 729 tonnes in 1983.

Spawning biomass varied between 2 100 and 3 700 tonnes over the period 1974-79, but has since been much higher due to good recruitment (particularly the 1978 and 1979 year classes) and also the 1982 year class which will contribute a major part of the catch in 1985.

Forecasts have been carried out with an estimate of the 1982 year class based on the size composition of French catches in 1984 which indicate it to be comparable to the 1979 year class, and using the average recruitment 1975-81 for the year classes after 1982.

1984				Management option for 1985	1985				1986	
Stock biom.	Spawn. stock biom.	$\bar{F}_{(1-7)}$	Catch		Stock biom.	Spawn. stock biom.	$\bar{F}_{(1-7)}$	Catch	Stock biom.	Spawn. stock biom.
14100	6 600	.60	7 100	$F_{85}=F_{84}$	16100	10 700	.60	7 000	14300	9 200
				$F_{85}=0.8\ F_{84}$		11 000	.50	5 900	15700	10 600
				F_{max}		11 300	.37	4 600	18500	13 200
				$F_{0.1}$		12 000	.20	900	22100	17 400

Weight in tonnes.
Spawning stock at spawning time.

The spawning stock biomass for this stock is close to the average levels and will increase as the 1982 year class matures. There is therefore no cause for concern in that respect, but F_{max} occurs at about two-thirds the present level of F, and there is no long-term catch benefit to be gained by allowing the present level of fishing mortality to be increased.

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

D.7.7. Celtic Sea Whiting

The international catch rose by 14% to 8 557 tonnes in 1983 and the total effort, as derived from French data, rose by 10%. Uncertainties about age determination again prevented a full analytical assessment from being carried out. Landings and total effort for this stock have not varied very much over the past twelve years.

ACFM recommends a precautionary TAC for 1985. Catch figures on which this can be based are given in Table D.7.7.

D.7.8. Celtic Sea Plaice

The international catch fell by 10% to 1 170 tonnes in 1983 and total effort, as derived from Belgian data, fell by 7%. The only data available to assess this stock are from Belgium, which takes only 27% of the international catch, and no analytical assessment could be made.

Since the fishing effort on Celtic Sea plaice appears to be declining and the catch-per-unit effort going up, there seems to be no biological justification for restricting catches below the level of recent years.

ACFM therefore recommends the TAC be based on average catch levels 1980-83.

D.7.9. Irish Sea Mesh Assessment

Mesh assessments were carried out for sole, whiting and cod in order to judge the effect of a mesh increase to 80 mm. The basic data were not complete, so the results are no more than a preliminary indication. They show very little change in long-term yield for any of the three species, but an increase in biomass and immediate losses of the order of 10% for both sole and whiting.

These estimates are based on a mesh size currently in use of 75 mm, as recorded on vessels fishing in the United Kingdom sector of the Irish Sea by the United Kingdom Fisheries Inspectorate (Table D.7.9.), but this is likely to be an overestimate of the mesh size in use throughout the Irish Sea demersal fisheries as a whole. It is well known that the directed fishery for *Nephrops* (60 mm) also catches finfish species, and changes that would follow an increase in mesh size from 75 mm to 80 mm in the finfish fishery might also be achieved by uniform enforcement of the mesh sizes already designated for the different species.

ACFM considers it premature to make any recommendation for the further adjustment of mesh sizes in the Irish Sea, and has referred the matter back to the Irish Sea and Bristol Channel Working Group for further examination, including estimation of the balance of gains and losses to the international mixed demersal and Nephrops fisheries as a whole.

D.8 Sole and Plaice 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		1983		1984
Rec. TAC	Actual catch	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]	Rec. TAC
6.7	18.0	8.0	20.3	13.0	22.6	15.0	15.8	15.0	15.4	15.0	21.6	20.0	24.8	20.0

1) Preliminary

In 1983, the total international catch was 24 810 tonnes which include 4 943 tonnes unreported landings. This catch was 3 232 tonnes higher than the catch in 1982.

In 1983, 25% of the catch (in weight) consisted of 2-year olds and 36% of 3-year olds.

Both Belgian and Dutch indices indicate an increase of effort in 1983. The United Kingdom whole year effort index was at the same level in 1983 as in 1982.

In the years 1966-67, the spawning stock biomass increased because of the exceptionally good 1963 year class produced after this severe winter. In the years 1970-81, a decrease from 60 000 tonnes to 26 000 tonnes took place. During the last three years, the spawning stock biomass has increased to 44 900 tonnes, because of above average recruitment for the year classes 1979, 1980 and 1981. Also the 1982 and 1983 year classes are estimated to be above average.

The mean fishing mortality increased gradually from 1957 to 1973 by a factor of about 5. Since then it has fluctuated without trend and in 1983 was estimated at 0.47 (see option table).

Assuming an unchanged exploitation, the catch in 1984 and 1985 will be 23 000 tonnes and 22 000 tonnes, respectively, the spawning stock biomass in 1985 and 1986 will then be 45 000 tonnes and 41 000 tonnes, respectively.

A spawning stock biomass of 40 000 tonnes was agreed in 1981 to be the minimum level required to produce good year classes.

Management options are given in the text table below.

NORTH SEA SOLE

1984				Management option for 1985	1985				1986	
Stock biom.	Spawn. stock biom.	$\bar{F}_{(3-10)}$	Catch		Stock biom.	Spawn. stock biom.	$\bar{F}_{(3-10)}$	Catch	Stock biom.	Spawn. stock biom.
63	45	0.47	23	$F_{0.1}$	60	45	0.14	8	72	57
				F_{max}			0.29	15	65	49
				$F_{83} = F_{85}$			0.47	22	57	41

The data unit of the biomass and the catch is 1 000 tonnes.
The spawning stock biomass is given for 1 January.

As the present level of F is above any biological reference points, <u>ACFM recommends that the level of exploitation should be reduced to F_{max} as quickly as possible.</u>

D.8.2 North Sea Plaice

Recent catches and TACs, in '000 tonnes:

1977		1978		1979		1980		1981		1982		1983		1984
Rec. TAC	Actual catch	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)]	Rec. TAC
71	119	115	114	120	145	112	140	105	140	-	155	164	143	182

1) Preliminary.

In 1983, the provisional total landing was 143 449 tonnes, being 13% below the predicted yield and TAC (164 000 tonnes). As in recent years, 30% of the total estimated landings was classed as 'unreported' (43 223 tonnes).

The catch per unit effort series show different trends in recent years. Belgian data indicate an increase of about 76% since 1978, while the United Kingdom figures suggest a decrease of a similar magnitude during the same period. These differences arise because the fleets are fishing on different age groups.

A sudden increase in the fishing mortality on the younger and a decrease on the older age groups was demonstrated for the period 1980-83. This change in exploitation pattern since 1980 was already noted in last year's report but not used as the period of only 3 years was considered too short to allow for its estimation. This decision was probably the main reason for the discrepancy between the predicted 1983 catch and the observed catch.

The spawning biomasses have been rather stable at about 350 000 tonnes since the early 1970s.

Recent year classes have been above average, but new information showed that the strength of the 1981 year class had to be considerably reduced to 662 million from the 1983 estimate of 1000 million.

As a consequence of adopting an exploitation pattern more appropriate to the recent fishing pattern and because of the reduced 1979 and 1981 year classes, the 1984 catch is now expected to be 146 000 tonnes rather than 182 000 tonnes.

Assuming constant fishing mortality over the period 1983-85, the catch in 1985 will be 147 000 tonnes. The spawning stock will be 343 000 tonnes.

Management options are given in the text table below.

NORTH SEA PLAICE

1984				Management option for 1985	1985				1986	
Stock biom.	Spawn. stock biom.	$\bar{F}_{(2-10)}$	Catch		Stock biom.	Spawn. stock biom.	$\bar{F}_{(2-10)}$	Catch	Stock biom.	Spawn. stock biom.
551	341	0.34	146	$F_{0.1}$	537	361	0.14	69	590	415
				F_{max}			0.29	129	528	360
				$F_{85} = F_{83}$			0.34	147	509	343

Weights in '000 tonnes.

ACFM indicates a preference for fishing at F_{max}, which corresponds to a TAC of 130 000 tonnes in 1985.

D.8.3 Sole in Division VIId

Recent catches and TACs, in '000 tonnes:

1978		1979		1980		1981		1982	1983
C	Rec. TAC	C	Rec. TAC	C	Rec. TAC	C	Rec. TAC	C	C
1.4	1.2	1.8	2.2	1.4	1.7	2.2	1.4	2.7	3.0 1)

1) Preliminary

In 1983, the provisional landings were 3 038 tonnes. This catch is the highest on record, nearly 10% higher than the catch of 1981 and 45% higher than the recommended TAC. Since 1971, the landings have risen by a factor of 3.2 attributable mainly to an increase of the landings in France.

A combined catch per unit effort from Belgian and United Kingdom data indicated an increase of about 30% in 1982 and in 1983 compared to the period before. The international effort index doubled during the last three years.

ACFM could not accept the analytical assessment carried out by the Working Group as the reliability of the landing statistics prior to 1978 could be questioned. The remaining data base starting in 1979 was not sufficient to allow for making an assessment in the absence of fishery-independent stock estimates.

ACFM therefore recommends a precautionary TAC for 1985. Taking into account the high level of recent recruitment observed in French 0- and 1-group surveys and in the catches, it is advised to select the precautionary TAC from the recent catch levels, viz. the period 1979-83.

D.8.4 Sole in Division VIIe

Recent catches and recommended TACs, in '000 tonnes:

1978		1979		1980		1981		1982	1983
C	Rec. TAC	C	Rec. TAC	C	Rec. TAC	C	Rec. TAC	C	C
0.9	0.4	1.2	0.5	1.3	0.8	1.2	1.0	1.4	1.4[1)]

1) Preliminary

The catch level in 1983 of 1 395 tonnes did not differ very much from the level observed in 1982 (1 446 tonnes).

Catch per unit effort indices based on United Kingdom landings have been thoroughly investigated and re-calculated. An increase in the years 1976 to 1979, resulting, to some extent, from recruitment of the strong 1975 year class, was followed by a decline since then. The catch rate in 1983 is 20% lower than the 1976-79 average.

The international effort index increased again in 1983 and is now 3.5 times the mean during the period 1972-77. During the same period, the effort by the United Kingdom fleet has increased by a factor of 6 and the actual effort of the beam trawl by 7.5.

Despite improvements in the 1984 assessment it proved difficult to take account of the variation in catchability and, therefore, to estimate the 1983 terminal fishing mortality.

The analyses led to a range within which the present level of fishing mortality must lie, bounded by lower and upper fishing mortality options.

Following the 'low terminal fishing mortality option', preferred by the Working Group, the resulting catch in 1985 should be about 1 400 tonnes at the 1983 level of fishing mortality. The 'high terminal fishing mortality option' would lead to a decrease in the catches to 1 100 tonnes in 1985 at the 1983 level of fishing mortality. The remaining spawning stock biomass in 1985 would be 8 700 tonnes for the low option and 2 600 tonnes for the high option.

Since it is not possible to decide between these options at present, ACFM therefore recommends a precautionary TAC for 1985. Taking into account the high level of recent recruitment observed in the stock, it is advised to select the precautionary TAC from the recent catch levels, viz. the period 1979-83.

D.8.5 Plaice in Divisions VIId and VIIe

The catches in 1983 were almost at the same high level (6 398 tonnes) as in 1981 and 1982, whereas in the 10 years up to 1980 the catches fluctuated between 2 600 tonnes and 4 200 tonnes. Recent year classes (1979-1981) accounts for more than 90% of the catch.

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

Therefore, ACFM can only advise a precautionary TAC based on catch levels in the years 1979-83.

E. STOCKS IN NEAFC REGIONS 2 AND 3

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

In last year's report, ACFM welcomed the improvements which had been made in the data base both for the Northern stock (Sub-areas IV, VI, and VII and Divisions VIIIa,b) and Southern stock (Divisions VIIIc and IXa). Attention must be drawn, however, to the absence of any official Spanish catch statistics since 1981. It must be stressed that there will be absolutely no possibility to carry out any new assessment of the hake stocks, least of all an analytical one, until these basic data are made available. Furthermore, advances are required in age reading and in the provision of age/length keys, and the sampling of landings and discards also needs to be improved.

Consequently, ACFM is not in a position to give any new advice on hake at present. ACFM can only repeat the management advice given in last year's report (Sections E.1.1 and E.1.2).

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 (Sub-areas IV, VI, VII, VIII and IX)

F.2.1 In previous years, ACFM has not made any recommendations about catch levels for horse mackerel because of lack of biological information about the stocks and doubts about catch statistics. The total catches in Sub-areas IV, VI, VII, VIII and IX were about 121 000 tonnes in 1983 compared to 103 000 tonnes in 1982. The catch in Sub-area VII increased from 33 500 tonnes in 1982 to 43 600 tonnes in 1983, while the 1983 catches in Sub-area VIII (21 200 tonnes) and Sub-area IX (38 000 tonnes) were approximately the same as in 1982. Reservations are again expressed about the accuracy of these statistics. No information was available about Spanish catches in Divisions VIIIc and IXa for 1983.

Information is still lacking which would enable stocks to be distinguished, and there is considerable uncertainty about age-reading determinations. Nevertheless, it is clear that the fishery conducted in Division IXa, mainly by Portugal, is mostly based on juvenile (0-1 group) fish. Portuguese research vessel data from Division IXa suggest an improvement in recruitment in 1982 and 1983 compared with 1981. As expressed before by ACFM, the yield from the fishery in Division IXa would be considerably increased if the exploitation rate could be altered so that catches of juveniles were reduced.

The overall data base required to assess the status of horse mackerel in the different areas is insufficient. Much of the difficulty relates to problems of catch statistics, ageing and stock identity. Additional processing and analysis are required before material collected during the 1980 and 1983 mackerel egg surveys can be used. Information is very limited concerning mortality estimates, recruitment, biomass estimates, measures of relative abundance and fecundity.

ACFM is therefore unable to give any advice on horse mackerel catch levels at present.

F.3 Sardine in Divisions VIIIc and IXa

One of the two countries (Spain), which is the principal exploiter of the sardine in these Divisions, informed the Secretariat just before the 1984 meeting of the Sardine Working Group that neither catch nor age data were available concerning its 1983 fishery and that, consequently, no scientists from that country would participate in the 1984 meeting of the Working Group. For this reason, and since it was already known that Portugal had decided not to carry out its planned part of the joint acoustic survey of the sardine stock in August 1984, the 1984 meeting of the Sardine Working Group had to be postponed until next year.

ACFM stresses again that a meaningful assessment of the sardine stock and the recruitment to it in the total area requires not only representative catch at age data, but also an estimate of stock size and its composition independent of commercial fisheries data. This can best be achieved by a well planned and coordinated joint acoustic survey during the recruiting period July - September by the two countries mainly concerned.

Because of this, and since any assessment of this stock has to be largely based on an annual acoustic survey, ACFM will not be able to provide any advice on this stock for 1985.

G. STOCKS IN NEACF REGIONS 1, 2 AND 3

G.1 Mackerel

As in previous years, assessments were carried out on the assumption that the fisheries exploit two main stocks - the North Sea stock and the Western stock.

Norwegian tag return data were used as a basis for splitting the catch of 3-year-old fish and older in Divisions IIa, IVa and VIa (north of 58°N during the winter) into North Sea and Western stock components. All mackerel at ages 1 and 2 caught in Division IIa and 10% of fish 3 years old and older, were allocated to the North Sea stock. In Division VIa, it was decided to allocate 10% of the fish aged 3 and older, taken in winter (November to April) north of 58°N to the North Sea stock and all 1 and 2-year-old fish to the Western stock. All catches in Division IVa were assumed to belong to the North Sea stock.

For the first time, estimates of discards from the fishery on the Western stock were included in the appropriate catch tables together with the landing figures. Discard estimates had previously been accounted for in the catches in numbers at age for the Western stock used in the VPA but had never been given in tables of catch data.

There were some small changes in the estimates of spawning stock based on egg surveys in the North Sea and western areas since 1980. For the North Sea spawning stock, the 1982 estimate was increased from 165 000 tonnes to 190 000 tonnes, and the 1983 estimate of 240 000 tonnes was accepted. For the Western stock, the spawning stock, estimated from the 1980 surveys, was increased from 6 200 x 10^6 to 7 310 x 10^6 fish (2.3 million tonnes) and the 1983 spawning stock estimated from the 1983 surveys was decreased from 7 200 x 10^6 fish to 6 958 x 10^6 fish (2.15 million tonnes). For both stocks, the estimates of spawning stock from the egg survey results were used as the basis for determining F in 1983 for the VPAs.

G.1.1. North Sea stock

The total catch taken from the stock in 1982 and 1983 was 47 000 tonnes, compared to 66 000 tonnes in 1981. Although ACFM had recommended a zero TAC on the North Sea stock for 1983, the EEC and Norway agreed to a TAC of 30 000 tonnes for Sub-area IV and Division IIIa. Catches from these areas totalled 36 000 tonnes in 1983. The catch in Division IIa in 1983 was 49 000 tonnes, the largest on record, 5 600 tonnes of which was from the North Sea stock and which is included in the 47 000 tonnes total North Sea stock catch.

The spawning stock biomass in 1983, calculated from the VPA, is estimated to have been 213 000 tonnes (see Figure G.1.2). The slight increase from the value estimated for 1982 is due to the influx of the 1981 year class which is stronger than any produced since 1975. The 1980 year class was estimated to be nearly as strong as the 1981 year class. However, the 1982 year class appears to be the weakest yet observed.

In the stock and catch predictions, the 1983, 1984 and 1985 year classes were assumed to be 20 x 10^6 fish. This is equivalent to the strength of the 1978 year class, which is considered to be the poorest year class observed (not considering the 1982 year class whose estimated size is based on only one year of catch data). The catch in 1984 was assumed to be 45 000 tonnes. The 1984 spawning stock was thus forecast to be approximately 210 000 tonnes, about the same as in 1983.

Management options

The management options for 1985 are given below and are shown in Figure G.1.1.

1983		1984				Management option for 1985	1985		
Total land-ings	$\bar{F}_{4-14}$	Stock biomass	Spawn. stock biom.	$\bar{F}_{4-14}$	Total land-ings		Stock biom.	$\bar{F}_{4-14}$	Total land-ings
47.4	.28	233	210	0.27	45	Maintain catch level	185	0.35	45
						$F_{85} = F_{84}$		0.27	37
						$F_{85} = F_{0.1}$		0.22	29
						$F_{85} = M$		0.15	21
						No fishing		0	0

It should be pointed out that the decreasing trend in spawning stock sizes shown by VPAs is not in agreement with the trend detected by the egg surveys. The egg surveys indicate an increase in spawning stock in recent years. One possible explanation for this may be that there is some influx of mackerel of Western stock to spawn in the North Sea and thus contribute to the egg production. It is possible that the distribution and mixing rates of the North Sea and Western stocks may be different from that assumed at present and this may partly account for the difficulties experienced in both assessments - particularly in relation to the trend in the North Sea spawning stock biomass. Therefore estimates of spawning stock biomass for 1985 and 1986 are not given in the option table above.

With the present low spawning stock and assumed low recruitment, ACFM recommends that no fishing be allowed in Sub-area IV and Division IIIa in 1985. If a complete closure is not possible, then catches in these fishing areas should not exceed 20 000 tonnes.

G.1.2. Western stock

The total catch taken from the Western stock in 1983 was estimated to be about 625 000 tonnes compared to 649 000 tonnes in 1982 and 664 000 tonnes in 1981. The 1983 catch includes about 91 000 tonnes, which could not be attributed to any particular country and which represented about 16% of the estimated landed catch from

Sub-areas VI and VII. Discarding of catches, particularly in Sub-area VII, has also accounted for a significant amount of the catch in recent years. However, in 1983 this appeared to be less of a problem than previously as the total estimated discards in Sub-areas VI and VII was only about 11 000 tonnes. It should be emphasized that, as in recent years, the total catch figures are considered unreliable because of uncertainties in the quantities of unallocated catches and discards.

There is some evidence of an increase in the abundance of 1 and 2-year-old mackerel in Division VIa in 1982 and 1983. This increase appeared to be independent of year class strength and could be the result of a northerly shift in the distribution of young fish. The average fishing mortality, estimated from VPA, represented an increase of 16% over that for 1982 (Figure G.1.2). The spawning stock, also estimated from VPA (Figure G.1.2), for 1980 was within 8% of that estimated by the egg survey for that year. The spawning stock in 1983, estimated to be about 2.2 million tonnes, has decreased by about 11% from 1982 and by 36% from 1978. Apart from the weak 1977 year class (500 million), recruitment has been at a fairly high and constant level until 1982. This 1982 year class appears to be as weak as that of 1977. Based on information from English research vessel catches in the Celtic Sea, the Bay of Biscay and west to the Continental Shelf, the 1983 year class also appears to be weak.

In the stock and catch predictions, the 1983 year class was assumed to be at the very low level of 500 million fish and the 1984 and 1985 year classes to be 1 000 million fish. The 1984 total landings were assumed to be 650 000 tonnes. The 1984 spawning stock is thus estimated to be about 1.9 million tonnes, a decrease of 13% from 1983. The assumption of two weak year classes (1982 and 1983) has a very adverse effect on the spawning stock. Even with no fishing in 1985 and 1986, the spawning stock will reach a new low level in both years of about 1.7 million tonnes. This is 50% of the 1978 level. If catches in 1985 and 1986 remain at the estimated 1984 level, the spawning stock biomass in 1986 will drop below 1.0 million tonnes.

Management options

The management options for 1985 are given in the text-table below and are shown in Figure G.1.2.

1983		1984				Management option for 1985	1985				1986	
Total landings*)	$\bar{F}_{(3-10)}$	Stock biomass	Spawn. stock biom.	$\bar{F}_{(3-10)}$	Total landings*)		Stock biom.	Spawn. stock biom.	$\bar{F}_{(3-10)}$	Total landings*)	Stock biomass	Spawn. stock biom.
625	0.22	2 500	1 879	0.26	650	Maintain catch level	1 976	1 463	0.36	650	1 452	980
						$F_{85} = F_{84}$		1 517	0.26	500	1 577	1 181
						$F_{85} = F_{0.1}$		1 573	0.17	338	1 714	1 338
						$F_{85} = M$		1 584	0.15	300	1 741	1 369
						No fishing		1 681	0	0	1 998	1 682

*) Includes landings taken from outside the Western area and excludes landings of North Sea stock from within the Western area. Spawning stock biomass is estimated at 1 June.

This trend cannot be reversed, given present catch levels and the assumed low recruitment strengths of the 1982 and 1983 year classes. There is no evidence for selecting any particular year class strength for the forecast but the chances of a strong one being produced are not believed to be high. In any event, the effect of doubling the assumed strength of the 1984 and 1985 year classes will boost the suggested catch level in 1985 by only 10 000 tonnes.

ACFM, therefore, recommends that the catch level in 1985 should be restricted to 340 000 tonnes, corresponding to the $F_{0.1}$ level of exploitation.

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

G.1.3. Closed area in the Celtic Sea

ACFM repeats the advice given in 1983 about the closed area in the Celtic Sea. It is now particularly important, because of the apparent weaknesses of the 1982 and 1983 year classes, that no fishing be allowed in the 'box' previously defined by ACFM off Cornwall. The western boundary of this box should be maintained at 7°W while the eastern boundary should be 2°W.

G.1.4. Effects of a ban on fishing in Division VIa(N)

ICES was requested by EEC to:-

1. provide on a monthly basis estimates of the proportion of mackerel of North Sea origin in the area in Division VIa north of 58°N during the period 1 November - 30 April;

2. assess quantitatively the effects of the recommendations on the evolution of the eastern mackerel stock under the following conditions:

   a) closure throughout the period recommended by ACFM (i.e., 1 November - 30 April),

   b) closure from 1 December - 30 April,

   c) closure from 1 - 31 December and from 1 March to 30 April.

These questions are relative to an earlier ACFM recommendation that fishing for mackerel should be banned in Division VIa north of 58°N during the period 1 November - 30 April as a conservation measure for North Sea stock.

The Working Group was unable to provide the exact advice as requested by EEC, primarily because the request was received only a few days before the meeting began, which did not allow for much preparation of data, and also because mixing rates and age composition of catches in Division VIa were not available for all months requested (November - April).

There is now a much lower proportion of North Sea stock in the Division VIa fishery than was estimated in earlier years. This is supported by changes in the fishery in this area and time period which have changed not only in national participation but also very markedly in age composition of the catches.

The effects on North Sea spawning stock biomass in 1983 to 1985 were estimated under the following assumptions:

1. the fisheries in both stocks in all areas continue throughout 1985 at their present level;

2. the different seasonal closures in Division VIa, north of 58°N, as defined in the EEC request, had been introduced during 1982, and

3. all fishing on North Sea stock had ceased at 1 January 1982.

For this analysis, total catches in both 1984 and 1985 from the Western and North Sea stocks were assumed to be 650 000 tonnes and 45 000 tonnes, respectively, in the absence of any closures and finally that the proportions of Western and North Sea fish caught in Division VIa, north of 58°N, were assumed to remain at the average of that observed in 1982 and 1983.

The effects of the different fishing regimes on the spawning stock biomass expressed as percentage increases or decreases are shown in the following text-table. All percentage changes are in relation to the 1982 spawning stock estimated by the most recent assessment.

Percentage changes in spawning stock biomass in relation to 1982

Fishing Regime	1982	1983	1984	1985
1) Fishing in all areas as at present	0.0	+3.3	+1.6	-21.1
2) No fishing in any area	+2.2	+27.1	+45.4	+40.1
3) Closure, 1 Nov.-30 Apr.	+0.5	+9.6	+9.4	-12.2
4) Closure 1 Dec.-30 Apr.	+0.2	+7.2	+5.4	-14.2
5) Closure 1-31 Dec. and 1 Mar.-30 Apr.	+0.1	+6.2	+4.1	-18.8

The present assessment of this stock estimates that the spawning stock biomass increased by about 2% from 1982 to 1984 because of recruitment of the relatively stronger 1981 and 1982 year classes. It is predicted to fall by 21% relative to 1982 because of the assumed continued poor recruitment.

With the changes which have taken place in recent years (see above), it is now evident that the area closure of the fishery for the maximum period proposed (1 November - 30 April), if it had been effective since 1982, would have had little positive effect on this decline (the decrease in spawning stock biomass would be 12% compared with 21%).

The analysis indicates that any closure in Division VIa will have a minimal positive effect on the North Sea spawning stock biomass relative to that which would be achieved by a complete ban on fishing for North Sea stock in all areas.

G.1.5 The Relationship between Sub-area IX Mackerel and Mackerel from the Western Area (Sub-areas VI, VII, VIII)

The catches taken in the mackerel fisheries which are confined to Division IXa only have not been included with those on which the Western stock assessment is based. The catches in 1983 in Portuguese waters amounted to only about 3 000 tonnes. Biological evidence about growth and maturity from Portuguese catches suggests that the stock may be different from the Western stock. There is, however, no information available about the stock boundaries of mackerel in these fishing areas. Information about these matters will be presented at the 1984 Statutory Meeting of ICES and will be available at the next meeting of the Mackerel Working Group. Until the stock separation of mackerel in these fishing areas has been resolved, it will not be possible to make any realistic assessments.

G.2 Blue Whiting

Recent catches and recommended TACs (in '000 tonnes) are given in the text table below:

Stock	1978 Catch	1979 Catch	1980 Catch	1981 Catch	1982 Catch	1982 TAC	1983 Catch[1]	1983 TAC[2]
Northern Area	575	1 091	1 093	871	545	1 000	541	570-780
Southern Area	34	27	30	39	31		28	

1) Preliminary
2) Precautionary

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

G.2.1 Blue Whiting in the Northern Area (ICES Statistical Areas I, II, IIIa IVa-c, V, VIa,b, VIIb,c, XIV)

Total landings of blue whiting from the northern area were at the same level in 1983 as in 1982 (Tables G.2.1 - G.2.5). The decline in landings from the Norwegian Sea fisheries continued in 1983 down to 55 000 tonnes compared to 110 000 tonnes in 1982 and 767 000 tonnes in 1980. This decline, however, was compensated by an increase in landings from the spawning fishery to 361 000 tonnes in 1983 compared to 317 000 tonnes in 1982. The landings from the mixed industrial fishery in 1983 remained at the same level as in 1982 (i.e. 118 000 tonnes).

G.2.1.1. Acoustic Surveys

In August-September 1984, the third ICES coordinated survey was carried out in the Norwegian Sea and adjacent waters by six vessels. The survey gave a total biomass estimate of 3.8 million tonnes, of which 0.05 million tonnes were 0-group fish (1984 year class), 1.8 million tonnes 1-group fish (1983 year class), 1.6 million tonnes 2-group fish (1982 year class) and 0.4 million tonnes were older fish (1981 year class and older).

Four estimates of the spawning stock were obtained during the spawning season in 1984. A Norwegian survey estimated the spawning stock at 2.1 million tonnes. Two USSR surveys yielded estimates of the spawning stock at 2.7 and 2.4 million tonnes, respectively, and a Faroese survey gave an estimate of the spawning stock of 2.2 million tonnes. Some of the 2 year olds (1982 year class) matured to spawn in 1984, and these are included in the Norwegian spawning stock estimate. In the USSR and Faroese estimates, however, only fish 26cm and larger are included.

The estimate of the adult stock obtained during the August survey in 1984 (0.4 million tonnes) is very different from the estimates obtained during the spawning season (2.7 - 2.1 million tonnes), and it is difficult to account for the discrepancy of 1.7 - 2.3 million tonnes. It should be noted that the similar discrepancy between the spring and August 1983 survey results amounted to 2.5 - 3.3 million tonnes. Some sources of error which might have introduced biasses into the estimates were discussed, amongst those a very wide spread of blue whiting over the entire area of their distribution during the feeding period, the pattern of which could have been affected by changes in the hydrological conditions in 1982 and 1983. ACFM concluded that the most likely estimates of the adult component in 1984 were those obtained during the spawning season and further, that the Norwegian Sea survey in 1984 indicated the 1982 and 1983 year classes to be strong, and that the total stock biomass increased during the last year.

G.2.1.2 Virtual Population Analysis

The acoustic estimates of the adult component made during the spawning season in 1984 were considered to be sufficiently close to justify a VPA run. The second survey of the USSR was chosen as a basis for the input parameters, since it had covered the largest area and thus might yield the most representative estimate of 3 year olds and older fish.

According to the VPA results, the total stock biomass decreased from 1974 to 1983 by about 45%. The strengths of the 1982 and 1983 year classes were felt to have been overestimated by the 1984 August survey, and it was therefore decided to use the input fishing mortality rates, corresponding to the average recruitment strength of 20 x 10^9 fish as 0-group (for the period of fairly good recruitment in 1970-78). Nevertheless, the recruitment of these two year classes brought about a slight increase in the stock in numbers in 1983.

Changes in the total stock biomass indicated by the VPA are reflected in catch per effort indices from the Norwegian Sea fishery. The resulting stock size estimates from the VPA presented in the text table below coincide to a large extent with the acoustic estimates of the adult stock obtained during the spawning seasons of 1981 and 1983.

Adult stock abundance (three year olds and older fish) estimated from acoustic surveys during the spawning season versus estimates from the VPA calibrated against the 1984 survey:

Year No x 10^9	1981	1982	1983	1984
Acoustic Survey (April)	32.5	?	25	15
VPA 1. January	33.1	25.3	19.7	16
Tonnes x 10^6				
Acoustic Survey	5.4	?	4.4	2.7
VPA	5.1	4.5	3.6	2.7

Therefore, the VPA results and catch predictions based on them were considered to be a sound basis for the management consideration of the blue whiting stock in the Northern Area (Figure G.2.1).

G.2.1.3 Management Considerations

In the catch predictions, recruitment at age 0+ for the 1982-83 year classes was taken to be 20 x 10^9 fish, for the reasons explained above, and the 1983 exploitation pattern was retained for both 1984 and 1985. On the basis of data available on the blue whiting landings in 1984, it was considered reasonable to expect no change in the fishing mortality level (average F on age groups 2-12, unweighted) in 1984 in comparison with that of 1983, and the predictions, therefore, were based on that assumption. A range of possible catch options for 1985, based on the unchanged exploitation pattern, together with the residual total stock and spawning stock biomass in 1986 are given in the text table below.

1984				1985				1986	
$\bar{F}_{(2-12)}$	Stock biom.	Spawn. stock biom.	Ex-pect. catch	$\bar{F}_{(2-12)}$	Stock biom.	Spawn. stock biom.	Catch options	Stock biom.	Spawn. stock biom.
0.14	4 934	2 996	578	$\bar{F}_{85}=\bar{F}_{84}=\bar{F}_{83} = 0.14$	5 246	3 127	615	5 547	3 427
				$\bar{F}_{0.1} = 0.18$			783	5 345	3 286
				$\bar{F}_{max} = 0.34$			1 370	4 570	2 690

Biomasses and catches in '000 tonnes.
Spawning stock biomass as at 1 January

ACFM was somewhat concerned with applying the 1983 exploitation pattern to the fishery in 1984 and 1985, when the fleets conducting the blue whiting fishery were likely to shift fishing effort to, and hence generate higher fishing mortality on, the abundant 1982 and 1983 year classes. Therefore, predictions with modified exploitation patterns, generating higher fishing mortality on both 1 and 2 year olds in 1984 and, respectively, on both the 2 and 3 year olds in 1985, were also calculated. These, however, resulted in estimates fairly consistent with those given in the text table above for the fishing mortality levels applied. In view of the above, and because at present there is no sound basis to modify the exploitation pattern on which the options in the above table are based, ACFM prefers, that the fishing mortality level in 1985 should not exceed that corresponding to $F_{0.1}$.

G.2.1.4 Effects of an Increase in the Minimum Mesh Size in the Blue Whiting Fishery to 40mm

ACFM was requested by NEAFC to provide an assessment of the effects on the blue whiting stock of an increase in the minimum mesh size to 40mm from the currently legal mesh size of 16 mm.

The Blue Whiting Assessment Working Group, which met in Copenhagen from 26 September to 3 October 1984, found out that in the directed fisheries for blue whiting no country involved currently used minimum mesh sizes below 36mm (i.e., Norway - 36mm; France - 36mm; Federal Republic of Germany - 50mm; USSR, German Democratic Republic and Poland - 40mm). Therefore, no assessment of the effects of an increase to 40mm mesh size was attempted.

However, managers should also be aware of blue whiting being caught in the mixed industrial fisheries, using the minimum mesh size of 16mm. The use of this mesh size in any of the blue whiting fisheries would generate high fishing mortality on younger age groups, but ACFM does not consider that to be a serious problem at the present time.

G.2.2 Blue Whiting in the Southern Area (ICES Statistical Areas VIId,e and VIIg-k, VIII and IX)

The 1983 preliminary figures of landings from the Southern Area blue whiting fisheries (28 000 tonnes) were at about the same level as in 1982 (Table G.2.6). Since, however, no catch-at-age data were made available by the countries involved, ACFM was not in a position, at this juncture, to make any assessment of the state of this stock.

H. STATEMENT IN RESPONSE TO NEAFC REQUEST CONCERNING REGION 3 STOCK ASSESSMENTS

At its meeting in November 1983, NEAFC asked ACFM to set out the scientific data requested from coastal States to enable the advice for stocks in Region 3 to be "of the same high standard as for Regions 1 and 2". ACFM's reponse is as follows:

A detailed stock assessment depends on a statistical service providing regular, representative, timely and accurate information about the commercial fishery, and on a research institute collecting biological information of a similarly high quality which it then applies to the commercial fishery data. All these activities must be carried out on a continuous basis, and reviewed from time to time so that they may be altered, where necessary, to take account of new information or changes in the fishery.

For stocks which are fished by more than one country, the results of the respective national statistics and research programmes must be evaluated at a joint meeting (such as an ICES Working Group) in order that an assessment of the whole stock can be made.

H.1. Objectives

The purpose of collecting information is to determine the following:

(a) the size of the stock (usually expressed as stock biomass, which means the weight of fish in the sea);

(b) the age structure of the stock;

(c) the proportion of the stock which consists of fish which are old enough to reproduce (known as the spawning stock biomass);

(d) the growth rate and natural mortality rate of the fish in the stock, both before and after the age at which they are liable to exploitation;

(e) the quantity of fish caught, and the age structure of the catch;

(f) the level of fishing activity (fishing effort) applied to the stock;

(g) the abundance of young fish (pre-recruits) which are not yet big enough to be caught by the fishing gear in use, or which have not yet moved from the nursery grounds to an area where they are accessible to the fishery;

(h) the type and size (such as trawl mesh size) of fishing gear in use and the extent to which different sizes (ages) of fish are liable to capture by each gear (mesh selection, for example);

(i) the direction and magnitude of changes in items a to h from year to year, including short-term forecasts of stock size and catch.

H.2. Requirements

In order to provide the information necessary to meet the above objectives, the following data must be routinely collected in a representative way and reported to ICES:

Statistical data on the commercial fishery:

(a) nominal catch in weight (of each species) by each of the various gear and vessel categories during specific units of time (usually per month) and in identified fishing areas (preferably statistical rectangles); if the catch loses weight in any way before landing (such as being gutted) then conversion factors must be worked out in order to derive the live weight equivalent of the landings;

(b) fishing effort expended, measured in the appropriate standard units (see the instructions accompanying the STATLANT forms) and broken down by gear, area and time as at (a) above.

Biological data

(a) the length, weight and age of both unrecruited and fully recruited fish, derived from routine sampling of the landings (and discards, see (b) below) and from young fish surveys;

(b) the size (age) structure and total weight of discards in fisheries where there is a significant level of discarding;

(c) the relationship between (i) length and weight, (ii) length and age, and (iii) weight and age;

(d) the relationship between length (age) and (i) fecundity, (ii) onset of maturity;

(e) the abundance of the recruiting (incoming) year classes, derived from well-designed young fish surveys;

(f) estimates, independent of the commercial fishery, of stock abundance (from acoustic surveys or trawl surveys); spawning stock biomass may also be calculated from egg and/or larval surveys;

(g) identification of unit stocks (and stock components in catches) by tagging experiments, biochemical investigations and/or studies of meristic characters (vertebral counts, for example);

(h) other biological investigations as necessary, for example in schooling behaviour, stomach contents, changes in catchability, etc.

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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 IIa	Division IIb	Total Catch
1960	357 327	155 116	91 599	622 042
1961	409 694	153 019	220 508	783 221
1962	548 621	139 848	220 797	909 266
1963	547 469	117 100	111 768	776 337
1964	206 883	104 698	126 114	437 695
1965	241 489	100 011	103 430	444 930
1966	292 253	134 805	56 653	483 711
1967	322 798	128 747	121 060	572 605
1968	642 452	162 472	269 160	1 074 084
1969	679 373	255 599	262 254	1 197 226
1970	603 855	243 835	85 556	933 246
1971	312 505	319 623	56 920	689 048
1972	197 015	335 257	32 982	565 254
1973	492 716	211 762	88 207	792 685
1974	723 489	124 214	254 730	1 102 433
1975	561 701	120 276	147 400	829 377
1976	526 685	237 245	103 533	867 463
1977	538 231	257 073	109 997	905 301
1978	418 265	263 157	17 293	698 715
1979	195 166	235 449	9 923	440 538
1980	168 671	199 313	12 450	380 434
1981	137 033	245 167	16 837	399 037
1982	96 576	236 125	31 029	363 730
1983*	64 803	200 279	24 910	289 992

* Provisional figures

Expected Catches

1984	73 000	184 000	22 000	279 000

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	U.S.S.R.	Others	Total all countries
1960	3 306	22 321	-	9 472	231 997	20	141 175	213 400	351	622 042
1961	3 934	13 755	3 921	8 129	268 377	-	158 113	325 780	1 212	783 221
1962	3 109	20 482	1 532	6 503	225 615	-	175 020	476 760	245	909 266
1963	-	18 318	129	4 223	205 056	108	129 779	417 964	-	775 577
1964	-	8 634	297	3 202	149 878	-	94 549	180 550	585	437 695
1965	-	526	91	3 670	197 085	-	89 962	152 780	816	444 930
1966	-	2 967	228	4 284	203 792	-	103 012	169 300	121	483 704
1967	-	664	45	3 632	218 910	-	87 008	262 340	6	572 605
1968	-	-	255	1 073	255 611	-	140 387	676 758	-	1 074 084
1969	29 374	-	5 907	5 543	305 241	7 856	231 066	612 215	133	1 197 226
1970	26 265	44 245	12 413	9 451	377 606	5 153	181 481	276 632	-	933 246
1971	5 877	34 772	4 998	9 726	407 044	1 512	80 102	144 802	215	689 048
1972	1 393	8 915	1 300	3 405	394 181	892	58 382	96 653	166	565 287
1973	1 916	17 028	4 684	16 751	285 184	843	78 808	387 196	276	792 686
1974	5 717	46 028	4 860	78 507	287 276	9 898	90 894	540 801 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	761	302	1 717	287 525	-	6 601	40 311	14 515	363 730
1983*	11 106	126	473	1 243	234 000	-	5 840	22 975	14 229	289 992

* 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
1960	125 675	1 854	27 925	155 434
1961	165 165	2 427	25 642	193 234
1962	160 972	1 727	25 189	187 888
1963	124 774	939	21 031	146 744
1964	79 056	1 109	18 735	98 900
1965	98 505	939	18 640	118 079
1966	124 115	1 614	34 892	160 621
1967	108 066	440	27 980	136 486
1968	140 970	725	40 031	181 726
1969	88 960	1 341	40 208	130 509
1970	59 493	497	26 611	86 601
1971	56 300	435	21 567	78 302
1972	221 183	2 155	41 979	265 317
1973	283 728	12 989	23 348	320 065
1974	159 037	15 068	47 033	221 138
1975	121 686	9 726	44 330	175 742
1976	94 064	5 649	37 566	137 279
1977	72 159	9 547	28 452	110 158
1978	63 965	979	30 478	95 422
1979	63 841	615	39 167	103 623
1980	54 205	68	33 616	87 889
1981	36 834	455	39 864	77 153
1982	17 948	2	29 005	46 955
1983*	7 550	185	13 872	21 607

*Provisional figures.

EXPECTED CATCHES

1984	8 000	+	13 000	21 000

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 Islands	France	German Dem.Rep.	Germany, Fed.Rep.	Norway	Poland	United Kingdom	U.S.S.R.	Others	Total
1960	172	-	-	5 597	47 263	-	45 469	57 025	125	155 651
1961	295	220	-	6 304	60 862	-	39 650	85 345	558	193 234
1962	83	409	-	2 895	54 567	-	37 486	91 910	58	187 438
1963	17	363	-	2 554	59 955	-	19 809	63 526	-	146 224
1964	-	208	-	1 482	38 695	-	14 653	43 870	250	99 158
1965	-	226	-	1 568	60 447	-	14 345	41 750	242	118 578
1966	-	1 072	11	2 098	82 090	-	27 723	48 710	74	161 778
1967	-	1 208	3	1 705	51 954	-	24 158	57 346	23	136 397
1968	-	-	-	1 867	64 076	-	40 129	75 654	-	101 726
1969	2	-	309	1 490	67 549	-	37 234	24 211	25	130 820
1970	541	-	656	2 119	37 716	-	20 423	26 802	-	87 257
1971	81	-	16	896	45 715	43	16 373	15 778	3	78 905
1972	137	-	829	1 433	46 700	1 433	17 166	196 224	2 231	266 153
1973	1 212	3 214	22	9 534	86 767	34	32 408	186 534	2 501	322 626
1974	925	3 601	454	23 409	66 164	3 045	37 663	78 548 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	53	-	1 258	41 421	-	827	2 900	-	46 955
1983*	428	-	1	729	19 371	-	259	680	139	21 607

*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	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*)
Belgium	30	28	2	1	-	-	-	-	-	-
Faroe Islands	6	67	137	8	1	-	-	206	-	-
France	1 116	-	-	660	3 608	1 142	1 297	537	841	-
German Dem.Rep.	28 275	28 020	22 636	17 614	16 165	16 162	8 448	4 614	4 463	3 394
Germany, Fed.Rep.	6 597	5 182	7 894	7 231	11 483	11 913	7 992	4 688	3 182	3 275
Netherlands	-	-	127	-	-	-	-	-	-	-
Norway	7 055	4 966	7 305	7 381	7 802	9 025	8 472	9 249	10 020 2)	11 051 2)
Poland	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	930	...	...
U.K.	3 509	2 746	4 961	6 330	3 390	1 756	1 307	470	336	-
USSR	48 787	230 950	263 546	144 993	78 092	70 451	72 802	81 652	112 685	99 429
Total	96 644	278 195	317 606	185 873	124 172 1)	113 620 1)	102 765 1)	102 372	131 527	117 149

*) Provisional data
1) The total figure used by the Working Group for assessments (including catches by non-members)
2) National statistics

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	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983 x)
S. marinus	27 272	39 125	48 584	39 508	31 695	26 475	23 411	20 826	16 341	18 128
S. mentella	69 372	239 070	269 022	146 365	92 477	87 145	79 354	81 546	115 186	99 021
Total	96 644	278 195	317 606	185 873	124 172	113 620	102 765	102 372	131 527	117 149

x) Provisional data

Table B.3.1 GREENLAND HALIBUT.
Nominal catch (tonnes) in Sub-areas I and II, 1974-1983 (data for 1974-1982 from Bulletin Statistique).

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*)
Faroe Isl.	-	-	2	21	-	24	-	8	-	-
German Dem.Rep.	5 914	8 472	8 955	8 176	4 611	3 488	2 080	1 358	1 153	1 913
Germany, Fed.Rep.	88	94	31	148	321	481	303	128	18	129
Norway: trawl catch 1)	4 656	1 686	4 030	2 564	2 302	921	1 559	2 949	1 746	1 814
long-line catch and gill net 2)	4 135	3 172	1 975	1 653	1 780	1 992	1 598	1 252	1 404	3 108
Poland	5 146	3 645	3 566	224	544	106	-	-	-	-
U.K. (Eng. + Wales)	866	731	935	1 059	407	59	26	9	10	-
USSR	16 958	20 372	16 580	15 045	14 651	10 311	7 670	9 276	12 394	15 378
Others	-	-	-	-	1	5	48	38	8	-
Total	37 763	38 172	36 074	28 890	24 617	17 312	13 284	15 018	16 733	22 342

*) Provisional data
1) From national statistics (incl. shrimp trawl)
2) From national statistics.

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	S.marinus	S. mentella
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	116 391	9 441 2)	103 323 1)3)	229 155 3)	123 165	105 990 3)
1983 *)	124 647	9 231	91 002 1)4)	224 880 4)	106 317	118 563 4)

1) Catches updated for Sub-area XII included

2) Catches updated for Sub-area VI included

3) Including 60 508 tonnes from the Oceanic Stock not included in the assessments

4) Including 60 187 tonnes from the Oceanic Stock not included in the assessments

*) Provisional data

Table B.5.1 GREENLAND HALIBUT. Nominal catch (tonnes) in Sub-areas V and XIV, 1974 - 1983.
(Data for 1974 to 1982 from Bulletin Statistique)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Faroe Isl.	48	8	375	1 251	258	150	1 042	767	1 532	1 112
France	-	-	-	-	12	70	51	8	27	-
German Dem.Rep.	25 801	16 963	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	1 949	1 388	2 219	5 207	2 726	6 461	2 318	3 007	2 581	1 112
Greenland	2	1	1	4	6	-	-	+	1	+
Iceland	2 843	1 212	1 689	10 090	11 319	16 934	27 838	15 455	28 300	28 336
Norway	-	7	7	7	19	1	3	2	+	-
Poland	1 542	1 072	-	-	-	-	-	-	-	-
U.K.[1] (Engl. & Wales)	2 323	1 209	1 680	19	9	-	-	-	-	-
USSR	1 772	1 634	74	-	-	-	-	-	-	-
Total	36 280	23 494	6 045	16 578	14 349	23 616	31 252	19 239	32 441	30 560

*)Provisional data
1)From national statistics

Table B.6.1 Nominal catches (in tonnes) of COD in Sub-area XIV, 1973-83. (Data for 1973-80 broken down by countries are from Bull.Stat.)

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Canada	-	-	-	2	-	-	-				
Faroe Isl.	167	652	581	440	1 407	6	-	-	292	-	300
German Dem. Rep.	8	15	326	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	9 262	2 309	1 552	7 075	3 564	3 936	1 062	3 193	7 367	8 940	7 998
Greenland	191	68	224	372	1 833	1 347	2 755	1 778	890	893	430
Iceland	1 446	3 009	785	3 133	25	13	3	19	1	-	-
Norway	-	-	1 864	364	537	17	-				
Poland	17	1	18	-	-	-	-				
UK (Engl. & Wales)	661	499	575	1 514	1 393	41					
UK (Scotl.)	-	-	-	-	-	2					
USSR	-	-	-	127	16	-	-				
Total	11 752	6 553	5 925	13 027	8 775	5 362	3 820	4 990	8 550	9 833	8 728
WG Total					c) 18 000	c) 26 000	c) 34 000	a)b) 12 000	a)b) 16 000	a)b) 27 000	b) 12 819

*) Preliminary.
a) Including estimates of discards
b) Including catches reported from ICES Sub-area XII and Div. Vb.
c) Including estimates of unreported catches

Table B.7.1.1 Landings of Icelandic summer-spawning HERRING 1974-1983 in tonnes x 10^{-3}

1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
1.2	12.8	17.8	28.7	37.3	45.1	53.3	39.5	56.5	58.7

Table B.7.2 Catches north of 62°N of Norwegian spring-spawning herring (tonnes) since 1972.

Year	Catches of adult herring in winter	Mixed herring fishery in autumn 1)	By-catches of O- and I-group herring in the sprat fishery
1972	0	9895	3266 2)
73	139	6602	276
74	906	6093	620
75	53	3372	288
76	0	247	189
77	374	11834	498
78	484	9151	189
79	691	1866	307
80	878	7634	65
81	844	7814	78
82	983	10447	225
83	3857	13290	907
1984	18605 3)		

1) Includes also by-catches of adult herring in other fisheries.

2) In 1972, there was also a directed herring O-group fishery.

3) Preliminary 1 January - 30 June 1983.

Table B.8.1 International catch of Barents Sea capelin ('000 tonnes) in the years 1965-83.

Year	Norway	USSR	Other	Total
1965	217	7		224
1966	380	9		389
1967	403	6		409
1968	522	15		537
1969	679	1		680
1970	1 301	13		1 314
1971	1 371	21		1 392
1972	1 556	37		1 593
1973	1 291	45		1 336
1974	987	162		1 149
1975	943	431	43	1 417
1976	1 949	596		2 545
1977	2 116	822	2	2 940
1978	1 122	747	25	1 894
1979	1 109	669	5	1 783
1980	999	641	9	1 649
1981	1 238	721	28	1 987
1982	1 158	596	5	1 759
1983	1 497	812		2 309

<u>Table B.8.2</u> The total annual and seasonal catch of CAPELIN in the Iceland - East Greenland - Jan Mayen area since 1964 (in '000 tonnes)

Year	Winter season		Summer and autumn season				Total
	Iceland	Faroes	Iceland	Norway	Faroes	EEC	
1964	8.6						8.6
1965	49.7						49.7
1966	124.5						124.5
1967	97.2						97.2
1968	78.1						78.1
1969	170.6						170.6
1970	190.8						190.8
1971	182.9						182.9
1972	276.5						276.5
1973	440.9						440.9
1974	461.9						461.9
1975	457.6		3.1				460.7
1976	338.7		114.4				453.1
1977	549.2	25.0	259.7				833.9
1978	468.4	38.4	497.5	154.1			1 158.4
1979	521.7	17.5	441.9	126.0	2.5		1 109.6
1980	392.0		367.2	118.6	24.4	14.3	916.5
1981	156.0		484.6	91.4	16.2	20.8	769.0
1982	13.0		0.0	0.0	0.0	0.0	13.0
1983	0.0		133.3	0.0	0.0	0.0	133.3
1984	437.0			104.3	6.2	8.0	555.5

Table C.1.1 Nominal catch (tonnes) of SAITHE in Sub-area I and Divisions IIa and IIb, 1974-83.
(Data for 1974-82 from Bulletin Statistique.)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983 x)
Belgium	5	47	1	-	-	-	-	-	-	-
Faroe Islands	46	28	20	270	809	1 117	532	236	339	539
France	7 119	3 156	5 609	5 658	4 345	2 601	1 016	194	82	537
German Dem. Rep.	29 466	28 517	10 266	7 164	6 484	2 435	-	-	-	-
Germany, Fed. Rep.	33 155	41 260	49 056	19 985	18 190	14 823	12 511	8 413	7 224	4 931
Netherlands	-	-	64	-	-	-	-	-	-	-
Norway	152 699	122 598	131 675	139 705	121 069	141 346	128 878	166 139	169 936	150 741
Poland	2 521	3 860	3 164	1	35	-	-	-	-	-
Portugal	-	6 430	7 233	783	203	-	-	-	-	-
Spain	7 075	11 397	21 661	1 327	121	685	780	-	-	-
Sweden	-	8	-	-	-	-	-	-	-	-
U.K. (England & Wales)	3 001	2 623	4 651	6 853	2 790	1 170	794	395	731	1 252
U.K. (Scotland)	103	140	73	82	37	-	-	-	1	-
USSR	28 931	13 389	9 013	989	381	3	43	121	14	206
Total	264 121	233 453	242 486	182 817	154 464	164 180	144 554	175 498	178 327	158 206

*) Preliminary

Table C.1.2 Nominal catch (tonnes) of SAITHE in Sub-area IV and Division IIIa, 1974-1983 (Data for 1974-1982 from Bulletin Statistique)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Belgium	33	81	127	107	44	14	13	12	4	8
Denmark	8 388	10 149	15 111	17 334	10 372	10 461	10 370	6 454	10 114	10 392
Faroe Islands	581	287	425	318	213	407	1 020	614	746	346
France	28 619	24 396	32 552	41 022	38 122	40 983	37 306	42 649	47 064	49 697
German Dem.Rep.	5 816	5 882	2 088	2 430	2 404	1 504	925	-	-	-
Germany Fed.Rep.	20 589	18 622	38 698	26 860	25 982	18 780	11 095	8 246	13 517	14 614
Iceland	5	1	-	-	-	-	-	-	-	-
Ireland	-	-	119	126	88	-	-	-	-	-
Netherlands	14 504	8 917	6 101	7 270	5 135	1 466	245	123	36	-
Norway b)	9 246	12 483	17 856	14 949	17 627	17 575	47 959	55 882	70 464	77 439
Poland	22 203	35 304	35 819	12 378	5 661	6 104	2 404	698	793	415
Spain	308	249	-	-	-	-	-	-	-	-
Sweden	1 187	913	1 271	1 275	990	211	342	156	372	369
UK (Engl./Wales	4 353	3 472	6 300	6 822	8 382	6 256	4 879	4 309	5 627	2 993
UK (Scotland)	10 956	8 898	13 034	11 366	14 330	8 257	6 525	6 529	8 136	5 752
USSR	104 500	110 743	83 669	46 385	10 161	2 015	-	-	-	-
Sub-total	231 288	240 397	253 170	188 642	139 511	114 033	123 083	125 672	156 873	162 025
By-catch from Industrial Fisheries:										
Denmark a)	38 800	27 800	53 684	1 805	72	493	-	-	-	-
Norway a)	3 469	9 878	13 082	4 392	2 494	1 142	363	1 280	5 003	1 445
TOTAL	273 557	278 075	319 936	194 839	142 077	115 668	123 446	126 952	161 876	163 470

*) Preliminary

a) Data from national Laboratories

b) In 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.

Table C.2.1 Nominal catch (tonnes) of SAITHE in Division Va, 1974-1983.
(Data for 1974-82 from Bulletin Statistique)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983 x)
Belgium	2 371	1 638	1 615	1 448	1 092	980	980	532	203	224
Faroe Isl.	1 712	1 366	3 267	3 013	4 250	5 457	4 930	3 545	3 582	2 157
France	94	32	51	-	-	-	-	-	23	-
Germany, Fed.Rep.	18 627	13 820	13 785	10 575	-	-	-	-	-	-
Iceland	65 169	61 430	56 811	46 973	44 327	57 066	52 436	54 921	65 124	55 899
Norway	-	6	5	4	3	1	1	3	1	-
U.K.(Engl. & Wales)	8 845	8 643	6 024	13	-	-	-	-	-	-
U.K.(Scotland)	731	1 021	443	-	-	-	-	-	-	-
Total	97 549	87 956	82 001	62 026	49 672	63 504	58 347	59 001	68 933	58 280

x) Preliminary

Table C.3.1 Nominal catch (tonnes) of SAITHE in Sub-area VI from 1974-83. (Data for 1974-82 from Bulletin Statistique.)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*)
Belgium	209	21	95	-	-	1	2	2		
Denmark	-	-	3	-	-	-	-	-	4	
Faroe Islands	6	6	7	11	-	14	4	3	5	2
France	22 802	19 946	29 216	19 686	21 519	15 662	15 427	16 654	17 102	22 027*)
German Dem.Rep.	-	8	3	-	-	-	-	-		
Germany, Fed.Rep.	16	481	511	254	604	131	49	581	441	295
Ireland	-	-	375	240	266	246	295	250	322	300
Iceland	-	+	-	-	-	-	-	-	-	
Netherlands	124	702	547	531	623	256	91	-	-	
Norway	22	10	17	91	122	20	62	25	19*)	55
Poland	125	164	91	-	-	-	-	-	-	
Spain	1 862	1 882	1 012	346	-	-	-	120	-	
U.K. (Eng. & Wales)	1 333	1 571	1 560	2 758	3 193	1 765	1 594	1 364	1 966	798
U.K. (N. Ireland)	3	12	13	9	27	11	9	10	7	8
U.K. (Scotland)	9 527	6 131	5 807	4 628	5 181	3 602	2 902	3 117	2 141	2 587
USSR	269	15	2 550	-	-	-	-	-	-	
Total	36 298	30 949	41 807	28 554	31 535	21 708	20 435	22 126	22 007	26 072

*) Preliminary

Table C.4.1 Nominal catch (tonnes) of SAITHE in Division Vb, 1974-1983
(Data for 1974- to 1982 from Bulletin Statistique)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*)
Belgium	-	-	6	-	-	-	-	-	-	
Faroe Islands	3 726	2 517	2 560	5 153	15 892	22 003	23 810	29 682	30 808	38 964
France	20 457	23 980	15 367	17 038	8 128	2 974	1 110	258	137	230
German Dem.Rep.	130	26	-	-	-	-	-	-	-	
Germany, Fed.Rep.	6 661	5 229	2 605	3 806	1 088	581	197	20	19	47
Netherlands	-	491	232	58	-	-	-	-	-	
Norway	1 660	486	2 232	1 279	1 124	1 137	62	134	15	33
Poland	1 925	815	1 007	-	-	-	-	-	-	
Spain	500	654	117	-	-	-	-	-	-	
UK (Engl.and Wales)	3 827	2 428	3 063	2 613	557	190	13	-	-	
UK (Scotland)	8 302	4 950	5 860	5 608	1 349	361	38	9	1	
USSR	-	-	16	-	-	-	-	-	-	
TOTAL	47 188	41 576	33 065	34 835	28 138	27 246	25 230	30 103	30 980	39 274

*) Preliminary

Table C.4.2 Faroe Plateau COD. Nominal catches by countries, 1974-1983 (tonnes) (Data for 1974-1982 from Bulletin Statistique).

Year	Faroe Islands	France	Germany Fed.Rep.	Norway	Poland	UK England	UK Scotland	Others	TOTAL
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	21 387	10	-	85*	-	-	2	-	21 484
1983**	37 916	-	127*	69*	-	-	7	-	38 119

*) Vb_2 included

**) Preliminary

***) Working Group data

Table C.4.3 Faroe Bank COD. Nominal catches by countries, 1974-83 (tonnes).
(Data for 1974-82 from Bulletin Statistique)

Year	Faroe Isl.	France	Germany Fed.Rep.	Norway	Poland	UK England	UK Scotland	Others	Total
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	-	-	16	-	-	152	-	2 352
1983**)	2 284						59		2 343

*) Catches included in Vb_1.

**) Preliminary.

Table C.4.4.1 Faroe Plateau HADDOCK. Nominal catches by countries, 1974-83 (tonnes).
(Data for 1974-82 from Bulletin Statistique)

Year	Faroe Islands	France	Germany, Fed.Rep.	Norway	Poland	UK England	UK Scotland	Others	Total
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	10 319	2	1	11	-	-	1	-	10 334
1983**)	11 898	-	+*)	11*)	-	-	2	-	11 911

*) Catches including Vb_1

**) Preliminary

Table C.4.4.2 Faroe Bank HADDOCK. Nominal catches by countries, 1974-83 (tonnes). (Data for 1974-82 from Bulletin Statistique)

Year	Faroe Islands	France	Germany Fed.Rep.	Norway	Poland	UK England	UK Scotland	Others	Total
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	1 153	-	*)	1	-	-	48	-	1 602
1983**)	967						13		980

*) Catches included in Vb_1.

**) Preliminary.

Table D.1.1.1 HERRING. Catch in tonnes 1973-1983 North Sea (Subarea IV and Division VIId) by country.
(National catches as officially reported. Unallocated catches provided by W.G. members).

Country \ Year	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Belgium	2 160	603	2 451	2 451	57	-	-	-	-	9 700	5 969
Denmark	174 254 a)	61 728	115 616	34 841	12 769	4 359	10 546	4 431	21 146	67 851	10 468
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	15 310	16 353
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)	1 837
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	22 656	49 000
Norway	99 739	40 975	34 183	27 386	4 065	1 189	3 617	2 165	70	680	32 512
Poland	5 738	9 850	7 069	7 072	2	-	-	-	-	-	-
Sweden	4 222 e)	3 561	6 858	4 777	3 616	-	-	-	-	-	284
U.K. (England)	2 268	5 699	6 475	9 662	3 224	2 843	2 253	77	303	3 730	111
U.K. (Scotland) f)	16 012	15 034	8 904	15 015	8 159	437	-	610	45	1 780	17 260
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	122 056	133 794
Total including unallocated catches							25 148	60 994	140 972	235 569	308 169

*) Preliminary
a) Total includes 2 107 t for human consumption unspecified to area
b) Supplied by Fiskirannsóknarstovan
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.1.2.1. HERRING in Division IIIa. Landings in tonnes 1973-1983
(Data mainly provided by Working Group members)

	Country/Year	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Skagerrak	Denmark	42 098	35 732	29 997	7 326	19 889	6 425	5 153	5 180	18 001	22 881	54 102
	Faroe Islands	5 265	7 132	8 053	1 553	10 064	1 041	817	526	990	715	1 980
	Germany Fed.Rep.	-	36	108	6	32	28	181	-	199	43	40
	Iceland	15 938	231	1 209	123	-	-	-	-	-	-	-
	Norway (Open Sea)	836	698	196	-	-	1 860	2 460	1 350	6 330	10 140	5 300
	Norway (Fjords)	1 680	1 720	1 459	2 304	1 837	2 271	2 259	2 795	950	1 560	2 834
	Sweden	20 429	11 683	12 348	6 505	8 109	11 551	8 104	10 701	30 274	24 859	35 176
	Total	86 246	57 232	53 370	17 817	39 931	23 176	18 974	20 552	56 744	60 198	99 432
Kattegat	Denmark	78 125	54 540	48 974	41 749	38 205	29 241	21 337	25 380	18 721	12 366	62 901
	Sweden	40 418	39 779	23 769	30 263	37 160	35 193	25 272	18 260	38 871	38 892	40 463
	Total	118 543	94 319	72 743	72 012	75 365	64 434	46 609	43 640	57 592	51 258	103 364
Division IIIa Total		204 789	151 551	126 113	89 829	115 296	87 610	65 583	64 192	114 336	111 456	202 796
Unallocated								8 117	20 053	57 000	35 344	-4 800
GRAND TOTAL								73 700	84 245	171 336	146 800	197 996

* Preliminary

Table D.1.2.2.

HERRING IN FISHING AREA IIIA (KATTEGAT AND SKAGERRAK)

CATCH IN NUMBERS UNIT: MILLIONS

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
0	2499	2006	433	934	147	457	682	3624	3334	4876
1	910	1471	1474	1437	876	168	467	966	965	2603
2	375	149	325	329	455	583	233	656	314	490
3	135	60	26	61	65	70	185	178	241	122
4	47	57	4	12	10	13	30	68	26	56
5	26	15	3	6	1	4	4	8	16	5
6	9	6	1	4	1	0	1	2	3	2
7	3	1	1	2	0	0	0	0	1	0
8+	1	1	1	0	0	0	0	0	0	0
TOTAL	4006	3766	2270	2784	1555	1296	1603	5502	4920	8154

Table D.1.3.1. Annual Celtic Sea and Division VIIj HERRING, 1974-83.
(Data provided by Working Group members.)

Year	France	German Dem.Rep.	Germany Fed.Rep.	Ireland	Netherlands	Poland	United Kingdom	USSR	Unallocated	Total
1974	2 261	-	433	16 276	2 105	954	-	-	-	22 029
1975	1 924	-	361	10 587	2 825	512	24	1 054	-	17 287
1976	1 919	147	28	5 986	1 627	324	-	826	-	10 857
1977	106	-	96	5 533	1 455	-	-	-	-	7 190
1978	8	-	220	6 249	1 002	-	-	-	850	15 519
1979	584	-	20	7 019	850	-	-	-	3 705	12 178
1980	9	-	2	8 849	393	-	-	-	-	9 253
1981	123	-	-	15 562	1 150	-	-	-	-	16 835
1982	+	-	-	9 501	-	-	-	-	-	9 501
1983*	495	-	-	10 000	1 500	-	-	-	10 187	22 187

Table D.1.3.2. 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
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
1983/84*	495	-	-	10 000	1 500	-	-	-	9 186	21 181

*Provisional

Table D.1.4.1 HERRING.
Catch in weight, Division VIa (North) 1973-1983

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Denmark	932	-	374	249	626	128	-	-	1 580	-	-
Faroes	10 003	5 371	3 895	4 017	3 564	-	-	-	-	74	834
France	2 441	411	1 244	1 481	1 548	1 435	3	2	1 243	2 069	1 313
German Dem.Rep.	251	200	600	279	-	-	-	-	-	-	-
Germany Fed.Rep.	9 663	8 687	5 582	4 084	-	26	-	256	3 029	8 453	6 283
Iceland	2 532	9 566	2 633	3 273	-	-	-	-	-	-	-
Netherlands	27 892	17 461	12 024	16 573	8 705	5 874	-		5 602	11 317	20 200
Norway	32 557	26 218	509	5 183	1 098	4 462	-		3 850	13 018	7 336
Poland	2 062	334	376	390	-	-	-		-	-	-
Sweden	-	-	-	2 206	261	-	-		-	-	-
UK(England)	-	45	125	20	301	134	54	33	1 094	90	-
UK(Scotland)	120 800	107 475	85 395	53 351	25 238	10 097	3	15	30 389	38 381	31 616
USSR	1 137	2 392	1 244	2 536	-	-	-	-	-	-	-
Unallocated	-	-	-	-	-	-	-	-	4 633	18 958	-4 059
TOTAL	208 270	178 164	114 001	93 642	41 341	22 176	60	306	51 420	92 360	63 523

* Preliminary

Table D.1.5.1. Monthly landings (tonnes) of HERRING from the Firth of Clyde (all fishing methods combined). (Data provided by the Working Group.)

Month	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
January	*	*	*	*	4*	4*	6*	15*	2*	+ *
February	91*	68*	7*	*	6*	8*	3*	15*	16*	1*
March	168*	85	69*	*	7*	13*	8*	14*	1*	1*
April	398	369	521	530	246	12*	4*	32*	2*	-*
May	280	283	436	544	245	4*	2*	25*	615	1*
June	607	203	281	640	238	336	114	429	850	265
July	690	354	332	494	376	466	656	982	757	519
August	543	240	473	601	587	450	645	511	262	681
September	310	515	541	559	581	374	559	106	-*	604
October	451	811	598	556	653	263	79	-*	-*	457
November	245	571	595	560	647	1*	3*	2*	-*	1*
December	91	120	236	328	272	-*	2*	4*	1*	-*
Not known	189	44	50	35						273[1)]
Total	4 053	3 663	4 139	4 847	3 862	1 951	2 081	2 135	2 506	2 803

* Subject to closure of directed fishery.

1) Landed in Northern Ireland and Isle of Man during July and August.

Table D.1.6.1 HERRING.

Estimated catches in weight in Divisions VIa (south) and VIIb,c, 1974-83.

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*)
Belgium	-	-	12	-	-	-	-	-	-	-
France	145	68	47	-	-	-	-	-	353	19
German Dem.Rep.	1 833	1 394	890	-	-	-	-	-	-	-
Germany, Fed.Rep.	5 667	4 431	924	221	100	5	-	2 687	265	-
Ireland	16 395	12 465	10 895	15 916	19 128	18 910	27 499	19 443	16 856	15 000
Netherlands	2 225	15 208	16 546	4 423	481	1 939	1 514	2 790	1 735	5 000
Poland	6 034	2 558	2 778	6	-	-	-	-	-	-
United Kingdom (N. Ireland)	28	6	1	1	6	2	1	2	-	-
USSR	4 262	2 634	674	-	-	-	-	-	-	-
Unallocated	-	-	-	-	-	1 752	1 110	-	-	13 000
Total	36 589	38 764	32 767	20 567	19 715	22 608	30 124	24 922	19 209	33 019

*) Provisional data

Table D.1.7.1. HERRING. Total catches (tonnes) in North Irish Sea (Division VIIa), 1974-83.

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
France	3 194	813	651	85	174	455[3)]	1	-	-	48[3)]
Ireland	5 894	4 790	3 205	3 331	2 371	1 805	1 340	283	300	860
Netherlands	1 116	630	989	500	98	-	-	-	-	-
U.K.	27 489	18 244	16 401	11 498	8 432[2)]	10 078[4)]	9 272	4 094	3 375	3 025
Other	945[1)]	26[1)]	-	-	-	-	-	-	1 180[5)]	-
Total	38 638	24 503	21 246	15 414	11 075	12 338	10 613	4 377	4 855	3 933

1) USSR 2) Includes 68.5 tonnes of spring-spawned herring

3) No data basis for allocation to stock 4) Additional unrecorded catch of 106 tonnes estimated

5) Unallocated *) Preliminary

Table D.1.7.2. HERRING. Total catch by stock in North Irish Sea, 1974 - 1983.

Country	1974		1975		1976		1977		1978		1979		1980		1981		1982		1983*	
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
France	3 194	-	813	-	651	-	85	-	87	87	-	-	1	-	-	-	-	-	-	-
Ireland	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	346	514
Netherlands	1 116	-	630	-	989	-	500	-	98	-	-	-	-	-	-	-	-	-	-	-
U.K.	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	1 759	1 266
Unallocated	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	779	401	-	-
Total Manx	30 677		19 283		16 287		12 431		8 458		10 130		8 660		2 937		3 097		2 105	
Total Mourne	7 961		5 220		4 959		2 983		2 548		1 753		1 953		1 440		1 758		1 780	

1 - Manx stock; 2 - Mourne stock

*) Preliminary

Table D.2.1.1 Total industrial landings (tonnes x 10^{-3}) from the North Sea, 1974-1983.

