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NO. 161

REPORTS OF THE ICES ADVISORY COMMITTEE ON FISHERY MANAGEMENT, 1988

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PREFACE

This volume of the Cooperative Research Report contains the reports of the Advisory Committee on Fishery Management in 1988.

After the May meeting, ICES 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 the report to the North Atlantic Salmon Conservation Organization (NASCO). The second part of the report to the NEAFC was issued after the November meeting. In order to distribute the advice to managers as fast as possible, the reports were issued in sections and distributed immediately after they had been completed.

The two reports to NEAFC have been edited into one report, placing the stocks in logical sequence and including all advice on each stock in one place.

The report to NEAFC is followed by the reports to IBSFC and NASCO.

Copenhagen, February 1989
Emory D. Anderson
Secretary to ACFM

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[1] Did not attend May 1988 meeting.
[2] Attended the May 1988 meeting in place of the regular member.

MEMBERS OF THE ADVISORY COMMITTEE ON FISHERY MANAGEMENT

1988/1989

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[1] Did not attend November 1988 meeting.
[2] Represented by Dr R.S. Bailey, outgoing Chairman, Pelagic Fish Committee.
[3] Attended the November 1988 meeting for several days in place of Mr Nielsen.
[4] Attended the November 1988 meeting in place of the regular member.

REPORTS OF THE ADVISORY COMMITTEE ON FISHERY MANAGEMENT

MAY AND NOVEMBER 1988

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 the two meetings, one in mid-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 different stocks has been distributed between the two meetings, taking into account various factors such as 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 six years in the basic criteria on which ACFM bases its advice. ACFM still considers that the biological advice provided should not be seen in isolation from economic considerations and welcomes 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 achieving viable management.

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

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 precautionay TACs to reduce the danger of excessive efforts 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 of the request of management bodies, has advised on implementation of TACs and their levels 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 these points.

Quality of the Data Base

In its 1986 report, ACFM expressed its concern that the data bases for assessments had been deteriorating for a number of important stocks and stressed the need for an improvement. The data from the fisheries in 1987 show that this situation has not changed significantly. ACFM is especially concerned about the lack of reliable catch data for a number of stocks. This may be caused by unreported catches, misreporting of catches by area, not having catches appropriately split into divisions, and inadequate sampling of landings in mixed fisheries. This not only makes assessments unreliable and, in some cases, impossible to carry out, but also implies that TACs for these fisheries cannot be effectively enforced.

Biological Reference Points

ACFM noted the proposal by the Methods Working Group in 1984 for the biological reference points F_{med} and F_{high}, which are intended to provide guidelines for levels of fishing mortality at which it is probable (in the case of F_{med}) and doubtful (in the case of F_{high}) that recruitment will, in the long-term, be sufficient to sustain a stable stock.

The values of F_{med} and F_{high} may be calculated very simply from stock and recruitment scatter diagrams and plots of biomass per recruit which are generally provided by ICES working groups. The procedure is simply to draw lines through the origin of the scatter plot which leave about 10% (in the case of F_{high}) and 50% (in the case of F_{med}) of the points above the line. The slopes of these lines correspond to values of recruitment per unit biomass, and the reciprocals of these values are estimates of the spawning biomass per recruit (an estimate of survival) which must be maintained for the stock to be sustainable. The fishing mortalities (conditional on the assumed exploitation pattern) to which these biomass-per-recruit values correspond may be determined from the plot of the relationship between these quantities and yield the estimates of F_{high} and F_{med}. Estimates based on percentiles are used rather than means because they are less sensitive to the actual size of extreme year classes.

F_{high} thus corresponds to a level of F at which survival is so low that recruitment (per unit biomass) is insufficient to maintain the stock in about nine years in ten. Whilst it cannot necessarily be taken as an estimate of the F at which collapse will occur, it is a level for which the available data provide very little evidence that it could be maintained indefinitely. It is, therefore, <u>not</u> a target or option level of F, but, on the contrary, a level which is probably dangerous to approach or maintain.

F_{med}, on the other hand, is a level for which there is sufficient evidence that it should be sustainable (assuming, of course, that the underlying environmental or ecological conditions to which the data relate are maintained). Below or in the vicinity of F_{med}, there should, therefore, be undue cause for concern about sustainability, and F_{med} could, therefore, in some circumstances, serve as a target for management, though many other factors (yield, exploitable biomass, etc.) are, of course, also relevant.

ACFM has found F_{med} in particular to be a useful quantity in providing guidance in preparing management options, and reference to it will be found in this report where appropriate. ACFM also stresses that biological reference points are intended to provide <u>guidance</u> concerning management options, and that no single reference point can possibly serve as a universal target for management.

ACFM advice is, however, based on the evaluation of as many relevant factors as possible, including levels of F in relation to biological reference points, spawning stock size in relation to historic levels, trends and recent levels of recruitment, and the precision of the assessments. Different factors dominate in different situations.

REPORT TO THE NORTH-EAST ATLANTIC FISHERIES COMMISSION

1 REVIEW OF NOMINAL CATCHES IN NEAFC AREA, 1978-1987

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 in order for the assessments 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 considerably between different stocks and fisheries, being negligible in some cases and constituting important parts of the total removal from other stocks.

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 in the assessments wherever data allow it 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.

2 STOCKS IN NEAFC REGION 1

2.1 North-East Arctic Cod

2.1.1 Advice from the May 1988 ACFM meeting

Source of Information: Working paper.

In the assessment of North-East Arctic cod carried out in 1987, which was the basis for the ACFM recommendation given in November 1987, the stock weights for the youngest age groups (3-7) in the most recent years were based on data from the Norwegian winter surveys. A very low growth (on average 6.4 cm) was observed in 1986 for age 3-5 fish, but in the catch and stock prediction, it was assumed that the growth in 1987 (and following years) would be normal, i.e., 11 cm per year, and the weights at age were adjusted accordingly. However, the data from the winter survey in 1988 showed a considerably lower growth (5.6 cm on average for ages 3-7), and the weights were about 30% below the stock weights used at 1 January 1988 in the assessment.

The reduced growth coincided with the collapse of the Barents Sea capelin stock. There is no doubt that capelin has been a major food resource for the cod, and it is possible that the growth of the cod will remain at a low level until the capelin stock is rebuilt. However, with decreasing numbers of young cod, the availability of food for each individual is likely to increase. Furthermore, changes in the distribution of the cod and an increase in the abundance of prey species other than capelin may improve the situation, e.g., if an abundant year class of herring enters the Barents Sea, as in 1983, a large food resource will suddenly be available. It is, therefore, difficult to predict the growth in 1988, but it is likely to be in the range from 5.6 cm (as in 1987) to 9.8 cm (average for 1977-1986).

The observed growth in 1987 has been used as a basis for a preliminary revision of the catch weights in 1987. New weight-at-age estimates have also been made for the catch in 1988 and the stock in 1989 for two assumptions about growth in 1988: 5.6 cm and 9.8 cm, covering the likely range.

The revised weights are given in Table 2.1.1.1.

The Norwegian survey in September-October 1987 gave estimates of stock numbers reasonably close to those in the Working Group's assessment. The winter survey in 1988 indicated much lower numbers, but this survey does not cover the whole stock area, and thus far most reliance is put on the results of the autumn survey. A revision of stock numbers has, therefore, not been attempted at this stage. With a large proportion of the catch-at-age data for 1987 still not available, there is yet no basis for a revision of the exploitation pattern. Preliminary landing figures indicate 530,000 t for 1987, which is 15,000 t less than the figure used in the assessment.

Using the stock numbers and exploitation pattern from the most recent assessment, but applying the revised weights, predictions of catch in 1988 and stock biomass in 1989 were made, and the results are given in Table 2.1.1.2. The reduced growth has also undoubtedly affected the maturity, but revisions of the maturity ogives have not yet been made, and the spawning stock biomass is, therefore, not given in the table. ACFM, in recommending 530,000 t for 1988, expected a reduction in fishing mortality to about 0.5 in 1988, and the catch and stock corresponding to a fishing mortality of 0.50 are included in the table together with the stock biomasses and fishing mortalities corresponding to catches of 500,000 t and 590,000 t in 1988, the latter being the agreed TAC.

The new predictions indicate that the fishing mortality in 1987 was about 0.95 and in 1988 will be at a level not far from 1.0 if the agreed TAC is taken. This is the highest level recorded. The recommended TAC for 1988 (corresponding to F = 0.50) should have been in the range 325,000-363,000 t. The expected increase in stock biomass from 1987 to 1988 has not occurred. Instead, a decline which is likely to continue from 1988 to 1989 is indicated. It is stressed, however, that these predictions are preliminary and some changes may be expected when a complete new assessment is available in the autumn.

ACFM in 1987 recommended a gradual reduction in fishing mortality towards F_{max}, and according to the 1987 assessment, this could be achieved already in 1989 with a TAC of 530,000 t in both 1988 and 1989. With the reduced stock biomass resulting from the revised weights at age and with new surveys confirming the declining trend in recruitment, the need for a reduction in fishing mortality has become more urgent. <u>ACFM, therefore recommends that catches in 1988 be reduced as far as possible from the agreed TAC towards the level of 325,000-363,000 t which corresponds to the recommended fishing mortality of 0.5 for this year</u>. It is realized that there are limitations to the reduction in catches that can be achieved with nearly half of 1988 already passed. However, to bring fishing mortality down to about 0.8, which has been the level in the period 1978-1987, and to halt the decline in stock biomass, a reduction to about 500,000 t is needed.

2.1.2 North-East Arctic Cod: Advice from the November 1988 ACFM meeting

Source of information: Arctic Fisheries Working Group report, September 1988 (C.M.1989/Assess:4).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC[3]	-	<434	<380	150	170	<446	<645	<363[4]	-	-	-
Agreed TAC[3]	300	300	300	220	220	400	560	451[5]	-	-	-
Actual landings[3]	399	364	290	278	308	430	518	-	1197	278	653
Sp. stock biomass	152	376	331	289	301	253	275	187[1]	681	152	345
Recruitment (age 3)	160	160	169	380	453	996	443	384[1]	1818	112	479
Mean F(5-10,u)	0.81	0.73	0.71	0.83	0.72	0.78	0.96	-	0.96	0.55	0.72

[1]Predicted or assumed. [2]Over period 1968-1987. [3]Coastal cod not included. [4]Revised from 530 in May 1988. [5]Revised from 590 during 1988. Weights in '000 t, recruitment in millions.

Catches: After reaching the lowest level in 39 years in 1984, landings have increased rapidly in response to improved recruitment (Tables 2.1.2.1 and 2.1.2.2). The available information indicates that discard rates were high in 1986 and 1987. Landings in 1988 are expected to decrease by more than 60,000 t, and the spawning fishery in Lofoten was the worst on record, i.e., for more than 100 years.

Data and assessment: Analytical assessment based on catch-at-age data. VPA tuned using 12 time series of trawl and acoustic surveys and commercial CPUE data. Recruitment estimated by combination of data from 16 index series.

Fishing mortality: Has increased from 1985 to the highest level on record (0.96) in 1987 (Figure 2.1). A further increase to 1.06 is expected in 1988, which is 4 x F_{max} (0.28) and 1.5 x F_{med} (0.69). The exploitation pattern has shifted onto younger fish during the last few years.

Recruitment: After a series of poor year classes, recruitment improved considerably with 1983 as an outstanding year class. However, the estimates of the 1982-1986 year classes have been gradually reduced as new information has become available. This may be due to discarding of young fish, or to higher than usual natural mortality on the abundant year classes. The most recent year classes, 1986-1988, are estimated as poor.

State of stock: Stock biomass has decreased from about 1.5 million t in 1986 to 899,000 t in 1988 and a further decrease to 855,000 t is expected in 1989. Spawning stock biomass fell to a low level of 187,000 t in 1988. An increase to 249,000 t is expected in 1989. Estimates of spawning stock biomass in earlier years are uncertain due to lack of reliable maturity ogives, but the current level may be the lowest in the stock history.

Forecast for 1989: Assuming F(88) = 1.06, Catch(88) = 455,000 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	F_{max}	0.28	249	173	489	SSB increased rapidly.
B	0.5F(88)	0.53		301	394	Sharp reduction in catch and increase in SSB.
C	F_{med}	0.69		371	349	Substantial reduction in catch and increase in SSB.
D	0.8F(88)	0.84		433	310	
E	F(88)	1.06		508	271	SSB increased moderately in short term.

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a rapid decline in spawning stock biomass after 1990. Catches will be decreasing after 1989 because of the weak 1986-1988 year classes.

Recommendation: At current fishing mortalities, the spawning stock biomass will, in a few years, fall below any previously recorded level, which may reduce the chances of good recruitment. A rapid rebuilding of the spawning stock is urgently called for, and a quick reduction in fishing mortality is needed to achieve this. ACFM recommends that fishing mortality be reduced substantially by 1990. An immediate reduction to F_{med} in 1989 would imply a TAC of 370,000 t, and a reduction to half the 1988 level would imply a TAC of 300,000 t.

Special comments: The assessment which was the basis for the TAC recommendation in November 1987 was revised in May 1988. The revision was based on new information on growth in 1987 and the stock numbers were only slightly changed to fit an updated landings figure for 1987. The most recent information indicates that growth is gradually returning to a normal level. This is the basis for the weights used in the prediction, but it is also assumed that the year classes that have suffered from reduced growth will not be able to regain normal length and weight for their age. The current assessment deviates from the previous one mainly on the 1981 and 1982 year classes. These have been subject to higher fishing mortalities than expected in 1987 and are accordingly reduced more than was anticipated. This accounts to a large extent for the high F level expected in 1988. The variations in weight for this stock mean that estimates of F_{max} also vary with time, and F_{med} may be an appropriate and more stable biological reference point. The variations in weight at age and the uncertainties about the size of recruiting year classes make a medium-term forecast unreliable.

Catch-at-age data for the first half of 1988, representing about 210,000 t, were examined by the Working Group. These appeared to correspond reasonably well with predicted catch numbers, except for age 5, where the catch numbers seemed to indicate a lower year total than predicted. This could mean that the current estimate of the 1983 year class is too high and calls for some caution in the management since the size of this year class will be of large importance to the fishery in the next few years.

2.2 North-East Arctic Haddock

Source of information: Arctic Fisheries Working Group report, September 1988 (C.M.1988/Assess:4).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	110	110	77	20	50	100	160	<240	-	-	-
Agreed TAC	110	-	-	-	50	100	250	240	-	-	-
Actual landings	77	47	22	17	41	97	151	-	320	17	122
Sp. stock biomass	123	102	66	38	31	58	32	69[1]	301	31	141
Recruitment (age 3)	6	8	5	5	280	437	140	25[1]	1017	5	153
Mean F(4-7,u)	0.62	0.52	0.44	0.36	0.50	0.59	0.72	-	0.84	0.26	0.55

[1]Predicted or assumed. [2]Over period 1968-1987. Weights in '000 t, recruitment in millions.

Catches: Landings have increased from 17,000 t, the lowest level on record, in 1984 to 151,000 t in 1987 (Tables 2.2.1 and 2.2.2). Landings in 1988 are expected to decrease to 120,000 t.

Data and assessment: Analytical assessment based on catch-at-age data. VPA tuned using 5 time series of trawl and acoustic surveys and commercial CPUE data. Recruitment estimated by combination of data from 10 index series.

Fishing mortality: Increasing since 1984 (Figure 2.2), but is expected to decrease to 0.52 in 1988 which is 1.8 x F_{max} (0.29), 4 x $F_{0.1}$ (0.13), and also well above F_{med} (0.35).

Recruitment: After a series of poor year classes which recruited to the fishery in 1980-1984, recruitment was good in 1985-1987. The 1985-1987 year classes, which are recruiting in 1988-1991, appear to be poor.

State of stock: The spawning stock biomass is expected to increase until 1990, but the total biomass has started to decline and this trend will continue unless the fishing mortality is reduced, because of the most recent poor year classes.

Forecast for 1989: Assuming F(88) = 0.52, Catch(88) = 120,000 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	0.5F(88)	0.26	88	59	128	SSB increasing)
B	F_{max}	0.29		65	123	) in the
C	F_{med}	0.35		78	113	) short
D	0.8F(88)	0.41		86	107	) term
E	F(88)	0.52		103	94	SSB fairly stable)

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a reduction in stock biomass and later also in spawning stock biomass. However, the reduction in biomass is chiefly the result of fluctuations in the recruitment and will occur even at very moderate fishing mortalities.

Recommendation: The low abundance of the 1985-1988 year classes will result in a considerable reduction in the stock in the near future. Fishing mortalities are moderate, but a reduction is needed to prevent the stock from falling to a dangerously low level during the period of low recruitment. ACFM recommends that the fishing mortality in 1989 is reduced substantially, by about the same proportion as that for North-East Arctic cod.

Special comments: Fishing mortality on this stock has been revised upwards by a substantial amount in this assessment as a result of new data and an improved treatment of F on the older age groups. Estimated stock size has been correspondingly revised downwards. In the short term, the stock will be sustained by the relatively strong 1982-1984 year classes, but in the medium term, a decline in stock and catches is inevitable because of poor recruitment from the 1985 year class on.

2.3 North-East Arctic Saithe

Source of information: Arctic Fisheries Working Group report, September 1988 (C.M.1989/ Assesss:4).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	123	130	130[3]	103[3]	85[3]	74[3]	<90	<83	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	175	168	157	159	107	70	92	-	265	70	175
Sp. stock biomass	246	300	352	458	467	454	539	-	565	223	395
Recruitment (age 1)	243	225	317	346	158	270[1]	270[1]	-	547	155	318
Mean F(3-8,u)	0.29	0.26	0.21	0.24	0.16	0.11	0.15	-	0.51	0.11	0.29

[1]Predicted or assumed. [2]Over period 1968-1987. [3]Catch at F_{max}; reduction to this level as quickly as possible is recommended. Weights in '000 t, recruitment in millions.

Catches: Landings declined sharply from 1984 to 1986 to the lowest level on record (Table 2.3), but are currently moderately increasing. Expected catch in 1988 is 105,000 t.

Data and assessment: Analytical assessment based on catch-at-age data. VPA tuned using CPUE from Norwegian trawlers and purse seiners. Reliable recruitment indices are not available.

Fishing mortality: Appears to have decreased since the early 1980s. The level appears to be between $F_{0.1}$ (0.14) and F_{max} (0.23), but the assessment is uncertain due to inconsistencies in the catch-at-age data. Exploitation pattern varies from year to year depending on relative effort of seiner and trawlers.

Recruitment: The 1983 year class appears to be stronger than the preceding ones and may be above average strength. Indices from 0-group surveys indicate that recruitment has been declining from 1985-1988, but the abundance of these year classes is not known.

State of stock: Stock level is uncertain, but the stock appears to be in a relatively stable state (Figure 2.3).

Forecast for 1989: A reliable catch forecast is not available, but the assessment suggests that, with a status quo fishing mortality in 1989, the catch would be 100,000 - 120,000 t, depending on the strength of the 1983 year class.

Recommendation: There are severe doubts about the validity of the assessment and the current level of fishing mortalities is accordingly uncertain. However, the effort data strongly indicate that fishing mortality has been substantially reduced in the most recent years and, therefore, is probably at a moderate level. ACFM, therefore, recommends that the catch in 1989 should not exceed 120,000 t.

Special comments: Sampling of landings of spawning saithe, especially in the gillnet fisheries, has been poor for many years and age compositions from other areas or gears have generally been used. It is stressed that age/length sampling of catches must be improved if more constructive advice is to be given in the future.

2.4 Redfish in Sub-areas I and II

Total redfish landings in Sub-areas I and II have been declining continuously from 132,000 t in 1982 to about 34,000 t in 1987 (Table 2.4.1). The decline has occurred mainly in Divisions IIa and IIb (Tables 2.4.3 and 2.4.4), but the decline in Division IIb was halted in 1987. Landings in Sub-area I have been fluctuating with no clear trend (Table 2.4.2).

The proportion of *Sebastes mentella* in the landings has declined from 85% in 1983 to 30% in 1987 (Table 2.4.5).

2.4.1 Sebastes mentella in Sub-areas I and II

Source of information: Arctic Fisheries Working Group report, September 1988 (C.M.1988/Assess:4)

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	70	70	70	70	85	85	70[3]	11	-	-	-
Agreed TAC	70	70	100	90	85	85	85	-	-	-	-
Actual landings	82	115	105	73	63	23	10	-	269	5	80
Sp. stock biomass	174	191	152	95	71	49	47	57[1]	320	47	180
Recruitment (age 6)	107	78	101	111	121	149	169	300[1]	591	78	321
Mean F(10-15,u)	0.31	0.44	0.69	0.87	0.82	0.41	0.16	-	0.87	0.01	0.33

[1]Predicted or assumed. [2]Over period 1968-1987. [3]Precautionary TAC based on recent catches. Weights in '000 t, recruitment in millions.

Catches: Landings have been declining since 1982 (Table 2.4.5), but are expected to stay at the 1987 level of 10,000 t in 1988.

Data and assessment: Analytical assessment based on catch-at-age data. VPA tuned on the basis of a plot of F vs. effort. Recruitment estimated by combination of USSR survey indices for five age groups.

Fishing mortality: Peaked in 1984-1985, but has subsequently been rapidly reduced (Figure 2.4.1) and is currently estimated to be between $F_{0.1}$ (0.11) and F_{max} (0.23).

Recruitment: The year classes recruiting to the fishery (at age 6) were about 500 million individuals in 1971-1977. The level in 1981-1984 was reduced to about 100 million, but since then there appears to have been a gradual improvement and the 1982 year class is estimated to be 300 million in 1988.

State of stock: Total biomass and spawning stock biomass have been declining and are both less than 20% of the peak levels in 1975, but the reduction in fishing mortality has stopped the decline.

Forecast for 1989: Assuming F(88) = 0.13, Catch(88) = 10,000 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	$F_{0.1}$	0.11	57	10	89	SSB increasing
B	F(88)	0.13		12	87	SSB increasing
C	F_{max}	0.23		21	79	SSB increasing

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to an increase in the spawning stock biomass.

Recommendation: Although fishing mortality is low and spawning stock biomass is increasing, the stock size is small compared to historical levels and continued low fishing mortality is needed to allow the stock to recover. ACFM recommends that fishing mortality is kept at the current low level, corresponding to a TAC of 12,000 t in 1989.

2.4.2 Sebastes marinus in Sub-areas I and II

Source of information: Arctic Fisheries Working Group report, September 1988 (C.M.1989/ Assess:4).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	19	14	15[2]	15[2]	15[2]	15[2]	-[3]	15	-	-	-
Agreed TAC	19	14	17	17	15	15	-	-	-	-	-
Actual landings	21	16	19	28	29	30	24	-	49	13	25

[1]Over period 1968-1987. [2]Precautionary TAC. [3]Recommended that a precautionary TAC is set based on recent catches. Weights in '000 t.

Catches: Landings decreased from 49,000 t in 1976 to 16,000 t in 1982, followed by an increase to about 30,000 t in 1984-1986 and a new decrease to 24,000 t in 1987 (Table 2.4.5).

Data and assessment: Catch-at-age data are available, but are considered unreliable. In the absence of a reliable analysis, a SHOT forecast was made.

Fishing mortality: Unknown.

Recruitment: Unknown.

State of stock: Survey data indicate that the stock, especially of younger fish, is declining, but there is yet no evidence of a stock decline in the CPUE data.

Forecast for 1989: Assuming Catch (88) = 23,000 t. For continued fishing at the current level of exploitation, a catch of 24,000 t for 1989 is predicted (SHOT forecast).

Recommendation: ACFM advises that the current level of exploitation should be maintained and, therefore, prefers a status quo catch in 1989 corresponding to a TAC of 24,000 t.

2.5 Greenland Halibut in Sub-areas I and II

Source of information: Arctic Fisheries Working Group report, September 1988 (C.M.1988/Assess:4)

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	12	12	17	17	20	20	-[3]	19	-	-	-
Agreed TAC	12	12	17	17	20	20	-	-	-	-	-
Actual landings	15	17	22	22	20	23	19	-	89	6	26
Sp. stock biomass	61	60	70	66	68	72	72	80[1]	80	20	48
Recruitment (age 3)	29	31	40	39	32	34	27	31[1]	43	24	32
Mean F(7-11,u)	0.18	0.31	0.37	0.37	0.35	0.36	0.27	-	0.55	0.18	0.37

[1]Predicted or assumed. [2]Over period 1970-1987. [3]Recommended that a precautionary TAC is set based on recent catches. Weights in '000 t, recruitment in millions.

Catches: Landings have been fairly stable at about 20,000 t in recent years, but are still considerably below the level in the 1970s (Tables 2.5.1-2.5.4).

Data and assessment: Analytical assessment based on catch-at-age data. VPA tuned using two time series of commercial CPUE data. Reliable recruitment indices are not available.

Fishing mortality: Decreased in 1987 from a level about 1.6 x F_{max} in 1983-1986 (Figure 2.5).

Recruitment: Has generally varied little between years, but longer periods of high or low recruitment are indicated. In the most recent years, the level has been close to the long-term mean, but the 1984 year class may be less abundant.

State of stock: Spawning stock biomass is increasing. Maturity ogives are available only back to 1981, but the spawning stock was probably at a considerably higher level in the early 1970s.

Forecast for 1989: Assuming F(88) = 0.24, Catch(88) = 19,000 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	$F_{0.1}$	0.11	80	10	105	SSB increasing
B	F_{max}	0.22		19	96	SSB increasing
C	F(88)	0.24		21	94	SSB increasing

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to increase in the spawning stock biomass.

Recommendation: Fishing mortality should not be increased from the current level which corresponds to a TAC of 21,000 t in 1989.

2.6 STOCKS OFF EAST GREENLAND

2.6.1 East Greenland cod (Sub-area XIV)

2.6.1.1 Advice from the May 1988 ACFM meeting

Source of information: Report of the Working Group on Cod off East Greenland, February 1988 (C.M.1988/Assess:11).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	-	12	6	6	4	4	5	-	12	4	6
Agreed TAC	-	11.5	11.5	11.5	11.5	11.5	11.5	-	11.5	11.5	11.5
Actual landings	16[3]	27[3]	13	8	2	5	7	-	27	2	11
Sp. stock biomass	55	49	27	25	16	42	21	21[1]	55	16	34
Mean F(5-10,u)	0.21	1.40	0.53	0.40	0.13	0.14	0.38	-	1.40	0.13	0.46

[1]Predicted or assumed. [2]Over period 1981-1987. [3]Including discards. Weights in '000 t.

Catches: After a peak in 1982, catches decreased sharply up to 1985, with a moderate improvement in 1986 and 1987 (Table 2.6.1).

Data and assessment: Stock estimates are derived from the bottom trawl survey of the Federal Republic of Germany, catch-in-numbers data, and certain assumptions about immigration and emigration.

Fishing mortality: Low level in 1985-1986 with increase in 1987.

Recruitment: The very abundant 1984 year class, which is of exploitable size in 1988, is dominating the stock, followed by the 1985 year class which will recruit in 1989.

State of stock: From the very low 1985 level, spawning stock increased in 1986 due to immigration from West Greenland. Reduced by 50% in 1987 due to fishing and emigration.