YEAR	Target industrial species				By-catch for reduction[6]				TOTAL[4]
	Norway pout	Sandeel	Sprat	Sum	Blue whiting[1]	Protected species[2]	Herring[3]	Sum	
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	435.4	487.6	621.5	1 544.5	36.0	198.0	12.0	246.0	1 790.5
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	235.4	568.6	209.1	1 013.1	61.8	85.4	84.2	235.8	1 266.9
1982	359.0	610.9	152.7	1 122.6	106.6	59.0	152.9	318.5	1 441.1
1983[5]	421.3	536.5	91.2	1 049.0	88.9	39.3	154.5	282.7	1 331.7

1) C.M.1984/Assess:2
2) C.M.1983/Assess:16 and 18 (Haddock, whiting, saithe)
3) C.M.1983/Assess:9
4) Does not include other species which on an average range between 20 000 and 40 000 tonnes
5) Preliminary
6) By-catches do not include fish landed for human consumption

Table D.2.1.2 Herring by-catch North Sea in tonnes by year and Division

Division	1977	1978	1979	1980	1981	1982	1983
IVa West	502	27	443	705	7 933	331	546
IVa East	186	-	2	48	-	491	574
IVb	8 790	7 545	14 882	6 008	75 533	150 357	153 361
IVc	-	223	1	494	702	1 699	11
Total	9 478	7 795	15 328	7 255	84 168	152 878	154 492

Table D.2.1.3 Revised herring by-catch North Sea in numbers at age (million) for 1982

Winterrings	0	1	2	3	4	5	6	7	8+
Division IVa West	-	-	-	-	-	1	1	-	1
Division IVa East	-	2	5	-	-	-	-	-	-
Division IVb	9 575	898	62	3	-	-	-	-	-
Division IVc	-	10	8	8	-	-	-	-	-
Total	9 575	910	75	11	-	1	1	-	1

Table D.2.1.4 Herring by-catch North Sea in numbers at age (million) for 1983

Winterrings	0	1	2	3	4	5	6	7	8+
Division IVa West	-	-	-	1	1	-	-	-	1
Division IVa East	-	1	5	-	-	-	-	-	-
Division IVb	10 029	915	81	3	-	-	-	-	-
Division IVc	1	-	-	-	-	-	-	-	-
Total	10 030	916	86	4	1				1

Table D.2.2.1 NORWAY POUT. Annual landings (in thousand tonnes) in Sub-area IV by countries North Sea 1957-83

Year	Denmark	Faroes	Norway	Sweden	UK (Scotland)	Others	Total
1957			0.2				0.2
1958							
1959	61.5		7.8				69.3
1960	17.2		13.5				30.7
1961	20.5		8.1				28.6
1962	121.8		27.9				149.7
1963	67.4		70.4				137.8
1964	10.4		51.0				61.4
1965	8.2		35.0				43.2
1966	35.2		17.8			+	53.0
1967	169.6		12.9			+	182.6
1968	410.8		40.9			+	451.8
1969	52.5	19.6	41.4			+	113.5
1970	142.1	32.0	63.5		0.2	0.2	238.0
1971	178.5	47.2	79.3		0.1	0.2	305.3
1972	259.6	56.8	120.5	6.8	0.9	0.2	444.8
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	435.4
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	167.5	16.6	51.3		+		235.4
1982	256.3	15.4	87.3		0		359.0
1983*	301.1	24.5	95.7		+		421.3

*Preliminary

Table D.2.2.2 NORWAY POUT. Annual landings (tonnes) in Division VIa (For 1971-1982 data officially reported to ICES)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*)
Belgium	1	-	-	-	-	-	-	-	-	-	-	-	-
Denmark	363	186	42	-	193	-	-	4 443	15 609	13 070	2 877	751	530
Faroes	-	-	1 743	1 581	1 524	6 203	2 177	18 484	4 772	3 530	3 540	3 026	6 261
Germany, Fed.Rep.	-	-	-	179	-	8	-	-	-	-	-	-	-
Netherlands	-	-	-	-	322	147	230	21	98	68	182	548	3)
Norway	-	-	-	144 2)	-	82 2)	-	-	-	-	-	-	-
Poland	-	-	-	75	-	-	-	-	-	-	-	-	-
UK (Scotland) 1)	1 622	3 760	9 282	4 702	6 614	6 346	2 799	302	23	1 202	1 158	586	+
USSR	-	-	-	40	2	7 147	-	-	-	-	-	-	-
Total	1 986	3 946	11 067	6 721	8 655	19 933	5 206	23 250	20 502	17 870	7 757	4 911	

*) Preliminary 1) Amended using national data. 2) Including by-catch. 3) Data not available

Table D.2.2.3 NORWAY POUT. Annual landings (tonnes) in Division IIIa (For 1971-1982 data officially reported to ICES)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983 3)
Denmark	25 800	17 259	23 152	10 669	15 666	40 144	20 694	23 922	23 951	26 235	29 273	51 023 4)	19 391
Faroes			643										
Norway	296			62*)	925*)	50*)	104	362	1 182	141	752	1 259	233
Sweden		1)	1)	1)	3 272	2 255	318	591 2)	32	39	60	103	51 5)
Total	26 096	17 259	23 795	10 731	19 863	42 449	21 116	24 875	25 165	26 415	30 085	52 385	19 675

1) Included in the North Sea. 2) Includes North Sea. 3) Preliminary. 4) Landings in foreign ports Jul-Dec not included.

5) Data from Data Form 5

*) Including by-catch

Table D.2.3.1 Landings of SANDEEL from the North Sea 1952- 83 in thousand tonnes.

Year	Denmark	Germany, Fed. Rep.	Faroes	Netherlands	Norway	Sweden	U.K.	Total
1952	1.6	0	0	0	-	0	0	1.6
1953	4.5	+	0	0	-	0	0	4.5
1954	10.8	+	0	0	-	0	0	10.8
1955	37.6	+	0	0	-	0	0	37.6
1956	81.9	5.3	0	+	1.5	0	0	88.7
1957	73.3	25.5	0	3.7	3.2	0	0	105.7
1958	74.4	20.2	0	1.5	4.8	0	0	100.9
1959	77.1	17.4	0	5.1	8.0	0	0	107.6
1960	100.8	7.7	0	+	12.1	0	0	120.6
1961	73.6	4.5	0	+	5.1	0	0	83.2
1962	97.4	1.4	0	0	10.5	0	0	109.3
1963	134.4	16.4	0	0	11.5	0	0	162.3
1964	104.7	12.9	0	0	10.4	0	0	128.0
1965	123.6	2.1	0	0	4.9	0	0	130.6
1966	138.5	4.4	0	0	0.2	0	0	143.1
1967	187.4	0.3	0	0	1.0	0	0	188.7
1968	193.6	+	0	0	0.1	0	0	193.7
1969	112.8	+	0	0	0	0	0.5	113.3
1970	187.8	+	0	0	+	0	3.6	191.4
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	464.4	0	4.9	0	52.6	0	46.7	568.6
1982	506.9	0	4.9	0	46.5	0.4	52.2	610.9
1983	485.1	0	2.0	0	12.2	0.2	37.0	536.5

- = no information

+ = less than half unit

Table D.2.3.2 Annual landings ('000 tonnes) of SANDEELS by stock areas of the North Sea (Denmark, Norway, United Kingdom (Scotland)).

	Stock areas		
Year	Shetland	Northern	Southern
1975	12.9	253.7	156.5
1976	20.2	135.0	330.6
1977	21.5	348.4	392.3
1978	28.1	163.0	577.2
1979	13.4	195.3	355.9
1980	25.4	292.0	401.2
1981	46.7	138.1	378.9
1982	52.0	74.4	479.2
1983	37.0	78.2	419.0

Table D.2.3.3 SANDEEL, Division VIa
Landings in tonnes 1974-1983 as officially reported to ICES

Year / Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Denmark							109			
Norway			17	54						
UK(Scotland)	+	+	+	13	+		211	5 972	10 873	13 051

Table D.2.3.4 SANDEEL, Division IIIa
Landings in tonnes as officially reported to ICES

Country	YEAR												
	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983**
Denmark	21 567	7 919	9 878	7 912	16 421	21 418	16 082	21 731	33 305	39 357	59 408	21 540	34 286*
Faroes								2					
Sweden		1)	1)	1)	79	67	432	1 121 2)	3	9	44	5	0

1) Included in the North Sea
2) Includes North Sea
* Final data for Denmark not yet available
** Preliminary

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			
1969	0.8	1.9	1.7	4.4	0.8	1.6	2.4	6.8	11.8	18.6
1970	1.1	2.4	2.4	5.9	3.1	6.0	9.1	15.0	6.4	21.4
1971	0.7	2.4	2.9	6.0	1.5	9.6	11.1	17.1	4.4	21.5
1972	0.8	3.3	2.4	6.5	1.4	17.9	19.3	25.8	6.9	32.7
1973	19.4	2.5	3.2	25.1	19.3	16.2	35.5	60.6	8.8	69.4
1974	17.3	2.0	1.2	20.5	31.6	18.6	50.2	70.7	3.3	74.0
1975	14.9	2.1	1.9	18.9	69.7	20.9	90.6	109.5	2.9	112.4
1976	12.8	2.6	2.0	17.4	30.4	13.5	43.9	61.3	0.6	61.9
1977	7.2	2.2	1.2	10.6	53.3	9.8	63.1	73.7	5.4	79.1
1978	23.1	2.2	2.7	28.0	36.1	9.4	45.5	73.5	5.2	78.7
1979	17.3	8.1	1.8	27.2	45.8	6.4	52.2	79.4	5.0	84.4
1980*	43.1	-	3.4	46.5	35.8	-	35.8	102.4	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	11.0	6.7	1.8	19.5	15.4	4.8	20.2	39.7	6.0	45.7
1983	3.4	6.7	1.5	11.6	9.1	13.2	22.3	33.9	3.0	36.9

* Sweden: 20 124 tonnes in Div. IIIa. Included in total but allocation to Skagerrak and Kattegat not possible.

Table D.2.4.2 SPRAT catches in the North Sea ('000 tonnes), 1974-83 (data provided by Working Group members).

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983[a)]
					IVa West					
Denmark	5.3	0.5	0.6	0.1	-	-	-	2.8	-	-
Faroe Islands	0.2	12.9	2.5	0.4	-	-	-	-	-	-
France	-	-	-	+	-	-	-	-	-	-
German Dem.Rep.	-	-	-	+	-	-	-	-	-	-
Germany, Fed.Rep.	-	-	+	0.6	-	-	0.1	-	-	-
Netherlands	+	+	+	+	-	-	-	-	-	-
Norway	-	1.5	29.9	16.0	1.3	0	-	-	-	-
Poland	-	0.3	-	-	-	-	-	-	-	-
Sweden	2.2	11.0	+	0	-	-	-	-	-	-
U.K. (England)	-	-	-	0	-	-	-	-	-	-
U.K. (Scotland)	41.2	9.4	12.7	26.9	16.9	6.8	3.8	1.0	+	-
USSR	1.0	1.3	1.2	+	-	-	-	-	-	-
Total	49.9	36.9	46.9	44.0	18.2	6.8	3.9	3.8	+	0
					IVa East (North Sea stock)					
Denmark	-	-	0.2	0.1	-	-	-	-	+	-
Norway	-	-	1.9	0.7	0.1	+	0.4	-	-	3.0
U.K. (Scotland)	-	-	+	0	-	-	-	-	-	-
Total	-	-	2.1	0.8	0.1	...	0.4	0	+	3.0
					IVb West					
Belgium	-	-	+	0	-	-	-	-	-	-
Denmark	55.4	106.6	104.4	57.5	44.1	75.3	76.7	53.6	23.1	32.6
Faroe Islands	4.0	30.0	42.9	1.8	-	2.8[b)]	2.8[b)]	-	-	-
France	-	-	-	+	-	-	-	-	-	-
German Dem.Rep.	1.7	4.5	6.4	0.7	-	-	-	-	-	-
Netherlands	-	-	-	0	-	-	-	-	-	-
Norway	9.5	145.7	73.0	5.5	56.2	47.8	18.3	0.2	8.6	-
Poland	-	9.1	10.5	0	-	-	-	-	-	-
Sweden	-	-	7.9	0	-	-	-	-	-	-
U.K. (England)	25.5	32.5	49.7	51.9	53.9	12.9	2.4	-	-	-
U.K. (Scotland)	8.6	4.9	18.1	10.9	14.8	5.0	2.5	0.7	0.2	+
USSR	32.9	47.8	50.4	1.6	-	-	-	-	-	-
Total	137.7	381.1	362.3	123.9	169.0	143.8	102.7	54.5	31.9	32.6

a) Preliminary figures as reported
b) Division IVb East and West.
\+ = less than 0.1.
\- = magnitude known to be nil.

/Continued

Table D.2.4.2 (Continued)

SPRAT catches in the North Sea ('000 tonnes), 1974-83 (data provided by Working Group members).

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983[a)]
					IVb East					
Denmark	104.0	215.2	201.1	126.8	161.0	191.5	149.0	127.5	91.2	39.2
German Dem.Rep.	-	0.4	-	0.7	-	-	-	-	-	-
Germany, Fed.Rep.	17.5	0.5	1.7	4.3	-	1.8	6.1	4.8	1.5	-
Norway	-	-	5.1	0	29.8	27.4	33.7	0.2	7.2	12.0
Sweden	-	-	-	1.5	-	-	0.6	-	-	-
Total	121.5	216.1	207.9	133.3	190.8	222.7	189.4	132.5	99.9	51.2
					IVc					
Belgium	+	+	-	0	-	-	-	-	-	-
Denmark	0.9	3.9	0.3	1.4	-	1.5	6.5	4.3	2.4	1.0
France	0.3	0.1	-	+	-	-	-	-	-	-
German Dem.Rep.	-	-	0.1	+	-	-	-	-	-	-
Germany, Fed.Rep.	-	-	-	0.4	-	-	-	-	-	-
Netherlands	+	0.2	-	0	-	-	-	-	-	-
Norway	-	-	-	-	0.2	3.1	16.2	-	3.7	-
UK(England)	3.4	2.9	0.7	0.2	0.0	1.4	4.3	14.0	14.9	3.6
USSR	+	+	0.2	-	-	-	-	-	-	-
Total	4.6	7.1	1.3	2.0	0.2	6.0	27.0	18.3	21.0	4.6
					Total North Sea					
Belgium	+	+	+	+	+	+	+	-	-	-
Denmark	165.6	326.2	306.6	179.9	205.1	268.3	232.2	188.2	116.6	72.6
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.	17.5	0.5	1.7	5.3	-	3.8	6.2	4.8	1.5	-
Netherlands	+	0.2	+	+	-	-	-	-	-	-
Norway	9.5	147.2	109.9	22.2	87.6	78.6	68.6	0.4	19.5	15.0
Poland	-	9.4	10.5	+	-	-	-	-	-	-
Sweden	2.2	11.0	7.9	1.5	-	-	0.6	-	-	-
UK(England)	28.9	35.4	50.4	52.1	53.9	14.3	6.7	14.0	14.9	3.6
UK(Scotland)	49.8	14.3	30.8	37.8	31.7	11.8	6.3	1.7	0.2	+
USSR	33.9	49.1	51.8	1.6	-	-	-	-	-	-
Total	313.6	641.2	621.5	304.0	378.3	379.6	323.4	209.1	152.7	91.2

a) Preliminary figures as reported.

Table D.2.4.3 SPRAT in Division VIa.
Landings in tonnes.

Countries	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*)
Denmark					259			242		
Faroes	109	56	181							
France										
Germany, Fed.Rep.	22	123	37	+		97		2		
Ireland	713	517	673	282	533	12	1 787	790	287	
Netherlands	223	140	661	49	46	125	428	892	2 156	
Norway			35	267					24	
Poland									-	
UK/Scotl.1)	5 959	8 127	6 455	4 246	11 563	1 087	2 987	1 488	1 057	1 859
Total	7 026	9 053	8 042	4 844	12 401	1 321	5 202	3 414	3 524	1 859

Source: ICES Statistician
1) Amended from national data.
*) Preliminary figures.

Table D.2.4.4 Nominal catch (tonnes) of SPRAT in Divisions VIId,e, 1974-83 (data for 1974-1982 as officially reported to ICES)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Belgium	-	-	-	-	-	-	-	-	-	3
Denmark	-	-	447	74	1 796	9 981	7 483	b)	286	638 a)
Faroe Islands	-	-	6	-	-	-	-	-	-	-
France	520	147	115	120	225	2 373	1 867	146	44	+
German Dem.Rep.	-	-	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	-	-	-	-	34	6	52	1	-	
Netherlands	16	109	49	115	826	441	1 401	1 015	1 533	NA
Norway	-	-	-	-	-	-	65	-	-	-
Poland	1	-	-	-	-	-	-	-	-	-
U.K. (Eng. & Wales)	3 256	1 315	3 107	2 928	2 118	2 032	6 864	10 183	4 749	3 216
Total	3 793	1 571	3 724	3 237	4 999	14 833	17 732	13 890	6 612	(3 857)

* Preliminary
a) Landings in foreign ports Jul-Dec not included
b) As per 22 February 1983, no final data available
NA) Not available

Table D.3.1.1 Cod landings from the Kattegat 1971-83 (tonnes)

Year	Denmark	Sweden	Germany 1) Fed.Rep.of	Total
1971	11 748	3 962	22	15 732
1972	13 451	3 957	34	17 442
1973	14 913	3 850	74	18 837
1974	17 043	4 717	120	21 880
1975	11 749	3 642	94	15 485
1976	12 986	3 242	47	16 275
1977	16 668	3 400	51	20 119
1978	10 293	2 893	204	13 390
1979	11 045	3 763	22	14 830
1980	10 096	4 206	38	14 302
1981	11 469	4 380	284	16 133
1982	9 897	3 087	58	13 042
1983	10 138	3 625	54	13 817

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 1971-83

Year	Denmark	Sweden	Norway*	Others	Total
1971	5 914	2 040	1 355	13	9 322
1972	6 959	1 925	1 201	22	10 107
1973	6 673	1 690	1 253	27	9 643
1974	6 694	1 380	1 197	92	9 363
1975	14 171	917	1 190	52	16 330
1976	18 847	873	1 241	466	21 427
1977	18 618	560	979	675	20 832
1978	23 614	592	1 442	260	25 908
1979	14 007	1 279	1 745	213	17 244
1980	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
1983	19 298	2 803	1 765	163	24 029

*) 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
1971	17 662	1 355	6 002	35	25 054
1972	20 410	1 201	5 882	56	27 549
1973	21 586	1 253	5 540	101	28 480
1974	23 737	1 197	6 097	212	31 243
1975	25 920	1 190	4 559	146	31 815
1976	31 833	1 241	4 115	513	37 702
1977	35 286	979	3 960	726	40 951
1978	33 907	1 442	3 485	464	39 298
1979	25 052	1 745	5 042	235	32 074
1980	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
1983	29 436	1 765	6 428	217	37 846

*) Mainly landings from Norwegian fiords.

Table D.3.2 Landings of Haddock from Division IIIa.

Country	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983 x)
Belgium	-	-	-	-	181	118	25	50	43	26	-	35
Denmark	2816	2832	4417	5015	7488	6907	4978	4120	7172	9264	10223	8855
Germany Dem.Rep.	.. a)	1	-	-	1	-	-	-	-	-	-	-
Germany Fed.Rep.	20	+	+	12	1	16	11	1	+	21	+	+
Netherlands	-	-	-	5	59	81	20	5	13	-	-	-
Norway	153	242	175	122	191	156	168	248	288	271	190	221
Sweden	.. b)	.. b)	.. b)	921	1075	2485	1435 c)	-	373	346	316	580
U.K. (England and Wales	-	16	26	40	59	-	-	-	1	-	-	-
U.K. (Scotland	-	-	+	-	-	-	-	-	-	-	-	-
Total	2989	3091	4618	6115	9055	9763	6637	4784	7890	9928	10675	9491

a) Division IIIa included in Sub-area IV
b) Division IIIa included in Division IVa
c) Division IIIa includes Division IVa,b

x) preliminary

Table D.3.3 Whiting landings from Division IIIa (from Bulletin Statistique)

Year	Denmark	Norway	Sweden	Others	Total
1972	14 538	24	IIIa	-	14 562
1973	22 479	67	incl. in	1	22 547
1974	28 749	89	IVa	4	28 842
1975	19 018	57	611	4	19 690
1976	17 870	48	1 002	57	18 977
1977	18 116	55	973	41	19 185
1978	48 102	58	899a)	32	49 091
1979	16 971	63	1 033	16	18 083
1980	21 070	65	1 516	3	22 654
1981	23 495	71	952b)	2	24 520
1982	30 128	40	1 067	-	31 236
1983*	25 254	43	1 068	-	26 365

*) Preliminary

Table D.3.4.1 Plaice landings from the Kattegat (tonnes).

Year	Denmark	Sweden	Total
1972	15 504	348	15 852
1973	10 021	231	10 252
1974	11 401	255	11 656
1975	10 158	369	10 527
1976	9 487	271	9 758
1977	11 611	300	11 911
1978	12 685	368	13 053
1979	9 721	281	10 002
1980	5 582	289	5 871
1981	3 803	232	4 038
1982	2 717	201	2 717
1983	3 280	291	3 571

Table D.3.4.2 Plaice landings from the Skagerrak (tonnes).

Year	Denmark	Sweden	The Netherlands	Total
1972	5 095	70	-	5 165
1973	3 871	80	-	3 951
1974	3 429	70	-	3 499
1975	4 888	77	-	4 965
1976	9 251	81	-	9 332
1977	12 855	142	-	12 997
1978	13 383	94	-	13 477
1979	11 045	105	-	11 150
1980	9 514	92	-	9 606
1981	8 115	123	-	8 238
1982	7 789	140	-	7 929
1983	7 503	170	1 500*	9 173

* WG-estimate

Table D.3.4.3 Plaice landings in Division IIIa. The Kattegat and the Skagerrak combined. Data submitted by Working Group members.

Year	Denmark	Sweden	Other Countries	Total
1971	19 560	395	19	19 974
1972	20 599	418	80	21 097
1973	13 892	311	55	14 258
1974	14 830	325	58	15 213
1975	15 046	446	199	15 691
1976	18 738	352	756	19 846
1977	24 466	442	884	25 792
1978	26 068	462	480	27 010
1979	20 766	386	810	21 962
1980	15 096	381	56	15 533
1981	11 918	355	316	12 589
1982*	10 506	345	8**	-
1983*	10 783	461	1 574	12 812

*) Preliminary
**) Federal Republic of Germany

Table D.3.5.1 Species composition in the Norwegian *Pandalus borealis* fishery in Division IVa (eastern part) Norwegian Deep. 1982.

1982					Human consumption							Industrial fish							
Month	Samp	Tot catch	shrimp	catch	Tot	Cod	Hadd	Whit	Saith	Hake	Others	Total	N.pou	Bl.wh	Praw	Cod	Whi	Hak	Others
April	1	3 299	2 318	70.3%	81	16	3			8	54	900		301					599
May	4	1 662	980	59.0%	70	20				21	29	613	1	313	4		2	7	286
June	3	2 906	1 341	46.1%	65	13				10	42	1 500	1	671	6	42		31	749
Aug	3	1 983	1 074	54.2%	109	56			2		51	800	41	400	4				355
Sep	3	2 088	755	36.2%	66	37					29	1 267	5	124	2				1 136
Oct	1	2 940	1 634	55.6%	206	52				3	51	1 100	14	635	8				443
Nov	1	3 214	1 027	32.0%	87	24				5	58	2 100	606	745	3				746
Dec	3	3 530	944	26.7%	86	21				2	63	2 500	1 084	1 189	14				213
Average		2 506	1 118		86	29	.2		.3	7	50	1 303	212	531	5	7	.5	6	542
%		100	44.6		3.4	1.2				.3	2.0	52.0	8.5	21.2	.2	.3	+	.2	21.6

Table D.3.5.2 Species composition in the Norwegian *Pandalus borealis* fishery in Division IVa (eastern part) Norwegian Deep. 1983

1983					Human consumption							Industrial fish							
Month	Samp	Tot catch	shrimp	catch	Tot	Cod	Hadd	Whit	Saith	Hake	Others	Total	N.pou	Bl.wh	Praw	Cod	Whi	Hak	Others
Feb	4	2 276	1 423	62.5%	172	65	4	15	15	30	50	680	162	192	25	5	8	56	225
Mar	5	1 786	1 181	66.1%	68	26	2	3		2	35	536	71	267	5	15	6	23	147
Apr	4	3 189	1 682	52.7%	106	34	1		3	15	53	1 400	1	1 191	9				199
May	4	3 233	1 425	44.1%	183	35	1			19	128	1 867	18	1 471	8				370
June	3	1 887	802	42.5%	184	33			1	5	145	900	3	413	2				482
Aug	2	3 384	1 007	29.8%	226	64				1	161	2 150	266	1 394	4				490
Sep	3	4 169	914	21.9%	255	108			35	1	111	3 000	1 884	210	10	8			888
Nov	4	1 768	382	21.6%	139	17			1	1	120	1 248	291	609	1				341
Average		2 611	1 128		155	44	1	2	5	10	93	1 296	290	684	8	4	2	13	293
%		100	43.2		5.9	1.7	+	.1	.2	.4	3.6	49.6	11.1	26.2	.3	.2	.1	.5	21.6

Table D.5.1 North Sea COD. Numbers ('000) and weight (tonnes) in each category. Working Group Data.

Year	Human consumption		Discards		Total	
	Number	Weight	Number	Weight	Number	Weight
1963	56 495	107 936	5 659	1 708	62 154	109 644
1964	51 729	115 435	6 571	1 857	58 300	117 292
1965	94 349	172 619	19 798	5 204	114 147	177 823
1966	115 024	211 937	22 578	6 010	137 602	217 947
1967	124 779	242 108	15 724	4 481	140 503	246 589
1968	146 039	277 062	6 372	2 150	152 411	279 212
1969	76 286	193 612	7 443	2 027	83 729	195 639
1970	124 517	218 763	63 759	11 002	188 276	229 765
1971	226 093	314 544	53 707	13 374	279 800	327 918
1972	243 478	341 051	21 573	8 831	265 051	349 882
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	185 388	257 825	xx)	xx)		
1983 x)	171 762	232 546	xx)	xx)		

xx) Insufficient data
x) Preliminary

Table D.5.2 North Sea HADDOCK. Numbers ('000) and weight (tonnes) in each category. Working Group data.

Year	Industrial		Human consumption		Discards		Total	
	Number	Weight	Number	Weight	Number	Weight	Number	Weight
1960	142 567	12 200	208 753	75 242	853 264	131 791	1 204 584	219 233
1961	982 786	11 100	189 763	74 862	888 867	132 991	2 061 416	218 953
1962	285 824	11 200	148 967	58 677	2 673 394	383 153	3 108 185	453 030
1963	255 844	13 700	180 624	68 364	1 245 890	188 969	1 682 358	271 033
1964	598 840	88 600	351 422	130 509	643 595	160 319	1 593 857	379 428
1965	1 092 756	74 600	369 998	161 613	253 860	62 236	1 716 614	298 449
1966	2 232 098	46 700	406 399	225 760	489 695	73 573	3 128 192	346 033
1967	699 516	20 700	272 201	147 391	448 264	78 059	1 419 981	246 150
1968	557 995	34 200	220 977	105 440	837 979	161 882	1 616 951	301 522
1969	1 889 659	338 353	909 208	330 897	1 203 447	260 231	4 002 314	929 481
1970	1 621 762	179 729	1 244 162	524 622	515 018	101 376	3 380 942	805 727
1971	913 516	31 546	473 069	235 358	1 282 184	177 485	2 668 769	444 389
1972	531 113	29 585	427 890	192 901	760 224	128 130	1 719 227	350 616
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	1 000 667	166 782	2 383 896	364 176
1975	734 412	41 380	362 239	146 616	1 862 031	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	1 107 027	17 414	190 326	83 249	286 969	41 834	1 584 322	142 497
1980	768 645	25 154	217 435	98 860	541 782	94 910	1 527 862	218 924
1981	828 555	17 615	273 542	130 009	298 115	60 290	1 400 212	207 914
1982	578 186	20 988	309 117	165 475	180 852	41 308	1 068 155	227 771
1983*	696 941	16 032	301 673	157 531	383 931	65 179	1 382 545	238 742

* Preliminary

Table D.5.3 North Sea WHITING. Numbers ('000) and weight (tonnes) in each category. Working Group data.

Year	Industrial		Human consumption		Discards		Total	
	Number	Weight	Number	Weight	Number	Weight	Number	Weight
1960	141 183	11 639	190 513	47 566	763 229	121 600	1 094 925	180 805
1961	271 885	16 177	289 708	67 828	1 645 728	241 122	2 207 321	325 127
1962	112 954	8 347	222 274	55 952	1 185 487	156 713	1 520 715	221 012
1963	499 847	45 431	214 477	58 205	853 608	154 401	1 567 932	258 037
1964	393 794	28 124	220 682	60 064	341 223	58 784	955 699	146 972
1965	182 171	22 259	313 057	85 978	490 073	77 184	985 301	185 421
1966	431 635	51 176	351 953	105 229	545 116	83 356	1 328 704	239 761
1967	280 275	22 840	245 396	68 215	1 102 690	142 703	1 628 361	233 758
1968	592 395	57 506	298 807	88 281	596 827	90 898	1 488 029	236 685
1969	1 980 444	152 364	203 640	57 149	625 916	114 566	2 810 000	324 079
1970	1 855 953	114 504	271 813	79 274	347 540	67 814	2 475 306	261 592
1971	1 477 350	71 699	185 690	58 005	458 746	62 589	2 121 786	192 293
1972	1 351 090	61 166	178 908	59 868	398 294	66 598	1 928 292	187 632
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	242 572	72 942	277 531	37 095	853 677	143 027
1983*	688 250	23 637	247 236	76 841	369 839	49 125	1 305 325	149 603

* Preliminary

Table D.5.4 Nominal catch (in tonnes) of COD in Sub-area IV, 1974-83. (Data for 1974-82 as officially reported to ICES)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983 x)
Belgium	10 253	7 566	7 483	10 346	17 473	12 576	9 630	8 744	6 604	6 645
Denmark	54 207	46 344	53 277	42 582	41 858	48 509	56 404	64 968	64 648	50 436
Faroe Islands	416	732	448	260	56	113	150	38	65	81
France	7 275	8 667	8 079	7 511	11 944	12 559	10 910	11 369	8 399	6 314
German Dem. Rep.	132	223	69	21	75	84	63	-	-	-
Germany, Fed. Rep.	17 089	16 457	24 445	22 663	37 040	20 411	26 343	29 741	18 525	20 246
Ireland	-	-	98	136	174	1	-	-	-	-
Netherlands	24 029	23 263	21 835	29 903	48 817	34 752	45 400	51 281	36 490	31 590
Norway a)	324	1 528	1 877	1 449	2 747	3 575	4 506	6 766	11 271	5 392
Poland	4 750	2 991	2 961	381	115	142	28	7	62	75
Spain	80	63	14	-	-	-	-	-	-	-
Sweden	2 071	900	597	36	... b)	298	293	321	453	337
UK (England & Wales)	39 857	33 615	46 475	35 424	59 127	54 923	49 951	59 856	54 277	53 352
UK (Scotland)	39 887	37 308	39 597	34 406	41 984	42 811	45 044	53 921	57 308	57 860
USSR	2 667	6 796	6 187	-	17	17	-	-	-	-
Total IV	203 037	186 453	213 442	185 118	261 427	230 771	248 722	287 012	258 102	232 328
Total IVa	64 152	58 343	68 352	55 623	43 357	41 118	48 467	55 109	60 024	56 713
Total IVb	114 087	107 227	126 218	100 191	164 388	147 313	161 767	194 283	171 365	167 424
Total IVc	24 798	20 883	18 872	29 304	53 682	42 340	38 488	37 620	26 713	8 191

x) Provisional

a) Figures from Norway do not include cod caught in Rec. 2 fisheries

b) Included in Division IIIa

Table D.5.5 Nominal catch (in tonnes) of HADDOCK in Sub-area IV, 1974-83. (Data for 1974-82 as officially reported to ICES)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983[x)]
Belgium	1 137	2 209	2 166	2 293	1 295	732	1 414	1 217	966	947
Denmark	44 342	32 930	46 899	20 069	8 093	8 248	12 928	13 198	32 159	32 770
Faroe Islands	435	267	183	385	12	7	27	46	6	43
France	4 020	4 646	5 500	6 914	5 122	7 208	7 407	11 966	15 988	11 557
German Dem. Rep.	8	44	20	8	37	12	36	-	-	-
Germany, Fed. Rep.	3 478	2 396	3 433	3 744	2 589	2 549	2 354	3 387	4 510	3 503
Ireland	-	-	31	53	101	-	-	-	-	-
Netherlands	3 035	1 901	1 728	1 598	857	955	1 557	2 279	1 021	1 163
Norway[a)]	324	331	367	374	609	968	1 191	2 283	2 853	2 525
Poland	3 001	1 485	1 155	485	62	106	59	31	317	150
Spain	210	-	-	-	-	-	-	-	-	-
Sweden[b)]	3 098	2 083	2 455	113	-[d)]	907	1 165	1 301	1 874	1 020
U.K. (England & Wales)	10 798	11 499	17 238	17 167	12 200	10 774	12 195	14 570	16 403	15 097
U.K. (Scotland)	71 679	64 686	80 576	89 465	58 406	54 119	64 058	82 798	107 773	99 472
USSR	42 234	49 686	42 852	8 010	54	18	-	-	-	-
Total IV	187 799	174 163	204 603	150 678	89 437	86 603	104 391	133 076	183 870	168 247
Total IVa	122 977	110 848	138 591	116 577	57 886	51 741	64 886	82 996	109 306	97 727
Total IVb	63 695	62 761	65 594	34 030	31 457	34 361	39 072	49 197	74 288	70 386
Total IVc	1 127	554	418	71	94	501	433	833	276	134
WG total catch[c)]	307 689	401 053	334 888	219 953	170 804	140 635	218 924	207 914	227 771	238 742

[x)] Provisional

[a)] Figures from Norway do not include haddock caught in Rec. 2 fisheries. For 1974 Rec. 2 fisheries were officially reported but have been deducted in the figures given here to make a consistent data series.

[b)] 1974 includes Division IIIa. [c)] Includes discards. [d)] Included in Division IIIa.

Table D.5.6 Nominal catch (in tonnes) of WHITING in Sub-area IV, 1974-83.
(Data for 1974-82 as officially reported to ICES)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983[x]
Belgium	3 156	3 279	2 640	3 275	3 304	3 941	3 153	2 623	2 272	2 860
Denmark	109 654	61 941	116 973	46 479	15 741	41 965	17 916	16 430	27 043	22 132
Faroe Islands	1 126	764	1 262	472	42	581	21	12	57	35
France	19 825	20 079	19 557	17 592	22 525	27 590	23 626	24 744	23 790	16 978
German Dem. Rep.	-	3	18	-	22	5	-	-	-	-
Germany, Fed. Rep.	454	446	302	461	348	1 280	1 267	601	223	422
Ireland	-	-	4	9	38	-	-	-	-	-
Netherlands	12 057	14 078	12 274	9 406	11 030	13 417	14 389	14 600	12 218	10 925
Norway[a]	58	55	71	33	64	49	27	27	16	27
Poland	1 002	888	509	445	8	3	1	-	-	1
Spain	110	65	18	-	-	-	-	-	-	-
Sweden[b]	2 440	255	153	341	...	31	16	9	11	28
U.K. (England & Wales)	5 519	5 246	5 112	6 185	7 542	7 581	6 778	5 964	4 743	4 326
U.K. (Scotland)	25 274	27 969	26 167	33 017	42 779	44 841	42 218	31 399	29 640	40 936
USSR	2 978	5 098	5 612	2 413	-	-	-	-	-	-
Total Sub-area IV	183 653	140 166	190 672	120 128	103 443	141 284	109 412	96 409	100 003	98 670
Total Division IVa	76 761	75 444	100 001	61 499	42 837	48 554	42 529	33 799	35 664	44 929
Total Division IVb	87 842	41 930	69 908	42 911	40 943	68 775	41 156	40 145	45 311	46 293
Total Division IVc	19 050	22 792	20 763	15 718	19 663	23 955	25 727	22 465	19 028	7 448
WG total catch[c]	351 266	290 589	345 951	294 635	178 773	234 947	225 221	192 173	143 027	149 603

[x] Provisional figures
[a] Figures from Norway do not include whiting caught in Rec.2 fisheries. For 1974 Rec.2 fisheries were officially reported, but have been deducted from the figures given here to make a consistent time series.
[b] 1974 includes Division IIIa, 1978 included in Division IIIa.
[c] Includes discards.

Table D.5.7 Mesh assessment for North Sea WHITING summary of changes in yields ('000 tonnes). H.C. = human consumption fishery.

		1985		1986		1987		1997	
		Landings	Discards	Landings	Discards	Landings	Discards	Landings	Discards
Total H.C.	Old New % Ch.	61.2 37.7 -38	58.3 29.4 -50	77.3 54.7 -29	62.7 35.5 -43	87.7 86.0 -2	61.9 37.8 -40	88.0 96.4 +10	61.2 38.6 -37
Industrial	Old New % Ch.	55.9 59.6 +7		64.2 76.5 +19		63.7 80.5 +26		62.6 80.8 +29	
Industrial + H.C.	Old New % Ch.	117.1 97.3 -17	58.3 29.4 -50	141.5 131.2 -7	62.7 35.5 -43	151.4 166.5 +10	61.9 37.8 -40	150.6 177.2 +18	61.2 38.6 -37
Belgium	% Ch.	-37	-49					+12	-35
England	"	-35	-48					+24	-29
France	"	-41	-49					0	-37
Netherlands	"	-44	-48					-8	-37
Scotland	"	-34	-51					+22	-38
Germany, Fed.Rep. of	"	-37	-49					+11	-35
Other H.C.	"	-39	-49					+5	-39

Table D.5.8 North Sea HADDOCK mesh assessment for summary % changes in yields ('000 tonnes). H.C. = human consumption fishery.

		1985		1986		1987		1997	
		Landings	Discards	Landings	Discards	Landings	Discards	Landings	Discards
Total H.C.	Old	143.1	96.4	229.5	72.7	216.7	62.5	175.5	61.3
	New	118.5	61.2	244.8	52.7	252.2	43.4	212.6	42.0
	% Ch.	-17	-37	+7	-27	+16	-31	+21	-32
Industrial	Old	34.4		34.8		33.4		30.9	
	New	35.9		38.2		37.4		34.6	
	% Ch.	+4		+10		+12		+12	
Industrial + H.C.	Old	177.5	96.4	264.3	72.7	250.1	62.5	206.4	61.3
	New	154.4	61.2	283.0	52.7	289.6	43.4	247.2	42.0
	% Ch.	-13	-37	+7	-27	+16	-31	+20	-32
Belgium	% Ch.	-9	-47					+30	-29
Denmark	"	-8	-37					+33	-33
England	"	-15	-49					+22	-30
France	"	-11	-56					+31	-34
Netherlands	"	-17	-52					-8	-12
Scotland	"	-19	-36					+18	-31
Germany, Fed.Rep.of	"	-19	-44					+23	-36
Other H.C.	"	-17	-37					+22	-32

Table D.6.1 Nominal catch (in tonnes) of COD in Division VIa, 1974-83. (Data for 1974-82 as officially reported to ICES)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983[x)]
Belgium	174	49	71	-	-	4	57	30	35	21
Denmark	-	7	-	-	-	-	27[a)]	-	3	-
Faroe Islands	13	3	39	43	-	40	3	-	2	-
France	3 678	3 546	5 611	3 583	4 499	4 590	5 495	7 601	7 160	8 760
German Dem. Rep.	-	2	-	-	-	-	-	-	-	-
Germany, Fed. Rep.	6	12	1	3	31	40	1	21	8	421
Ireland	883	1 141	1 341	984	1 214	2 237	2 331	2 725	3 527	2 616
Netherlands	5	5	11	5	3	20	1	-	-	-
Norway	14	17	22	29	40	32	48	40	238	274
Poland	175	68	18	-	-	-	-	-	-	-
Spain	137	180	15	20[a)]	108[a)]	-	-	-	-	-
Sweden	-	-	-	-	-	-	-	-	1	-
U.K. (England & Wales)	2 467	2 217	2 742	2 434	2 082	2 348	2 302	3 187	2 948	1 068
U.K. (Scotland)	6 084	5 806	7 475	5 513	5 539	6 929	7 603	10 339	7 969	8 815
U.K. (Northern Ireland)	3	3	13	5	5	2	2	7	33	30
USSR	13	107	46	-	-	-	-	-	-	-
Total VIa	13 652	13 163	17 405	12 619	13 521	16 242	17 870	23 950	21 924	22 005

x) Provisional
a) Includes IVb

Table D.6.2 Nominal catch (in tonnes) of COD in Division VIb, 1974-83.
(Data for 1974-82 as officially reported to ICES)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983[x]
Belgium	-	-	1	-	-	-	-	-	-	-
Denmark							...[a]	-	-	-
Faroe Islands	5	3	22	40	10	92	75	2	77	87
France	1 128	4	4	3	1	2	1	4	27	27
Germany, Fed. Rep.	-	-	-	-	-	111	136	443	+	...[a]
Ireland	-	-	-	-	3	-	-	-	-	-
Norway	3	-	8	3	69	138	80	134	51	462
Spain	-	-	-	...[a]	...[a]	-	33	-	-	-
U.K. (England & Wales)	-	28	77	89	285	129	1	67	3	163
U.K. (Scotland)	39	98	61	33	384	198	370	143	157	35
USSR	-	110	1 398	-	-	-	-	-	-	-
Total	175	243	1 571	168	752	670	696	793	315	774

x) Provisional

a) Included in Division VIa

Table D.6.3 Nominal catch (in tonnes) of COD in Divisions VIId and VIIe, 1974-83. (Data for 1974-82 as officially reported to ICES)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983[x]
Belgium	67	59	65	53	435	699	163	363	293	389
Denmark	-	2 718	1 506	1 120	2 160	2 052	660[a]	-	-	-
France	3 099	2 143	1 646	5 185	8 044	4 848	4 001	4 486	3 349	3 011
Netherlands	4	+	2	1	+	-	-	4	1	-
Poland	6	-	-	-	-	-	-	-	-	-
U.K. (England & Wales)	260	159	142	581	654	485	365	428	568	641
U.K. (Scotland)	-	-	-	-	-	+	-	-	-	-
USSR	-	3	4	-	-	-	-	-	-	-
Total VIId,e	3 436	5 082	3 365	6 940	11 293	8 084	5 189	5 281	4 211	4 041

x) Provisional

a) Includes Divisions VIIb, c

Table D.6.4 Nominal catch (in tonnes) of COD in Divisions VIIb, c and VIIg-k, 1974-83. (Data for 1974-82 as officially reported to ICES)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983[x]
Belgium	167	116	159	85	52	51	110	198	97	112
Denmark	-	-	-	-	-	18	...[b]	-	-	-
France	2 302	2 877	3 196	1 972	2 192	2 918	4 475	6 803	5 041	4 381
Germany, Fed. Rep.	-	-	-	-	3[a]	-	7	-	-	-
Ireland	283	474	506	315	323	552	1 028	1 542	1 906	945[c]
Netherlands	9	54	46	291	279	-	5	-	+	-
Norway	-	1	-	+	-	-	-	-	-	-
Poland	39	19	40	6	-	2	-	-	-	-
Spain	232	588	1 140	51	11	-	17	37	-	-
U.K. (England & Wales)	26	73	44	33	28	33	83	288	419	85
U.K. (Scotland)	-	-	-	-	2	1	12	+	-	-
USSR	72	134	203	-	-	-	-	-	-	-
Total VIIb, c, g-k	3 130	4 336	5 234	2 753	2 890	3 575	5 737	8 868	7 463	5 523

[x] Provisional

[a] Catch in Division VIIg only

[b] Included in Division VIIe

[c] Catch in Divisions VIIb,c only.

Table D.6.5 - Nominal catch (in tonnes) of HADDOCK in Division VIa, 1974-83. (Data for 1974-82 as officially reported to ICES).

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983[x)]
Belgium	98	23	45	-	-	2	3	1	2	1
Denmark	-	-	13	-	-	37	-	-	+	-
Faroe Islands	1	-	-	-	-	2	-	-	-	-
France	3 979	2 328	3 026	3 401	4 255	4 786	2 808	3 403	3 760	4 577
German Dem. Rep.	-	9	-	-	-	-	-	-	-	-
Germany, Fed. Rep.	18	3	30	+	20	2	3	7	71	78[a)]
Ireland	1 715	599	1 115	616	441	877	726	1 891	3 983	2 976
Netherlands	63	19	30	28	13	2	2	3	391	-
Norway	-	-	3	7	13	9	16	29	37	72
Poland	97	20	-	-	-	-	-	-	-	-
Spain	540	-	-	-	-	-	-	-	-	-
U.K. (England & Wales)	1 512	1 214	1 971	3 827	2 805	1 654	1 279	1 052	2 035	1 305
U.K. (Scotland)	9 583	8 973	11 992	11 422	9 629	7 459	8 198	12 051	19 249	20 430
U.K. (Northern Ireland)	-	-	-	-	-	-	+	-	1	-
USSR	364	495	533	-	-	-	-	-	-	-
Total VIa	17 970	13 683	18 758	19 301	17 176	14 830	13 935	18 437	29 529	29 439
WG Total incl. discards	33 342	46 635	34 071	23 657	19 510	27 147	17 470	33 278	39 439	36 287

x) Provisional

a) Includes Division VIb

Table D.6.6 Nominal catch (in tonnes) of HADDOCK in Division VIb, 1974-83. (Data for 1974-82 as officially reported to ICES)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983[x]
Belgium	-	-	33	-	-	-	-	-	-	-
Faroe Islands	2	1	8	3	11	20	5	1	21	19
France	353	21	4	4	3	4	1	10	32	14
Germany, Fed. Rep.	-	-	-	-	-	-	17	-	4	...[a]
Ireland	-	-	-	-	61	-	-	-	-	-
Norway	-	-	-	+	4	16	2	10	3	20
Poland	-	-	-	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	6	88	-	-
U.K. (England & Wales)	-	5	2 111	2 694	2 365	1 654	6 261	9 005	3 736	113
U.K. (Scotland)	22	71	640	297	2 060	548	1 051	27	5	136
USSR	48 911	49 830	40 474	-	-	-	-	-	-	-
Total VIb	49 288	49 928	43 243	2 998	4 504	2 242	7 343	9 141	3 801	302

[x] Provisional

[a] Included in Division VIa

Table D.6.7 Nominal catch (in tonnes) of HADDOCK in Divisions VIId and VIIe, 1974-83.
(Data for 1974-82 as officially reported to ICES)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983x)
Belgium	+	+	+	1	-	1	+	2	1	1
Denmark	-	-	-	2	22	21	15	-	-	-
France	487	868	405	438	356	333	298	421	344	61
Germany, Fed. Rep.	-	+	-	-	-	-	-	-	-	-
Ireland	-	-	-	4	-	-	+	-	-	-
Netherlands	-	1	-	-	-	-	-	-	94	-
Poland	-	-	-	-	-	-	-	-	-	-
U.K. (England & Wales)	113	99	45	29	22	51	59	119	60	41
USSR	33	3	-	-	-	-	-	-	-	-
Total VIId and VIIe	633	971	450	474	400	406	372	542	499	103

x)Provisional

Table D.6.8 Nominal catch (in tonnes) of HADDOCK in Divisions VIIb,c and VIIg-k, 1974-83. (Data for 1974-82 as officially reported to ICES)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983x)
Belgium	35	33	19	13	5	2	2	3	3	-
Denmark	-	-	-	-	-	1	-	-	-	-
Faroe Islands	-	-	-	-	-	-	-	-	-	-
France	6 057	4 583	3 726	2 244	1 479	1 931	2 219	2 571	2 005	1 973
Germany, Fed. Rep.	-	+	3	-	-	-	-	-	-	-
Ireland	829	507	287	153	111	155	274	679	905	405a)
Netherlands	2	4	14	1	-	16	-	-	6	-
Poland	143	-	-	-	-	-	-	-	-	-
Spain	1 100	-	-	294	-	-	5	277	-	-
U.K. (England & Wales)	39	46	24	18	13	19	50	92	182	21
U.K. (Scotland)	-	-	-	-	8	22	56	4	-	-
USSR	456	1 290	183	-	-	-	-	-	-	-
Total VIIb,c and VIIg-k	8 661	6 463	4 256	2 273	1 616	2 146	2 606	3 626	3 130	2 399

x) Provisional

a) Divisions VIIb,c only

Table D.6.9 Nominal catch (in tonnes) of WHITING in Division VIa, 1974-83.
(Data for 1974-82 as officially reported to ICES)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983[x]
Belgium	10	1	14	-	-	-	+	-	2	-
Denmark	-	-	-	-	119	92	32[a]	-	+	-
Faroe Islands	1	30	2	-	-	770	-	-	-	-
France	2 983	2 763	3 655	3 395	3 610	2 779	2 609	1 637	1 798	1 216
German Dem. Rep.	-	-	31	-	-	-	-	-	-	-
Germany, Fed. Rep.	80	62	1	1	2	4	1	49	53	58[a]
Ireland	2 431	2 429	3 255	2 752	2 080	2 791	4 407	8 148	3 040	3 207
Netherlands	23	85	255	78	23	17	2	6	285	-
Norway	-	-	1	-	-	-	-	-	-	-
Poland	9	-	-	-	-	-	-	-	-	-
Spain	1 479	1 871	821	763[a]	-	-	-	-	-	-
U.K. (England & Wales)	112	132	244	520	669	320	227	118	166	148
U.K. (Scotland)	9 929	12 668	16 658	9 873	8 174	10 613	7 386	8 519	8 419	10 339
U.K. (Northern Ireland)	-	-	-	-	-	-	-	-	7	-
Total VIa	17 057	20 041	24 937	17 382	14 677	17 386	14 664	18 477	13 770	14 968

[x] Provisional

[a] Includes Division VIb

Table D.6.10 Nominal catch (in tonnes) of WHITING in Division VIb, 1974-83.
(Data for 1974-82 as officially reported to ICES)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983 x)
Denmark	-	-	-	-	-	-	... a)	-	-	-
Faroe Islands	1	-	-	-	-	-	-	-	-	-
France	-	-	-	-	-	-	3	-	-	-
Germany. Fed. Rep.	-	-	-	-	-	-	-	-	-	... a)
Ireland	-	-	-	-	1	-	-	-	-	-
Spain	-	-	-	... a)	-	-	-	196	-	-
U.K. (England & Wales)	-	-	3	2	5	1	+	-	-	-
U.K. (Scotland)	+	12	15	5	24	2	59	+	-	5
Total VIb	1	12	18	7	30	3	62	196	-	5

x) Provisional

a) Included in Division VIa

Table D.6.11 Nominal catch (in tonnes) of WHITING in Division VIId and VIIe in 1974-83. (Data for 1974-82 as officially reported to ICES)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983 x)
Belgium	39	70	103	36	85	92	85	102	101	93
Denmark	-	-	18	-	1	2 585	6	2	-	-
France	7 917	10 060	8 390	8 886	8 010	5 352	7 690	8 842	8 051	4 443
Germany, Fed. Rep.	25	1	-	-	-	-	-	-	-	-
Ireland	-	-	-	11	12	-	13	-	-	-
Netherlands	12	14	5	1	2	1	2	2	70	-
U.K. (England & Wales)	579	1 255	1 504	1 342	1 038	930	839	1 136	1 222	1 207
Total VIId,e	8 572	11 400	10 020	10 276	9 148	8 960	8 635	10 084	9 444	5 743

x) Provisional

Table D.6.12 Nominal catch (in tonnes) of WHITING in Divisions VIIb,c and VIIg-k in 1974-83.
(Data for 1974-82 as officially reported to ICES)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983 x)
Belgium	75	83	97	60	37	26	31	61	28	47
France	4 331	3 637	4 731	3 962	3 868	4 127	5 603	5 922	4 767	6 203
Germany, Fed. Rep.	-	2	-	1	45	-	+	-	-	-
Ireland	1 641	2 562	1 980	1 201	1 172	2 674	3 710	3 612	4 073	1 113 a)
Netherlands	915	66	112	86	63	3	4	21	78	-
Spain	1 367	2 974	2 772	-	-	-	-	-	-	-
U.K. (England & Wales)	15	61	21	26	38	23	60	257	153	42
U.K. (Scotland)	-	-	-	2	1	1	80	1	-	-
USSR	-	64	2	-	-	-	-	-	-	-
Total VIIb,c and g-k	8 344	9 449	9 715	5 338	5 224	6 854	9 488	9 874	9 099	7 405

x) Provisional

a) Divisions VIIb,c only

Table D.7.1. Nominal catch (tonnes) of COD in Division VIIa, 1974-1981 as reported to ICES, 1982-1983 as used by the Working Group.

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Belgium	409	282	257	135	144	174	246	395	269	139
Denmark	-	-	-	-	-	-	-	6	-	-
France	2 601	2 623	1 938	1 370	1 022	1 125	1 009	1 178	1 066	490
Ireland	3 276	3 477	4 815	3 862	3 128	3 755	4 421	6 552	4 758	3 671
Netherlands	113	53	87	32	15	11	36	94	48	82
UK (England + Wales)	2 463	2 132	1 815	1 186	875	980	1 918	2 712	2 544	1 401
UK (Isle of Man)	-	-	-	-	-	297	232	221	161	103
UK (N. Ireland)	1 279	1 153	1 175	1 409	1 064	1 898	2 591	3 360	3 852	3 470
UK (Scotland)	49	70	91	60	79	118	286	376	583	334
TOTAL	10 190	9 790	10 178	8 054	6 328	8 358	10 739	14 894	13 281	9 690
Total figures used by Working Group for stock assessment	10 251	9 863	10 247	8 054	6 271	8 371	10 776	14 907	13 381	9 665

Table D.7.2. Nominal catch (tonnes) of WHITING in Division VIIa, 1974-1983.
(Data for 1974 to 1982, human consumption, as officially reported).

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*)
Belgium	94	99	68	63	51	42	45	85	45	73
France	2 700	2 784	2 985	1 952	2 098	1 897	1 616	1 254	1 375	627
Ireland	4 184	3 946	5 055	4 821	4 562	3 847	5 546	5 362	4 207	2 734
Netherlands	52	52	56	24	12	11	10	12	14	17
UK (England + Wales)	685	617	635	1 008	1 105	842	1 000	816	1 195	1 200
UK (N. Ireland)	2 045	2 280	3 290	2 692	3 089	2 946	3 954	9 052	9 927	5 227
UK (Scotland	52	54	104	161	152	154	251	102	189	119
UK (Isle of Man)	...	...	...	...	...	372	243	346	268	127
USSR	7	-	-	-	-	-	-	-	-	-
Total human consumption	9 819	9 832	12 193	10 721	11 069	10 111	12 665	17 029	16 989	10 124
Total human consumption figures used by the Working Group for stock assessment	9 364	9 275	11 651	10 204	10 404	9 892	12 665	17 029	17 219	10 120
Estimated industrial catches (Ireland only)	283	353	425	760	927	-	-	-	-	-
Estimated discards from Nephrops fishery	2 020	3 348	1 823	4 802	1 917	2 019	3 302	3 577	893	1 837

*) Preliminary

Table D.7.3. Nominal catch (tonnes) of PLAICE in Division VIIa, 1974-1983
(Data for 1974-1982 as officially reported to ICES)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Belgium	247	248	136	110	109	151	214	231	130	164
France	132	134	126	141	110	152	104	51	60	44
Ireland	891	884	1 032	953	1 025	1 032	1 086	1 243	923	1 351
Netherlands	47	75	73	24	15	18	60	40	29	59
UK (England + Wales)	2 240	2 544	1 945	1 422	1 792	1 817	2 139	2 117	1 868	1 666
UK (Isle of Man)	...	...	...	...	...	52	20	27	12	11
UK (N. Ireland)	104	125	120	165	173	161	139	132	159	188
UK (Scotland)	54	53	52	89	89	106	141	64	47	41
Others	1	-	-	-	-	-	-	1	-	
TOTAL	3 716	4 063	3 484	2 904	3 313	3 489	3 903	3 906	3 228	3 524
Total figures used by Working Group for stock assessment:	3 715	4 063	3 473	2 904	3 231	3 428	3 903	3 906	3 237	3 524

* Preliminary

Table D.7.4. Irish Sea SOLE. Nominal catches ('000) 1974-83 (Data used by the Working Group).

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Belgium	664	805	674	566	453	779	1 002	892	670	437
Denmark	-	-	-	-	-	-	-	15	-	-
France	54	59	72	39	65	48	41	13	9	2
Ireland	28	24	74	84	127	134	229	157	159	202
Netherlands	320	233	381	227	177	247	176	186	138	237
UK (Engl.and Wales)	218	281	195	161	189	290	367	311	277	219
UK (N.Ireland)	23	24	49	49	57	47	44	41	31	23
UK (Scotland)	...	15	18	21	30	42	68	45	44	29
UK (Isle of Man)	...	...	...	...	...	30	18	7	10	10
Total	1 307	1 441	1 463	1 147	1 098	1 617	1 945	1 667	1 338	1 159

*) Preliminary

Table D.7.5. Celtic Sea SOLE (Divisions VIIf and VIIg). Nominal catch (tonnes) 1974-83 by country.

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Belgium	914	663	1 053	779	506	693	981	938	819	871
France	75	133	181	80	160	153	141	91	100	124
Ireland	2	5	10	2	2	7	14	8	3	4
Netherlands	15	2	7	7	-	-	-	-	-	-
UK (Engl.& Wales)	99	116	99	93	112	101	178	175	206	330
Total	1 105	919	1 350	961	780	954	1 314	1 212	1 128	1 329

* Preliminary

Table D.7.6. Nominal catch (tonnes) of COD in Divisions VIIf and VIIg, 1974-1983

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Belgium	197	377	226	107	88	110	172	285	172	244
France	1 770	2 472	3 351	2 088	2 567	3 244	5 036	7 473	5 984	4 719
Germany, Fed.Rep.	-	-	-	-	-	-	7	-	-	-
Ireland	24	15	13	17	30	72	246	108	142	274
Netherlands	-	-	-	-	-	-	-	-	-	304
UK (England and Wales)	153	127	92	59	67	81	199	299	302	188
U.S.S.R.		30	1	-	-	-	-			
Total	2 144	3 021	3 683	2 271	2 752	3 507	5 660	8 165	6 600	5 729

*Preliminary

Table D.7.7. Nominal catch (tonnes) of WHITING in Divisions VIIf and VIIg (1974-1983)

VIIg	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983[a]
Belgium	60	60	65	52	37	26	31	61	28	47
Ireland	9	23	27	10	12	85	211	62	62	124
France	3 060	3 033	4 226	3 626	3 449	3 683	4 947	5 406	4 563	5 903
Netherlands	914	54	21	61	63	2	3	0	0	0
U.K. (England and Wales)	13	57	21	25	38	23	60	190	104	39
Total VIIg	4 056	3 227	4 360	3 774	3 599	3 819	5 252	5 719	4 757	6 113
VIIf[b]										
Belgium	12	156	97	45	29	74	41	41	42	73
France	1 491	1 488	1 655	2 111	3 171	1 983	2 986	2 587	2 609	2 248
Netherlands	0	1	4	4	1	2	0	0	0	0
U.K. (England and Wales)	121	107	109	141	143	124	141	119	83	123
Total VIIf	1 624	1 752	1 865	2 301	3 344	2 183	3 168	2 747	2 734	2 444
Total VIIf + g	5 680	4 979	6 225	6 075	6 943	6 002	8 420	8 466	7 491	8 557

a) Preliminary

b) Data for 1974-1982 as officially reported to ICES

Table D.7.8. PLAICE in Divisions VIIf and VIIg. Nominal catches (tonnes) 1974-1983

COUNTRY	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Belgium	270	195	307	214	196	171	372	365	341	314
France	218	413	360	365	527	467	706	697	568	532
Ireland	20	50	49	28		49	61	64	198	48
Netherlands	-	2	-	-	-	-	-	-	-	-
U.K. (England and Wales)	214	227	153	150	152	176	227	251	196	276
Spain	-	-	-	-	-	-	7	-	-	-
U.S.S.R.	-	1	-	-	-	-	-	-	-	-
Total	722	888	869	757	875	863	1 373	1 377	1 303	1 170

* Preliminary

DIVISION	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
VIIg	358	420	555	424	483	478	769	798	755	315
VIIf	364	468	314	333	392	385	604	579	548	855
VIIf + g	722	888	869	757	875	863	1 373	1 377	1 303	1 170

* Preliminary

Table D.7.9. Trawl mesh sizes in use in the UK sector of the Irish Sea (VIIA), for the period 1980-83

	Total number of observations					Mean mesh size (mm)				
	UK	France	Belgium	Netherlands	Ireland	UK	France	Belgium	Netherlands	Ireland
Nephrops	125	11	0	0	5	66.3	73.7	-	-	54.5
Flatfish	206	74	299	125	23	75.9	77.2	79.5	78.5	75.7
Beam Trawl	42	0	227	96	15	76.3	-	79.4	78.5	76.2
Roundfish	270	112	256	118	24	74.4	78.1	79.8	78.6	75.5

Table D.8.1 Nominal catch (tonnes) of SOLE in Sub-area IV, 1974-83

Country \ Year	1974	1975	1976	1977	1978	1979	1980	1981 a)	1982	1983 **
Belgium	1 130	1 392 *	1 456	1 671 *	1 727 *	2 044 *	1 378	1 363	1 927 a)	1 861
Denmark	705	682	574	348	465	313 *	710 *	720	522 a)	694
France	195	297	598	308	346	309 *	232 *	144	686	203
Germany Federal Republic	173	233	192	310	467	242 *	338 *	346	290 a)	619
Netherlands	15 434 *	15 242	11 044	10 873	6 749	7 646 *	12 695 *	12 400	17 749 a)	16 057
United Kingdom (Engl. + Wales)	340	426	455	491 *	625 *	649	452 *	381	402 a)	433
Other Countries	12	-	7	2	1	40	2	-	2	
Total	17 989	18 272	14 326	14 003	10 380	11 243	15 807	15 354	21 578	19 867
Unreported landings		2 500	3 000	4 000	9 900	11 354				4 943
Grand Total		20 772	17 326	18 003	20 280	22 597	15 807	15 354	21 578	24 810

a) Figures revised by Flatfish Working Group.
* Figures revised by *ad hoc* Flatfish Working Group 1982

** Provisional Working Group estimates

Table D.8.2 North Sea PLAICE. Nominal catch (tonnes) in Sub-area IV, 1974-83

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983[1)]
Belgium	6 198*	6 162*	5 286*	7 321*	6 231*	7 687*	7 005*	6 346*	6 755	9 716
Denmark	19 814	22 731	25 612	20 900	21 285	27 497	27 057	22 026	24 532	18 749
Faroe Islands	-	1	-	1	-	-	-	-	-	-
France	519	536	497	598	750	856	711*	586*	1 046	675
Federal Republic of Germany	3 231*	4 041*	3 649*	5 414*	4 595*	4 315*	4 319*	3 449*	3 626	2 397
Ireland	-	-	-	-	-	19	-	+	-	-
Netherlands	54 438	51 293	46 457	42 307	28 219	38 295	39 782	40 049	55 715	51 328
Norway	13	13	20	16	13	13	15	18	17	15
Poland	-	153	40	-	-	-	-	-	-	-
Sweden	431	35	28	-	-	7	7	3	6	+
UK (Engl.and Wales)	23 855*	20 291*	23 772*	27 625*	27 862	25 825*	18 687*	17 129*	16 385	13 241
UK (Scotland)	4 002	3 230	3 310	3 622	3 877	4 126	4 345	4 390	4 355	4 105
USSR	39	50	-	-	-	-	-	-	-	-
Total	112 540	108 536	108 671	107 804	92 832	108 640	101 928	93 996	112 439	100 226
Unreported catches	-	-	4 999	11 384	21 152	36 707	38 023	45 751	42 112	43 223
GRAND TOTAL	112 540	108 536	113 670	119 188	113 984	145 347	139 951	139 747	154 551	143 449

* = Figure revised by ad hoc Flatfish Working Group 1982,
otherwise from Bulletin Statistique

1) Preliminary

Table D.8.3 ENGLISH CHANNEL SOLE - Division VIId
Nominal catch (in tonnes), 1974-83.

Year	Belgium	France	Nether-lands	U.K.	Total
1974	159	706 (1)	3	309	(940)
1975	132	464	1	244	841
1976	203	599	-	404	1 206
1977	225	737	-	315	1 277
1978	241	782	-	366	1 389
1979	311	1 129	-	402	1 842
1980	302	1 075	-	279	1 656
1981	491	1 513	-	210	2 214
1982	526	1 828*	4	379	2 737
1983	541	2 077	-	419	3 038

* revised from Bulletin Statistique

(1) Divisions VIId and VIIe

( ) estimated

Table D.8.4 Western Channel SOLE - Division VIIe. Nominal catches (in tonnes),1974-83.

YEAR	BELGIUM	DENMARK	FRANCE	NETHERLANDS	IRELAND	U.K.	TOTAL
1974	6	-	706[1)]	3[1)]	-	181	(427)
1975	3	-	271	1[1)]	-	217	491
1976	4	-	352	-	-	260	616
1977	3	-	331	-	-	272	606
1978	4	20	384	-	-	453	861
1979	1	-	515	-	-	665	1 181
1980	45	-	447	-	13	764	1 269
1981	16	-	415	-	-	784	1 215
1982	97	-	321**	-	-	1 012	1 446*
1983	50	-	320	-	-	1 025	1 395

* Includes 16 tonnes from Channel Isls.
** Revised from Bulletin Statistique
1) Divisions VIId and VIIe
( ) Estimated

Table D.8.5 English Channel PLAICE
Nominal catch (tonnes) in Divisions VIId and VIIe, 1974-83

Year	Belgium		Denmark		France		Netherlands	U.K. (England + Wales)		Total	
	VIId	VIIe	VIId	VIIe	VIId	VIIe	VIId, VIIe	VIId	VIIe	VIId	VIIe
1974	148	4	-	-	2 180		13	564	248	3 157	
1975	153	8	-	-	1 802	288	-	293	279	2 248	575
1976	147	5	1[2)]	-	1 439	323	-	376	312	1 963	640
1977	149	3	81[2)]		1 714	336	-	302	363	2 246	702
1978	161	3	-	156[3)]	1 810	314	-	349	467	2 320	940
1979	217	2	28	-	2 094	458	-	278	515	2 617	975
1980	435	22	-	-	2 346	440	-	*517	606	3 298	1 068
1981	850		-	-	3 968			1 643		6 461	
1982	819		-	-	3 867			1 643		6 351	
1983	1 050[1)]		-	-	3 606[1)]			1 742[1)]		6 398[1)]	

* Raised for under-reporting

1) Provisional

2) Includes Division VIIe

3) Includes Division VIId

NOTE: All figures up to 1979 are from Bulletin Statistique
All others from national statistics

Table F.2.1. Landings of HORSE MACKEREL in Sub-area IV by country (tonnes)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Belgium	34	23	15	14	15	9	8	34	7	55
Denmark	-	-	-	63	1 543	496	199	3 576	1 612	1 894
Faroe Islands	772	156	116	130	3	0	260	0	2 327	5 189
France	582	140	147	325	182	221	292	2	567	258
German Dem. Rep.	-	-	4	-	-	-	-	-	-	-
Germany, Fed. Rep.	686	696	162	2	1 993	376	+	139	30	52
Ireland	-	-	-	-	-	-	1 161	412	-	-
Netherlands	576	173	82	223	106	88	101	355	559	1
Norway	20 713	2 174	4 842	450	1 037	199	119	2 292	7	73
Poland	62	-	11	6	-	-	-	-	-	2
Sweden	2[a)]	+	-	-	-	+	-	-	-	-
U.K. (England & Wales)	5	3	11	22	36	23	11	15	6	-
U.K. (Scotland)	1 222	2	+	4	5	+	-	-	-	-
U.S.R.R.	5 894	6 566	3 278	87	-	-	-	-	-	-
TOTAL	30 548	9 933	8 668	1 326	4 920	1 412	2 151	6 825	5 115	7 524

* Preliminary

a) Includes IIIa

Table F.2.2. Landings of HORSE MACKEREL in Sub-area VI by country (tonnes)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Belgium	–	–	–	–	–	–	–	–	–	–
Denmark	–	–	–	–	–	443	734	341	2 785	7
Faroe Islands	342	2	2	–	–	–	–	–	1 248	–
France	–	–	293	113	91	151	45	454	4	10
Ireland	–	–	–	–	59	–	–	–	–	–
Germany, Fed. Rep.	209	263	5	–	–	155	5 550	10 212	2 113	4 823
Netherlands	–	106	69	19	114	6 910	2 385	100[a)]	50[a)]	5 500[a)]
Norway	627	869	90	–	–	–	–	5	–	–
Poland	1 067	479	48	–	–	–	–	–	–	–
Spain	400	150	175	147	91	20	–	–	–	–
U.K. (England & Wales)	14	6	37	40	44	73	9	5	+	–
U.K. (Scotland)	41	187	85	105	9	39	1	17	83	–
U.S.R.R.	780	1 210	3 390	246	–	–	–	–	–	–
TOTAL	3 480	3 272	4 194	670	408	7 791	8 724	11 134	5 036	10 340

* Provisional

a)Estimated from biological sampling

Table F.2.3. Landings of HORSE MACKEREL in Sub-area VII, by country (tonnes)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983[*]
Belgium	3	4	2	1	1	3	+	1	1	-
Denmark	-	-	-	-	2 104	4 287	5 045	3 099	877	994
France	2 466	2 443	3 800	2 448	3 564	4 407	1 983	2 800	2 314	4 717
G.D.R.	8	-	92	45	-	-	-	-	-	-
Germany, Fed.Rep.	825	521	3	308	2 923	5 333	2 289	1 079	12	2 195
Ireland	-	-	-	1 133	3 388	-	-	16	-	-
Netherlands	-	41	280	2 088	10 556	25 174	23 002	25 000[a]	27 500[a]	34 350[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	(100)
UK (Engl. and Wales)	675	438	2 014	1 343	2 918	2 686	12 933	2 520	2 670	1 215
UK (Scotl.)	-	-	-	-	-	-	1	-	-	-
USSR	95 650	101 393	150 728	20 366	-	-	-	-	-	-
Total	116 901	117 599	177 010	28 855	26 060	43 525	45 697	34 749	33 478	43 571

*) Provisional

a) Estimated from biological sampling

() Estimated from 1982 catch level

Table F.2.4. Landings of HORSE MACKEREL in Sub-areas VIII and IX, by country (tonnes)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*)
Sub-area VIII										
Denmark	-	-	-	-	-	127	-	-	-	-
France	2 477	2 386	3 380	4 881	3 643	4 240	3 361	3 711	3 073	2 200
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	(19 000)
UK (Engl.& Wales)	-	-	-	-	-	22	-	+	1	-
USSR	925	11 436	30 763	15 213	3	-	-	-	-	-
Total	66 238	86 738	129 558	124 906	83 804	47 155	37 495	40 073	22 683	(21 200)
Sub-area IX										
Poland	-	-	-	168	-	-	-	-	-	-
Portugal	48 071	43 491	49 041	51 341	32 043	26 977	25 132	26 032	28 334	29 986
Spain	2 954	1 882	3 339	981	14 787	12 880	11 679	12 120	8 840	(8 000)
USSR	-	422	644	14 898	381	250	-	-	-	
Total	51 025	45 795	53 024	67 388	47 211	40 107	36 811	38 152	37 174	(37 986)

*) Preliminary

( ) Estimated from 1982 catch level

Table G.1.1 Nominal catch (tonnes) of MACKEREL in the North Sea, Skagerrak and Kattegat (IV and IIIa)1974 - 1983 (Data for 1974-1976 as officially reported to ICES. Data from 1977 onwards were submitted by Working Group members).

Country \ Year	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Belgium	145	134	292	49	10	10	5	55	102	92
Denmark	3 890	9 836	27 986	21 833	18 068	19 171	13 234	9 982	2 034	8 410
Faroe Isl.	18 625	23 424	63 476	42 836	33 911	28 118	14 770	-	720	-
France	2 254	2 749	2 607	2 529	3 452	3 620	2 238	3 755	3 041	2 248
Germany, Dem.Rep.	234	141	259	41	233	-	-	-	-	-
Germany,Fed.Rep.	270	276	284	-	284	211	56	59	28	10
Iceland	4 689	198	302	-	-	-	-	-	-	-
Ireland	-	-	-	-	-	-	738	733	-	-
Netherlands	3 259	2 390	2 163	2 673	1 065	1 009	853	1 706	390	96
Norway	248 314	206 871	197 351	180 800	82 959	90 720	44 781	28 341	27 612	23 469
Poland	4 520	2 313	2 020	298	-	-	-	-	-	-
Sweden	3 579	4 789	6 448	4 012	4 501	3 935	1 666	2 446	692	1 157
U.K.(Engl.&Wales)	61	33	89	105	142	95	76	6 520	28	16
U.K. (Scotland)	390	578	1 199	1 590	3 704	5 272	9 514	10 575	28	4
USSR	8 161	9 330	1 231	2 765	488	162	-	-	-	-
Unallocated	-	-	-	-	-	500	-	3 216	450	96
Total	298 391	263 062	305 709	259 531	148 817	152 823	87 931	67 388	35 125	35 598

*) Preliminary

Note: In contrast to the corresponding tables in Working Group reports for year prior to 1982, the catches do not include catches taken in IIa.

Table G.1.2 Nominal catches (tonnes) of MACKEREL in the Norwegian Sea (Division IIa), 1974-1983.

Country \ Year	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Denmark[2]							-	801	1 008	10 427[3]
Faroe Isl.[1]	-	-	-	-	283	6	270	-	180	-
France[2]	-	7	8	-	2	-	-	6	8	-
German Dem. Rep.[2]	11	-	-	-	-	-	-	51	-	-
Germany,F.R.[2]	-	-	-	-	53	174	2	-	-	4
Netherlands[2]	-	-	2	-	-	-	-	-	-	-
Norway[1]	6 818	34 662	10 516	1 400	3 867	6 887	6 618	12 941	34 540	38 405
Poland	-	-	-	-	-	-	-	-	231	-
U.K. (England and Wales)[1]	+	+	+	+	1	-	-	255	-	-
U.K. (Scotland)[2]	-	-	-	-	-	-	296	968	-	-
USSR*	-	-	-	-	-	5	1 450	3 640	1 641	40
Total	6 829	34 669	10 526	1 400	4 206	7 072	8 340	18 662	37 608	48 876

1) Data provided by W.G. members

2) Data reported to ICES

3) Includes 1 497 tonnes caught in Division Vb

*) Preliminary

Table G.1.3 Nominal catch (tonnes) of MACKEREL in the western area (VI, VII and VIII)
(Data for 1974-77 as officially reported to ICES)

Country / Year	1974	1975	1976	1977	1978**	1979**	1980**	1981**	1982**	1983 *) **
Belgium	7	17	10	1	1	3	3	-		++
Denmark	-	-	3	698	8 677	8 535	14 932	13 464	15 100	15 000
Faroe Islands	8 659	1 760	5 539	3 978	15 076	10 609	15 234	9 070	10 500	9 400
France	37 824	25 818	33 556	35 702	34 860	31 510	23 907	14 829	12 300	11 000
Germany, Dem.Rep.	2 885	9 693	4 509	431	-	-	-	-	-	-
Germany, Fed.Rep.	993	1 941	391	446	28 873	21 493	21 088	29 221	11 200	23 000
Iceland	-	21	10	-	-	-	-	-	-	-
Ireland	8 526	11 567	14 395	23 022	27 508	24 217	40 791	92 271	109 700	110 000
Netherlands	7 315	13 263	15 007	35 766	50 815	62 396	91 081	88 117	67 200	83 100
Norway	32 597	1 907	4 252	362	1 900	25 414	25 500	21 610	19 000	19 000
Poland	22 405	21 573	21 375	2 240	-	92	-	1	-	-
Spain+)	30 177	23 408	18 480	21 853	19 142	15 556	15 000	11 469	15 600	15 000
Sweden	-	-	38	-	-	-	-	-	-	-
U.K. (England & Wales)	21 132	31 546	57 311	132 320	213 344	244 293	150 598	75 722	82 900	62 000
U.K. (N.Ireland)	75	30	95	97	46	25	-	4 153	9 600	18 400
U.K. (Scotland)	8 466	16 174	28 399	52 662	103 671	103 160	108 372	109 153	147 400	120 100
USSR	103 435	309 666	262 384	16 396	-	-	-	-	-	-
Unallocated						54 000	98 258	140 322	97 300	90 600
Total ICES members	284 496	468 384	465 754	325 974	503 913	601 303	604 761	609 402	597 800	576 600
Bulgaria	13 558	20 830	28 195	-	-	-	-	-	-	-
Rumania	-	2 166	13 222	-	-	-	-	-	-	-
Discard	-	-	-	-	50 700	60 600	21 600	42 300	24 900	11 300
GRAND TOTAL	298 054	491 380	507 178	325 974	554 613	661 903	626 361	651 702	622 700	587 900

*) Preliminary
**) Working Group estimate
+) Includes *S. japonicus*

Table G.1.4 Nominal catch (tonnes) of MACKEREL in Sub-area IX, 1974-1983.

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Portugal	2 329	2 224	2 595**	1 743**	1 555**	1 071**	1 921**	3 108**	3 600**	2 239
Spain	3 264	3 345	2 520	2 935	6 221	6 280	2 719	2 111	796	800**
France	-	1	-	-	-	-	-	-	-	-
Poland	-	-	-	8	-	-	-	-	-	-
USSR	-	44	466	2 879	189	111	-	-	-	-
TOTAL	5 593	5 614	5 581	7 565	7 965	7 462	4 460	5 219	4 396	3 039

* Preliminary

** Working Group estimate

Table G.2.1 Landings (tonnes) of Blue Whiting from the main fisheries 1973-1983

Area	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Norwegian Sea Fishery (Sub-areas I + II and Divisions Va, XIVa + XIVb)	878	146	6 746	3 336	56 999	236 226	741 042	766 798	520 738	110 685	55 511
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	316 656	361 219
Icelandic Industrial Fishery (Division Va)	2 833	4 230	1 294	8 220	5 838	9 484	2 500	-	-	-	7 000
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	117 578	117 737
Southern Fishery (Sub-areas VIII + IX, Divisions VIId,e + VIIg-k)	27 452	25 733	31 715	35 035	30 723	33 898	27 176	29 944	38 749	30 971	28 378
Total	103 016	107 513	112 045	163 977	268 736	608 710	1 118 598	1 122 564	909 557	575 890	569 845

* Preliminary

Table G.2.2 Landings (tonnes) of Blue Whiting from the Norwegian Sea (Sub-areas I and II, Divisions Va, XIVa, and XIVb) fisheries 1973-1983, as estimated by the Working Group.

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983[1]
Denmark	-	-	-	-	-	-	-	-	-	473	-
Faroes	-	-	-	-	593	2 810	762	-	11 131	-	13 864
France	-	-	-	-	-	-	-	-	5 093	2 067	2 890
German Democratic Republic	-	-	-	90	2 031	7 301	22 502	14 234	15 607	3 042	5 553
Germany, Fed. Rep. of[2]	3	2	35	33	6 777	8 421	1 157	8 919	17 385	890	2
Iceland	60	119	3	569	4 768	17 756	12 428	4 562	4 808	-	-
Norway	-	20	31	737	-	-	33 588[3]	902	187	-	5 061
Poland	-	-	-	95	1 536	5 083	4 346	11 307	2 434	443	-
UK (England and Wales)	-	-	-	60	165	11	-	-	-	-	-
UK (Scotland)	-	-	-	-	-	-	-	-	-	-	-
USSR	815	5	6 677	1 752	41 129	194 844	666 259	726 874	464 093	103 770	28 141
Total	878	146	6 746	3 336	56 999	236 226	741 042	766 798	520 738	110 685	55 511

1) Preliminary

2) Including catches off East Greenland (Division XIVb).
(327 tonnes in 1977, 896 tonnes in 1978, 204 tonnes in 1979 and 8 757 tonnes in 1980).

3) Including purse-seine catches of 29 162 tonnes of juvenile Blue Whiting.

Table G.2.3 Landings (tonnes) of the Blue Whiting from the Spawning Fishery (Divisions Vb, VIa,b and VIIb,c) 1973-1983, as estimated by the Working Group

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Denmark	-	-	-	-	18 745	23 498	21 200	19 272	11 361	23 164	28 680
Faroes	1 155	1 527	-	12 826	29 096	39 491	35 780	37 488	23 107	38 958	56 168
France	-	-	-	-	-	-	-	-	-	1 212	3 600
German Democratic Republic	-	-	-	4 971	1 094	1 714	172	181	6 562	7 771	3 284
Germany, Fed. Rep. of	-	2 655	-	85	3 260	6 363	3 304	709	935	701	825
Iceland	319	-	-	-	5 172	7 537	4 864	5 375	10 213	1 689	1 176
Ireland	-	-	-	160	-	-	-	-	-	-	-
Netherlands	-	-	-	-	-	1 172	154	-	222	200	150
Norway	2 445	3 247	7 301	24 853	38 214	116 815	186 737	133 754	166 168 1)	169 790 2)	185 646 3)
Poland	-	116	4 704	10 950	3 996	2 469	4 643	-	2 279	-	-
Spain	6 571	6 484	8 153	5 910	183	14	-	-	-	-	-
Sweden	-	-	-	-	6 391	6 260	-	3 185	-	-	-
UK (England and Wales)	-	-	455	341	1 475	5 287	4 136	3 878	6 000	-	-
UK (Scotland)	-	-	279	1 488	3 001	1 599	1 466	6 819	2 611	-	-
USSR	4 537	1 178	9 443	19 778	26 160	17 009	22 091	40 032	58 858	73 171	81 690
Total	15 027	15 207	30 335	81 362	136 787	229 228	284 547	250 693	288 316	316 656	361 219

1) Including 28 466 tonnes from directed fisheries in Division IVa. * Preliminary

2) Including 35 001 tonnes from directed fisheries in Division IVa.

3) Including 32 043 tonnes from directed fisheries in Division IVa.

Table G.2.4 Landings (tonnes) of Blue Whiting from the Icelandic mixed industrial trawl fisheries Division Va 1973-83.

* Preliminary

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*
Iceland	2 833	4 230	1 294	8 220	5 838	9 484	2 500	-	-	-	7 000

Table G.2.5 Landings (tonnes) of Blue Whiting from the Mixed industrial fisheries and caught as by-catch in ordinary fisheries in the North Sea (Divisions IVa-c and IIa), 1973-83, as estimated by the Working Group.

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983 1)
Denmark	-	-	-	-	16 071	54 804	28 932	49 947	35 066	34 463	38 290
Faroes	3 714	2 610	428	1 254	-	1 177	1 489	1 895	3 133	27 269	12 757
France	-	-	-	-	-	-	-	-	-	1 417	249
German Democratic Republic 2)	-	-	-	-	-	988	49	-	-	-	-
Germany, Fed. Rep. of 2)	-	-	-	-	76	1 514	13	252	-	93	-
Ireland	-	-	-	-	-	-	-	-	2 744	-	-
Norway	50 835	59 151	40 210	34 600	20 737	39 989	30 930	21 962 3)	18 627	47 856	62 591
Poland 2)	-	55	-	45	838	601	-	-	229	550	-
Spain	350	318	195	47	-	-	-	-	-	-	-
Sweden 4)	-	-	-	-	639	648	1 249	1 071	1 955	1 241	3 850
UK (England and Wales) 2)	-	-	-	-	3	+	-	-	-	4 689	-
UK (Scotland)	-	-	414	58	25	153	37	2	-	-	-
USSR 2)	1 927	63	708	20	-	-	634	-	-	-	-
Total	56 826	62 197	41 955	36 024	38 389	99 874	63 333	75 129	61 754	117 578	117 737

1) Preliminary.
2) Reported landings in human consumption fisheries.
3) Including mixed industrial fishery in the Norwegian Sea.
4) Reported landings assumed to be from human consumption fisheries.

Table G.2.6 Landings (tonnes) of Blue Whiting from the Southern Areas (Sub-areas VIII and IX and Divisions VIIg-k and VIId,e) 1973-1983, as estimated by the Working Group

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983[1]
German Democratic Republic	-	-	-	-	-	-	-	-	-	-	-
Germany, Fed. Rep. of	-	-	-	-	-	25	-	-	-	-	-
Ireland	-	-	-	-	-	-	1	-	-	-	-
Netherlands	-	-	-	-	-	7	-	31	633	200	50
Poland	-	170	-	385	169	53	-	-	-	-	-
Portugal	-	-	-	-	1 557	2 381	2 096	6 051	7 388	3 271	4 328
Spain[2]	26 741	24 627	30 790	29 470	25 259	31 428	25 016	23 862	30 728	27 500	24 000
UK (England and Wales)	-	-	-	-	+	-	-	-	-	-	-
UK (Scotland)	-	-	-	-	-	-	63	-	-	-	-
USSR	711	936	925	5 180	3 738	4	-	-	-	-	-
Total	27 452	25 733	31 715	35 035	30 723	33 898	27 176	29 944	38 749	30 971	28 378

[1] Preliminary.

[2] Significant quantities taken in Divisions VIIg-k not included in the Table are discarded every year.

Figure B.1.1.1 North-East Arctic COD.

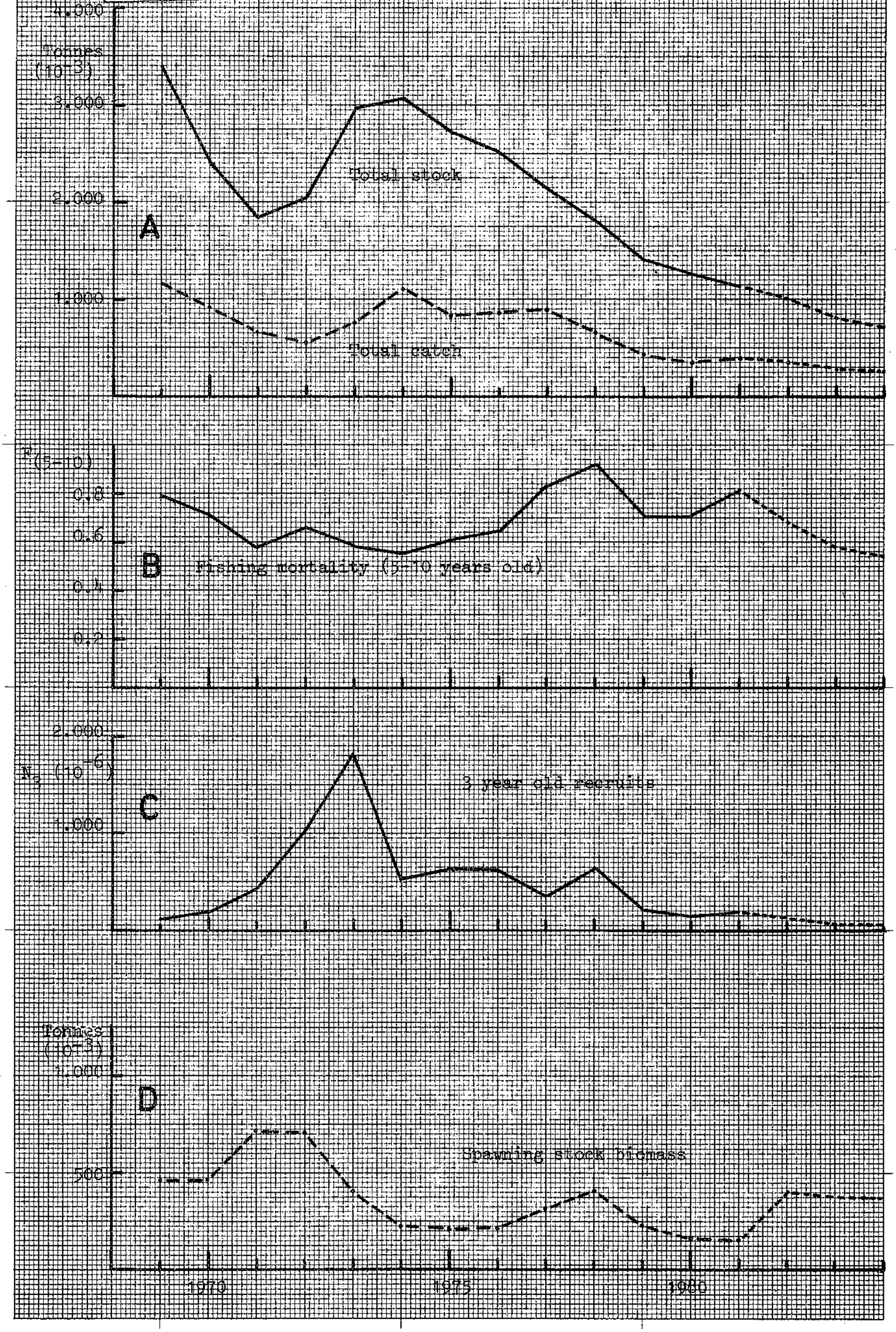


Figure B.1.1.2 North-East Arctic COD. Y/R, Yield 1985, recruited biomass (3+) and spawning stock biomass at beginning of 1986 for different levels of fishing mortalities in 1985.

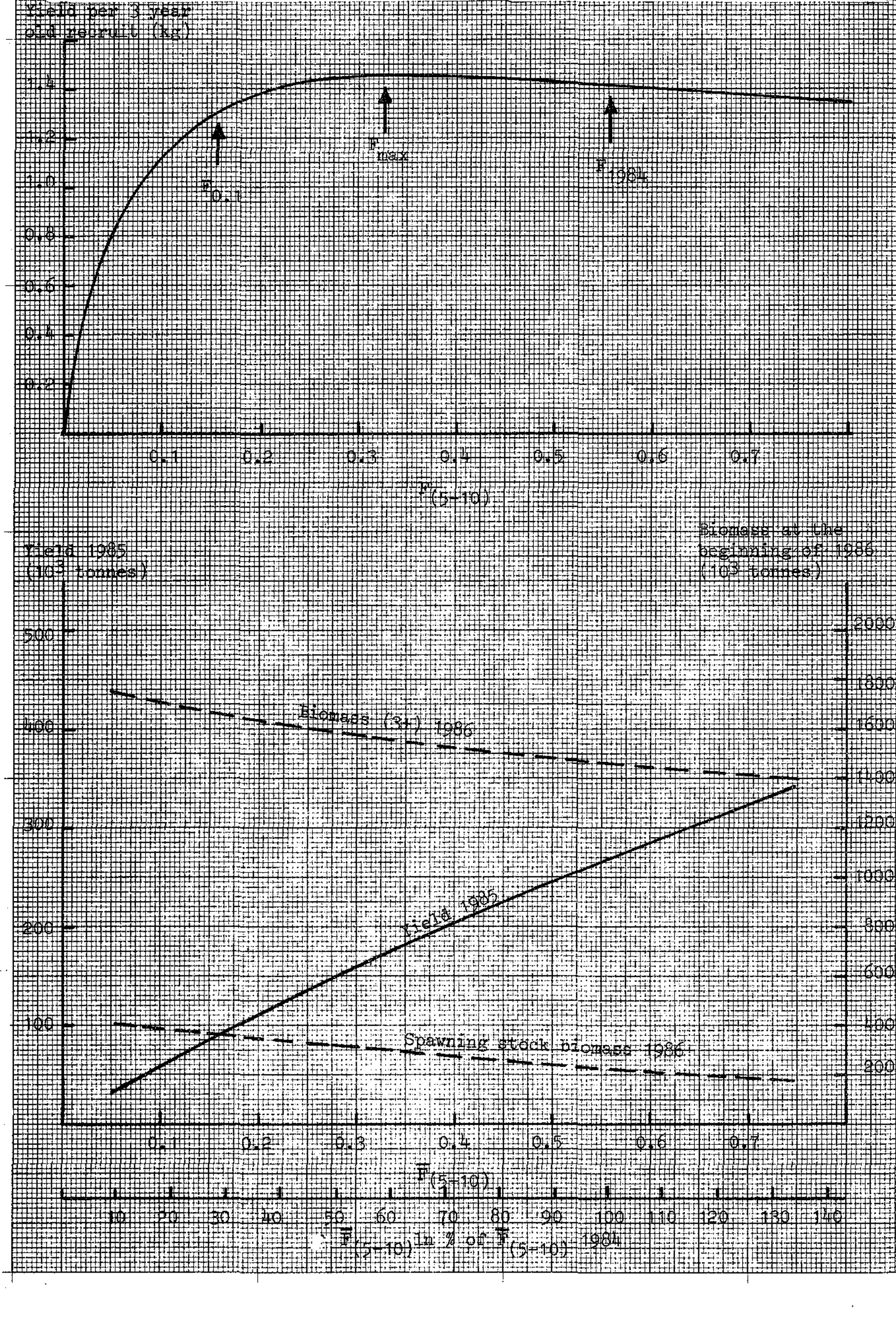


Figure B.1.2.1 North-East Arctic HADDOCK.

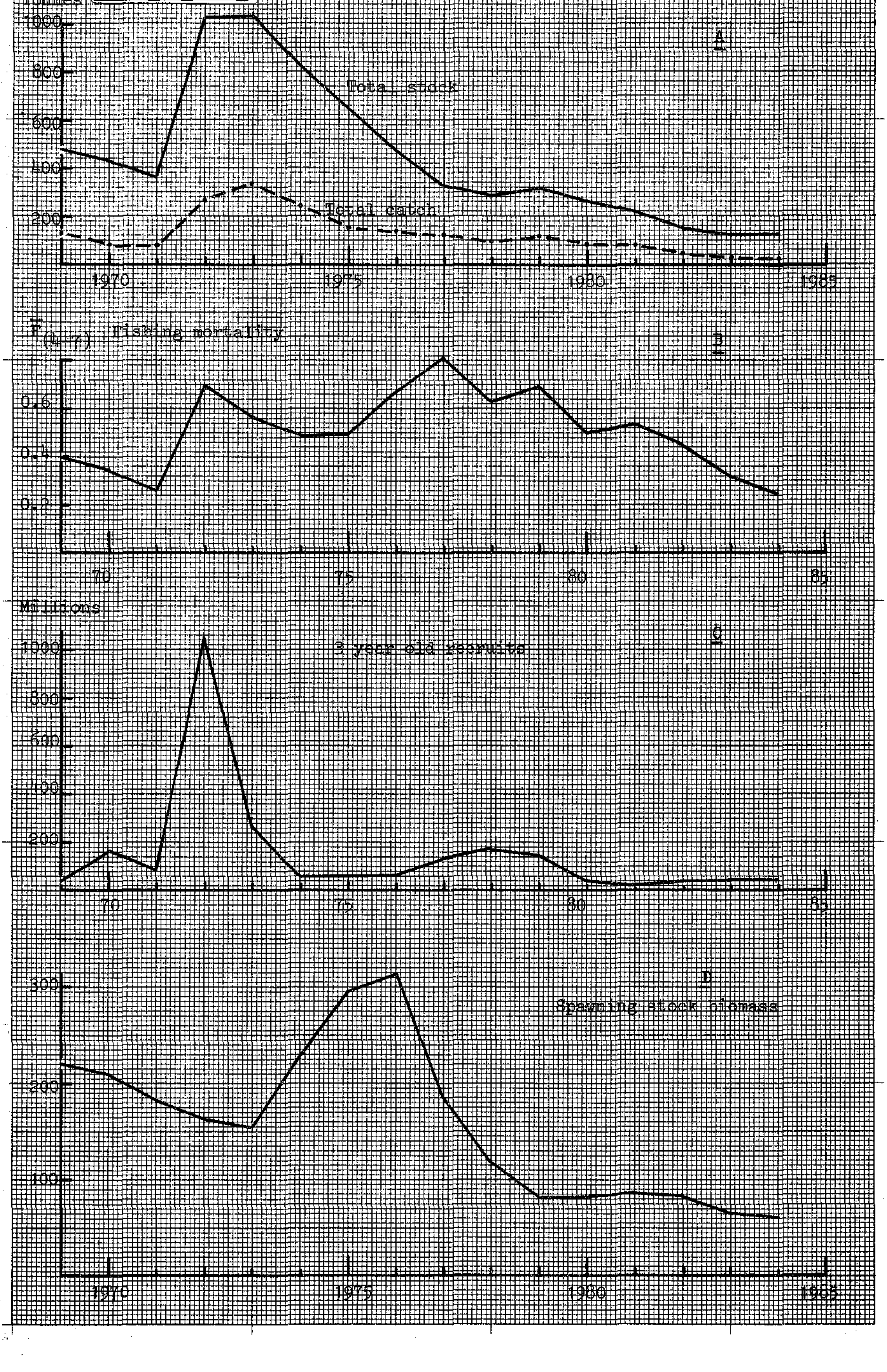


Figure B.1.2.2 North-East Arctic HADDOCK. Y/R, yield 1985, total recruited biomass (age 3+) and spawning stock biomass at the beginning of 1986 for different levels of fishing mortalities in 1985.

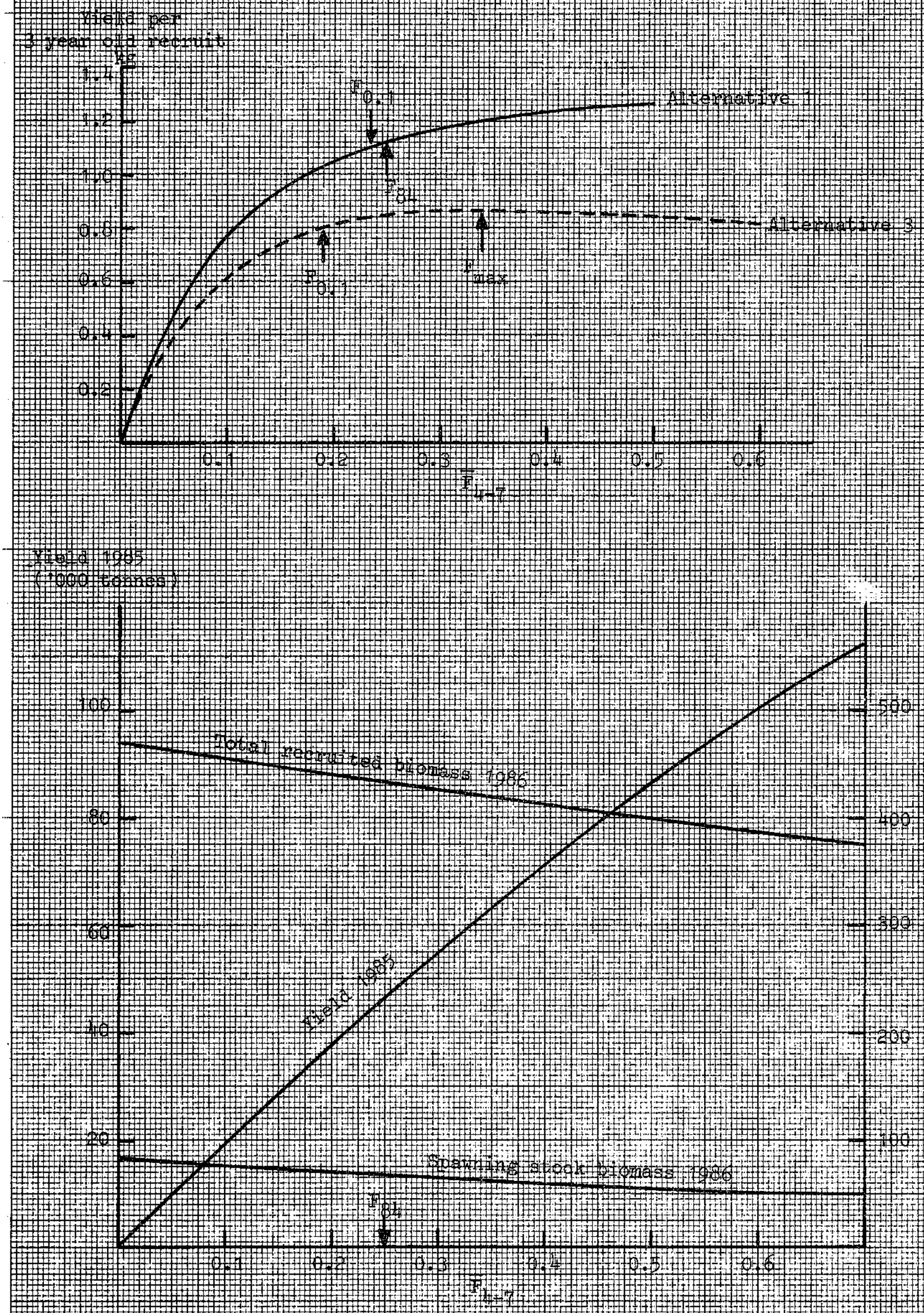


Figure B.2.1 Sebastes mentella in Divisions IIa and IIb. The fishing mortality, catch and development of the stock from 1967-83.

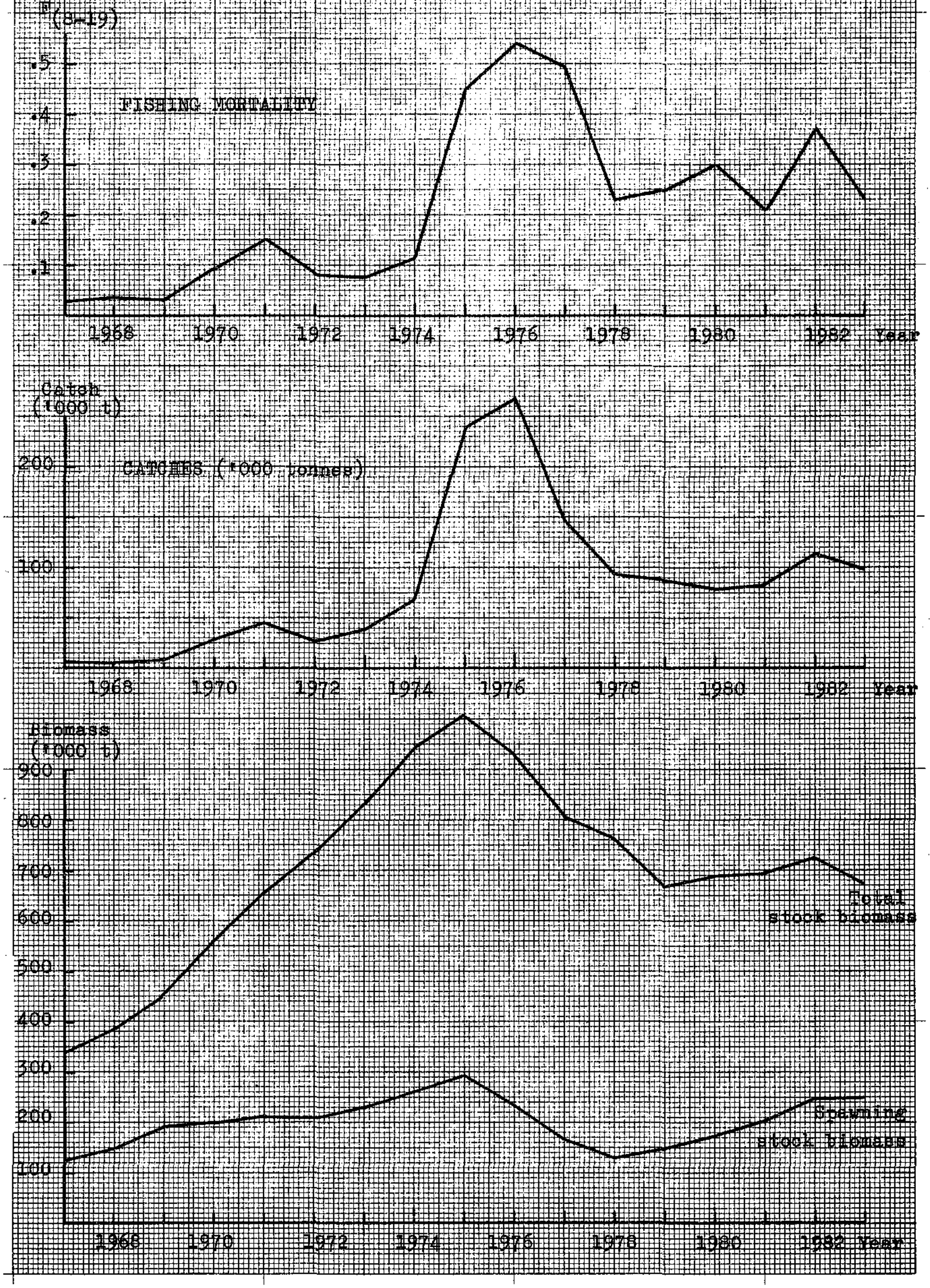


Figure B.2.2 *Sebastes mentella* in Divisions IIa and IIb. Yield per recruit for the present exploitation pattern (M = 0.1).

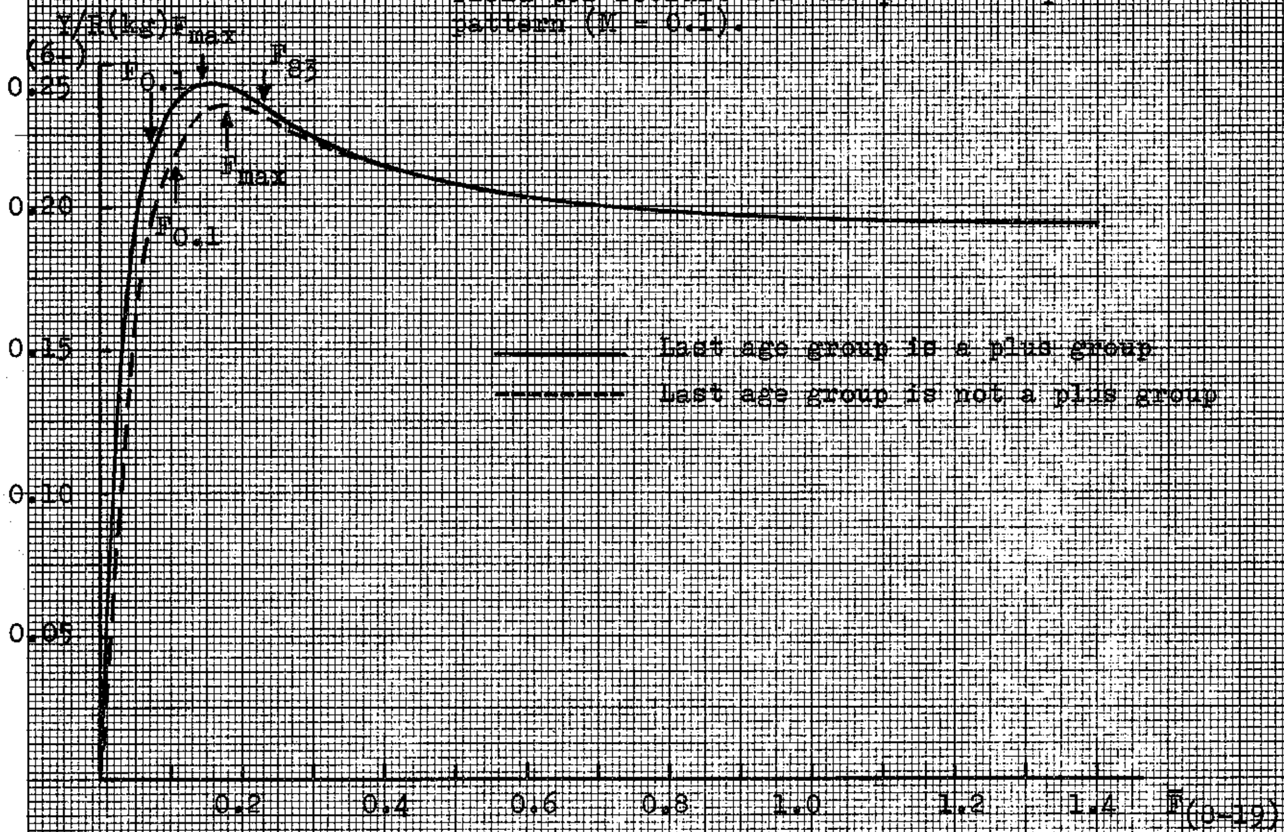


Figure B.2.3 *Sebastes mentella* in Divisions IIa and IIb. Projection for catch in 1985, total biomass (TSB) and spawning stock biomass (SSB) at the beginning of 1986 at different levels of fishing mortality in 1985.

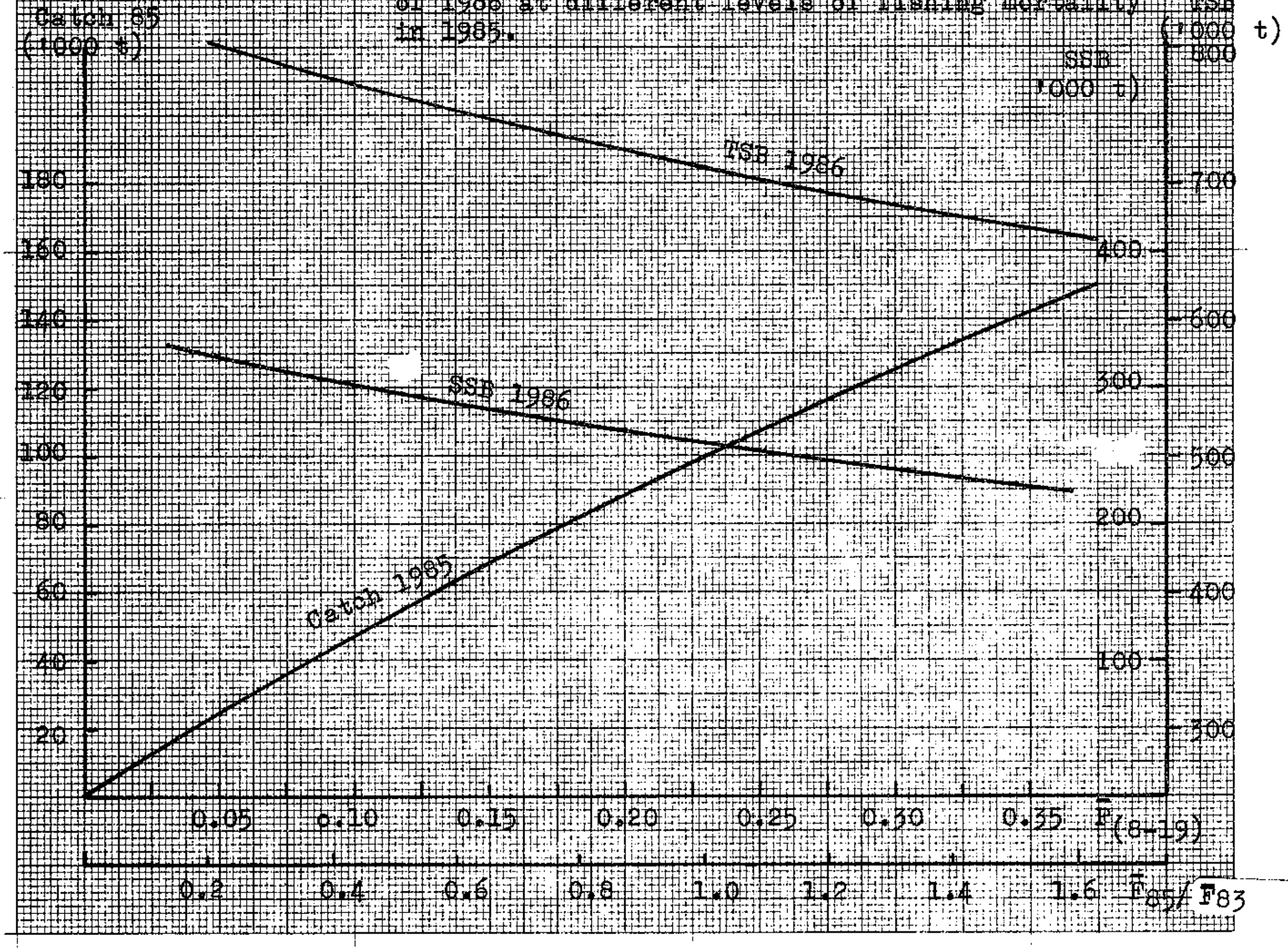


Figure B.3.1 GREENLAND HALIBUT in Sub-areas I and II.
The fishing mortality, catch and development of the stock from 1970-83.

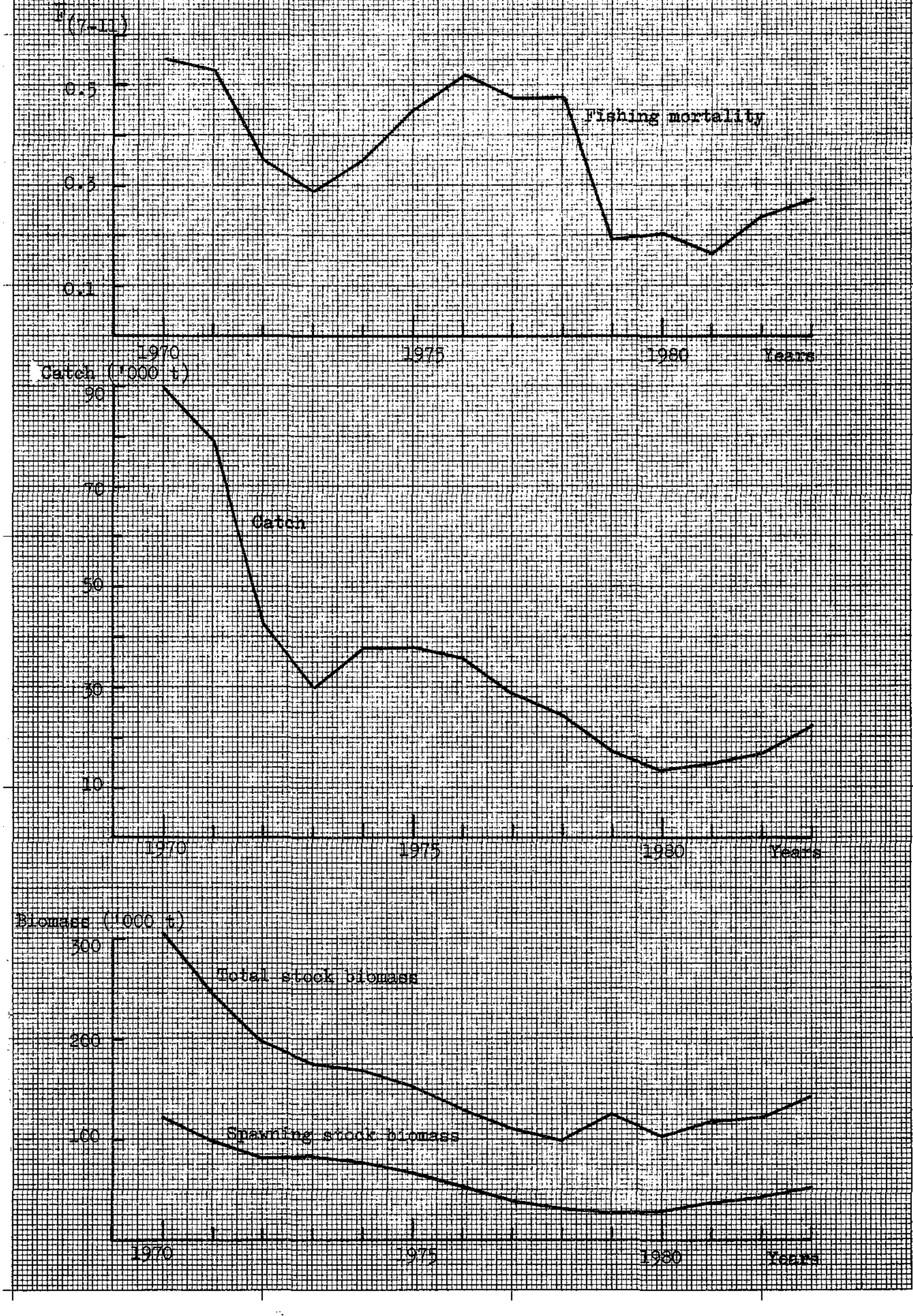


Figure B.3.2 GREENLAND HALIBUT in Sub-areas I and II.
Yield per recruit and spawning stock biomass per recruit.

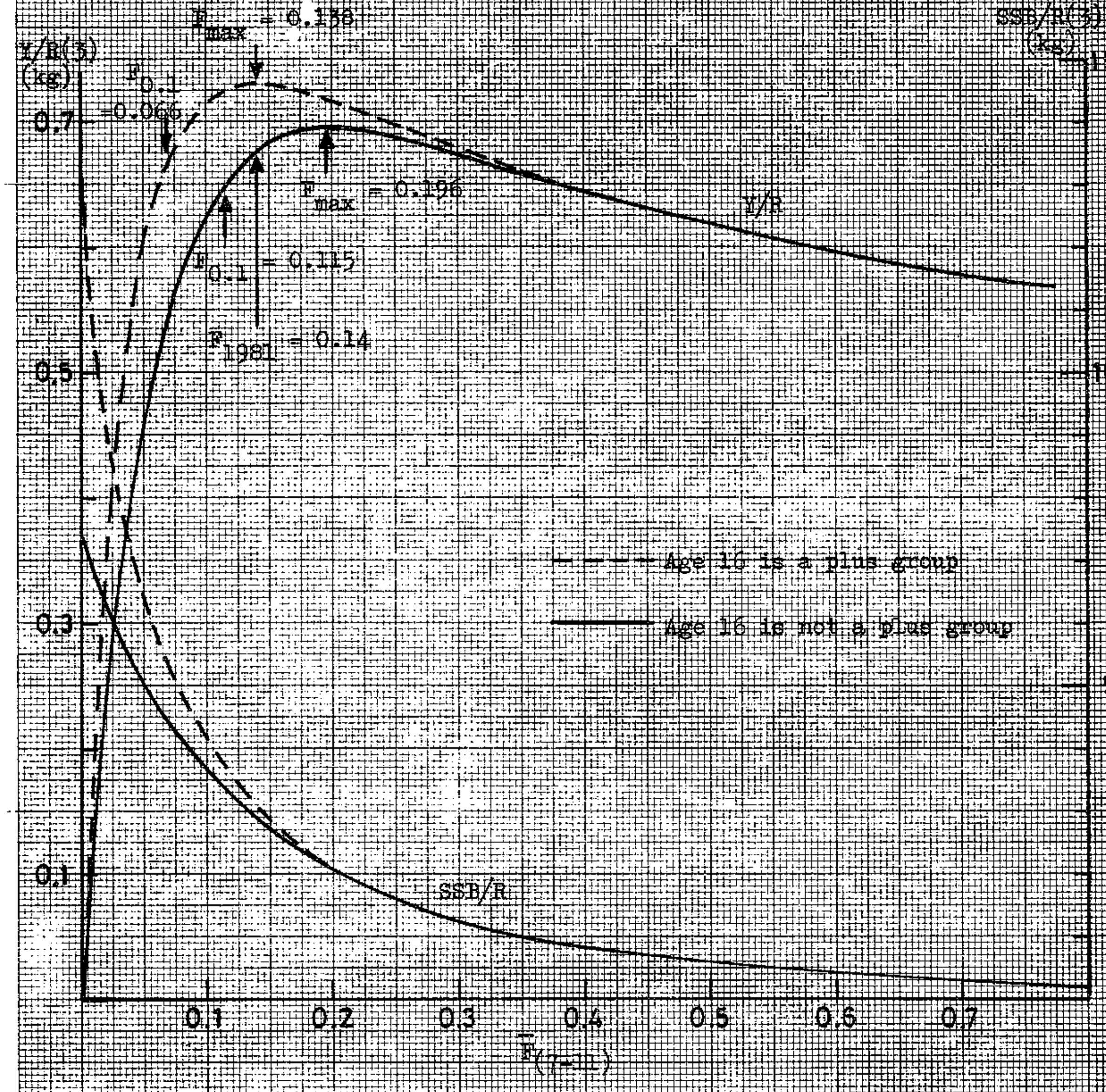


Figure B.3.3 GREENLAND HALIBUT in Sub-areas I and II.
Projection of catch in 1985, the biomass of the spawning stock and the biomass of the total stock at the beginning of 1986 for different levels of fishing mortality in 1985.

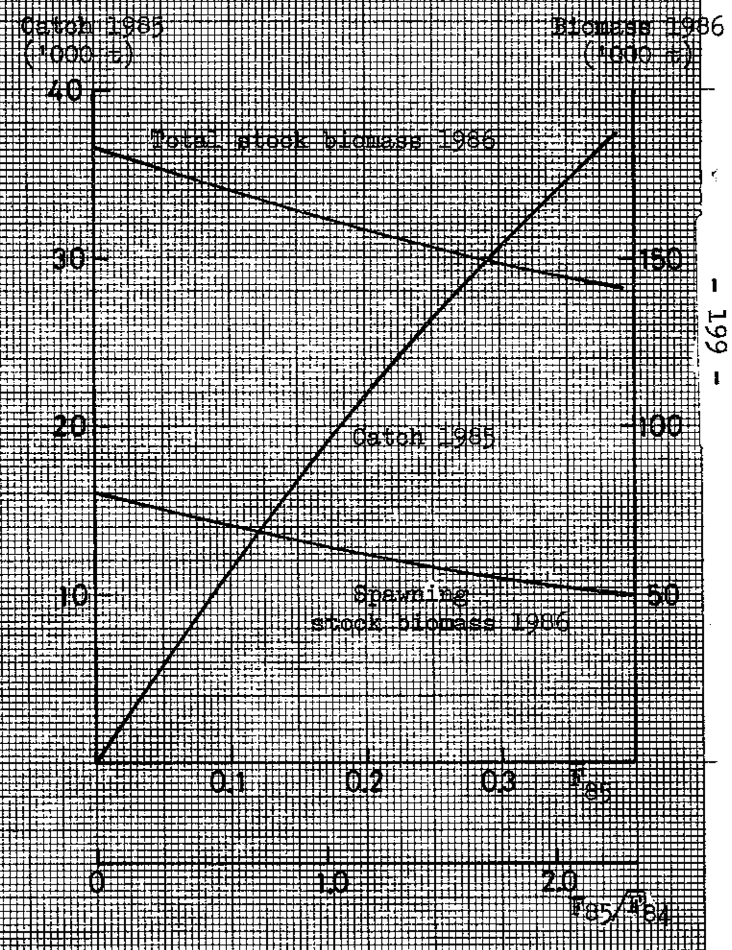


Figure B.4.1 *Sebastes marinus* in Sub-areas V and XIV. The fishing mortality, catch and development of the stock from 1967 to 1983.

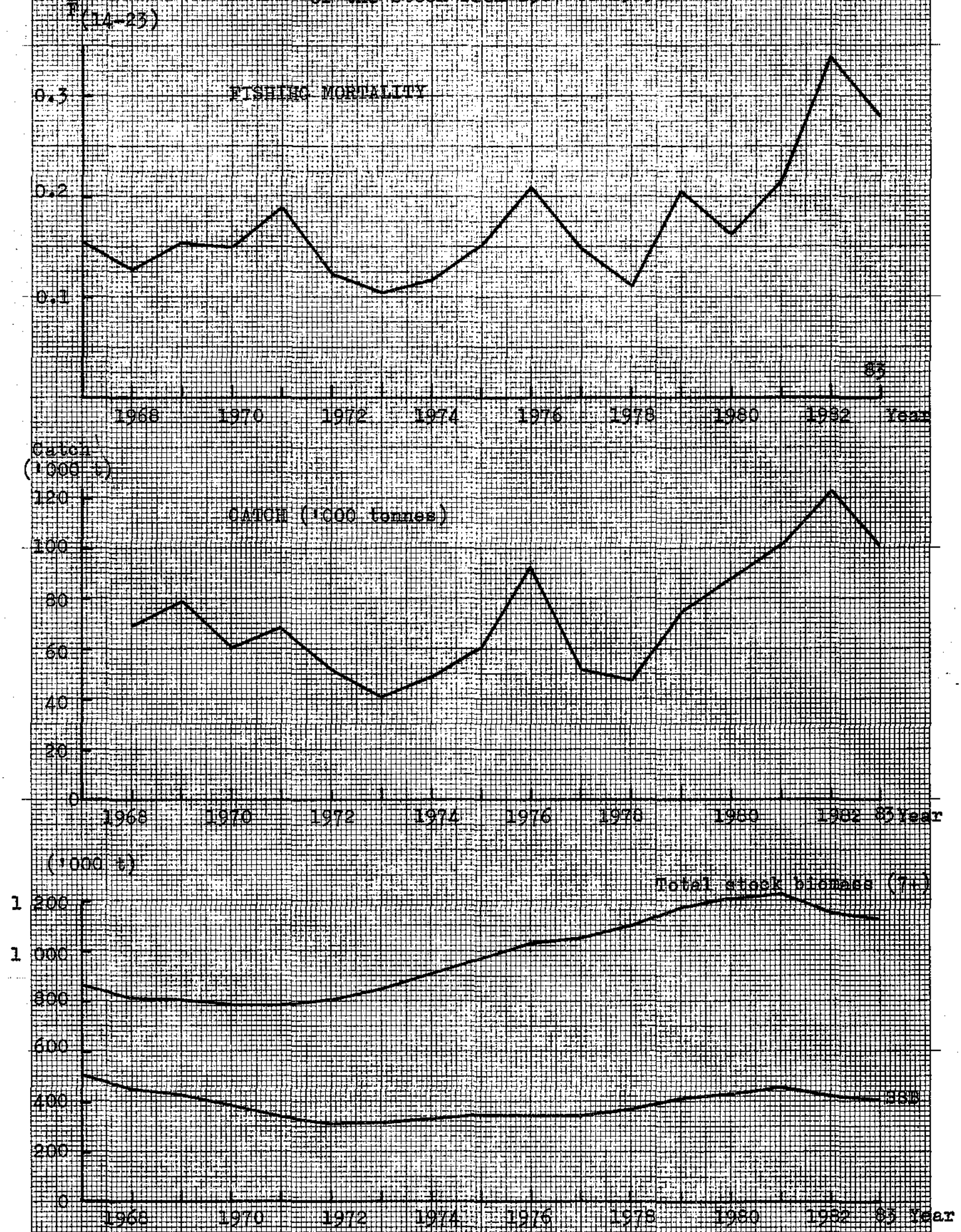
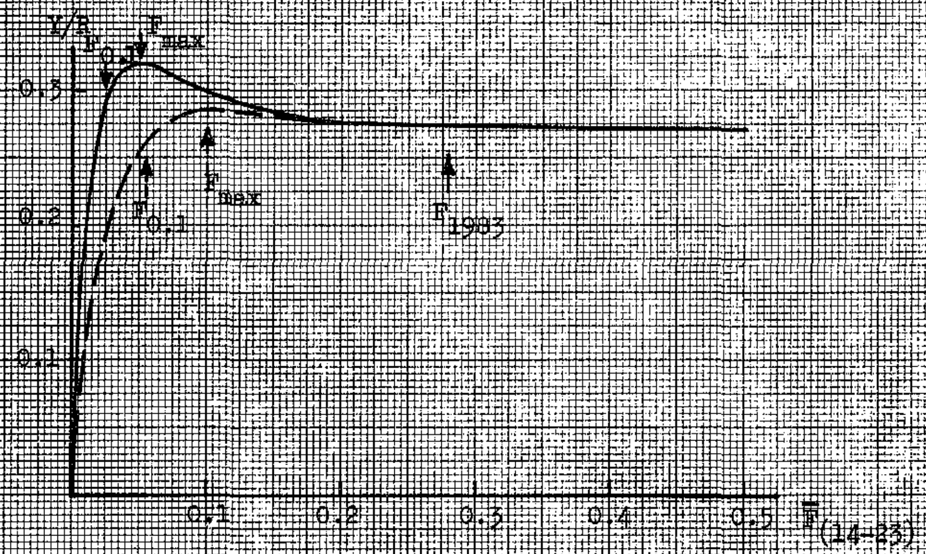


Figure B.4.2 Sebastes marinus in Sub-areas V and XIV. Yield per recruit.



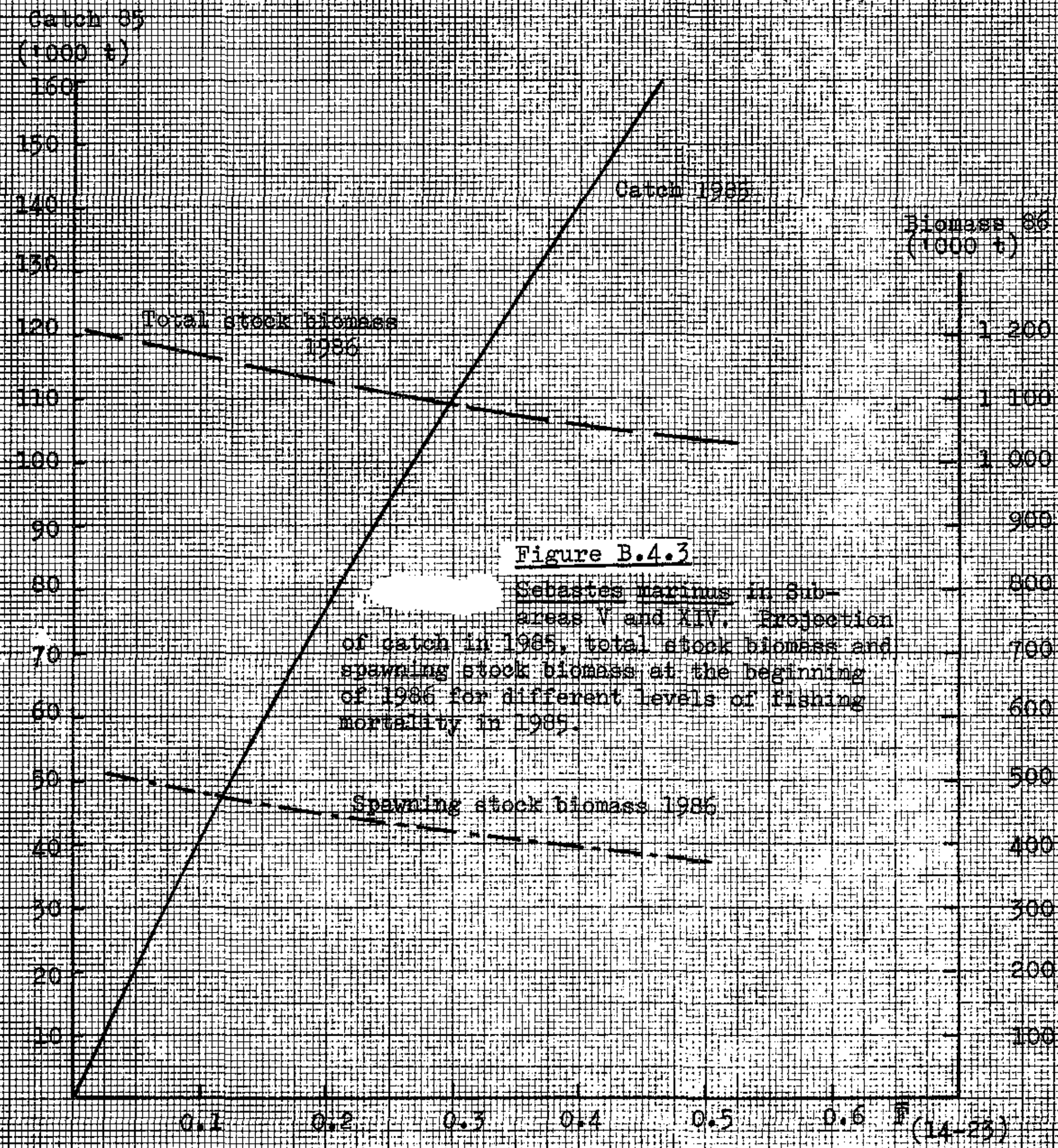


Figure B.4.3

Sebastes marinus in Sub-areas V and XIV. Projection of catch in 1985, total stock biomass and spawning stock biomass at the beginning of 1986 for different levels of fishing mortality in 1985.

Figure B.6.1.1 Main spawning grounds, migrations of mature fish and larval drift of the cod stocks at West Greenland, East Greenland, and Iceland.

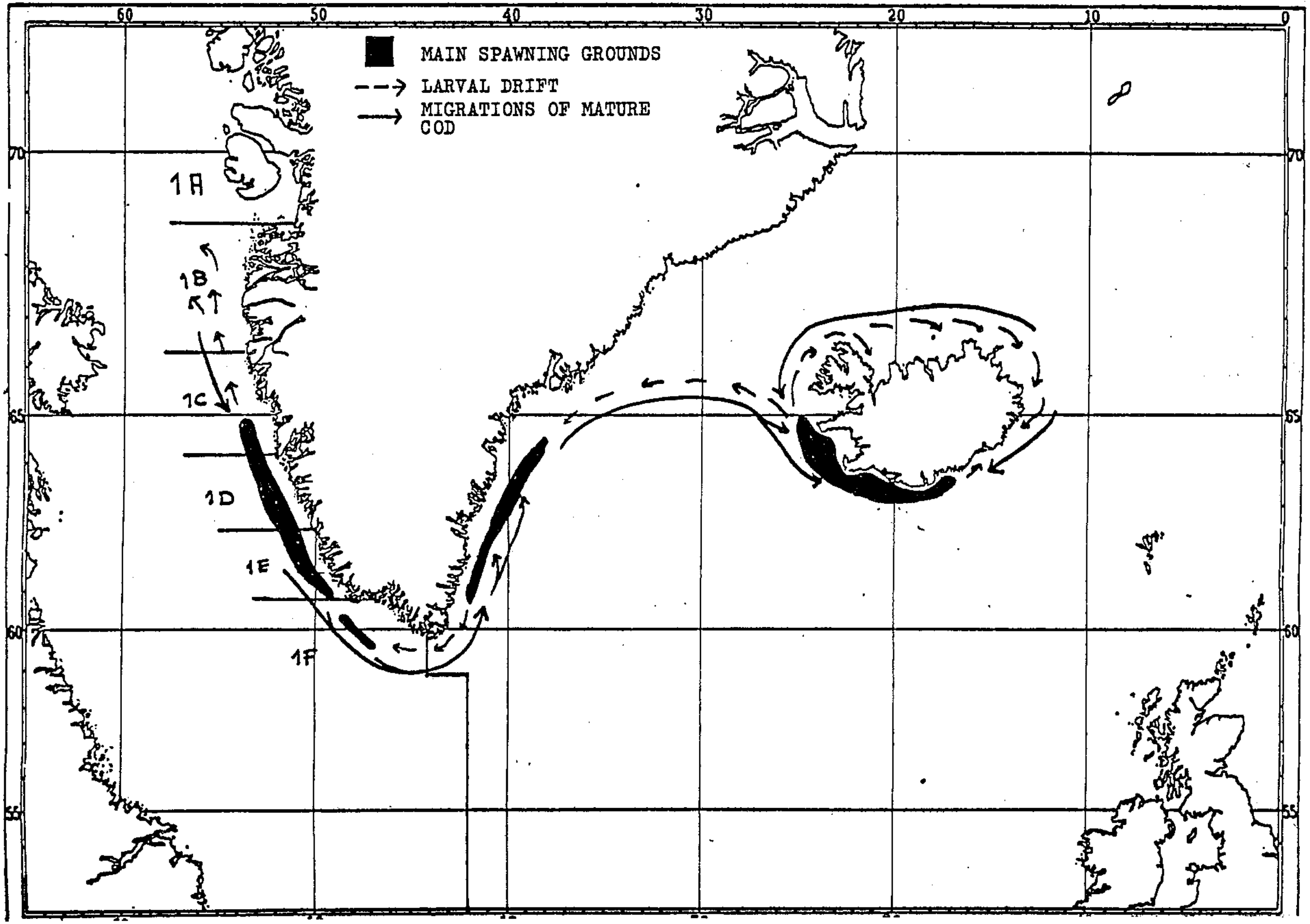


Figure B.6.1.2 East Greenland COD.
Catch 1984 and spawning stock biomass at the beginning of 1985 for different levels of fishing mortality in 1984.

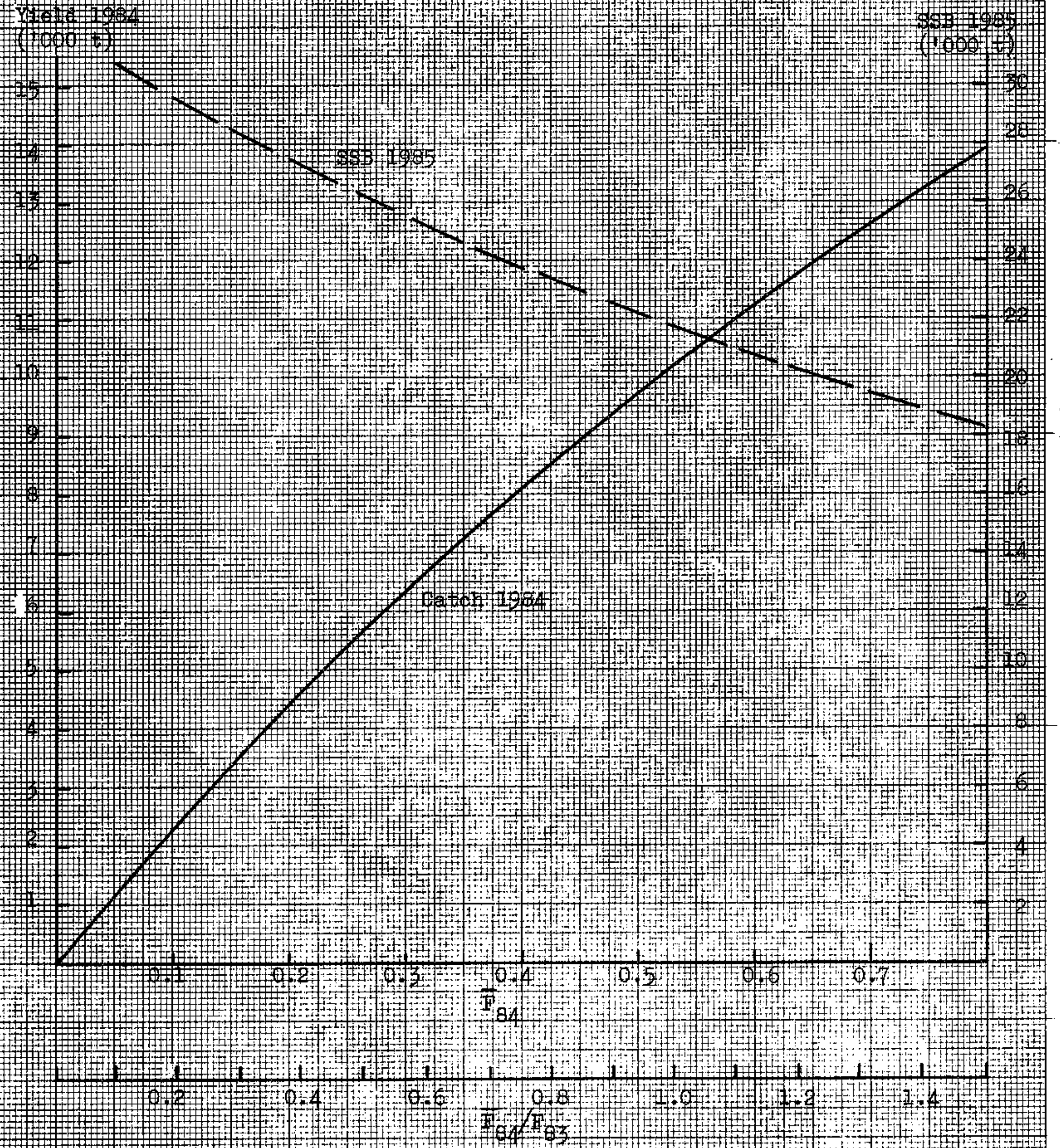


Figure B.7.1.1 Icelandic summer-spawning HERRING.