Forecast for 1988: (Figure 2.6.1)

Option	Basis	F(88)	Predicted			Consequences/implications
			SSB(88)	Catch(88)	SSB(89)[1]	
A	F(86)	0.14	21	6	27	
B	Y/EB = 0.20($F_{0.1}$)	0.26		10	24	
C	TAC = 11.5 t	0.30		11.5	23	
D	F(87) (F_{max})	0.38		14	21	

[1]Does not include immigrants from West Greenland in 1989. Weights in '000 t.

Continued fishing at the 1987 level of fishing mortality (Option D), which is slightly below F_{max} will lead to the maintenance of the spawning stock biomass at the current low level. A catch of 10,000 t (Option B) is associated with a yield exploitable biomass ratio (Y/EB) of 0.20 and corresponds to fishing at the $F_{0.1}$ level. The consequences of the agreed TAC of 11,500 t (Option C) would be a fishing mortality between the $F_{0.1}$ and F_{max} levels. For Options B and C, only a slight increase in SSB is calculated.

Special comments:

a) Preliminary ACFM advice from November 1987: In the report of the ACFM meeting from November 1987, it was recommended that the level of exploitation in 1988 should not be increased in order to prevent the spawning stock from declining again. This provisional advice was based on a preliminary assessment carried out on raw data from the 1987 groundfish survey and a preliminary age composition of 1987 landings.

The Working Group assessment was based on a more refined analysis of the survey results and also on a more detailed breakdown of the catch-in-number-at-age data by season and vessel category. As a result, the fishing mortality estimated for 1987 is about 70% higher and the estimate of the spawning stock biomass is about 60% than in the preliminary assessment from November. As a consequence, in the catch prediction for 1988, fishing mortality associated with the same catch level is about 20% higher than given in the November advice, and the resulting SSB estimates for the beginning of 1989 are lower.

b) Definition of biological management objectives: In the East Greenland area, the stock situation is very complicated. The state of the stock is, to a large extent, affected by factors which are very difficult to estimate and to predict, i.e., immigration of cod from West Greenland (depending on the stock situation in that area), emigration of mature cod to Icelandic spawning grounds, and drift of larvae from Iceland. The role of a local spawning stock can still not be fully evaluated, and recruitment estimates from it are not obtainable. Under these circumstances, management objectives are very difficult to establish.

In view of these difficulties, ACFM asked the Working Group whether the yield/biomass ratio could be useful for the future assessment of the stock. Therefore, the yield/exploitable biomass ratios (Y/EB) of various cod stocks in the North Atlantic were analyzed in order to establish ratios associated with certain levels of fishing mortality which might by analogy, be useful for providing management objectives for the cod stock in East Greenland waters.

For each stock, the regression of Y/EB against mean fishing mortality was calculated. The results show that the Y/EB ratios associated with the various $F_{0.1}$ values for the Northeast Atlantic cod stocks are very similar ranging from 0.17 to 0.23 and the corresponding values for F_{max} range from 0.27 to 0.33. Both the intercept and the slope of the regression of Y/EB versus mean fishing mortality for East Greenland cod are not very different from those obtained for the other Northeast Atlantic cod stocks.

On this basis, it was concluded for the East Greenland cod stock that Y/EB ratios of about 0.2 and 0.3 correspond to fishing at the $F_{0.1}$ and F_{max} level, respectively.

2.6.1.2 East Greenland cod: Advice from the November 1988 ACFM meeting

Source of information: Result of Federal Republic of Germany groundfish survey, autumn 1988.

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	-	12	6	6	4	4	5	5	12	4	6
Agreed TAC	-	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
Actual landings	16	27	13	8	2	5	7	11.5[1]	27	2	11.2

[1]Predicted or assumed. [2]Over period 1981-1988. Weights in '000 t.

Results of groundfish survey: Provisional estimates of stock abundance and trawlable biomass from the 1988 Federal Republic of Germany autumn bottom trawl survey which ended at the beginning of October are given in the text table below together with the corresponding figures from the 1980-1987 surveys.

			Biomass		Stock numbers	
Year	Season	Ship	Tonnes	+/- %	('000)	+/- %
1980	Oct/Nov	"Karlsburg"	62,944	33	15,425	34
1981	Nov/Dec	"W. Herwig"	88,336	43	19,448	35
1982	Sep/Oct	"W. Herwig"	19,782	35	6,106	52
1983	Sep/Oct	"W. Herwig"	26,980	38	6,730	33
1984	Oct[1]	"A. Dohrn"	21,151	42	6,488	51
1985	Oct	"W. Herwig"	21,842	26	7,815	27
1986	Oct	"W. Herwig"	44,288	34	17,554	32
1987	Sep/Oct	"W. Herwig"	33,929	36	25,296	37
1988	Sep/Oct[2]	"W. Herwig"	33,063	47	14,800	40

[1]Only 36 valid hauls. [2]Preliminary.
Confidence intervals are given at 95% significance level.

Survey results were evaluated using stratification by geographical areas and depth zones. Compared to the results of the 1987 survey, there is only a slight decrease in trawlable biomass but a substantial reduction in stock abundance in numbers. Age composition of survey stock is not yet available.

Data and assessment: An analysis was carried out only on length-based data.

Fishery: The increased catch in the first two months of 1988 was due to increased effort by the Federal Republic of Germany fleet. About 95% of the catch in numbers (7.5 million) was caught in the area south of 63°N in the first four months of the year. These catches mostly affected the 1984 year class and, on a somewhat lower level, the 1981 year class off East Greenland. About 5% of the total catch was taken in the area north of 63°N consisting mainly of the 1981 and older year classes with strong impact on the 1979 year class.

Migration: From differences in the length distributions of commercial catches which are representing the composition of the trawlable stock in spring and length distributions of survey catches in autumn, a substantial immigration of the 1981 year class from West Greenland can be concluded.

State of the stock: The analysis of the length composition data from the 1988 survey indicates a reduction of the dominating 1984 year class of more than 50% from 1987 in terms of numbers. This was compensated in terms of biomass by a substantial immigration of the 1981 year class from West Greenland. Because of this, the stock in 1988 remained at the level estimated in 1987.

Recommendation: It would appear that the biomass at the beginning of 1989 will be similar to that at the beginning of 1988. Catches in 1989 at the level seen in 1988 will, therefore, reduce this biomass significantly. ACFM cannot predict whether the stock will be replenished after the fishery by immigration from West Greenland and, therefore, reiterates its previous advice that catches should not exceed 5,000 t.

Special comments: The final advice for 1989 will be given in May 1989 when the report of the Working Group on Cod Stocks off East Greenland has been evaluated by ACFM.

2.6.2 Pandalus in Denmark Strait (Divisions XIVb-Va)

Source of information: NAFO Scientific Council Provisional Report, June 1988 (SCS Doc.88/20)

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Advised TAC	-	4.2	4.2	4.2	5.0	-	-	-	-	-	-
Effective TAC[1]	8.0	4.5	5.7	5.2	6.1	7.2	7.2	7.2	-	-	-
Actual landings	4.8	4.9	4.2	6.7	8.1	11.1	11.9	-	11.9	1.2	5.8

[1]On western side of mid-line only. [2]Over period 1979-1987. Weights in '000 t.

Catches: Fishery began in 1978, climbed rapidly to 8,300 t in 1980, fell in 1981, and increased again after 1983 to new high in 1987.

Data and assessment: Four catch rate series, but only for a short period, and trends contradictory with two showing a decrease, one generally stable, and one increasing. Ice cover varies from year to year and gear configuration has changed, but effect on catch rates has not been analyzed. Research surveys annually 1985-1987.

Fishing mortality: No estimates.

Recruitment: No estimates.

State of stock: Size composition apparently stable. Research survey biomass estimates variable. CPUE series inconsistent with each other. Stock probably stable.

Forecast for 1989: Not available.

Recommendation: Catches between 1985-1987 have averaged 10,400 t and, as no trends in biomass are evident, ACFM concurs with the NAFO Scientific Council in advising that catches in the present fishery area in Denmark Strait be held at approximately 10,000 t for a few years as a precautionary measure to allow time for any impact of the recent increase in catch on recruitment to be detected or an improved assessment.

Special comments: Shrimp occur in other parts of the Denmark Strait, but very little is known about this distribution. Exploratory fishing, provided it occurs well separated from the traditional area (65°30'-67°30'N; 27-33°W) is of no immediate concern, from a biological view point. Although estimates of the by-catch of redfish in the traditional fishery are low, given recent reporting of localized high catches of small redfish, these should be monitored in the fishery and in any exploratory fishery. The effects of ice cover in controlling shrimp exploitation rates could not be evaluated.

2.7 Redfish in Sub-areas V and XIV

Total redfish landings from Sub-areas V and XIV have increased in the 1980s mainly because of the increase in the catches of "oceanic type" mentella (Table 2.7.8). The total catches of redfish in NEAFC Region 1 were 206,000 t in 1987 (Tables 2.7.1-2.7.8).

The total catch of redfish, excluding catches of "oceanic type" mentella, was reduced by about 9,000 t in 1987. This is a further reduction from the levels around 170,000 t in 1982-1984. It should be noted that the redfish fishery in Sub-area XIV (East Greenland) has gone down from 42,000 t in 1982 to 8,000 t in 1987.

2.7.1 Sebastes marinus in Sub-areas V and XIV

Source of information: Report of the North-Western Working Group, September 1988 (C.M.1989/Assess:3).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	60	60	60	80	104	104	≤83	≤84	104	60	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings, total	102	123	107	96	79	77	77	-	123	77	94
Division Va	76	98	87	85	67	68	69	-	98	68	79
Division Vb	3	2	3	6	9	6	6	-	9	2	5
Sub-area XIV	24	24	16	5	2	3	2	-	24	2	11
Sp. stock biomass	491	447	426	419	395	398	398	370[1]	491	395	425
Recruitment (age 11)	202	134	121	151	96	191[1]	191[1]	191[1]	202	96	155
Mean F(4-23,u)	0.21	0.31	0.24	0.22	0.17	0.17	0.16	-	0.31	0.16	0.21

[1]Predicted or assumed. [2]Over period 1981-1987. Weights in '000 t, recruitment in millions.

Catches: Total catches rose in the early 1980s because of increased effort, especially in Division Va. Total catches decreased from the level of 123,000 t in 1982 to around 80,000 t in 1985-1987. Catches in East Greenland waters have declined to a very low level. At present, 90% of the catches are taken in Icelandic waters, 8% in Faroese waters, and 2% in East Greenland waters.

Data and assessment: Survey data are available for the East Greenland area. Catch-at-age data were used in a virtual population analysis tuned by Icelandic effort data.

Fishing mortality: Fishing mortality remained at a low level around 0.17 for the last three years (Figure 2.7.1).

Recruitment: It has not been possible to use available 0-group and survey data to to estimate recruitment. Long-term averages from the VPA have been used for the most recently recruited year classes in the prediction.

State of stock: Following the increased fishery in the early 1980s, the stock has stabilized at a lower level with spawning stock sizes around 400,000 t. It has not been possible to evaluate the stock situation separately in the three main fishing areas: East Greenland, Iceland, and Faroe Islands. Therefore, nothing can be said about any difference in trends in the situation between the three areas.

Forecast for 1989: Assuming F(88) = 0.16, Catch(88) = 77,000 t.

Option	Basis	F(89)	Predicted				
			SSB(89)	Catch(89)	SSB(90)	Catch(90)	SSB(91)
A	0.8F(87)	0.13	358	64	361	65	371
B	F(87)	0.16		77	349	76	349
C	1.2F(87)	0.20		90	337	85	329

Weights in '000 t.

Continued fishing at current levels of fishing mortality assuming average recruitment will lead to a reduction in spawning stock levels of about 10%.

Recommendation: $F_{0.1}$, F_{max}, and other biological reference points are difficult to calculate for this species. ACFM prefers that fishing mortality should be maintained at the present level, corresponding to a TAC of 77,000 t for 1989 and 76,000 t for 1990. As the redfish fisheries are not managed on a species basis, the figure for S. mentella should be added to these figures to establish the TAC for redfish in the demersal fisheries for 1989 and 1990.

By-catch of small redfish in the Denmark Strait prawn fishery: There has been an increase in the prawn fisheries in the Denmark Strait since 1981. The Dohrn Bank area is the main fishing ground in this area.

Information on by-catches of redfish has been obtained by observers on commercial prawn trawlers. This information seems to indicate low overall by-catch percentages around 1% in 1987, and the numbers of small redfish removed by prawn trawlers in the two months covered by observers in 1987 (March and April) was estimated to be 7 million.

Information from a small observer program in November covering 37 tows in 10 days gave considerably higher estimates. For 4-7 trawlers fishing for 10 days, the estimate of numbers of small redfish taken by prawn trawls was 5 million.

ACFM has addressed the question of by-catches of small redfish in the important nursery areas for redfish in East Greenland waters. By-catches in cod trawls was the main concern when ACFM, in 1981, recommended a prohibition of fishing with bottom trawls in an area defined by the following coordinates:

From the coast of Greenland at 67°N to

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

The definition of this box was based on survey data and indicated the main nursery areas as found by trawl samples. In the light of the new information on by-catches of redfish in the prawn fishery, ACFM reiterates its earlier advice and recommends that all fishing with bottom trawl should be prohibited in the area defined above.

The catches, mentioned earlier, covered by observers did not take place in the "Redfish box". ACFM recommends that further investigations should be carried out to make it possible to assess the magnitude of the problem on a more firm basis.

In the event it is established that general by-catch rates are more in line with the high November estimates than the lower estimates for March and April, additional measures might be necessary.

ACFM will refer further analysis of this whole question back to the North-Western Working Group.

2.7.2 Sebastes mentella "traditional fishery" in Sub-areas V and XIV

Source of information: Report of the North-Western Working Group, September 1988 (C.M.1989/Assess:3).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	25	12	12	25	25	25	-	-	25	12	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings, total	44	46	58	41	45	46	38	-	58	38	45
Division Va	20	19	37	25	25	19	19	-	37	19	23
Division Vb	5	8	6	8	11	15	12	-	15	5	9
Sub-area XIV	19	19	15	9	9	12	7	-	19	7	13

[1] Over period 1981-1987. Weights in '000 t.

Catches: Catches declined about 8,000 t in 1987, mainly because of the decline in East Greenland waters (Sub-area XIV). The trend in catches differs between the three main fishing areas.

Data and assessment: Catch-at-age data were used in virtual population analysis. The VPA was tuned with Icelandic effort data raised to total international effort. The resulting estimates of fishing mortality were generally low, about 0.1 for the most recent years, or of the same order as the assumed natural mortality. The assessment was, however, not used because of the problem of stock identity. The relationship between the S. mentella fished in the demersal fisheries and the "oceanic type" mentella is still not known.

Fishing mortality: Information from the attempted assessment seems to indicate low fishing mortality.

Recruitment: No indices of recruitment in this stock are available for analysis.

State of stock: Uncertain, but the fisheries seem generally to be stable in recent years.

Forecast for 1989: Not available.

Recommendation: As the redfish fisheries are not managed on a species basis, a precautionary TAC should be established based on recent catch levels. This would correspond to a figure around 40,000 t. In earlier years, a precautionary figure of 25,000 t was recommended by ACFM, but with actual landings between 38,000 and 45,000 t in recent years and no evidence of reduced catch rates, a figure around 40,000 t seems more appropriate. This figure should be added to the figure recommended for S. marinus in order to establish the TAC for redfish in Sub-areas V and XIV.

2.7.3 Sebastes mentella "oceanic type" in Sub-areas XII and XIV

Source of information: Report of the North-Western Working Group, September 1988 (C.M.1989/Assess:3).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	-	61	60	65	72	105	91	-	105	60	76
Sp. stock biomass	(Total stock biomass around 1.2 million t)										

[1]Over period 1982-1987. Weights in '000 t.

Catches: This fishery started in 1982 and is now the most important redfish fishery in NEAFC Region 1 reaching levels around 100,000 t in recent years (Table 2.7.8). The effort doubled in the same period and catch rates have decreased from 2 t/trawl hour to 1.1 t/trawl hour. During the same period, the age distribution has changed towards younger age groups.

Data and assessment: Catch-at-age data are available, but the time series is too short to allow an analytical assessment. Ichthyoplankton and acoustic-trawl surveys are available and both types of surveys produce similar estimates of the total stock around 1.2 million t.

Fishing mortality: Comparing the catch with the stock estimates indicates that fishing mortalities are in the order of 0.1. The stock identity problem has, however, to be solved before a more firmly based assessment can be undertaken.

Recruitment: Unknown.

State of stock: Catch rates have decreased but this is expected when a fishery starts on an accumulated stock. The USSR surveys do not seem to indicate drastic changes in abundance.

Forecast for 1989: Not available.

Recommendation: Considering the rapid increase in effort in the pelagic fisheries for *S. mentella* in the Irminger Sea and the uncertainty about the relationship with *S. mentella* fished in the demersal fisheries, ACFM prefers that the present level of fishing effort is not increased, corresponding to catches of around 90,000 to 100,000 t in 1989 and 1990. Having no definite estimates of virgin stock biomasses to compare with the present stock estimate of about 1.2 million t, it should be noted that these catches may not be sustainable in the long run with present fishing effort.

2.8 Greenland Halibut in Sub-areas V and XIV

Source of information: Report of the North-Western Working Group, September 1988 (C.M. 1989/ Assess:3).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm.TAC	15	19	24	23	-	-	≤28	≤28	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	19	32	31	34	32	33	47	-	47	19	33

[1] Over period 1981-1987. Weights in '000 t.

Catches: Catches rose to 47,000 t in 1987, which is 14,000 t above the highest figure in the historical series (Tables 2.8.1-2.8.4). About 95% is taken in Division Va (Icelandic waters). According to information from the fishery, the increase in 1987 is partly related to an expansion of the fishing area and the fishing season.

Data and assessment: Catch-at-age data were used in virtual population analysis. Icelandic effort data were used for tuning the VPA. The estimation of levels of fishing mortality in the most recent year, especially the exploitation pattern, caused problems. An estimate based on tuning with Icelandic effort data gave results which could not be reconciled with other evidence. Therefore, the assessment was postponed until these problems can be more thoroughly analyzed.

Recommendation: A revised assessment will be made available for the May 1989 ACFM meeting, and final advice for 1989 and 1990 will be presented in the report from that meeting. Until this happens, ACFM recommends that a preliminary TAC for 1989 of 33,000 t be established, subject to revision in May 1989.

2.9 Icelandic Saithe (Division Va)

Source of information: Report of the North-Western Working Group, September 1988 (C.M. 1989/ Assess:3).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	72	62	66	70	60	60	64	64	72	60	65
Agreed TAC	-	-	-	70	70	70	-	-	-	-	-
Actual landings	59	69	58	63	57	66	81	-	81	57	65
Sp. stock biomass	177	210	214	206	166	186	194	189[1]	210	166	193
Recruitment (age 3)	21	20	27	44	33	88	47[1]	47[1]	88	20	40
Mean F(4-9,u)	0.26	0.33	0.27	0.25	0.29	0.28	0.42	-	0.42	0.25	0.30

[1]Predicted or assumed. [2]Over period 1981-1987. Weights in '000 t, recruitment in millions.

Catches: Landings increased from 57,000 t in 1985 to 81,000 t in 1987 (Table 2.9).

Data and assessment: Catch-at-age data were used in virtual population analysis. Effort data were used to tune the VPA and the exploitation pattern was estimated from separable VPA.

Fishing mortality: The increased catches in 1987 correspond to an increase in fishing mortality from 0.28 to 0.4 (Figure 2.9).

Recruitment: The 1983 year class is estimated to be above average. Average recruitment has been assumed for subsequent year classes.

State of stock: The spawning stock biomass has been stable in recent years and is expected to increase as the 1983 year class enters the stock.

Forecast for 1989: Assuming F(88) = 0.37, Catch(88) = 75,000 t.

Option	Basis	F(89)	Predicted				
			SSB(89)	Catch(89)	SSB(90)	Catch(90)	SSB(91)
A	$F_{0.1}$	0.16	207	41	267	53	301
B	F_{med}	0.22		53	255	66	276
C	0.8F(88)	0.30		70	239	80	244
D	F_{max}	0.34		79	230	87	221
E	F(88)	0.37		84	224	91	217

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to an increase in spawning stock biomass because of the 1983 year class.

Recommendation: ACFM prefers that the fishing mortality level is reduced towards F_{med}. With the incoming 1983 year class increasing the catches, this may be achieved by setting the TACs to 80,000 in 1989 and 1990, which corresponds to a reduction in fishing mortality to F_{max} in 1989 and a further reduction towards F_{med} in 1990.

2.10 Demersal Stocks in Division Vb (Faroe Area)

Tables 2.10.1 and 2.10.2 give data on landings and effort for the three main species in the demersal fisheries in Division Vb: cod, haddock, and saithe. Effort has been stable at a high level in the trawl fisheries since 1984. Saithe is almost exclusively fished with trawls, whereas 31% of the cod catches are taken by handline, longline, and gillnet, and 55% of the haddock catches are taken by gears other than trawl, mainly longline. Effort in gears other than trawl has decreased in recent years.

The directivity in the trawl fisheries changes according to availability of the two main species, cod and saithe.

Following good recruitment in both cod and saithe, the total landings of saithe, cod, and haddock increased to a total of 105,000 t in 1984. The strong year classes have been rapidly reduced and the landings of the same species in 1987, with virtually the same effort, totalled 79,000 t.

In order to reach a more satisfactory level of exploitation in the demersal fisheries in the Faroe area, especially the fisheries for cod and saithe, the level of effort has to be reduced, and, ACFM, therefore, repeats its advice from 1986 that the effort in the demersal fisheries should be reduced.

2.10.1 Faroe saithe (Division Vb)

Source of information: Report of the North-Western Working Group, September 1988 (C.M.1989/ Assess:3).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	29	29	26	20-25	19	-	≤32	≤32	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	30	31	39	55	45	42	40	-	55	30	40
Sp. stock biomass	91	97	108	94	124	102	85	101[1]	124	85	100
Recruitment (age 3)	34	14	43	26	21	31	35	22[1]	43	14	28
Mean F(4-8,u)	0.38	0.34	0.39	0.49	0.38	0.48	0.46	-	0.49	0.34	0.42

[1]Predicted or assumed. [2]Over period 1981-1987. Weights in '000 t, recruitment in millions.

Catches: Landings decreased from 55,000 t in 1984 to 40,000 t in 1987 (Table 2.10.3).

Data and assessment: Catch-at-age data were used in virtual population analysis. The VPA was tuned with effort data. The Working Group did not finalize the assessment, but during the ACFM meeting some problems in the handling of the data were solved and the assessment was finalized. The exploitation pattern was estimated from separable VPA.

Fishing mortality: The fishing mortality has been increasing in recent years (Figure 2.10.1).

Recruitment: The present assessment seems to indicate that the 1983 and 1984 year classes are above average. Average recruitment has been assumed in this assessment for the year classes after 1985. No independent estimates of recruitment are available.

State of the stock: The spawning stock is at present at a very low level compared with the historic series.

Forecast for 1989: Assuming F(88) = 0.41, Catch(88) = 43,000 t.

The mesh size in the trawl fisheries will be increased from 135 mm to 155 mm in 1989. This has been taken into account in the forecast and estimation of biological reference points.

Option	Basis	F(89)	Predicted				
			SSB(89)	Catch(89)	SSB(90)	Catch(90)	SSB(91)
A	$F_{0.1}$	0.17	114	20	133	24	150
B	F(88)	0.39		40	111	41	108
C	F_{max}	0.40		42	109	41	105

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to stable or slightly decreasing levels of spawning stock biomass from the present low level.

Recommendation: ACFM prefers that the fishing mortality level should be reduced in order to make rebuilding of the stock possible. In this stock with periods of low recruitment, the fishing mortality should be kept at a moderate level.

2.10.2 Faroe Plateau cod (Sub-division Vb1)

Source of information: Report of the North-Western Working Group, September 1988 (C.M. 1989/ Assess:3).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	14	20	23	25	23	22	≤31	≤29	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	23	21	38	37	39	35	24	-	39	21	31
Sp. stock biomass	47	57	58	63	62	81	74	43[1]	81	47	63
Recruitment (age 1)	28	32	65	26	8	5	23[1]	23[1]	65	5	27
Mean F(4-8,u)	0.49	0.44	0.73	0.49	0.76	0.56	0.41	-	0.76	0.41	0.55

[1]Predicted or assumed. [2]Over period 1981-1987. Weights in '000 t, recruitment in millions.

Catches: The catches decreased from 39,000 t in 1985 to 24,000 t in 1987 (Table 2.10.4).

Data and assessment: Catch-at-age data were used in virtual population analysis. The VPA was tuned with data from trawl surveys. The exploitation pattern was estimated from separable VPA.

Fishing mortality: High levels in the 1980s fluctuating according to the catch rates of cod compared with saithe (Figure 2.10.2).

Recruitment: The good 1981 and 1982 year classes have largely passed through the fishery. No year classes after 1982 are above average and two seem to be well below. Average recruitment for the year classes after 1985 has been assumed in the assessment.

State of stock: The stock is at present fished down to a low level.

Forecast for 1989: Assuming F(88) = 0.41, Catch(88) = 21,000 t.

The mesh size in the trawl fisheries will be increased from 135 mm to 155 mm in 1989. This has been taken into account in the forecast and estimation of biological reference points.

Option	Basis	F(89)	Predicted				
			SSB(89)	Catch(89)	SSB(90)	Catch(90)	SSB(91)
A	$F_{0.1}$	0.19	47	10	66	12	85
B	F(88)	0.40		19	56	20	66
C	F_{max}	0.41		19	55	20	65

Weights in '000 t. F_{med} is estimated to be 0.52.

Continued fishing at current levels of fishing mortality will lead to stable or slightly increasing levels of spawning stock biomass from the present low level.

Recommendation: ACFM prefers that the fishing mortality level is not allowed to increase in order to make rebuilding of the stock possible. In order to give figures for total allowable catches for Division Vb, about 2,000 t from the Faroe Bank have to be added (Table 2.10.5).

2.10.3 Faroe haddock (Division Vb)

Source of information: Report of the North-Western Working Group, September 1988 (C.M.1989/ Assess:3).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	15	14	10	14	12	14	≤17	≤18	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	12	12	13	12	15	14	15	-	15	12	13
Sp. stock biomass	70	47	47	48	57	60	53	49[1]	70	47	55
Recruitment (age 1)	22	22	43	40	13	6	22	22[1]	43	6	24
Mean F(4-8,u)	0.12	0.26	0.22	0.19	0.22	0.28	0.36	-	0.36	0.12	0.22

[1]Predicted or assumed. [2]Over period 1981-1987. Weights in '000 t, recruitment in millions.

Catches: Catches have been stable at a low level compared to the historic series of catch data. There has been a slight increase in the most recent years (Tables 2.10.6 and 2.10.7).

Data and assessment: Catch-at-age data were used in virtual population analysis. The VPA was tuned with trawl survey data. The exploitation pattern was estimated from separable VPA. It should be noted that the estimates derived in the tuning process are not determined very accurately.

Fishing mortality: Fishing mortality has been rather stable around the $F_{0.1}$ level in recent years. It increased in 1987 to 0.36, according to the present assessment (Figure 2.10.3).

Recruitment: The recruitment in the late 1970s and the first part of the 1980s was well below average. The 1982 and 1983 year classes are estimated to be above average, but are not of the size of the large 1972, 1973, and 1974 year classes, which formed the basis of the fishery in the late 1970s. Average strength has been assumed in the assessment for the year classes after 1985.

State of stock: The stock is stable at a low level, mainly because of the generally low level of recruitment in the last 10-15 years.

Forecast for 1989: Assuming F(88) = 0.37, Catch(88) = 15,000 t.

The mesh size in the trawl fisheries will be increased from 135 mm to 155 mm in 1989. This has been taken into account in the forecast and estimation of biological reference points.

Option	Basis	F(89)	Predicted				
			SSB(89)	Catch(89)	SSB(90)	Catch(90)	SSB(91)
A	$F_{0.1}$	0.24	49	8	53	8	57
B	F(88)	0.34		11	50	11	52
C	F_{max}	0.67		20	41	15	39

Weights in '000 t. F_{med} is estimated to be 0.53.

Continued fishing at current levels of fishing mortality will lead to slightly decreasing spawning stock biomass levels. The spawning stock level is at present at a very low level compared with the historic series.

Recommendation: ACFM prefers that fishing mortality is not increased above present levels in order to allow the stock to be rebuilt from the present reduced levels. The increase in mesh size should give some protection to the haddock not recruited to the spawning stock.

2.11 Blue Ling, Ling, and Tusk in Sub-areas V, VI, and XIV

The North-Western Working Group has continued the compilation of data on these stocks. Detailed catch data are updated in Tables 2.11.1 - 2.11.12.

Some new information has been made available, especially on the longline fisheries. ACFM is, however, not yet able to make any assessment of the state of these stocks.

2.12 Atlanto-Scandian Herring

2.12.1 Icelandic spring-spawning herring

In 1987, there were no signs of recovery of the Icelandic spring-spawning herring stock, and the fishery was based entirely on summer spawners.

2.12.2 Icelandic summer-spawning herring (Division Va)

Source of information: Report of the Herring Assessment Working Group for the Area South of 62°N, April 1988 (C.M.1988/Assess:17).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	40	50	50	50	50	65	70	-	-	-	-
Agreed TAC	42	50	52.5	50	50	65	72.9	-	-	-	-
Actual landings	40	57	59	50	49	65	73	-	73	0.3	34
Sp. stock biomass	212	223	257	273	298	341	486	539[1]	486	11	171
Recruitment (age 1)	964	239	235	729	1496	574	196	607[3]	1496	34	384
Mean F(4-14,w)	0.21	0.30	0.18	0.21	0.19	0.28	0.24	-	1.54	0.007	0.31

[1]Predicted or assumed. [2]Over period 1969-1987. [3]From acoustic estimate. Weights in '000 t, recruitment in millions.

Catches: Stable up to 1985, increasing in the last two years, and now higher than in any year in the period since 1969 (Table 2.12.2).

Data and assessment: Analytical, based on catch-in-number data and winter acoustic surveys. The data base is satisfactory.

Fishing mortality: Has fluctuated around $F_{0.1}$ level (F = 0.22) and is now slightly higher.

Recruitment: Variable with a number of above-average year classes over the last few years.

State of stock: A continuing recovery from the low level in the early 1970s; now at a higher level than in any year since 1947 (Figure 2.12.2.1). The spawning stock biomass in 1987 is now estimated to be about 100,000 t higher than predicted in last year's report.

Forecast for 1988:

Option	Basis	F(88)	Predicted SSB(88)	Predicted Catch(88)	Predicted SSB(89)	Consequences/implications
A		0.19	539	90	488	Small decrease in stock size
B	$F_{0.1}$	0.22		101	483	from a peak in 1988

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a decline in the stock from its current (1988) peak level in the period 1947-present (Figure 2.12.2.2).

Recommendation: ACFM prefers that fishing mortality should not exceed the $F_{0.1}$ level.

Special comments: The fishery is now based on a reasonable number of year classes. Despite a large variation in recruitment, it has been possible to maintain a steady or somewhat increasing yield by fishing at around the $F_{0.1}$ level. Due to the recent high recruitment to the stock, a TAC in 1988 corresponding to $F_{0.1}$ would result in a catch of about 100,000 t, which is an increase of 37% from 1987. Continued fishing at the $F_{0.1}$ level in 1989 would result in a decline in the catch to 95,000 t. An alternative option would be to catch 90,000 t in 1988 and then increase F to the $F_{0.1}$ level in 1989, which would correspond to a catch of 100,000 t.

ACFM points out that these catches are well in excess of the long-term average yield of 75,000 t for this stock.

2.12.3 Norwegian spring-spawning herring

Source of information: Atlanto-Scandian Herring and Capelin Working Group report, October 1988 (C.M.1989/Assess:7).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	0	0	0	38	50	150	150	120-150	150	0	55.4
Agreed TAC[3]	9.3	12	21	38	60	126	115	120	115	9.3	54.5
Actual landings	13.7	16.7	23.1	53.5	81.0	136.8	122.9	-	136.8	13.7	63.9
Sp. stock biomass	544	549	613	636	573	526	491	1353[1]	636	491	562
Recruitment (age 3)	398	635	99	66	97	10000	191	267[1]	10000	66	1641
Mean F(4-9,w)	0.02	0.02	0.03	0.10	-	-	0.07	-	-	-	-

[1]Predicted or assumed. [2]Over period 1981-1987. [3]National quotas. Weights in '000 t, recruitment in millions.

Catches: Kept at a low level until 1984, but have increased in later years (Table 2.12.3).

Data and assessment: Analytical assessment, catch at age (VPA) and abundance estimates based on acoustic survey.

Fishing mortality: Kept at low level except for the years 1985 and 1986, when unrecorded fishing mortality, due to discarding of catches and breaking of gear, appears to have formed a considerable part of the total mortality.

Recruitment: Extremely low except for the 1983 year class (Figure 2.12.3).

State of stock: Depleted, but slowly recovering.

Forecast for 1989: Assuming F(88) = 0.07, Catch(88) = 120,000 t.

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Catch(89)	SSB(90)	
A	No fishing	0.00	1,533	0	1,636	Spawning stock slightly increased
B	0.8F(88)	0.05		95	1,546	Spawning stock slightly increased
C	F(88)	0.07		118	1,524	Spawning stock slightly decreased

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a decline in the stock.

Recommendation: Due to the expected poor recruitment from the 1984-1987 year classes, ACFM noted that the preferred level of spawning stock of 2.5 million t will not be reached in the near future regardless which catch option is chosen. Fishing at the current level of fishing mortality in 1989 will lead to a slight decrease in spawning stock biomass already in 1990. ACFM, therefore, recommends that the fishing mortality in 1989 should be reduced and that the TAC for 1989 should not exceed 100,000 t.

Special comments: ACFM noted that unrecorded fishing mortality due to discards and breaking of gear has formed a considerable proportion of the total mortality on this stock in recent years. It is stressed that this mortality should be taken into account when setting the TAC.

2.13 Capelin

2.13.1 Barents Sea capelin (Sub-areas I and II, excluding Division IIa west of 5^0W)

Source of information: Atlanto-Scandian Herring and Capelin Working Group report, October 1988 (C.M.1989/Assess:7).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	1900	1600	2300	1100	1000	0	0	0	2300	0	1188
Agreed TAC	1900	1700	2300	1400	1100	120	0	0	2300	0	1265
Actual landings	1987	1759	2233	1477	851	123	0	0	2375	0	1074
Sp. stock biomass	1767	582	122	219	83	36	16	-	1767	16	353
Recruitment (age 2)	411	307	425	372	246	11	4	-	425	4	254

[1] Over period 1981-1988. Weights in '000 t, recruitment in billions.

Catches: Drastic decline in catches after a peak in 1983. Since May 1986, there has been no fishing (Table 2.13.1).

Data and assessment: Analytical assessment based on acoustic survey.

Fishing mortality: Not used in assessment.

Recruitment: Extremely low since 1985.

State of stock: Depleted, although abundance has increased slightly in 1988.

Recommendation: No catch in 1989.

Special comments: ACFM points out that the decline in the stock cannot be explained by fishing alone, but may be partly due to changes in the Barents Sea ecosystem and increased predation by cod.

2.13.2 Capelin in the Iceland - East Greenland - Jan Mayen area (Sub-areas V and XIV and Division IIa west of 5°W)

2.13.2.1 Advice from the May 1988 ACFM meeting

Source of information: Working paper.

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC[3]	440	366	0	375	300	700	1100	500[4]	1100	0	469
Agreed TAC[3]	-	-	0	640	920	1280	1290	1050	1290	-	-
Actual landings[3]	680	626	0	573	892	1307	1332	1115	1332	0	773
Sp. stock biomass	160	140	260	440	460	450	420	400[1]	460	140	333
Recruitment (age 1)	73	48	145	134	220	102	107[1]	-	220	48	104

[1]Predicted or assumed. [2]Over period 1981-1987. [3]The figures in the TAC table refer to a fishing season ending in the year indicated, starting in July and ending in March. [4]TAC for the period July-November. Weights in '000 t. recruitment in billions.

Catches: Catches have varied according to agreed TAC recommendations and state of stock (Table 2.13.2).

Data and assessment: Analytical assessment based on acoustic survey and catch-at-age data.

Fishing mortality: Not estimated.

State of stock: Highly variable due to the short life span.

Forecast for December 1988/March 1989 season: Deferred until November 1988.

Recommendation: ACFM recommends that the TAC for the period July - November 1988 should not exceed 500,000 t.

Special comments: Due to a very westerly distribution of adult capelin and ice cover over the western limit of the distribution area, the results of the October 1987 acoustic survey were considered invalid, and ACFM was, therefore, not able to give any advice for the December 1987 - March 1988 period at its November 1987 meeting.

A new Icelandic acoustic survey of the fishable stock took place in November - December 1987 when the capelin had assembled on their traditional wintering grounds off North and Northwest Iceland. Surveying conditions were good and the resulting abundance estimate is considered reliable. On the basis of this estimate and the usual criteria for a remaining spawning stock (400,000 t), a TAC of 550,000 t was set by the relevant management bodies for the December 1987-March 1988 period. The total catch in the 1987/1988 season amounted to about 1,115,000 t when the Faroese catch of about 65,000 t, taken in the July - October 1987 period, is included.

At its meeting in November 1987, ACFM decided to defer until May 1988 its advice on a TAC for the 1988 summer and autumn seasons. The reason for this was that further information on the abundance of the immature part of the capelin stock was expected from surveys in November/December 1987 and January/February 1988.

The exploitable stock in the 1988/1989 season will consist of the 1986 year class and that part of the 1985 year class that did not mature and spawn in 1988. Attempts to estimate the abundance of immature capelin of the 1986 and 1985 year classes in the autumn of 1987 failed due to drift ice, which covered the East Greenland Plateau where most of these capelin were presumably distributed at the time. Similarly, a survey of the immature stock in January-February 1988 had to be abandoned because of adverse ice conditions. Therefore, the only existing estimate of the 1986 year class is that obtained in August 1987.

Since 1979, the main management aim has been to preserve a spawning stock of 400,000 t. Based on this target spawning stock size, a preliminary TAC for the 1988/1989 season of about 770,000 t has been calculated using the acoustic estimates of 1-group capelin in August 1987. However, as additional information on capelin of both year classes may be obtained from the acoustic survey of the stock in October 1988, and in view of the short August data series, ACFM recommends that the advice on a TAC for the period December 1988 - March 1989 should be deferred until autumn 1988.

2.13.2.2 Capelin in the Iceland-East Greenland-Jan Mayen area: Advice from the November 1988 ACFM meeting

Source of information: Atlanto-Scandian Herring and Capelin Working Group report, October 1988 (C.M.1989/Assess:7).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC[3]	440	366	0	375	300	700	1100	500[4]	1100	0	518
Agreed TAC[3]	-	-	0	640	920	1280	1290	1115[1]	1290	0	-
Actual landings[3]	680	626	0	573	892	1307	1332	1117[1]	1332	0	796
Sp. stock biomass	160	140	260	440	460	450	420[1]	400[1]	460	140	329
Recruitment (age 1)[5]	73	48	145	134	220	102	107[1]	-	220	48	112

[1]Predicted or assumed. [2]Over period 1980-1987. [3]The figures in the TAC table refer to a fishing season ending in the year indicated, starting in July and ending in March. [4]Preliminary TAC for the period July-November. [5]Age 1 at the beginning of the season. Weights in '000 t, recruitment in billions.

Catches: Catches have varied according to TAC recommendations and state of stock (Table 2.13.2).

Data and assessment: Analytical assessment based on acoustic survey and catch-at-age data.

Fishing mortality: Not estimated.

State of stock: Highly variable due to the short life span.

Forecast for 1989: Summer and autumn seasons: deferred until May 1989.

Recommendation: ACFM recommends that a TAC of 830,000 t be set for the period late October 1988-March 1989. TAC recommendations for the 1989 summer/autumn seasons will be deferred until May 1989.

Special comments: Since 1979, the main management aim has been to preserve a spawning stock of 400,000 t. Based on this target spawning stock size, a preliminary TAC for the 1988/1989 seasons of about 770,000 t was calculated using the acoustic estimates of 1-group capelin in August 1987. However, as additional information on capelin of both year classes was expected from the acoustic survey of the stock in October 1988, and in view of the short August data series, ACFM recommended at its May 1988 meeting ting recommended that the TAC for the period July-November 1988 should not exceed 500,000 t and that the advice on a TAC for the period December 1988-March 1989 should be deferred until autumn 1988.

A survey of the fishable stock took place in October 1988. Surveying conditions were good and the resulting abundance estimate is considered reliable. On the basis of this estimate and the usual criteria for a remaining spawning stock (400,000 t), a TAC of 915,000 t is recommended for the July 1988 - March 1989 season, of which 830,000 t remain for the period late October 1988 - late March 1989.

The exploitable stock in the 1989/1990 season will consist of the 1987 year class and that part of the 1986 year class that did not mature and spawn in 1989. Calculations based on the target spawning stock size and the acoustic estimates of 1-group capelin in August 1988 would result in a TAC of 1,025,000 t for the 1989/1990 season. However, as considerable further information on the two year classes involved is expected upon completion of the January 1989 survey, and in view of the uncertainties involved in prediction based on the short August date series, ACFM recommends that the advice on a TAC for the 1989 summer and autumn season should be deferred until spring 1989.

3 STOCKS IN NEAFC REGION 2

3.1 Herring Stocks South of 62^{0}N

3.1.1 General considerations on the exploitation of herring stocks

In its 1987 report, ACFM considered the general strategy for the management of herring stocks in some detail and wishes to endorse what it said at that time.

In the present report, the objectives and levels of exploitation used in providing TAC advice given are not identical for each herring stock. The reasons for the advice given are nonetheless explained under the "Special comments" and "Recommendation" sections pertaining to each stock, and, in general, the advice has taken into account:

a) the present stock size in relation to a target stock size defined by the long-term historic potential of the stock;

b) the need for stability of catch levels, taking into account expected recruitment variability;

c) the need for consistency of advice between management units in those cases where a stock is exploited in more than one management area;

d) the need to prevent the fishing mortality rate from rising to unsustainable levels, taking into account the susceptibility of pelagic stocks to collapse under heavy exploitation combined with recruitment failure;

e) the reliability of the assessment of the stock in question.

North Sea herring stocks

Herring stocks in the North Sea are managed as two geographical units (Divisions IVa,b, and Divisions IVc and VIId). The separate assessment of the stocks spawning in these two areas, however, has become increasingly difficult for the following reasons:

a) Catches of Divisions IVc and VIId herring caught in the more northern areas during the summer feeding period cannot be quantified, with the result that fishing mortality and the size of the spawning stock cannot be estimated for this stock.

b) Recruitment to the southern stock cannot, at present, be predicted separately from that to the total North Sea from young fish surveys.

At its present meeting, ACFM, therefore, had no alternative but to assess the state of the stocks in the total North Sea and Eastern Channel as a single unit. ACFM, nevertheless, stresses that the stocks spawning in the two areas appear to be developing quite independently of each other, possibly as a result of different exploitation rates. ACFM, therefore, considers that the two management units should be retained, and advice is given on that basis in the present report.

3.1.2 Herring in Divisions IVa,b

Source of information: Report of the Herring Assessment Working Group for the Area South of 62^0N, April 1988 (C.M.1988/Assess:17).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
					Divisions IVa,b						
Recomm. TAC	0	0	62	95	166	235	600	500	-	-	-
Agreed TAC	-	-	72	-	-	500	560	500	-	-	-
Actual landings	99	167	244	272	467	492	577	-	577	10	253
					Total North Sea						
Sp. stock biomass[3]	214	293	452	741	770	805	862	1,171[1]	2,255	58	720
2+ stock biomass[3]	236	321	499	832	894	888	1,066	1,431[1]	2,255	64	746
Recruitment (1-ring)[3]	4.7	8.1	14.7	13.4	12.6	21.0	31.7	22.1[1]	31.7	0.9	9.0
Mean F(2-6,u)[3]	0.36	0.25	0.32	0.41	0.61	0.53	0.52	-	1.42	0.05	0.65

[1]Predicted or assumed. [2]Over period 1972-1987 for landings; 1960-1987 for stock data. [3]Sub-area IV and Division VIId. Weights in '000 t, recruitment in billions.

Catches: Gradually increasing under TAC control (Table 3.1.2). In 1987, unallocated catches of 35,000 t; estimated discards of 11,500 t. Of the total catch, an estimated 19,000 t were 0-group and 122,000 t 1-group juveniles.

Data and assessment: Catch-in-number data adequate, including some estimates of discarding. VPA tuned using acoustic survey estimates of total North Sea stock. Assessment for total North Sea. Recruitment estimated from IYFS. Approximately 14,000 t of Baltic herring caught in the Eastern North Sea from May-September were transferred to the assessment of the stock in Sub-divisions 22-24 and Division IIIa.

Fishing mortality: Gradual increase since reopening of fishery to a level in 1986 and 1987 50% higher than that advised by ACFM. Some uncertainty about precise level of F in 1987, which may be underestimated.

Recruitment: Now at long-term average level with at least one very good year class (1985) and an above-average 1986 year class.

State of stock: Gradually increasing under improved recruitment (Figure 3.1.2). Some uncertainty about precise level of SSB in 1987 which may be overestimated.

Forecast for 1989: Assuming F(88) = 0.40 , Catch(88) = TAC for entire North Sea and Eastern Channel = 530,000 t. Forecast for total North Sea (Sub-area IV and Division VIId).

Option	Basis	F(89)	Predicted					Consequences/implications
			SSB (89)	2+ stock (89)	Catch (89)	SSB (90)	2+ stock (90)	
A	$F_{0.1}$	0.12	1,685	1,951	206	2,152	2,352	Rapid increase to agreed management objective (2.2 million t).
B	F_{med}	0.33	1,466	1,704	514	1,559	1,725	Gradual increase in SSB.

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a progressive decrease in SSB (and stock of 2-ringers and older).

Recommendation: ACFM recommends that F should be reduced to the level that should maintain a spawning stock biomass of 1.5-2.0 million t assuming average recruitment (F = 0.33). This corresponds to a TAC in 1989 of 514,000 t for the entire North Sea. The TAC agreed for Divisions IVc and VIId should be subtracted from this amount to give a TAC for Divisions IVa,b (see Special comments). Existing regulations (sprat box closure, 20-cm minimum landing size, by-catch regulations) designed to protect 0-group and small 1-ring herring should be maintained. The spawning area closures in Division IVb should be maintained.

Special comments: The present assessment of the North Sea stock implies that the spawning stock in 1987 is lower than that predicted from last year's assessment. This has come about partly because the mean weight of the herring has decreased and partly because the percentage of 2-ringers that matured decreased from 75% in 1986 to 63% in 1987.

The catches of juvenile herring in the North Sea in 1987 were approximately the same as in 1986. Catches of 0-group in particular have been reduced to a much lower level than in the period 1981-1983 largely as a result of the sprat box and by-catch regulations. However, there is still a high and uncontrolled level of exploitation of juvenile herring in Division IIIa which must reduce recruitment to the North Sea stocks. In addition, there is evidence from the International Young Fish Survey that the proportion of North Sea juveniles that enter Division IIIa has increased in recent years from around 30% in 1983-1985, to 55% in 1986, 39% in 1987, and 72% in 1988.

As pointed out in last year's report, the expected recruitment of the very good 1985 year class and that of the above-average 1986 year class provides an opportunity to rebuild the stock without having to reduce present catch levels to any significant extent. ACFM once again stresses that such an opportunity seldom arises.

If the TAC of 30,000 t advised for Divisions IVc and VIId is adopted in 1989, then the corresponding advice for Divisions IVa,b would be 484,000 t.

3.1.3 Herring in Divisions IVc and VIId (Downs herring)

Source of information: Report of Herring Assessment Working Group for the Area South of 62°N, April 1988 (C.M.1988/Assess:17).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	20[3]	60[3]	36[3]	49	62	42	10	15	-	-	-
Agreed TAC	20	72	73	55	90	70	40	30	-	-	-
Actual landings	42	69	64	46	70	52	45	-	70	1	34
Sp. stock biomass	← No reliable information →							-	-	-	-
Recruitment (1-ring)[4]	1,326	1,632	1,613	2,562	1,004	1,312	403[1]	-	2,562	224	942
Mean F(2-6,u)[4]	0.80	1.03	1.10	0.79	0.94	1.13	0.62[1]	-	1.71	0.08	0.74

[1]Predicted or assumed. [2]Over period 1972-1987 for landings; 1964-1987 for stock data. [3]For period October-March. [4]Recruitment indices and fishing mortalities based on VPA of catches in Divisions IVc and VIId only are indicative only of trends. Weights in '000 t.

Catches: Decrease in catch to a level slightly higher than agreed TAC in 1987.

Data and assessment: Total catches from stock not known so no analytical assessment possible. Acoustic surveys terminated in 1986. Trends in stock indicated by larval survey.

Fishing mortality: Estimates in table above are indicative of likely values and suggest that F is already much higher than target values when catches of this stock in Divisions IVa,b are taken into account.

Recruitment: No absolute estimates, but probably fairly stable at rather low level in recent years.

State of stock: Larval survey indices indicate a fairly stable stock from 1981-1987. No absolute estimate of stock size available for 1987. Continued fishing at current levels of fishing mortality is likely to lead to no further recovery of the stock and possibly a steady decline.

Recommendation: Since the fishing mortality on Downs herring appears to be at a high level, and since Divisions IVc and VIId are the only areas where the Downs stock can be protected by specific management measures, ACFM recommends that the catch in this area in 1989 should be no higher than the TAC agreed for 1988, i.e., 30,000 t. Additional protection of this stock can be gained by allowing any part of this TAC to be taken in Divisions IVa,b.

Special comments: The most recent estimate of the stock of herring that spawns in Divisions IVc and VIId was around 130,000 t based on the 1986 acoustic survey. During the period prior to the collapse of this fishery around 1955, an estimated spawning stock of around 300,000 - 500,000 t supported a fairly stable fishery of around 100,000 t. Although the level of exploitation on the Downs stock in the more northerly areas may be different from what it was prior to 1955, this indicates that the present stock may support a catch in Divisions IVc and VIId at around a quarter of the spawning stock size. On the assumption that the stock has remained at roughly the same level in 1987, this indicates a TAC of around 30,000 t.

3.1.4 Herring in Sub-divisions 22-24 and Division IIIa

Source of information: Report of the Working Group on Assessment of Pelagic Stocks in the Baltic, April 1988 (C.M.1988/Assess:18). Report of the Herring Assessment Working Group for the Area South of 62°N, April 1988 (C.M.1988/Assess:17).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC (IIIa)[3]	-	40	40[4]	40[4]	80	132	112	99	138	40	-
Agreed TAC (IIIa)[3]	-	60	59	58	117	46	138	138	138	46	-
Actual landings (Baltic)[5]	158	151	152	191	211	164	145	166	211	145	167
Actual landings (IIIa)[6]	172	158	198	233	242	217	234	-	242	158	208
Sp. stock biomass	175	210	213	258	305	269	231	253[1]	305	175	237
Recruitment (2-ring)	3160	1988	2597	3495	2940	2274	2748	3991[1]	3495	1988	2743
Mean F(3-6,u)	1.09	1.09	0.67	0.88	0.91	0.81	0.72	-	1.09	0.67	0.88

[1]Predicted or assumed. [2]Over period 1981-1987. [3]Adult herring fishery in Division IIIa only. [4]TAC for 1 Sep-31 Aug. [5]Includes Sub-divisions 22-24, 2-group and older from Division IIIa, and transferred amounts from North Sea. [6]Includes landings of juvenile herring in mixed clupeoid fishery. Weights in '000 t, recruitment in millions.

Catches: The catches (in tonnes) went down in 1987 (Tables 3.1.4.1 and 3.1.4.2), but not the catches in number. The mean weight at age of the herring was very low in 1987.

Data and assessment: An analytical assessment using four young fish indices and four acoustic indices.

Fishing mortality: Decreasing since 1985, but still 10% above F_{max} (Figure 3.1.4).

Recruitment: Three year classes above average (2-group in 1987, 1988, and 1989).

State of stock: The stock is still at a high level compared to the previous 15 years. Sign of further increasing stock.

Forecast for 1989: Assuming F(88) = 0.72, Catch(88) = 166,000 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	$F_{0.1}$	0.24	297	73	415	Sharp reduction in catch and effort and rapid increase in SSB
B	F_{max}	0.66		174	316	Small increase in catch and large increase in SSB

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to an increase in SSB and catch because of large year classes.

Recommendation: The TAC for 1989 should not exceed 174,000 t for the total adult spring-spawning stock. The TAC for "mixed clupeoids" in Division IIIa should be set at not more than 80,000 t in 1989.

Special comments: A part of the stock is caught in the North Sea, another in Division IIIa, and only in Sub-divisions 22-24 are all herring catches from this stock. Therefore, recommendations for this stock are very difficult to make.

The assessment of the spring-spawning stock known to migrate between the Western Baltic and Division IIIa was carried out on data from Division IIIa and Sub-divisions 22, 23, and 24.

Insufficient data on the numbers at age and racial composition of catches of juvenile herring in Division IIIa prevented an assessment of the exploitation level on the youngest age groups, and the combined assessment was based on catch data for 2-ring and older spring-spawning herring.

Racial investigations of the vertebral number of herring caught in the eastern part of the North Sea showed that, in the last part of May and in June, July, August, and September, all 3-group and older herring were of Skagerrak-Kattegat and Western Baltic stock origin. Therefore, a proportion of the catch in the eastern part of the North Sea was included in the assessment of the combined stock. The amount transferred was 6,968 t in 1984, 17,386 t in 1985, 19,654 t in 1986, and about 14,000 t in 1987.

To provide the management bodies with separate catch options for Sub-divisions 22-24 and for Division IIIa, ACFM has calculated the proportion of the catch in the combined area that will be taken in the two areas assuming that the relative levels of fishing mortality and exploitation pattern in the two management areas remain the same as in recent years. For the F_{max} option given above, the share of the catch in the two areas in 1988 and 1989 will be as follows (in '000 t):

Year	Total catch in combined area	Predicted catch in Sub-divisions 22-24	Predicted catch in adult herring fishery in Division IIIa
1988	166	83	83
1989	174	90	84

The predicted catches given in the table above include 2-group and older herring. The directed fishery for adult herring takes, however, an unavoidable by-catch of smaller juvenile herring. The amount of juvenile herring in the directed fishery for adult herring should be added to the catch predictions in Sub-divisions 22-24. For 1989, this component is predicted to be 10,000 t.