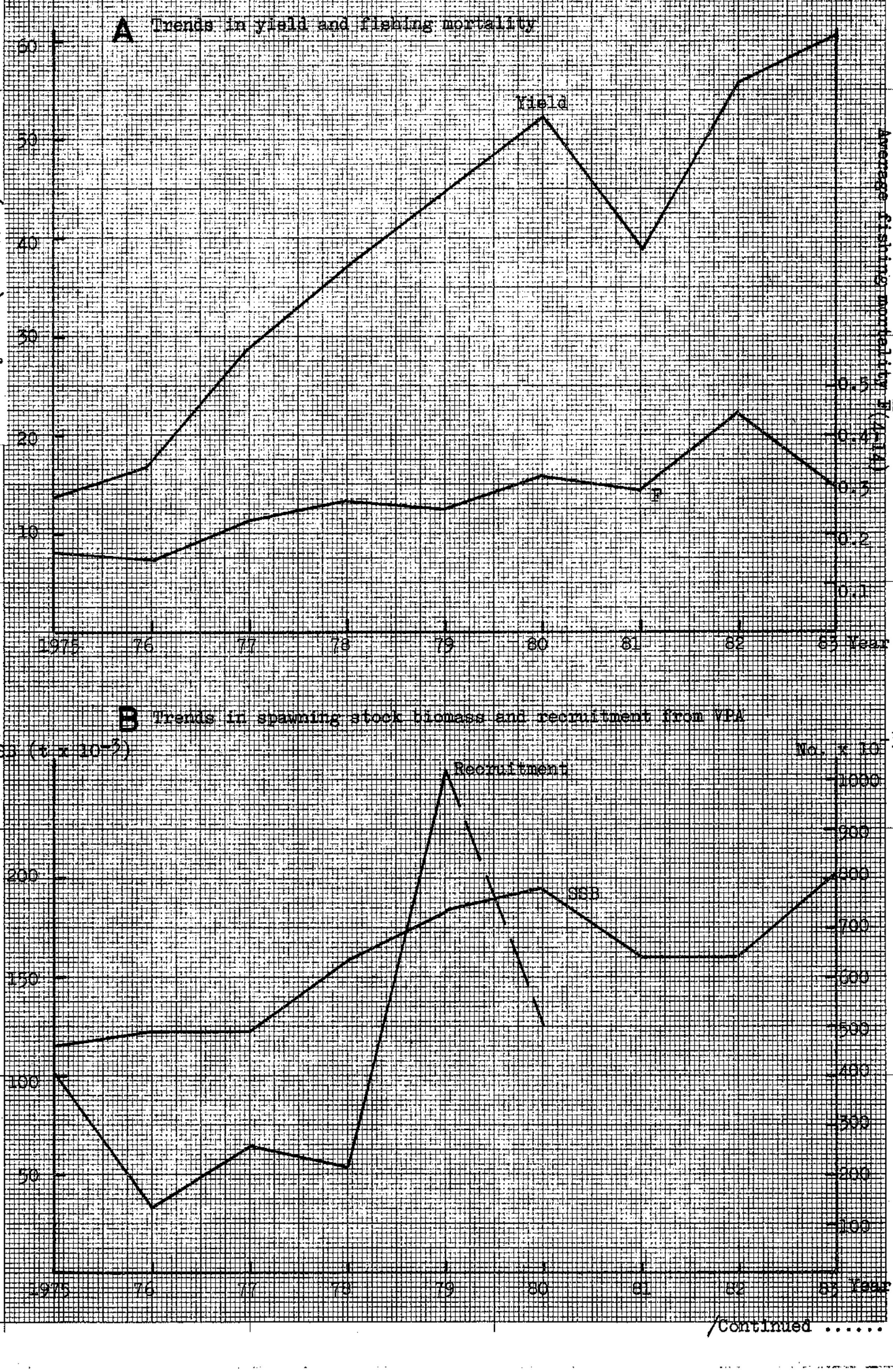


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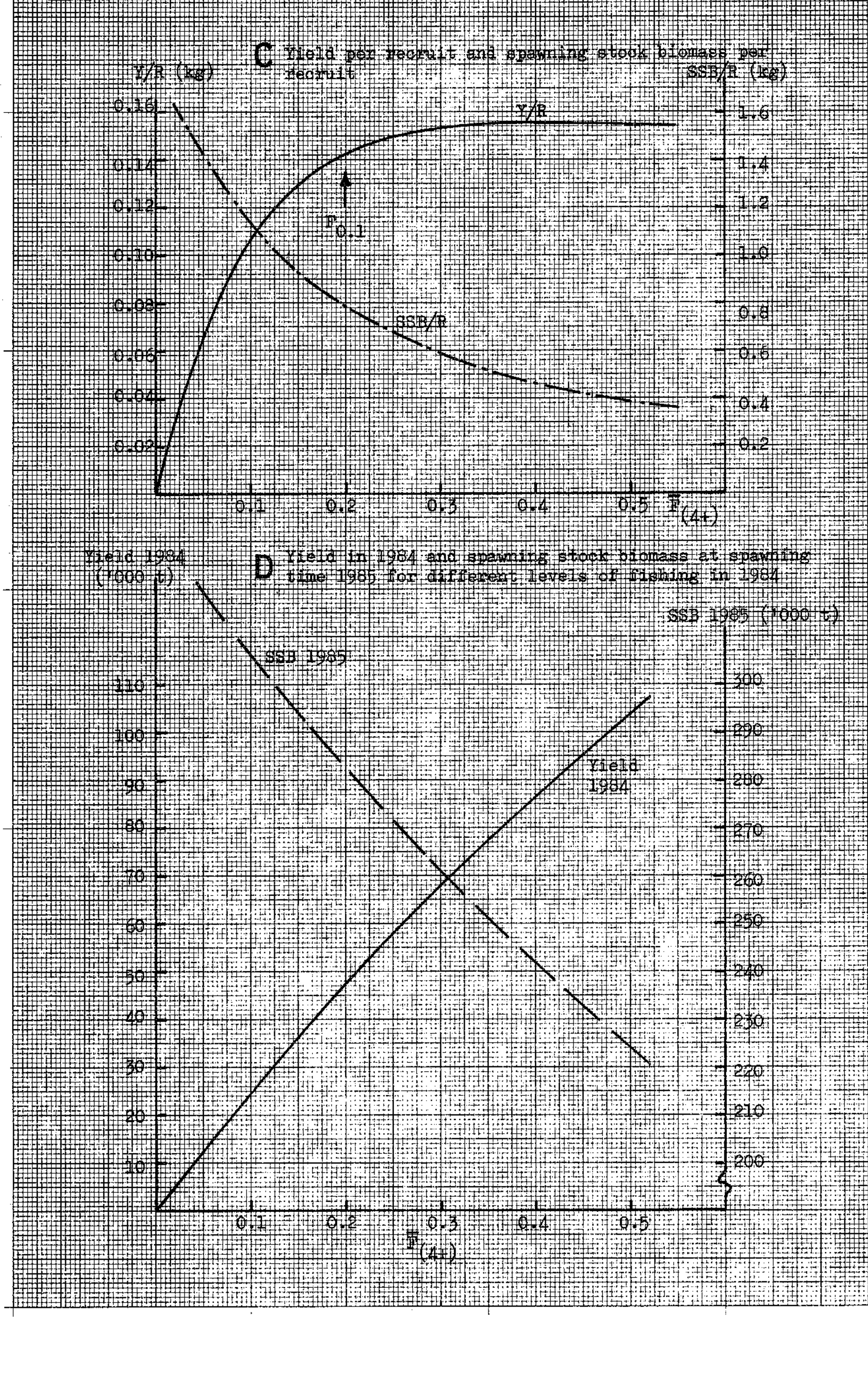
Figure B.7.1.1 (Continued)



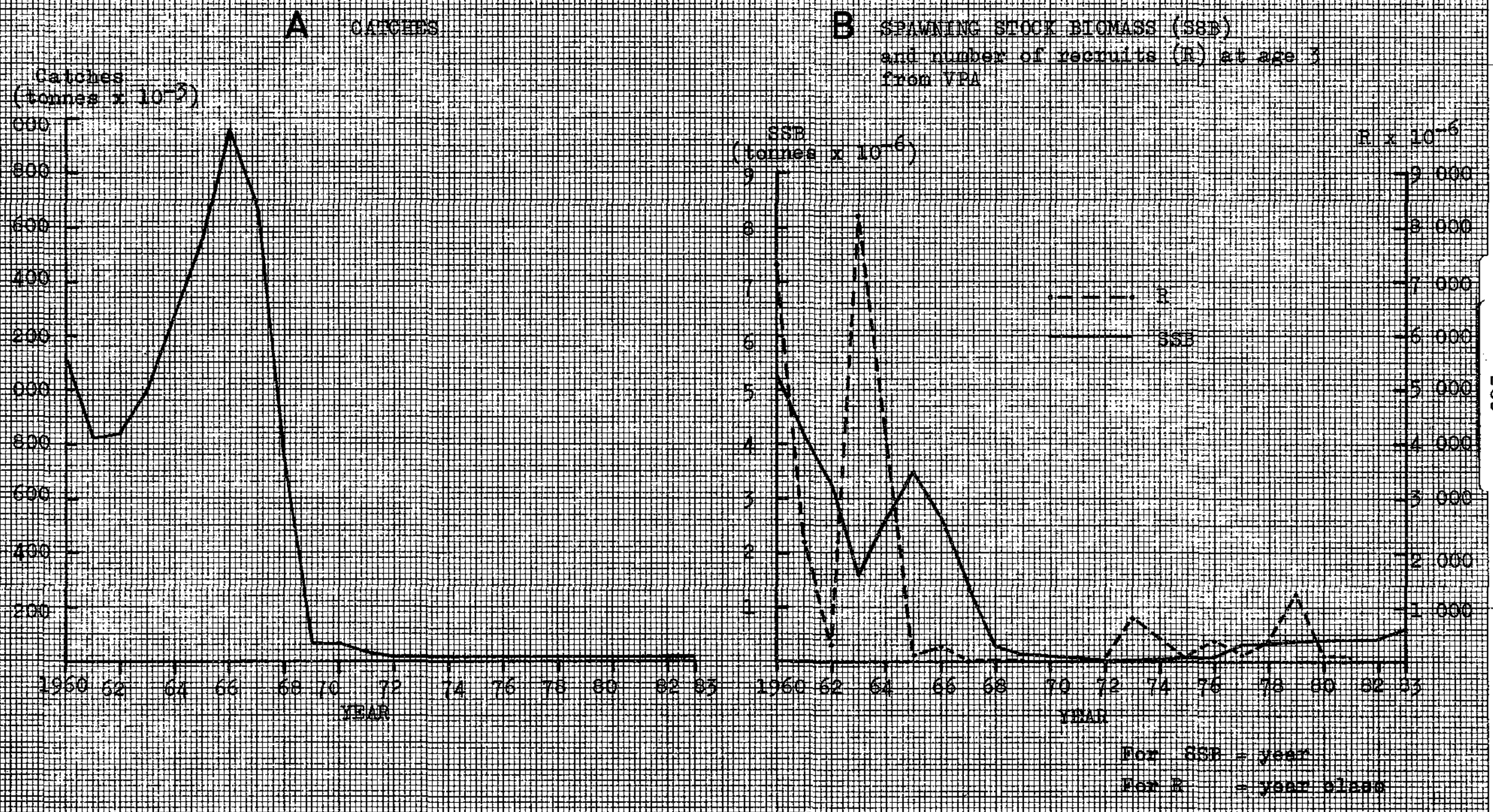


Figure 3.7.2 Norwegian spring-spawning HERRING.

Figure C.1.1 . FISH STOCK SUMMARY (Stock) North-East Arctic SAITHE

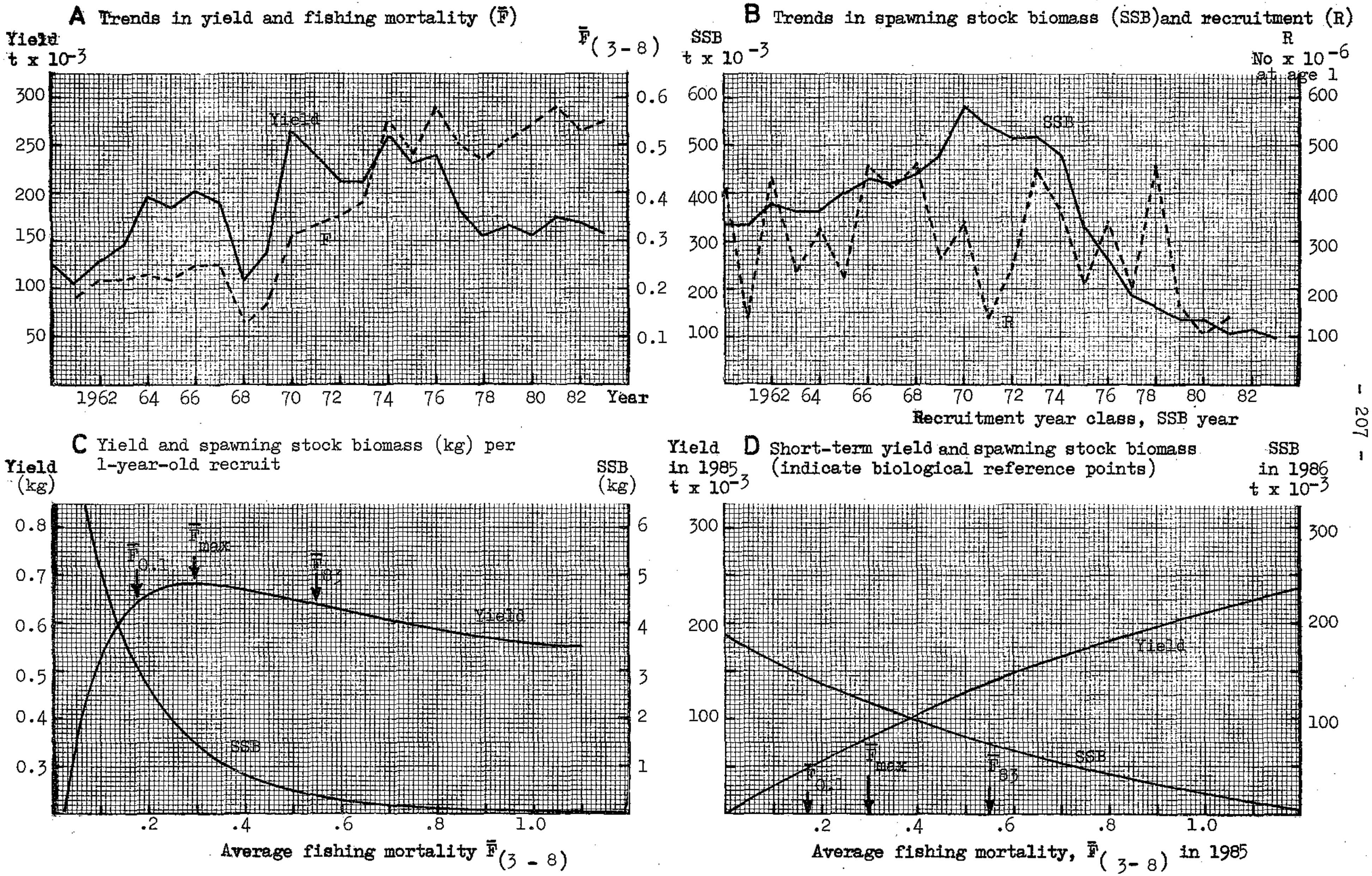


Figure C.1.2 FISH STOCK SUMMARY (Stock) North Sea SAITHE

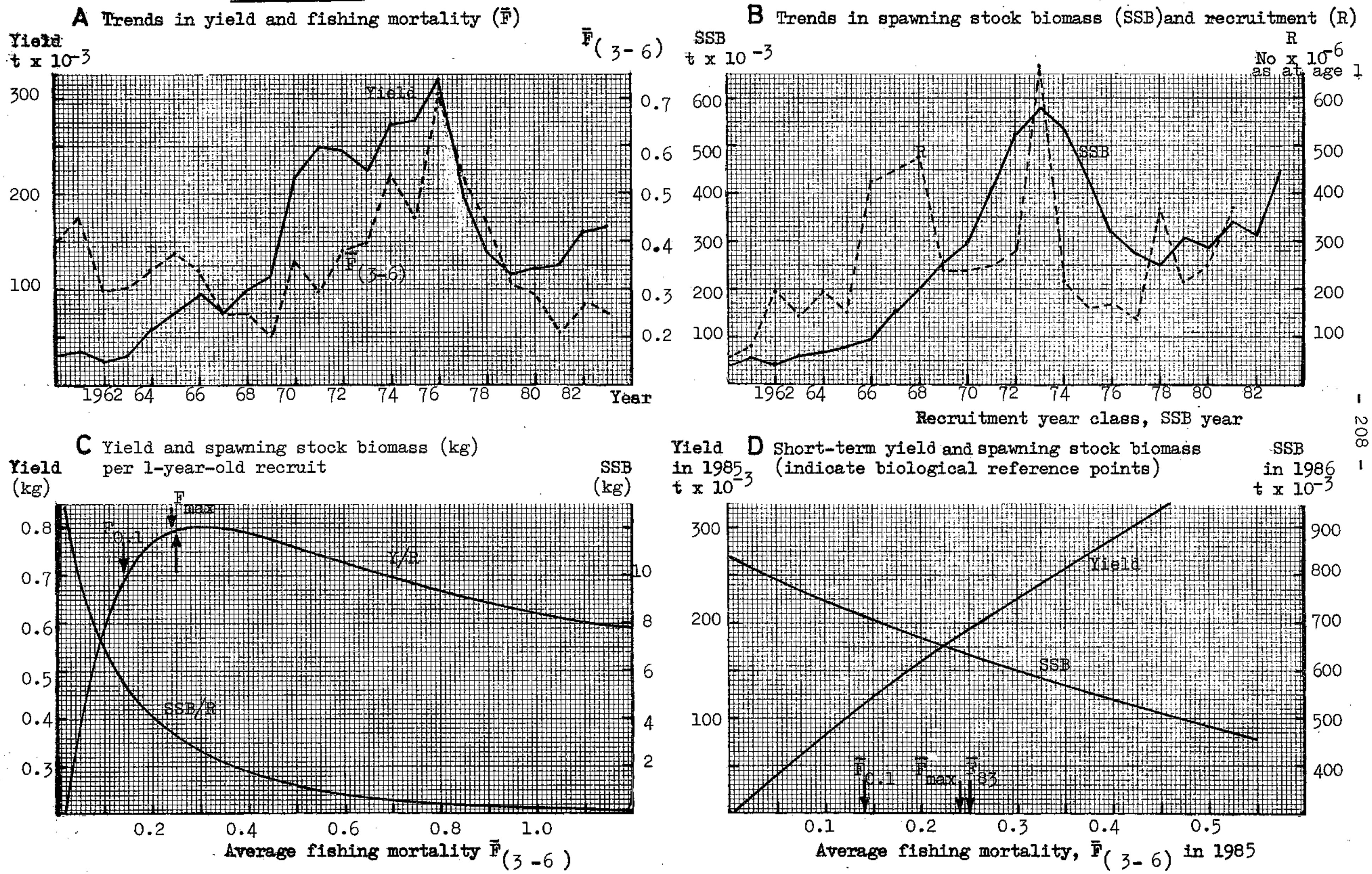


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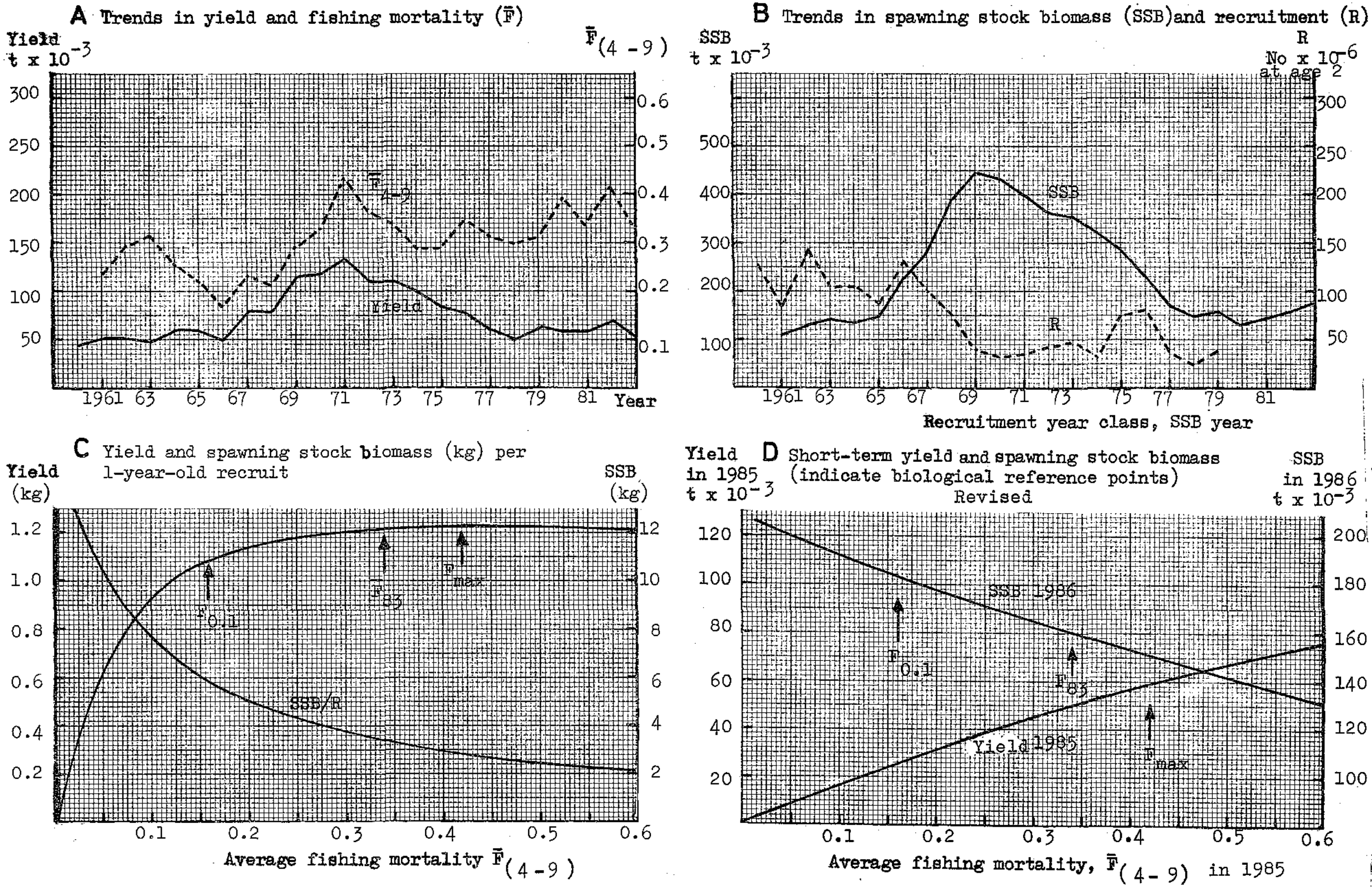
Figure C.2.1 F I S H   S T O C K   S U M M A R Y (Stock) Icelandic SAITHE



Yield ←

Figure C.3.1 FISH STOCK SUMMARY (Stock) West of Scotland SAITHE

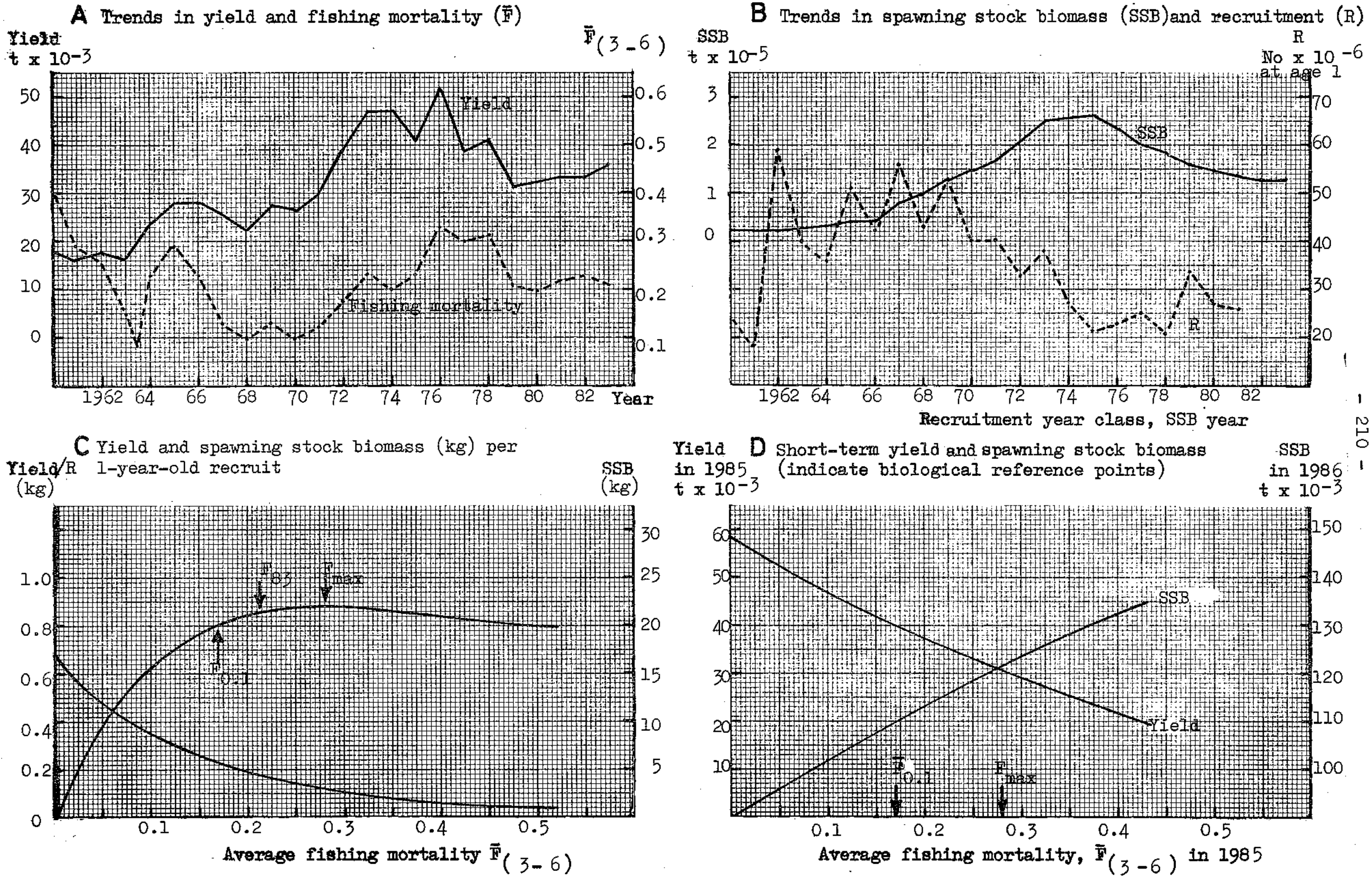


Figure C.4.1 F I S H S T O C K S U M M A R Y (Stock) Faroe SAITHE

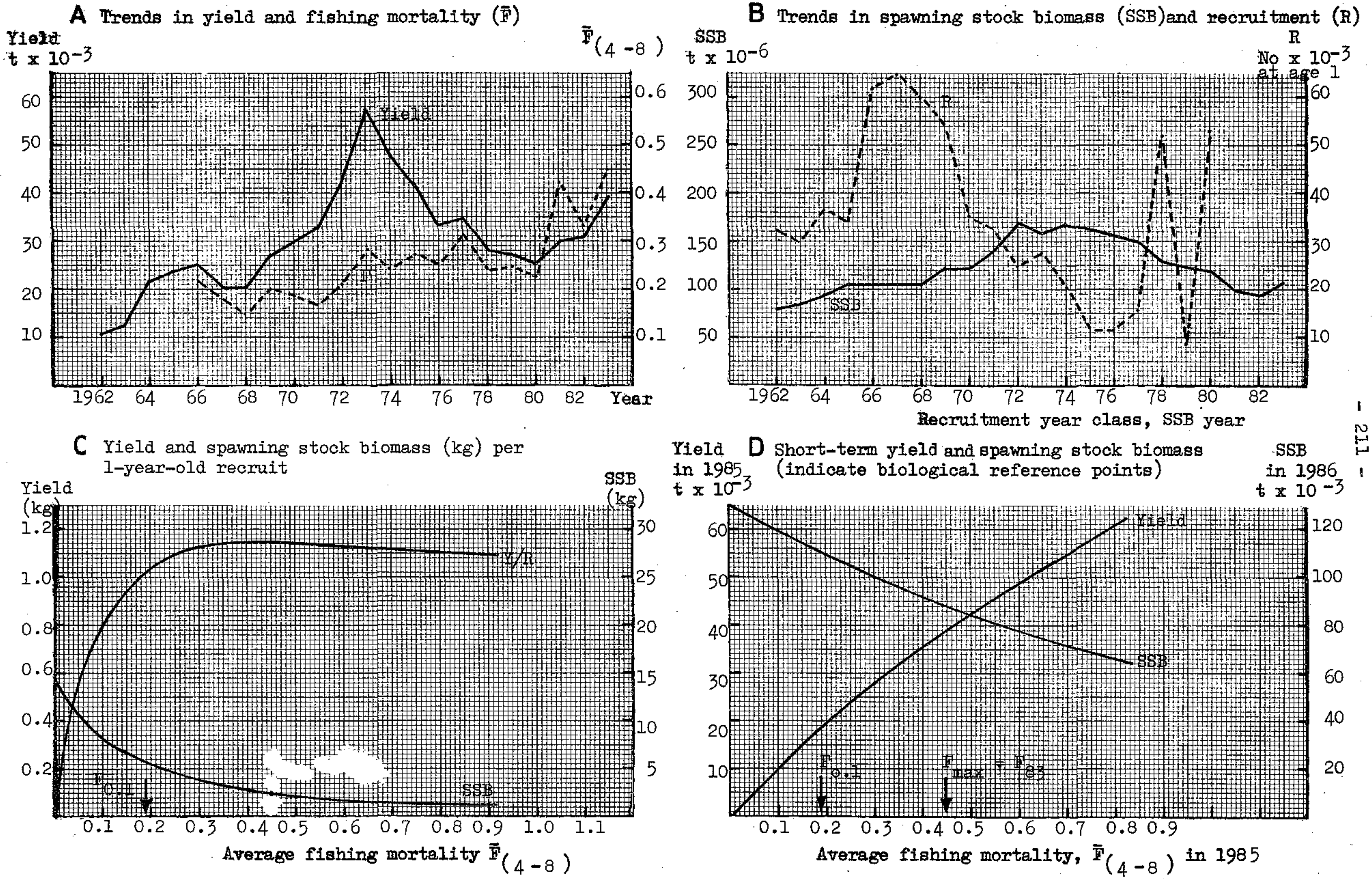


Figure C.4.2 FISH STOCK SUMMARY (Stock) Faroe Plateau COD

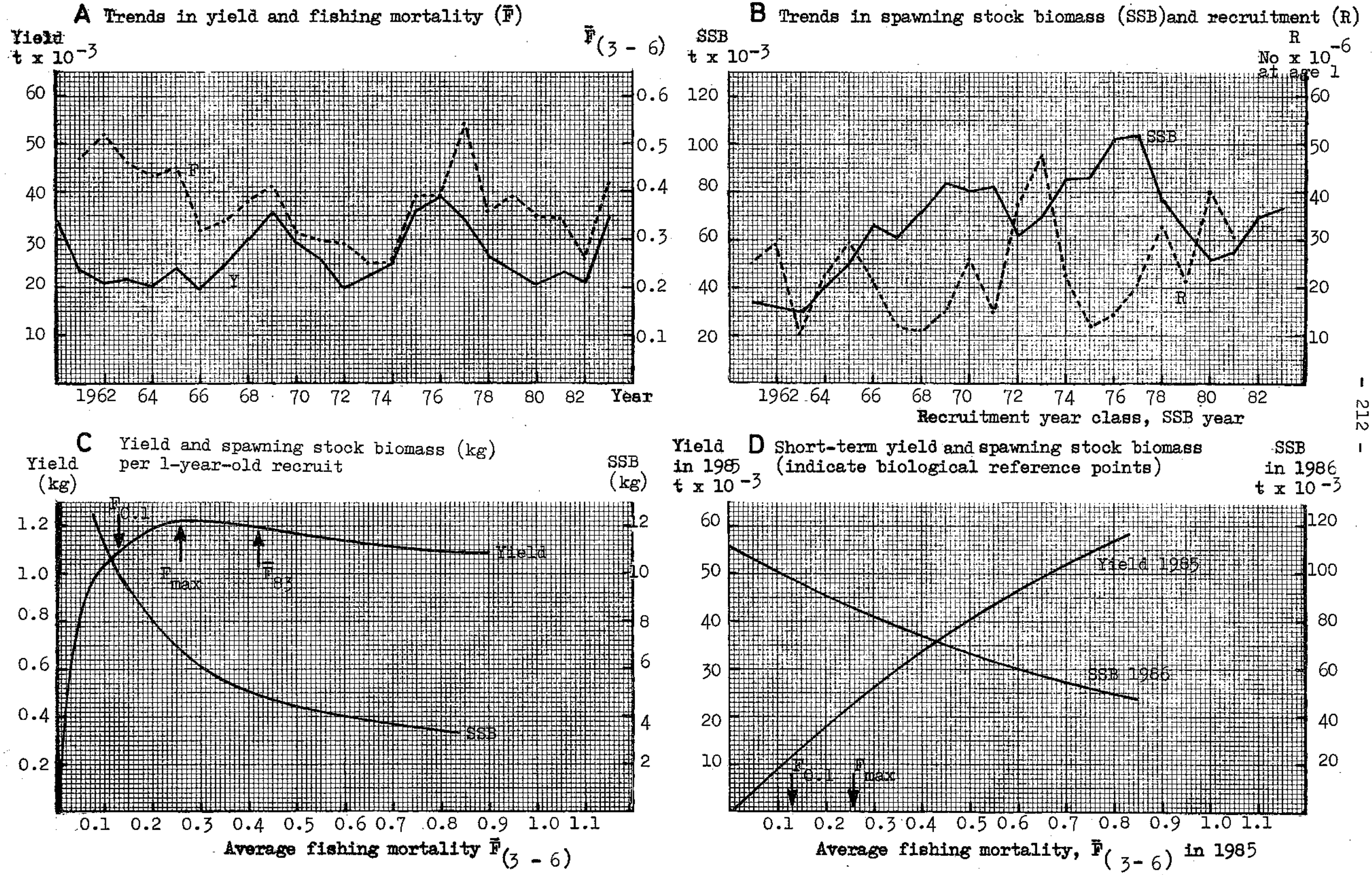


Figure C.4.4 FISH STOCK SUMMARY (Stock) Faroe HADDOCK

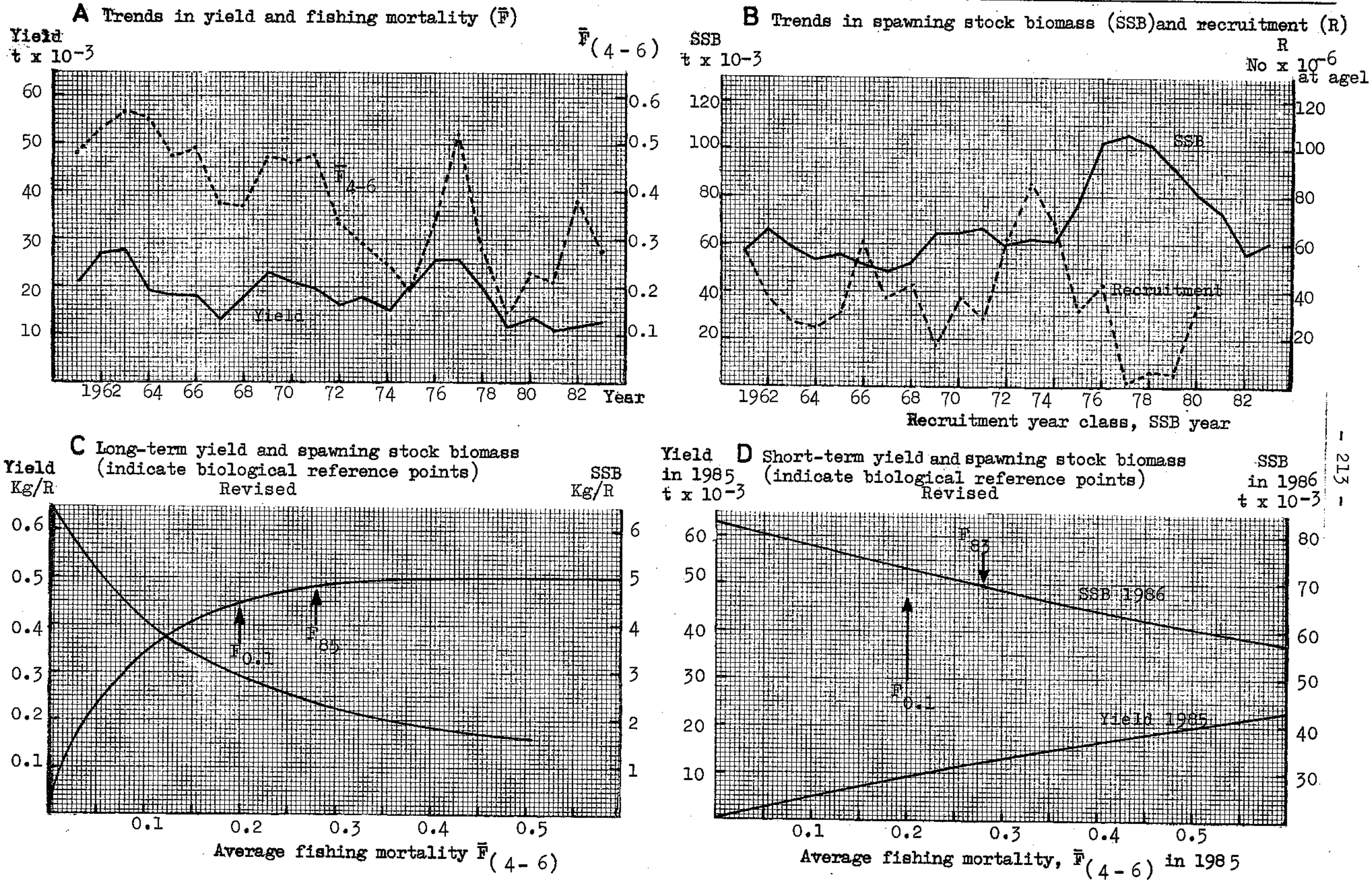


Figure D.1.1.1. HERRING in Divisions IVa and IVb combined.

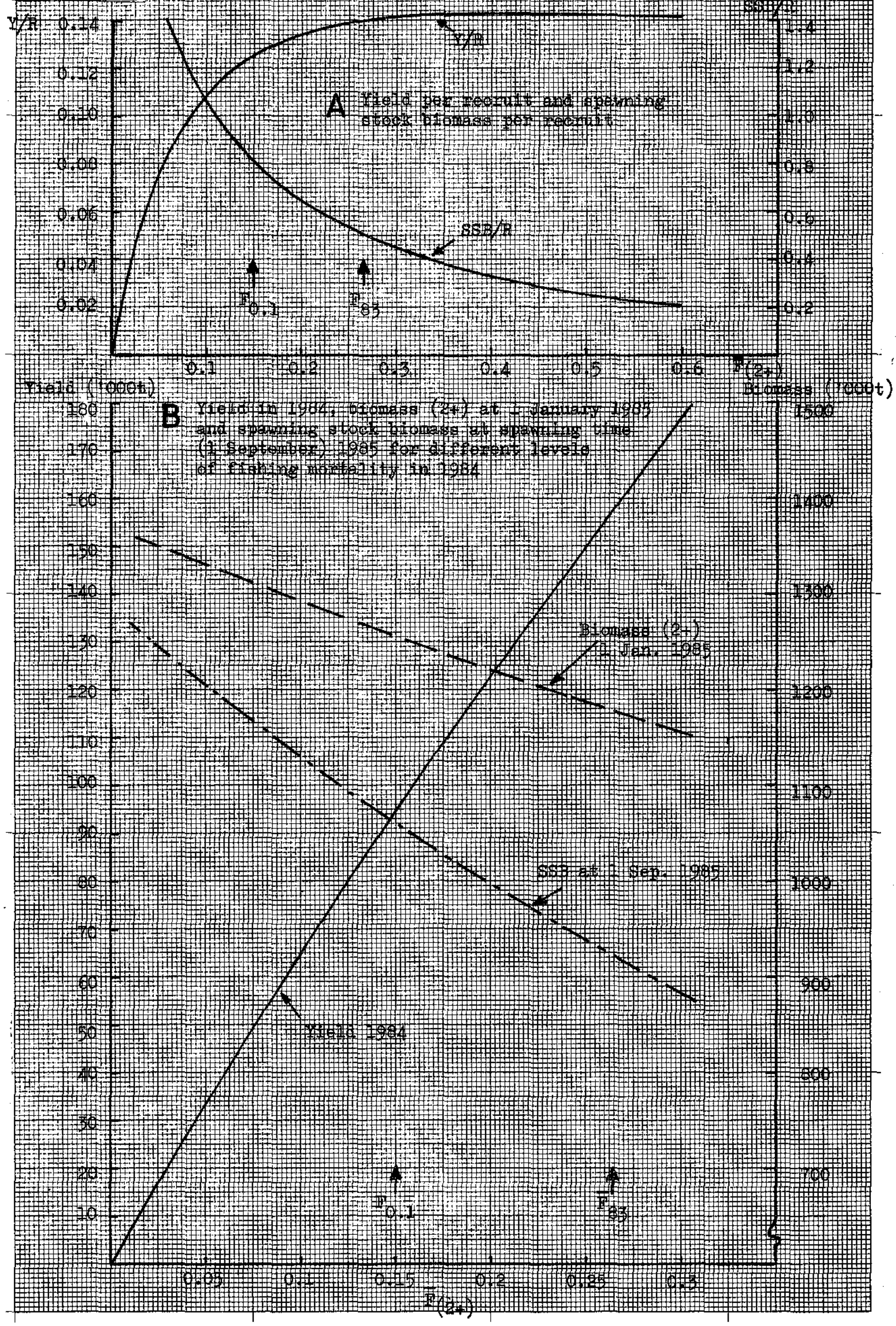


Figure D.1.1.2. HERRING in Divisions IVc and VIId.

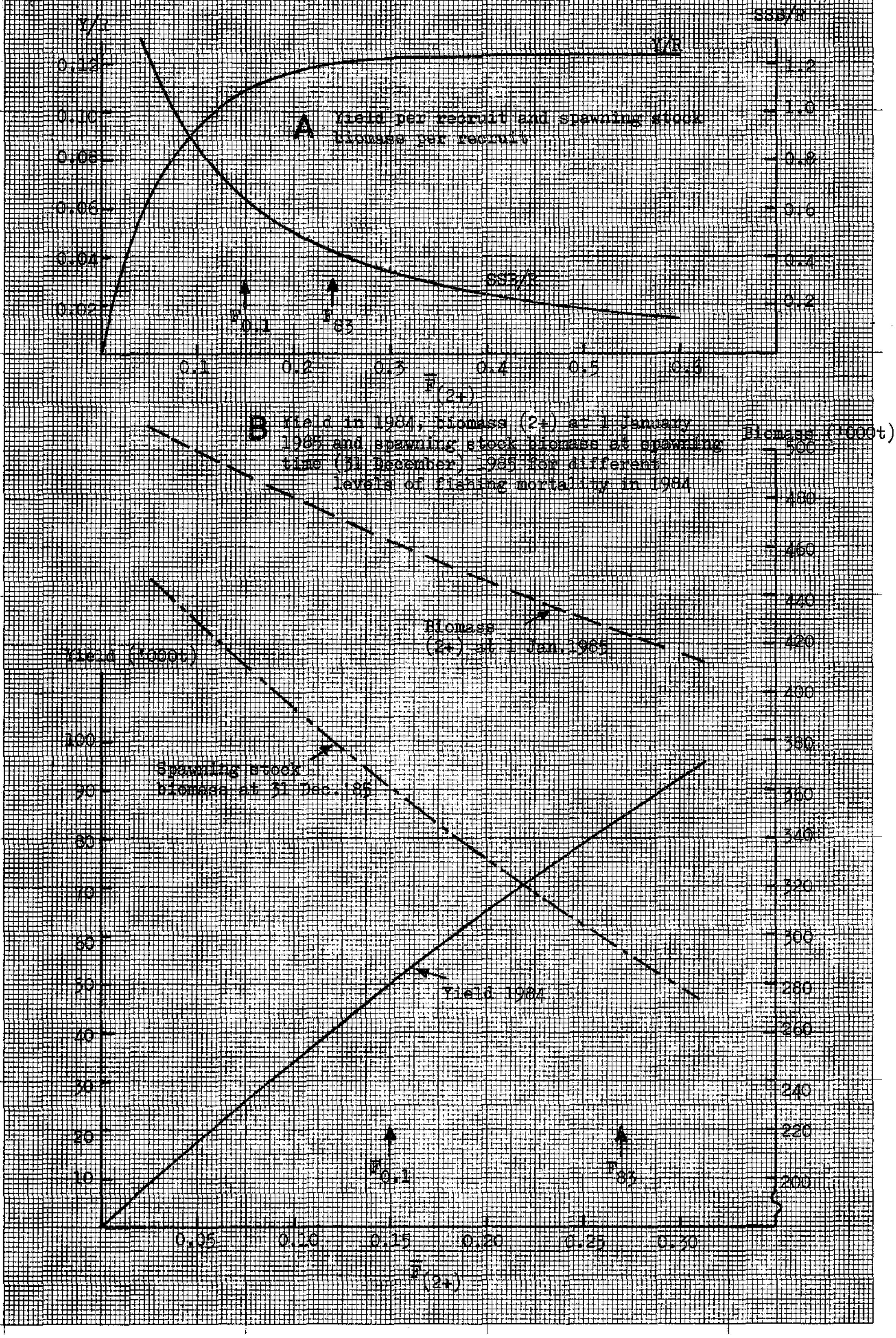


Figure D.1.1.3. HERRING in Divisions IVc and VIId.

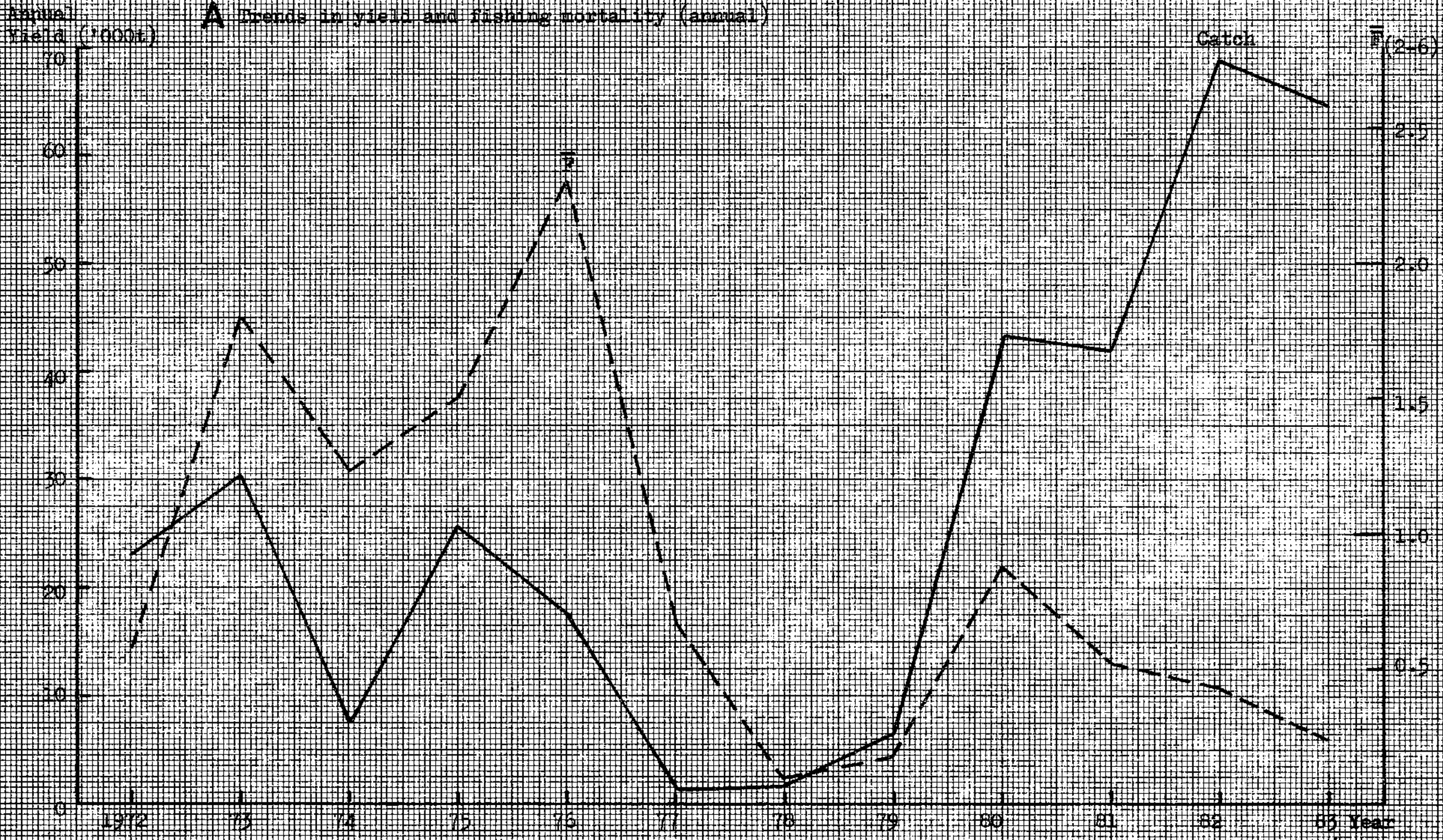


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Figure D.1.1.3. (Continued)

B Trends in yield and fishing mortality (seasonal)

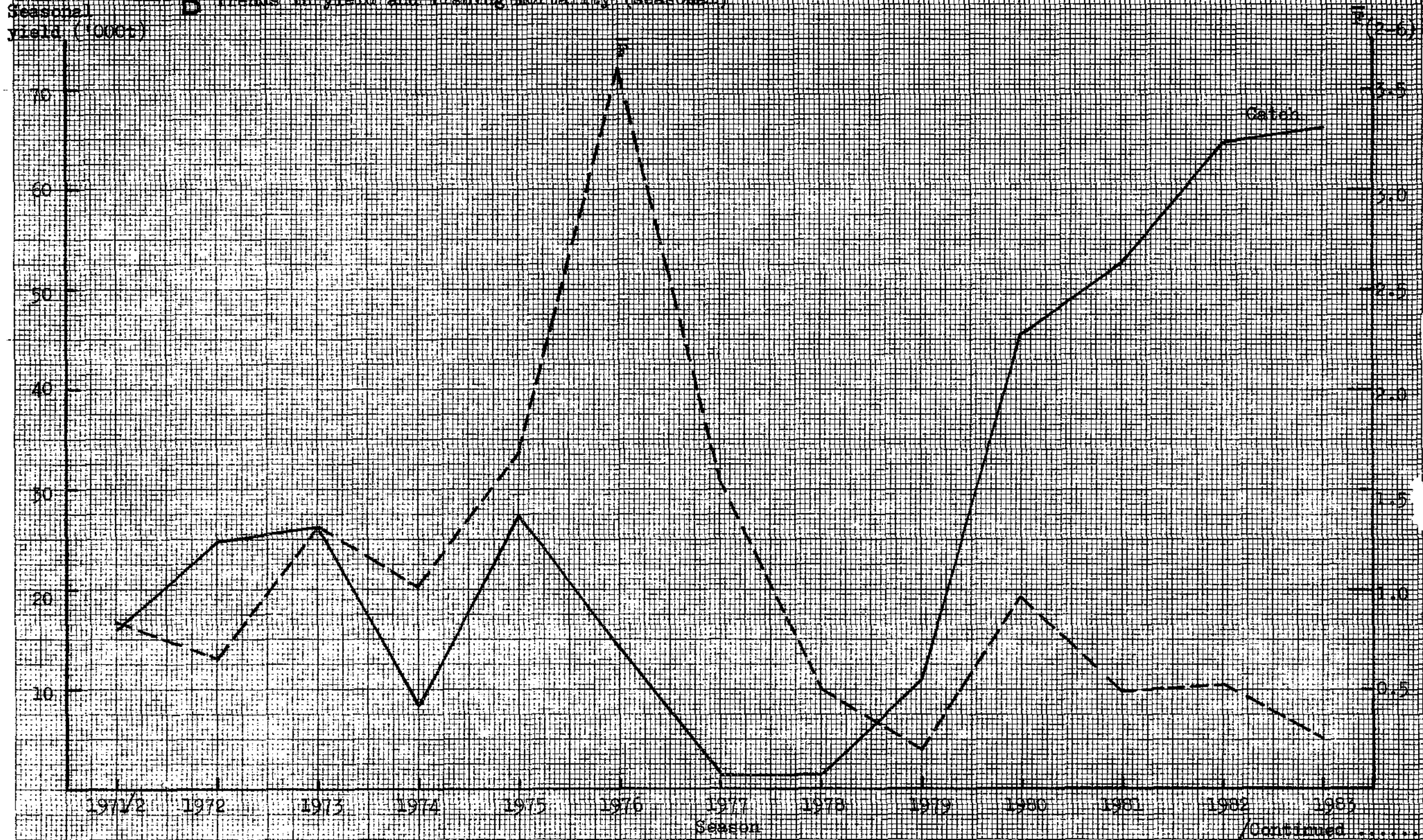

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Figure D.1.1.3. (Continued)

C Trends in spawning stock biomass and recruitment (annual)

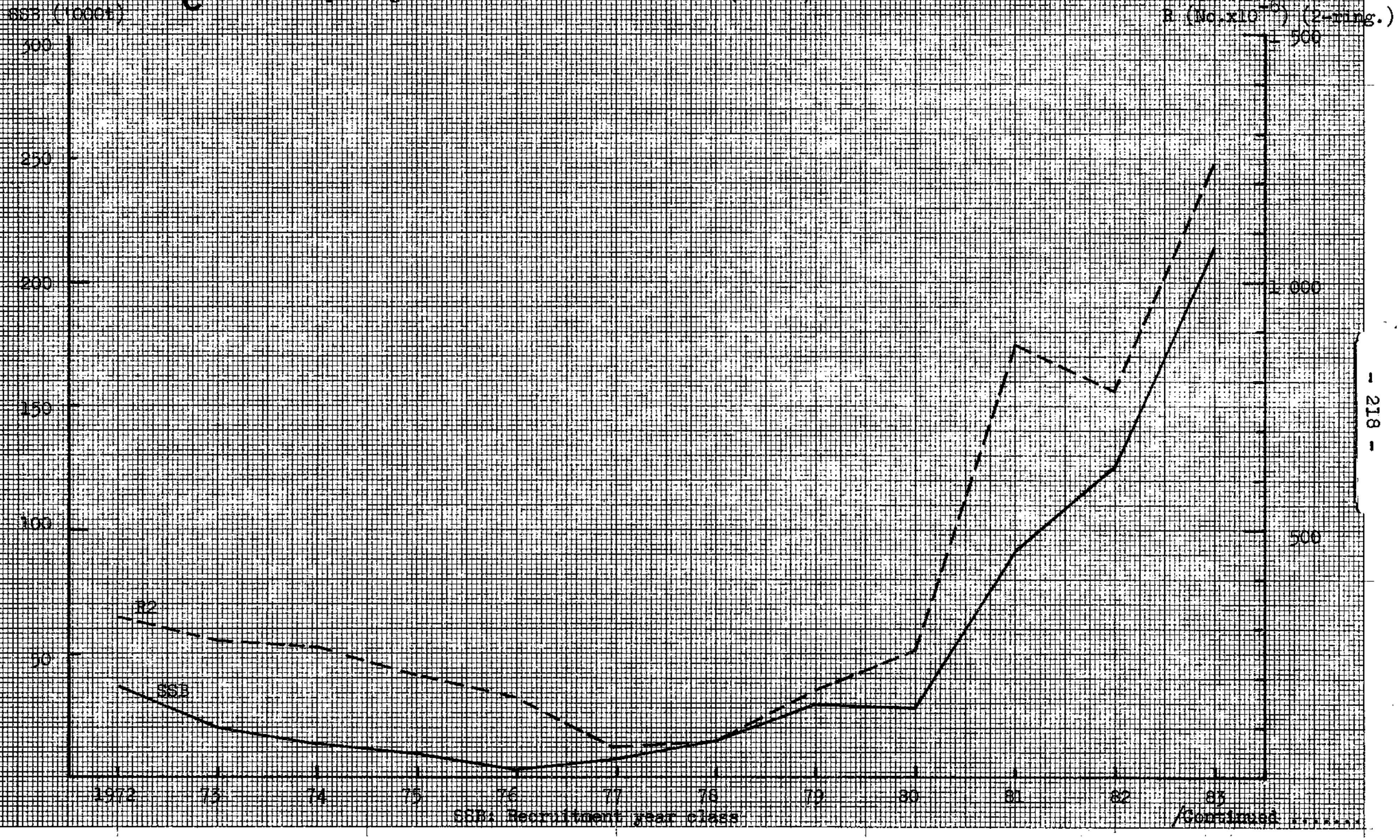

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Figure D.1.1.3. (Continued)

D Trends in spawning stock biomass and recruitment (seasonal)

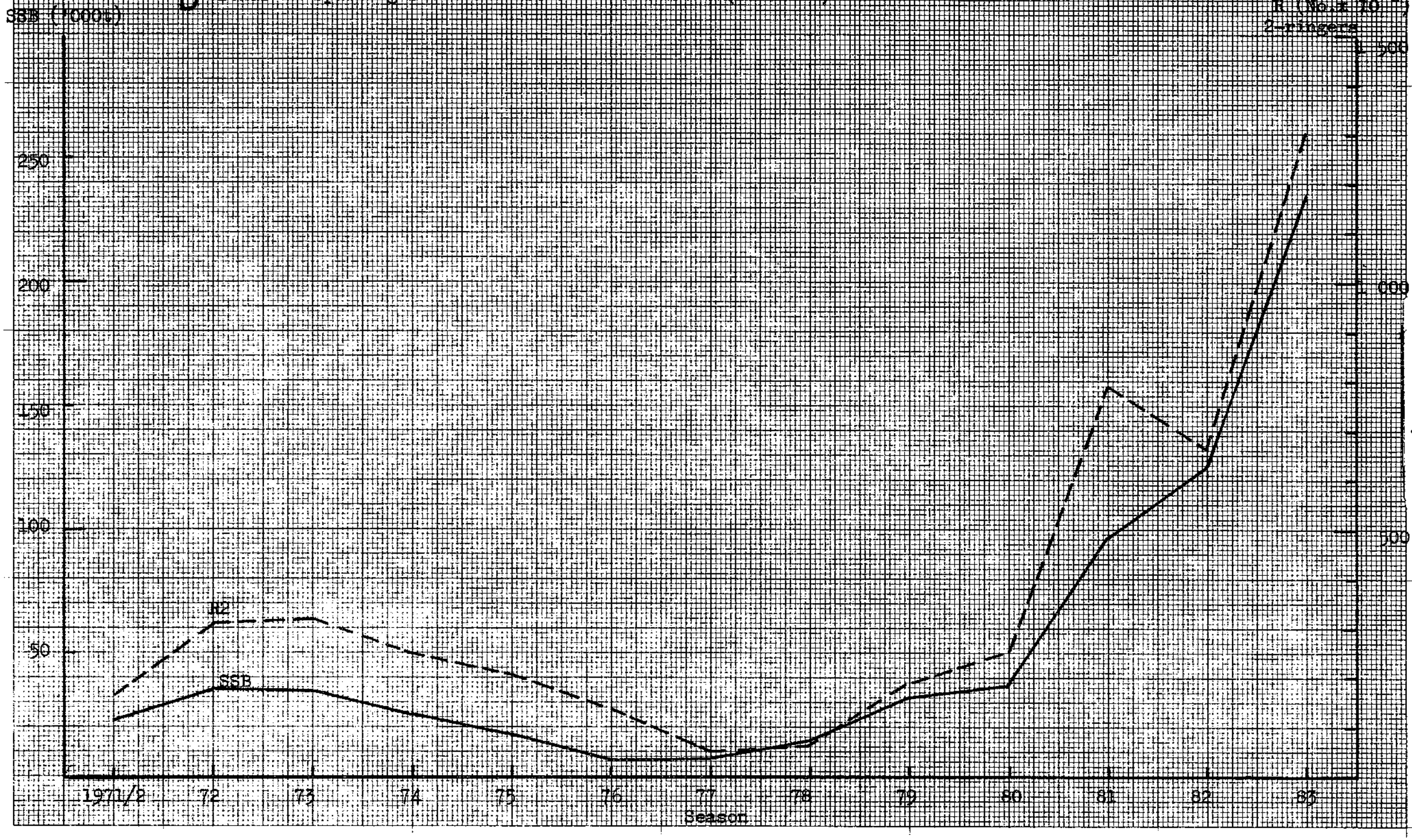

Figure D.1.3.1. Celtic Sea HERRING in Division VIIj.

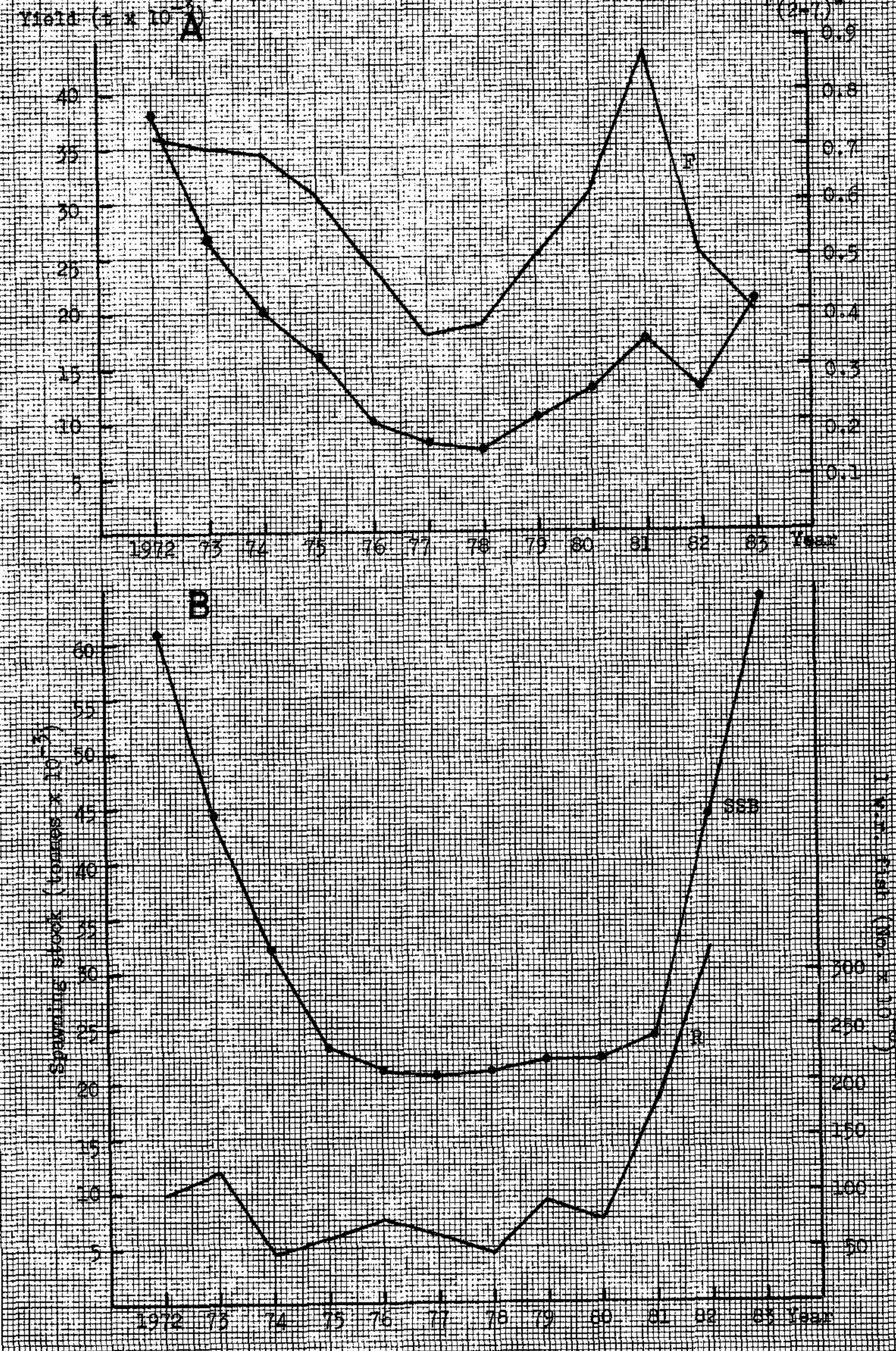

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Figure D.1.3.1. (Continued)

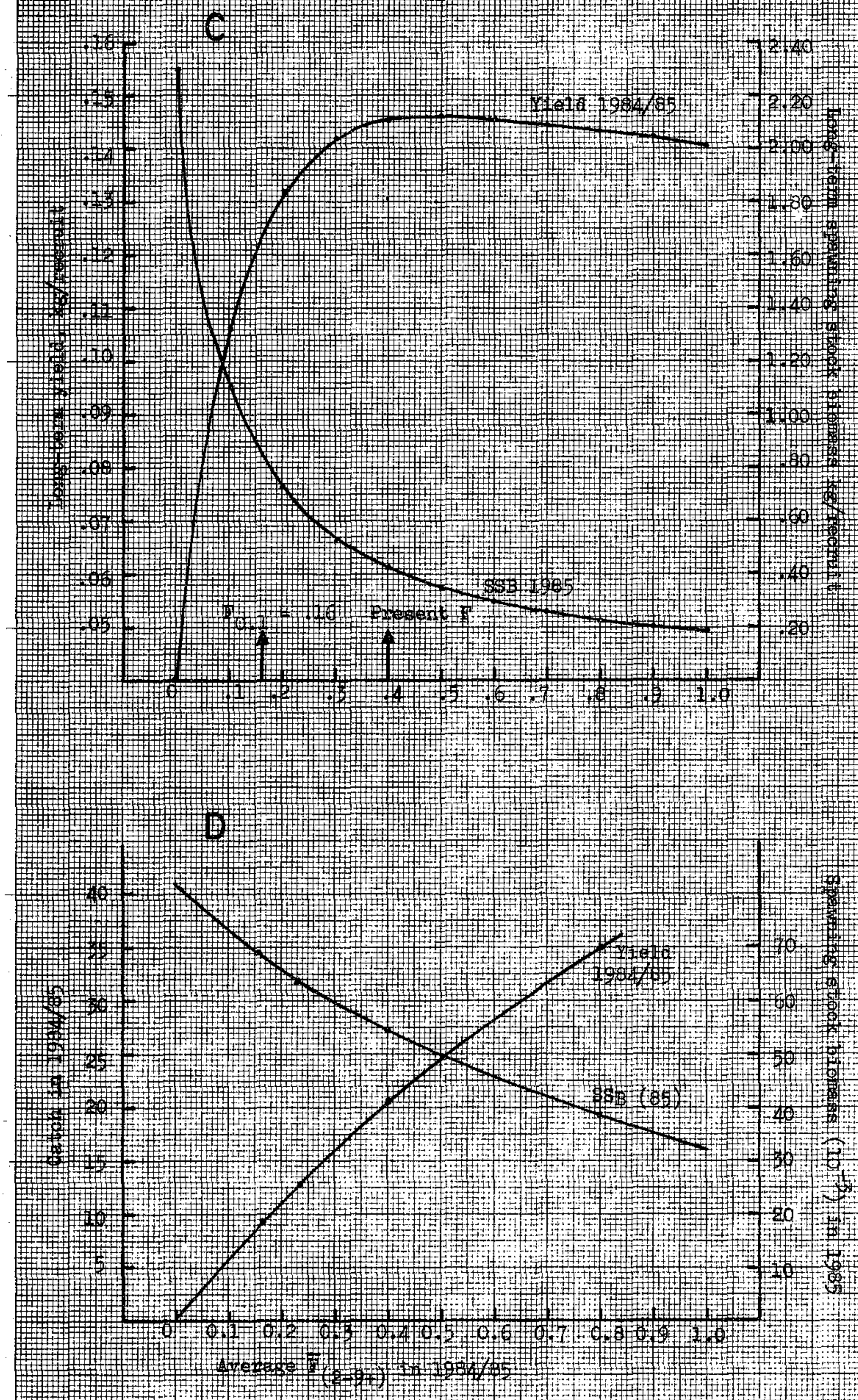

Figure D.1.6.1. HERRING in Divisions VIa South and VIIb-e. Results from VPA (input F = 0.4) in 1983.