The total catch of 0- and 1-group herring in Sub-divisions 22-24 increased from around 6,000 t in 1986 to around 20,000 t in 1987. A large part of this comes from the small-meshed fishery catching a mixture of sprat and herring. The Danish sprat catches decreased from 6,000 t in 1986 to 2,300 t in 1987, and this shows that the small-meshed fishery in 1987 took a higher proportion of juvenile herring than sprat. ACFM is concerned by the signs that the industrial fishery in recent years has increased its exploitation of juvenile herring in the Southwestern Baltic.

As in 1986, the TAC of 80,000 t in the fishery for mixed clupeoids in Division IIIa was exceeded, the total catch of juvenile herring in this fishery being estimated at around 116,000 t. Since these herring which, to a large extent, recruit to the North Sea stocks, are not included in the assessment of any stock, it is not possible to give analytical advice for this fishery. However, ACFM reiterates its opinion that adherence to a TAC of 80,000 t would be a significant step forwards controlling the catches of juvenile herring in this area and recommends that the TAC be set at this level again in 1989.

3.1.5 Celtic Sea and Division VIIj herring

Source of information: Report of the Herring Assessment Working Group for the Area South of 62°N, April 1988 (C.M.1988/Assess:17).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC[2]	6	6[5]	6[5]	13	13	17	18	13	-	-	-
Agreed TAC[3]	6	8[5]	8[5]	13	13	17	18	13	-	-	-
Actual landings[4]	17	10	22	20	16	13	23	-	30	7	14
Sp. stock biomass	30	47	81	91	106	107	?	?	107	28	58
Recruitment (1-ring)	386	691	1041	908	776	195	?	?	1041	138	406
Mean F(2-6,u)	0.83	0.75	0.56	0.93	0.26	0.15	?	?	0.93	0.15	0.55

[1] Over period 1970-1987 for landings; 1970-1986 for stock data. [2] VIIj, VIIg and VIIa south of 52°30'N for 1 April-31 March. [3] VIIg-k and VIIa south of 52°30'N for calendar year. [4] Calendar year. [5] 1 October-31 March. Weights in '000 t, recruitment in millions.

Catches: Catch increased considerably in 1987 (Tables 3.1.5.1 and 3.1.5.2). Some misreporting of catches from Division VIIj to Division VIIb. Considerable amounts of slipping of catches, but this was not quantified. The Irish fishery was closed for three periods during the 1987/1988 season when yields of roe were low.

Data and assessment: Figures in table above based on 1987 assessment. No assessment possible in 1988 because no stock surveys have been carried out since 1984/1985 and no estimates of slipped catches. Good biological data are available from the landings.

Fishing mortality: No estimate of F is available for 1987.

Recruitment: Landings dominated by 2-3-ringers. Landings of 1-ringers at low level in 1986 and 1987, but this may not indicate recruitment level because of lower growth and delay in age of recruitment.

State of stock: In 1987 assessment, SSB believed to be about 100,000 t in 1985 and 1986.

Forecast for 1989: Precise predictions not available.

Recommendation:

1. In the absence of an analytical assessment for 1987, ACFM recommends that the catch in the 1989/1990 season should not exceed 20,000 t (see Special comments).

2. In order to give extra protection to the spawning concentrations of herring, ACFM recommends that the seasonal closure of known spawning areas, initiated in 1987 as the commencement of a rotational 3-year cycle, be retained for the time being as described below and in Figure 3.1.5.

   Season 1: Prohibit all herring fishing from 15-31 October in the area bounded by 09°00' West longitude, 51°15' North latitude, 11°00' West longitude, 52°30' North latitude, and by the Irish coast (Box A).

   Season 2: Prohibit all herring fishing from 1-16 November in the area bounded by 08°00' West longitude, 51°15' North latitude, 09°00' West longitude, and by the Irish coast (Box B).

   Season 3: Prohibit all herring fishing from 15-31 January in the area bounded by 52°30' North latitude, 06°00'West longitude, 52°00'N latitude, and by the Irish coast (Box C).

3. ACFM further recommends that the management system be improved so that the slipping and discarding of catches at sea is reduced.

Special comments:

1. In the absence of survey data since the 1984/1985 spawning season, it is not possible to estimate the present size of the stock. At the stock level projected for 1986 (100,000 t), historical yield/biomass ratios indicate that a catch of around 15,000-20,000 t should be sustainable so long as recruitment is maintained at an average level. Until more definite information on the size of the stock is available, ACFM considers that it would be unwise to allow catches to rise above this level.

   In addition to surveys, better information is also required on the quantities of herring killed as a result of slipping or discarding catches.

2. The fishery is largely dependent on the Japanese roe market, which explains the recent development of the fishery.

3. If real-time information concerning the onset and progress of spawning in each box were to be made available each year, the timing and duration of the closed period could be defined more precisely in order to cover the main spawning activity. On the other hand, this would reduce even more the opportunities to fish these spawning components and thus a greater proportion of the TAC would be taken from the other two boxes. This would imply an increase in fishing effort in the latter, and possibly reduce or even negate the potential advantage to the stock of the box system. ACFM will give further advice on this subject in 1989 after it has been considered in more detail by the Working Group.

3.1.6 Herring in Division VIa (North)

Source of information: Report of the Herring Assessment Working Group for the Area South of 62°N, April 1988 (C.M.1988/Assess:17).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	70	70	58	53	30	37-45	38-55	46	-	-	-
Agreed TAC	70.0	70.0	70.0	64.0	56.5	51.9	49.7	49.8	-	-	-
Actual landings	51.4	92.4	63.5	75.2	43.8	81.7	63.0	-	208.3	0.06	92.6
Sp. stock biomass	201	204	183	320	348	359	367	365[1]	642	71	233
Recruitment (2-ring)	390	736	425	1,646	740	819	691	506[1]	3616	211	855
Mean F(2-6,u)	0.27	0.46	0.34	0.26	0.16	0.25	0.17	-	0.96	0.001	0.44

[1]Predicted or assumed. [2]Over period 1970-1987. Weights in '000 t, recruitment in millions.

Catches: Catches in 1987 about 25% lower than in 1986 (Table 3.1.6) owing to a decrease in unallocated catches from 38,000 to 18,000 t. The catch was still 20% higher than the agreed TAC, however.

Data and assessment: Catch and biological data generally of high quality. Larval abundance data difficult to interpret with increasing trend in stock. Assessment based on catch data and 1987 acoustic estimate of SSB. Survey estimates of recruitment unreliable.

Fishing mortality: Decreased in 1987 to 0.17, which is the estimated $F_{0.1}$ level.

Recruitment: Recruitment in recent years about average (Figure 3.1.6). For 1988 and 1989, the geometric mean recruitment has been assumed.

State of stock: Increasing to a size comparable to the early stable period pre-1965.

Forecast for 1989: Assuming F(88) = 0.14 , Catch(88) = TAC = 50,000 t

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Catch(89)	SSB(90)	
A	$F_{0.1}(=F_{87})$	0.17	357	58	349	Slight decrease in SSB
B	F_{med}	0.28	332	91	296	Decline in SSB of about 20%

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a relatively stable stock size until 1990. The slight reduction in the above table is highly dependent on assumed levels of recruitment. The recruitment assumed in the prediction has been exceeded in each of the years 1984-1987.

Recommendation: <u>To stabilize the spawning stock at around the present level, ACFM recommends that the fishing mortality should be maintained at its 1987 level, corresponding to a TAC in 1989 of 58,000 t</u>.

3.1.7 Clyde herring (Division VIa)

Source of information: Report of the Herring Assessment Working Group for the Area South of 62°N, April 1988 (C.M.1988/Assess:17).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	-	2.5	2.5	2.5	-	3.07	3.5	3.2	-	-	-
Agreed TAC	-	2.5	2.5	3.0	3.0	3.4	3.5	3.2	-	-	-
Actual landings	2.1	2.5	2.8	3.2	3.0	3.4	2.9	-	7.8	2.0	3.7

[1] Over period 1970-1986. Weights in '000 t.

Catches: Landings failed to reach TAC in 1987 (Table 3.1.7). No estimates of discards available. A considerable reduction in fishing effort (number of days fishing).

Data and assessment: Monthly landings and age data; effort data, but no discard data in 1987. Weight of individual herring at a given length 20-30% lower in 1987. Stock size estimate in 1987 based on landings and effort data was very different from equivalent assessment in 1987 and also different from results of an acoustic survey in July.

Fishing mortality: Unknown.

Recruitment: Unknown.

State of stock: Marked discrepancies between this year's assessment and those of previous years makes a reliable assessment of this stock impossible. The landings in 1987 appeared to consist of approximately 50% local spring spawners and 50% immigrant autumn spawners. The size of the indigenous spring-spawning stock is not known, but larval production in this area has been very low in recent years.

Forecast for 1989: Precise predictions not available.

Recommendation: In view of the uncertainties in the assessment, ACFM recommends that the landings in 1989 should be stabilized at recent levels (2,900-3,400 t). To protect the indigenous spring-spawning stock, no fishing for herring should take place in the Firth of Clyde in the period January-mid April (see Special comments).

Special comments: Since the long-term potential of the Clyde herring fishery almost certainly depends on the state of the spring-spawning stock that spawns within the Clyde, management in the near future should be aimed at providing protection for this stock. This stock congregates for spawning in the period January-March, and in 1987, observations on the spawning ground indicated that spawning continued into early April.

3.1.8 Herring in Divisions VIa (South) and VIIb,c

Source of information: Report of the Herring Assessment Working Group for the Area South of 62°N, April 1988 (C.M.1988/Assess:17).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	7[3]	11	12	12	14	17	18	11-18	-	-	-
Agreed TAC	-	11	12	12	14	17	17	14	-	-	-
Actual landings	25	19	33	27	23	29	35	-	39	15	27
Sp. stock biomass	106	109	98	159	138	147	131	112[1]	159	82	109
Recruitment (2-ring)	175	229	209	691	205	295	233	235[1]	691	175	295
Mean F(2-7,u)	0.30	0.24	0.40	0.22	0.22	0.25	0.35	-	0.43	0.14	0.28

[1]Predicted or assumed. [2]Over period 1970-1987. [3]Division VIIb only. Weights in '000 t, recruitment in millions.

Catches: Generally fluctuate between 20,000-30,000 t, but 1987 catch of 35,000 t was highest for over ten years (Table 3.1.8). Main catches by Irish fleet fishing inshore. Considerable quantities (>50% in 1987) were unallocated. Catches have exceeded TAC by a factor of 2 since 1982.

Data and assessment: Good biological data. Larval surveys carried out since 1981 do not give indications of trends in SSB consistent with catch data.

Fishing mortality: Has been relatively stable in this area fluctuating between 0.22 and 0.40 since 1977. F in 1987 is uncertain, but may be at about the level it was during period of high catches in mid-1970s, i.e., higher than in 1986.

Recruitment: In this area appears to be very constant. Good year classes enter the fishery every 5 or 6 years. The 1976 and 1981 year classes are strong - the 1981 year class the highest in recent years (Figure 3.1.8). The 1985 year class appears to be strong in young fish surveys, but these surveys cannot yet be used for predictive purposes. Recruitment in 1988-1989 assumed to be average of 1980-1986, excluding the strong 1981 year class.

State of stock: The SSB as indicated by the present assessment was about 130,000 t in 1987, which is much higher than projected in the 1987 assessment. The stock appears to have been underestimated in recent years (see Special comments).

Forecast for 1989: Assuming F(88) = 0.41, Catch(88) = 35,000 t (see Special comments).

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Catch(89)	SSB(90)	
A	$F_{0.1}$	0.16	115	13	125)	Increase in spawning stock
B	F_{med}	0.18	113	15	121)	
C	F(87)	0.35	102	26	97	Decrease in spawning stock

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a progressive decrease in spawning stock in 1989-1990 if recruitment is at the levels assumed.

Recommendation: To stabilize F at a sustainable level that is not likely to deplete the stock, ACFM recommends that fishing mortality should be reduced towards F_{med}. If this is to be achieved in 1989, the corresponding catch would be 15,000 t.

Special comments:

1. In both 1986 and 1987, the assessments of this stock were based largely on trends in the abundance of larvae. From comparisons between stock size and larval abundance over the available time series (1981-1987), however, it is now clear that the larval surveys are not at present providing a consistent indication of changes in SSB, possibly because they may not cover the entire area in which this stock spawns and/or because they have not completely covered the spawning period of the winter-spawning component.

   This stock has sustained catches in the range 15,000-39,000 t over the period since 1970, and a more coherent assessment is obtained by supposing that the stock size has remained more or less constant and that the present level of catches is generating about the same level of fishing mortality that equivalent catches did in the mid-1970s. While the present assessment is somewhat uncertain, ACFM considers that it is likely to be more reliable than those carried out in 1986 and 1987.

2. While the agreed TAC for 1988 is 14,000 t, ACFM is aware that TACs for this stock have been grossly exceeded every year since they were first set in 1982. The stock forecast for 1989 has, therefore, been based on the assumption that the catch in 1988 will be the same as in 1987 (35,000 t). ACFM wishes to stress, however, that this should not be taken as an indication that the TAC for 1988 should be raised to this level. A revised catch level for 1988 consistent with last year's advice and with this year's revised assessment would be around 17,000 t.

3.1.9 Irish Sea herring (Division VIIa)

Source of information: Report of the Herring Assessment Working Group for the Area South of 62°N, April 1988 (C.M. 1988/Assess:17).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	-	3.8	3.0	4.0	5.0	6.3	4.3	10.5	-	-	-
Agreed TAC	-	3.8	3.0	4.0	5.0	6.3	4.5	10.5	-	-	-
Actual landings	4.4	4.9	3.9	4.1	9.2	7.4	5.8	-	38.6	3.9	14.0
Sp. stock biomass	7.3	12.1	17.7	22.3	16.1	15.7	15.0	14.9[1]	33.8	5.4	16.4
Recruitment (1-ring)	211	223	222	118	147	163	148	144[1]	668	118	260
Mean F(2-7,u)	0.51	0.34	0.20	0.17	0.42	0.37	0.30	-	1.04	0.17	0.60

[1] Predicted or assumed. [2] Over period 1972-1987. Weights in '000 t, recruitment in millions.

Catches: Catches have exceeded the TAC throughout the series and were 30% higher than the TAC in 1987 (Table 3.1.9). Discarding was low and unquantified.

Data and assessment: No fishery-independent data were available. A provisional assessment was carried out using catch data and a series of effort data which was revised in 1987.

Fishing mortality: Because of the changes in the effort data, the F in 1986 appears to have been underestimated in last year's assessment. In 1987, it was near the F_{med} value.

Recruitment: The Irish Sea young fish survey shows very little correlation with the assessment based on catch and effort data and cannot be used for predictive purposes. Recruitment has been poor for the last 4 years, and recruitment at this low level has been assumed for 1988-1989.

State of stock: SSB appears to have been declining over the last 3 years (Figure 3.1.9) and is now estimated to be less than half the estimate in the 1987 assessment.

Forecast for 1989: Assuming F(88) = 0.30, Catch(88) = 5,600 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	$F_{0.1}$	0.17	17	3.2	18	Gradual increase in SSB
B	F(87)	0.30	15	5.5	15	Stability in stock and catch

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a constant or slowly increasing SSB, depending on recruitment.

Recommendation: To conserve the stock and maintain stability of catches, ACFM recommends that the TAC in 1988 should be reduced to 5,600 t and that fishing mortality should be kept constant, corresponding to a TAC in 1989 of 5,500 t. The spawning area and nursery area closures applied by the management body in 1987 should be continued.

Special comments: The validity of assessments of this stock are totally dependent on catch and effort data and must be treated with some reservation because the relationship between fishing mortality and effort is not yet established. Nevertheless, ACFM considers that the present assessment is more likely to be correct than that carried out in 1987. In this case, the TAC of 10,500 t set for 1988 is considerably above that corresponding to safe biological limits. If the TAC is taken in 1988, then a considerable reduction in catch in 1989 (to around 2,500 t) would be required to prevent any further decrease in spawning stock size, which is still well below its earlier high levels. The provision of survey data for this stock would assist in evaluating the validity of future assessments.

3.2 Industrial Fisheries in the North Sea and Adjacent Waters

3.2.1 Data deficiencies

In 1985 and 1986, ACFM commented on the inadequate level of biological samples taken from the industrial fisheries in these two years. The number of samples increased considerably in 1987, and since the second quarter of 1987, it has been at the same level as prior to 1985. In general, adequate information on age, length, and weight of species taken in the industrial fishery was available to ACFM for 1987.

3.2.2 Trends in the industrial fishery in the North Sea

The total landings from the industrial fisheries in the North Sea are shown in Table 3.2.2. The total landings were around 1.8 million t in the mid-1970s and declined gradually to about 1.5 million t towards 1980. The decline of the sprat stock in the 1980s has caused a further decline in industrial landings to about 1.1 million t in 1986 and 1987.

The landings of sandeel are by far the most important component in the fishery, and 825,000 t of sandeel were landed in 1987. Landings of sandeel in both 1986 and 1987 were about 30% above the mean value in the period 1974-1985, and this fishery has offset the declining trend in the industrial fishery. Even though landings of sprat increased from 16,000 t in 1986 to 32,000 t in 1987, the sprat fishery remained at a very low level compared to landings above 300,000 t in the 1970s. The Norway pout fishery declined to 147,000 t in 1987, which is the lowest landing observed since 1969.

The low landings of sprat in recent years can chiefly be explained by a much reduced stock compared to the 1970s, whereas the low landings of Norway pout are a combined effect of a low stock size and reduced fishing effort. The latter can partially be associated with the low price of fish meal in 1986 and 1987.

Landings of protected species - haddock, whiting, and saithe

Landings of protected species which occur as by-catch in the fishery for sandeel, sprat, and Norway pout have decreased significantly since the 1970s. An annual by-catch of around 200,000 t was observed in 1974-1977, and this was reduced to a third in 1978-1982. In the period 1983-1987, the by-catch continued to decrease, and around 25,000 t were caught annually in the period 1985-1987. Landings of protected species consist mainly of whiting (16,000 t), whereas the by-catch of haddock and saithe was about 4,000 t each in 1987.

Landings of herring

Landings of herring in the small-meshed fishery in 1987 were 47,000 t. Landings have been reduced from the peak level of around 150,000 t in 1982-1983 and have since then varied around 45,000 t.

Landings of herring in the purse seine fishery and in the 32-mm trawl fishery are not considered in this section of the report (see Section 3.1.2), even though a considerable part of these landings are used for reduction to fish meal. Total catches of herring are dealt with in Section 3.1.2.

3.2.3 Trends in the industrial fishery in Division IIIa

The total landings in the small-meshed industrial fishery in Division IIIa are shown in Table 3.2.3. Landings have oscillated around 200,000 t since the beginning of the 1980s. Landings declined from 205,000 t in 1986 to 172,000 t in 1987. Catches of herring in 1987 remained at the same high level as in the period 1984-1987 and herring was, in 1987, the predominant species in the industrial fishery in Division IIIa (see Sections 3.1.2 and 3.1.4).

3.2.4 Norway pout in Division IIIa

Source of information: Industrial Fisheries Working Group report, March 1988 (C.M.1988/ Assess:15).

Catches: The provisional landings in 1987 declined to only 3,000 t (Table 3.2.4). Landings have been low in 1985-1987, being only about 20% of the average landings in the period 1974-1986.

3.2.5 Norway pout in Sub-area IV

Source of information: Industrial Fisheries Working Group report, March 1988 (C.M.1988/ Assess:15).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	-	371.0	379.1	380.0	383.5	368.0	200.0	-	-	-	-
Actual landings	235.7	359.7	422.9	354.9	196.5	174.4	147.2	-	471	147	295
Sp. stock biomass	342	568	746	577	257	285	508	-	746	257	495
Recruitment (age 1)	28	103	103	63	34	49	71	5[1]	103	28	69
Mean F(1-2,u)	0.78	0.89	0.89	1.35	1.23	0.79	0.31	-	1.35	0.31	0.92

[1]Predicted or assumed. [2]Over period 1978-1986. Weights in '000 t, recruitment in billions.

Catches: Landings of Norway pout continued to decline in 1987 and reached their minimum since 1969 (Table 3.2.5). Landings in recent years have been taken primarily in the second half of the year.

Data and assessment: Catch-at-age data and fishing effort are available. Recruitment indices are available. Fishing effort standardized for differences in fishing power. Input fishing mortalities were selected to produce year-class strength in accordance with survey information.

Fishing mortality: Fishing effort has been markedly reduced since 1982 and fishing mortality in 1987 is estimated to be approximately one third of its mean level in 1982-1984. Reduction in fishing effort is mainly caused by reduced revenue in the fishery because of low prices on fish meal.

Recruitment: No recruiting year class has been above average strength in the years 1984-1987. The recruitment in 1988 is estimated to be very low, only about 10% of average strength, and is the lowest value on record.

State of stock: The Norway pout stock has declined in recent years, and the low catches in 1986 and 1987 are a combined effect of a reduced stock size and reduced fishing effort.

Forecast for 1988: ACFM has, at its previous meetings, predicted catches of Norway pout assuming status quo fishing effort. In recent years, fishing effort has changed and catches in 1988 are difficult to predict since fishing effort may again change.

Assuming fishing effort in 1988 remains at the low 1987 level, a catch around 110,000 t is expected. If fishing effort increases to the 1985 level (50% above the 1987 effort), catches in 1988 are expected to be around 175,000 t. It is seen that, irrespective of the actual level of fishing effort in 1988, landings are expected to be relatively low because of the weak 1987 year class.

3.2.6 Norway pout in Division VIa

Source of information: Industrial Fisheries Working Group report, March 1988 (C.M.1988/ Assess:15).

Catches: Annual landings as officially reported to ICES are given by country in Table 3.2.6 for the period 1974-1987. Landings increased sharply from about 5,800 t in 1986 to 38,300 t in 1987.

3.2.7 Sandeel in Division IIIa

Source of information: Industrial Fisheries Working Group report, March 1988 (C.M.1988/- Assess:15).

Catches: Landings from Division IIIa show considerable varioation without any apparent trend (Table 3.2.7). Landings in 1987 were 5,000 t, only 25% of the mean value in the period 1979-1986.

3.2.8 Sandeel in the Southern North Sea

Source of information: Industrial Fisheries Working Group report, March 1988 (C.M.1988/ Assess:15).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	378.9	479.2	419.0	532.8	513.5	457.4	379.4	-	533	355	449
Sp. stock biomass	431	284	843	411	669	191	725	-	843	191	513
Recruitment (age 0)	860	129	704	148	653	138	-	-	860	129	392
Mean F(1-3,u)	0.59	0.81	0.58	1.15	1.93	0.92	0.65	-	1.93	0.58	0.89

[1]Over period 1978-1987. Weights in '000 t, recruitment in billions.

Catches: Catches in 1987 decreased 17% compared to 1986 and continued the declining trend from the very high level in 1984-1985 (Tables 3.2.8.1 and 3.2.8.2). Catches are taken predominantly in May and June in the central part of the southern assessment area (Figure 3.2.8).

Data and assessment: Catch-at-age data and fishing effort data are available. The assessment is based on fishing mortality/effort relationships. No recruitment index is available.

Fishing mortality: Fishing mortality in 1987 was about 30% below the mean value and even below half the 1984-1985 level. In recent years, some fishing effort has been diverted to the sandeel fishery in the Northern North Sea.

Recruitment: Very strong year classes entered the fishery in 1981, 1983, and 1985. No information is available on the 1987 year class.

State of stock: The biomass of the sandeel stock in the southern area has varied without any trend in the 1980s, although the alternating strength in the recruiting year classes has caused similar fluctuations in the biomass.

Forecast for 1988: Landings of sandeel are dominated by 1-group sandeel in most years. No estimate is available in the strength of the 1987 year class, and thus no prediction of landings in 1988 can be made.

3.2.9 Sandeel in the Northern North Sea

Source of information: Industrial Fisheries Working Group report, March 1988 (C.M.1988/ Assess:15).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	138.1	74.4	78.2	91.9	79.7	375.1	419.2	-	419	74	199
Sp. stock biomass	126	71	68	136	173	118	234	-	257	68	143
Recruitment (age 0)	55	86	97	47	255	202	-	-	255	47	122
Mean F(1-2,u)	1.11	0.80	0.52	0.57	0.88	1.08	1.45	-	1.45	0.39	0.85

[1]Over period 1976-1987. Weights in '000 t, recruitment in millions.

Catches: Catches of sandeel in the Northern North Sea were 419,000 t in 1987, this being the highest on record (Tables 3.2.8.1 and 3.2.8.2). The fishing season starts in April and ends in August. About half of the total catch in 1987 was taken in June.

Data and assessment: Catch-at-age data and catch-per-unit-effort data are available. Stock size and fishing mortalities are estimated in an analytical assessment. Input fishing mortalities are based on fishing mortality/effort relationships. No recruitment index is available.

Fishing mortality: Fishing mortality increased from a relatively low level in 1983 to a high level in 1987 about 70% above the mean value. Fishing effort in the sandeel fishery can be diverted between the northern and southern areas, and the abundant northern stock has attracted substantial fishing effort in recent years.

Recruitment: The 1985 and 1986 year classes have both been very strong. No information is available on the strength of the 1987 year class.

State of stock: The sandeel stock in the northern area was low in the beginning of the 1980s. Strong recruitment in 1985 and 1986 has increased the stock size to the highest level on record.

Forecast for 1988: Landings of sandeel in most years are dominated by the 1-group. No recruitment estimates are available for the 1987 year class, and, therefore, no forecast for 1988 is possible.

3.2.10 Sandeel in the Shetland area

Source of information: Industrial Fisheries Working Group report, March 1988 (C.M.1988/ Assess:15).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	46.7	52.0	37.0	32.6	17.2	14.0	7.2	-	52.0	7.2	31.5
Sp. stock biomass	36	31	31	40	33	25	15	-	40	15	35
Recruitment (age 0)	65	71	35	21	10	36	58	-	65	10	46
Mean F(2-5,u)	0.53	0.62	0.46	0.65	0.37	0.47	0.16	-	0.65	0.12	0.44

[1]Over period 1976-1987. Weights in '000 t, recruitment in millions.

Catches: Landings have declined steadily since the peak in 1982. Landings in 1987 were the lowest since the development of the fishery in 1974 (Table 3.2.8.2).

Data and assessment: Catch-at-age data and fishing effort are available. An analytical assessment is available, and fishing mortalities by age groups are determined by fishing mortality/effort relationships. No recruitment estimates are available.

Fishing mortality: Fishing effort was reduced in 1987, and fishing mortality is now only 25% of the peak level in 1984.

Recruitment: Recruitment by the 1984, 1985, and 1986 year classes appears to be below average. A reliable estimate of the 1987 year class is not yet available.

State of stock: Total stock biomass appears to have increased from 1986 to 1987, whereas spawning stock size continued to decline from the peak level in 1985.

Forecast for 1988: As for the sandeel fisheries in the northern and southern areas, the fishery in the Shetland area depends very much on 0- and 1-group sandeel. Since no reliable estimate is available for the 1987 year class, no catch forecast can be made for 1988.

3.2.11 Sandeel in Division VIa

Source of information: Industrial Fisheries Working Group report, March 1988 (C.M.1988/ Assess:15).

Catches: Catches as officially reported to ICES are shown in Table 3.2.11. Catches decreased from 24,000 t in 1986 to 14,000 t in 1987.

Data and Assessment: Data are being assembled, but the time series is too short to permit an assessment.

3.2.12 Sprat in Division IIIa

Source of information: Industrial Fisheries Working Group report, March 1988 (C.M.1988/ Assess:15).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	-	77.0	-	-	-	80.0[2]	80.0[2]	80.0[2]	-	-	-
Actual landings	79.4	51.2	29.5	40.1	29.0	19.8	23.0	-	101	20	54
Recruitment (age 1)[3]	2,809	1,577	1,173	4,141	2,077	684	1,830	945	5,713	684	2865

[1] Over period 1978-1987. [2] Mixed clupeoid TAC. [3] Survey indices. Weights in '000 t.

Catches: Landings have shown a declining trend since 1979 and appear now to have stabilized at a low level (Table 3.2.12). Catches of sprat are taken both in a directed fishery for human consumption and in the industrial fishery for herring and sprat.

Data and assessment: No catch-at-age data are available, and no assessment has been made. Recruitment information is available from IYFS surveys, and acoustic surveys aimed at herring give qualitative information on stock size.

Recruitment: Except for the 1983 year class, all recruiting year classes have been below average in the 1980s. The 1988 recruitment is just above the lowest year class on record.

State of stock: All stock indicators point to a low sprat stock in Division IIIa.

Forecast for 1988: ACFM attempted to use the SHOT method to predict catches in 1988. Provided fishing effort remains constant in 1988, a catch of around 20,000 t is predicted for 1988.

Recommendation: Additional information and management considerations are given in the section on Division IIIa herring in this report (Section 3.1.4).

3.2.13 Sprat in Sub-area IV

Source of information: Industrial Fisheries Working Group report, March 1988 (C.M.1988/Assess:15).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	-	-	-	-	-	-	-	0	-	-	-
Agreed TAC	-	400.0	330.0	-	153.0	100.0	57.0	57.0	-	-	-
Actual landings	209.1	152.7	88.2	77.2	50.2	16.4	31.8	-	380	16	171
Recruitment (age 1)[2]	886	183	572	347	659	73	807	310	1,474	73	634

[1]Over period 1978-1987. [2]Survey indices. Weights in '000 t.

Catches: Total landings doubled in 1987 compared to 1986, but are still very low, being only 17% of the mean landings of the most recent 10-year period (Table 3.2.13). Catches are predominantly taken in Division IVb East.

Data and assessment: Catch-at-age data were available for 1987. Unfortunately, catch-at-age data are not available for 1985 and 1986, and no analytical assessment is available. Acoustic surveys aimed at juvenile herring give qualitative information on the size of the sprat stock.

Fishing mortality: No estimates available.

Recruitment: A recruitment index for 1-group sprat is derived from the International Young Fish Surveys. Recruitment has been low in the 1980s and the improvement observed in 1987 has not been maintained in 1988. The 1988 recruitment is about half to average of the strength of recruiting year classes in the recent 10-year period.

State of stock: All indicators of stock size point to the very poor state of the sprat stock in the North Sea. Recruitment data do not suggest any improvement in the very near future.

Forecast for 1988: Fishing effort in the sprat fishery in the North Sea has decreased in recent years because of the introduction of management measures aimed at juvenile herring (i.e., sprat boxes). No quantitative estimates of fishing effort are available, and it is difficult to predict catches in 1988. ACFM attempted to predict catches in 1988 using catch data and recruitment data. Assuming that fishing mortality in 1988 will remain at the 1987 level, catches at about 35,000 t may be expected in 1988.

Recommendation: Based on the biological management objective to protect any recruiting year class, ACFM recommends that a TAC should be set for 1988 at a level less than that of recent low catches since 1985, and preferably 0.

Special comments: At its meeting in May 1987, ACFM reviewed the report of the Sprat Biology Workshop. It is suggested by the Workshop that environmental factors and not fishing or displacement by herring may be responsible for the change in abundance of the sprat stock. If this is the case, it is impossible, with the present state of knowledge of the environment, to predict if or when the sprat stock will again increase in abundance.

3.2.14 Sprat in Division VIa

Source of information: Industrial Fisheries Working Group report, March 1988 (C.M.1988/ Assess:15).

Catches: Catches of sprat from Division VIa from 1978-1987 are shown in Table 3.2.14. Landings in 1987 remained at the same very low level of 900 t as in 1986.

3.2.15 Sprat in Divisions VIId,e

Source of information: Industrial Fisheries Working Group report, March 1988 (C.M.1988/ Assess:15).

Catches: Landings have declined from the peak level in 1980, however, an increase from 1,200 t in 1986 to 2,700 t in 1987 (Table 3.2.15).

Data and assessment: Catch-at-age data are available for the UK fishery in the Lyme Bay areas. Recruitment data were not available.

Forecast for 1988: No prediction is available. Catch-at-age data suggest relatively poor recruitment from the 1986 and 1987 year classes, and it is expected the catches in 1988-1989 will be below the 1987-1988 level.

3.3 Demersal Stocks in Division IIIa

3.3.1 Cod in the Kattegat

Source of information: Division IIIa Demersal Stocks Working Group report, March 1988 (C.M.1988/Assess:13).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	16.4	15.0	15.0	12.0	12.0	-[3]	<13	<15	-	-	-
Agreed TAC	-	16.4	16.4	16.0	16.0	17.0	15.5	15.0	-	-	-
Actual landings	15.3	12.5	12.8	11.9	12.7	9.1	13.3	-	20.1	9.1	13.6
Sp. stock biomass	21.8	15.1	13.6	14.7	16.2	10.1	8.0	17.0[1]	29.3	10.1	18.5
Recruitment (age 1)	17.2	20.6	20.8	11.4	9.1	30.9	13.3	17.0[1]	30.9	10.8	18.7
Mean F(3-6,u)	0.95	1.42	1.23	1.35	1.39	1.39	1.38	-	1.42	0.77	1.29

[1]Predicted or assumed. [2]Over period 1977-1987. [3]Precautionary TAC based on recent catch levels. Weights in '000 t, recruitment in millions.

Catches: Catches increased from 9,100 t in 1986 to 13,300 t in 1987 (Table 3.3.1). Catches in 1987 were just above the 1982-1985 average level of about 12,000 t.

Data and assessment: Catch-at-age data are available from Denmark. CPUE data are available from the Danish and Swedish fisheries. Recruitment indices are available from IYFS surveys. The development in CPUE and effort data for the most recent years does not match the trend in stock size and fishing mortality satisfactorily. A tentative assessment was made by ACFM assuming constant fishing mortality in the period 1984-1987.

Fishing mortality: The tentative assessment shows that fishing mortality for this stock is very high and has increased by about 50% from the 1970s to the 1980s.

Recruitment: The assessment and survey information show that the 1985 year class was very strong, whereas the 1986 and 1987 year classes are estimated to 13.3 and 17.0 million, respectively. The long-term average (1972-1985) is 19.8 million.

State of stock: Fishing mortality has been increasing in this fishery in the 1970s and 1980s. This has resulted in a considerable decrease in spawning stock size from about 30,000 t in 1972-1974 to 10,000-15,000 t in 1983-1987. The estimate of spawning stock in 1987 is somewhat uncertain because of the tentative nature of the assessment. However, spawning stock size in 1987 is probably the lowest on record (Figure 3.3.1). The strong 1985 year class will reverse the declining trend in SSB in 1988, but because of the high level of exploitation of this stock, the SSB will again decrease in 1989.

Forecast for 1989: Assuming F(88) = 1.38, Catch(88) = 14,000 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	0.6F(87)	0.83	13	9	16	SSB in 1990 at similar level as in the early 1980s.
B	0.8F(87)	1.10		11	14	
C	F(87)	1.38		13	12	Stable SSB in 1989-1990.

Weights in '000 t.

Recommendation: ACFM recommends that fishing mortality be reduced significantly in 1989. In order to stabilize the spawning stock at the same level as in the early 1980s, ACFM recommends a TAC of about 10,000 t for 1989.

Special comments: As noted above, fishing mortality is very high for this stock. One consequence of this is that each year class will only sustain the fishery (and spawning stock) for relatively few years before it is fished out of the population.

In order to exemplify this, the contribution to the catches by the strong 1985 year class has been calculated. The 1985 year class entered the fishery in 1987 and, depending on the F level, will contribute until 1992-1995.

Contribution to catches by the 1985 year class

Year	Mean weight (kg)	High exploitation (present F)	Medium exploitation (half the present F)
		Catch (t)	Catch (t)
1987	0.7	5,400	2,700
1988	1.1	9,200	7,200
1989	2.0	5,060	7,100
1990	2.9	1,570	4,300
1991	4.2	840	3,500
1992	5.2	140	1,100
1993	8.3	35	700
1994	8.3	-	300
1995	8.3	-	120
1996	8.3	-	50
Total		22,245	27,070
Overall mean weight (kg)		1.1	1.7

As shown in the text table above, the total yield from the 1985 year class will be 20% higher if fishing mortality is only half the present level. In addition, the fish landed under the "medium F" scenario will have an average weight of 1.7 kg compared to 1.1 kg for the present level of F.

Finally, the 1985 year class would contribute considerably to the catches in the 1990s if fishing mortality was reduced. This would make landings in the 1990s less dependent on recruitment in 1986-1990 and, therefore, provide a basis for stable landings.

The scenario and comments outlined above are relevant for several stocks in the Northeast Atlantic. ACFM has, however, used the cod stock in the Kattegat to exemplify the more general points, since they are of particular relevance when a strong year class offers the possibility of improving the exploitation pattern of a highly exploited stock.

3.3.2 Cod in the Skagerrak

Source of information: Division IIIa Demersal Stocks Working Group report, March 1988 (C.M.1988/Assess:13).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC[3]	16.0	16.0	16.0	20.0	20.0	-[4]	<21	-[4]	-	-	-
Agreed TAC[3]	-	20.0	25.0	28.0	29.0	29.0	22.5	21.5	-	-	-
Actual landings[3]	28.9	26.1	21.8	19.9	16.6	20.1	19.8	-	28.9	15.5	21.7
Sp. stock biomass	27.1	30.1	21.0	16.7	17.5	17.6	9.4	13.0[1]	30.1	9.4	20.5
Recruitment (age 1)	14.0	17.1	19.8	14.0	11.2	29.2	12.1	31.7[1]	31.1	11.2	19.5
Mean F(3-6,u)	0.80	1.20	1.07	0.86	0.91	1.53	1.30	-	1.53	0.47	0.99

[1]Predicted or assumed. [2]Over period 1978-1987. [3]Not including Norwegian fjords. [4]Precautionary TAC based on recent catch levels. Weights '000 t, recruitment in millions.

Catches: The catch level in 1987 is nearly the same as in 1986 (Table 3.3.2), but slightly lower than in the early 1980s (1981-1984 mean = 24,100 t).

Catches taken in the Norwegian fjords are reported separately (Table 3.3.2). Landings in 1986 and 1987 were stable at around 800 t, which is only half the level in the early 1980s.

Data and assessment: Catch-at-age data available for the Danish catches. CPUE data available from Denmark and Sweden. IYFS provides recruitment index. Analytical assessment based on fishing effort/fishing mortality relationship available for the open Skagerrak.

Fishing mortality: Fishing mortality has decreased from 1986 to 1987, but was still at a very high level in 1987 (Figure 3.3.2).

Recruitment: The 1987 year class was estimated to be at the same high level as the 1985 year class (32 million). The 1986 year class was estimated to be below average (12 million) (1978-1987 average is 19.5 million).

State of stock: Estimates of stock size and fishing mortality exist for the period 1978-1987. In this period, the spawning stock increased from 19,000 t in 1978 to 30,000 t in 1982 and again decreased to 18,000 t in 1986. In 1987, the spawning stock is estimated to have decreased even further to 9,400 t, which is the lowest in the period. The improvement in stock size in 1988 is caused by strong 1985 and 1987 year classes, but the stock size will decrease again if fishing mortality is kept at the present very high level.

Forecast for 1989: Assuming F(88) = 1.30, Catch(88) = 20,000 t.

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Catch(89)	SSB(90)	
A	F_{med}	0.86	9	17	20	
B	0.8F(87)	1.04		20	17	
C	F(87)	1.30		23	14	

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a moderate increase in SSB to 14,000 t in 1990 because of the strong 1987 year class. The strength of this year class is not yet fully confirmed.

Recommendation: ACFM recommends that fishing mortality be reduced towards the F_{med} level.

ACFM recommends that TACs be set separately for the Skagerrak and Norwegian coastal areas; for the latter area, the TAC should be based on recent catch data.

<u>Special comments</u>: Young cod in the Skagerrak are exploited at the same high levels as are the young cod in the North Sea. The fishing mortality on 2-group cod is somewhat lower in the Kattegat, but ACFM is of the opinion that a mesh increase in the cod fisheries in Division IIIa should be considered. The recommended mesh size in the fishery for cod in the North Sea is 120 mm, and the IBSFC has agreed on a minimum mesh size of 105 mm for 1989 in the Baltic.

ACFM will come back to this question in May 1989 when the effects of a mesh increase in Division IIIa have been analyzed.

3.3.3 Haddock in Division IIIa

<u>Source of information</u>: Division IIIa Demersal Stocks Working Group report, March 1988 (C.M.1988/Assess:13).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	4.5	7.0	7.0	7.0	-[2]	-[2]	-[2]	-[2]	-	-	-
Agreed TAC	-	10.4	9.5	10.5	11.5	11.5	11.5	10.0	-	-	-
Actual landings	10.4	12.1	10.3	8.7	9.3	4.5	5.3	-	12.1	4.5	8.7
Recruitment (age 1)[3]	4.3	47.7	33.8	71.7	160.8	57.0	250.6	125.2	250.6	4.3	89.4

[1]Over period 1981-1987. [2]Precautionary TAC based on recent catch levels. [3]Survey indices. Weights in '000 t.

<u>Catches</u>: The catch in 1987 increased slightly from 1986 (Table 3.3.3), but remained at the same low level.

<u>Data and assessment</u>: Catch-at-age data were available for the Danish human consumption fishery. No age composition was available for by-catches in the Danish industrial fishery (1,760 t in 1987). IYFS provides recruitment survey indices. ACFM attempted to utilize the recruitment index and catch-at-age data as a basis for an analytical assessment. The assessment cannot, however, form the basis for a prediction, because of difficulties in interpreting the results.

<u>Fishing mortality</u>: The assessment shows rather high fishing mortalities around 1.0 for the period 1981-1987.

<u>Recruitment</u>: Although the recruitment indices have not yet proved to be reliable predictors of year-class strength, they suggest that the 1986 and 1987 year classes are strong.

<u>State of stock</u>: The assessment shows that the stock is exploited at a high level and that biomass has decreased in the period for which data exist (1981-1987).

<u>Forecast for 1989</u>: No forecast available.

<u>Recommendation</u>: ACFM recommends that a precautionary TAC be set on the basis of recent catch levels.

3.3.4 Whiting in Division IIIa

Source of information: Division IIIa Demersal Stocks Working Group report, March 1988 (C.M.1988/Assess:13).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	22.0	22.0	22.0	22.0	-[2]	-[2]	-[2]	-[2]	-	-	-
Agreed TAC	-	22.15	22.15	22.15	22.15	22.15	17.0	17.0	-	-	-
Actual landings	24.0	14.1	12.6	14.0	13.4	16.4	16.6	-	49.1	12.6	20.0
Recruitment (age 1)[3]	968	690	262	500	940	1,379	2,178	2,978	2,978	262	1,117

[1] Over period 1977-1987. [2] Precautionary TAC based on recent catch levels. [3] Survey indices. Weights in '000 t.

Catches: The catch in 1987 was at the same level as in 1986 and has increased from the early 1980s (Table 3.3.4).

Data and assessment: No catch-at-age data were available and, therefore, no assessment was carried out.

Fishing mortality: Not available.

Recruitment: The 1986 and 1987 year classes, based on the IYFS, appear to be good, the IYFS indices at age 1 being about 4 times higher than the 1974-1985 average.

State of stock: No information available.

Forecast for 1989: No forecast available.

Recommendation: ACFM recommends a precautionary TAC based on recent catch levels.

3.3.5 Plaice in the Kattegat

Source of information: Division IIIa Demersal Stocks Working Group report, March 1988 (C.M.1988/Assess:13).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	8.0	4.0	4.0	1.5	4.0	-[3]	-[3]	<3.7	-	-	-
Agreed TAC	-	7.0	6.1	5.0	5.5	5.5	4.75	4.75	-	-	-
Actual landings	4.0	2.9	3.6	3.6	3.4	2.7	3.2	-	13.1	2.7	5.8
Sp. stock biomass	10.0	8.3	7.9	8.0	8.8	9.3	10.7	10.0[1]	30.0	7.8	13.8
Recruitment (age 1)	13.7	18.9	18.5	18.2	13.7	15.8	4.0	14.0[1]	28.7	4.0	14.2
Mean F(3-9,u)	0.54	0.41	0.54	0.79	0.34	0.43	0.40	-	0.81	0.34	0.56

[1]Predicted or assumed. [2]Over period 1977-1987. [3]Precautionary TAC based on recent catch levels. Weights in '000 t, recruitment in millions.

Catches: The catch increased slightly from 1986 to 1987 (Table 3.3.5), but is still on the same low level as seen in the early 1980s.

Data and assessment: Analytical assessment was carried out using the available CPUE series. Recruitment index available from survey data.

Fishing mortality: The F in 1987 was at the same level as in 1985-1986 which is somewhat lower than in the early 1980s.

Recruitment: The 1985 year class was estimated to be slightly above average (16 million) (1980-1984 level: 15 million), but the 1986 year class was estimated to be well below the average (4 million).

State of stock: The SSB is still only half of the level in the 1970s (21,000 t in 1975-1979) caused by the very low recruitment in the 1980s (Figure 3.3.5).

Forecast for 1989: Assuming F(88) = 0.40, Catch(88) = 3,800 t.

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Catch(89)	SSB(90)	
A	F(87)	0.40	800	2,900	8,000	

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to an unchanged spawning stock size in 1988-1989 at the same level as in 1982-1986.

Recommendation: ACFM recommends that fishing mortality should not be allowed to increase above the present level.

Special comments: Landings from this stock in the 1980s have been only 25% of the level of the 1970s. This is due to a similar reduction in recruitment to the stock. The recruitment in recent years does not indicate an improvement in stock size in the near future.

3.3.6 Plaice in the Skagerrak

Source of information: Division IIIa Demersal Stocks Working Group report, March 1988 (C.M.1988/Assess:13).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	14.0	7.0	7.0	7.0	9.0	-[2]	-[2]	-[2]	-	-	-
Agreed TAC	-	10.0	10.0	10.0	12.0	14.5	14.5	15.0	-	-	-
Actual landings	8.2	7.9	7.7	9.5	12.3	15.4	14.1	-	15.4	7.7	10.9
Sp. stock biomass	22.6	21.5	25.8	47.0	57.9	51.8	41.0	-	57.9	21.5	34.8
Recruitment (age 2)	27.0	50.9	109.5	83.7	44.9	26.1	20.0	-	109.5	20.0	46.2
Mean F(3-9,u)	0.30	1.08	0.67	0.38	0.40	0.41	0.45	-	1.08	0.30	0.66

[1] Over period 1978-1987. [2] Precautionary TAC based on recent catch levels. Weights in '000 t, recruitment in millions.

Catches: The catch has increased since 1983 (Table 3.3.6). The present level is slightly above that in the late 1970s (1975-1980 average = 11,300 t).

Data and assessment: Total international landings are uncertain for this area. Catch-at-age data are available for the Danish and Swedish fisheries. An assessment was attempted, but the time series are too short to resolve the inconclusive results from the analysis.

Fishing mortality: The tentative assessment suggests a constant fishing mortality around 0.4 for the years 1984-1987.

Recruitment: Catch-at-age data suggest strong recruitment in 1982-1984.

State of stock: The VPA shows an increase in the SSB in 1984-1986. The present level is the highest in the period for which data are available. The result should be considered in view of the uncertainty of the total international landings.

Recommendation: ACFM recommends a precautionary TAC based on historic catch levels.

3.3.7 Sole in Division IIIa

Source of information: Division IIIa Demersal Stocks Working Group report, March 1988 (C.M.1988/Assess:13).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC[2]	-	600	600	600	600	600	850	950	-	-	-
Actual landings	295	224	315	406	548	783	824	-	824	224	518
Recruitment (age 2)[3]	-	-	-	8.2	18.3	1.7	2.1	-	-	-	-

[1]Over period 1977-1987. [2]TAC set only by the EC. [3]Survey indices. Weights in t.

Catches: Data on landings are available for the period 1952-1987 (Table 3.3.7). Landings have showed relatively slow variations around a mean value of about 400 t for the whole period. Landings increased to about 800 t in 1986 and 1987. Catches at this high level were also experienced in 1976-1978.

Data and assessment: Catch-at-age data are available for the Danish fishery in 1984-1987. Recruitment indices are available for 1960-1987, but the surveys were discontinued in 1974-1979 and 1981-1983. ACFM analyzed the available catch-at-age data in order to give a rough indication of the mortality level and likely catches in 1988-1989.

Fishing mortality: The tentative analysis suggests a fishing mortality in the range of 0.4 - 0.5 in the period 1984-1987.

Recruitment: The recruitment indices and the catch-at-age data show that recruitment was low in 1976-1980 and high in the 1980s. The 1983 year class is especially estimated to be a strong one. No firm conclusions can be drawn on the strength of the 1984-1986 year classes, but they appear to be moderately high.

State of stock: No estimates are available on present stock size or historic levels of biomass. The present analysis indicates that fishing mortality is moderately high and that the resource is fully exploited.

Forecast for 1989: A catch forecast for 1988 and 1989 depends on the assumed trend in fishing effort in recent years. No data on fishing effort are available, and possible trends cannot, therefore, be detected. Assuming that fishing effort remained constant in 1984-1987, an annual catch of 800 t is predicted for 1988 and 1989. Assuming that fishing effort increased 15% per year during this period, catches of 700 t and 650 t are predicted for 1988 and 1989, respectively.

Recommendation: ACFM recommends that fishing mortality should not be allowed to increase, and the TAC for 1989 should be less than 800 t.

Special comments: A minimum mesh increase from 80 to 90 mm in the trawl fisheries has been agreed for Division IIIa and will be implemented 1 January 1989. This measure will lead to short-term losses of about 30% in sole catches taken by the trawler fleet. ACFM was not able to carry out a full analysis of the short-term losses and long-term gains implied by the mesh increase. The present analysis suggests, however, that the consequences of a mesh increase in the sole fishery in Division IIIa will be similar to the results for North Sea sole. For North Sea sole, a mesh increase from 80 to 90 mm would lead to short-term losses of 27% and long-term gains of 5% in yield, and a 40% increase in spawning stock size.

The mesh increase in the trawl fisheries will change the exploitation of the sole stock in Division IIIa. The overall effect of the mesh increase on both short-term and long-term catches and biomass depends on the relative proportion of catches taken by gillnetters and trawlers. Since no data on catches by fleets were available to ACFM, no account of the mesh increase could be taken when predicting catches in 1988 and 1989.

3.4 Pandalus borealis in Division IIIa and the North Sea

3.4.1 Introduction

The four fisheries in this area, in the Farn Deep (Division IVb), in Division IVa on the Fladen Ground and along the Norwegian Deeps, and in the Skagerrak and Kattegat (Division IIIa) are thought to exploit four different shrimp stocks. Analyses were made and advice given on the latter three stocks.

Management and sex reversal

ACFM has, with the available data, been able to assess the shrimp stock in Division IIIa and make a tentative assessment of the stock on the Fladen Ground. It has, however, not been possible for ACFM to determine biological reference points in terms of either fishing mortality rates or spawning stock sizes.

Nonetheless, it is possible to indicate the consequences of different general management decisions, taking into account the fact that Pandalus borealis change sex from male to female as they grow older and that natural mortality is probably very high.

Normally the shrimp spawn for the first time as males in the autumn when they are 1 1/2 years old. One year later, most of them have changed sex and spawn as females. Their yearly spawning is completed in the following spring when they shed their eggs/larvae hitherto carried under their bodies.

The three described Pandalus stocks display the characteristics of high, medium, and low exploitation levels.

When a P. borealis stock is exploited heavily, such as the stock on the Fladen Ground, the mean age in the stock will decrease. Most of the catches will consist of males (small shrimp), and a small proportion of a year class will survive to became females (large shrimp). In these circumstances, the risk is high of reduced recruitment, with decreased stock sizes as a consequence. The response from P. borealis to high mortality levels is for animals to become females at an earlier age. At Fladen Ground, about 50% of a cohort spawn as (small) females at an age of 1 1/2 years.

The effect of a high mortality regime is marked fluctuations in catches and catch rates (see Table 3.4.4), with short periods of high catches followed by longer periods of low catches, during which the spawning stock slowly rebuilds.

With a low mortality regime, on the other hand, as in the Norwegian Deep, a large proportion of a year class survives to form a larger spawning stock consisting of several age groups. The effects on the fishery will be more stable catches and, on average, higher catch rates than those achieved under the high mortality regime. The stock in the Norwegian Deeps appears to be lightly exploited and has the highest proportion of older females and the highest catch rates of the stocks dealt with.

The Division IIIa stock appears to be at an intermediate exploitation level.

The average size of the shrimp caught is 270-420/kg in the catches from Fladen, 180-275 in Division IIIa, and 165-215 in the Norwegian Deeps.

Managers have the possibility of choosing a management strategy in relation to a desired exploitation level, catch composition, and/or degree of stability in the catches.

The tools may be mesh size regulations in combination with catch and/or effort limitations.

As already stated, in the absence of relevant data, ACFM cannot give specific advice on appropriate levels of fishing effort or TACs. Generally, ACFM would advise that the present effort level should not be increased.

Closer monitoring of the fisheries would, in a few years time, give a better foundation for advice on management since the knowledge base will be improved, which will include an understanding of the significance of population fecundity and the ability to become females at an earlier age.

On mesh size, ACFM can indicate that the minimum mesh size should, in order to save first spawning females, be greater than 35 mm, preferably in the order of 40-45 mm (which is the size implemented in Canadian and Icelandic Pandalus fisheries).

3.4.2 Pandalus borealis in Division IIIa

Source of information: Report of the Working Group on the Assessment of Pandalus Stocks, February 1988 (C.M.1988/Assess:14).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	8.7	7.7	6.1	6.1	9.9	10.2	9.5	-	10.2	3.1	6.0
Sp. stock biomass[3]	-	-	-	3.9	6.0	13.1	7.8	3.6[1]	13.1	3.9	-
Recruitment (age 0)	-	-	-	22.0	8.8	7.3	3.1	8.0[1]	22.0	3.1	-
Mean F(1-3,u)	-	-	-	0.35	0.61	0.56	0.70	-	0.70	0.35	-

[1]Predicted or assumed. [2]Over period 1970-1987. [3]At spawning time (Oct). Weights in '000 t, recruitment in billions.