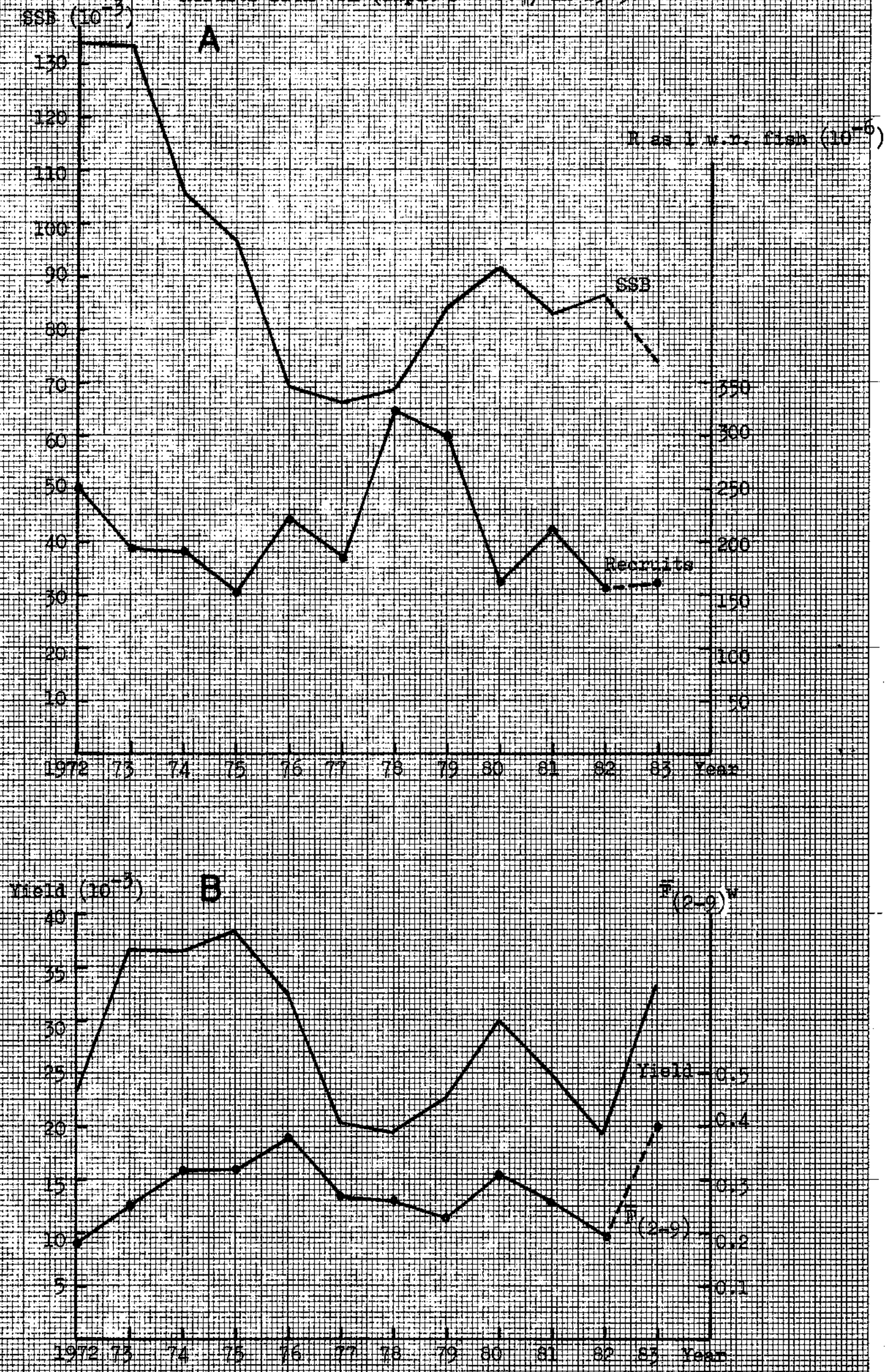

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Figure D.1.6.1. (Continued)

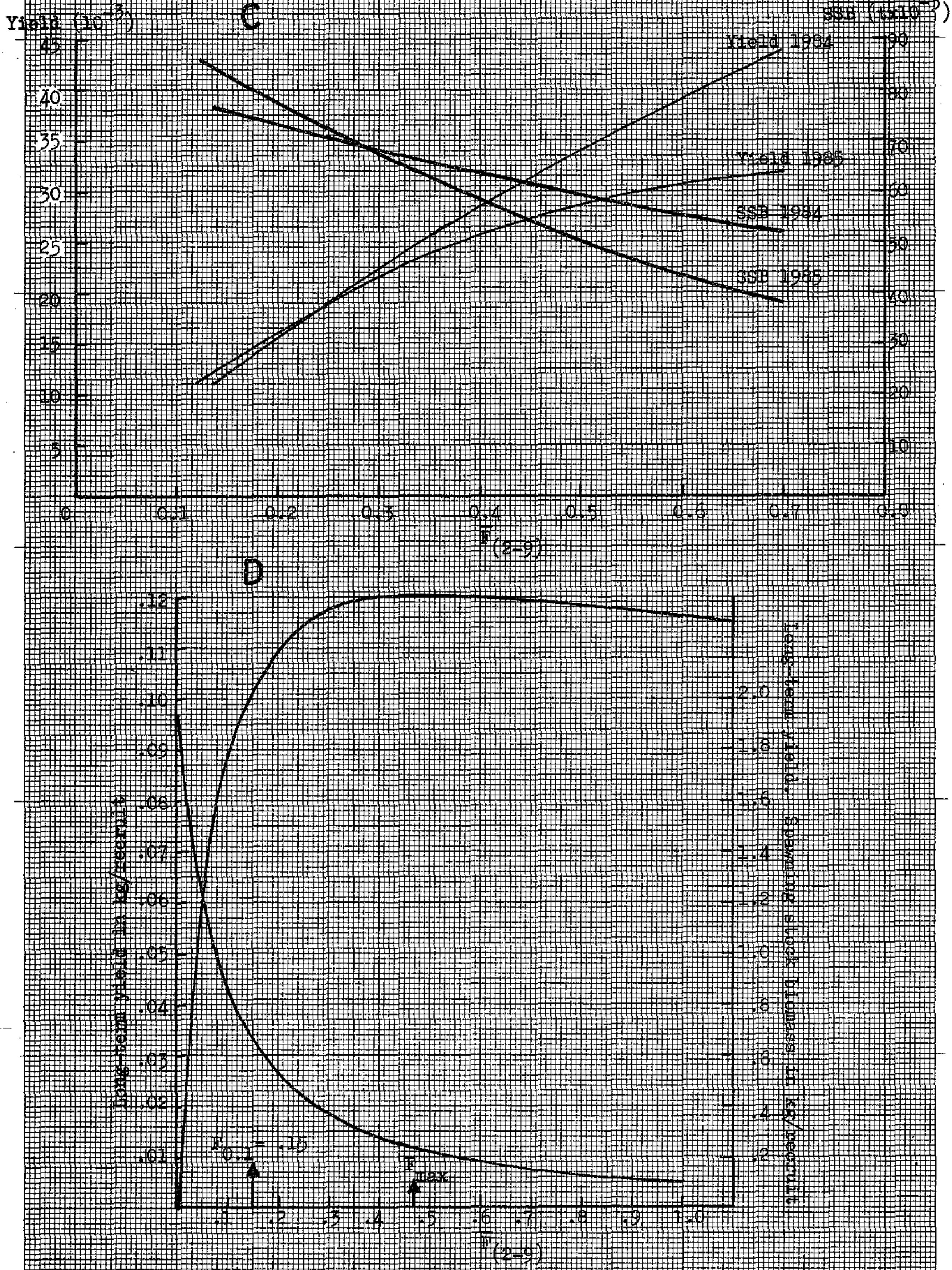

Figure D.1.7.1 Irish Sea HERRING.
Fish stock summary.

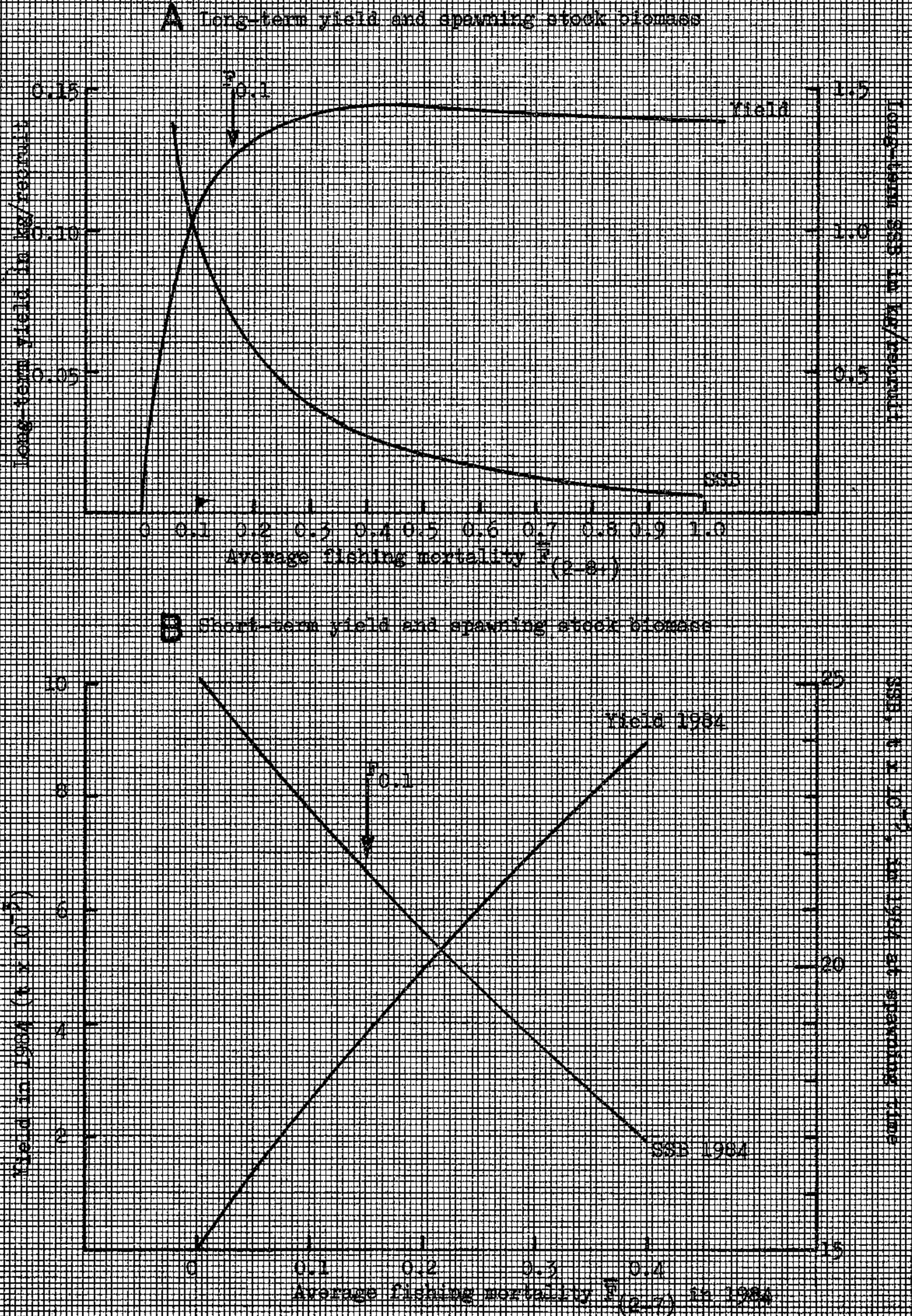

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Figure D.1.7.1. (Continued)

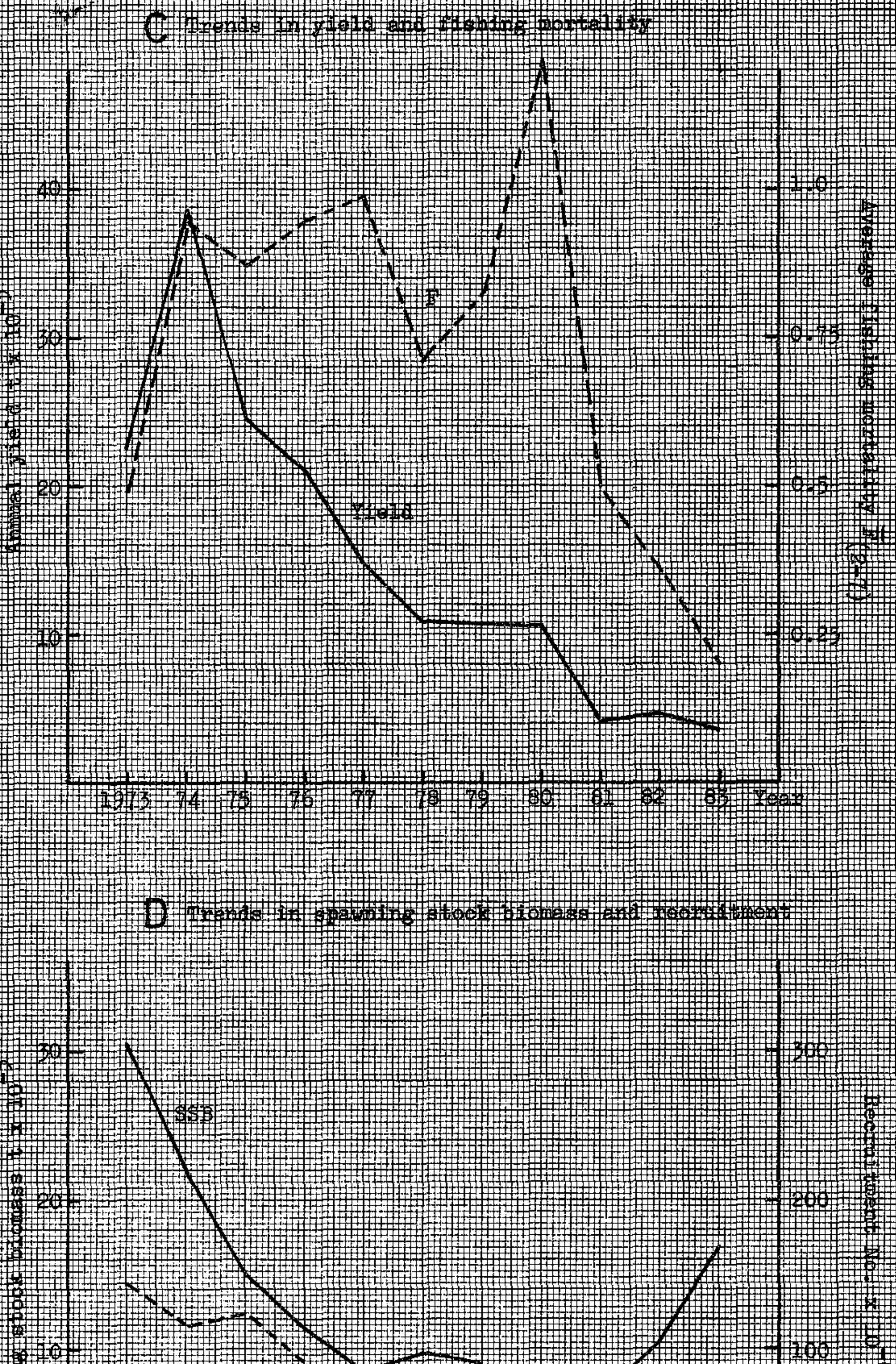


Figure D.2.2.1 NORWAY POUT.
Prediction of catch.

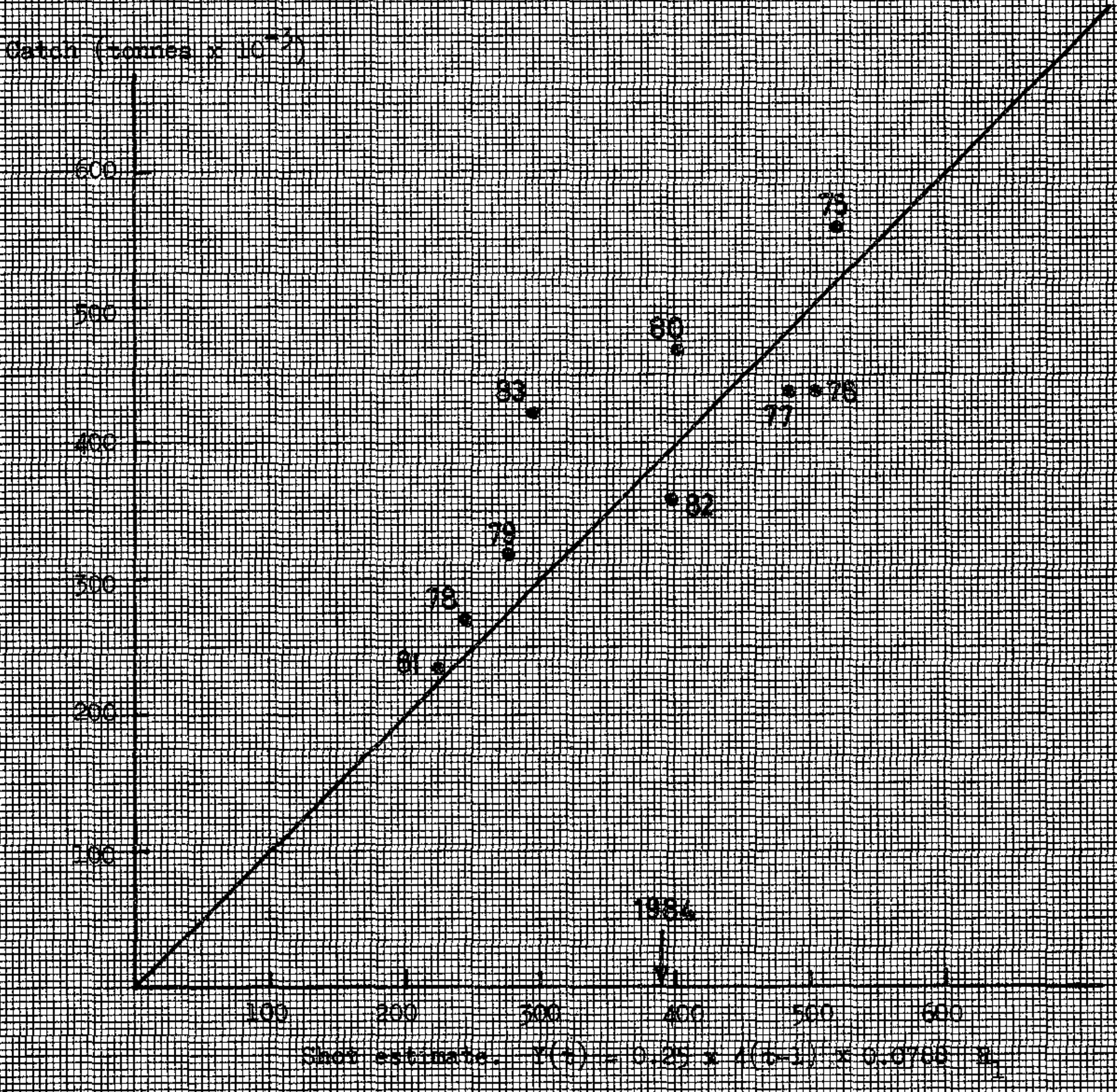


Figure D.2.4.2 North Sea SPRAT.
Plot of SHEPHERD'S index vs actual landings.

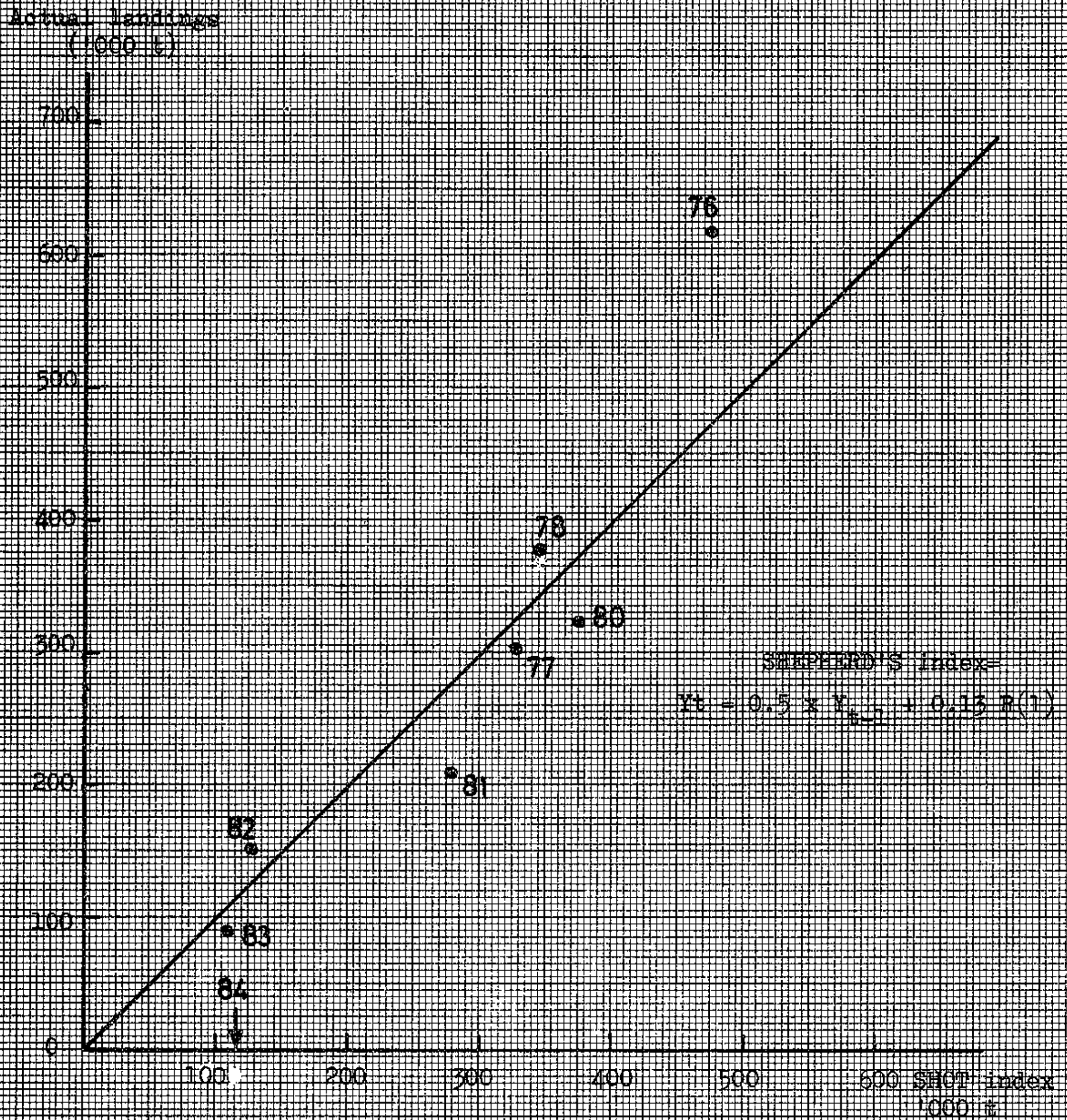


Figure D.5.1 FISH STOCK SUMMARY - ACFM Meeting (Stock) North Sea COD (Sub-area IV)

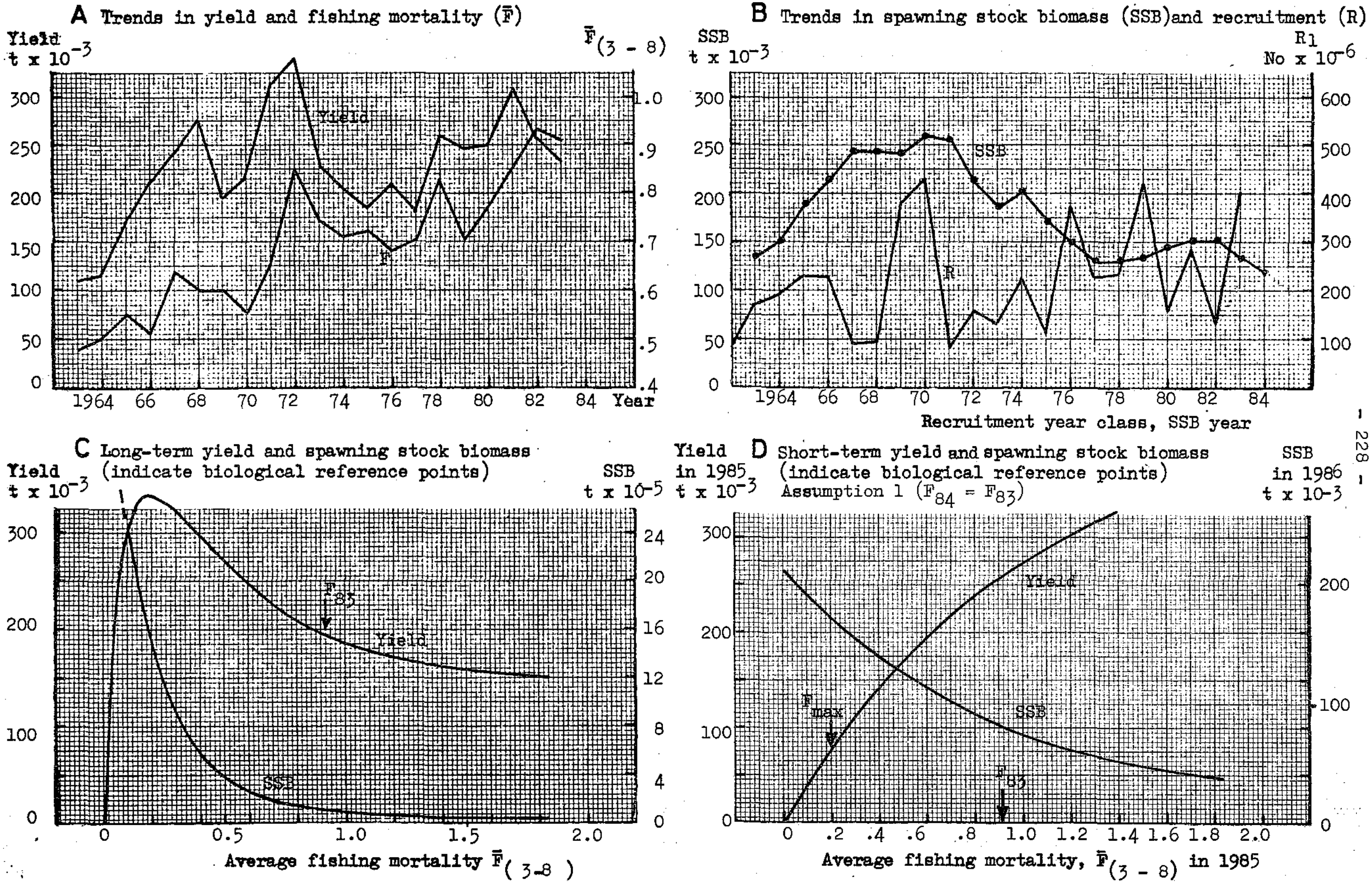


Figure D.5.2 F I S H   S T O C K   S U M M A R Y - ACFM Meeting (Stock) North Sea HADDOCK

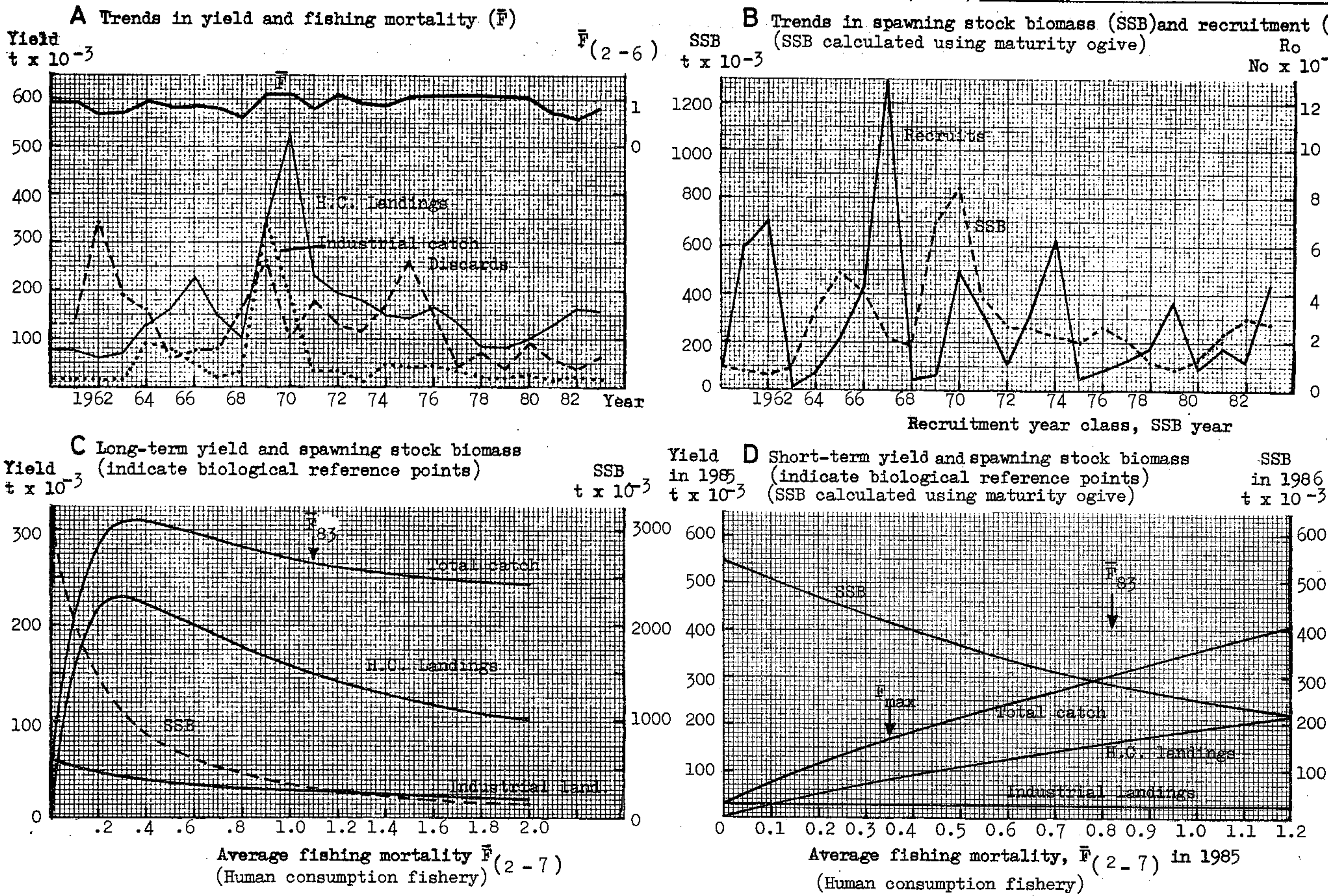


Figure D.5.3 FISH STOCK SUMMARY (Stock) North Sea WHITING

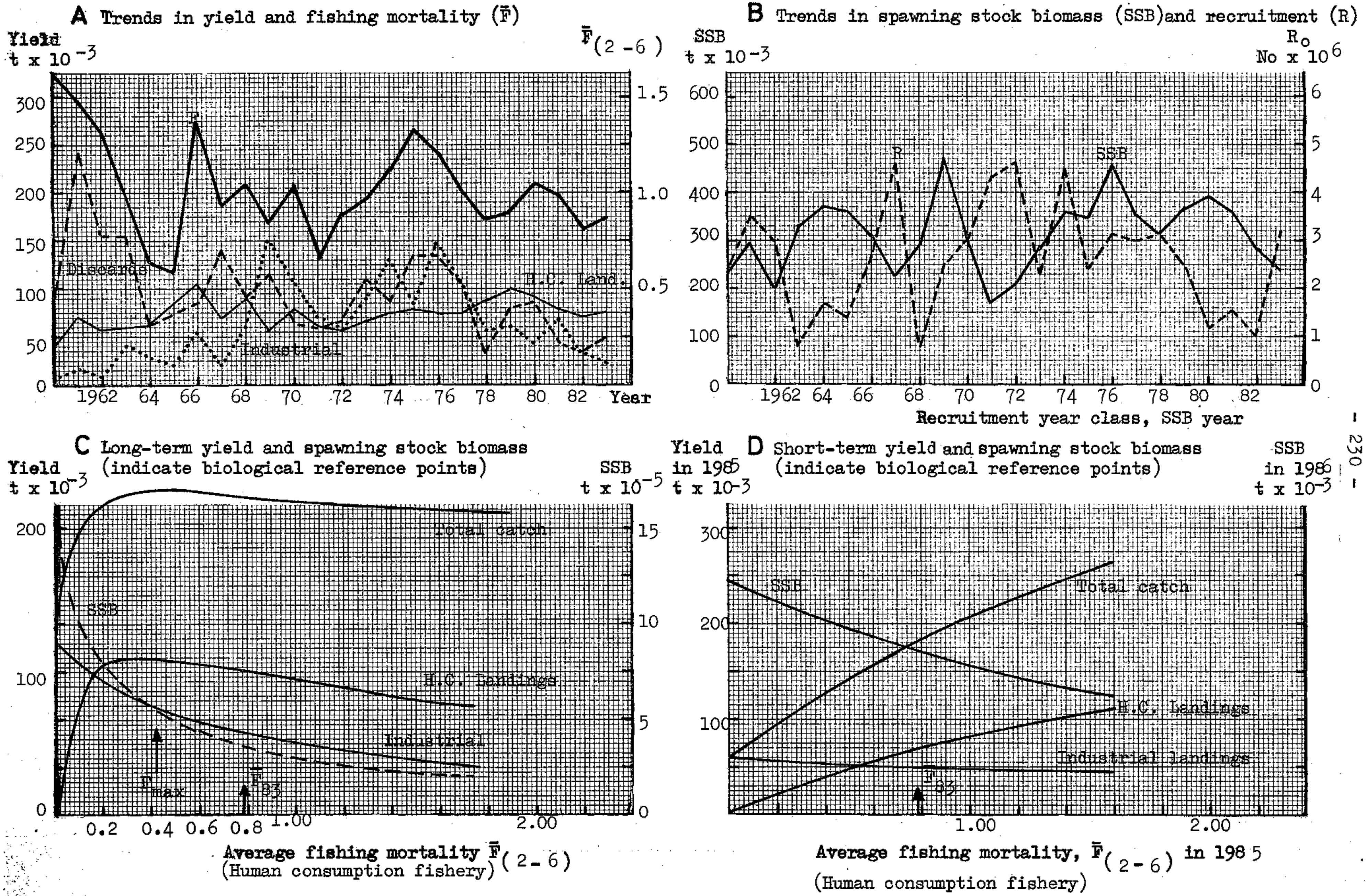


Figure D.6.1 FISH STOCK SUMMARY (Stock) West of Scotland COD (Div. VIa)