Catches: Landings in 1987 (for the third year) remained at the high level of 10,000 t (Table 3.4.2). Discards were not reported.

Data and assessment: Quarterly length frequency distributions for the period 1984-1987 were broken down to normal distributions assumed to represent age groups. Total quarterly effort was estimated from available CPUE data. Quarterly VPA (1984-1987) was calibrated by effort data.

Fishing mortality: Had doubled from 1984 to 1985-1987.

Recruitment: The 1984 year class appears to be twice as abundant as the 1985 and 1986 year classes both in the VPA and in the Norwegian trawl survey. This survey indicates that the 1987 year class is small.

State of stock: Low recruitment levels and high catches have caused the total stock size to decrease. The SSB is predicted to decrease to about 4,000 t at spawning time in 1988.

Forecast for 1989: Assuming F(88) = 0.70, Catch(88) = 5,000 t.

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Catch(89)	SSB(90)	
A	F(87)	0.70	1.8	4.4	1.8	Large reduction in SSB.

Weights in '000 t.

The available information shows that a catch level of 10,000 t is not sustainable for this stock. This high level was also attained in 1962-1964 and was then followed by a long period (1965-1975) with catches of 3,000-4,000 t (Figure 3.4.2).

Special comments: The catches in 1988 are predicted to be 5,000 t, given that the 1987 exploitation level is continued. In 1989, the same exploitation level would yield 4,400 t and a spawning stock biomass below 2,000 t.

In view of the difficulties in carrying out a full analytical assessment, a SHOT forecast has been made for this stock, based on catches for 1979-1987 and the recruit indices available for the 1984-1987 year classes. Following the Working Group analysis, an average (150) of the 1985 and 1986 values was assumed for all other year classes. This calculation indicates catches of 6,600 and 5,900 t for 1988 and 1989, respectively, assuming a constant exploitation rate, with an associated reduction in exploitable biomass from its high level from 1985 to 1987, because of the weak 1987 year class. This SHOT forecast largely confirms the prediction.

3.4.3 Pandalus borealis in Division IVa - the Norwegian Deeps

Source of information: Report of the Working Group on the Assessment of Pandalus Stocks, February 1988 (C.M.1988/Assess:14).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	1.3	2.5	2.0	1.5	2.3	2.6	4.2	-	4.2	0.6	1.9
Danish CPUE (kg/day)	-	471	470	279	465	486	507	-	-	-	-
Swedish CPUE (kg/hr)	-	42	35	25	30	34	38	-	-	-	-
Total rel. effort	-	1.00	1.32	1.49	1.68	1.31	1.98	-	-	-	-

[1]Over period 1970-1987. Weights in '000 t.

Catches: Landings reached in 1987 their highest level since 1970 (Table 3.4.2).

Data and assessment: Danish and Swedish data on CPUE and results from Norwegian trawl surveys were available. The sampling of catches for length frequencies (age groups) was not sufficient for an analytical assessment.

Fishing mortality: Available data indicate a doubling of effort from 1982 to 1987. Total average mortality for 1984-1987 was estimated to be 0.85, which is lower than the corresponding estimate for Division IIIa (1.5).

State of stock: In relation to the stock in Division IIIa, this stock seems to be more lightly exploited.

Forecast for 1989: Not available.

Recommendation: The exploitation level is apparently lower for this stock than for the stock in Division IIIa. The effort seems, however, to be increasing. ACFM was not in a position to calculate any appropriate TAC level from the present data base. If managers choose to regulate the shrimp fisheries in Division IIIa, this could lead to a diversion of effort. The fishery in this area should consequently be closely monitored.

3.4.4 Pandalus borealis in Division IVa - the Fladen Ground

Source of information: Report of the Working Group on the Assessment of *Pandalus* Stocks, February 1988 (C.M.1988/Assess:14).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	1.0	0.6	7.6	4.6	5.0	3.7	8.0	-	8.0	0.3	3.0
Sp. stock biomass	-	-	-	6.2	6.0	6.7	6.4	-	6.7	6.0	-
Recruitment (age 1)	-	-	-	9.2	5.1	10.2	7.8	-	10.2	5.1	-
Mean F(1-3,u)	-	-	-	0.54	0.66	0.39	0.80	-	0.80	0.39	-

[1]Over period 1970-1987. Weights in '000 t, recruitment in billions.

Catches: Have been highly fluctuating. The 1987 catches were the highest during the period 1970-1987 (Table 3.4.4).

Data and assessment: CPUE data available. Quarterly length distributions for some quarters 1984, 1985, and 1987. These were transformed to age distributions. A VPA on quarterly data for 1984-1987 was calibrated by estimated total effort data.

Fishing mortality: Total mortality estimated to be 1.7, M was assumed to be 1.0. Fishing mortality has been in the range of 0.4-0.8.

Recruitment: No survey data available.

State of stock: ACFM is aware that this assessment is based on a rather limited number of samples, and the results should be viewed with this in mind. According to the VPA, SSB has been stable since 1984-1987.

Forecast for 1989: Not available.

Recommendation: As pointed out in Section 3.4.1, the catches from this stock are, at the present level of exploitation, likely to fluctuate widely, being very dependent on the strength of the recruiting year class. Therefore, a failure in recruitment in one year is likely to result in a collapse of the Fladen shrimp fishery for a period of at least 1-2 years. Although no relevant assessment data are available for the 1970s, ACFM points out that a similar situation existed in the early 1970s when the fishery collapsed in 1973. The situation calls for a careful monitoring of the fishery.

3.5 Cod, Haddock, Whiting, and Saithe in the North Sea (Sub-area IV)

3.5.1 Roundfish in Sub-area IV: overview

3.5.1.1 Advice from the May 1988 ACFM meeting

The levels of exploitation on the cod, haddock, and whiting stocks in the North Sea are very high. About 50% of the catch usually consists of fish which are only 1 or 2 years old. Fishing mortality rates exceed 1.0 on the age groups which contribute most to the catch, so that fewer than one third of the fish survive from one year to the next. The fisheries are, therefore, very highly dependent on newly-recruiting young fish. Under these conditions, it is possible to make reliable predictions of catches for the coming year only if very reliable estimates of the size of incoming year classes are available. These can only be obtained from comprehensive and well-designed trawl surveys by research vessels. With the current levels and pattern of exploitation, the precision of even the best available data is not generally sufficient to permit very accurate forecasts to be made. This position can only be improved by reducing the level of exploitation on young fish. The assessment of these stocks is also made more difficult by the poor biological sampling of the industrial by-catches from 1984 to 1986 and the inadequate coverage of discard data.

The stock of cod has been fished down to a very low level, and survival is so low that recruitment is insufficient to maintain the stock in most years. Fishing mortality must be reduced to give the stock a chance to recover. The 1985 year class is large and needs to be protected to the maximum extent possible until it has matured and can make a major contribution to spawning. This will not occur until 1989 when 62% of this year class will be mature. More than half the spawning stock biomass is normally composed of 4- and 5-year-old fish. The 1986 and 1987 year classes are estimated as below average. The size of the latter is still uncertain and that of 1988 is still unknown.

The haddock and whiting stocks are subject to very large natural fluctuations, and in spite of very heavy exploitation, remain within the range of sizes experienced over the past 20 years. In either case, however, a succession of two or three poor year classes would induce a critical situation.

The size of the 1986 year class of haddock has been revised downwards from the high estimate made last year, and the 1987 year class is estimated to be the smallest in the last 20 years. The catch in 1989 is, therefore, likely to be considerably smaller than those of recent years, and spawning stock size is expected to decline sharply. ACFM will give quantitative advice for 1989 in November when new information on the size of the 1987 year class will be available.

There have been several good year classes of whiting recently, and the spawning stock size and forecast catches are higher than those of recent years.

The interpretation of the data for saithe is less straightforward, and it is quite possible that its state is worse than the present assessment suggests. Its status needs to be clarified by improvements to the data and their interpretation. No recruitment indices are available.

ACFM recognizes that roundfish in the North Sea are caught in mixed fisheries, and will attempt to take this into account when framing its advice for these stocks in November.

The possible effects of biological interactions between species (predation) have been briefly considered by the Working Group. This analysis implies that the effects of certain management measures (including increases in minimum mesh size) may not be correctly estimated by standard single-species models. The reliability of these results is, however, not known, and the calculations do not take account of all relevant factors, including the effect of changes in the size composition on the value of the catch, and the differing effects on individual fisheries. These matters will be considered further by the Multispecies Working Group. At present, there is no firm evidence that current proposals for the protection of juvenile fish should be relaxed, and, in fact, ACFM considers that greater protection should be given to juvenile North Sea cod.

3.5.1.2 Roundfish in Sub-area IV: overview: Advice from the November 1988 ACFM meeting

The levels of exploitation on the cod, haddock, and whiting stocks in the North Sea are very high. About 50% of the catch usually consists of fish which are only 1 or 2 years old. Fishing mortality rates exceed 1.0 on the age groups which contribute most to the catch, so that fewer than one third of the fish survive from one year to the next. The fisheries are, therefore, very highly dependent on newly-recruiting young fish. Under these conditions, it is possible to make reliable predictions of catches for the coming year only if very reliable estimates of the size of incoming year classes are available. These can only be obtained from comprehensive and well-designed trawl surveys by research vessels. With the current levels and pattern of exploitation, the precision of even the best available data is not generally sufficient to permit very accurate forecasts to be made. This position can only be improved by reducing the level of exploitation on young fish. The assessment of these stocks is also made more difficult by the poor biological sampling of the industrial by-catches from 1984 to 1986 and the inadequate coverage of discard data.

The stock of cod has been fished down to a very low level, and survival is so low that recruitment is insufficient to maintain the stock in most years. Fishing mortality must be reduced to give the stock a chance to recover. The 1985 year class was large and needs to be protected to the maximum extent possible until it has matured and can make a major contribution to spawning. This will not occur until 1989 when 62% of this year class will be mature. More than half of the spawning stock biomass is normally composed of 4- and 5-year-old fish. The 1986, 1987, and 1988 year classes are all estimated as below average, and catches and spawning stock size are at a low level.

The haddock and whiting stocks are subject to very large natural fluctuations, but in spite of very heavy exploitation, the whiting stock remains within the range of sizes experienced over the past 20 years. In either stock, however, a succession of two or three poor year classes would induce a critical situation. This may now be the case for haddock.

The size of the 1986 year class of haddock has been revised downwards from the high estimate made last year, and the 1987 year class is estimated to be the smallest in the last 20 years. The catch in 1989 will, therefore, be considerably smaller than those of recent years, and spawning stock size is expected to decline sharply.

There have been several good year classes of whiting recently, and the spawning stock size and forecast catches are higher than those of recent years.

The interpretation of the data for saithe is less straightforward, and it is quite possible that its state is worse than the present assessment suggests. Its status needs to be clarified by improvements to the data and their interpretation. No recruitment indices are available.

ACFM recognizes that roundfish in the North Sea are caught in mixed fisheries, and has taken this into account when framing its advice.

The possible effects of biological interactions between species (predation) were considered by the Working Group. This analysis implies that the effects of certain management measures (including increases in minimum mesh size) may not be correctly estimated by standard single-species models. The reliability of these results is, however, not known, and the present calculations, relate only to the universal adoption of 120 mm and do not provide the detailed effects on individual fisheries. These matters will be considered further by the Multispecies Assessment Working Group. At present, there is no firm evidence that current proposals for the protection of juvenile fish should be relaxed, and, in fact, ACFM considers that greater protection should be given to juvenile North Sea cod.

The forecasts for the roundfish stocks were delayed until November this year in order to make use of the most recent data from surveys carried out in August/September and October/November. For cod and haddock, these data indicate that the sizes of the 1987 year classes are smaller than previously available data had indicated, and that the 1988 year classes of both stocks are well below average. This has resulted in recommendations for TACs considerably lower than those of recent years, and ACFM stresses that, in a situation where recruitment is poor, catch levels cannot be sustained, especially when, as in these cases, the fisheries are heavily dependent on new recruits. If TACs for these stocks are set higher than those recommended by ACFM, this will only make the state of the stocks worse in 1990.

The catch forecasts for the roundfish stocks take into account the increase in minimum mesh size to 90 mm on 1 January 1989.

Effects of an increase in minimum mesh size to 120 mm when fishing for cod

In its report of May 1988, ACFM suggested that consideration should be given to a minimum mesh size of 120 mm when fishing for cod in the North Sea. ACFM, therefore, requested relevant analyses from the North Sea Roundfish and Multispecies Assessment Working Groups during 1988, and the results of these were available to ACFM.

A precise definition of fishing for cod has not yet been established. The calculations of the effect of such a measure are, therefore, necessarily preliminary.

Standard single-species calculations were made by some members of the Roundfish Working Group. These are multiple fleet, medium-term projections through to 1998 of the catches of cod, haddock, whiting, and saithe by each of the major fleets, together with projections of spawning stock biomass. Two sets of projections were prepared. The first assumes that all vessels will switch to 120 mm for all the gadoid fisheries. This is unlikely to be realistic if the 120 mm minimum mesh relates specifically to "fishing for cod". The second set of projections is, therefore, based on the simple assumption that the percentage of each fleet adopting 120 mm is roughly the same as the percentage of cod and saithe in its catches of gadoids.

For cod, the results indicate short-term losses of around 30% converting to long-term gains of a similar size after four or five years, for most fleets if all adopt 120 mm. There are larger short-term losses and long-term losses too, for the fleets which currently exploit the younger age groups of cod, and also for Nephrops trawlers. Similar effects, but of lesser size, are seen for the more realistic calculations involving selective adoption of 120 mm, except for those fleets which are at present heavily dependent on small fish. Significant long-term increases in SSB (120% and 61%, respectively) are also projected.

For haddock, the calculations for universal adoption of 120 mm indicate severe short-term losses in catch (around 70%) converting to substantial long-term gains (around 80%) after about seven years associated with almost complete elimination of discards, and a four-fold increase in SSB. The more realistic calculations imply short-term losses and long-term gains in catch averaging about 25%, with a 40% reduction in discards and a 75% increase in SSB.

For whiting, the universal 120 mm calculations indicate the almost complete elimination of catches of whiting in the short-term, with a subsequent recovery to about 80% of their "no-change" level (i.e., a long-term loss of about 20%). Here again discards are almost completely eliminated, and there is a three-fold gain in SSB. The more realistic calculations indicate moderate short-term losses (40%) converting to small long-term gains (4%), with a 36% reduction in discards and a 35% gain in SSB.

For saithe, universal adoption of 120 mm would lead to moderate short-term losses of about 14% with long-term gains of about 10% for most fleets, together with a 30% long-term gain in SSB. Similar but smaller losses and gains are predicted under the more realistic assumption.

However, all of these calculations are based on standard single-species models and are in conflict with the results obtained by the Multispecies Assessment Working Group, whose calculations include the results of predation, but are otherwise generally comparable. In general, the Multispecies Working Group (Tables 4.6.1 - 4.6.9) indicates much smaller gains in the long-term (short-term losses/gains have not been calculated, but would be similar to those from the single-species assessment). Gains in yield in the single-species assessment are often converted to losses in the multispecies assessment.

Certain conclusions are, however, preserved in the multispecies calculation. In particular, all the calculations imply a gain in SSB for cod (between 30% and 90%) and whiting, and one version of the multispecies calculation also predicts a gain in SSB for haddock (of about 23%), although another method predicts a loss of about 40%.

All the calculations confirm that there would be appreciable increases in the mean weight of fish landed, and, therefore, in their unit value, which would enhance any gains and reduce any losses.

In view of the continuing uncertainty over the robustness of the multispecies calculations, the balance of evidence is still that an increase in mesh to 120 mm would assist in a recovery of the SSB of cod (for which the proposal was made). The side effects on other species are still uncertain, and it is almost certain that any long-term gains in yield are considerably overestimated by the single-species calculations.

In the light of the uncertainty over the effects on other species, and the absence at present of a clear definition as to what should be regarded as fishing for cod, ACFM maintains its existing recommendation and will commission further work to clarify the position, recognizing that the recommendation could not be implemented immediately.

3.5.2 Cod in Sub-area IV (North Sea)

3.5.2.1 Advice from the May 1988 ACFM meeting

Source of information: North Sea Roundfish Working Group report, April 1988 (C.M.1988/Assess:21) and additional information.

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	<220	<235	<220	<215	<259	<130	125-200	148	259	125	208
Agreed TAC	220	235	240	215	250	170	175	160	250	170	215
Actual landings	301	273	233	206	192	158	174	-	301	158	227
Sp. stock biomass	173	168	136	119	111	100	95	96[1]	173	95	136
Recruitment (age 1)	272	559	274	540	92	581	254	277[1]	802	92	451
Mean F(2-8,u)[3]	0.77	0.89	0.88	0.84	0.78	0.80	0.86	-	0.89	0.72	0.80

[1]Predicted or assumed. [2]Over period 1977-1987. [3]Human consumption landings only. Weights in '000 t, recruitment in millions.

Catches: Estimated landings in 1987 were 173,585 t (Table 3.5.2) which was close to the TAC of 175,000 t. Landings in 1988 are being constrained by the agreed TAC.

Data and assessment: Analytical assessment of catch-at-age data using CPUE data, research survey data, and shrimp by-catch data. Discard data only available for Scottish fleets and not used in assessment.

Fishing mortality: Appears to have declined a little since 1982, but is still high. The high value estimated for 1987 may have been artificially elevated by a possible anomalous F value for the poor 1984 year class.

Recruitment: Has fluctuated strongly and is normally insufficient to maintain the stock at current high levels of F. The 1986 and 1987 year classes appear to be below average.

State of stock: Spawning stock biomass is estimated to have fallen to a record low level of 95,000 t in 1987, compared with a suggested minimum level of 150,000 t. The stock is overexploited relative to biological reference points (F_{max}, $F_{0.1}$, F_{med}).

Forecast for 1989: Present estimates indicate that catches will need to be reduced again in 1989, to halt the decline in the spawning stock. ACFM will give firm advice for 1989 in November, when new information on the sizes of the 1987 and 1988 year classes will be available.

Recommendation: Measures to protect juvenile cod, including the seasonal requirement to use a 100-mm minimum mesh size in the cod box (Figure 3.5.2.3), should be maintained. Consideration should be given to the introduction of a 120-mm minimum mesh size when fishing for cod, throughout the North Sea.

Special comments: Improved methods making better use of all available data are now being used, which should lead to more stable assessments of this stock. The new assessment generally agrees very closely with that adopted by ACFM in November 1987. Fishing mortality is now estimated to be a little lower than previously thought, but the assessment does not indicate a reduction in F in 1987 even though the TAC constrained the catches. In 1987, ACFM assumed that 15,000 t of cod would be discarded in 1987. Data on discards are not adequate to permit them to be properly evaluated, and they are not included in the present assessment.

The sizes of the 1985 and 1986 year classes are confirmed at values close to those adopted by ACFM last November. That of the 1987 year class is now estimated to be 277 million, somewhat larger than the preliminary estimate made by ACFM, but still below average. The size of this year class is still uncertain, and that of the 1988 year class is unknown. In view of the importance of 1- and 2-year-old fish in the catches, ACFM defers making a forecast for 1989 until its November meeting, when the results of two additional surveys will be available.

If catches are constrained by the TAC in 1988, fishing mortality should be reduced to 0.74, close to F_{med} but a further reduction will probably be required in 1989 to allow any increase in SSB in 1990 and thereafter towards the suggested minimum level of 150,000 t.

No additional information is available on the effect of technical measures to reduce exploitation of juvenile cod. ACFM notes that the long-term effects on yields of protecting juveniles are not precisely known. Reduced exploitation of 1- and 2-year-old fish is most important for this stock in order to reduce discards, to allow an increase in the spawning stock size from its historic low level, and to delay exploitation to allow more time in which to obtain data on the size of recruiting year classes. This would also allow an increase in the average size of fish caught and increase the stability and predictability of catches. ACFM, therefore, reiterates its advice that the minimum effective mesh size needs to be at least 120 mm to allow any significant reduction in mortality on 2-year-old fish. The establishment of a 120-mm minimum mesh size during the winter in the "cod box" only would not be fully effective, since 2-year-old cod occur outside this area at other times of the year, and ACFM recommends an increase in minimum mesh size to 120 mm when fishing for cod throughout the North Sea.

3.5.2.2 Cod in Sub-area IV (North Sea): Advice from the November 1988 ACFM meeting

Source of information: North Sea Roundfish Working Group report, April 1988 (C.M.1988/ Assess:21) and additional information.

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	<220	<235	<220	<215	<259	<130	125-200	148	259	125	208
Agreed TAC	220	235	240	215	250	170	175	160	250	170	215
Actual landings	301	273	233	206	192	158	174	-	301	158	227
Sp. stock biomass	173	168	136	119	111	100	95	96[1]	173	95	136
Recruitment (age 1)	272	559	274	540	92	581	254	205[1]	802	92	451
Mean F(2-8,u)[3]	0.77	0.89	0.88	0.84	0.78	0.80	0.86	-	0.89	0.72	0.80

[1]Predicted or assumed. [2]Over period 1977-1987. [3]Human consumption landings only. Weights in '000 t, recruitment in millions.

Catches: Estimated landings in 1987 were 173,585 t (Table 3.5.2) which was close to the TAC of 175,000 t. Landings in 1988 are being constrained by the agreed TAC.

Data and assessment: Analytical assessment of catch-at-age data using CPUE data, research survey data, and shrimp by-catch data. Discard data only available for Scottish fleets and not used in assessment.

Fishing mortality: Appears to have declined a little since 1982, but is still high.

Recruitment: Has fluctuated strongly and is normally insufficient to maintain the stock at current high levels of F. The 1986 and 1987 year classes are below average. The 1988 year class appears from preliminary data also to be below average at 238 million.

State of stock: Spawning stock biomass is estimated to have fallen to a record low level of 95,000 t in 1987 (Figure 3.5.2.1), compared with a suggested minimum level of 150,000 t. The stock is overexploited relative to biological reference points (F_{max}, $F_{0.1}$, F_{med}) (Figure 3.5.2.2).

Forecast for 1989: Assuming F(88) = 0.77, Catch(88) = 160,000 t (TAC).

Option	Basis	F(89)[1]	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	$F_{0.1}$	0.15	99	34	176	SSB reaches target level
B	F_{max}	0.23		51	161	
C	0.6F(87)	0.52		100	121	20% increase of SSB
D	0.8F(87)	0.69		124	102	SSB stabilises at low level
E	F(87)	0.86		144	86	Further fall in SSB to below the historical minimum level

[1]90 mm mesh assumed. Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a further fall in spawning stock size (see Overview).

Recommendation: ACFM maintains its recommendation that fishing mortality should be reduced to avoid any further decline in spawning stock size, corresponding to a TAC of not more than 124,000 t for 1989. ACFM would prefer a sharper reduction in fishing mortality to allow a quicker recovery of the spawning stock, corresponding to a TAC of 100,000 t, but notes that this should be considered in conjunction with the fisheries for other roundfish species (especially whiting) in the North Sea. Measures to protect juvenile cod, including the seasonal requirement to use a 100 mm minimum mesh size in the cod box (Figure 3.5.2.3), should be maintained. An increase in mesh size to 120 mm when fishing for cod would considerably assist the recovery of the cod stock in the long-term (see Overview).

Special comments: The new assessment generally agrees very closely with that adopted by ACFM in November 1987. Fishing mortality is now estimated to be a little lower than previously thought, but the assessment does not indicate any reduction in F in 1987 even though the TAC constrained the catches. In 1987, ACFM assumed that 15,000 t of cod would be discarded in 1987. Data on discards are not adequate to permit them to be properly evaluated, and they are not included in the present assessment.

The sizes of the 1985 and 1986 year classes are confirmed at values close to those adopted by ACFM last November. That of the 1987 year class is now estimated to be 205 million, which is well below average.

The first usually reliable indicator of the size of the 1988 year class became available during the meeting, and leads to an estimated size of 238 million, making the third weak year class in succession.

The size of this stock and the catches which can be sustained by it will remain at low levels unless recruitment returns to the historically high levels observed in the 1970s.

At present, the spawning stock biomass of North Sea cod has fallen far below the advised minimum level of 150,000 t and will fall even further until 1991 without a reduction in F. The danger of too low SSB is the production of year classes below their true potential as the result of reduced egg production. Although no firm evidence is available, the strength of the 1984-1988 year classes gives reason for concern in this respect. A most likely effect of too low egg production is reducing the chances for an exceptionally strong year class as observed in 1969, 1970, 1976, and 1979. Year classes of that size would be necessary under present fishing conditions to achieve a substantial rebuilding of the spawning stock.

If catches are constrained by the TAC in 1988, fishing mortality should be reduced to 0.77, but a considerable further reduction will be required in 1989 to allow any significant increase in SSB in 1990 and thereafter towards the suggested minimum level of 150,000 t.

ACFM notes that substantial quantities of cod are caught in fisheries directed at other species, including flatfish, and advises managers to take note of these interactions in order to avoid discarding of legal-sized fish.

Additional information is available on the effect of technical measures to reduce exploitation of juvenile cod (see Overview). ACFM notes that the long-term effects on yields of protecting juveniles are not precisely known. Reduced exploitation of 1- and 2-year-old fish is most important for this stock in order to reduce discards, to allow an increase in the spawning stock size from its historic low level, and to delay exploitation to allow more time in which to obtain data on the size of recruiting year classes. This would also allow an increase in the average size of fish caught and increase the stability and predictability of catches. ACFM, therefore, reiterates its advice that the minimum effective mesh size needs to be at least 120 mm to allow any significant reduction in mortality on 2-year-old fish. The establishment of a 120 mm minimum mesh size during the winter in the "cod box" only would not be fully effective, since 2-year-old cod occur outside this area at other times of the year, and ACFM recommends an increase in the minimum mesh size to 120 mm when fishing for cod throughout the North Sea.

Preliminary analyses of the effects of such a measure were available to ACFM (see Section 3.5.1.2) and confirm that there would be a substantial benefit to the spawning stock of cod, but considerable side effects (not all necessarily adverse) on fisheries for other species. The way in which fishing for cod could be defined also requires further examination, and ICES will investigate this further during 1989.

In response to an EC request, ACFM also prepared catch option tables for 1989 assuming the adoption of a 120-mm mesh size. The results are given in the option table below:

Forecast for 1989: Assuming F(88) = 0.9(F87) = 0.77, Landings(88) = 160,000 t (TAC), and 120-mm mesh in 1989.

Option	Basis	F(89)[1]	SSB(89)	Landings(89)	SSB (90)
A	$F_{0.1}$	0.14	99	28	177
B	F_{max}	0.21		43	163
C	0.6F(87)	0.48		84	125
D	0.8F(87)	0.64		104	106
E	F(87)	0.80		121	91

[1]Averages reduced by adoption of 120 mm mesh. Weights in '000 t.

The short-term effects of a mesh increase on catches and SSB depend on the actual strength of the year classes at the time of the mesh change. In the long-term, a mesh increase will assist in the rebuilding of the spawning stock (see Overview).

The results indicate that, as expected, adoption of 120 mm mesh would assist in the recovery of the spawning stock biomass, but that this alone would have only a small effect on the SSB in 1990, and that a reduction in fishing mortality would be required in addition.

3.5.3 Haddock in Sub-area IV (North Sea)

3.5.3.1 Advice from the May 1988 ACFM meeting

Source of information: North Sea Roundfish Working Group report, April 1988 (C.M.1988/ Assess:21).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	140	200	170	172	209	239	120	185	-	-	-
Agreed TAC	140	180	181	170	207	230	140	185	-	-	-
Actual landings	147	185	172	138	165	168	112	-	185	97	140
Sp. stock biomass	228	285	241	189	229	207	140	140[1]	285	103	189
Recruitment (age 0)	30.2	18.8	62.8	16.0	23.3	33.2	6.4	37.4[1]	66.9	6.4	30.9
Mean F(2-6,u)[3]	0.72	0.65	0.95	0.99	0.92	1.14	1.12	-	1.14	0.65	0.95

[1]Predicted or assumed. [2]Over period 1978-1987. [3]Human consumption landings plus discards. Weights in '000 t, recruitment in billions.

Catches: Total landings in 1987 were below the agreed TAC (Table 3.5.3). Industrial by-catches constituted 4.5% of the catches in 1987. Large quantities of fish are discarded, sometimes as much as one third of the catch.

Data and assessment: Analytical assessment of catch-at-age data using CPUE and research vessel indices to estimate terminal Fs and recruitment. By-catch data were poor in the period 1984-1986. Discard data available and used in assessment.

Fishing mortality: F in the human consumption fishery is very high and close to the highest level in the last 20 years. Juvenile fish are heavily exploited, and the majority of 1- and 2-year-old fish caught are discarded. Industrial by-catch mortality has decreased in recent years.

Recruitment: Fluctuates very greatly without a clear trend (Figure 3.5.3.1). The estimate of the 1986 year class is lower than the estimate made in 1987 due to additional information from research vessels surveys being included. The estimate of the 1987 year class is the lowest for the last 20 years, mainly based on the IYFS index.

State of stock: F is high and the fishery is mainly relying on juvenile fish. Spawning stock has been decreased in the last 2 years and will be close to the historical minimum by 1989. The stock is almost entirely dependent on recruiting year classes.

Forecast for 1989: ACFM will give firm advice for 1989 in November when new data on the size of the 1987 year class will be available. Present estimates indicate that continued fishing at current levels of fishing mortality will lead to a sharp decline in catches and spawning stock size because of the very small size of the 1987 year class.

Recommendation: The very high level of discarding of 1- and 2-year-old fish should be reduced, preferably by the modification of fishing gear to reduce the retention of small fish.

Special comments: The present assessment implies that fishing mortalities are slightly higher than previously thought.

The estimated size of the 1986 year class has been substantially reduced in the light of new data and improved analysis, and is now thought to be about average (rather than 1.5 times the average as before). This revised assessment is in line with reports from the fishery and the VPA analysis of catch-at-age data.

Data are now available on the size of the 1987 year class. Two independent estimates indicate that it is extremely small, the smallest in the last 20 years, but the precise size is still uncertain.

The new assessment implies that landings in 1988 will be only about 112,000 t, much less than the TAC, if fishing mortality remains at its recent very high level.

Assuming constant fishing mortality, landings in 1989 are forecast to be substantially lower than recent low levels, with SSB also falling to a low level in 1989. These calculations are, however, sensitive to the size of the weak 1987 year class, which is still uncertain, and for which new data will become available later in the year.

The stock is very heavily exploited, and fishing mortality needs to be reduced towards F_{med} (about 0.6). The level of discarding remains very high; reducing discards would be the most effective conservation measure, since industrial by-catch has now declined to a low level. This could be achieved by further increases in minimum mesh size and by the modification of fishing gear to reduce the retention of small fish. These would also have practical advantages because of the reduction in time spent sorting catches and the increase in the proportion of larger and more valuable fish.

3.5.3.2 Haddock in Sub-area IV (North Sea): Advice from the November 1988 ACFM meeting

Source of information: North Sea Roundfish Working Group report, April 1988 (C.M.1988/ Assess:21) and additional information.

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	140	200	170	172	209	239	120	185	-	-	-
Agreed TAC	140	180	181	170	207	230	140	185	-	-	-
Actual landings	147	185	172	138	165	168	112	-	185	97	140
Sp. stock biomass	228	285	241	189	229	207	140	140[1]	285	103	189
Recruitment (age 0)	30.2	18.8	62.8	16.0	23.3	33.2	3.5	9.5[1]	66.9	6.4	30.9
Mean F(2-6,u)[3]	0.72	0.65	0.95	0.99	0.92	1.14	1.12	-	1.14	0.65	0.95

[1]Predicted or assumed. [2]Over period 1978-1987. [3]Human consumption landings plus discards. Weights in '000 t, recruitment in billions.

Catches: Total landings in 1987 were below the agreed TAC (Table 3.5.3). Industrial by-catches constituted 4.5% of the catches in 1987. Large quantities of fish are discarded, sometimes as much as one third of the catch.

Data and assessment: Analytical assessment of catch-at-age data using CPUE and research vessel indices to estimate terminal Fs and recruitment. By-catch data were poor in the period 1984-1986. Discard data available and used in assessment.

Fishing mortality: F in the human consumption fishery is very high and close to the highest level in the last 20 years. Juvenile fish are heavily exploited, and the majority of 1- and 2-year-old fish caught are discarded. Industrial by-catch mortality has decreased in recent years.

Recruitment: Fluctuates very greatly without a clear trend (Figure 3.5.3.1). The estimate of the 1986 year class is lower than the estimate made in 1987 due to additional information from research vessel surveys being included. The estimate of the 1987 year class is the lowest for the last 20 years. Preliminary estimates of the 1988 year class indicate that it is well below average.

State of stock: F is high and the fishery is mainly relying on juvenile fish. Spawning stock has been decreased in the last 2 years and will be close to the historical minimum by 1989. The stock is almost entirely dependent on newly recruiting year classes.

Forecast for 1989: Assuming F(88) = 1.12, Landings(88) = 110,000 t.

Option	Basis	F(89)[1]	Predicted SSB(89)	Landings(89) Total	HC	Ind.	Disc.	SSB(90)	Consequences/implications
A	$F_{0.1}$	0.24	101	27	24	3	6	130	Massive reduction in F, SSB increases
B	0.6F(87)	0.63		57	54	2	9	96)	Decrease in SSB to below historical minimum level
C	0.8F(87)	0.84		68	66	2	11	82)	
D	F(87)	1.05		78	76	2	14	71)	

[1]90 mm mesh assumed. Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a sharp decline in spawning stock size.

Recommendation: Fishing mortality should be lowered to reduce the decline in spawning stock size as a result of poor recruitment, corresponding to a TAC for 1989 of not more than 68,000 t.

The very high level of discarding of 1- and 2-year-old fish should be reduced, preferably by the modification of fishing gear to reduce the retention of small fish.

ACFM points out that, if the small size currently estimated for the 1988 year class is confirmed, the catches and the stock size will remain at very low levels in 1990.

Special comments: The present assessment implies that fishing mortalities are slightly higher than previously thought.

The very large size estimated for the 1986 year class at the time of the last assessment of this stock in May 1987 has not been confirmed by more recent data. The new assessment was delayed as long as possible in order to have all the most recent data available, but these all indicate poor subsequent recruitment.

Firm data are now available on the size of the 1987 year class. Five independent estimates indicate that it is extremely small, the smallest in the last 20 years. First indications of the size of the 1988 year class from the most recent surveys are that this is also well below average.

Even assuming constant fishing mortality, landings in 1989 are forecast to be much lower than recent low levels, with SSB also falling to a low level in 1989.

The stock is very heavily exploited, and fishing mortality needs to be reduced towards F_{med} (about 0.6) (Figure 3.5.3.2). The level of discarding remains very high; reducing discards would be the most effective conservation measure, since industrial by-catch has now declined to a low level. This could be achieved by further increases in minimum mesh size and by the modification of fishing gear to reduce the retention of small fish. These would also have practical advantages because of the reduction in time spent sorting catches and the increase in the proportion of larger and more valuable fish.

3.5.4 Whiting in Sub-area IV (North Sea)

3.5.4.1 Advice from the May 1988 ACFM meeting

Source of information: North Sea Roundfish Working Group report, April 1988 (C.M.1988/ Assess:21).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	120	200	125	102	118	135	127	134	-	-	-
Agreed TAC	150	170	170	149	160	135	135	120	-	-	-
Actual landings	146	105	105	97	68	72	78	-	158	68	111
Sp. stock biomass	451	349	308	247	247	294	360	527[1]	477	247	361
Recruitment (age 0)	23.7	20.7	32.9	26.9	57.5	66.4	45.1	47.6[1]	66.4	20.7	41.0
Mean F(2-6,u)[3]	0.72	0.58	0.72	0.89	0.80	0.78	0.89	-	0.94	0.58	0.77

[1]Predicted or assumed. [2]Over period 1978-1987. [3]Human consumption landings plus discards. Weights in '000 t, recruitment in billions.

Catches: Estimated landings in 1987 were well below those predicted and below the agreed TAC. However, the declining trend observed previously seems to have reversed (Table 3.5.4). There is still a high rate of discarding in this fishery, sometimes amounting to as much as one third of the catch for some fleets.

Data and assessment: Analytical assessment of catch-at-age data using CPUE and recruit survey indices. Industrial by-catch data of better quality than in previous years. Discard data available but incomplete.

Fishing mortality: Remains high, but without showing any trend, and is close to F_{med} (about 1.0). F due to industrial by-catch has declined to a fairly low level. The majority of 1- and 2-year-old fish caught are discarded.

Recruitment: Very poor from 1980 to 1984, improving thereafter. The 1986 year class is 40% above average, and 1987 appears to be only 5% below average.

State of stock: The stock has partly recovered from its recent low level (Figure 3.5.4.1). The spawning stock size is just below the long-term average, and is predicted to increase in 1988 due to recent good recruitment.

Forecast for 1989: Present estimates indicate that continued fishing at current levels of fishing mortality will lead to a significant recovery in landings in 1989 from their current low levels. SSB should remain at a fairly high level. ACFM will give firm advice for 1989 in November when new data on the size of the 1987 year class will be available.

Recommendation: The very high level of discarding of 1- and 2-year-old fish should be reduced, preferably by the modification of fishing gear to reduce the retention of small fish.

3.5.4.2 Whiting in Sub-area IV (North Sea): Advice from the November 1988 ACFM meeting

Source of information: North Sea Roundfish Working Group report, April 1988 (C.M.1988/Assess:21) and additional information.

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	120	200	125	102	118	135	127	134	-	-	-
Agreed TAC	150	170	170	149	160	135	135	120	-	-	-
Actual landings	146	105	105	97	68	72	78	-	158	68	111
Sp. stock biomass	451	349	308	247	247	294	360	527[1]	477	247	361
Recruitment (age 0)	23.7	20.7	32.9	26.9	57.5	66.4	40.7	41.4[1]	66.4	20.7	41.0
Mean F(2-6,u)[3]	0.72	0.58	0.72	0.89	0.80	0.78	0.89	-	0.94	0.58	0.77

[1]Predicted or assumed. [2]Over period 1978-1987. [3]Human consumption landings plus discards. Weights in '000 t, recruitment in billions.

Catches: Estimated landings in 1987 were well below those predicted and below the agreed TAC. However, the declining trend observed previously seems to have reversed (Table 3.5.4). There is still a high rate of discarding in this fishery, sometimes amounting to as much as one third of the catch for some fleets.

Data and assessment: Analytical assessment of catch-at-age data using CPUE and recruit survey indices. Industrial by-catch data of better quality than in previous years. Discard data available but incomplete.

Fishing mortality: Remains high, but without showing any trend, and is close to F_{med} (about 1.0) (Figure 3.5.4.2). F due to industrial by-catch has declined to a fairly low level. The majority of 1- and 2-year-old fish caught are discarded.

Recruitment: Very poor from 1980 to 1984, improving thereafter. The 1986 year class is 40% above average, and 1987 and 1988 appear to be average.

State of stock: The stock has partly recovered from its recent low level (Figure 3.5.4.1). The spawning stock size is just below the long-term average, and is predicted to increase in 1988 due to recent good recruitment.

Forecast for 1989: Assuming F(88) = 0.76, Landings(88) = 128,000 t (constrained by TAC).

Option	Basis	F(89)[1]	Predicted SSB(89)	Landings(89) Total	HC	Ind.	Disc.	SSB(90)	Consequences/implications
A	$F_{0.1}$	0.23	492	74	43	31	22	558	Massive reduction in F, large increase in SSB
B	0.6F(87)	0.41		97	67	30	33	524	
C	0.8F(87)	0.55		115	86	29	43	498)	Fall in SSB but still above
D	F(87)	0.69		130	102	28	52	473)	long-term mean

[1]90 mm mesh assumed. Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a slight fall in SSB.

Recommendation: The increase in minimum mesh size to 90 mm in 1989 should result in some reduction in fishing mortality, especially on young fish. No further reduction is immediately required for conservation of the whiting stock itself, but a reduction in line with those recommended for cod and haddock may be desirable to avoid by-catch problems in the mixed gadoid fisheries. The very high level of discarding of 1- and 2-year-old fish should be reduced, preferably by modifications of the fishing gear to reduce the retention of small fish.

3.5.5 Saithe in Sub-area IV and Division IIIa (North Sea)

Source of information: North Sea Roundfish Working Group report, April 1988 (C.M.1988/ Assess:21)

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	127	100	131	160	195	195	<198	156	-	-	-
Agreed TAC	127	125	158	180	200	240	173	165	-	-	-
Actual landings	136	173	173	195	199	167	147	-	202	126	163
Sp. stock biomass	224	188	196	170	153	150	182	297[1]	282	150	209
Recruitment (age 1)	216	348	505	510	165	279	280	283[1]	510	137	273
Mean F(3-6,u)[3]	0.34	0.50	0.52	0.62	0.62	0.63	0.40	-	0.63	0.34	0.50

[1]Predicted or assumed. [2]Over period 1977-1987. [3]Human consumption landings only. Weights in '000 t, recruitment in millions.

Catches: Catches in 1986 and 1987 were considerably less than the agreed TAC (Table 3.5.5).

Data and assessment: Analytical assessment of catch-at-age data using CPUE data. No independent estimates of year-class strength. The interpretation of the data is difficult and uncertain.

Fishing mortality: Has increased in recent years with a shift towards heavy exploitation on fairly young fish. Fishing mortality appears to have decreased in 1987, but there has been no reduction in the effort of the major fleets, so this interpretation is uncertain.

Recruitment: Some information from observers is available, but because of its subjectivity, this was not used. Average recruitment has been assumed for the 1985 and later year classes.

State of stock: The stock has been declining, but it now seems to be recovering (Figure 3.5.5.1). Fishing mortality is close to F_{med} (Figure 3.5.5.2). The assessment is, however, uncertain.

Forecast for 1989: Assuming F(88) = 0.40, Landings(88) = 168,000 t.

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Landings(89)	SSB(90)	
A	0.8F(87)	0.32	301	141	335	
B	F(87)	0.40		170	310	Landings near average; SSB stable at fairly high level.

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to catches near recent average levels with a continued recovery in SSB.

Recommendation: Fishing mortality should not be allowed to increase, corresponding to a TAC for 1989 not exceeding 170,000 t.

Special comments: The present assessment is substantially different from that adopted last year.

The reduction in fishing mortality in 1987 is not supported by the effort data for the major fleets, and F may in reality be higher than estimated in this assessment. It is not possible to resolve this uncertainty at present.

3.6 Cod, Haddock, Whiting, and Saithe in Sub-areas VI and VII

3.6.1 Roundfish in Sub-areas VI and VII: overview

The state of the roundfish stocks west of Scotland is less certain than those in the North Sea, mainly because the levels of biological sampling of the catches are inadequate in certain countries, and there are as yet no fishery-independent indices of recruitment for the area. Data from Scottish research vessel trawl surveys aimed at estimating the abundance of both young and adult fish in this area were presented for the first time. These will become most useful and should be continued.

Levels of exploitation are also quite high in Division VIa, particularly on cod. The cod stock is estimated to be near its historically low level. There are conflicting data on the size of the 1986 year class, and a conservative estimate has been used.

The haddock and whiting stocks in Division VIa are subject to lower and more variable exploitation than the cod and are estimated to be within the range experienced over the last 20 years. There is considerable uncertainty in the recruitment estimates for these stocks.

The haddock stock in Division VIb (Rockall) is of a very variable size, as it is maintained by occasional episodes of good recruitment. Surveys indicate that the 1984-1986 year classes are large, and these should begin to contribute to the fishery in 1988. A catch forecast has been made for this stock for the first time.

Haddock in Divisions VIa and VIb are biologically two distinct stocks. The stock in Division VIa is reasonably well understood, but the Division VIb stock is very variable and has been subject to precautionary TACs. The practice of applying a single TAC to these stocks means that the Division VIa fishery is often unregulated. ACFM repeats its advice that separate TACs should be set for haddock in Divisions VIa and VIb.

In Sub-area VII (excluding Division VIIa), the quantity and quality of the data available for roundfish stocks are not generally good enough to permit the state of the stocks to be determined with much confidence, and catch forecasts of acceptable precision cannot, therefore, be made. In Divisions VIId,e and also in Divisions VIIf,g, the data for cod and whiting are gradually improving. Precautionary TACs are at present in force for Sub-area VII, excluding Division VIIa (together with some other areas). For the future, it would be preferable if TACs were set separately for stocks for which assessments exist, but scientific research aimed at obtaining more information about stock definitions in the area would also be desirable.

3.6.2 Cod in Division VIa (West of Scotland)

Source of information: North Sea Roundfish Working Group report, April 1988 (C.M.1988/ Assess:21).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	9.5	17.5	25.8	23.0	27.0	25.0	22.0	16.0	-	-	-
Agreed TAC[3]	20.0	17.5	27.0	25.0	25.0	25.0	22.0	18.4	-	-	-
Actual landings	24.0	22.0	21.5	20.6	18.5	11.8	19.5	-	24.0	11.8	18.0
Sp. stock biomass	39	37	33	31	25	20	22	24[1]	39	20	28
Recruitment (age 1)	6	15	9	15	6	13	16	13[1]	21	6	14
Mean F(2-5,u)[4]	0.70	0.73	0.80	0.92	0.99	0.73	0.84	-	0.99	0.64	0.78

[1]Predicted or assumed. [2]Over period 1977-1987. [3]TAC is for the whole of Sub-area VI. [4]Human consumption landings only. Weights in '000 t, recruitment in millions.

Catches: Estimated landings in 1987 were 19,456 t (Table 3.6.2), reversing the sharp decline in 1986. Predicted landings for 1988 are close to the TAC.

Data and assessment: Analytical assessment based on catch-at-age data, CPUE data, and research survey data. Preliminary recruit indices available for the first time from Scottish research vessel surveys. Discard data (only available for Scottish fleet) were not used.

Fishing mortality: Shows an increasing trend, although it has declined a little from the peak level in 1985.

Recruitment: The estimate of the size of the 1986 year class is very uncertain. The catch data in 1987 suggest a higher abundance than that adopted and shown in the table above, which is a conservative estimate.

State of stock: The spawning stock is at an historically low level (Figure 3.6.2.1) and is likely to remain at that level in 1989. Fishing mortality is well above F_{med} (~0.5) (Figure 3.6.2.2).

Forecast for 1989: Assuming F(88) = 0.84, Landings(88) = 18,000 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Landings(89)	Predicted SSB(90)	Consequences/implications
A	F_{med}	0.50	25	13	32	Rapid recovery of SSB
B	0.8F(88)	0.67		16	28	Some recovery of SSB
C	F(88)	0.84		18	24	No recovery of SSB

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to SSB remaining near its recent historically low level. The forecast is, however, highly dependent on the uncertain size of the 1986 year class.

Recommendation: Fishing mortality should be reduced towards F_{med} to allow some recovery of the spawning stock, corresponding to a TAC not exceeding 16,000 t in 1989.

3.6.3 Cod in Division VIb (Rockall)

Source of information: North Sea Roundfish Working Group Report, April 1988 (C.M.1988/ Assess:21).

Landings are small (Table 3.6.3) and accommodated by 500 t added to the TAC adopted for cod in Division VIa and applied to the whole of Sub-area VI.

3.6.4 Haddock in Division VIa (West of Scotland)

Source of information: North Sea Roundfish Working Group report, April 1988 (C.M.1988/Assess:21).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC[3]	<15.5	<15.5	<14.4	<27.0	<25.0	-	<23.0	25.0	-	-	-
Agreed TAC[3]	21.5	21.5	45.0	40.0	36.0	34.5	32.0	35.0	-	-	-
Actual landings	18	30	29	30	24	20	27	-	30	13	22
Sp. stock biomass	81	105	90	66	73	69	62	55[1]	105	26	64
Recruitment (age 0)	101	57	481	91	80	143	22	168[1]	549	22	179
Mean F(2-6,u)[4]	0.37	0.43	0.49	0.68	0.61	0.37	0.61	-	0.74	0.37	0.59

[1]Predicted or assumed. [2]Over period 1978-1987. [3]TAC is set for Divisions VIa and VIb combined. [4]Human consumption landings plus discards. Weights in '000 t, recruitment in millions.

Catches: Estimated landings fluctuate and are estimated to be above average in 1987 (Table 3.6.4).

Data and assessment: Analytical assessment of catch-at-age data including discards. CPUE data are used to tune VPA. Recruitment estimates are based on research vessel surveys in the North Sea. The estimate of the 1986 year class is at variance with tuned VPA results.

Fishing mortality: F fluctuates considerably. The present level is close to the average. The reduction in F in 1986 is only partly supported by the effort data.

Recruitment: Extremely fluctuating, generally in correlation with recruitment to North Sea stock, although this relationship may not hold true for the 1986 year class, whose size is still uncertain. The 1987 year class is estimated to be as low as the minimum for the last 20 years. New data which would permit a revised forecast may become available during the year.

State of stock: Spawning stock size is near the average (Figure 3.6.4.1), under moderate to high fishing mortality levels. Exploitation of this stock is effectively uncontrolled because of the combined TAC for Divisions VIa and VIb.

Forecast for 1989: Assuming F(88) = 0.61, Landings(88) = 21,000 t.

Option	Basis	F(89)	Predicted						Consequences/implications
			SSB(89)	Landings(89)			Disc.	SSB(90)	
				Total	HC	Ind.			
A	0.6F(87)	0.37	41	12	12	0	7	42	
B	0.8F(87)	0.49		15	15	0	9	37	
C	F(87)	0.61		18	18	0	10	32	Reduction in landings and considerable reduction in SSB.

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to reduced catches and SSB (Figure 3.6.4.2) because of the weak 1987 year class. The prediction is strongly dependent on the sizes of the 1986 and 1987 year classes, which are still uncertain.

Recommendation: Fishing mortality should be reduced to ameliorate the sharp reduction in spawning stock size, corresponding to a TAC for Division VIa for 1989 not exceeding 15,000 t. Separate TACs should be set for Divisions VIa and VIb.

3.6.5 Haddock in Division VIb (Rockall)

Source of information: North Sea Roundfish Working Group report, April 1988 (C.M.1988/Assess:21).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	6.0	6.0	30.0	20.0	8.0	5.0	10.0	10.0	-	-	-
Agreed TAC	← Included in Sub-area VI combined TAC →										
Actual landings	9.1	3.9	0.4	2.6	9.3	4.7	7.3	-	9.3	0.4	5.1
Recruitment (age 1)[2]	0.8	1.6	0.2	+	4.4	0.9	2.7	-	-	-	-

[1]Over period 1978-1987. [2]Relative values - from R/V survey data. Weights in '000 t.

Catches: Increased again in 1987, being somewhat above the average level (Table 3.6.5). The catches of this stock fluctuate strongly, following occasional good recruitment.

Data and assessment: Catch-at-age data for 1985-1987 and research vessel data for 1979-1987 are used in a multiplicative model to provide parameters for an approximate forecast.

Fishing mortality: Total mortality (ages 2+) is estimated to be about 1.0.

Recruitment: Is highly variable. The 1984 and 1986 year classes are well above average.

State of stock: The stock size is increasing because of several strong year classes.

Forecast for 1989: Assuming F(88) = F(87), Catch(88) = 16,000 t.

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Catch(89)	SSB(90)	
A	F(87)			18		

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to increased catches as a result of good recruitment.

Recommendation: The precautionary TAC could be increased to 18,000 t for 1989 to allow the development of a fishery on recent good year classes, provided it is set for Division VIb only.

Special comments: ACFM repeats its advice that separate TACs should be set for Divisions VIa and VIb. If a high combined TAC were set to allow high catches in Division VIb, but the catch was in fact taken in Division VIa, severe excessive mortality would be generated on the Division VIa stock.

3.6.6 Whiting in Division VIa (West of Scotland)

Source of information: North Sea Roundfish Working Group report, April 1988 (C.M.1988/ Assess:21).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC[3]	14.0	13.0	8.2	6.4	12.0	13.0	15.0	15.0	-	-	-
Agreed TAC[3]	16.4	13.0	16.0	16.4	16.4	16.4	16.4	16.4	-	-	-
Actual landings	12	14	16	16	13	8	10	-	17	8	13
Sp. stock biomass	52	45	37	28	23	21	22	31[1]	52	21	32
Recruitment (age 1)	40	35	44	69	62	49	94	76[1]	192	35	78
Mean F(2-4,u)[4]	0.37	0.36	0.53	0.78	0.94	0.63	0.62	-	0.94	0.36	0.61

[1]Predicted or assumed. [2]Over period 1978-1987. [3]TAC is set for Divisions VIa and VIb combined. [4]Human consumption landings only. Weights in '000 t, recruitment in millions.

Catches: Landings have declined recently. The 1986 landings are the lowest on record, and the 1987 landings are much less than the TAC and the predicted level (Table 3.6.6).

Data and assessment: Analytical assessment of catch-at-age data, excluding discards. CPUE data and recruit indices used, but data are not entirely reliable.

Fishing mortality: Fluctuates considerably. The current level is close to the mean.

Recruitment: Is estimated by correlating with the North Sea. Recent year classes have been near average. Recruitment in 1987 was, however, higher than in the previous 6 years and above the average for the period 1978-1987.

State of stock: The stock size is near average (Figure 3.6.6.1) and the present level of exploitation is not very high.

Forecast for 1989: Assuming F(88) = 0.62, Catch(88) = 12,000 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	0.8F(87)	0.50	31	11	36	
B	F(87)	0.62		13	33	Maintenance of recent average catch & SSB

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to maintenance of catch and SSB near recent average levels (Figure 3.6.6.2).

Recommendation: Fishing mortality should not be allowed to increase, corresponding to a TAC in 1989 not exceeding 13,000 t.

3.6.7 Whiting in Division VIb (Rockall)

Source of information: North Sea Roundfish Working Group report, April 1988 (C.M.1988/ Assess:21).

Landings of whiting from Division VIb are negligible (Table 3.6.7).

3.6.8 Saithe in Sub-area VI (West of Scotland and Rockall)

Source of information: North Sea Roundfish Working Group report, April 1988 (C.M.1988/ Assess:21).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	27	25	23	27	26	20	23	35	-	-	-
Agreed TAC	27.0	25.0	23.0	27.0	27.8	27.8	27.8	35.0	-	-	-
Actual landings	24	24	29	22	27	42	31	-	42	22	27
Sp. stock biomass	143	142	130	123	128	114	112	107[1]	213	112	149
Recruitment (age 1)	35	43	43	50	12	33[1]	33[1]	33[1]	50	12	33
Mean F(3-6,u)	0.21	0.24	0.25	0.19	0.23	0.42	0.41	-	0.42	0.19	0.27

[1]Predicted or assumed. [2]Over period 1977-1987. Weights in '000 t, recruitment in millions.