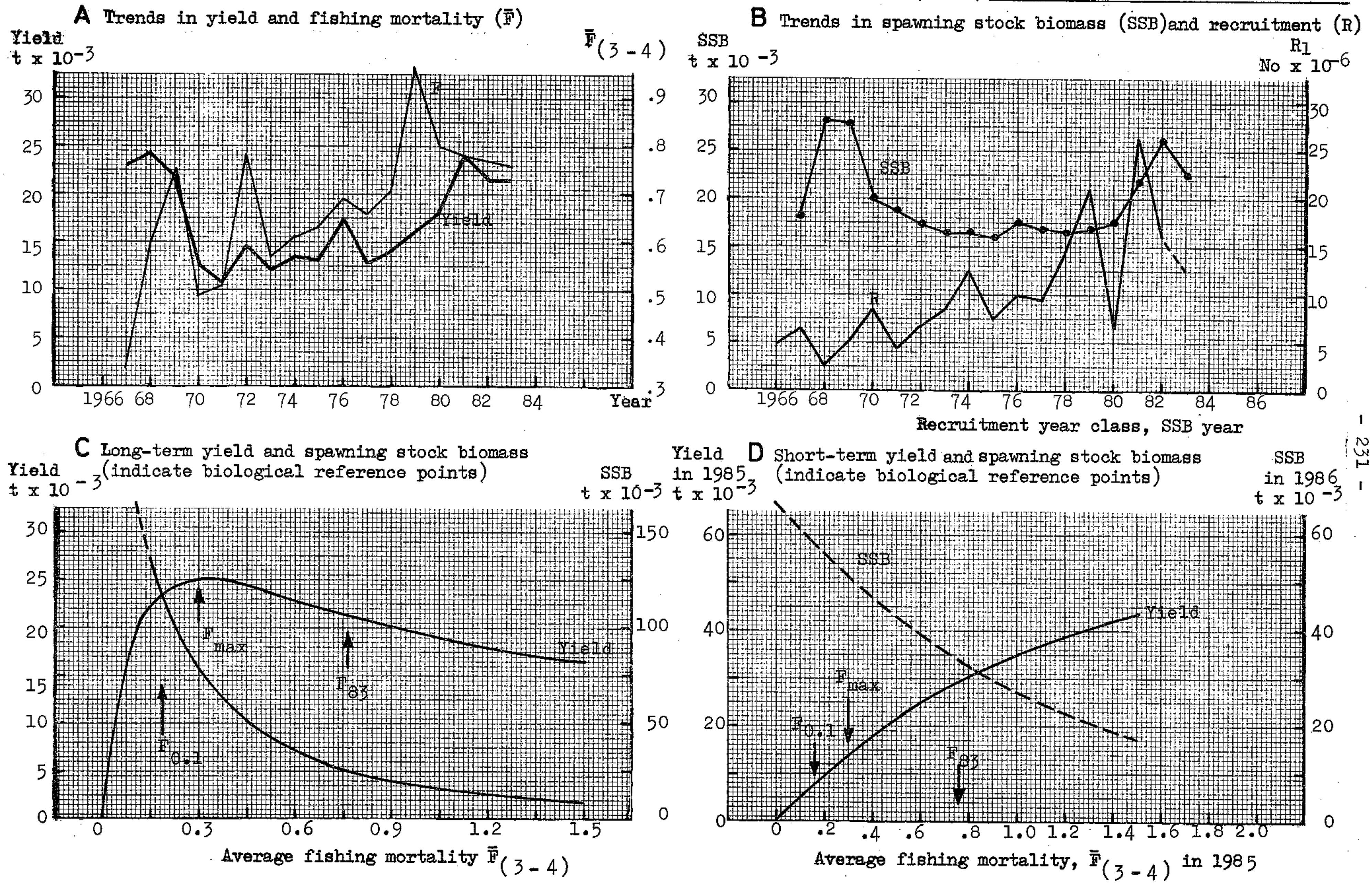


Figure D.6.2 FISH STOCK SUMMARY (Stock) HADDOCK in Division VIa

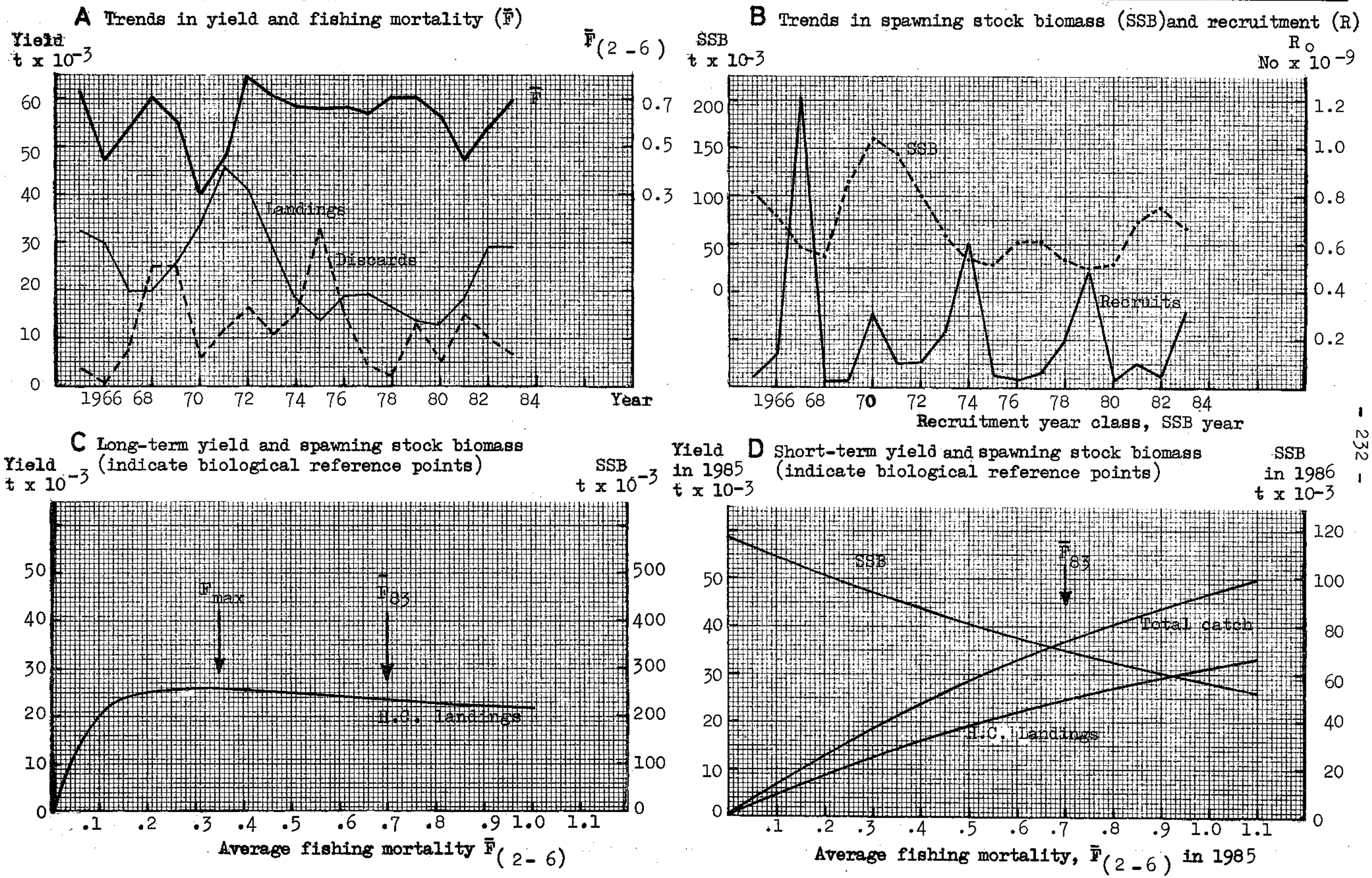


Figure D.6.3. FISH STOCK SUMMARY (Stock) WHITING in Division VIa

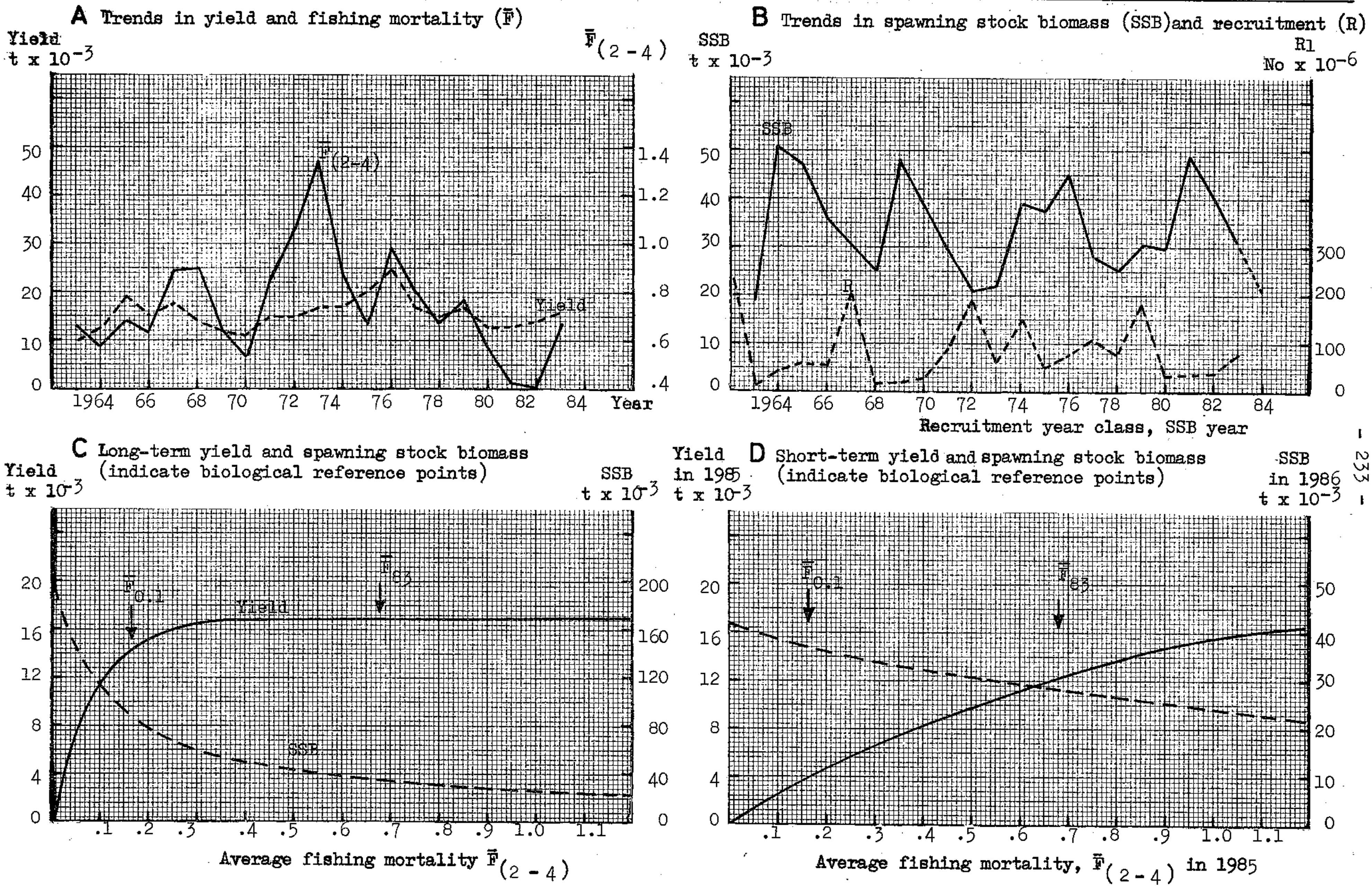


Figure D.7.1. FISH STOCK SUMMARY (Stock) Division VIIa COD

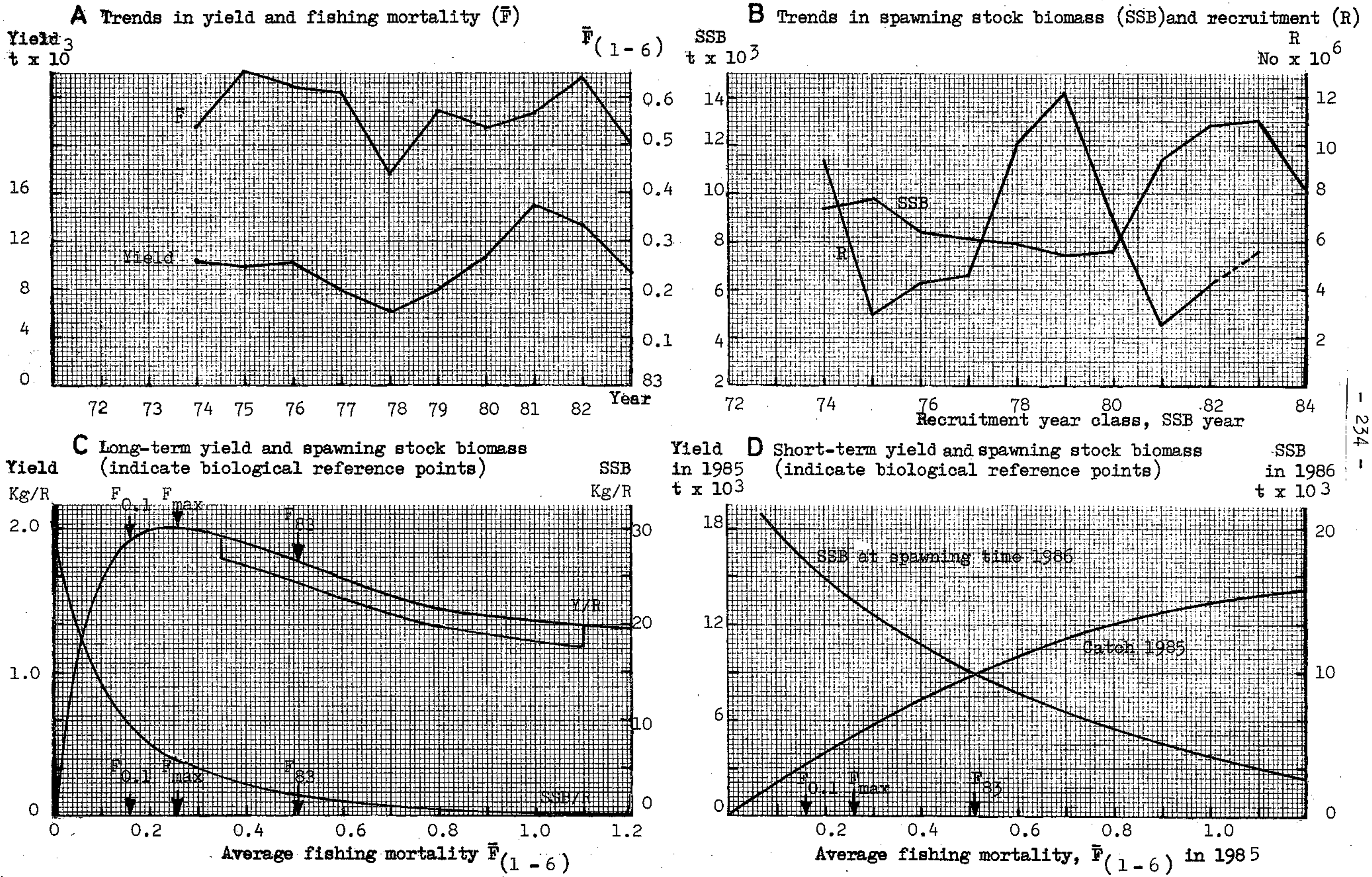


Figure D.7.2. FISH STOCK SUMMARY (Stock) Irish Sea WHITING

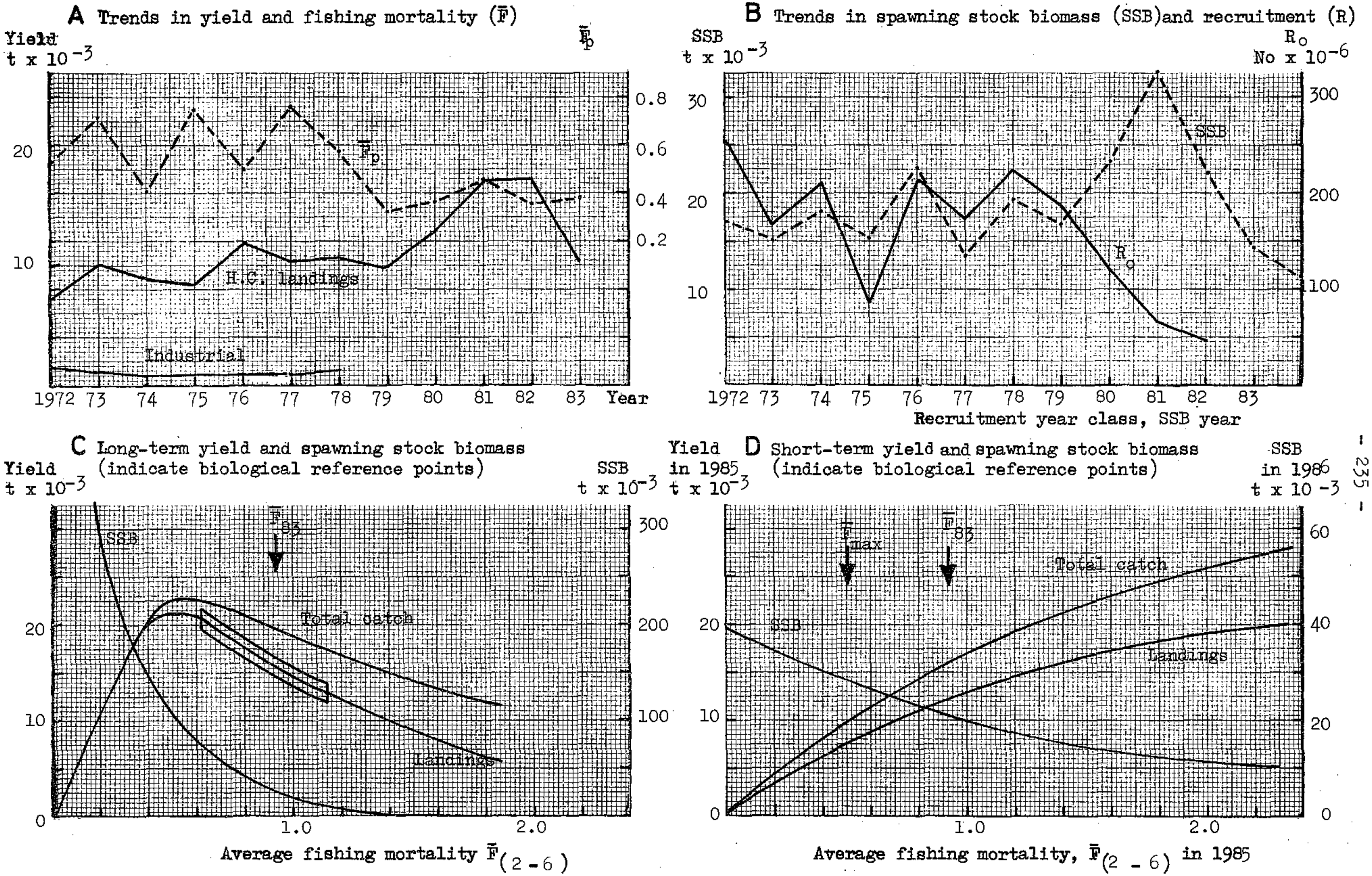


Figure D.7.3. FISH STOCK SUMMARY (Stock) Irish Sea PLAICE

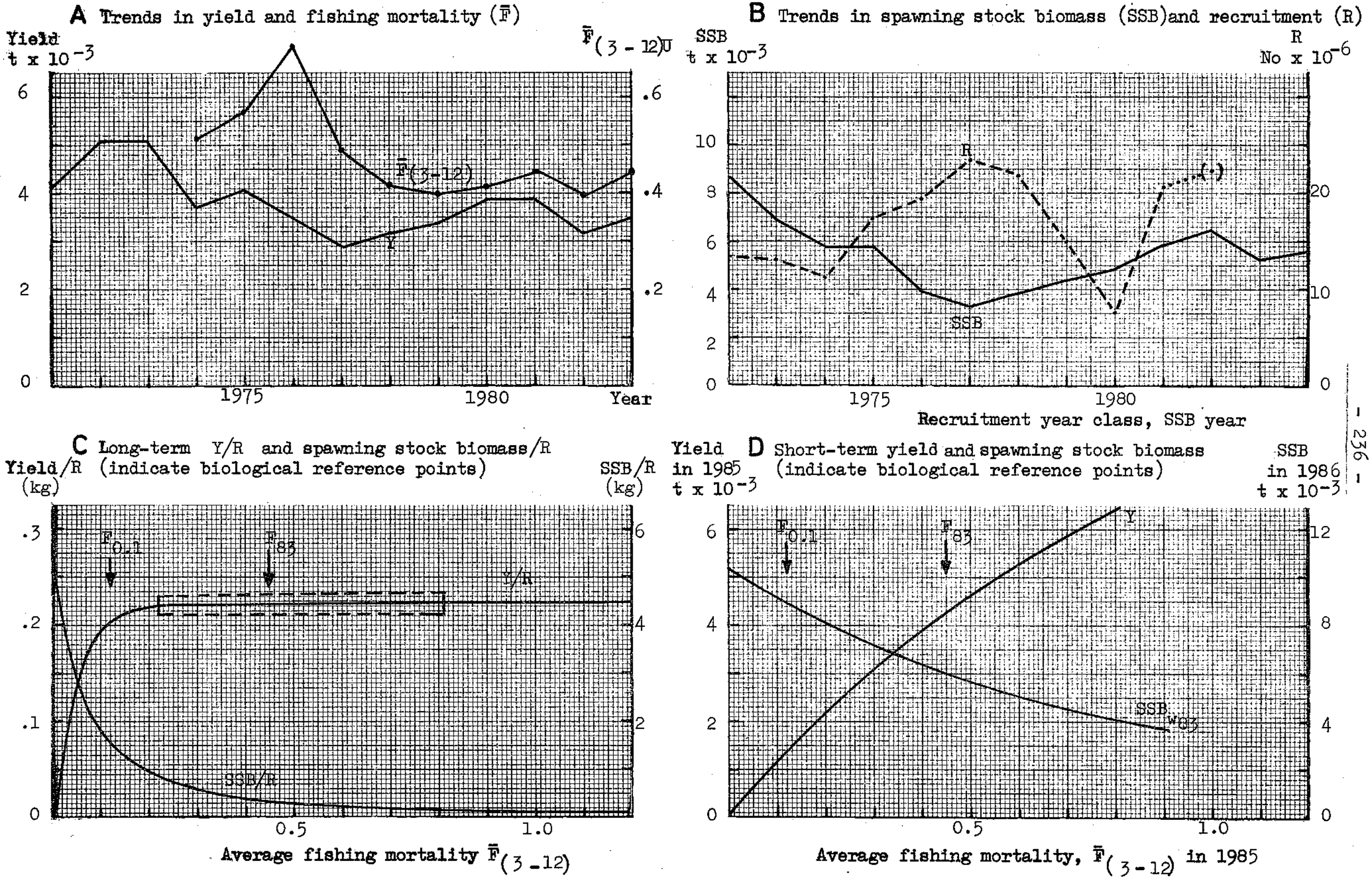


Figure D.7.4. F I S H S T O C K S U M M A R Y (Stock) Irish Sea SOLE

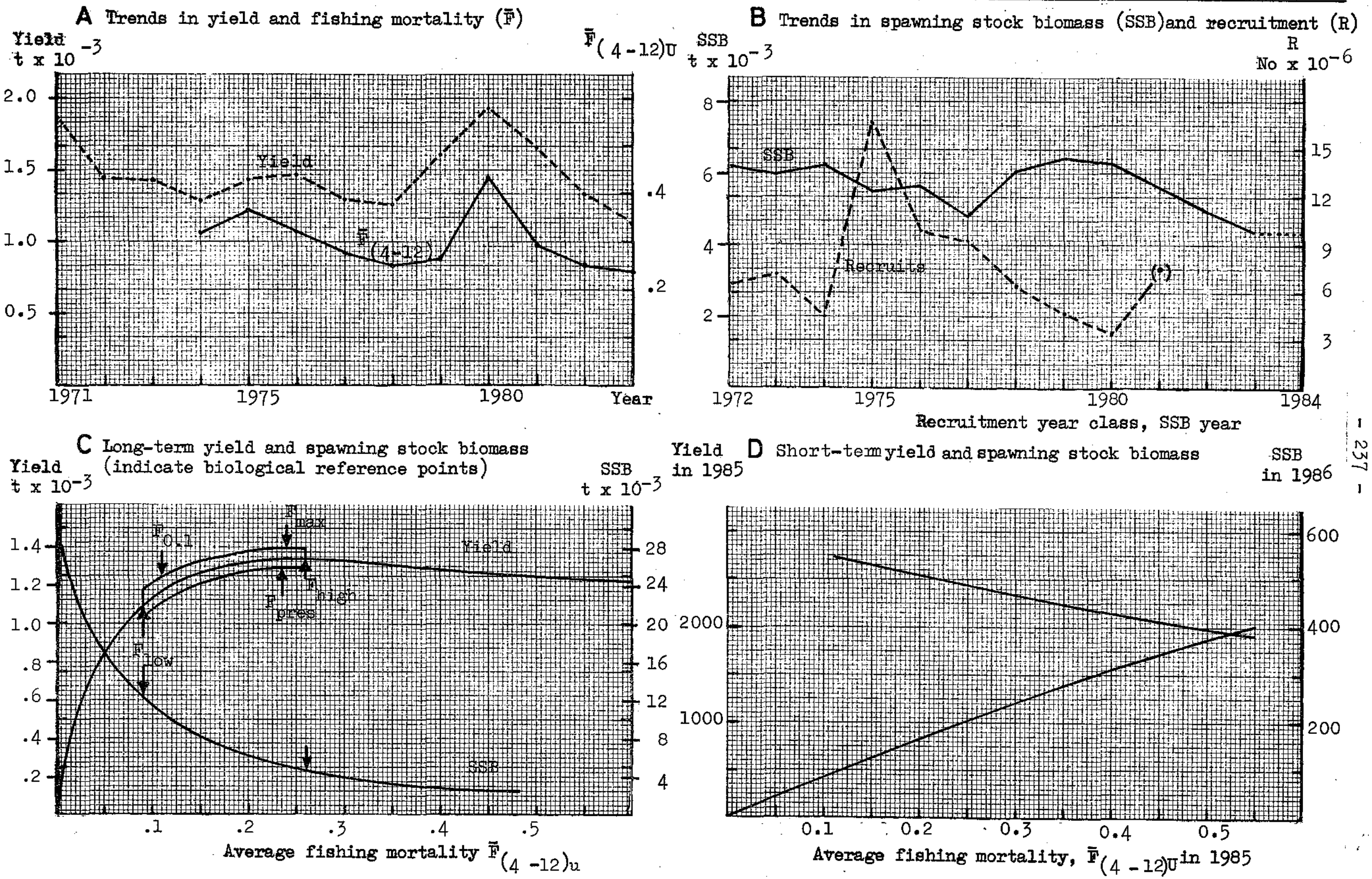


Figure D.7.5. FISH STOCK SUMMARY (Stock) Celtic Sea SOLE

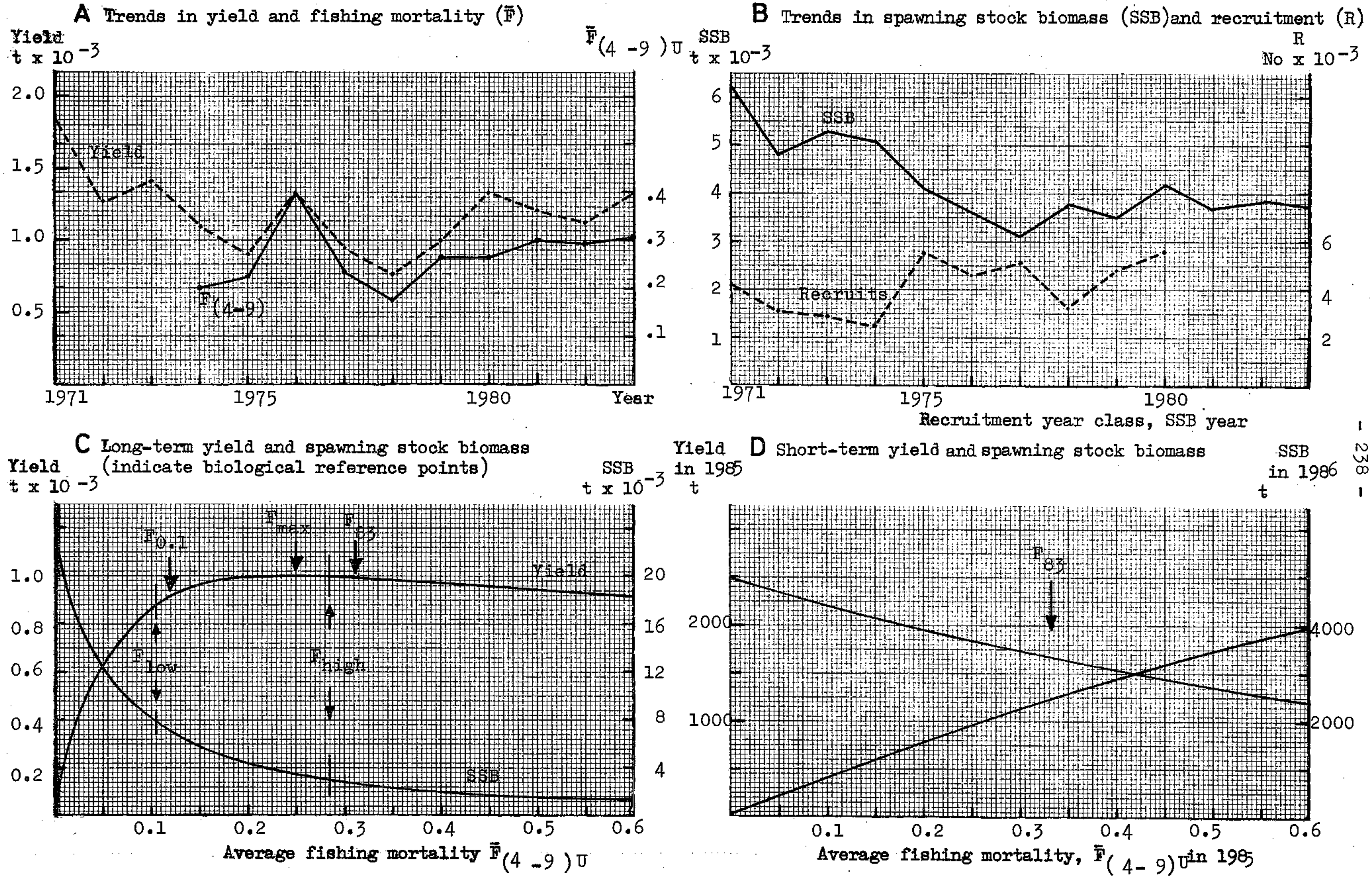


Figure D.7.6. FISH STOCK SUMMARY (Stock) Celtic Sea COD

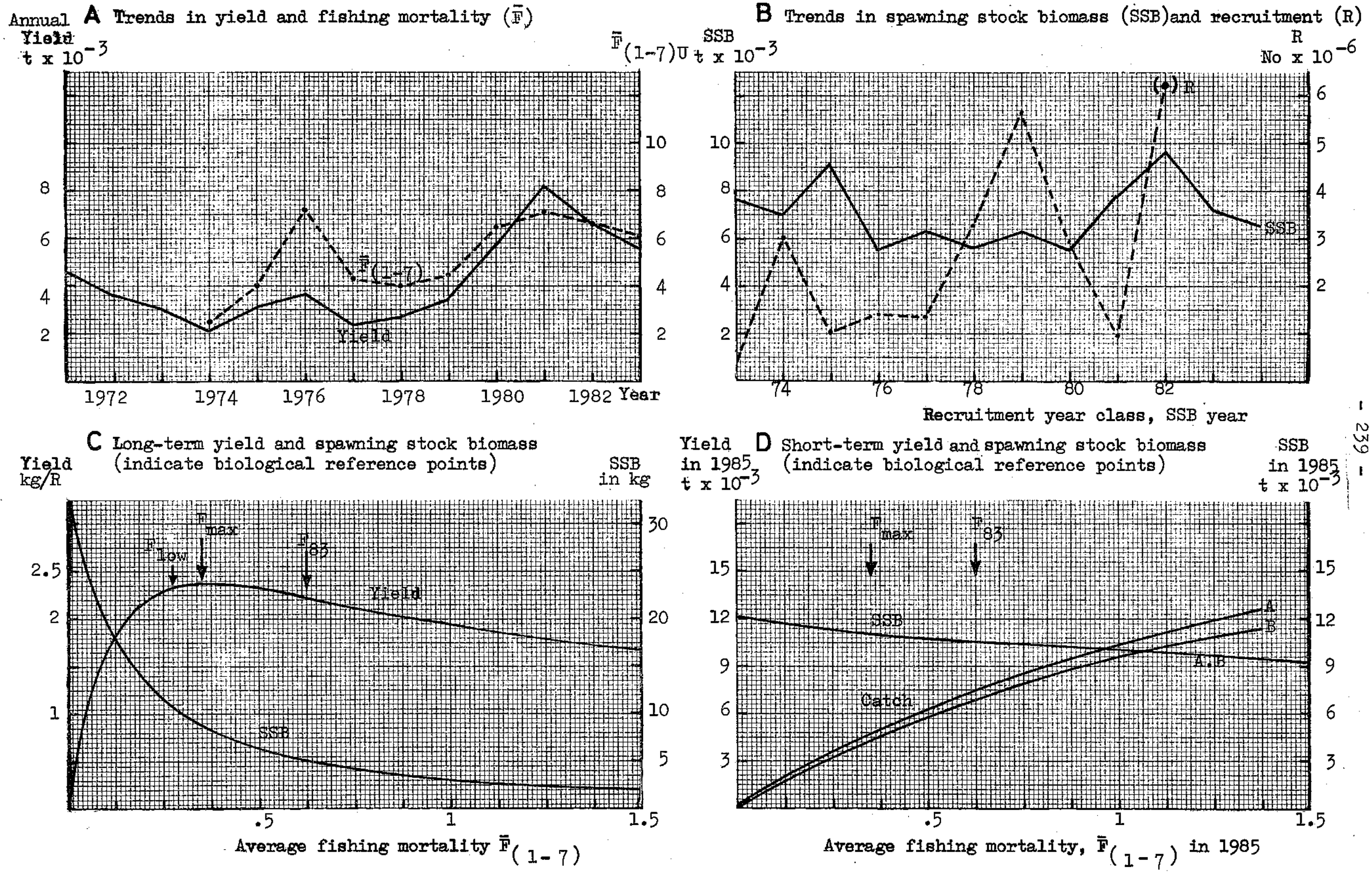


Figure D.8.1 . FISH STOCK SUMMARY (Stock) North Sea SOLE

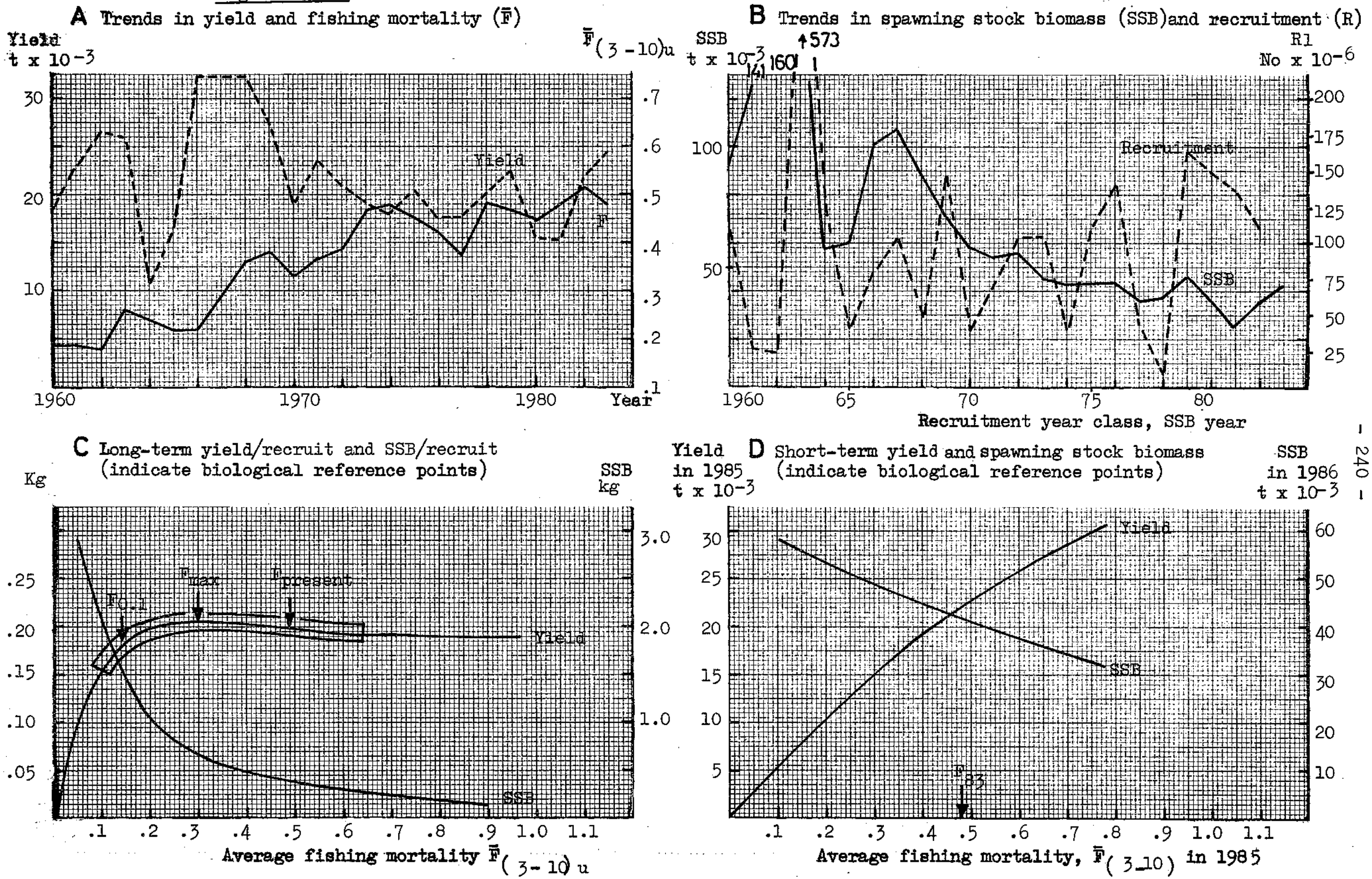


Figure D.8.2 FISH STOCK SUMMARY (Stock) North Sea PLAICE

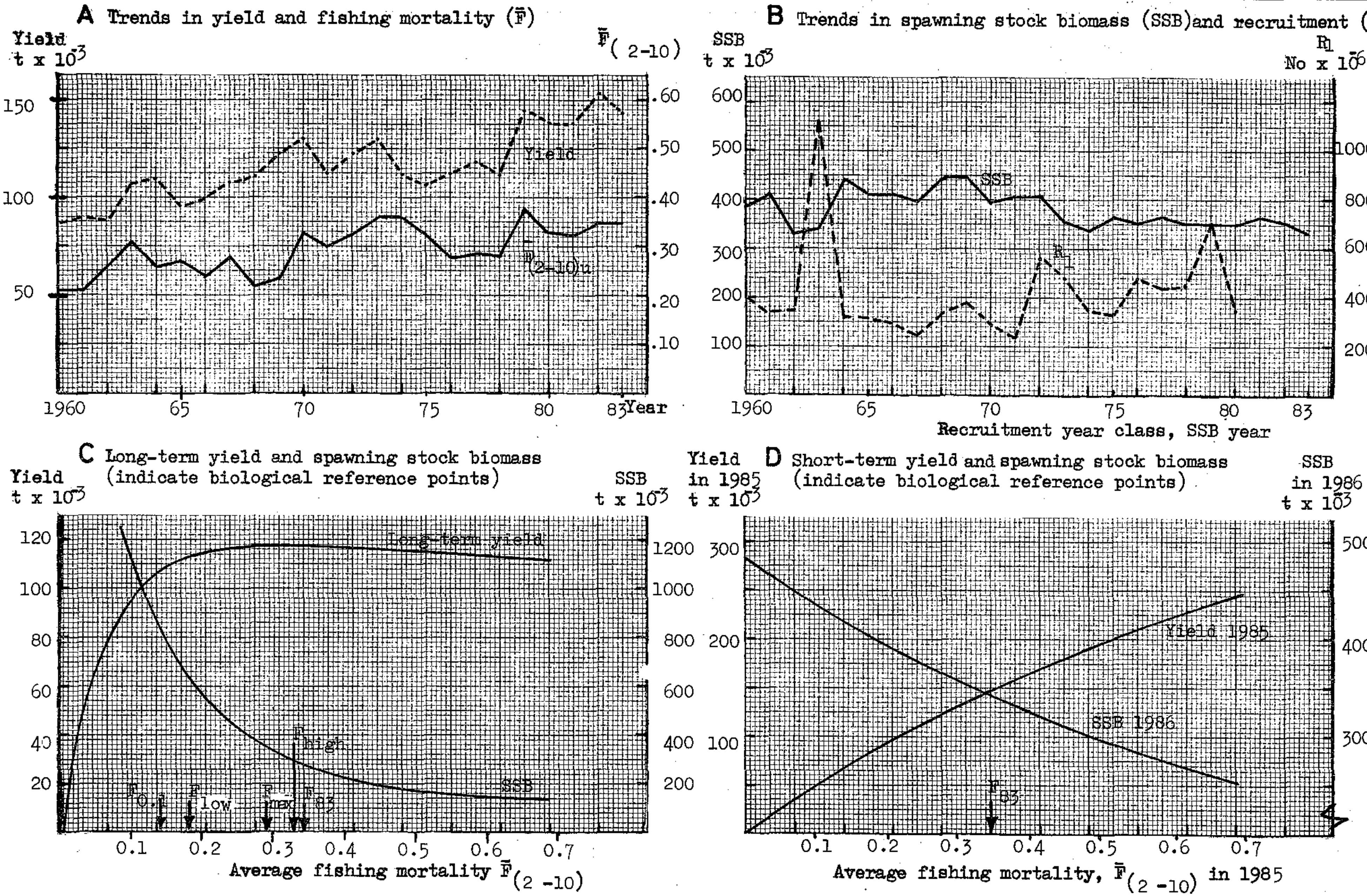


Figure G.1.1 FISH STOCK SUMMARY (Stock) MACKEREL - NORTH SEA

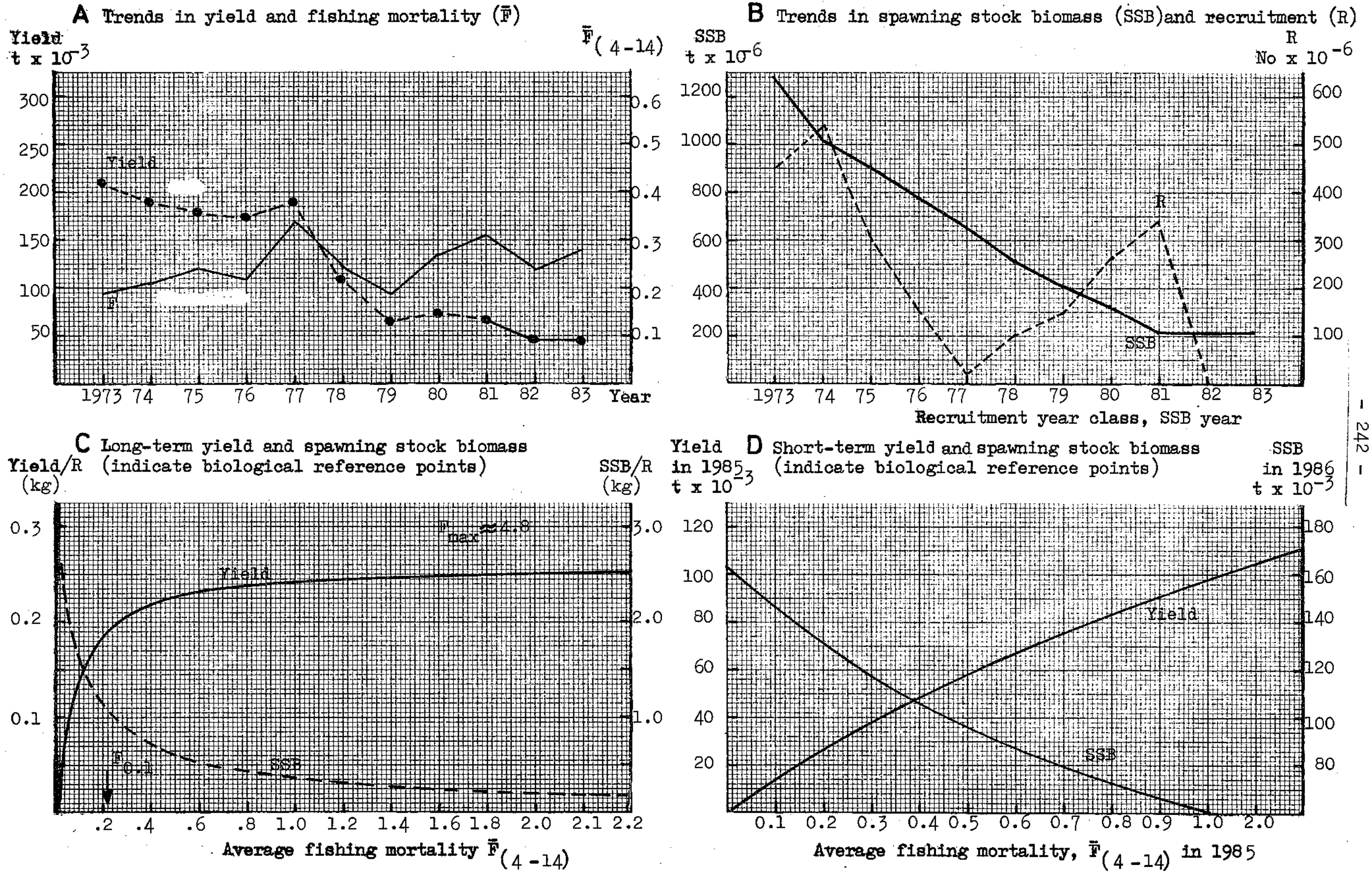


Figure G.1.2 F I S H S T O C K S U M M A R Y (Stock) MACKEREL - Western

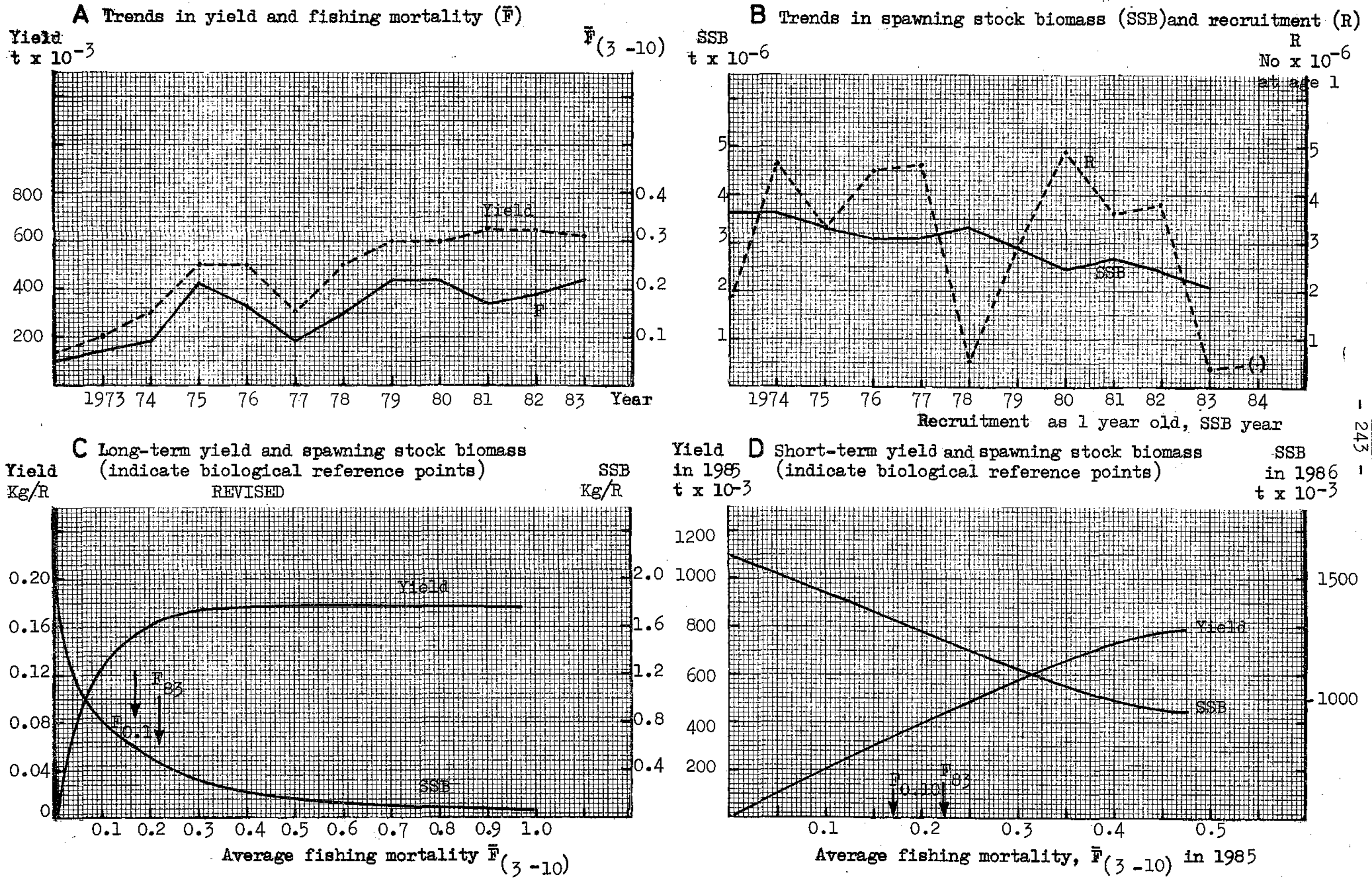
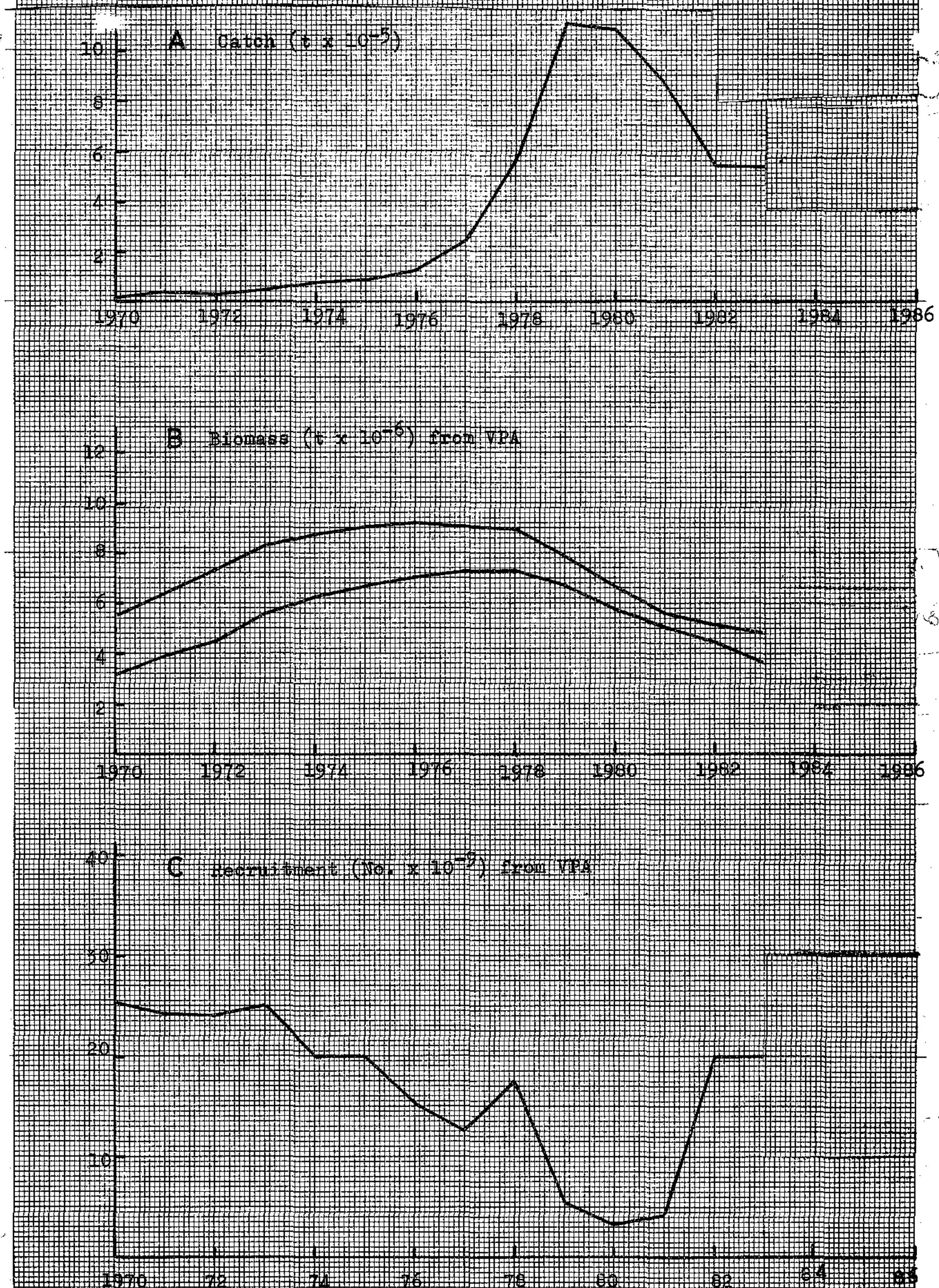


Figure G.2.1 BLUE WHITING. Northern area.



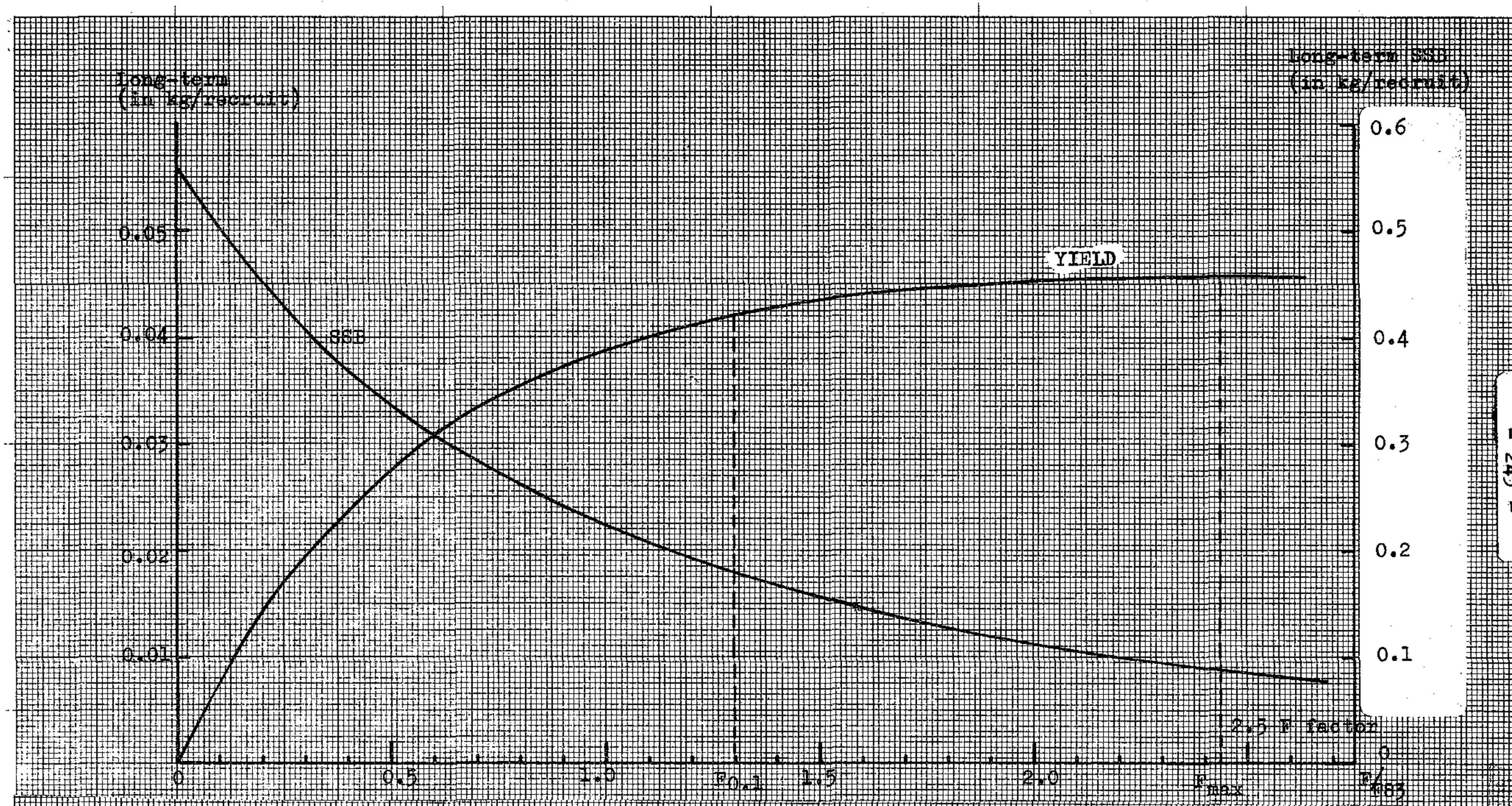
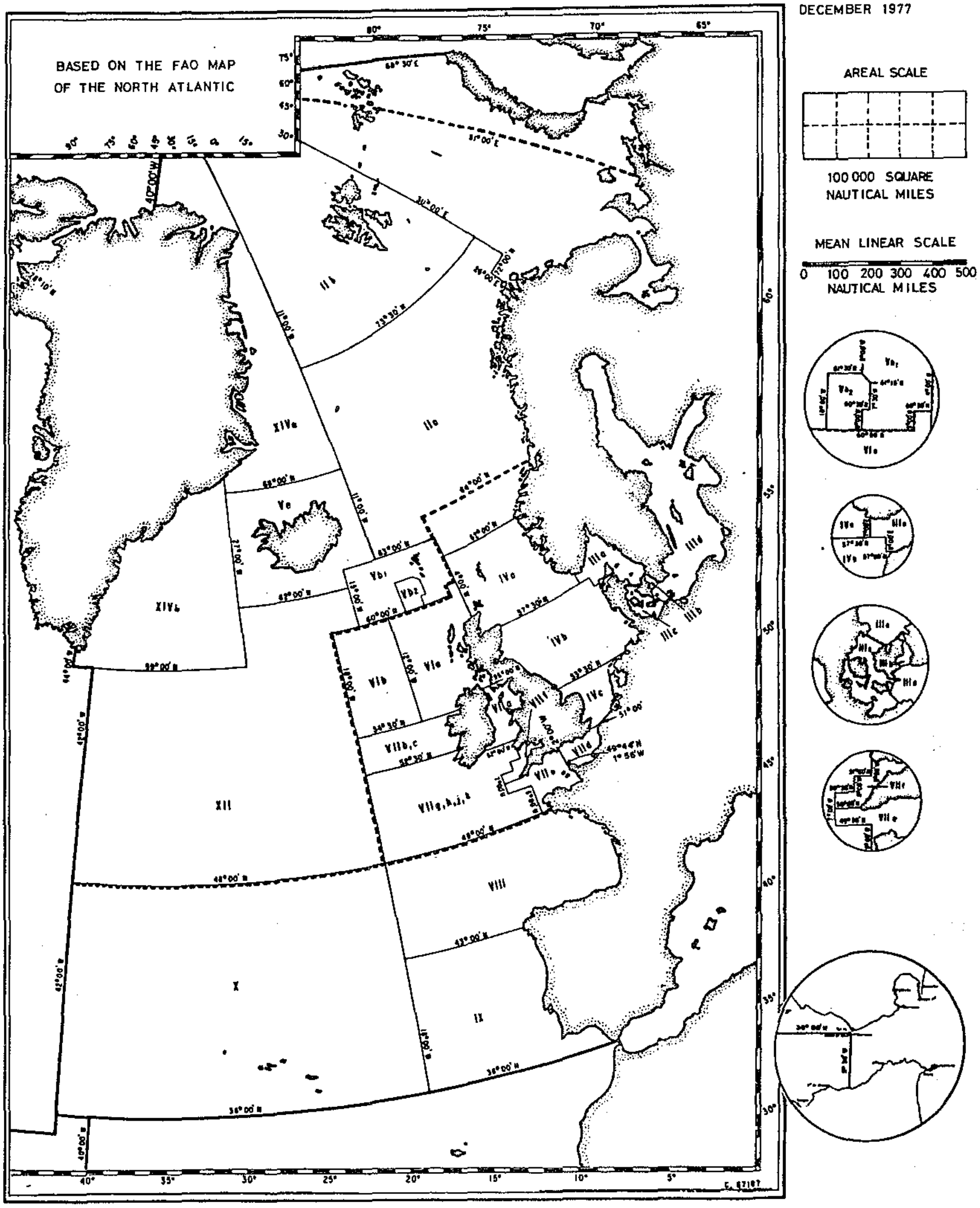


Figure G.2.2 Long-term yield and spawning stock biomass per recruit



ICES FISHING AREAS

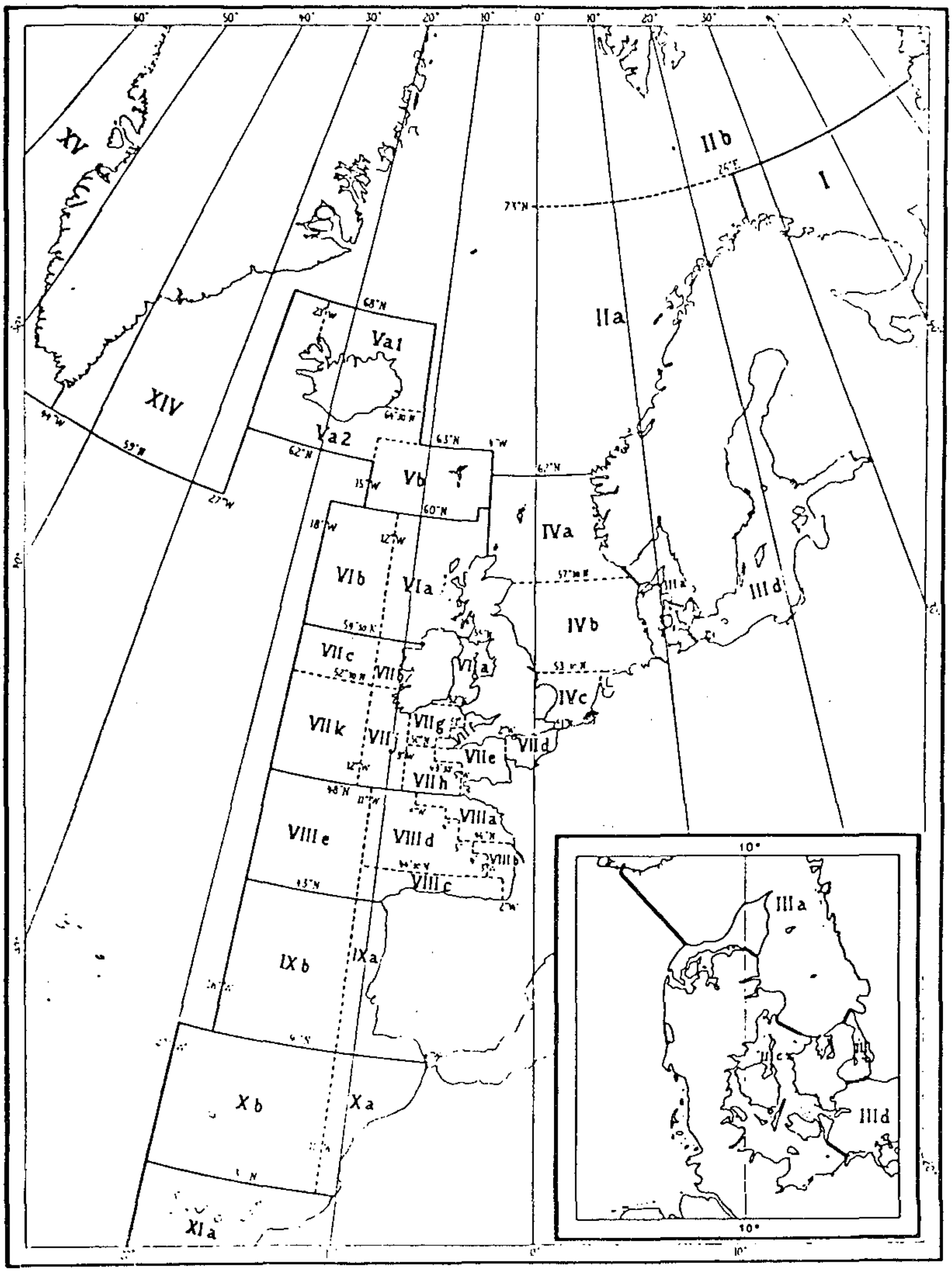


CHART OF FORMER ICES DIVISIONS

REPORT TO THE INTERNATIONAL BALTIC SEA FISHERY COMMISSION

A. REVIEW OF NOMINAL CATCHES IN THE BALTIC AREA, 1973-1983

1. A general review of officially reported catches in the Baltic 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 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 267-276.

B. THE BALTIC PELAGIC FISHERIES

Assessment of Herring and Sprat Stocks

Acoustic survey

The stock estimates from the 1983 joint acoustic survey conducted by the German Democratic Republic, Poland and Sweden were discussed by ACFM. Due to problems with the target strength to be applied for sprat due to lack of actual measurements, the results of this survey could not be fully used in the assessment. The apparent increase of the sprat stocks in 1983 has made the actual target strength value much more critical than when surveying a depleted stock. The relative age distributions obtained during the 1983 survey are not influenced by the technical problems and were incorporated in some of the assessments.

B.1. Herring Stocks

B.1.1. General (Table B.1.1.)

Data on herring landings presented to the Working Group for 1982 and 1983 include landings from mixed fisheries and exclude landings of sprat in directed herring fisheries.

Due to corrections in the preliminary catch figures presented last year, the actual catch for 1982 rose to about 468 000 tonnes. The preliminary catch for 1983 is still higher - about 479 000 tonnes. As compared with the previous year, landings in 1983 increased mainly in the central and northern Baltic (Sub-divisions 27, 28, 29N, 30 and 32) as well as in Sub-division 22. In Sub-divisions 23-25 catches decreased. Both in 1982 and 1983, catches considerably exceeded the TACs recommended by ICES and were also slightly higher than the TACs set by IBSFC.

The percentage of autumn herring in the stocks is at present insignificant. Therefore, in the assessments the catches of autumn-spawning herring have been added to catches of spring-spawning herring and treated together with them.

B.1.2. State of the stocks and management advice

B.1.2.1 Sub-divisions 22, 23 and 24

In 1983, the catch in this area remained at the high level of 115 000 tonnes. ACFM reviewed the attempts that had been made to assess the herring in this area together with the adult herring in Division IIIa. It will ask the appropriate Working Groups to continue this work, but at least this year will not base its advice on a combined assessment, mainly because of the difficulties in estimating present fishing mortalities. Additional information could be obtained if the joint Danish-Swedish acoustic survey in Division IIIa could be extended into the western Baltic.

An assessment based on the catches in Sub-divisions 22+24 was made. Fishing mortalities for ages 0 - 4 were chosen to give a best fit between stock size as 0-group and the indices from the Young Fish Surveys for these year classes. Trends in yield, fishing mortality, recruitment and stock size are shown in Figure B.1.2.1.1.

The spawning stock is now rapidly declining, and the effects of the good 1983 year class will not become visible until 1986. The exploitation level is far above the $F_{0.1}$ point on the yield curve.

ACFM recommends that fishing mortality on this stock should be reduced towards the $F_{0.1}$ level as much as possible in 1985.

The age distributions of the catches show that a high proportion of juvenile herring is caught.

In order to improve the present exploitation pattern, ACFM recommends that the minimum mesh size in the trawls is increased to 40 mm when fishing for herring in Sub-divisions 22 and 24.

The effects on yield and stock sizes from such a regulation were evaluated and presented in ACFM's 1983 report to IBSFC.

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 9 000 tonnes.

B.1.2.2. Sub-divisions 25, 26 and 27

The reported landings for 1983 (174 000 tonnes) were at the 1982 level. The exploitation level in 1983 was estimated from the 1981 and 1982 acoustic surveys. Fishing mortalities for 0 and 1-group were chosen to give year class strengths corresponding to the recruitment estimates. The 1982 (4 191 x 10^6 fish) and 1983 (7 078 x 10^6 fish) year class strengths were calculated from the results of the Polish young fish survey. The 1984 year class was assumed to be of the 1972-81 average level (7 139 x 10^6 fish). The catch in 1984 was assumed to be on the 1983 level as TACs agreed for 1984 by the IBSFC since its allocation to national quotas were identical for the two years. Trends in yield, fishing mortality, recruitment and stock size are shown in Figure B.1.2.2.1.

Both the stock size and the catches seem to be stable, and as the level of exploitation is close to the $F_{0.1}$ level, ACFM recommends that the catches are maintained at the present level in 1985.

The Working Group presented an attempt to assess the coastal herring and the open sea herring separately. The Danish and Swedish catches, however, had to be split in a crude way due to lack of data, while the catches of Poland and USSR were allocated to stocks by means of otolith typing.

Since no otolith studies had been made on the samples from the acoustic surveys, the stock estimates from these surveys could not be used for tuning the VPAs.

The separate assessments demonstrate that while the coastal herring are exploited close to F_{max}, the open sea herring appear to be lightly exploited only. The recruitment as 1-group seems on average to be about 3×10^9 for the coastal and 2×10^9 for the open sea herring stock.

The combined assessment presented above indicates a stock fished around $F_{0.1}$, and that assessment suggests that no increases in long-term yield can be expected from increasing the level of fishing mortality.

Based on assumptions of average recruitment in 1983-84, the combined assessment projects a decrease in the total catch from 170 000 tonnes in 1984 to 158 000 tonnes in 1985 under unchanged fishing pressure. The separate assessments predict a decrease for the coastal stock of 10% but a 40% increase from the open sea stock by 1985. This large increase is not considered to be an adequate assessment of the situation, and the Working Group will be asked to look critically into the assessment of the open sea herring stock in 1985. In this report, therefore, ACFM's advice is based on the joint assessment of coastal and open sea herring together.

B.1.2.3. Sub-divisions 28 and 29S

Open sea stock

Catches increased slightly from 44 000 tonnes in 1982 to about 48 000 tonnes in 1983.

An assessment was carried out, based on the stock estimates from the 1981 and 1982 acoustic surveys. It gave an estimate of spawning stock sizes of around 400 000 tonnes for the most recent period and a level of exploitation well below the $F_{0.1}$ level.

Since this assessment leads to a major revision of the status of the stock, ACFM finds it advisable to wait for further confirmation of the likely stock level before any changes in the catch levels are recommended.

ACFM, therefore, recommends a precautionary TAC for 1985 based on the level of recent years, i.e., about 40 000 tonnes.

Gulf of Riga herring

The input fishing mortalities for 1983 were taken as the average level for the period 1977-81, with the fishing mortality of older age groups somewhat decreased to take into account a decrease in the numbers of trap nets in recent years. The abundance of the 1983 year class was taken at the average level for the period 1975-82 (1 670 x 10^6 fish). Trends in yield, fishing mortality, recruitment and stock size are shown in Figure B.1.2.3.1.

The level of exploitation is still well above the $F_{0.1}$ level and the spawning stock size is low compared with earlier years.

ACFM recommends that the fishing mortality is reduced as far as possible towards $F_{0.1}$ level.

B.1.2.4. Sub-divisions 29N and 30(E)

ACFM discussed in detail the trends in mean weight at age which were presented as the evidence in support of separating the assessments for herring in Sub-division 29N(E) and 30(E). It was concluded that these trends could be explained by migration or by sampling short-comings, or both. No information was available to ACFM on recaptures from among the 4 000 tagged herring released in the area, but in ACFM's opinion 4 000 releases were in this case too low a number to yield useful results from a herring tagging programme.

ACFM, therefore, could not accept the hypothesis of two separate stocks in this area. Since the Working Group had not carried out a single assessment for Sub-divisions 29N(E) and 30(E) together, ACFM had no alternative but to recommend a precautionary TAC. Since there is no evidence to suggest that catches ought to be reduced, ACFM recommends a precautionary TAC of 57 000 tonnes in 1985.

B.1.2.5. Sub-division 31(E)

The catch in 1983 was 8 500 tonnes, which is about the level of the 1976-82 period. Finnish effort and cpue at age were used to estimate the 1983 exploitation level. Although ACFM would have preferred a different interpretation of some elements in the effort analysis, it accepted the assessment.

Trends in yield, fishing mortality, recruitment and stock size are shown in Figure B.1.2.5.1.

Taking into account the stability in catches and stock size, and the level at which the stock is exploited, ACFM recommends that this stock should continue to be managed at the current catch level, that is a TAC of 9 000 tonnes in 1985.

B.1.2.6. Sub-divisions 29N, 30 and 31(W)

The catches in this area increased slightly in 1983 to just below 10 000 tonnes. ACFM found that the data series for this stock, 1978-83, is still too short to be the basis for an analytical assessment. Furthermore, no additional information on which to base an estimate of current exploitation level is available. ACFM therefore recommends that a precautionary TAC for 1985 is set at the current catch level, that is 10 000 tonnes.

B.1.2.7. Sub-division 32

ACFM discussed the evidence presented in Annex 1 of the Working Group report in support of the hypothesis of two separate herring stocks in the Gulf of Finland. A VPA, based on catch data from the USSR fishery as presented to the Working Group and carried out by the Finnish members of the Group, was also tabled at ACFM.

For the same reasons expressed concerning Sub-divisions 29N and 30(E), the growth data were not accepted by ACFM as indicating the existence of separate herring stocks in Sub-division 32. After a full discussion, ACFM concluded that there was no scientific evidence to support the hypothesis.

On examining the assessment of Sub-division 32 herring carried out by the Working Group, ACFM considered that the basis on which fishing mortality in 1983 had been estimated was inadequate, although further analysis of the data (extended by possible 1984 information) by the Working Group in 1985 could produce useful results. The 1984 assessment could not therefore be regarded as an analytical one, and ACFM recommends a precautionary TAC of 45 000 tonnes in 1985. This is close to the catch level in recent years.

B.2. Sprat Stocks (Table B.2.1)

The reported landings decreased further in 1983 to about 36 000 tonnes. The steady decrease in landings in recent years may be seen in Figure B.2.1.

B.2.1. State of the stocks and management advice

The acoustic estimate of sprat biomass in October 1983 indicated a substantial increase compared to 1981 and 1982, although its absolute level could not be calculated for the reasons given in Section B.1. For these reasons also, the assessments carried out by the Working Group could not be considered to be analytical. ACFM's advice is given on the basis of apparent trends in the sprat firstly in Sub-divisions 22, 24-26 and 28, and secondly in Sub-divisions 27 and 29-32.

The results - partly reported to ICES - from two Polish acoustic surveys in May and September 1983 in Sub-divisions 25 and 26, and a survey by USSR is Sub-divisions 26 and 28 in September 1983, all showed a high level of sprat biomass.

ACFM recommends that a precautionary TAC for 1985 of 60 000 tonnes is set for Sub-divisions 22, 24, 25, 26 and 28, based on expected catches.

In Sub-divisions 27 and 29-32, there has so far been no sign of increased recruitment to the stock.

ACFM therefore recommends that the catches in 1985 in these Sub-divisions should be kept at the present level of 8 000 tonnes.

B.2.2. Distribution of effort and cpue

To meet the request of IBSFC to ICES concerning estimates of the distribution of the main stocks and fishery effort within and between the fishery zones, the data for the whole Baltic are not sufficient. Effort and cpue data of fishery for herring submitted by Sub-divisions show that only a few areas are covered as to Sub-division and country. Effort and cpue distribution as to statistical rectangles are given for the Finnish fishery zone in Sub-divisions 29N - 32 for herring and sprat. German Democratic Republic data consist of selected data for 28.5 m cutters. Polish data are given as a sum of Sub-divisions 24, 25 and 26, for the pelagic and bottom trawl fisheries. The Federal Republic of Germany presented effort and cpue data in pair trawl fisheries for 1983 in Sub-divisions 21, 22, 24 and 25 covering about 38% of its herring catches. Sweden submitted log-book data on catch and effort of herring caught with pelagic herring trawls in Sub-divisions 24 to 29 for 1983 (licensed fishing vessels larger than 12 m). From the USSR herring trap-net fishery, effort and cpue data have been presented for 1976-83, as well as trawled effort and catch per unit effort data from the herring pair trawl fisheries in Sub-divisions 26 and 28 for 1983.

According to the material available, already large differences are observed between different regions in herring effort and catch per trap net. These differences confirm that detailed data for all fisheries are to be recommended.

The effort and cpue data submitted to the Working Group in 1984 were used in many of the assessments presented to ACFM. The collection of appropriate data, and their detailed evaluation by the Working Group, should continue (and should be extended where possible) in 1985 and future years.

C. THE BALTIC DEMERSAL FISHERIES

C.1 Cod in Sub-divisions 22 and 24

C.1.1 Recent catches

The total landings of cod at 48 000 tonnes (including 1 000 tonnes from Sub-divisions 23) in 1983 were only slightly above the 1982 level of 47 000 tonnes. The landings from Sub-division 22 increased from 21 000 tonnes in 1982 to 24 000 tonnes in 1983, whereas for Sub-division 24 a slight decrease from 25 000 tonnes in 1982 to 23 000 tonnes in 1983 was observed.

Information on discards was available for Sub-division 22 for the period 1978-83. The estimates of discards were derived for Denmark by a sampling procedure, and for the Federal Republic of Germany from logbooks and samples. However, in view of doubts about the accuracy of these data and the short time series, it was decided not to include the discard figures in the assessment.

C.1.2 The 1984 assessment

Data on effort and cpue were available from Denmark for Sub-division 22 and from the German Democratic Republic and Sweden for Sub-division 24. The Danish effort estimates were provided for 1977, 1978 and 1983, whereas the German Democratic Republic and Swedish data covered the time period from 1980-83. Total effort indices derived from the available data show an increase of 9% from 1982 to 1983. Age compositions of the landings were submitted by Denmark, the German Democratic Republic and the Federal Republic of Germany, accounting for 100% of the landings in Sub-division 22 and for 70% of the landings in Sub-division 24.

In previous assessments, knife-edge maturity at age 3 was assumed and used in the calculation of the spawning stock biomass. In the present assessment, the estimates of spawning stock biomass are based on a maturity ogive which was derived from data on the proportion of mature fish at age.

Recruitment estimates from Young Fish Surveys for 1-group cod were available from Denmark, the German Democratic Republic and the Federal Republic of Germany. As the latter has the longest time series and shows the highest correlation to the VPA estimates, these indices were used to calculate the strength of the 1982 year class at 70 x 10^6 and the 1983 year class at 34 x 10^6 at age 1. It should be noted that according to this estimate the 1983 year class is the lowest one since 1974. Recruitment for the 1984 and 1985 year classes is assumed to be average,e.g., 114 x 10^6 at age 0. In view of the declining trend in the recruitment since 1979, this average recruitment level could be too optimistic. However, these figures have only a slight effect on the calculated catches in 1985 and the resulting spawning stock biomass in 1986. The terminal Fs on age groups 0 to 2 in 1983 were calculated on the basis of the recruitment estimates of these year classes. Fishing mortalities for age groups 3 to 11 were calibrated to fit with the effort increase of 9% from 1982 to 1983.

According to the assessment, the spawning stock biomass decreased from about 54 000 tonnes in 1980 to a level of 37 000 tonnes in 1983. The present fishing mortality of $\bar{F}_{(2-7)}$ = 1.04 is far in excess of $F_{0.1}$ = 0.12 and F_{max} = 0.19. For the projection of catches in 1985, total biomass and spawning stock biomass in 1985 and 1986, it was assumed that fishing mortality in 1984 will remain at the 1983 level and the exploitation pattern will not be changed.

C.1.3 Management advice

1984				Management option for 1985	1985				1986	
Stock biomass	Spawn. stock biom.	$\bar{F}_{(2-7)}$	Total land-ings		Stock biom.	Spawn. stock biom.	$\bar{F}_{(2-7)}$	Total land-ings	Stock biomass	Spawn. stock biom.
63	33	1.04	40	$F_{0.1}$	53	27	0.12	6	96	49
				F_{max}			0.19	9	92	46
				$F_{85}=0.8\ F_{83}$			0.83	29	65	26
				$F_{85} = F_{83}$			1.04	33	59	22

Figures in '000 tonnes.

On the assumption of a catch of 40 000 tonnes in 1984, the spawning stock will decrease to 27 000 tonnes in 1985, the lowest level on record. A continuation of the present high exploitation rate or even a 20% reduction would imply a further decrease of the spawning stock biomass in 1986. ACFM therefore recommends that fishing mortality is reduced towards the F_{max} level.

C.2 Cod in Sub-divisions 25-32 (Table C.2.1)

C.2.1 Recent catches

The total landings from Sub-divisions 25-32 increased slightly from 312 000 tonnes in 1982 to 324 000 tonnes in 1983. Approximately 90% of the total catch was taken in Sub-divisions 25, 26 and 28.

Data on discards in 1983 were presented by Denmark and the Federal Republic of Germany. The Danish data on bottom trawling show an average discard rate of 9.7% in January and of 12.2% in April. The annual discards of the Federal Republic of Germany were estimated as 0.3% in Sub-division 25 and as 0.5% in Sub-division 26. Data on discards were not taken into account in the VPA.

C.2.2 The 1984 assessment

Effort and cpue data for recent years, including 1983, were submitted by Finland, the Federal Republic of Germany, the German Democratic Republic, Poland, Sweden and USSR.

The cpue data were used to estimate national effort corresponding to total catches. From 1982 to 1983, an increase in total effort of 25% was estimated. Data on the age composition of landings were submitted by all fishing countries except the German Democratic Republic and Sweden. Data on recruitment were available from trawl surveys conducted by Denmark, Poland and the USSR. The Danish trawl survey carried out in March 1984 showed that the 1980 year class is still dominating by number in Sub-divisions 25, 26 and 29S. In Sub-division 28, the 1981 year class was found to be the most abundant followed by the 1980 year class. The 1982 and 1983 year classes were found to be poor in all Sub-divisions.

The Polish and USSR young fish indices, derived from surveys since 1968, were combined in order to get a reliable time series of indices for the strength of year classes at age 2. From a regression between these indices and the number of 2-groups from VPA, the following year class strengths were predicted:

1980 year class: 552×10^6 at age 2

1981 year class: 472×10^6 at age 2.

The 1982 year class appears both in the USSR and Polish Young Fish Surveys as very poor and was set at a very low level of 367×10^6 at age 1, corresponding to the 1969 year class which is the lowest on record. For the recruitment at age 1 in 1984 and 1985, the average figure of 718×10^6 for 1970-80 as estimated from VPA was used.

Effort increased by 25% from 1982 to 1983.

Projections of catches in 1985, total biomass and spawning stock biomass in 1985 and 1986 were calculated on the assumption that the catch level in 1984 will be the same as in 1983 and that the exploitation pattern will remain unchanged. It should be noted that this implies an increase of approximately 50% in fishing mortality.

C.2.3 Management advice

1984				Management option for 1985	1985				1986	
Stock biomass	Spawn. stock biom.	$\bar{F}_{(4-7)}$	Total landings		Stock biom.	Spawn. stock biom.	$\bar{F}_{(4-7)}$	Total landings	Stock biomass	Spawn. stock biom.
711	535	1.82	330	$F=F_{0.1}$(1983)	598	304	0.23	42	768	527
				$F=F_{max}$(1983)			0.52	87	714	473
				F=F(1983)			1.20	162	625	385
				F=F(1984)			1.82	209	571	330

Figures in '000 tonnes

A continuation of the 1983 fishing mortality level or that assumed for 1984 will result in catch levels for 1985 of 162 000 tonnes or 209 000 tonnes, respectively.

Fishing mortality on this stock appears to have increased very rapidly and although the precise level may be somewhat uncertain, it is obvious that fishing mortality is too high with regard to the rational exploitation of the resource. ACFM, therefore, recommends a reduction in the level of exploitation towards F_{max}.

D. BALTIC SALMON STOCKS

D.1. Sub-divisions 24-31

Catches are reported in tonnes as follows:-

Year	Tonnes
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	2 023
1983*	2 240

*Preliminary

The reduction of fishing effort due to the establishment of the national fishing zones in 1978 was followed by an increase in 1980 and 1981. The effort decreased again in 1982. Preliminary information suggests that the effort data for 1983 are averaging those of 1981 and 1982 (Figure D.1). The annual yield has followed the same trend. The catch in 1983 was a little below the average of catches in 1972-82 (2 439 tonnes). The increased catch in 1983 was mainly caused by the increased USSR catches, especially those of the coastal and/or river catches in Sub-division 28. Danish and Polish catches have also increased (Table D.1).

The recruitment in 1983 was 4 018 000 a.s.u. (artificial smolt unit), of which about 2 770 000 were hatchery-reared. Compared to earlier years, the releases in 1984 will increase considerably (1 000 a.s.u.):-

Year	Tonnes
1979	2 720
1980	2 930
1981	2 503
1982	2 704
1983	2 770
1984*	3 500

*Estimated

The wild production during these years is estimated to be about 600 000 smolts per year (1.2 million a.s.u.).

Parr densities, especially in the upper parts of the rivers, have generally decreased. Only one river of the five investigated showed a slight increase in the parr density. Thus, it is evident that wild smolt production in 1985 will be smaller than in previous years.

Fishing for breeding fish in the rivers which have reared stock, show no clear trend in recent years. However, in the breeding fishery in the River Vindelälven where a wild stock still exists, the number of female spawners has decreased considerably since 1979.

On the basis of Finnish and Danish drift-net and long-line cpue data, the abundance of salmon in the Baltic Sea show no marked trends during the recent years. Thus, the situation in the fishery appears to have stabilised.

The assessment model was calibrated in 1982, and no reason was found to recalibrate it. However, releases have increased and are expected to increase further. The 1984 releases will be about 3.5 million a.s.u. giving a total expected recruitment to the Baltic salmon stock of 4.7 million a.s.u. The catch options for 1985 have been adjusted to this increased recruitment, but the target escapement has been kept at 2.4% since the change in recruitment has been relatively small (10-20%). Furthermore, 350 000 a.s.u. of the Finnish releases in Sub-division 30 are of Neva stock origin, and tagging has shown that these salmon migrate much less than the northern stocks released in the same area (93% of the Neva stock recaptures came from Sub-division 30 (Table D.2)). This Neva stock component does not contribute to the wild production, and so the 1985 catch options have been based on a recruitment to the stock in Sub-divisions 24-31 of 4.4 million a.s.u.

The 1985 catches, provided the fishery is unchanged, are expected to be about 2 700 tonnes with an escapement of 1%, while the target escapement of 2.4% (to maximise genetic variability) will be met by a catch level in 1985 of about 1 700 tonnes and an annual long-term yield of about 2 600 tonnes.

Yield 1985 tonnes	Escapement 1986 %	Long-term yield (tonnes)	Long-term escapements %
1 398	2.8	1 928	3.6
1 698	2.5	2 207	3.1
2 134	2.0	2 628	2.3
2 562	1.3	2 688	1.4
2 695	1.0	2 695	1.0

The Neva stock releases to Sub-division 30 will not experience the high fishing mortalities in the Baltic proper. The actual yield from these releases cannot be found from the assessment model, but can be inferred directly from tagging results which suggest 200-300 kg/1 000 smolts released as compared to the around 100 kg per 1 000 smolts released found by tagging experiment with Iijoki stock. Based on a return of 250 kg/1 000 smolts, 350 000 a.s.u. released annually to Sub-division 30 would yield about 100 tonnes per annum.

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.

Year	Tonnes
1975	74
1976	95
1977	88
1978	75
1979	70
1980	69
1981	73
1982	134
1983*	152

*Preliminary

In the Finnish rivers flowing to the Gulf of Finland, there is no natural salmon production. No exact data from the USSR are available, but the natural smolt production is assumed to be negligible. Hatchery-reared fish have been released as follows (1 000 a.s.u.):-

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984*
USSR	236	284	258	191	202	221	115	55	186	153	170
Finland	-	-	-	1	1	20	35	108	165	283	350
Total	236	284	258	192	203	241	150	163	351	436	520

*) Estimated

Because of increased numbers of introduced salmon smolts in the Gulf of Finland, Finnish catches have markedly increased. However, about 1% of the smolts released in the mouth of the River Kymi have returned as spawners to the river mouth fishery in 1980-82, as calculated from tag returns.

In the Gulf of Finland, the desired escapement level depends mainly on the demand for breeding fish in the three hatcheries. The annual release and current exploitation of the stock maintain this artificial salmon smolt production in Finland. No data concerning the escapement of the salmon stocks in the USSR rivers are available.

If the stocking is kept above 270 000 a.s.u., a catch of 135 tonnes may be taken with the present exploitation level without reducing the availability of brood stock for the hatcheries. This does not take into account the need to protect the small wild production from rivers on the USSR side.

D.3. The Level of Wild Smolt Production Based on the Proportions of Wild and Hatchery-Reared Fish in the Catches

In general, the percentage of wild salmon in the offshore and coastal fishery was smaller in 1983 compared to the previous year. These percentages seem to reflect the situation of increased hatchery-reared smolt released and decreasing wild smolt production which was shown by parr density studies in the rivers. In the coastal fishery, the percentage of salmon of wild origin is higher than in the offshore fishery.

Since the data available do not cover the entire Baltic Sea, however, they could not be utilized in an assessment.

D.4. The Distribution of the Baltic Salmon Stock between National Fishing Zones

The distribution of Baltic salmon between NFZs cannot be evaluated due to lack of information on the geographical distribution of effort from all countries.

The distribution of recaptures by NFZs from various tagging programmes are shown in Table D.2. These data reflect the combined effects of fishing effort, availability of salmon to the fisheries, stock distribution of salmon and tag reporting efficiency of the fishermen.

D.5. Data Sets Needed for Increasing the Accuracy of the Assessments

Cpue data should be collected from all salmon fisheries and they should be prepared uniformly to enable comparison of the national data sets. The cpue should be presented on a monthly basis by Sub-divisions as number of salmon (n)/100 drift-nets/day, n/1 000 long-line hooks/day and n/trap-net/day. The type of the trap net (traditional or "laxfälla-type") should be distinguished.

Results from electro-fishing in rivers with natural salmon and sea-trout production should be collected to enable more precise estimates of natural smolt production. Statistics of breeding fisheries should be collected and presented uniformly.

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 and hatchery-reared salmon and possible differences in their behaviour.

Data on A.+ salmon from, e.g., taggings and catch statistics (discards) should be collected to increase the knowledge about their behaviour and growth. This would enable advice on minimising the discards.

The abundance of sea trout and rainbow trout in the salmon catches should be investigated and the catch statistics of these species should be made more reliable. Data on production of wide-migrating and short-migrating sea trout stocks should be collected and presented separately.

The effect of using different lengths of the gangings in the long-line fishery on size of salmon caught and on by-catches of cod should be investigated.

The development of materials, dimensions and methods in drift-net, long-line and trap-net fisheries in the Baltic Sea should be studied if possible changes have any effect on the cpue.

The wide use of coded wire taggings combined with fin clipping of the adiposal fin is under consideration. The program is crucially dependent on the joint cooperation of all countries with a Baltic salmon fishery and, more important, with those countries which release smolt to the Baltic Sea.

Table A.1. Nominal fish catches in the Baltic from 1973-82 (in '000 tonnes). (Data as officially reported to ICES.)

Species	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Cod	189	189	234	255	213	196	273	392	383	366
Herring	404	407	415	393	413	420	459	465	432	453
Sprat	213	242	201	195	211	132	78	58	47	48
Flatfish	18	21	24	19	22	23	24	19	17	17
Salmon	2.7	2.9	2.9	3.1	2.4	2.0	2.3	2.5	2.4	2.3
Freshwater species	23	21	20	21	22	22	20	21	19	18
Others	55	54	60	46	42	44	47	29	31	30
Total	905	937	957	932	925	839	903	987	931	934

Footnote: Anadromous species, except salmon, not included.

Table A.2. Nominal catch (tonnes) of HERRING in Divisions IIIb,c,d, 1963-82. (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
1982	40 289	85 000	50 868	8 928	76 329	92 675	99 175	453 264

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 IIIb,c,d, 1963-82.
(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
1982	6 663	4 550	1 086	581	14 188	1 890	18 866	47 824

a) Including Division IIIa.

Table A.4. Nominal catch (tonnes) of COD in Divisions IIIb,c,d, 1963-82.
(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)]
1982	98 230	8 126	11 368	19 247	92 541	44 807	86 906	365 525[d)]

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.

d) Includes catches by the Faroe Islands of 4 300 tonnes.

Table A.5. Nominal catches (tonnes) of FLATFISHES in Divisions IIIb,c,d, 1963-82. (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
1982	5 818	421	3 608	543	4 214	250	2 596	17 450

a) Including Division IIIa.
b) Excluding subsistence fisheries.

Table B.1.1. Recent catches[1] of HERRING and TAC's in thousand tonnes

Year / Sub divs	1977 Rec. TAC	1977 IBSFC TAC	1977 Actual catch	1978 Rec. TAC	1978 IBSFC TAC	1978 Actual catch	1979 Rec. TAC	1979 IBSFC TAC	1979 Actual catch	1980 Rec. TAC	1980 IBSFC TAC	1980 Actual catch
22-24			75			78	68		94	68		109[4]
25,26			152	290		142	115		168	118		145[4]
27,28[3],29S			68			73	65		63	61		71
G.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 Rec. TAC	1981 IBSFC TAC	1981 Actual catch	1982 Rec. TAC	1982 IBSFC TAC	1982 Actual catch	1983 Rec. TAC	1983 IBSFC TAC	1983 Actual catch[2]
22-24	71		100[4]	70[6]		115			115
25,26,27	115		165[4]	130[7]		179			174
28[3],29S	28		35	28[7]		44			48
G.of Riga	15		17	12[8]		13			15
29N,30 (E)	62[5]		49	63[7]		55			57
31 (E)			8			9			9
29N,30,31(W)			8	8[6]		8			10
32	50		45	45		45			51
Total	341[5]	418.6	427	356	445	468		474.9	479

1) Working Group data
2) Preliminary
3) Excl.Gulf of Riga
4) Danish catches in Sub-div.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

Table B.1.2. HERRING catches in the Baltic Sea by countries and Sub-divisions, 1982 and 1983 (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
1982													
Denmark[2)]	48 693	11 603	7 139	14 653	15 298								
Finland	85 000	-	-	-	-	-	-	-	168	36 097	19 097	8 722	20 986
German Dem.Rep.	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	97 070		2 460	8 420	39 550	340	32 150	7 380	570	3 800	1 730	670	-
USSR	99 175				8 958	18 006		21 435	27 187				23 589
Total	468 110	20 384	9 599	87 135	108 506	38 975	32 150	28 815	27 925	39 897	20 757	9 392	44 575
1983													
Denmark[2)1)]	42 422	17 928	4 237	8 706	11 551								
Finland	89 000	-	-	-	-	-	-	-	-	35 100	21 700	8 500	23 700
German Dem.Rep.[1)]	51 991	1 268	-	49 471	880	-	372	-	-	-	-	-	-
Germany, Fed.Rep.	8 843	6 603	-	1 292	948	-	-	-	-	-	-	-	-
Poland	83 741	-	-	16 686	47 431	19 624	-	-	-	-	-	-	-
Sweden	90 615	-	2 416	6 536	26 592	168	37 811	6 117	1 489	6 393	2 397	696	
USSR	112 370				3 024	26 020		30 413	25 118				27 795
Total	478 982	25 799	6 653	82 691	90 426	45 812	38 183	36 530	26 607	41 493	24 097	9 196	51 495

1) Preliminary

2) Split between Sub-divisions 24 and 25 is based on where the landings take place

Table B.2.1. Recent catches of SPRAT and TAC's in thousand tonnes.

Year	1977			1978			1979			1980		
Sub-division	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, 25			36			22	34		17	17		13
26, 28			85			73	80		32	46		26
27, 29-32			60			38	41		31	14		20
Total	240	275	181	210	184.3	133	155	161	80	77	80.5	59

Year	1981			1982			1983		
Sub-division	Rec. TAC	IBSFC TAC	Actual catch	Rec. TAC	IBSFC TAC	Actual catch	Rec. TAC	IBSFC TAC	Actual catch
22, 24, 25	15		14			14			14
26,28	31		18			24			13
27, 29-32	14		17			11			9
Total	60	60	49	0	47.9	49	0	47.9	37

Table C.1.1 Total Catch of COD by countries. Sub-divisions 22-32

Year	Denmark	Finland	German Dem.Rep.	Germany, Fed.Rep.	Poland	Sweden	USSR	Total
1965	35 313	23	10 680	15 713	41 498	21 705	22 420	147 352
1966	37 070	26	10 589	12 831	56 007	22 525	38 270	177 318
1967	39 105	27	21 027	12 941	56 003	23 363	42 980	196 446
1968	44 109	70	24 478	16 833	63 245	24 008	43 610	216 353
1969	44 061	58	25 979	17 432	60 749	22 301	41 580	212 160
1970	42 392	70	18 099	19 444	68 440	17 756	32 250	198 451
1971	46 831	53	10 977	16 248	54 151	15 670	20 910	164 840
1972	59 717	76	13 720	15 516	57 093	16 471	30 140	192 733
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	91 594	8 126	11 368	21 860	92 541	46 548	86 906	365 063
1983*	108 504	6 100	10 521	25 154	76 474	53 740	92 248	372 741

*provisional data

Table C.1.2 Total Catch of COD in Sub-divisions 22, 23 and 24

Year	Denmark			German Dem.Rep.		Germany, Fed.Rep.		Sweden		Total		
	22	23	24	22	24	22	24	23	24	22	23	24
1965	13 863		5 594	3 494	6 211	10 510	3 020		2 182	27 867		17 007
1966	14 412		6 088	3 918	4 475	9 534	1 914		2 110	27 864		14 587
1967	13 266		5 915	4 188	5 819	11 421	1 463		1 996	28 875		15 193
1968	15 789		6 804	5 097	7 263	12 025	2 790		2 113	32 911		18 970
1969	14 690		5 912	4 177	3 342	10 215	2 502		1 413	29 082		13 169
1970	14 378		5 707	4 495	3 501	12 490	2 099		1 289	31 363		12 596
1971	16 831		6 884	3 602	4 405	11 686	1 796		1 419	32 119		14 504
1972	17 717		7 928	4 560	5 105	10 531	1 782		1 277	32 808		16 092
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	11 609	1 365	7 469	1 787	8 828	7 394	666	140	7 933	20 790	1 505	24 896
1983*	14 051	977	7 968	1 441	7 656	8 937	323	120	6 910	24 429	1 097	22 857

*Provisional data

Table C.1.3 Total catch of COD in Sub-divisions 22 - 32.

Year \ Area	DENMARK				FINLAND				FEDERAL REPUBLIC OF GERMANY					GERMAN DEMOCRATIC REPUBLIC						
	22	23	24	25-28	29	30[2]	31	32	22	24	25	26	28	22	24	25	26	27	28	29
1971	16 831		6 884	23 116		53			11 686	1 796	1 300	1 466		3 602	4 405	1 950	983		37	
1972	17 717		7 928	34 072		76			10 531	1 782	3 193	10		4 560	5 105	1 950	2 072		33	
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	707	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	11 669	1 638	746	71 151	4 557	1 368	42	2 159	7 394	666	13 069	662	69	1 787	8 828	-	728	-	25	-
1983[1]	14 051	977	7 968	85 508	2 937	613	12	2 538	8 937	323	14 179	1 599	116	1 441	7 656	-	1 402	-	22	-

Year \ Area	POLAND		SWEDEN									USSR						Total
	25[4]	26	23	24	25	26	27[3]	28	29	30	31	25	26	27	28	29	32	
1971	27 581	26 570		1 419	13 132		833	240		46			16 115		4 795			164 840
1972	24 926	32 167		1 277	13 842		876	440		36			23 951		6 189			192 733
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	360 743[4]
1983[1]	35 153	41 321	120	6 910	27 630	1 810	6 490	9 200	1 260	320	-	-	33 600	-	39 464	6 095	13 089	359 829[5]

1) Provisional
2) Finland 1971-1974 Sub-divisions 29-32 combined
3) Sweden 1971-1974 Sub-divisions 27 and 29 combined
4) Poland some by-catches from 24 included
5) Sum of figures used in assessments

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
1965	15 856	23	975	2 183	41 498	19 523	22 420	102 478
1966	16 570	26	2 196	1 383	56 007	20 415	38 270	134 867
1967	19 924	27	11 020	1 057	56 003	21 367	42 980	152 378
1968	21 516	70	12 118	2 018	63 245	21 895	43 610	164 472
1969	23 459	58	18 460	4 715	60 749	20 888	41 580	169 909
1970	22 307	70	10 103	4 855	68 440	16 467	32 250	154 492
1971	23 116	53	2 970	2 766	54 151	14 251	20 910	118 217
1972	34 072	76	4 055	3 203	57 093	15 194	30 140	143 833
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	29 860	164 872
1978	30 266	1 437	2 260	4 270	69 319	14 463	37 200	154 009
1979	34 350	2 938	1 403	9 777	79 754	20 593	75 034	223 849
1980	49 704	5 962	1 826	11 750	123 486	29 291	124 350	346 369
1981	68 521	5 681	1 277	7 021	120 001	37 730	87 746	328 877
1982	71 151	8 126	753	13 800	92 541	38 475	86 906	311 752
1983*	85 508	6 100	1 424	15 894	76 474	46 710	92 248	324 358

*provisional data

Table D.1. Annual nominal catches in tonnes of Baltic SALMON in 1973-83. S = Sea, C = Coastal, R = River.

Sub-division	Baltic Main Basin 24-29							Gulf of Bothnia 30-31						Gulf of Finland 32				Total
Nation	Denmark	Finland	Germany, Fed.Rep.	Poland	Sweden	USSR		Denmark	Finland		Sweden			Finland		USSR		
	S	S	S	S	S	S	C/R	S	S	C	S	C	R	S	C	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	282	17	0	190	157	26	242	35	65	1	5	2	2 651
1982	597	212	20	38	375	275	31	0	177	133	-	135	30	102	27	-	5	2 157
1983*)	621	154	25	76	370	362	105	0	215	140	-	140	32	120	30	-	2	2 392

*) Preliminary data.

See annotations on next page.

Annotations to Table D.1.

Five percent of the Swedish catches in 1983 stated for the Main Basin have been taken in Sub-division 30.

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 ungutted = 1.0972 W gutted estimated by Thurow (1965).

Data from Denmark, Federal Republic of Germany, Finland and the USSR include sea trout of an order of 3%, 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 Bothnia and the Main Basin include 6% non-commercial catches. In the Gulf of Finland such catches comprise about 25% of the total yield.

Table D.2. Distribution of salmon tag returns on fishing zones in percents of total number returns. Stocking year excluded.

National zone	Releasing place (country and Sub-division), and stocking year							
	Sweden	F i n l a n d					USSR	Poland
		30[1]	30[2]	31	31	32		
	1969 -72	1979-83	1979-83	1969-76	1977-80	1976-83	1970-76	1960-62
Denmark	4.6	2.5	31.1	4.0	11.8	5.3	8.8	16.7
Finland	6.2	88.7	44.8	37.0	40.8	90.4	21.8	8.3
German Dem.Rep.	0.8	-	0.6	0.1	0.6	0.1	-	-
Poland	9.0	-	1.9	4.2	2.2	-	2.6	33.3
Sweden	55.7	8.8	16.2	35.6	24.6	2.0	38.0	29.2
USSR	10.0	-	2.6	8.2	8.5	1.3	28.8	12.5
White zone	13.7	-	2.8	10.9	11.5	0.9	-	-
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1) River Neva stock

2) River Iijoki stock

Figure B.1.2.1.1. FISH STOCK SUMMARY (Stock) HERRING Sub-divisions 22 + 24

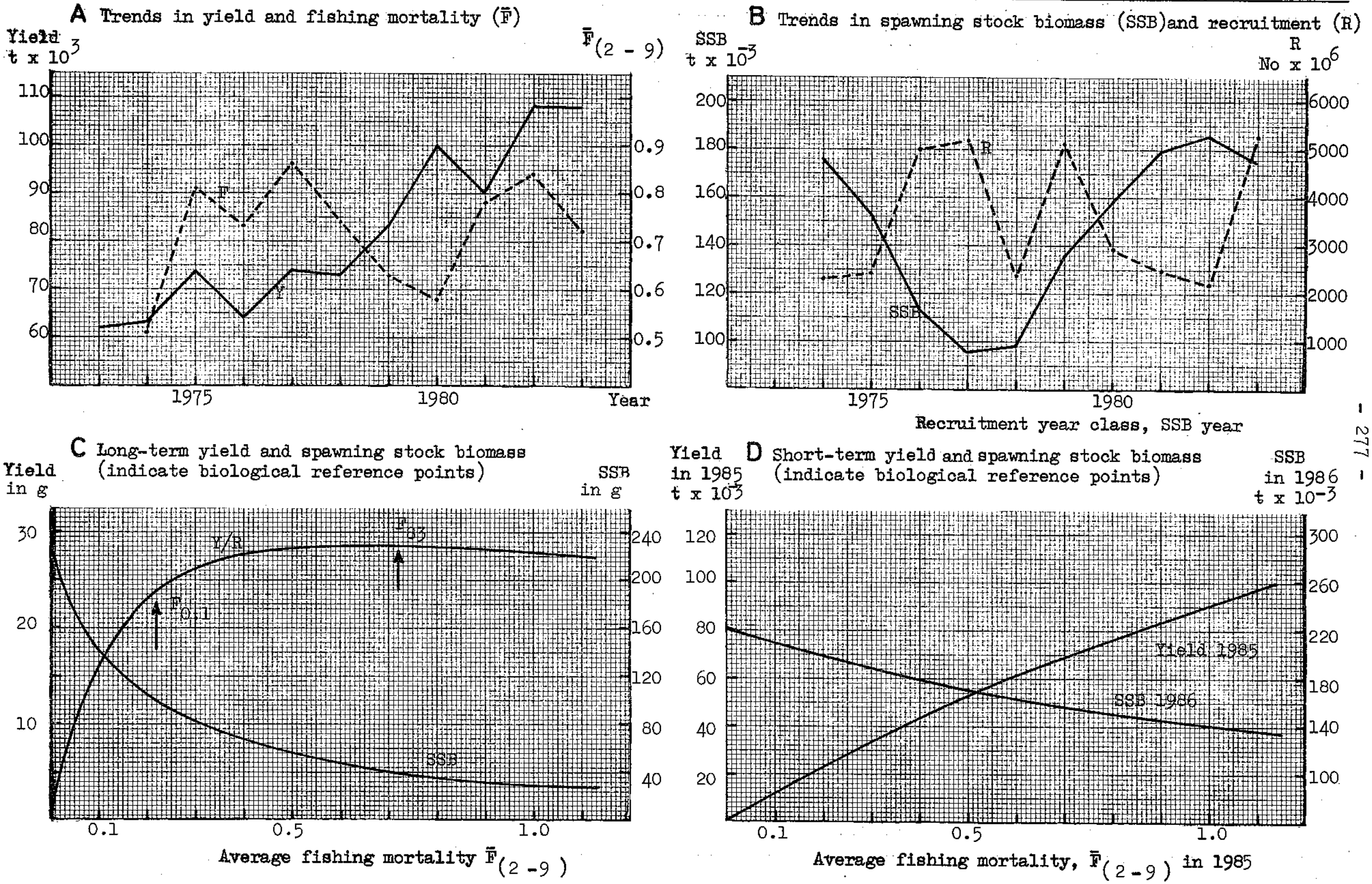


Figure B.1.2.2.1. FISH STOCK SUMMARY (Stock) HERRING - Southern Central Baltic

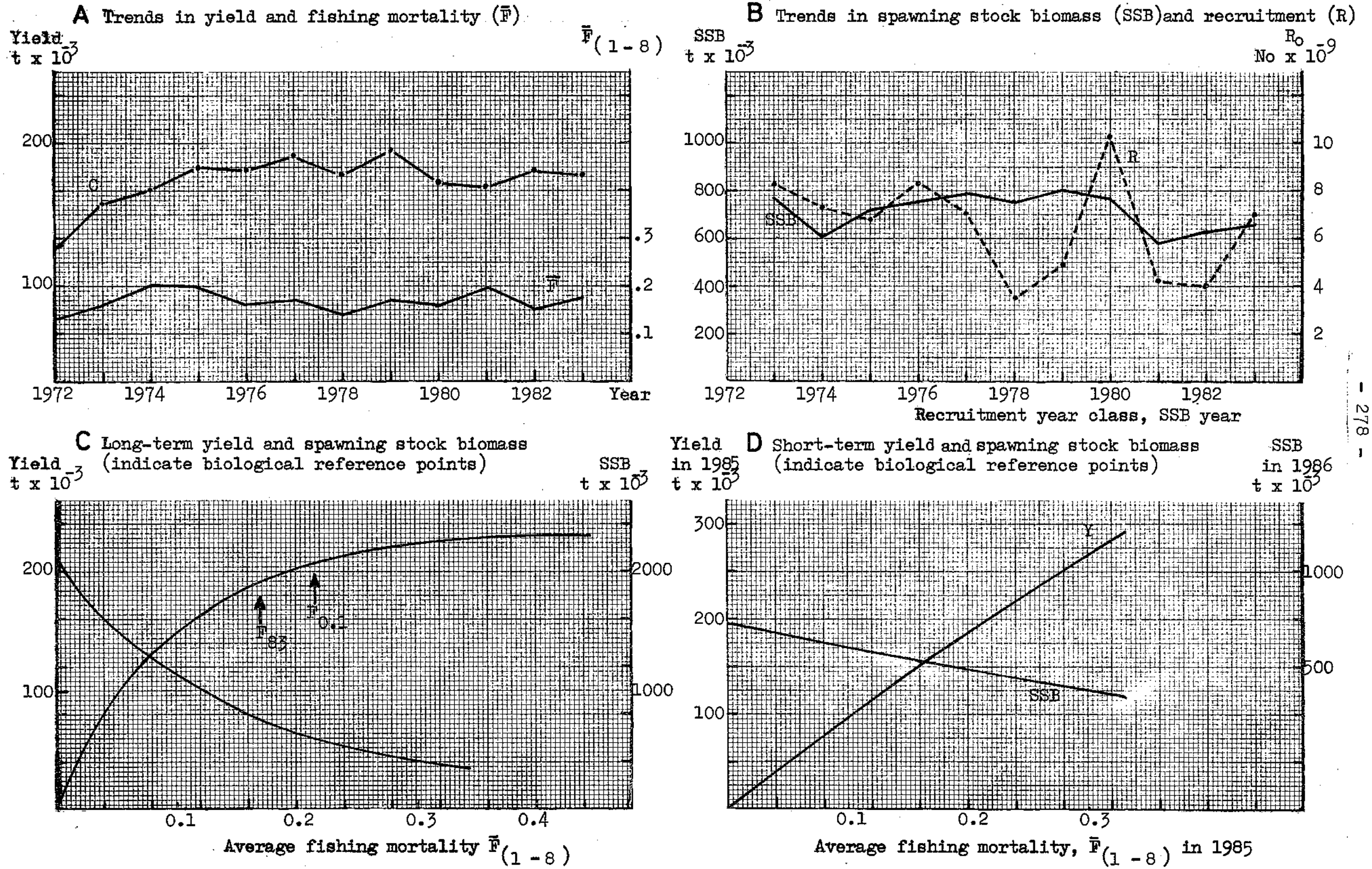


Figure B.1.2.3.1. FISH STOCK SUMMARY (Stock) HERRING in the Gulf of Riga

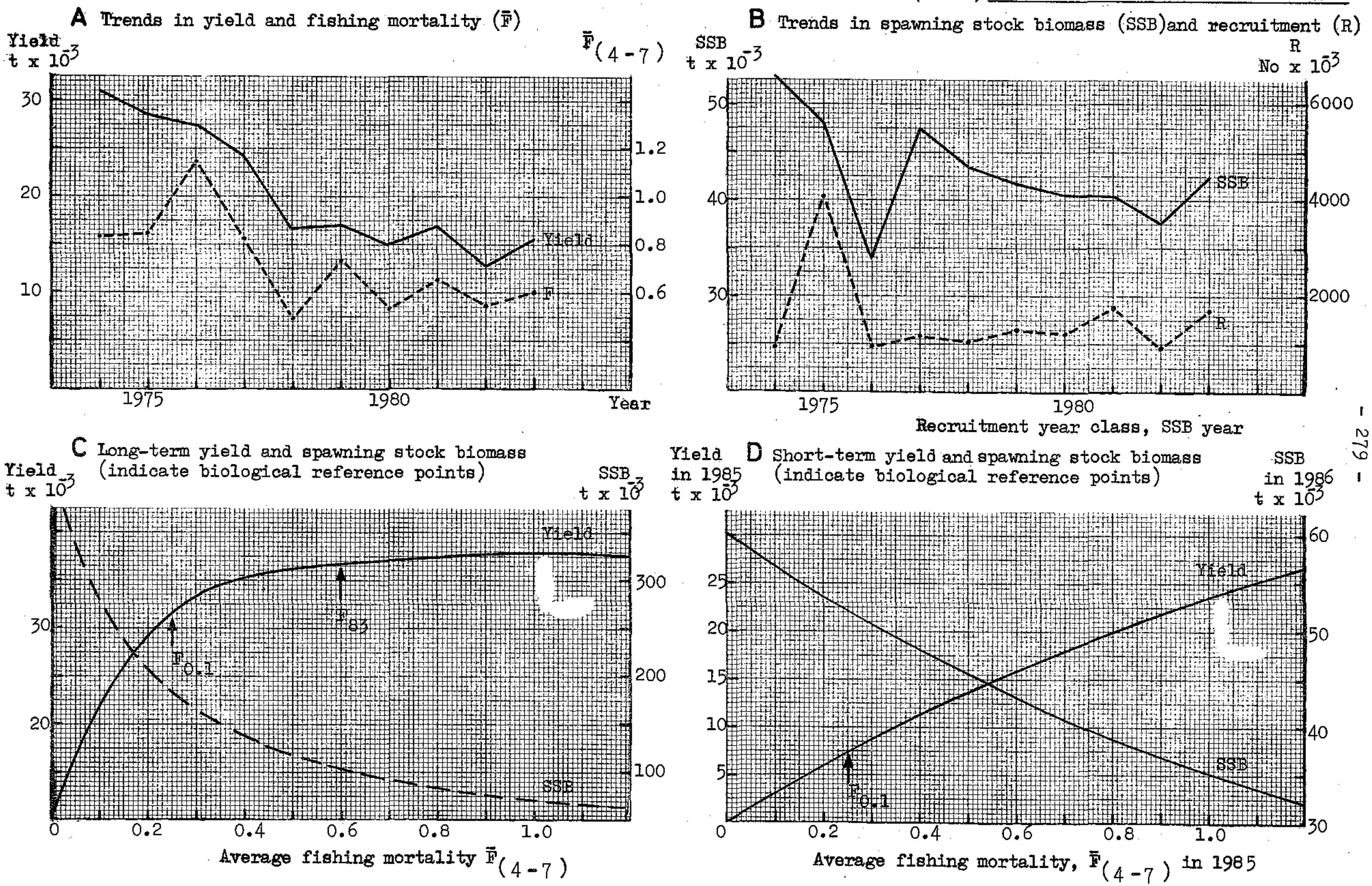


Figure B.1.2.5.1. FISH STOCK SUMMARY (Stock) HERRING - Bothnian Bay(E) (31E)

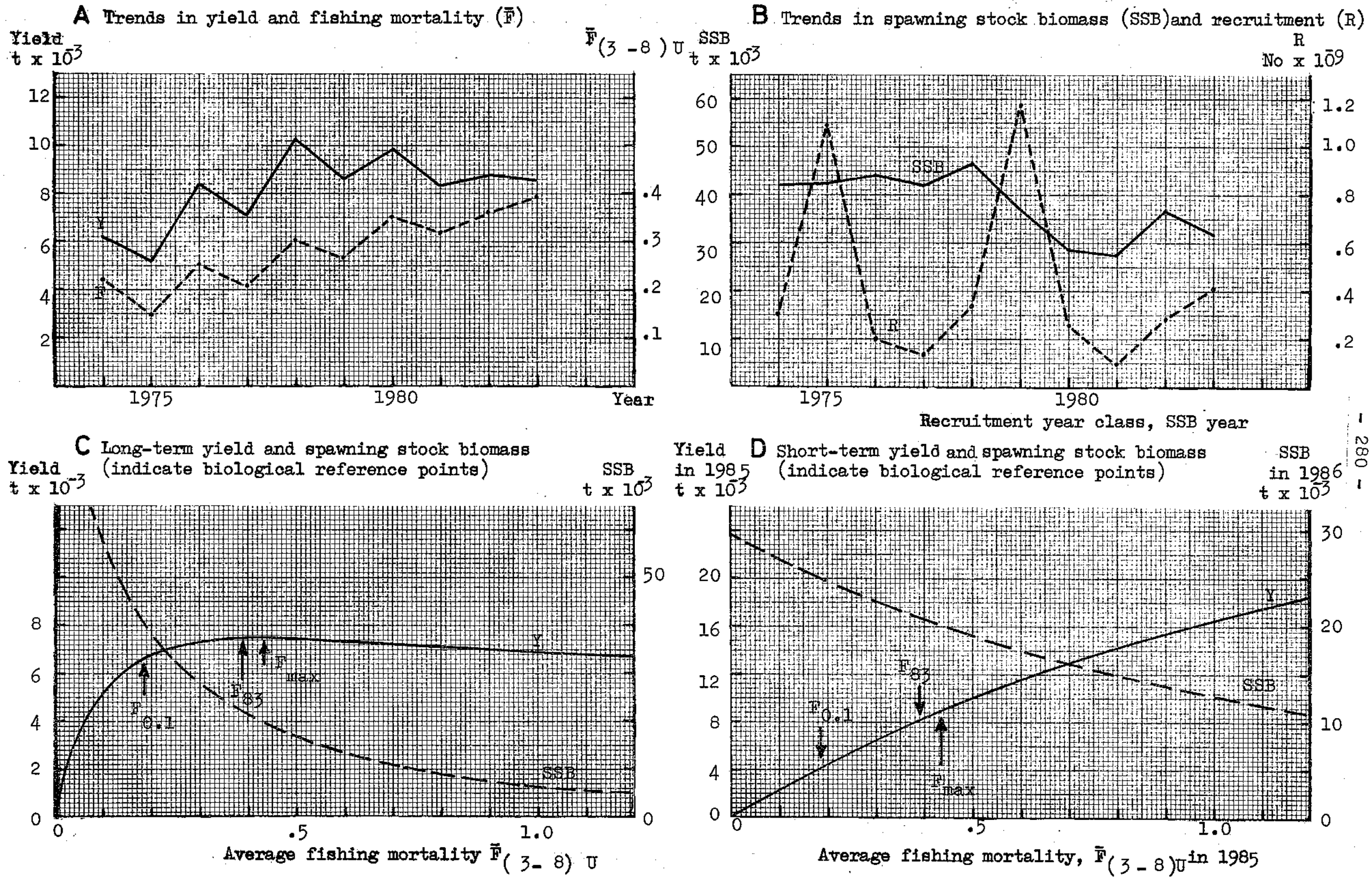


Figure B.2.1. SPRAT catches ('000 tonnes) in 1965-83 (data from Working Group reports, corrections for by-catches taken into account).

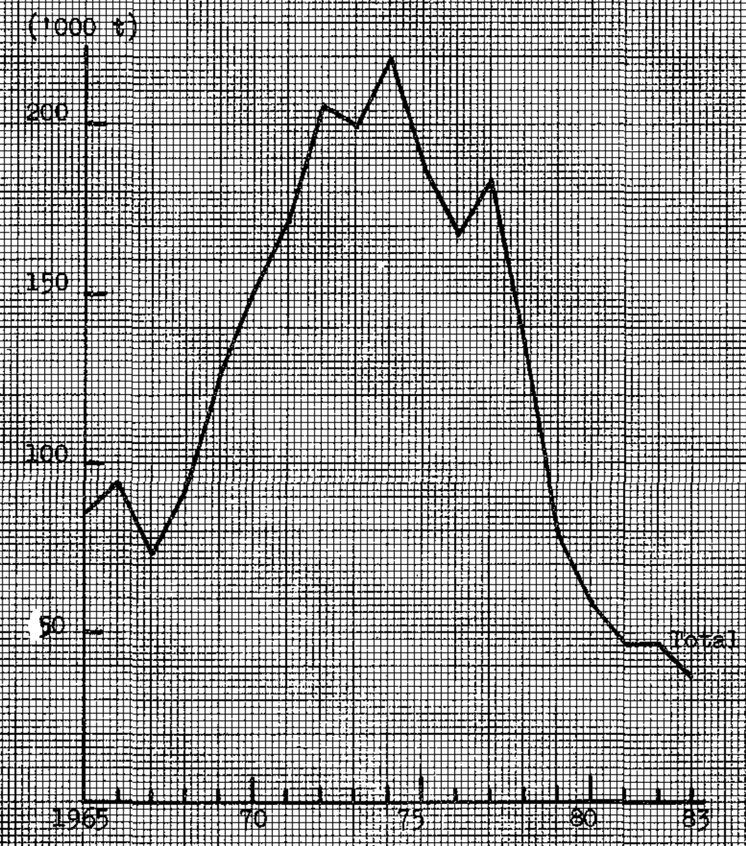


Figure C.1.1 FISH STOCK SUMMARY (Stock) COD. Sub-divisions 22 and 24

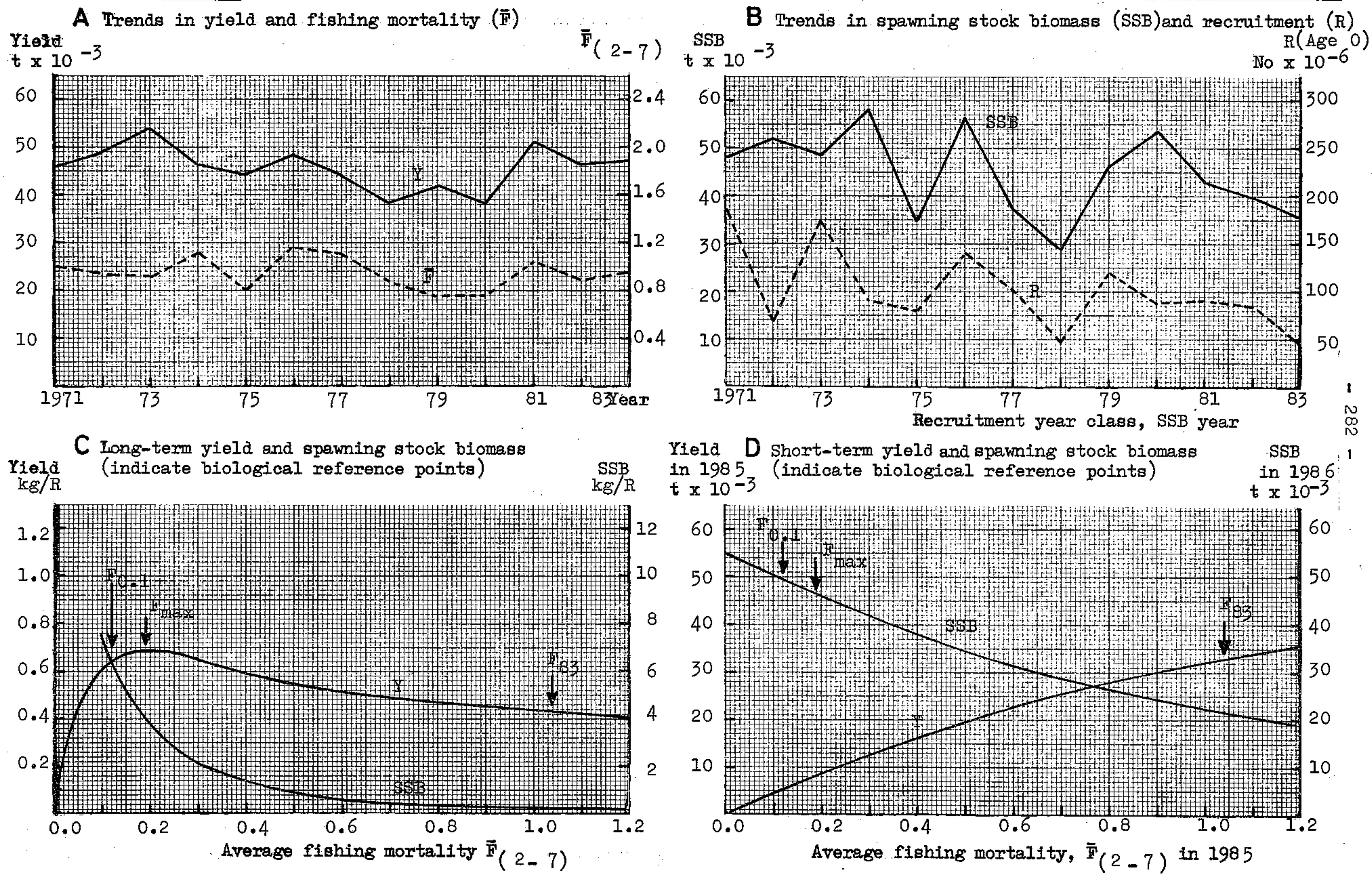


Figure C.2.1 FISH STOCK SUMMARY (Stock) COD. Sub-divisions 25-32

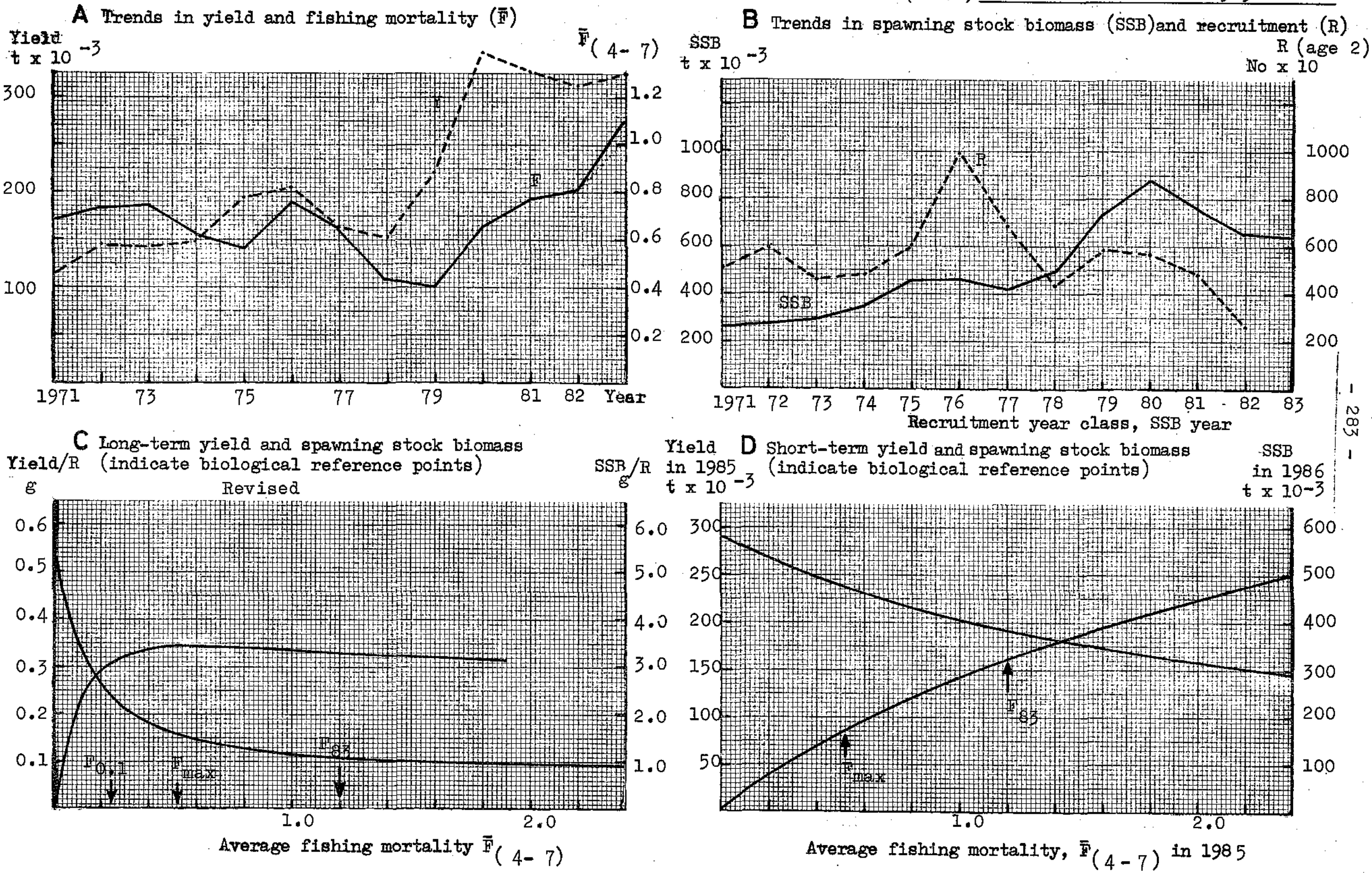
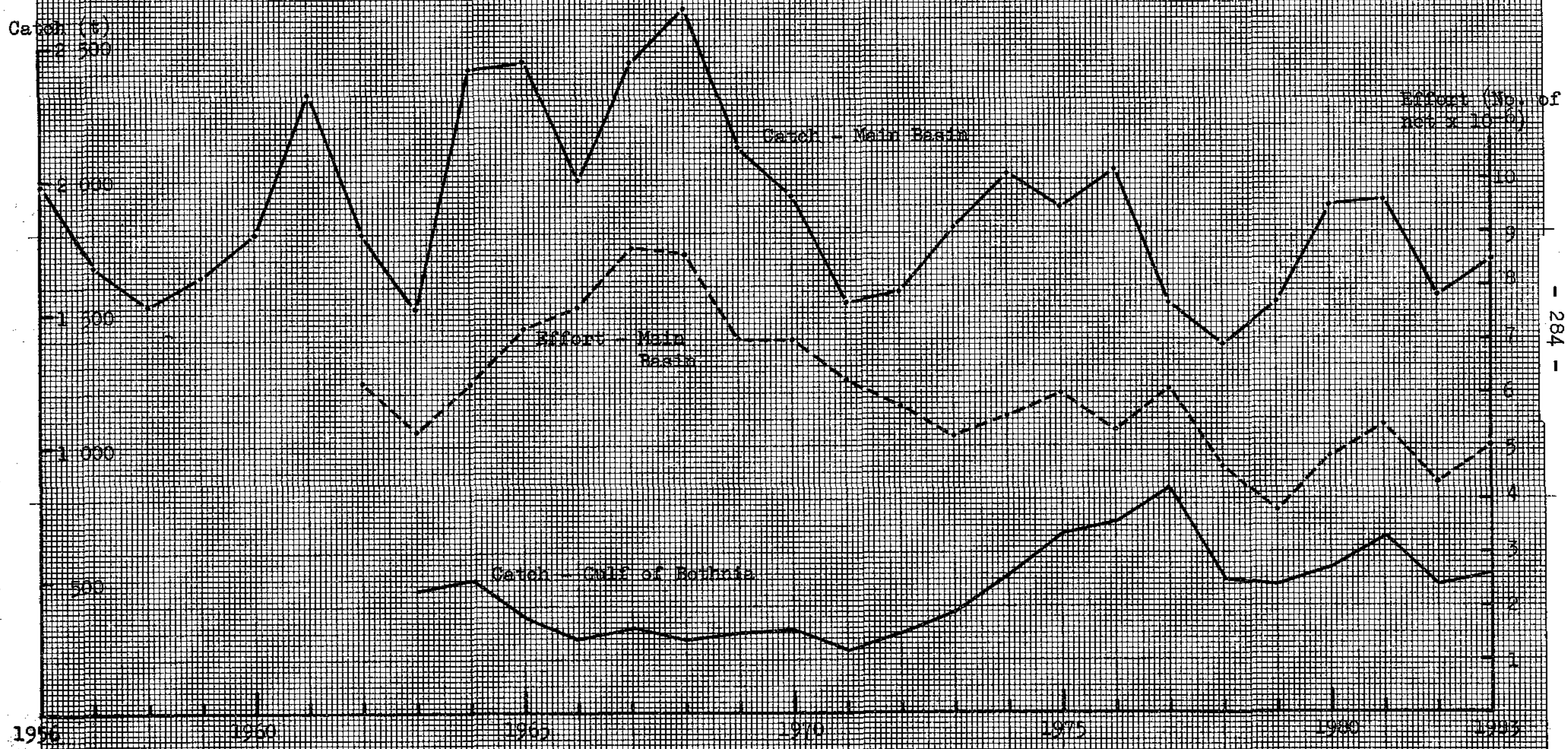
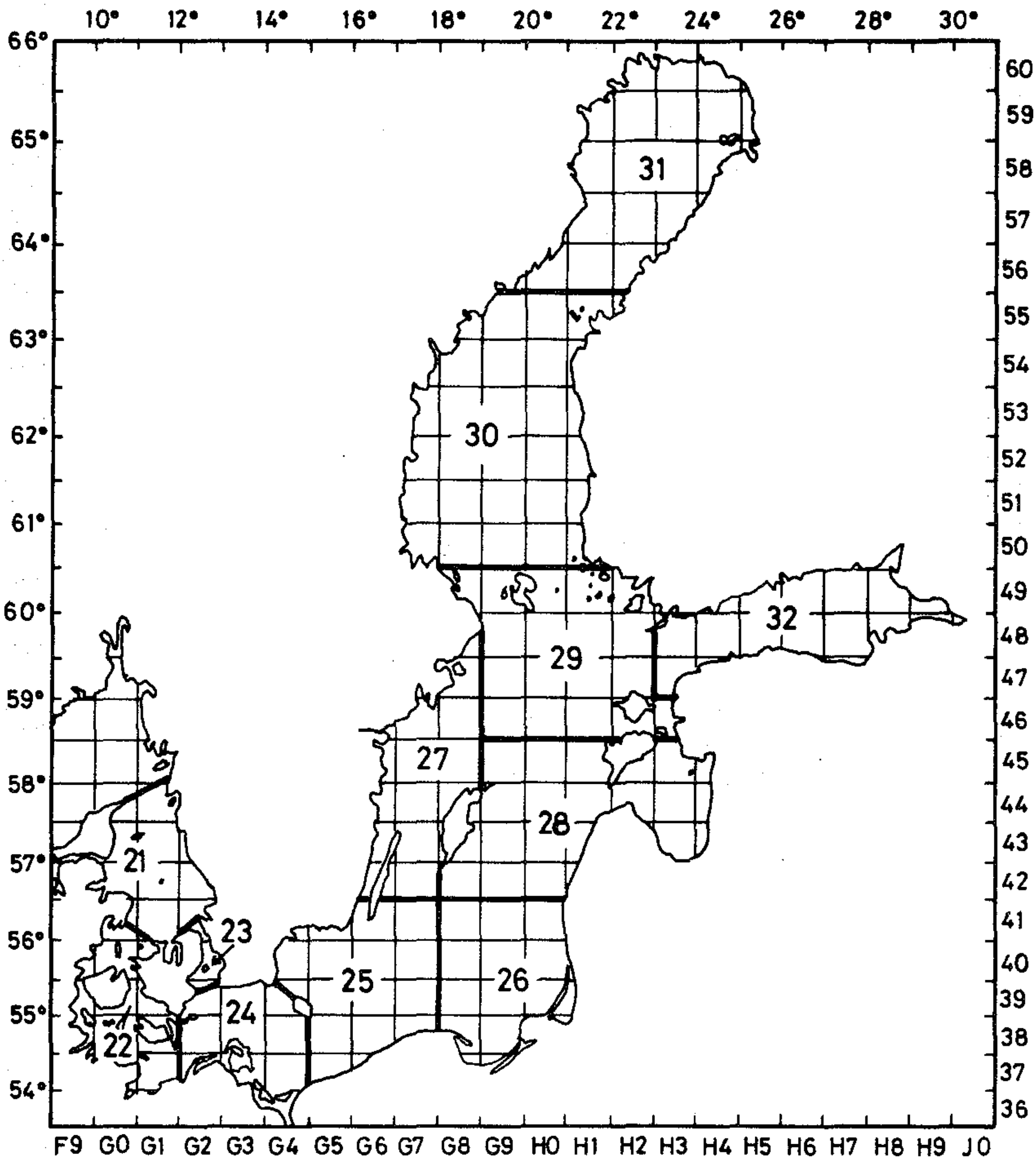


Figure D.1. Nominal catch of SALMON in the Baltic Main Basin and the Gulf of Bothnia, and effort of the offshore salmon fishery with drifting gear in the Main Basin (long-line effort converted to drift-net effort).





ICES 27.3.03.00 (Baltic)

REPORT TO THE NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION COUNCIL

A. REVIEW OF NORTH ATLANTIC SALMON CATCHES

Table A.1 presents annual catches in home waters of North Atlantic salmon, 1960-83, the catches for 1983 being provisional. Total catches continued to decline to well below the 1980 level of 8 000 tonnes, but the 1983 catch may not be less than that of 1982 when provisional figures are finalised. Canadian catches experienced a sharp decline from 1 800 tonnes in 1982 to 1 400 tonnes in 1983.

B. THE SALMON FISHERIES IN THE NORTH ATLANTIC

B.1 North-East Atlantic

B.1.1 Effects of the fishery in the Norwegian Sea and Faroes Area on home waters

No additional calculations were carried out for the fishery north of the Faroes zone for which no new data were available.

Description of the Faroes and Norwegian Sea fisheries

Table B.1.1.1 shows nominal catches taken in the northern Norwegian Sea between 1965 and 1983. Catches increased rapidly in the late 1960s to over 900 tonnes and then declined gradually through the 1970s to around 200 tonnes. In 1982 and 1983, catches increased again to about 600 tonnes and 400 tonnes, respectively, as a result of increased fishing by Faroese vessels. The data in Table B.1.1.2 show that from a moderate catch in the Faroes area in the mid-1970s the fishery escalated substantially from 1979 to reach a yield of over 1 000 tonnes in 1981. In 1982 and 1983, a quota of 625 tonnes was applied to this fishery.

In the seasons 1980/81 and 1981/82, no area restrictions were imposed on the salmon fishery in the Norwegian Sea. In these years, only a few fish were caught in October and November and at this time of year the fishery was confined close to the Faroe plateau. The fishery in January is very dependent on weather conditions, and there have been considerable differences between the catches in recent years. In January 1982, a relatively good fishery took place over a large area in the Norwegian Sea. As the 1980/81 and 1981/82 seasons proceeded, the fishery extended as far as 71°N, but in the 1982/83 season the Faroese vessels were restricted to the Faroes fisheries zone. The fishery was good in February – March and April 1983, and a number of vessels had taken their quota by the end of April. However, some vessels which started late continued fishing into May and June.

Assessment of the effect of the fishery at the Faroes

To estimate the total losses to European home water stock for each tonne landed in the Faroese fishery, the same model was used as in previous assessments. This takes into account non-catch fishing mortality, differences in weight between salmon in home waters and the Faroes, the age distribution and time of return of different sea-age classes and their survival rates. The results of this assessment suggest that for each tonne of salmon landed in the Faroes fishery, about 1.6 tonnes are lost to stocks returning to European home waters. The approximate nature of some of the parameter values and the possibility of annual variation of all parameters should be noted. Therefore, the value of 1.6 tonnes lost to home waters for each tonne of salmon caught in the Faroes fishery estimated above must be considered approximate.

Research requirements

Tagging:

It was agreed that feasibility studies should be carried out using the material now available from home waters to determine whether the stocks of salmon at the Faroes are likely to be separated using scale discrimination techniques before undertaking any large tagging experiment at the Faroes. Further scale samples from home water stocks known to be contributing to the fishery at the Faroes should be supplied to the Scottish laboratory to provide a larger data base on which to base future analyses.

Feasibility studies were called for on the use of smolt tagging to establish exploitation rates for monitored rivers and their use in obtaining material for discriminant analysis.

Results of any studies which would help in assessing the relative merits, including feasibility and costs, of smolt tagging programs and a program of tagging in the sea should be made available.

Sampling programs:

Because no parameters used in the current assessment model were brought forward which could not be studied by modifications to the shore-based sampling program, it was recommended that the observer program at sea be suspended. Tissue and blood sampling programs were both at a stage at which no further samples were required unless further research offered opportunities for improved discrimination between stocks and identification of maturity status, respectively.

Given a suspension of the observer program at sea, the market sampling program at the Faroes should be expanded. Scanning for micro and other tags should be continued for at least 5 years at the Faroes to permit recovery of tags from 1984 and 1985 smolts.

B.1.2 Exploitation and fishing mortality on Salmon stocks in the North-East Atlantic Commission Area

Estimates of exploitation rates, based on tagged fish, were presented for some home water fisheries in Norway, Scotland, Iceland and Ireland. A tagging experiment in Norway also led to an estimate of the exploitation rate of the Norwegian Sea salmon fisheries, including that at the Faroes. The exploitation rate U is defined as the number of fish caught in a fishery divided by the number of fish available.

Tables B.1.2.1 and B.1.2.2 present the results from a Norwegian tagging experiment, involving the release of Carlin-tagged wild and hatchery-reared smolts at the mouth of the River Imsa (south-western Norway). The hatchery-reared fish were derived from nine parent stocks, including the stock native to Imsa. On return to the River Imsa, all ascending adult fish were captured in a trap at the river mouth. Observations available to date refer to fish returning to home waters as one-sea-winter fish in 1982 and as two-sea-winter fish in 1983. Table B.1.2.1 shows exploitation rates of 49% to 99% on returning one-sea-winter fish and 70% to 100% on two-sea-winter fish. Published estimates for several years between 1950 and 1974 for the Laerdalselv River, using counts of spawning salmon, varied from 43% to 92%, while published estimates for 1964-74 for the River Eira, based on redd counts, varied from 40% to 83%*).

Table B.1.2.2 shows estimated exploitation rates in the Norwegian Sea derived from the River Imsa tagging described above. They are less than 10% for one-sea-winter fish and vary from 0% to 68% for two-sea-winter fish. The relationship between exploitation rate estimates of size of returning salmon suggests a size-selective fishery.

Table B.1.2.3 shows estimated exploitation rates in various Scottish fisheries for periods between 1952 and 1983, based on tagging and release of returning salmon caught in coastal bag nets. Fish caught by fixed engines were assumed unavailable to river sweep-net fisheries and fish caught by both coastal net fisheries were unavailable to rod and line fisheries.

Exploitation rates for the North Sea net and coble fishery from 1976-83 varied from 42% to 53% on one-sea-winter salmon and from 39% to 63% on multi-sea-winter fish. Corresponding estimates for 1983 for the River Spey were 11% ± 3% for net and 7% ± 3% for rod and reel.

Data relating to Icelandic rivers have been published. In two of these rivers there is both a net and rod fishery and in one case, escapement has been estimated using a resistivity fish counter. In the other two rivers, rod fishing is the only method of capture and in one case, escapement has been estimated using a mechanical fish counter. The exploitation rate on the two rivers with fish counters has been calculated from the escapement and reported catches. Natural mortality during the period that fish are available to the fishery, and non-catch fishing mortality were considered negligible. Exploitation rates on the other two rivers were calculated from mark-recapture experiments, making similar assumptions to those previously described for Scottish coastal tagging experiments. The resulting figures ranged from approximately 0.2 (rod fishery) to 0.85 (rod and net fishery).

Unpublished results of a smolt tagging experiment for one Irish river system, the Burrishole, were reported verbally to ACFM. Data are at present available from a single year (1982) and suggest an exploitation rate on this stock greater than 80%.

Data from a Swedish tagging study of hatchery-reared smolts released on the west coast of Sweden showed a high exploitation rate by Norwegian home water fisheries on returning fish from the experiment. Quantitative data were not available to the Working Group.

Conclusions

ACFM noted that the above estimates were directly applicable only to the years and areas from which they were calculated. It appears that a wide range of exploitation rates occur in home water fisheries in the North-East Atlantic, ranging from a few percent

*) The range of estimated total exploitation rates on the River Eira stock in Norwegian waters was 78% to 97%.

to over 90%. The exploitation rates estimated for Scottish fisheries showed a wide range between areas, but were relatively stable between years at the same site. The estimated exploitation rates from Norwegian studies were high, although ACFM recognised that the exploitation rates on stocks in Norway other than those reported could be quite different. Data from studies of four Icelandic fisheries resulted in a range of exploitation rate estimates from 20-85%. The lowest figures were obtained for western Scotland, the highest for fish released in the River Imsa (southwest Norway).

Data deficiencies and needed research

ACFM recommends that estimates of exploitation rates for areas where they are not currently available should be obtained. The estimates should include figures for non-catch fishing mortality in home waters. Estimates should also include figures for illegal fisheries and non-reporting of legal catches. It would be preferable if these could be collected from carefully chosen rivers, which, taken together, would be representative of the exploitation rate in home waters and contributions to sea fisheries.

B.1.3 Options for Total Catches within Safe Limits

The problems of estimating a Total Allowable Catch (TAC) for salmon were examined in detail by ACFM in 1982. The parameters which would be required for a TAC assessment were re-examined at the May 1984 meeting of ACFM, and all new information available to these parameters was evaluated.

Recruitment

Little new information was describing stock/recruitment relationships for Atlantic salmon stocks. In addition to the requirement for data relating to such relationships discussed in 1982, ACFM recognised that TAC assessments would require estimates of recruitment into the exploited phase of the life cycle. Research is currently being undertaken by the Scottish laboratory with the aim of evaluating total annual Scottish smolt production. Although such an approach widely adopted could provide a basis for the assessment of recruitment, it may not be possible to provide such estimates annually, and the possibility of significant fluctuations in post-smolt mortality should be noted. The calculation of a TAC within safe biological limits should, therefore, incorporate values for post-smolt mortality.

Growth

Some improvements have been made in the estimation of growth parameters for a limited number of stocks.

Migration

No new data were presented to the Working Group.

Natural mortality

No new data were available to the Working Group.

Stock composition

Information is required on the spatial and temporal distribution of stocks and biological characteristics of stocks. The ability to discriminate between salmon from different stocks in mixed fisheries is a necessary prerequisite to obtaining such information. Data relating to wild fish of known origin taken in the Faroese fishery are inadequate to allow satisfactory reference standards to be defined for this fishery for the development of a discriminant function.

Catch statistics

The catch statistics currently reported by most countries are nominal catches. For assessment purposes, these figures would need to be corrected for non-reporting of catches and non-catch fishing mortality. In addition, sex and sea-age composition are required for all landings.

ACFM concluded that the new information available was not adequate to vary its advice in 1982, and that it would not be possible at the present time to estimate and advise on a single TAC which would maintain the home water stocks and safeguard spawning within safe biological limits. At this time it is not possible to calculate a TAC for high sea fisheries for salmon in the North-East Atlantic due to the inadequacy of available data. In principle, a TAC is a desirable means of limiting the fishing mortality exerted in high seas fisheries and to achieve a target level of exploitation for them, but it is doubtful whether a single TAC would be a practicable method to adequately ensure spawning escapement within safe biological limits for stocks which are, at least in part, harvested in mixed stock fisheries operating either on the high seas or in home waters.

B.1.4 Distribution of salmon stocks - North-East Atlantic Commission Area

The information available to the ACFM comes from three main sources:

I. High seas fisheries,

II. Research vessel surveys,

III. Incidental observations and illegal fisheries.

Figure B.1.4 represents a synopsis of areas, where salmon have been found and does not imply their absence in the remainder of the Commission area.

High seas fisheries

The Norwegian and the Barents Seas are the only areas where high sea fisheries have taken place to any extent.

During the history of the high seas fisheries, the areas fished have varied widely. Compiling all areas fished, however, it appears that viable salmon fisheries have taken place in almost the entire Norwegian Sea from the Shetland-Faroe-Iceland Ridge up to at least 74°N and extending into the Barents Sea as far as Novaya Zemlya.

From tagging data some information, however, scarce, exist on the origin of stocks migrating to various parts of the Norwegian Sea. Of 1 757 salmon (mostly one-sea-winter fish) tagged at sea between 62°30' and 63°00'N and between 5°W and 7°W (i.e., just north of the Faroes) 89 were recaptured in home water fisheries. The distribution of the recaptures indicated that the majority of the tagged fish migrated to Scotland, Norway and Ireland and, to a lesser extent, England, Northern Ireland, Sweden and USSR.

Recaptures of salmon tagged as smolts in the Faroese fishery have confirmed that rivers in Norway, Scotland, Sweden, England and Ireland contribute to this fishery.

Despite the apparent mixing, within the Faroese zone, of salmon from Sweden, Scotland and Norway as shown by recaptures of fish tagged as smolts, the proportion of tags recovered per 10 fish caught appears to be higher to the north and northwest of the Faroes. This would imply that the salmon stocks are not randomly mixed within the Faroese area, which was found to be statistically significant ($p<0.001$). Further north in the Norwegian Sea, recaptures of salmon tagged as smolts originating from all European countries have been reported at least as far north as 70°N. The proportions of tag returns originating from Norway and USSR in relation to other European countries, however, appear to increase with latitude.

Research vessel surveys

Outside the Barents Sea and the Norwegian Sea, experimental fishery has been conducted in the Irminger Sea. In this experiment, salmon catches were widely distributed within this area. The catch per unit effort was less than that found in the West Greenland fishery. Based on scale characteristics, 21% of the salmon caught were of North American origin and 79% European.

Incidental observations and illegal fisheries

Salmon have been caught incidentally throughout the North Sea and the Irish Sea. Illegal fishing is known to have taken place as far as 50 nm of the northwestern Irish coast.

Data deficiencies and needed research

It was pointed out that a complete and general answer to the question of this section would require a costly research program. Answers could be given on some aspects with more modest programs if NASCO could elaborate on the kind of information required. As it is doubtful that a major program can be prepared in the near future, delay in feedback from NASCO on the kind of accuracy of the data required would not be serious.

B.1.5 Salmon biomass in the Faroese fishing zone

ACFM was not able to assess the salmon biomass in the Faroese fishing zone, nor to estimate the average weight gained, nor the level of feed consumed. No estimates of salmon biomass in the Faroese area were available, nor was there information on the duration of stay in the Faroese zone or the food consumed there.

The total stock of salmon in the Faroese area might be estimated from catch in number per unit effort, if better knowledge becomes available on the behaviour of salmon during the feeding season. At the present stage, however, there has been neither confirmation of the basic assumptions underlying the proposed model, nor estimation of values for the critical parameters entering the model, but an experiment based mainly on acoustic tagging of salmon might provide the lacking knowledge and permit an estimate of absolute stock. This approach will be evaluated by ICES, and NASCO will be advised of the results.

Data deficiencies and needed research

The deficiencies in data required to assess the salmon biomass in the fisheries zone of the Faroe Island and to estimate the average weight gained and the food consumed by salmon in this area were discussed. It was concluded that it was a complex question but could be approached in two ways:

1. Estimate average biomass and average instantaneous growth rate at a number of times during the year with no relation to immigration and emigration of individual fish,
2. Estimate biomass taking into account the duration of stay at the Faroes of individual fish, which would require, apart from data on abundance, data on duration of stay, size at time of arrival and departure, specific growth rates by sea-age class, stomach samples for feeding rate, food consumption and conversion rates. It would also be necessary to have estimates throughout the year and over the entire Faroe fisheries zone. These estimates would have to be ongoing to establish annual variation.

Estimates of salmon abundance could, in principle, be provided by refinements of the catch rate model described above, by tagging and possibly by acoustic surveys. Tagging programs are discussed on page 287.

B.1.6 Effects of harvesting salmon at different stages of their migration routes

Available information which could be used to describe the salmon migration routes is very scarce apart from in some inshore areas. The question could, therefore, only be answered in relation to the various fisheries. With regard to the Faroese fishery, the relative effect on returns to home waters is presented in the text table below. From this it appears that the highest relative losses occur when harvesting young fish which would have matured one year later and the least when harvesting older fish which would have matured the same year.

Assessment of the relative effects on returns to home waters of harvesting salmon at different stages of their migration routes

Age at catch	Age at home	Relative loss
1	1	1.77
1	2	3.12
2	2	1.40
2	3	2.19
3	3	1.29
3	4	1.47

Within the Commission area there are a number of interception fisheries inside national 12-mile limits in which salmon originating from other countries are caught. From tagging data it appears that most of these fish would have reached home water a few weeks after capture and the relative losses consequently were not very great. However, significant numbers of these fisheries are conducted with drift nets which in addition to the reported landings also induce non-catch fishing mortality.

Data deficiencies and needed research

The deficiencies in the data available from the Faroes and Norwegian Sea areas and home waters to assess the relative effects of harvesting salmon at different stages of their migration routes were outlined on page 292 : non-catch fishing mortality, ratio of the weight at each sea-age class in home waters to the mean weight at Faroes, proportion by weight at Faroes, proportion by weight of each sea-age class relative to the total nominal catch, estimated proportion of the fish of each sea-age class in the fishery returning in the same and subsequent years, and survival rates of different sea-age classes between Faroes and home waters. Further deficiencies were identified as data needed to improve estimates of specific growth curves and a requirement for sex ratios in the light of the information on the selectivity by sex due to the differences in timing of the fishing seasons in home waters.

The need for information on post-smolt mortality, which had been identified by many authors, was highlighted. Information on this subject would help to clarify whether there is large-scale straying of salmon which do not return to home waters.

B.2 West Greenland and Related Home Water Fisheries

B.2.1 The West Greenland fishery 1982 and 1983

Statistics and composition of the fishery and the regulations in force

The reported nominal catches of salmon at West Greenland in the years 1960-83 are given in Table A.2.

The 1982 fishery took place in the period 25 August to 26 November resulting in a nominal catch of 1 077 tonnes which was 176 tonnes or 14% below the quota of 1 253 tonnes. As in previous years, the total quota (TAC) was divided into two components: a "free component" (1 021 tonnes) for which all licensed fishermen could fish, and a "small boat component" (232 tonnes) allocated to small vessels on a district basis. The free component was closed by 16 September, the catch at that date amounting to 993 tonnes. The small boat component was fished for thereafter, and as the catches between 17 September and 11 October were only 53 tonnes, the regulatory scheme was revised so that the remaining part was opened to all licensed fishermen. However, only a few fishermen switched back to salmon fishing at that time, and from 12 October to 26 November only 31 tonnes were taken.

The 1983 fishery was opened on 10 August and the last landing of that year was made on 13 November, when the total nominal catch was 310 tonnes, i.e., 74% below the quota of 1 190 tonnes. The "free component" of the quota was 958 tonnes and the "small boat component" 232 tonnes. After the first two weeks' fishing the catch was much below those made during the first two weeks of the 1981 and 1982 seasons. This tendency continued throughout the 1983 season. In the text table below, the total catches for the first week and the two first weeks for the years 1981-83 are given:

	Nominal catch in tonnes	
Year	First week	First two weeks
1981	465	735
1982	470	766
1983	105	192

The geographical distribution of the landings in 1982 and 1983 fisheries (Table B.2.1.1) was rather similar to those in 1976-81, i.e., the main part of the catch was from NAFO Divisions 1B and 1C (Figure B.2.1). The distribution of the fishery in terms of distance to the shore is not known, but the fishery took place between the shore and approximately 40 nm from the baseline.

All the catch was taken by gill nets. Most of the catch was taken by drift nets, although some inshore set gill nets were still in use. The mesh size in force is 140 mm (stretched mesh). This is a target mesh size, not a minimum mesh size. The type of boats participating in the salmon fishery varies from small open boats to small cutters up to 60 GRT.

No measures of effort are available. Reports of reduced participation after the initial phase suggest that there was less fishing effort in 1983 than in previous years. The number of licences is not a reliable measure of fishing effort since many licencees do not participate in the fishery.

Origin of salmon at West Greenland

A new data base for discriminating continent of origin of salmon has been developed, based on scale samples from fisheries in 1980 in home waters in North America and Europe. The new data base was established because of observed changes in the growth of European-origin salmon in 1980. Country of origin was not considered as the data base was thought to be insufficient for this type of analysis.

A test sample independent from the data base used for developing the discriminant function showed a mis-classification of only 2% with the new technique. Further test samples collected in the home water fisheries of Europe and North America in 1982 and 1983 indicated mis-classifications of 6.6% and 4.6%, respectively. Only a small bias was observed in favour of either group in both years.

The new discriminant function was used to identify the continent of origin of salmon in the West Greenland fishery in 1982 and 1983. The results indicated that the proportion of salmon of North American origin in samples from commercial catches at West Greenland in 1982 was 62% (95% CL* 60-64)

* CL means 95% confidence limits

and in research vessel catches in 1982 it was 47% (95% CL 43-52). In samples from commercial catches in 1983 it was 40% (95% CL 41-38) (Table B.2.1.2). These confidence limits assume that sampled fish were taken at random throughout the catches, but the sampling at West Greenland in 1982 was limited and the high value of 62% depends heavily on a single catch landed at Godthåb. This 1982 value derived by combining numbers of North American and European salmon sampled from landings at Holsteinsborg and Godthåb shows the largest discrepancy between research and commercial vessels in the time series (Table B.2.1.2). Comparisons to investigate spatial and temporal trends showed no temporal trends but differences in the North American proportion between NAFO Divisions and inshore and offshore areas were indicated. There is no trend in proportion of continent of origin of research and commercial catches at West Greenland, but the observed value of 40% of North American origin in the 1983 commercial samples is considerably below those of the previous two years.

Biological characteristics

Biological characteristics of salmon were recorded by sampling research vessel catches in 1982 and commercial catches in 1982 and 1983. The samples were analysed for fork length, whole weight, and age differences among the fish identified to continent of origin. North American-origin salmon were shorter and lighter than their European counterparts, similar to previous observations. The sea- and smolt-age compositions of samples collected at West Greenland in 1982-83 are summarised in Table B.2.1.3. The sea-age composition in 1982 of 6.0% multi-sea-winter salmon and previous spawners is derived from a combination of samples of commercial landings in NAFO Divisions 1B and 1D. Samples from 1B had a higher percentage of multi-sea-winter salmon and previous spawners (7.7%) than those from 1D (2.8%). The 1983 samples, although more numerous, were also taken in 1B and 1D, but comparison of individual samples showed a uniform distribution of sea ages. The increase in the proportion of multi-sea-winter salmon and previous spawners in 1982 and 1983 is consistent with fish plant records of the weight distribution of commercial landings landed in Divisions 1B.

In 1982 there was a small reduction in mean smolt age observed in samples from commercial and research vessel catches at West Greenland in comparison with that observed previously. In 1983, there was a substantial reduction in mean smolt age observed in samples from commercial catches in 1B and 1D and, correspondingly, a large increase in proportion of on-year old smolts from Europe. This value of 35% is more than twice the 1982 value of 15%.

B.2.2 Possible causal factors for low 1983 catches at West Greenland and implications for 1984

The water temperature off West Greenland has decreased considerably during the past 3-4 years. The mean temperature of the water column in June 1983 was about 0.4°C, the lowest recorded since 1970. Surface water temperatures were also quite low, similar to those experienced in the early 1970s. This was most likely to be due to an abnormally strong 1982/83 winter cooling in the Davis Strait area, resulting in greater formation of ice which inhibited normal summer temperature increases. ACFM was also informed that the East Greenland current was abnormally strong in 1983, and that its border with the warmer Irminger current was sharply defined and further offshore than normal at West Greenland. No direct observations of these hydrographical events on the distribution of salmon were reported.

Significant correlations (R^2 = 0.40 and 0.65, $p<0.05$) were obtained for catch per unit effort on sea surface temperature during experimental fishing in 1972 and 1982 but not within other years. Similar data for all years combined 1969-83 show a weak correlation (R^2 = 0.11).

A review of the sea-age composition of the 1983 catches at West Greenland suggests that one-sea-winter salmon were not as abundant, relative to the multi-sea-winter salmon, as in previous years.

The low 1983 catch of one-sea-winter and multi-sea-winter salmon at West Greenland is coincident with low abundance of one-sea-winter and multi-sea-winter salmon in Canada (Table A.1) and multi-sea-winter salmon in USA. The total landings in eastern Canada in 1983 were the second lowest recorded in recent years. Since almost one half of the salmon normally harvested at West Greenland is of Canadian origin, a low abundance of Canadian salmon producing stocks would negatively impact on the catches at West Greenland.

Low returns of two-sea-winter spring salmon to several rivers in Scotland, December 1983 - April 1984, also suggest low abundance of some stock components that would normally be expected to make a significant contribution to West Greenland catches in 1983. ACFM has no evidence of reduced abundance of salmon originating from other countries which would have contributed to the West Greenland fishery in 1983.

Although hard data are not available, field observations suggest that low catch rates were experienced by Greenlandic fishing vessels in the initial phase of the fishery in 1983. This resulted in a subsequent reduction in the number of vessels fishing for salmon.

Low abundance of spawners occurred in 1978 and 1979 in many Canadian rivers, probably as a result of lower than normal marine survival of the 1977 smolt class. The subsequent reduced egg depositions in 1978-79 would affect the abundance of one-sea-winter and two-sea-winter salmon with total ages three and four in 1983. Thus, the lower than normal abundance of one-sea-winter salmon originating in rivers in Nova Scotia, New Brunswick and parts of insular Newfoundland and Québec, and two-sea-winter salmon in some Gulf of St. Lawrence rivers, may be at least partly attributed to low egg depositions in 1978 and 1979. This does not, however, totally explain the almost uniform low abundance of one-sea-winter and two-sea-winter salmon throughout the Canadian fisheries, particularly of salmon from spawning before 1978 and 1979.

There was no indication of reduced survival of eggs to smolts related to the 1982 smolt class.

Reduced marine survival of hatchery-reared smolts of Saint John river origin was noted for 1982 releases and, to a lesser extent, for the 1981 releases (see section on Marine Survival). One-sea-winter and two-sea-winter return rates for releases of hatchery-reared smolts 1974-82 were significantly correlated (R^2 = 0.45 and 0.56, respectively) with recorded Canadian catches and can, therefore, be considered to be an index of marine survival for Canadian salmon stocks. Thus, the reduced marine survival in the 1981 and 1982 smolt classes would appear to contribute partly to the low abundance of one-sea-winter and two-sea-winter salmon in Canada and at West Greenland.

ACFM concluded that the low catch at West Greenland in 1983 was possibly caused by several factors:

1. low sea temperatures which may have affected the catch rates and/or availability of salmon,

2. reduced stock abundance in Canada, and reduced abundance of the spring-run component in Scotland, and

3. possible reduced fishing effort.

There was evidence for Canadian stocks that low abundance was influenced by low egg depositions and lower marine survival.

It was concluded above that the low abundance of some stock components which normally contribute to catches at West Greenland may have been partly responsible for the low 1983 catch there. Low abundance would suggest low returns of two-sea-winter salmon to some rivers in 1984. It is, however, likely that this will vary between rivers and countries. The lower abundance of salmon of North American origin relative to those of European origin at West Greenland in 1983 seems to indicate that a relatively lower return is more likely to occur in North America than in Europe. This is supported by the low abundance of one-sea-winter salmon in Canada in 1983. No estimate of stock size for 1983 is available to quantify the extent of the expected low return of two-sea-winter salmon in 1984.

Any decrease of fishing effort and/or decrease in catchability of salmon at West Greenland in 1983 would mean that the low catch at Greenland could exaggerate the apparent low stock abundance. In view of the Working Group's previous advice that catching of fish at West Greenland impacts on the catch of salmon in home waters, a reduction in fishing mortality at West Greenland will reduce the loss to home waters.

B.2.3 Effects of catches at West Greenland upon home water stocks and fisheries

The most recent assessment by ICES of the effects of the West Greenland fishery upon subsequent stocks and yields in home waters was made in 1980. The fisheries in the Norwegian Sea were assumed not to catch salmon returning from West Greenland. The validity of this assumption has been questioned and is examined below. Assessments since that time have been concentrated on estimating TACs corresponding to varying opening dates equivalent to a TAC of 1 190 tonnes with the opening data of 10 August assuming a 140 mm mesh size. ICES has been guided in these analyses by the principle of ensuring the same proportion in the catch as in the mixture of stocks at West Greenland between the component originating from rivers in North America and that originating from Europe.

Although some of the parameters, for instance the proportional contribution by continent of origin, do fluctuate somewhat between years, the ACFM did not find sufficient changes in the parameters to warrant a new assessment on the direct effect of the West Greenland fishery on home water stocks and yield.

From its most recent assessment, ACFM concluded that for each tonne of European-origin salmon in the reported catch at West Greenland, from 1.29 to 1.75 tonnes would be lost, on average, to European home water stocks. Similarly, for each tonne of North American-origin salmon in the reported catch at West Greenland, from 1.47 to 2.00 tonnes would be lost to North American stocks. Thus, the combined loss to home waters per tonne of reported catch at West Greenland is likely to be from 1.37 to 1.85 tonnes.

ACFM noted that the recapture rate at West Greenland per 1 000 fish tagged as smolts in Scotland has decreased in most recent years. Since the overall reporting rate for recaptures in the Greenland fishery seems not to have decreased to the same extent, it appears that the contribution of Scottish rivers to salmon at West Greenland may have decreased in most recent years. Moreover, the effect of the Greenland fishery upon Scottish stocks seems to be mainly on the spring-run of salmon, and the abundance of this component of the Scottish stock has decreased in recent years as the relative abundance of other components of this stock has increased.

B.2.4 Effects of home water catch levels upon subsequent spawning stock and smolt production

Exploitation rates of salmon in home waters can vary over a very wide range of values, from less than 10% to over 90%. The exploitation rate U is defined as the catch in numbers divided by the number of salmon available to the fishery concerned. The significance of the exploitation rate with respect to spawning stock and smolt production depends upon the capacity of the particular natal river to support egg deposition and rearing of fry, parr and smolts. When this capacity is reached or exceeded, the relationship between the escapement from the home water fishery and subsequent smolt production becomes less than proportional or, perhaps, inverse. Otherwise, the relationship between escapement and smolt production is direct, as is the case with most of the Canadian rivers examined. Assuming egg deposition and rearing capacities are not reached or exceeded, it is more advantageous to reduce exploitation rates that are high than rates that are relatively low. For example, if the exploitation rate is 90%, a 10% reduction would almost double spawning escapement; whereas, if the exploitation rate is 20%, a 50% reduction (to an exploitation rate of 10%) would only increase escapement by 12.5%. Growth and natural mortality between the period of the home water fishery and spawning are assumed to be negligible, so that the reduction in spawning stocks resulting from home water catches is approximately proportional (1:1).

B.2.5 Effect of the Faroese fishery on the occurrence of salmon at West Greenland

Tagging of salmon at sea close to the Faroes between 1969 and 1975 produced evidence that the Faroese fishery harvested salmon that would otherwise be available to the West Greenland fishery. Three of the 91 recoveries from the 1 751 fish tagged in Faroese waters were made at West Greenland. There has been no tagging at sea at the Faroes since 1975.

In recent years the fishery at the Faroes has moved north where it now harvests salmon which are roughly 80% maturing and more than 90% two-sea-winter and older. The West Greenland fishery harvests salmon which are non-maturing and more than 90% one-sea-winter (Table B.2.1.3). The age composition of the present catch at Faroes is older than that of both the catch in earlier years and the fish which were tagged. This change in age composition is attributed to the recent northward movement of the fishery. The age composition of the present Faroese catch resembles that reported for the 1971-73 Danish long-line fishery in the Norwegian Sea situated north of latitude 68°.

On the basis of the differences in maturity status and sea-age composition of the catches in the Faroese and Greenland fisheries, ACFM concluded that the Faroese fishery does not harvest significant numbers of salmon that would otherwise subsequently be available to the West Greenland fishery. It was noted, however, that the Faroese fishery may be harvesting salmon on their return migration from West Greenland to European rivers. Further, the Faroese fishery may be impacting on spawning stock which contribute to both Faroese and Greenland fisheries.

On the basis of the two recent recaptures of tagged fish from Canada in the Faroese fishery, ACFM noted that the fishery at Faroes harvests some salmon that might otherwise return to North American rivers. These fish might however be strays. Scale samples for discriminant scale analysis to establish the extent of North American fish in the Faroes catch should be made available.

B.3 Salmon in the North American Commission Area

B.3.1 Request from NASCO

This advice responds to questions posed by the Council of the North Atlantic Salmon Conservation Organisation (NASCO) in relation to the North American Commission of NASCO.

B.3.2 Estimates of catches of salmon originating in the rivers or artificial production facilities of one party of the North American Commission of NASCO and taken in the fisheries of another party.

B.3.2.1 Wild Smolt Production in U.S.A. Rivers

Seven rivers in Maine are currently self-sustaining and supporting salmon fisheries, and another five have minor populations. The total smolt rearing area for these rivers is an estimated 19 700 units (1 unit = 100 m^2). Estimates of the number of smolts in fresh water produced per unit range from 2 to 9. The accuracy of the production estimates was questioned, but 2.4 and 5.5 smolts/unit were considered reasonable bounds consistent with estimates for other North American rivers with wild salmon populations. Additional production of smolts is expected from escapement of spawners in several other Maine rivers during 1981-84. The only river outside of Maine with known wild smolt production is the Pawcatuck River in Rhode Island; current production in this river is considered minor.

B.3.2.2 History, Description, and Analysis of the U.S.A. Hatchery and Tagging Program

Since 1966, about 1 250 000 tagged Atlantic salmon smolts have been released in the U.S.A. An additional 590 000 smolts were tagged with coded wire nose tags and released in southern New England. In addition, more than 10 000 adult Atlantic salmon were tagged during the period 1962-1982 while entering four Maine rivers on their spawning migration. During the period 1962-1984, more than 8.5 million hatchery-reared smolts were released in the U.S.A. rivers, with an additional 6.3 million juvenile Atlantic salmon (fry and parr) released in headwater areas of numerous New England rivers. U.S.A. hatchery production has increased dramatically in recent years. Fry stocking increased from 50 000 fry in 1968 to over 1.2 million fry in 1984. Parr stocking increased from approximately 55 000 parr per year in the 1960s to over 300 000 parr per year in 1981-1984. Smolt stocking increased from an average of close to 160 000 smolts per year in the 1960s to an average of approximately 850 000 smolts per year in the 1980s.

U.S.A. tagged salmon released in Maine during 1966-1982 have been recaptured in East Greenland, West Greenland, Labrador, Newfoundland, Nova Scotia, Bay of Fundy, and homewaters. The highest proportion of tag returns in non-U.S.A. fisheries has been from 1-SW (one sea-winter) fish (91.6%), while the highest proportion of homewater returns have been from 2-SW fish (94.5%). The bulk of recaptures of 1-SW and MSW (multi sea-winter) other than at homewaters have been from NAFO Sub-area 1 (West Greenland (56%) and Newfoundland (40%)). Within Newfoundland, 26% have been from Labrador and 63% have been from Statistical Areas A-D. U.S.A. salmon caught in Nova Scotia comprise only 3% and New Brunswick only 1% of the total. The bulk of recaptures of post kelts (77%) has been from Newfoundland, 14% from West Greenland, 9% from Nova Scotia, and 19% from New Brunswick.

Marine recoveries of 1-SW and MSW salmon tagged in Maine, 1966-1983, are detailed by month or recovery in the Working Group report. Most of the U.S.A. tag recoveries from Labrador occurred in July-September, whereas a substantial number (30%) of the recoveries from insular Newfoundland were in the fall months. These recoveries indicate that most Maine salmon migrate north along the outer coast of Newfoundland in the spring to summer feeding areas in the Davis Strait-Labrador Sea area. A few fish may utilize a migration route that passes up the west coast of Newfoundland through the Strait of Belle Isle. They return during the fall to overwinter off Newfoundland and some return to northern feeding grounds next spring while others return to homewaters. Since these migration routes reflect only tag returns from fisheries and, since salmon fisheries occur close to shore, little is known of the offshore movements of salmon. Recovery of one salmon possessing a U.S.A. tag in research fishing on the Grand Banks suggest that some salmon may be far enough offshore to avoid being caught in coastal salmon fisheries during at least part of their migration.

B.3.2.3 Multivariate Analysis of Origin of Salmon Caught Near Twillingate

A paper originally presented to ICES in 1978 applied a multivariate analysis of four scale measurements to estimate the composition of samples of salmon caught near Twillingate, Newfoundland. The analysis involved a reference set of scales from different smolt classes than those appearing on the Twillingate samples. The analysis is now considered inconclusive with regard to determination of stock origin of the Twillingate catch because it was later found that variations between years on the scale characters are greater than variations between stocks for a given year.

B.3.2.4 Estimation of Harvest of U.S.A. Origin Fish in Canadian and Greenland Waters

The harvest (in numbers) of U.S.A. origin salmon in non-U.S.A. fisheries was estimated using returns of tags from fish tagged as smolts in the U.S.A. and returns of adult salmon to U.S.A. waters.

Resultant estimates of harvest of the 1966-1981 smolt classes of Maine origin salmon at Greenland, Newfoundland, and other Canadian provinces, are given in Table B.3.1. The estimated harvest in Greenland ranged from 80 to 5 370 fish annually, peaking in 1970. The Newfoundland harvest ranged from an estimated 243 to 7 837 fish annually, peaking in 1980. The estimated harvest for other Canadian provinces ranged from 28 to 926 fish, peaking in 1968, and the combined harvest in non-U.S.A. fisheries ranged from 1 442 to 10 169 fish, peaking in 1980.

Figure B.3.1 (this report) shows the harvest at Greenland and in Canada of 1-SW salmon of Maine origin and run sizes of 2-SW salmon in Maine rivers from 1967-83. A smolt class harvested at Greenland and in Canada in year i + 1 as 1-SW fish also appears as the run of 2-SW fish in Maine in year i + 2. The estimated total harvest at Greenland and in Canada has fluctuated widely from year to year, with a range of about 1 500 to 10 000 pieces.

In the early 1970s most of this harvest was taken at Greenland while after 1976 the majority was harvested in Canada. There is a positive correlation between harvest at sea in year i + 1 and run size in year i + 2. Since no tagged Maine salmon were released in 1978, there is no estimate of the 1979 harvest.

More detailed analyses were performed on the 1980 and the pooled 1981-82 tag return data from Newfoundland and Labrador. Approximately 90% of tags of immature fish reported from Newfoundland and Labrador were from Statistical Areas A-D and O (Labrador).

The pattern of estimated harvest of U.S.A. origin salmon in these areas is compared to the pattern of Canadian commercial catch statistics for the same area in Tables B.3.2 and B.3.3.

In light of the data deficiencies that exist for the reporting of tags and in Canadian commercial catch statistics, the comparisons were made on a relative basis. Thus, data for each cell were divided by the appropriate grand total. The relation between U.S.A. origin fish and Canadian commercial catches was consistent between the two tables. In both tables, there was an increasing proportion of U.S.A. fish relative to Canadian catches later in the year. Most U.S.A. origin salmon in both tables were caught during June and July. The harvest of U.S.A. origin salmon declined consistently from July to September in both tables. In Newfoundland (Areas A-D), the catch of U.S.A. origin salmon increased markedly during October-December. Both tables also show that a small proportion (<1%) of the total Newfoundland and Labrador commercial catch occurs during the period September-December yet a large proportion (16-40%) of the harvest of U.S.A. origin salmon occurred during this period. These results are also consistent with the tag returns as reported in Table B.3.4. The return of Canadian grilse to their natal streams prior to these months may increase the relative fraction of U.S.A. origin fish in Canadian waters. Other explanations might be that catches are underestimated during the fall, or that some dates of recapture imputed from postmarks are later on in the year than actual dates of recaptures.

Comparisons of Tables B.3.2 and B.3.3 indicate that there are annual variations in the proportion of total tag returns and catches prior to and after September in each of Statistical Areas A, B, C, D and O, as well as annual variations in proportion of tag returns and catches between individual areas.

Negative values in the estimated U.S.A. catches reflect the allocation procedures used for tags without Area of capture. In particular, they suggest that the assumption of a uniform distribution of unknown tags over years and that the proportional allocation of unknowns over areas within months may be in error. Errors might also arise due to the method by which the month of return for tags is imputed.

B.3.3 Description of Fisheries Catching Salmon Originating in Another Party's Rivers or Artificial Production Facilities

B.3.3.1 Salmon and Non-Salmon Fisheries in Fisheries Statistical Districts 18-32 and 35-40 in Nova Scotia

Fisheries Statistical Districts (FSD) of Nova Scotia are shown in Fig.B.3.2. The great majority of U.S.A. tags returned from Nova Scotia and New Brunswick came from fish caught in FSD 18-32 and 35-40 in Nova Scotia. Numbers of salmon trap nets and gill nets within FSD's 18-32 and 35-40 have declined from 41 and 60, respectively, in 1981 to 35 and 51 in 1983 (Table B.3.5). Fishing effort (net days) is available for the period since 1980.

Non-salmon gear for the same years in the same FSD's consists of commercial fish traps and weirs (the principal by-catch gear) (Table B.3.6) and numerous (1 000's) groundfish and surface gill nets. Between 1974 and 1978 non-salmon gear accounted for 38.4 percent of salmon landings in mainland Nova Scotia. Such catches represent 42.4 percent (1.6 t) in FSD's 26-28, 30-34, 36 and 37 and 100 percent of salmon landings (2.6 t) in FSD's 35 and 38-41.

Open seasons for licensed salmon gear have been reduced from 3.5 or 4 months (depending on FSD's) in 1980 to 3 weeks in 1984. Although there are no regulated seasons for non-salmon gear, the retention of salmon by-catch has been illegal since 1981.

Total annual landings of Atlantic salmon by all gear types in these FSD's have ranged from 49.7 t in 1967 to 7.4 t in 1983 (Table B.3.7). Total estimated numbers of salmon for each of these Districts appear in Table 12.[x)] Estimated numbers of 1-SW, 2-SW and 3-SW salmon landed in each District 1970-83 are shown in Tables 13, 14 and 15 of the Working Group Report. Since 1981, 1-SW fish have comprised from 35 to 60 percent of the total numbers.

A few tags of U.S.A. origin have been returned from additional FSD's on the Bay of Fundy shore of New Brunswick, and the eastern shore and Atlantic coast of Cape Breton Island, Nova Scotia.

B.3.3.2 Newfoundland and Labrador

The commercial salmon fishery in Newfoundland and Labrador is a limited entry fishery. The fishery is controlled by season, amount of fishing gear per licensed fisherman, mesh size, and placement of gear.

x) Table 12 is part of the Working Group report, Doc. C.M.1985/Assess:5.

The entire salmon fishery in Newfoundland and Labrador is a fixed gill net or trap net fishery. Salmon traps are a small but unknown proportion of the total gear licensed. The webbing of both nets and traps is multifilament nylon material, since it is illegal to use webbing that contains monofilament in single or multiple strands. The regulated minimum mesh size is 127 mm for all areas (Figs. B.3.3 + B.3.4) except in Bay St. Georges (Area K) and a section of the south coast from Cape Pine to Point Crewe (Areas G and H) where the minmum mesh size is 114 mm. It is illegal to use drift nets or seines for Atlantic salmon in Newfoundland and Labrador.

In bays less than six nautical miles in width, salmon gear (nets and trap leaders) must be tied up on Sundays so as to permit the free passage of fish.

The total number of fishermen and fishing gear licensed to fish for Atlantic salmon in each Statistical Area A to O, 1975-1983 are shown in Tables B.3.8 + B.3.9. In 1975, a new salmon licensing policy was implemented whereby there was a freeze on new entrants, a program of licence reduction through attrition, and additional restrictions on licence transfers. The number of licensed commercial fishermen and licensed fishing effort in the Province of Newfoundland and Labrador has decreased by 26% and 21% respectively, (Tables B.3.8 + B.3.9). Statistical Areas C, E, F, G, J and L have experienced more than a 30% decrease in licensed gear since 1975. Areas B, I and N had a reduction of 10% in licensed effort and Areas M and O (Labrador) received a slight increase in licensed effort. No data are available on the effective fishing effort, as all licensed gear is not necessarily fished throughout the fishing season. Therefore, the impact of changes in the fishing effort on fishing mortality rates cannot be evaluated.

Measures to reduce fishing mortality and interception of non-Newfoundland-Labrador origin salmon in 1975-84 are given in Table B.3.10.

Average monthly catches of large (>2.7 kg) and small salmon (<2.7 kg) for Newfoundland Statistical Areas A to O from 1974-83 are presented in Tables B.3.11 + B.3.12. The mean yearly number of fish landed by month and Statistical Areas A-O, 1975-83 are given in Tables B.3.13 + B.3.14. The landings include salmon caught in licensed salmon gear and other gear. No estimates are available on the proportion of salmon caught in other gear. The landings also include an estimate of fish consumed by fishermen or sold locally and not recorded on purchase slips. Estimated catches for October-December are primarily obtained from estimated local sales.

B.3.4 Data Deficiencies and Research Programs

The Working Group Report identifies data deficiencies related to sex ratios of catches, gear types, catch statistics, tag returns, measurement of effective fishing effort, statistical reporting and stock identification technique as follows:

1. Sex Ratios - No data are available to characterize the sex composition of the intercepted catch. It is likely that it may not be possible to segregate sexes in these catches using tag returns. The need for such data is uncertain.

2. Gear Type - About 1/3 of the tags returned are accompanied by information concerning gear and the information supplied is often ambiguous. Reported landings are not broken out by gear type and incidental catches may not be reported in future landings data, because regulations forbid possession of salmon by-catches. The importance of such illegal by-catches should be assessed.

3. Catch Statistics - There is some evidence that catch statistics for salmon reported in local sales in the fall are underestimated, but it is unclear whether local sales are also underestimated in periods earlier in the year when reported landings are high. These data are important for interpreting interceptions in the Newfoundland fall fishery and may be important in assessing fishing mortality on some other stocks.

4. Tag Returns - There is a need to evaluate the accuracy of information accompanying tag returns, perhaps through community surveys. In addition, there is a need for accurate information on the date and location of capture, and the proportion of captures that are not reported, particularly in light of the possibility that non-reporting may be increasing in Canadian and Greenland fisheries as a result of increased regulation.

5. Description of Fisheries - A measure of effective fishing effort which reflects the type and amount of gear and duration of deployment needs to be developed.

6. Statistical Reporting - It was agreed that basic statistical data be compiled according to the temporal resolution of Table 27 of the Working Group Report and with geographic resolution as follows:

   USA - by rivers as listed in Table 28 of the Working Group Report.

   - by statistical area for marine catches.

   Newfoundland and Labrador - by statistical section as presented in Figures B.3.3 and B.3.4.

   Nova Scotia, New Brunswick and Prince Edward Island - by management zone as presented in Table 29 of the Working Group Report and Figure B.3.2 of the present Report.

   Quebec - by Quebec marine fisheries districts (Figure 8 of the Working Group Report).

7. Stock Identification Technique - Carlin tagging programs should be continued. The possibility of increasing the return rate through alternative reward programs should be investigated. Any modification of the present reward program should be coordinated. Further research needs to be conducted on rates of non-reporting.

   It was agreed that the use of coded wire tags to identify salmon of USA origin in interception fisheries has the advantage of low tagging mortality and rapid application. However, the codes on the wire tags cannot be read unless removed from the fish, an adipose mark is required, detection and tagging equipment are costly, the method is not practical for wild fish of varying sizes, and an extensive screening of the catches is required by trained observers. The Working Group agreed that the method, while suitable for certain uses, has little potential for solving problems posed by the North American Commission.

   It was agreed that the possibility of defining stocks using a variety of scale characteristics (such as shape and texture) of both hatchery or wild produced smolts be pursued, perhaps including a marking program to integrate tetracycline into bony structures.

   Genetic techniques have not as yet provided the necessary resolution to segregate North Amercian salmon into Canadian and USA components. New genetic techniques, however, should be further investigated for use in, at least, separating North American and European salmon at West Greenland.

   Other techniques should be explored to identify practical and cost effective methods to identify stock origin including biochemical and physical characteristics of the individuals.

Remedial measures proposed are endorsed by the ACFM.

C. MARINE SURVIVAL

Poor marine survival of the 1982 smolt class was not apparent for a number of Atlantic salmon stocks (Table C.1). There was direct evidence for poor marine survival from one Canadian river, Saint John. There was also indirect evidence, based on low harvests and escapements, of poor marine survival for some salmon stocks in Labrador, the east coast of Newfoundland, and the north shore of Québec. In the North Esk, Scotland, there was direct evidence that the marine survivals of the 1980-82 smolt classes were lower than values observed for smolt classes 1974-76. There is no information to identify possible causes. Observations in Sweden and Iceland suggest that marine survival of salmon can be adversely affected by cold temperatures at sea.

D. RESEARCH PRIORITIES FOR NORTH ATLANTIC SALMON IN THE CONTEXT OF NASCO

It was agreed that a list of NASCO research priorities would be heplful to ICES. The following was proposed as an amended version of the statement considered by NASCO at its January 1984 meeting:

Effective conservation, restoration and enhancement of North Atlantic salmon stocks require the establishment and maintenance of a scientific information base and the better understanding of mechanisms whereby natural factors and human interventions affect salmon stocks. The Council recognises the vital role of coordination of research and compilation of data which could be played by ICES. The following programs of research are considered essential for NASCO to meet its objectives:

1. A systematic program should be undertaken to monitor all North Atlantic salmon fisheries. Biological samples of catches should be taken in addition to the compilation of statistics of catch, fishing effort, exploitation rates, non-catch fishing mortality*, fishing gear and seasons.

2. A statistical data base of catch, fishing effort, seasons and fishing gear, together with artificial smolt production, mark and recapture data and biological sampling information should be developed.

3. Research should continue on the identification of the location of origin of salmon. These studies should aim to improve scientific methodology, increase knowledge of salmon migration and provide estimates of total stock production.

4. Specific rivers, some of which should include multi-sea-winter stock components, should be selected and monitored over a long period to provide information on annual smolt production, exploitation rates, geographical distributions of catches, wherever taken, adult returns and spawning escapement. Such monitoring should aim additionally to improve knowledge of factors influencing the salmon productivity of the freshwater habitat leading to improved estimates of optimal spawning levels and assessment of means to improve the productivity of salmon rivers.

* Non-catch fishing mortality refers to fish mortalities generated directly or indirectly by fishing which are not included in recorded catches.

5. A program should be developed to define and study factors influencing the natural mortality and age at maturity of salmon in the sea with special emphasis on determining the extent and causes of mortality in the months following the entry of smolts into the sea.

6. In addition it would be desirable to determine the geographical distribution of salmon throughout the marine phase.

Abundance Projection for Canadian Salmon Stocks in 1984

The poor returns of one-sea-winter salmon abundance in Canada in 1983 indicate low returns of two-sea-winter salmon in 1984. The low egg depositions in northern rivers in 1978 and 1979 are expected to result in low returns of one-sea-winter salmon in 1984 and two-sea-winter salmon in 1985. Most large salmon-producing rivers in the Gulf of St. Lawrence and Saint John River have experienced reduced egg depositions in recent years. Thus, the low abundance is expected for these stocks for several years. Since these stocks are known to make a significant contribution to the West Greenland fishery, the projected low abundance of Canadian stocks may reduce the catch rates in that fishery from historical average levels.

Reference

Anon. 1985. Report of Meeting of the Working Group on North Atlantic Salmon, St. Andrews, New Brunswick, Canada, 18-20 September 1984. ICES, Doc. C.M.1985/Assess:5.

Table A.1 Nominal catches of SALMON in home waters (in tonnes round fresh weight) 1960-1983

YEAR	France	England + Wales	Scotland g)			Ireland b)			N. Ireland b) c)	Norway d)			Sweden (W c)	Finland	USSR e)	Iceland	Canada i)			USA	Total f) all Countries
	T	T	S	G	T	S	G	T	T	S	G	T	T	T	T	T	S	G	T		
1960	50-100	283	927	509	1,436	-	-	743	139	-	-	1 659	40	-	1 100	100	-	-	1 636	<2	7 212
1961	50-100	232	772	424	1,196	-	-	707	132	-	-	1 533	27	-	790	127	-	-	1 583	<2	6 403
1962	50-100	318	808	932	1 740	-	-	1 459	366	-	-	1 936	45	-	710	125	-	-	1 719	<2	8 483
1963	50-100	325	1 168	530	1 698	-	-	1 458	306	-	-	1 786	23	-	480	145	-	-	1 861	<2	8 148
1964	50-100	307	913	1 001	1 914	-	-	1 617	377	-	-	2 147	36	-	590	135	-	-	2 069	<2	9 268
1965	50-100	320	836	728	1 563	-	-	1 457	281	-	-	2 000	40	-	590	133	-	-	2 116	<2	8 576
1966	50-100	387	788	836	1 624	-	-	1 238	287	-	-	1 791	36	-	570	106	-	-	2 359	<2	8 475
1967	50-100	420	867	1 276	2 133	-	-	1 463	449	-	-	1 980	25	-	883	146	-	-	2 863	<2	10 417
1968	50-100	282	783	780	1 563	-	-	1 413	312	-	-	1 514	20	-	827	162	-	-	2 111	<2	8 279
1969	50-100	377	539	1 408	1 947	-	-	1 730	267	801	582	1 383	22	-	360	133	-	-	2 202	<2	8 496
1970	50-100	527	503	826	1 329	-	-	1 787	297	815	366	1 171	20	-	448	195	1 562	761	2 323	<2	8 173
1971	50-100	426	496	923	1 419	-	-	1 639	234	771	436	1 207	18	-	417	204	1 482	510	1 992	<2	7 631
1972	34	442	588	1 106	1 693	200	1 604	1 804	210	1 054	514	1 568	18	32	462	250	1 201	558	1 759	<2	8 273
1973	12	450	661	1 303	1 964	244	1 686	1 930	182	1 220	506	1 726	23	50	772	256	1 651	783	2 434	2.7	9 802
1974	13	383	578	1 053	1 631	170	1 958	2 128	184	1 149	484	1 633	32	76	709	225	1 589	960	2 539	0.9	9 563
1975	25	447	669	892	1 561	274	1 942	2 216	164	1 038	499	1 537	26	76	811	266	1 573	912	2 485	1.7	9 614
1976	9	208	328	682	1 010	109	1 452	1 561	113	1 063	467	1 530	20	66	NA	225	1 721	785	2 506	0.8	7 188
1977	19	345	369	762	1 131	145	1 227	1 372	110	1 018	470	1 488	10	59	NA	230	1 883	662	2 545	2.4	7 311
1978	20	349	781	542	1 323	147	1 082	1 230	148	668	382	1 050	10	37	NA	291	1 225	320	1 545	4.1	6 007
1979	10	261	598	478	1 075	105	922	1 097	99	1 150	681	1 831	12	26	430	225	705	582	1 287	2.5	6 356
1980	30	360	861	283	1 134	202	745	947	122	1 352	478	1 830	17	34	631	249	1 763	917	2 680	5.5	8 040
1981	20	493	843	389	1 233	164	521	685	101	1 189	467	1 656	26	44	450	163	1 619	818	2 437	6.0	7 314
1982	20	286	596	496	1 092	63	930	993	132	986	363	1 348	25	54	311	147	1 082	716	1 798	6.4	6 212
1983[a]	16	424[h]	361[h]	231	592[h]	150	1 506	1 656	187	945	585	1 530	NA	57	NA	198	911	513	1 424	1.3	6 085

S = Salmon (two or more sea winter fish) G= Grilse (one sea winter fish) T=S+G
a = Provisional figures
b = Catch on River Foyle allocated 50% Ireland and 50% N Ireland
c = Not including angling catch (mainly grilse)
d = Before 1966 sea trout and sea char included (5% total)
e = USSR catch mainly salmon (2 or more sea winter fish)
f = French catch taken as 75 tonnes from 1960-1971 and USA catch as 1 tonne from 1960-1971
g = Salmon and grilse figures for 1962-1977 corrected for grilse error
h = The difference between provisional and final figures are likely to be larger than in previous years because of delay in processing the returns
i = Includes estimates of local sales and by-catch

Table A.2 Nominal salmon catches at West Greenland 1960-1983 (in tonnes, round fresh weight)

Year	Norway	Faroes	Sweden	Denmark	Gill-net and drift net Greenland[d)]	Total	TAC
1960	0	0	0	0	60	60	
1961	0	0	0	0	127	127	
1962	0	0	0	0	244	244	
1963	0	0	0	0	466	466	
1964	0	0	0	0	1 539	1 539	
1965	a)	36	0	0	825	861	
1966	32	87	0	0	1 251	1 370	
1967	78	155	0	85	1 283	1 601	
1968	138	134	4	272	579	1 127	
1969	250	215	30	355	1 360(385)[d)]	2 210	
1970	270	259	8	358	1 244	2 146[c)]	
1971	340	255	0	645	1 449	2 689	
1972	158	144	0	401	1 410	2 113	
1973	200	171	0	385	1 585	2 341	
1974	140	110	0	505	1 162	1 917	
1975	217	260	0	382	1 171	2 030	
1976	0	0	0	0	1 175	1 175	1 190
1977	0	0	0	0	1 420	1 420	1 190
1978	0	0	0	0	984	984	1 190
1979	0	0	0	0	1 395	1 395	1 190
1980	0	0	0	0	1 194	1 194	1 190
1981	0	0	0	0	1 264	1 264	1 265[e)]
1982	0	0	0	0	1 077	1 077	1 253[e)]
1983	0	0	0	0	310	310[b)]	1 190[e)]

a) Figures not available, but catch is known to be less than the Faroese catch

b) Provisional

c) Including 7 metric tonnes caught on long-line by one of two Greenland vessels in the Labrador Sea early in 1970

d) Up to 1968 gill-net only, after 1968 gill-net and drift-net. The figures in brackets for the 1969 catch are an estimate of the minimum drift-net catch

e) TAC corresponding to specific opening dates of the fishery.

Factor used for converting landed catch to round fresh weight in fishery by Greenland vessels = 1.11. Factor for Norwegian, Danish and Faroese drift-net vessels = 1.10.

Table B.1.1.1

Reported nominal catches in the northern Norwegian Sea long-line fishery north of latitude 67°N: 1965-1983 (tonnes round fresh weight)

Danish catches converted from gutted weight with a factor 1.16

	Denmark		Faroes		Germany Fed. Rep.		Norway		Sweden		
Year	No. of vessels	Catch	No. of vessels	Catch	No. of vessels	Catch	No. of vessels	Catch	No. of vessels	Catch	Total Longline Catch
1965	1-2	–[a]	0	0	0	0	0	0	0	0	–[a]
1966	10	–[a]	0	0	0	0	0	0	–	–[a]	–[a]
1967	22	77	0	0	0	0	–	–[a]	6	–[a]	77+
1968	28	177	–	–	0	0	–	100[c]	16	126	403[c]
1969	40	413	0	0	5	24	–	450[c]	2	24	911[c]
1970	60	481	–	–	4	21	–	420[c]	1	24	946[c]
1971	20	162	0	0	2	9	–	300[c]	1	17	488[c]
1972	20	182	0	0	2	4	–	300[c]	1	20	506[c]
1973	15	233	0	0	0	0	–	250[c]	2	50	533[c]
1974	10	148	0	0	0	0	–	200[c]	1	25	373[c]
1975	15	245	0	0	0	0	–	200[c]	1	30	475[c]
1976	20	264	0	0	0	0	0	0	1	25	289
1977	24	192	0	0	0	0	0	0	0	0	192
1978	13	124	0	0	0	0	0	0	0	0	124
1979	10	118	0	0	0	0	0	0	0	0	118
1980	7	127	?	28	0	0	0	0	0	0	155
1981	8	213	–	–	0	0	0	0	0	0	213
1982	7	334	?	259	0	0	0	0	0	0	593
1983	9	383	0	0	0	0	0	0	0	0	383

a Catch not known

c Estimated catch

Table B.1.1.2

Reported nominal catches in the Faroese Area long-line fishery 1968-1983 (tonnes round fresh weight)

Converted from gutted weight with a factor 1.11

Year	Denmark		Faroes		
	No. of vessels	Catch	No. of vessels	Catch	Total Longline Catch
1968	0	0	2	5[a]	5
1969	0	0	4	7	7
1970	0	0	5	12[a]	12
1971	0	0	0	0	0
1972	0	0	2	9	9
1973	0	0	5	28	28
1974	0	0	5	20	20
1975	0	0	6	28	28
1976	0	0	9	40	40
1977	0	0	9	40	40
1978	2	14	8	37	51
1979	2	75	7	119	194
1980	6	150	22	568	718
1981	6	100	38	1025[a]	1.125
1982	6	74	31	606	680
1983[b]	6	62	25	678	740

[a]A small part of the catch taken more than 200 miles from the Faroese baseline

[b]Preliminary data

Table B.1.2.1 Estimated exploitation rates in Norwegian home waters assuming 50% and 70% tag reporting rates

Stock	1 SW fish 50%	1 SW fish 70%	2 SW fish 50%	2 SW fish 70%
R Imsa wild	0.88	0.84	0.93	0.90
R Imsa	0.80	0.74	0.92	0.89
R Sandvik	0.89	0.85	0.95	0.93
R Figgjo	0.84	0.79	0.95	0.94
R Alta	0.97	0.95	0.97	0.95
R Eira	0.93	0.91	0.86	0.82
R Arøy	0.91	0.87	0.91	0.88
R Suldal	0.86	0.82	0.77	0.70
R Lone	0.57	0.49	0.83	0.78
R Figga	0.99	0.98	1.00	1.00

Table B.1.2.2 Estimated exploitation rates in the Norwegian Sea assuming 50% and 70% tag reporting rates in Norwegian home waters

Stock	1 SW fish 50%	1 SW fish 70%	2 SW fish 50%	2 SW fish 70%
R Imsa wild	0.00	0.00	0.25	0.32
R Imsa	0.01	0.01	0.38	0.46
R Sandvik	0.00	0.00	0.50	0.58
R Figgjo	0.00	0.00	0.26	0.32
R Alta	0.02	0.03	0.55	0.64
R Eira	0.06	0.08	0.48	0.55
R Arøy	0.01	0.02	0.58	0.65
R Suldal	0.06	0.08	0.38	0.44
R Lone	0.00	0.00	0.00	0.00
R Figga	0.00	0.00	0.59	0.68

<u>Table B.1.2.3</u> Exploitation rates on all combined Scottish sea-winter salmon tagged at coastal netting stations 1952-1983

Area	Year	Number tagged	Fixed Engine U	Fixed Engine Cl[1)]	Net and Coble U	Net and Coble Cl	Rod and Line U	Rod and Line Cl
West Coast	1981-83	258	0.04	0.02	0.03	-	0.05	0.03
Northwest Coast	1979-81	916	0.06	0.02	0.03	0.01	0.02	0.01
North Coast	1977-79	776	0.06	0.02	0.10	0.02	0.03	0.01
Moray Firth	1978-83	2 349	0.10	0.01	0.09	0.01	0.05	0.01
East Coast	1952-55, 1977-78	1 280	0.28	0.02	0.27	0.03	0.02	0.01

1) Confidence limit

Table B.2.1.1 Distribution of nominal catches (tonnes) taken by Greenland vessels in 1973-1983 by NAFO Divisions according to place where landed.

Division \ Year	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983[1)]
IA	182	44	124	166	201	81	120	52	160	111	14
IB	194	116	168	302	393	349	343	275	347	330	77
IC	145	229	175	262	336	245	524	404	346	239	93
ID	385	290	204	225	207	186	213	231	202	136	41
IE	487	395	315	182	237	113	164	158	158	167	55
IF	192	88	185	38	46	10	31	74	31	76	30
Not known									20	18	
Total	1 585	1 162	1 171	1 175	1 420	984	1 395	1 194	1 264	1 077	310
E. Greenl.	+	+	+	+	6	8	+	+	+	+	+
TOTAL	1 595	1 162	1 171	1 175	1 426	992	1 395	1 194	1 264	1 077	310

1) Provisional figures

Table B.2.1.2 Percentage (by number) of North American and European salmon in research vessel catches at West Greenland 1969-1983 and from commercial samples 1978-1983

Year	Sample size	Percentage North American	95% confidence interval		Percentage European	95% confidence interval	
			Upper	Lower		Upper	Lower
RESEARCH							
1969	212	51	57	44	49	56	43
1970	127	35	43	26	65	74	57
1971	247	34	40	28	66	72	50
1972	3488	36	37	34	64	66	63
1973	102	49	59	39	51	61	41
1974	834	43	46	39	57	61	54
1975	528	44	48	40	56	60	52
1976	420	43	48	38	57	62	52
1977	-	-	-	-	-	-	-
1978(a)	606	38	41	34	62	66	59
1978(b)	49	55	69	41	45	59	31
1979	328	47	52	41	53	59	48
1980	617	58	62	54	42	46	38
1981	-	-	-	-	-	-	-
1982	443	47	52	43	53	58	48
1983	-	-	-	-	-	-	-
COMMERCIAL							
1978	392	52	57	47	48	53	43
1979	1653	50	52	48	50	52	48
1980	978	48	51	45	52	55	49
1981	4570	59	61	58	41	42	39
1982	1949	62	64	60	38	40	36
1983	4896	40	41	38	60	62	59

a) During fishery

b) Research samples after fishery closed

Table B.2.1.3 Sea age composition from research vessel and commercial catches of Atlantic salmon at West Greenland, 1969-83

Year	Type	Sea Age Composition (%)			Total number
		ISW	MSW	PS	
1969	Research	93.8	4.9	1.3	226
1970	Research	93.8	4.1	2.1	145
1971	Research	99.2	0.4	0.4	251
1972	Research	94.1	5.6	0.3	877
1973	Research	93.8	4.4	1.8	113
1974	Research	97.7	1.7	0.6	836
1975	Research	97.6	2.0	0.4	535
1976	Research	95.7	2.6	1.7	422
1977	No Observations				
1978	Research	96.9	1.1	1.1	609
1979	Commercial	96.6	2.1	1.3	1 655
	Research	96.7	1.8	1.5	340
1980	Commercial	97.5	2.2	0.3	980
	Research	98.4	1.1	0.5	617
1981	Commercial	97.0	2.5	0.6	4 559
1982	Commercial	93.6	6.0	0.5	1 922
	Research	95.3	2.4	2.2	491
1983	Commercial	90.5	8.1	1.4	4 744

Table B.3.1

Estimated harvest (numbers)[1] of Maine origin Atlantic salmon in non-USA fisheries.

Year i	Maine (year i+2)			Greenland		Newfoundland (year i+1)		Other Canada		Total	
	Tags returned	Run size[2]	ratio[3]	No. tags	Harvest	No. tags	Harvest	No. tags	Harvest	No. tags	Harvest
1966	176	1,223	.144	40	496	45	496	39	430	124	1,422
1967	10	848	.012	1	148	5	661	7	926	13	1,735
1968	16	1,140	.014	6	765	3	340	3	340	12	1,445
1969	65	968	.067	54	1,439	39	924	3	71	96	2,434
1970	272	2,029	.134	403	5,370	54	640	11	130	468	6,140
1971	195	1,419	.137	93	1,212	21	243	4	46	118	1,501
1972	180	1,782	.101	120	2,122	31	487	5	79	156	2,688
1973	393	2,644	.149	334	4,003	115	1,255	8	85	457	5,313
1974	270	1,575	.171	141	1,472	103	956	3	28	247	2,456
1975	93	2,283	.041	39	1,699	81	3,136	21	813	141	5,648
1976	83	4,509	.018	15	1,488	15	1,323	3	265	33	3,076
1977	33	2,185	.015	10	1,190	7	741	1	106	18	2,037
1978	0	-	-	-	-	-	-	-	-	-	-
1979	381	5,999	.064	64	1,786	316	7,837	22	546	402	10,169
1980	253	5,810	.044	40	1,623	67	2,417	4	144	111	4,184
1981	163	2,442	.067	3	80	91	2,156	9	213	103	2,449

[1]Harvest = tags/(0.70*(1 - non-catch fishing mortality)*ratio).

0.70 = tag return rate

Non-catch fishing mortality = 0.20 (Greenland) and 0.10(Canada)

[2]Estimated run size in Maine rivers.

[3]Tags returned/run size.

- Tag recoveries from Atlantic Sea Run Salmon Commission, 1966-1979 compiled by Bastien (1984).

Table B.3.2

Comparison of percent composition of Canadian commercial catch statistics and USA origin fish (in parentheses) by Statistical Area and month for 1980.

1980	A	B	C	D	O	Sum
May	0.18 (0)	0.29 (0)	0.38 (0.11)	0.34 (0.06)	0.04 (0)	1.23 (0.17)
June	7.03 (8.12)	4.53 (4.07)	1.36 (0.90)	0.88 (1.23)	58.84 (1.67)	72.64 (15.99)
July	3.89 (24.65)	3.33 (11.60)	1.06 (1.92)	0.85 (1.36)	13.83 (14.41)	22.96 (53.94)
Aug	0.11 (2.06)	0.36 (0.92)	0.01 (0.80)	0.03 (0.80)	2.40 (9.55)	2.91 (14.13)
Sept	* (0)	0.07 (0.33)	0 (0)	0 (0.80)	0.15 (1.67)	0.22 (2.80)
Oct	* (0.66)	0.02 (3.00)	* (0.27)	0 (0.06)	* (0)	0.02 (3.99)
Nov	0.01 (1.12)	0.01 (3.54)	* (0.88)	0 (0.03)	0 (0)	0.02 (5.57)
Dec	0 (0.32)	0 (1.68)	* (1.14)	0 (0.18)	0 (0)	0 (3.32)
SUM	11.22 (36.93)	8.61 (25.14)	2.81 (4.88)	2.10 (4.52)	75.26 (27.30)	

Table B.3.3

Comparison of percent composition of Canadian commercial catch statistics and USA origin fish (in parentheses) by Statistical Area and month for 1981 plus 1982.

1981 + 1982	A	B	C	D	O	Sum
May	0.52 (0.07)	1.15 (0)	1.20 (-0.04)	1.19 (-0.89)	0.01 (1.09)	4.07 (1.12)
June	15.61 (12.35)	7.81 (2.66)	3.09 (2.69)	2.19 (2.75)	12.82 (1.09)	41.52 (21.54)
July	8.49 (4.98)	6.53 (5.94)	1.98 (2.09)	1.49 (0.17)	29.43 (18.53)	47.92 (31.71)
Aug	0.24 (-1.91)	0.79 (-2.06)	0.12 (-0.93)	0.28 (2.34)	4.11 (9.27)	5.54 (6.71)
Sept	* (0)	0.11 (0.73)	0 (0)	* (0)	0.54 (4.91)	0.65 (5.64)
Oct	0.01 (2.33)	0.04 (8.84)	0.01 (1.12)	* (0)	0.02 (0.55)	0.08 (12.84)
Nov	0.07 (2.38)	0.10 (-1.53)	0.02 (5.99)	0.01 (0.06)	0.01 (0.55)	0.21 (7.45)
Dec	0 (3.92)	0.01 (5.52)	* (2.75)	0 (1.09)	0 (0.55)	0.01 (13.83)
SUM	24.94 (24.12)	16.54 (20.10)	6.42 (13.67)	5.16 (6.41)	46.94 (36.54)	

* $<$ 0.005%

Table B.3.4 Marine Recoveries of 1+ sea-winter salmon (1967-1983). Data presented by NAFO area and division, and by month of recovery.

NAFO	Area	Total recoveries	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Unk.
	(NEW BRUNSWICK ((Fundy)	14	-	-	-	1	5	6	2	-	-	-
4X	(NOVA SCOTIA											
	((Fundy)	18	-	1	-	13	4	-	-	-	-	-
	((South Shore)	13	1	1	5	2	-	-	-	3	1	-
	(UNKNOWN	3	-	-	-	-	-	-	-	-	-	3
	NOVA SCOTIA											
4W	(Eastern Shore)	2	-	-	1	1	-	-	-	-	-	-
4Vn	(Cape Breton)	1	-	-	-	1	-	-	-	-	-	-
TOTALS		51	1	2	6	18	9	6	2	3	1	3
	NEWFOUNDLAND											
3Pn+s	J	18	-	-	3	14	1	-	-	-	-	-
3Ps	I	12	-	-	1	10	-	-	-	-	1	-
3Ps	H	13	-	-	1	10	2	-	-	-	-	-
	(G	13	-	-	2	8	1	-	-	-	-	2
	(F	14	-	2	5	5	2	-	-	-	-	-
3L	(E	16	-	1	6	3	-	-	-	2	3	1
	(D	39	-	1	15	15	4	-	1	1	-	2
	(C	86	-	2	11	21	4	-	5	22	19	2
3K	(B	208	-	-	21	72	4	2	23	57	27	2
	(A	234	1	1	41	152	9	-	5	18	5	2
	UNKNOWN	109	-	-	22	46	13	3	4	6	4	11
TOTALS		762	1	7	128	356	40	5	38	106	59	22
	LABRADOR											
2J		70	-	1	4	47	15	2	-	-	-	1
2H		121	1	-	-	21	60	33	1	1	1	3
2G		10	-	-	-	2	6	1	-	-	-	1
	Unknown "0"	6	-	1	1	2	1	-	-	-	-	1
4R+S	West Coast & North Shore	18	-	-	-	12	5	1	-	-	-	-
TOTALS		225	1	2	5	84	87	37	1	1	1	6
	GREENLAND											
E.G.		7	-	-	-	-	-	3	4	-	-	-
1F		108	-	-	-	4	58	38	8	-	-	-
1E		140	-	-	1	21	73	35	4	-	-	6
1D		199	-	-	-	12	116	45	16	5	-	5
1C		316	-	-	-	30	130	78	31	7	-	40
1B		238	-	-	-	3	31	85	45	7	-	67
1A		87	-	-	-	-	18	50	14	3	-	2
1*	Unknown	350	-	-	-	8	44	66	43	9	-	180
TOTALS		1,445	-	-	1	78	470	400	165	31	-	300

Table B.3.5 **Numbers of licensed salmon trap and gill nets in Fishery Statistical Districts 18 to 32 and 35 to 40, 1981 to 1983.**

FSD	1981		1982		1983	
	trap	gill	trap	gill	trap	gill
18						
19	12	1	7	1	7	1
20	4		4		4	
21						
22	17	6	16	5	16	5
23	6	1	6	1	6	1
25		10		9		9
26		1		1		1
27	2	24	2	21	2	19
28		13		12		12
30		4		4		3
31						
32						
35						
36						
37						
38						
39						
40						
Total	41	60	35	54	35	51

Table B.3.6 Numbers of licensed non-salmon commercial fish traps and herring weirs in Fishery Statistical Districts 18 to 32 and 35 to 40, 1981 to 1983.

FSD	1981		1982		1983	
	trap	weir	trap	weir	trap	weir
18						
19	3					
20	7		7		7	
21	11		29		13	
22	36		4		15	
23	75		71		59	
25	68		73		61	
26	2					
27	5		4		5	
28	10		9		10	
30	4		6		5	
31	6		10		5	
32	2				2	
35		1		1		
36						
37		1		1		1
38		32		28		32
39		2				
40						
Total	229	36	213	30	182	33

Table B.3.7 Commercial salmon catches (kg) by selected Fisheries Statistical Districts, of Nova Scotia, 1967-1983. Figures include catches from salmonid gear as well as by-catch estimates (Cutting, MS 1984).

Fish.Stat. Dist.	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
18	0	0	0	0	0	0	0	11	0	0	0	363	867	1 185	34	113	272
19	1 234	1 024	1 248	621	1 155	789	1 086	1 309	2 711	1 478	1 108	1 958	318	1 743	1 475	422	568
20	5 670	3 076	1 046	688	1 117	1 130	1 058	2 595	3 032	1 854	2 315	1 805	236	3 147	2 467	413	1 446
21	1 356	404	545	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	6 384	4 566	4 593	1 300	1 276	2 321	2 224	3 034	8 886	2 314	7 815	8 287	5 141	18 623	2 511	3 523	2 056
23	7 949	1 516	1 558	685	1 157	891	1 001	1 599	2 496	800	2 707	1 265	301	2 926	3 271	3 166	672
25	2 331	473	375	285	383	496	769	3 098	2 033	1 277	4 978	2 271	878	1 312	415	594	919
26	1 966	694	1 170	598	634	601	485	539	444	678	1 341	309	130	246	63	200	91
27	2 402	752	743	400	137	366	541	423	1 156	1 946	1 335	2 021	1 618	4 622	1 324	734	847
28	861	256	252	450	238	216	245	203	408	355	976	419	212	806	245	994	452
30	0	492	104	54	68	94	295	594	608	82	533	643	42	91	205	103	0
31	13	0	0	0	0	3	0	0	0	75	41	703	340	482	544	272	0
32	4	0	5	0	0	0	0	794	998	0	0	0	0	136	136	454	0
35	1 363	492	434	395	294	0	66	240	166	512	522	197	94	206	0	0	0
36	0	0	0	0	0	0	0	0	0	10	14	54	9	19	0	0	0
37	0	0	0	0	0	340	104	136	321	183	396	210	115	134	0	62	33
38	199	132	12	0	0	11	11	0	14	4	11	14	0	0	0	0	0
39	710	38	4	0	5	0	12	0	0	0	0	0	0	0	0	0	0
40	17 267	9 297	4 528	3 057	2 422	3 984	968	2 027	3 413	2 438	2 724	985	1 477	1 736	91	50	0
Total	49 709	23 212	16 617	8 533	6 464	11 242	8 865	16 602	26 686	14 012	26 816	21 504	11 778	37 414	12 781	11 100	7 356

Table B.3.8 Number of licensed commercial salmon fishermen by Statistical Area, 1975-83. Percent change, 1975-83, in number licensed is shown.

Area	Number of licensed salmon fishermen									% change
	1975	1976	1977	1978	1979	1980	1981	1982	1983	
A	769	696	655	664	663	651	636	651	618	-20
B	1,399	1,234	1,154	1,148	1,148	1,163	1,126	1,154	1,039	-26
C	765	685	622	621	617	591	550	562	482	-37
D	596	525	469	473	457	446	412	428	386	-35
E	635	518	446	459	445	449	429	416	360	-43
F	314	308	264	261	266	246	246	273	240	-24
G	103	103	86	87	85	81	75	79	72	-30
H	388	335	303	284	296	279	269	278	254	-35
I	226	194	188	186	186	182	179	176	152	-33
J	393	353	324	316	308	294	288	297	273	-31
K	181	157	142	139	140	130	124	128	114	-37
L	185	111	97	100	93	95	94	95	83	-55
M	185	157	144	141	138	137	134	138	124	-33
N	158	130	112	118	116	109	109	109	107	-32
O	729	781	750	818	810	739	731	753	800	+10
Total Nfld.	6,252	5,506	5,006	4,997	4,958	4,853	4,671	4,784	4,304	-30
Prov.	6,981	6,287	5,756	5,815	5,768	5,592	5,402	5,537	5,104	-26

Table B.3.9 Number of licensed gear units (50 fathoms) by Statistical Area, 1975-83. Percent change, 1975-83, in number licensed is also shown.

Area	Licensed salmon fishing gear (in 50 fathom units)									%
	1975	1976	1977	1978	1979	1980	1981	1982	1983	change
A	2,818	2,639	2,473	2,516	2,515	2,480	2,411	2,362	2,478	-12
B	3,962	3,547	3,327	3,371	3,349	3,485	3,390	3,233	3,753	-5
C	2,565	2,354	2,163	2,172	2,169	2,320	1,944	1,706	1,669	-35
D	2,074	2,074	1,876	1,901	1,853	1,834	1,709	1,630	1,511	-27
E	2,567	2,276	1,973	2,066	1,971	2,024	1,954	1,678	1,420	-45
F	1,875	1,823	1,582	1,588	1,617	1,536	1,524	1,555	1,093	-42
G	432	347	292	287	283	268	252	242	245	-43
H	1,330	1,207	1,063	1,069	1,051	1,003	979	903	948	-29
I	594	577	554	576	588	593	598	505	580	-2
J	1,974	1,823	1,691	1,661	1,619	1,556	1,528	1,426	1,155	-41
K	574	501	467	456	455	426	403	364	418	-27
L	412	301	270	264	247	254	253	214	259	-37
M	411	350	322	288	312	314	309	304	461	+12
N	439	372	314	344	345	324	328	316	425	-3
O	3,154	3,558	3,408	3,725	3,795	3,501	3,450	3,531	3,436	+9
Total Nfld	22,027	20,191	18,367	18,559	18,374	18,417	17,581	16,438	16,415	-25
Prov	25,181	23,749	21,775	22,284	22,169	21,918	21,031	19,969	19,851	-21

Table B.3.10 Major changes to management of commercial fisheries for Atlantic salmon in Newfoundland and Labrador, 1975-84.

1975

- New Salmon Licensing Policy implemented.

  Maine features are:

  (1) Freeze on new entrants
  (2) Policy of attrition introduced
  (3) Strict transfer policy introduced.

1976

- Licensing policy modified to eliminate from the fishery persons employed full-time in jobs other than the fishery.

1978

- Reduced fishing season in area Cape St. Gregory south to Cape Ray from May 15 - December 31 to June 1 - July 10; and in area Cape Ray to Pass Island, season reduced from May 15 - December 31 to May 20 - July 10.

- Changes in herring and mackerel fishing season to reduce salmon by-catch - closed period: herring - June 15 to July 31; mackerel - July 1 to July 31.

1979

- To reduce salmon by-catch:

  (1) mesh size in cod trap leaders increased to 177 mm;
  (2) monofilament prohibited in cod traps.

1981

- Commercial salmon season changed from May 15 - December 31 to May 18 - December 31 for all areas except Area J which remained May 20 - July 10 and Area KL which remained June 1 - July 10.

- Closure of Bay of Islands to cod traps.

- Closure of area outside two nautical miles off Port aux Basques.

1982

- Fourteen separate management zones to be implemented (includes Gulf area of Newfoundland). this will result in more specific localized management plans on a zone-by-zone basis if necessary.

(ctd)

Table B.3.10 (cont'd)

1983

- Implement a program to standardize amount of fishing gear per licensed fisherman such that full-time fishermen are limited to 200 fathoms and part-time fishermen limited to 50-100 fathoms. The program was brought in over two years. In 1983 all part-time fishermen who were previously licensed for more than 100 fathoms were reduced to 100 fathoms and; full-time fishermen who were licensed for more than 300 fathoms were reduced to 200 fathoms in 1983 except for those fishermen who had been licensed for more than 300 fathoms; these were reduced to 300 fathoms in 1983 and to 200 fathoms in 1984. Fishermen who had been licensed for less than 200 fathoms had their licensed gear increased to 200 fathoms in 1983.

1984

- Area J_2 - closed to salmon fishing.
- Transfer of licenses restricted to among the immediate family members.
- It became illegal to retain salmon captured incidentally in non-salmon commercial gear.
- Voluntary buy-back of fishing licences.
- No transfer of part-time licences.

OPEN SEASONS

1975-1977	All Areas A to O	May 15 - December 31
1978-1980	Areas A to I; M to O	May 15 - December 31
	Area J	May 20 - July 10
	Areas K, L	June 1 - July 10
1981-1983	Areas A to I; M to O	May 18 - December 31
	Area J	May 20 - July 10
	Areas K, L	June 1 - July 10
1984	Areas A to I; M to O	June 5 - December 31
	Area J_1, K, L	June 5 - July 10
	Area J_2	Closed

Table B.3.11

AVERAGE MONTHLY CATCH, 1974-83, OF SMALL SALMON FOR NEWFOUNDLAND STATISTICAL AREA A-0

MONTH	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	TOTAL
5	43.5	768.6	177.7	468.3	2545.6	534.5	141.1	225.6	218.3	816.1	175.8	27.0	116.1	18.8	14.5	6291.5
6	26256.5	15041.6	7086.1	6347.0	3381.7	4347.0	1919.2	5858.5	2898.7	12451.2	6790.2	2459.2	2662.6	939.0	6799.9	105238.4
7	38898.4	22743.0	6908.5	7547.6	2413.9	3882.2	2825.5	6081.7	3021.3	6870.1	2553.2	1212.4	4841.4	4389.8	54174.0	168363.0
8	1075.8	2170.4	764.0	859.6	48.6	154.4	314.1	374.2	441.0	304.5	120.6	15.9	303.6	71.3	12524.7	19542.7
9	3.8	140.6	6.8	1.4	0.0	2.3	0.0	1.6	0.0	0.0	0.0	2.3	3.6	0.0	717.4	879.8
10	1.6	14.3	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	22.4
11	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	66279.8	40878.5	14943.1	15223.9	8392.3	8920.4	5199.9	12541.6	6579.3	20441.9	9639.8	3716.8	7927.3	5418.9	74234.5	300338.0

Table B.3.12

AVERAGE MONTHLY CATCH, 1974-83; OF LARGE SALMON FOR NEWFOUNDLAND STATISTICAL AREA A-0

MONTH	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	TOTAL
5	646.5	1590.1	3721.4	3193.8	4649.7	4560.1	35.8	803.7	437.3	13015.4	535.2	89.6	109.8	1.9	99.2	33489.5
6	16864.9	8562.0	6143.7	4471.5	3098.9	3973.0	371.8	2442.1	1787.0	17460.2	1764.0	694.5	780.9	263.0	23832.7	92510.2
7	9870.1	4559.1	1280.9	923.6	798.6	874.3	170.7	888.5	170.6	684.2	413.7	229.4	389.8	486.5	63544.9	85284.9
8	544.6	1746.3	439.7	388.5	66.6	22.1	29.1	11.0	105.3	139.0	38.3	11.1	87.4	29.7	11999.3	15658.0
9	3.9	157.6	11.5	8.4	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0	1480.9	1668.4
10	28.7	169.0	29.8	4.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	64.3	296.8
11	91.4	241.1	54.7	2.7	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	396.8
12	0.0	26.7	6.1	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.2
TOTAL	28050.1	17051.9	11687.8	8993.8	8615.5	9431.9	607.4	4145.3	2500.2	31298.8	2751.2	1024.6	1371.6	781.1	101026.6	229337.8

Table B.3.13 Estimated number of 1-sea-winter Atlantic salmon harvested in Newfoundland and Labrador commercial fisheries by statistical area and year.

Area	1975	1976	1977	1978	1979	1980	1981	1982	1983
A	60303	89300	61651	25731	103080	80078	93998	59428	53542
B	71225	30249	44691	17821	21524	64024	44106	50764	36695
C	28024	6284	18031	11578	5342	18246	14252	18607	13688
D	21994	10204	15236	10193	9661	14568	12843	12006	6432
E	9819	7983	11318	4771	2347	10012	9363	3091	3741
F	14513	9128	7915	1487	2719	10362	6940	3457	4838
G	3395	2833	2454	3702	11445	6153	7024	6706	3891
H	9604	11266	11366	7416	3129	19347	4698	16820	5084
I	9008	10265	3226	4210	4095	5602	3820	10191	3581
J	35959	52492	8601	2352	7976	19399	6849	10521	9965
K	5606	13307	11976	7401	10550	11441	11097	6466	7201
L	2816	2046	2657	2735	3111	8113	4230	4875	4693
M	5937	11986	4437	6046	11038	6668	8300	6528	13082
N	4289	4993	4404	1484	7449	6926	7370	11002	2432
O	111791	78209	69602	33656	45714	103479	114680	79449	48392
Total	394283	340545	277565	140583	249180	384418	349570	299911	217257

Table B.3.14 Estimated number of multi-sea winter salmon caught in Newfoundland-Labrador commercial fisheries by Statistical Area and year.

Area	1975	1976	1977	1978	1979	1980	1981	1982	1983
A	27034	40698	51394	17675	15708	34853	36479	17340	20401
B	22950	14303	20371	14564	7403	24029	26632	16022	11901
C	24380	10811	19150	12785	3849	10609	14366	6089	7265
D	14171	6648	11849	10689	1757	6919	10356	4278	4086
E	12153	7042	11875	8572	1418	10747	11168	2425	3478
F	17669	10628	11754	5901	1881	13953	8644	2238	3438
G	628	310	266	1013	1239	522	834	395	447
H	3304	4269	3677	4782	3106	5916	2226	3526	2767
I	1246	3575	1550	1512	1029	2960	2031	3868	1288
J	44207	70272	35897	18851	18327	22691	19931	20669	15100
K	2431	3748	4958	2572	1462	3416	1573	1432	2218
L	858	825	1524	991	476	1818	687	993	833
M	1444	1620	2166	1225	926	1651	1227	887	1523
N	843	283	1431	594	477	1164	1179	969	446
O	114521	131540	116980	91473	52238	124955	112334	83243	59719
Total	287839	306572	294842	193199	111296	266203	249667	164374	134910

Table C.1 Annual variation in survival of smolts originating from sample North American and European rivers.

Country and Stock	Description of data set [1]	Sea-age of Return	Indices [2] of Survival from Smolt to Adult stage for Smolt Year Classes 1974	1975	1976	1977	1978	1979	1980	1981	1982
CANADA											
St John river	Hatchery, returns	1	1.58	2.37	2.08	0.87	1.80	4.00	1.80	1.33	0.60
	to home river	2	0.48	0.64	0.66	0.30	1.17	0.82	0.36	0.24	-
Area N, Newfoundland	Wild, returns to sea fisheries and home river	1	10.53	12.76	15.66	5.76	19.78	13.75	9.19	12.06	12.00
IRELAND											
Burrishoole River	Wild, returns to	1	9.21	6.04	4.14	6.17	9.41	7.82	2.87	5.08	5.66
	home river	2	0.50	0.28	0.19	0.09	0.49	0.77	0.19	0.31	-
Corrib River	Wild, returns to fisheries and home river	1	-	-	-	-	-	-	6.1	6.8	10.5
N IRELAND											
Bush River	Wild, returns to	1	-	-	6.21	6.46	5.77	10.68	5.63	-	7.79
	home river	2	-	-	1.45	1.19	1.00	1.63	0.59	-	-
SCOTLAND											
North Esk River	Wild, returns to	1	36.00	11.38	23.78	-	-	-	8.36	11.00	10.69
	sea fisheries and	2	9.91	9.32	17.45	-	-	-	7.40	5.70	-
	home river	3	0.35	0.20	0.46	-	-	-	0.31	-	-
NORWAY											
Orsta River	Wild, returns to	1	-	-	-	-	-	1.52	0.72	1.49	-
	sea fisheries and home river	2	-	-	-	-	-	1.01	0.14	0.28	-
Mixed	Hatchery, returns	1	-	-	-	-	-	1.55	1.48	1.07	-
	to sea fisheries, and home river	2	-	-	-	-	-	1.17	0.99	0.94	-
FINLAND											
Neiden River	Wild, returns to	1	-	-	0.97	0.75	0.35	-	-	-	-
	sea fisheries and	2	-	-	0.19	0.61	0.18	-	-	-	-
	home river	3	-	-	0.29	0.68	0.18	-	-	-	-
Tana River	Wild, returns to	1	-	0.34	1.26	2.67	0.51	0.91	-	-	-
	sea fisheries and	2	-	0.52	0.58	0.71	1.35	0.40	-	-	-
	home river	3	-	0.31	0.31	0.39	0.34	0.40	-	-	-

1. Identifies origin of smolt groups as hatchery or wild and specifies the area of return or capture as adult fish
2. Indices of survival expressed as the percentage of smolts captured in fisheries and/or returning to home waters as adults

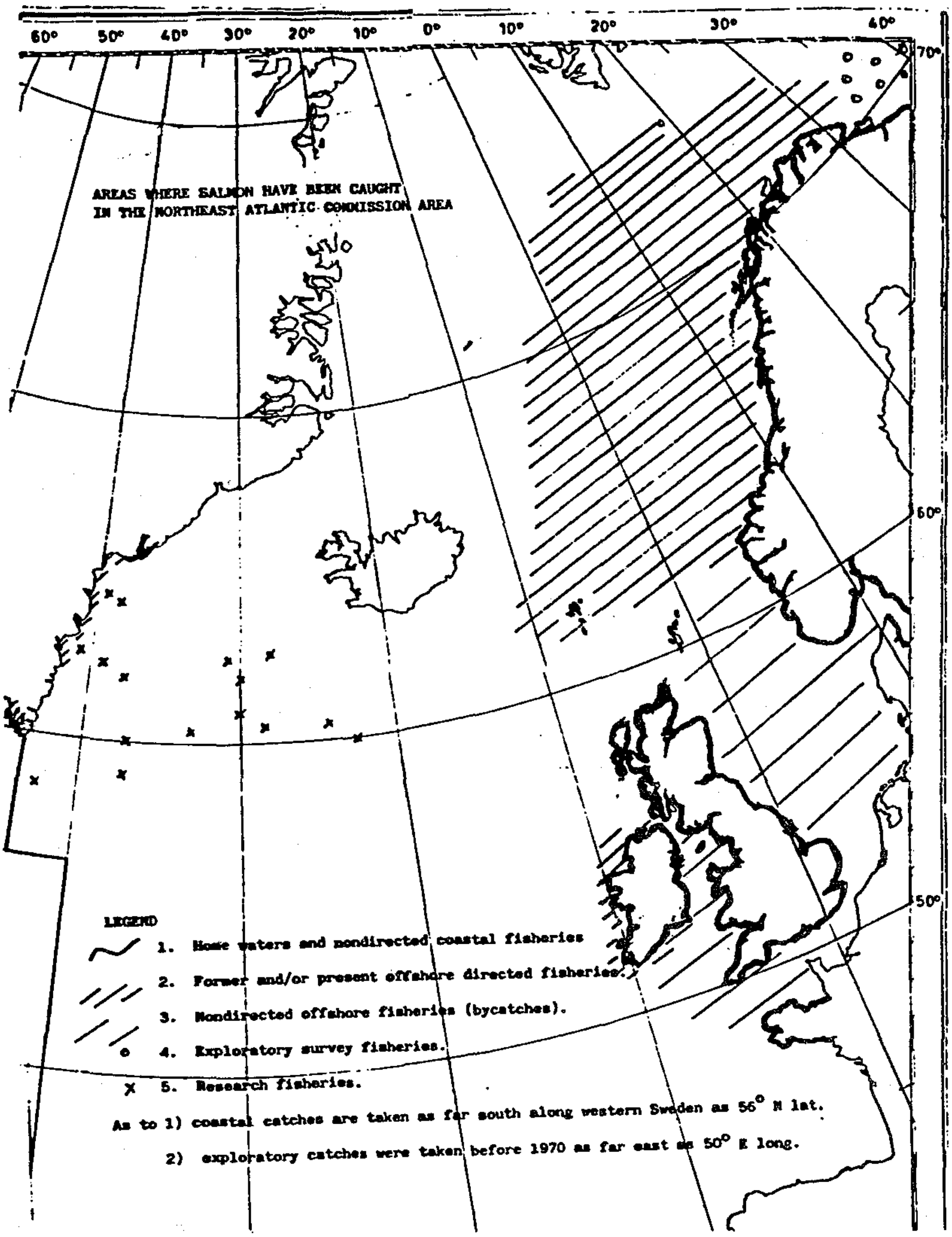

AREAS WHERE SALMON HAVE BEEN CAUGHT
IN THE NORTHEAST ATLANTIC COMMISSION AREA
60°
50°
40°
30°
20°
10°
0°
10°
20°
30°
40°
70°
60°
50°
LEGEND
1. Home waters and nondirected coastal fisheries
2. Former and/or present offshore directed fisheries.
3. Nondirected offshore fisheries (bycatches).
4. Exploratory survey fisheries.
5. Research fisheries.
As to 1) coastal catches are taken as far south along western Sweden as 56° N lat.
2) exploratory catches were taken before 1970 as far east as 50° E long.

Figure B.1.4

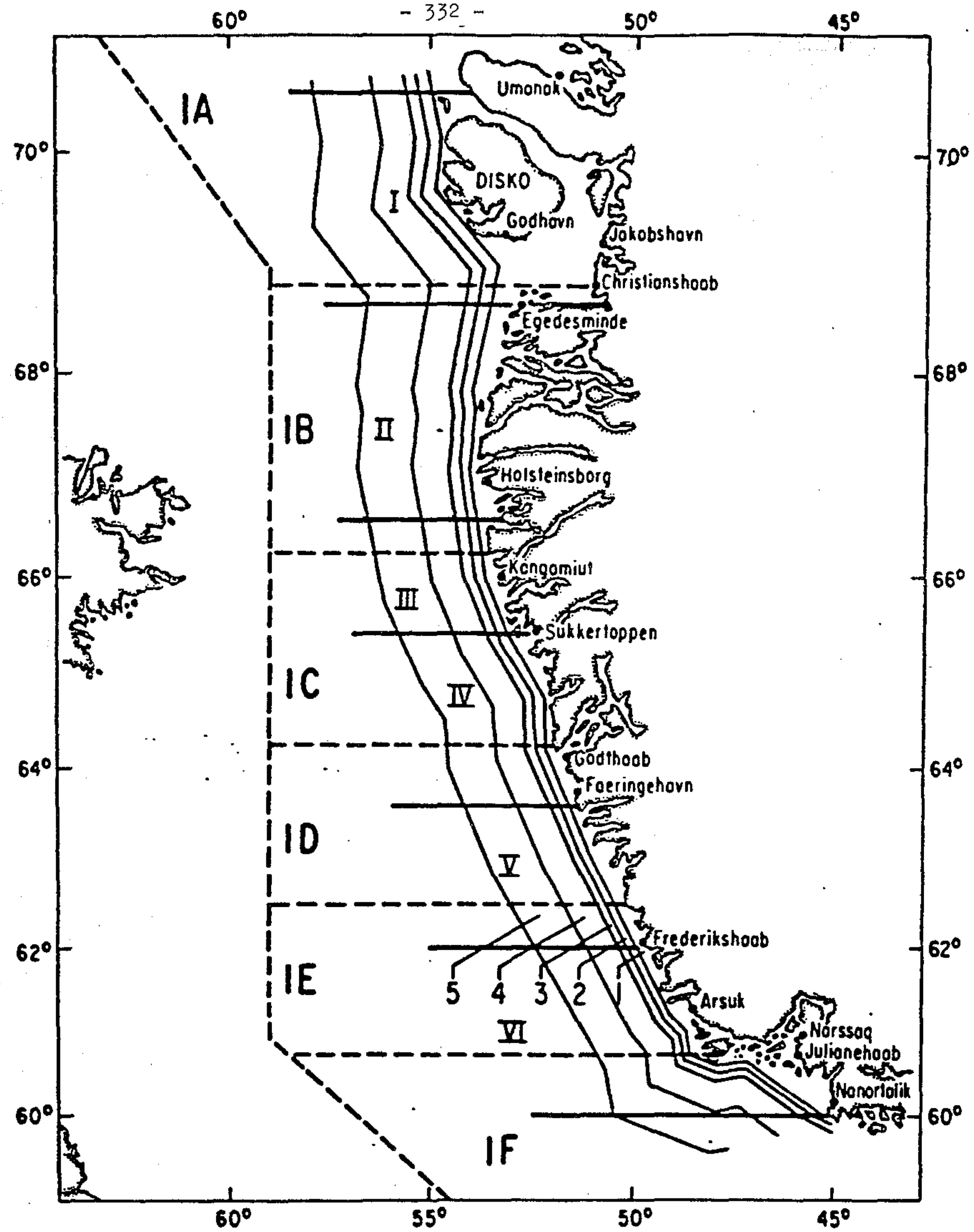
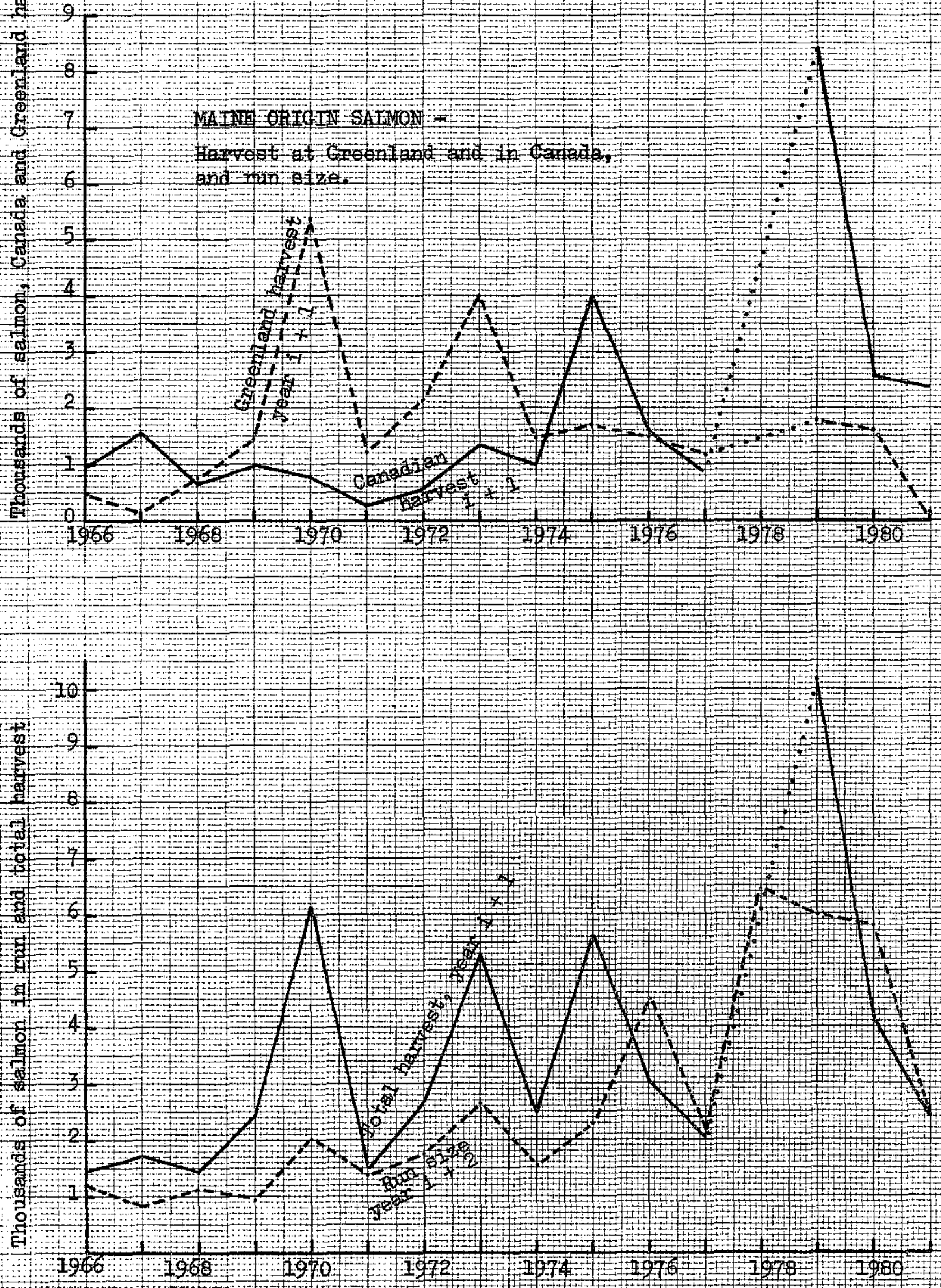


Figure B.2.1

Area map of West Greenland showing NAFO divisions, fishing areas (I-VI), and subareas (1-5).

Figure B.3.1 SALMON from Maine rivers and their harvest in non-USA rivers



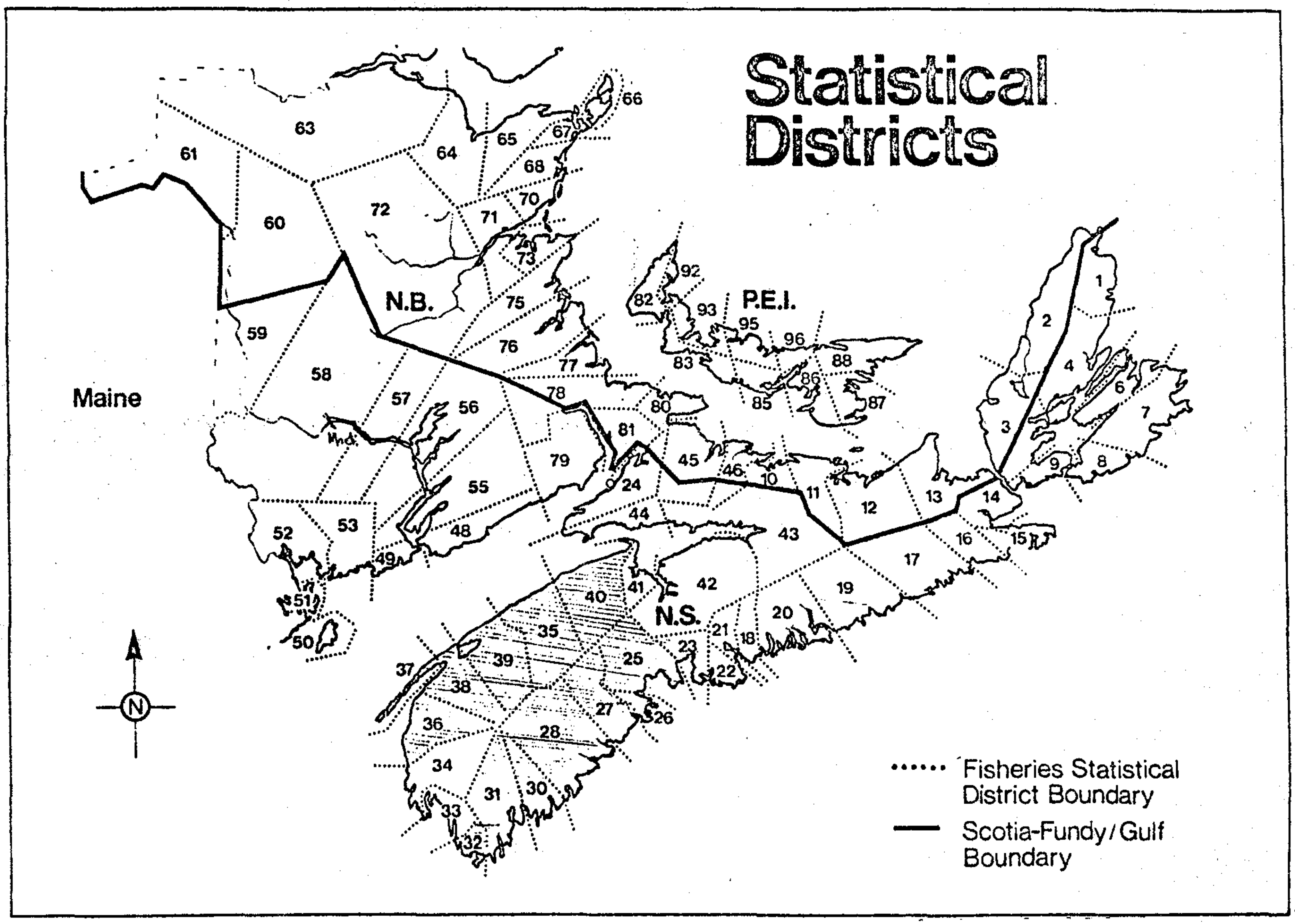


Figure B.3.2 Fisheries Statistical Districts of Nova Scotia, New Brunswick and Prince Edward Island.

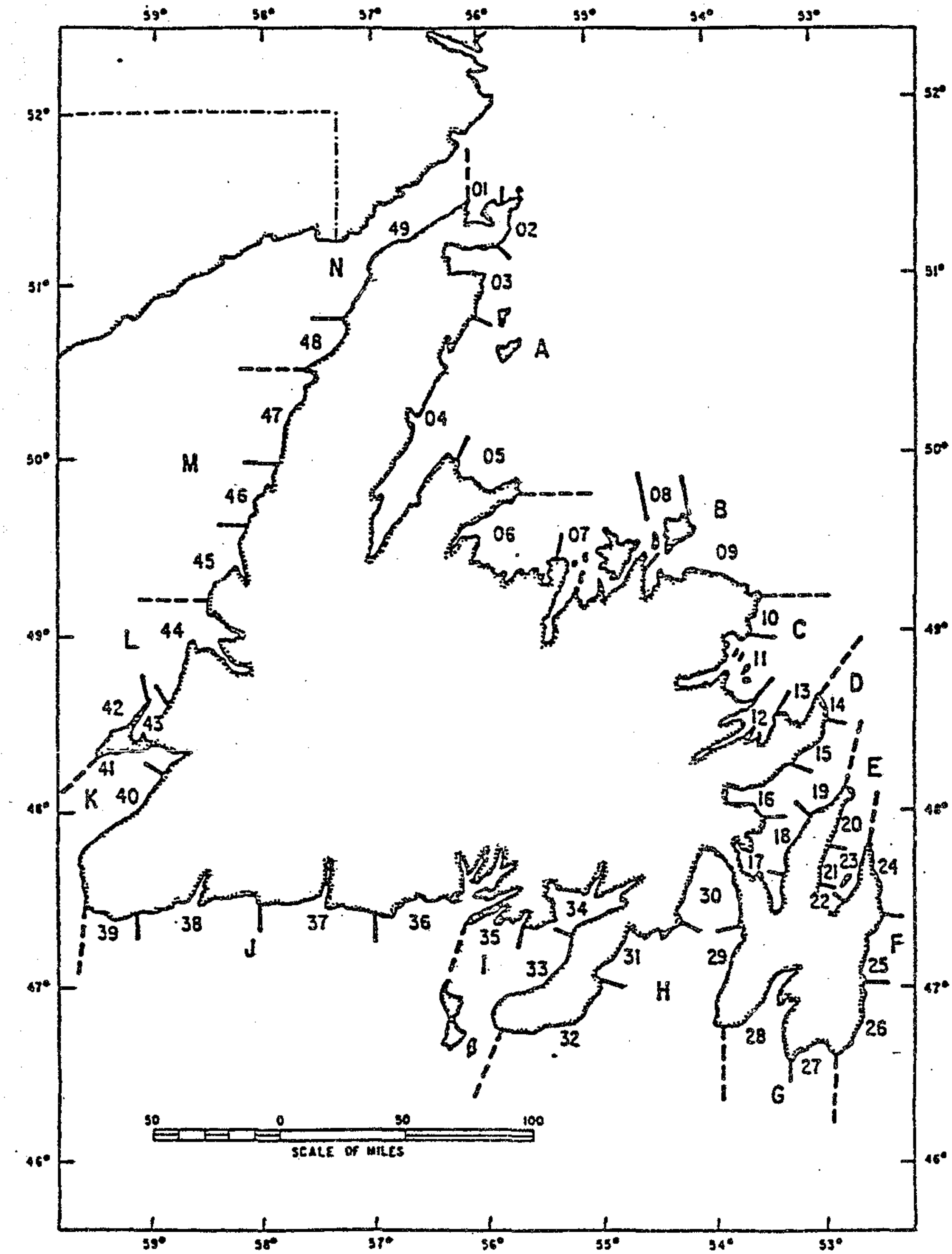


Figure B.3.3 Boundaries of Statistical Section (numerically indicated) and Statistical Areas (alphabetical) in insular Newfoundland.

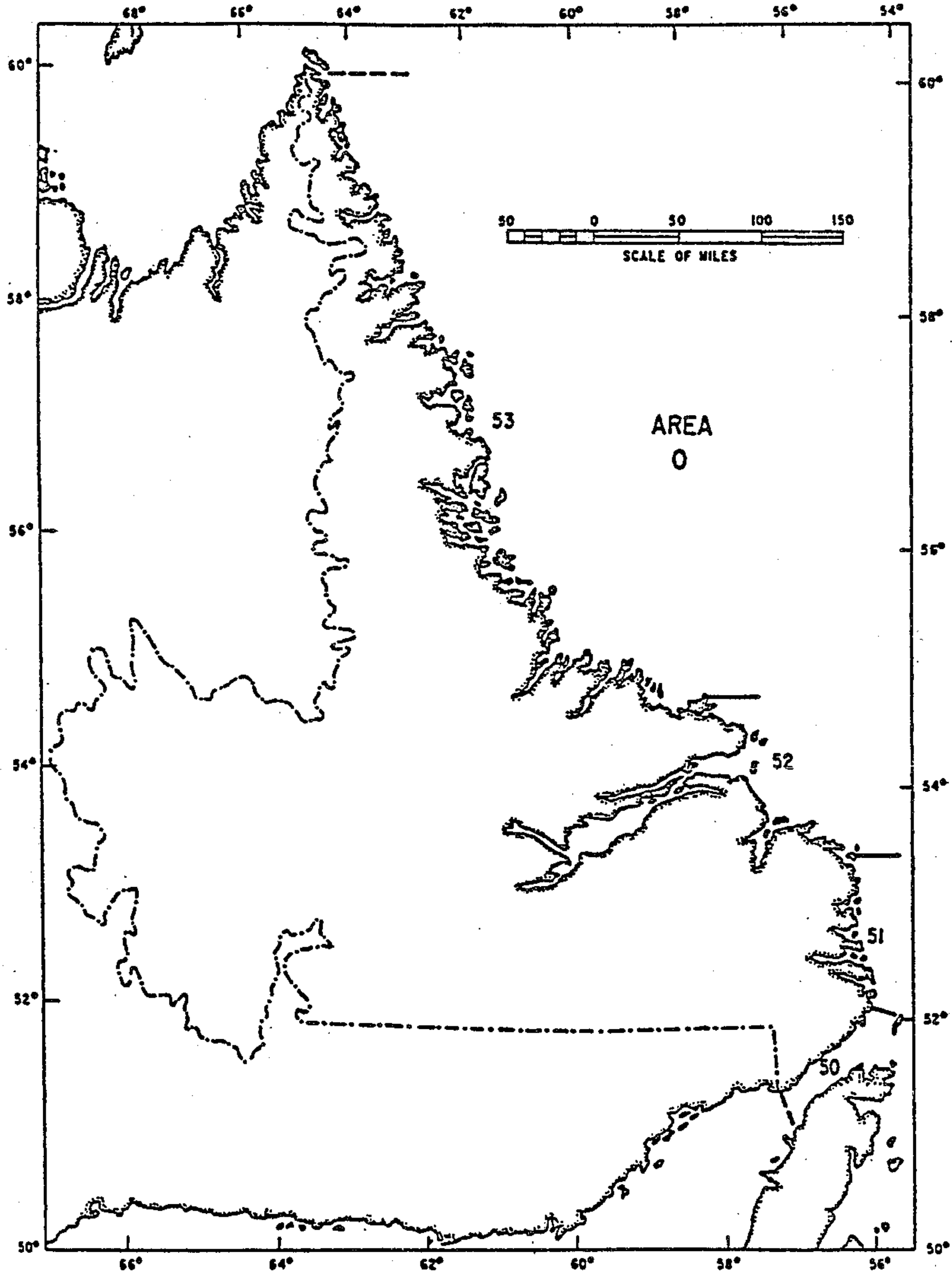


Figure B.3.4 Boundaries of Statistical Section (numerically indicated) and Statistical Areas (alphabetical) in Labrador.

Indication of spine colours

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

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