Catches: The estimated landings in both 1986 and 1987 were higher than the nominal landings, but the landings in 1987 close to the TAC (Table 3.6.8).

Data and assessment: Analytical assessment of catch-at-age data using CPUE data. No independent estimates of year-class strength. Interpretation of data difficult, and the assessment is uncertain.

Fishing mortality: Increased sharply in 1986 and has remained at that level in 1987. Current levels are well above F_{high} (0.3).

Recruitment: No independent estimates are available, but recruitment seems to have been insufficient to maintain the stock during the last decade.

State of stock: The stock has been declining since 1975 and is predicted to decline further (Figures 3.6.8.1 and 3.6.8.2).

Forecast for 1989: Assuming F(88) = 0.41, Catch(88) = 32,000 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	0.6F(87)	0.24	88	20	88	Decline in SSB halted
B	0.8F(87)	0.33		25	83	
C	F(87)	0.41		31	79	Continued decline in SSB

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to continuing high catches with SSB falling to an historically low level.

Recommendation: Fishing mortality should be reduced to a level which should be sustainable (i.e., less than 0.3). If this is to be achieved in 1989, it would imply a TAC not exceeding 20,000 t for 1989.

3.6.9 Cod in Divisions VIId,e (English Channel)

3.6.9.1 Advice from the May 1988 ACFM meeting

Source of information: North Sea Roundfish Working Group report, April 1988 (C.M.1988/ Assess:21).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	←— Precautionary TAC for Sub-area VII excluding Division VIIa —→										
Actual landings	5.3	4.2	4.4	3.7	4.0	6.9	9.0	-	11.3	3.7	6.6
Sp. stock biomass	2	2	2	1	1	2	2	1[1]	3	1	2
Recruitment (age 1)	3	5	5	6	10	13	13	8[1]	16	3	8
Mean F(2-4,u)[3]	1.22	0.89	1.41	0.96	0.39	2.37	1.13	-	2.37	0.39	1.15

[1]Predicted or assumed. [2]Over period 1977-1987. [3]Human consumption only. Weights in '000 t, recruitment in millions.

Catches: Estimated landings in 1987 were 8,987 t. The landings have increased sharply since 1985 (Table 3.6.9).

Data and assessment: Catch-at-age data for 1986 revised. No CPUE or survey data available. A full analytical assessment was performed for the first time, but its reliability is uncertain due to the poor quality of the basic data. Effort data are lacking, and VPA was tuned against mean Fs. Data on maturity are lacking, and estimates of spawning stock are provisional.

Fishing mortality: Shows strong annual fluctuations, probably due to the poor quality of the catch-at-age data. The overall level appears to be high.

Recruitment: The 1975 and 1976 year classes were strong and recruitment appears to have increased to similar levels in the past 3 years. The sizes of the most recent year classes are, however, very uncertain.

State of stock: Total biomass appears to have increased in recent years (Figure 3.6.9). Spawning stock will increase if recent year classes are as large as presently estimated.

Forecast for 1988 and 1989: The assessment is very uncertain, but present estimates imply that continued fishing at current levels of fishing mortality will lead to continuing high catches. Provided recent year classes really are as strong as assumed, spawning stock biomass should increase.

Recommendation: The precautionary TAC for 1988 (22,000 for Sub-area VII excluding Division VIIa) could be revised if further analysis of available data confirms the very large size of the most recent year classes. ACFM will give advice for 1989 in November, taking account of any new data and analysis carried out during 1988.

Special comments: In 1987, ACFM was unable to offer any advice because the catch-at-age data for 1986 were withdrawn. Catches have been very high in 1986 and 1987 either because of misreporting, increased effort or good recruitment.

The data for 1986 have been revised, and data for 1987 are now available. Re-analysis indicates that fishing mortality dropped in 1985 and increased sharply to an almost incredibly high level in 1986. These conclusions assume that F in 1987 was near the average level of about 1.0, but are not very sensitive to that assumption. In addition, it appears that the sizes of the 1984 and 1985 year classes are large, and that of 1986 may be even larger. No independent recruit index data are available to confirm this interpretation. A catch forecast based on this analysis indicates that catches in 1988 and 1989 are likely to remain around 10,000 t at constant effort.

The new analysis, however, also confirms that the data are of poor quality, and shows that there is little correlation of year-class strengths with those for the North Sea. There is, therefore, great difficulty in making a reasonable forecast until midway through the current year.

Since the meeting of the Working Group, further analyses of the same data (using separable VPA and a multiplicative model) have broadly confirmed this interpretation of the data, but reinforced the suspicion that the 1986 year class may be very strong indeed. This is also consistent with preliminary analysis of CPUE data for the first quarter of 1988, which shows very high catch rates.

Further analysis of the data is in progress.

3.6.9.2 Cod in Divisions VIId,e (English Channel): Advice from the November 1988 ACFM meeting

Source of information: North Sea Roundfish Working Group report, April 1988 (C.M.1988/ Assess:21) and additional information.

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	←— Precautionary TAC for Sub-area VII excluding Division VIIa —→										
Actual landings	5.3	4.2	4.4	3.7	4.0	13.6	16.7	-	16.7	3.7	7.6

[1]Over period 1977-1987. Weights in '000 t.

Catches: Estimated landings in 1987 were 8,987 t. The landings have increased sharply since 1985 (Table 3.6.9).

Data and assessment: Catch-at-age data for 1986 revised. No CPUE or survey data available. A full analytical assessment was performed for the first time, but is unreliable due to the poor quality of the basic data. Effort data are lacking, and VPA was tuned against mean Fs. Data on maturity are lacking, and estimates of spawning stock are provisional.

Fishing mortality: Shows strong annual fluctuations, probably due to the poor quality of the catch-at-age data. The overall level appears to be high.

Recruitment: The 1975 and 1976 year classes were strong and recruitment appears to have increased to similar levels in the past 3 years. The sizes of the most recent year classes are, however, very uncertain.

State of stock: Total biomass appears to have increased in recent years (Figure 3.6.9).

Forecast for 1989: Assuming landings(88) = 13,000 t.

Option	Basis	F(89)	Predicted landings (89)	Consequences/implications
A	SHOT	F(88)	10	Decline in catch and SSB towards average levels

Recommendation: Even under the most optimistic interpretation of the data, catches are likely to decline in 1989 as recent apparently good year classes disappear from the fishery. Fishing mortality should not be allowed to rise, corresponding to a TAC for Divisions VIId,e for 1989 not exceeding 10,000 t.

Special comments: Data for 1986 and 1987 have been subject to further revisions, but still exhibit internal inconsistencies. Catches were at a very high level in 1986, 1987, and 1988 either because of misreporting, increased effort, migration of fish from the North Sea, or good recruitment. The true cause cannot be determined from the data available.

Revised French catch data for 1987 and data for English, French, and Belgian catches and effort in the first part of 1988 were submitted to STCF in September and analyzed by them [Report of 14th Meeting, SEC(88) 1321, Appendix 2]. Further revisions of the catch data were also available to ACFM.

Catches in 1988 were expected to be about 11,000 t, but an increase in the TAC for 1988 was recently agreed, and will probably be taken, resulting in catches of about 13,000 t.

The 1987 year class may be as strong as those of 1985 and 1986. A SHOT forecast was prepared which assumes that all the recent increased catches are due to excellent recruitment. This implies recruitment in 1986 and 1987 of 4 times the recent average, which is not impossible since such levels seem to have occurred in the late 1970s when high catches also occurred.

On the basis of this most optimistic possible interpretation of the data, and assuming a further very high recruitment in 1988, the SHOT forecast implies a reduction in the yield/biomass ratio by about 20% in 1988. If the same level of exploitation is maintained in 1989, the forecast catch is about 10,000 t. The reduction from the 1986 to the 1988 level occurs because the strong year classes have passed through the fishery, and recruitment from the 1988 year class is taken to be normal.

3.6.10 Whiting in Divisions VIId,e (English Channel)

Source of information: North Sea Roundfish Working Group report, April 1988 (C.M.1988/Assess:21).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	Precautionary TAC for Sub-area VII excluding Division VIIa										
Actual landings	10.1	9.4	7.4	8.1	7.3	7.5	8.4	-	10.1	7.3	8.5
Sp. stock biomass	19.0	15.0	15.0	17.0	22.0	17.0	16.0	12.0[1]	22.0	10.0	17.7
Recruitment (age 0)	67	80	108	24	45	40	57	64[1]	108	24	70
Mean F(2-4,u)[3]	1.12	0.95	0.75	0.82	0.50	0.45	0.80	-	1.12	0.45	0.90

[1]Predicted or assumed. [2]Over period 1978-1987. [3]Human consumption landings only. Weights in '000 t, recruitment in millions.

Catches: Estimated landings have been fairly stable (Table 3.6.10).

Data and assessment: Analytic assessment of catch-at-age data. Sampling levels are very variable, and some uncertainties remain in the data base. Reliability of the assessment should be regarded with some caution.

Fishing mortality: High and variable, without showing any trend.

Recruitment: No independent estimates available. Recruitment variable without trend. Catch-at-age data suggest a very strong 1983 year class and a poor one in 1984.

State of stock: Fluctuating. Total biomass is currently at a low level, and SSB is a little below average (Figure 3.6.10.1).

Forecast for 1989: Assuming F(88) = 0.80, Catch(88) = 6,000 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	0.8F(87)	0.64	13	5	16	
B	F(87)	0.80		6	15	

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a decrease in the landings and maintain SSB at its current level (Figure 3.6.10.2).

Recommendation: A precautionary TAC should be set on the basis of recent catch levels.

3.6.11 Other stocks in Sub-area VII

Source of information: North Sea Roundfish Working Group report, April 1988 (C.M.1988/ Assess:21).

For roundfish in the following areas, sufficient data from biological sampling of the catches are not available for any useful assessment of the state of the stocks to be carried out at present. TACs can only be based on the nominal catch data given in the tables listed.

Species	Area	Table
Cod	VIIb,c,h-k	3.6.11.1
Haddock	VIId,e	3.6.11.2
Haddock	VIIb,c,g-k	3.6.11.3
Whiting	VIIb,c,h-k	3.6.11.4
Saithe	VII (all divisions)	3.6.11.5

3.6.12 Management units for cod and whiting in Sub-area VII

The management units for cod and whiting in Sub-area VII are not entirely consistent with the areas for which assessments are possible. Ideally, TACs should be set for the same areas as the assessments (which are constrained by the availability of biological samples, etc.). However, at present, the assessments, which are carried out for Divisions VIId,e and Divisions VIIf,g, are not very reliable, and it is not certain that this grouping of divisions is the most appropriate in the light of the information on stock separation in the area. It is possible that it would be better to group Division VIIe with Divisions VIIf,g, and treat Division VIId either separately or in conjunction with the North Sea. No firm recommendation is possible at present, but the matter should be kept under review.

3.7 Irish Sea/Bristol Channel and Celtic Sea Stocks

Assessment and management areas

The report of the Irish Sea and Bristol Channel Working Group contains a review of the validity of the current assessment and management areas.

For Irish Sea (Division VIIa) and Celtic Sea (Divisions VIIf,g) whiting, plaice, and sole, there is no good reason to modify the assessment areas presently used, either on biological grounds or on the basis of the distribution of stocks and fisheries. For cod, there is no evidence of a strong association between the populations in both the Irish and Celtic Seas and those in other areas. There is, however, good evidence of a close relationship between cod in the Irish and Celtic Seas, and these areas could be combined for assessment purposes, although this was not done in this year's assessment.

All four species are exploited in mixed-species fisheries in both the Irish and Celtic Seas and so ACFM believes that management areas should be consistent for all species, and that these two areas should be Division VIIa and Divisions VIIf,g. This is currently the situation for plaice and sole, but for cod and whiting, Divisions VIIf,g are combined with other areas, most of which are not subject to assessments. If in the future Irish and Celtic Sea cod are combined for assessment, ACFM would still provide separate advice for the two management areas.

Consistency of advice

Cod, whiting, plaice, and sole are exploited in the Irish and Celtic Seas almost entirely in mixed-species fisheries, and so it is necessary to make the advice for the various stocks consistent if discarding of marketable fish is to be kept to a minimum. The Working Group provided plots for the four Irish Sea stocks showing the effects on catches of varying fishing mortality separately in the beam trawl and otter trawl fleets. The advice for 1989 for Irish Sea whiting, plaice, and sole will be consistent only if fishing mortality is reduced in both fleets. For cod, the TAC advice depends on whether the aim for management is to benefit the Nephrops stock or protect the cod stock. A restrictive TAC for cod would have implications for whiting and, to a lesser extent, plaice as all constitute considerable proportions of otter trawl catches.

For Celtic Sea plaice, the consequences resulting from the mixed fishery are discussed under Special comments.

3.7.1 Irish Sea cod

Source of information: Irish Sea and Bristol Channel Working Group report, September 1988 (C.M.1989/Assess:2).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	13.0	12.5	10.0	10.4	8.8	10.7	10.3	10.1	-	-	-
Agreed TAC	13.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	-	-	-
Reported landings	14.9	13.3	10.3	8.6	11.1	10.1	12.0	-	-	-	-
Unallocated	+	+	-0.3	-0.3	-0.6	-0.3	0.8	-	-	-	-
Landings used by WG	14.9	13.3	10.0	8.4	10.5	9.9	12.7	-	14.9	6.3	10.0
Sp. stock biomass	9.8	10.0	8.4	6.3	6.1	5.7	6.2	6.4[1]	10.2	5.7	7.6
Recruitment (age 1)	6.5	2.9	4.3	6.4	6.6	4.9	10.6	6.5[1]	12.3	2.7	5.7[3]
Mean F(1-6,u)	0.68	0.82	0.74	0.73	0.78	0.81	0.86	-	0.86	0.50	0.68

[1]Predicted or assumed. [2]Over period 1970-1987. [3]GM value. Weights in '000 t, recruitment in millions. +Less than 100 t.

Catches: Landings in 1987 were 28% higher than in 1986 (Table 3.7.1), which in turn were about average.

Data and assessment: Analytical assessment using catch-at-age data, tuned with Northern Ireland and England/Wales CPUE data.

Fishing mortality: Increasing trend since 1984 (Figure 3.7.1).

Recruitment: Surveys indicate the 1986 year class to be strong and 1987 to be above average; 1988 year class assumed average. No evidence of low recruitment at low SSB.

State of stock: Spawning stock biomass in 1988 is still below average, having increased from an all-time low level in 1986 due to good recruitment.

Forecast for 1989: Assuming F(88) = 0.85, Catch(88) = 14,650 t.

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Catch(89)	SSB(90)	
A	F_{max}	0.27	10.9	5.6	17.9	Large increases in SSB, catches reduced
B	F_{med}	0.77	8.2	12.5	8.0	Increase in SSB, catch about 1987 level
C	F(87)	0.85	7.8	13.4	7.0	Small decrease in SSB; above-average catch in 1989

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to no major change in SSB in 1990.

Recommendation: Fishing mortality appears to have been increasing since 1984, should not be allowed to increase further, and from the point of view of the cod stock should be reduced. However, a substantial increase in cod biomass would have an adverse effect on the Nephrops stock.

Special comments: The provision of new CPUE data for Northern Ireland, which takes a major share of the catch, allows more confidence to be placed in this year's assessment. Effort data should be provided by Ireland (which takes the largest proportion of the international catch) to further improve the assessment.

3.7.2 Irish Sea whiting

Source of information: Irish Sea and Bristol Channel Working Group report, September 1988 (C.M.1989/Assess:2).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	12.0	10.0	12.0	10.0	13.4	16.0	16.0	12.0	-	-	-
Agreed TAC	-	18.2	18.2	18.2	18.2	18.2	18.2	18.2	-	-	-
Reported landings	17.0	17.0	10.8	12.5	16.8	10.0	12.4	-	-	-	-
Unallocated	-	0.2	-0.3	-1.0	-0.8	0.1	-1.8	-	-	-	-
Landings used by WG	17.0	17.2	10.5	11.6	16.0	10.1	10.6	-	17.2	10.1	13.2
Discards from *Nephrops* fishery	3.6	0.9	1.8	3.7	2.3	2.3	4.4	-	4.4	0.9	2.8
Sp. stock biomass	17.3	14.3	9.0	8.1	10.4	6.7[1]	6.1[1]	6.1[1]	17.3	6.1	10.6
Recruitment (age 0)	63	67	183	131	105	149[1]	233[1]	104[1]	233	63	104[3]
Mean F(2-6,u)	0.95	1.19	1.10	1.17	1.28	1.45	1.53	-	1.53	0.85	1.79

[1]Predicted or assumed. [2]Over period 1980-1987. [3]GM value. Weights in '000 t, recruitment in millions.

Catches: Catches have been below average since 1985 (Table 3.7.2). Discards in 1987 were the highest on record and correspond to a very strong 1987 year class.

Data and assessment: Previous assessments have always been doubtful. The most recent analytical assessment was catch-at-age data and is tuned using CPUE data for two fleets, England/Wales otter trawl and new Northern Ireland trawl series. Recruit indices are used to predict recruitment.

Fishing mortality: The present assessment indicates that fishing mortality has risen since 1983, and is very high ($F > F_{high}$).

Recruitment: The 1985 year class is average, the 1986 year class above average, and the 1987 year class appears to be very strong, but its estimation is uncertain.

State of stock: The spawning stock is at the lowest level observed in the short time series available (Figure 3.7.2).

Forecast for 1989: Assuming F(88) = 1.53, Catch(88) = 11,500 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	$F_{0.1}$	0.20	13	2	19	Large increase in SSB
B	F_{med}	0.70	11	7	12	Stabilize SSB, slightly above average
C	F_{high}	1.25	10	11	7	Further reduce SSB
D	F(87)	1.56	9	13	6	Further reduce SSB

Weights in '000 t.

Continued fishing at the very high current level of fishing mortality will lead to further depletion of the spawning stock in 1989, assuming GM recruitment after 1987. However, 65% of the predicted 1989 catch is comprised of the 1987 year class, and its size is uncertain.

Recommendation: Fishing mortality has risen each year since 1983, is now about twice F_{med} and higher than F_{high}, and should be reduced to below F_{high}. However, the most effective management strategy for whiting would be to enforce the 70 mm minimum mesh size regulation.

Special comments: The provision of effort data for Northern Ireland for this year's assessment should mean that this assessment is more reliable than previous ones. The assessment of this stock is still hampered by the absence of effort data for the Irish fleet.

3.7.3 Irish Sea plaice

Source of information: Irish Sea and Bristol Channel Working Group report, September 1988 (C.M.1989/Assess:2).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	4.0	3.0	3.5	3.1	4.0	5.0	5.0	4.8	-	-	-
Agreed TAC	-	4.5	4.5	4.5	5.0	5.0	5.0	5.0	-	-	-
Reported landings	3.9	3.2	3.7	4.2	6.1	4.6	5.6	-	-	-	-
Unallocated	-	+	+	+	-1.0	+	0.3	-	-	-	-
Discards	-	-	-	-	-	0.3	0.3	-	-	-	-
Catch used by WG	3.9	3.2	3.6	4.2	5.1	4.8	6.2	-	6.2	2.9	4.1
Sp. stock biomass	5.7	5.5	4.7	5.5	6.6	7.5	7.1	6.3[1]	10.4	3.4	6.9
Recruitment (age 1)	8.3	22.0	21.2	24.5	14.5	26.1	30.3	24.8[1]	34.1	8.3	16.7[3]
Mean F(3-12,u)	0.44	0.40	0.49	0.43	0.46	0.50	0.58	-	0.69	0.26	0.47

[1]Predicted or assumed. [2]Over period 1964-1987. [3]GM value. Weights in '000 t, recruitment in millions. +Less than 100 t.

Catches: Have increased in recent years following good recruitment (Table 3.7.3). Catch in 1987 was 29% above 1986. The 10% by-catch restriction estimated to have resulted in 270 t discards (marketable fish) in 1987.

Data and assessment: Analytical assessment using catch at age from 1964-1987, and catch and effort data for tuning for 1976-1987.

Fishing mortality: Rising, 16% higher in 1987 than in 1986 (Figure 3.7.3).

Recruitment: The 1981, 1982, 1983, 1985, and 1986 year classes are all above average; 1987 also appears to be good. The 1986 and 1987 year classes are expected to account for about 45% and 18%, respectively, of the 1989 catch.

State of stock: SSB is currently just under the long-term average, and will decline at the present level of fishing mortality if recruitment returns to average levels.

Forecast for 1989: Assuming F(88) = 0.58, Catch(88) = 6,700 t.

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Catch(89)	SSB(90)	
A	F_{max}	0.22	7.1	3.3	9.7	Sharp reduction in catch and effort
B	F_{med}	0.38	6.9	4.6	8.4	32% reduction in catch
C	0.8F(87)	0.47	6.7	5.8	7.2	Slowly increasing SSB
D	F(87)	0.58	6.5	6.8	6.3	Decline in SSB

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to decline in SSB, severity governed by recruitment.

Recommendation: F should not be allowed to increase further. The Y/SSB ratio will exceed 1.0, for the first time, in 1988. F is close to F_{high}, and preferably should be reduced towards the level which pertained up to 1985. Fishing mortality should be reduced by 20% in 1989 corresponding to a catch in 1989 of 5,800 t.

3.7.4 Irish Sea sole

Source of information: Irish Sea and Bristol Channel Working Group report, September 1988 (C.M.1989/Assess:2).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	1.8	1.6	0.7	1.0	1.1	1.65	1.9	1.6	-	-	-
Agreed TAC	-	0.6	1.4	1.25	1.25	1.9	2.1	1.75	-	-	-
Reported landings	1.7	1.3	1.3	1.0	1.7	1.9	1.9	-	-	-	-
Unallocated	+	+	-0.1	+	-0.5	0.1	0.9	-	-	-	-
Catch used by WG	1.7	1.3	1.2	1.1	1.1	2.0	2.8	-	2.0	1.1	1.5
Sp. stock biomass	4.9	4.2	3.5	3.5	5.0	6.3	5.9	4.8[1]	7.3	3.5	5.3
Recruitment (age 2)	4.3	2.8	7.2	16.3	16.2	9.3[4]	6.5[4]	6.5[1]	16.3	2.8	7.5[3]
Mean F(2-14,u)	0.45	0.29	0.34	0.24	0.24	0.40	0.52	-	0.52	0.24	0.33

[1]Predicted or assumed. [2]Over period 1970-1987. [3]GM value 1970-1985. [4]Revised by ACFM but no significant effect on forecast. +Less than 100 t. Weights in '000 t, recruitment in millions.

Catches: Large increase in 1988; TAC exceeded by about 30% (Table 3.7.4).

Data and assessment: Age-based, tuned with CPUE from two fleets (Belgium beam and UK trawl). Age composition available for only 57% of catch.

Fishing mortality: Major increases in 1986 (+70%) and 1987 [+30% on F(86)], due to exceeding TAC.

Recruitment: 1982-1984 year classes are good, 1985 somewhat below average.

State of stock: Despite large increases in F, present SSB is near average due to three very good year classes (Figure 3.7.4). However, continued fishing mortality at the 1987 level in 1989 and 1990 would result in a historically low SSB of <3,500 t in 1991.

Forecast for 1989: Assuming F(88) = 0.42, Catch(88) = 1,750 t (TAC).

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	F_{max},F_{med}	0.27	4.3	1.10	4.5	Higher catch rates and greater stability
B	0.8F(87)	0.42	4.2	1.48	4.0	
C	F(87)	0.52	4.2	1.77	3.7	Decline to near historical low SSB

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead in decline in SSB to near historical low levels, assuming average recruitment.

Recommendation: Move slowly back towards F_{max} by reducing fishing mortality from the high levels of 1986 and 1987, corresponding to a TAC of less than 1,480 t in 1989. This would maintain the SSB at over 4,000 t in 1990.

3.7.5 Celtic Sea cod

Source of information: Irish Sea and Bristol Channel Working Group report, September 1988 (C.M.1989/(Assess:2).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	3.5	3.5	3.5	<3.7	<7.0	5-6	<6.4	7.0	-	-	-
Agreed TAC		TAC covers Sub-areas VII (except Division VIIa) and VIII									
Actual landings	8.2	6.6	5.3	5.6	6.2	8.0	7.4	-	8.2	2.1	4.8
Sp. stock biomass	4.3	6.9	6.4	4.1	7.3	9.2	7.4	7.0[1]	9.2	3.0	5.4
Recruitment (age 1)	2.27	0.83	3.52	3.95	2.52	2.12	5.78	2.87[1]	5.78	0.41	2.47[3]
Mean F(2-7,u)	0.94	0.75	0.71	0.60	0.54	0.80	0.66	-	0.94	0.36	0.63

[1]Predicted or assumed. [2]Over period 1971-1987. [3]GM (1978-1986). Weights in '000 t, recruitment in millions.

Catches: Landings in 1987 were slightly down from the previous year, which in turn was close to the highest on record (Table 3.7.5). France accounts for 86% of landings. Effort declined slightly compared to 1986. The 1986 year class appears very strong in 1987 and 1988 catches.

Data and assessment: Analytical assessment using catch-at-age data and tuned for the first time using CPUE data for Lorient gadoid trawlers.

Fishing mortality: Fishing mortality in 1987 was at about the long-term average level (Figure 3.7.5). Tuning indicates that recent fishing mortalities are higher than assumed in previous assessments.

Recruitment: For the first time, recruitment was estimated using recruit indices from the Irish Sea. The analysis confirms the existence of a very strong 1986 year class.

State of stock: SSB in 1989 will be at the highest level in the series as a result of the strong 1982, 1983, and 1986 year classes.

Forecast for 1989: Assuming F(88) = 0.66, Catch(88) = 8,300 t.

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Catch(89)	SSB(90)	
A	F_{max}	0.28	12.1	4.1	16.7	Small catches; very large increase in SSB
B	F(87)	0.66	11.2	8.6	10.4	Historically high catch; no major change in SSB
C	F_{med}	0.81	10.9	9.8	8.9	Very high catch; decline in SSB

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to no major change in spawning stock biomass between 1989 and 1990.

Recommendation: A TAC should be set for Divisions VIIf and VIIg combined. Fishing mortality should not be allowed to rise, corresponding to a TAC in 1989 of 8,600 t for Divisions VIIf,g. A precautionary TAC based on recent catch levels should be set for other parts of Sub-areas VII and VIII except Divisions VIIa,d,e.

3.7.6 Celtic Sea whiting

Source of information: Irish Sea and Bristol Channel Working Group report, September 1988 C.M.1989/Assess:2).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	-	-	6.5	-	-	8-10	7.1	7.0	-	-	-
Agreed TAC		TAC covers Sub-areas VII (except Division VIIa)									
Actual landings	8.5	7.5	8.5	7.2	7.3	6.6	8.5	-	8.5	6.6	7.6
Sp. stock biomass	-	-	8.2	8.3	8.9	9.5	9.5	9.8[1]	9.5	8.2	8.9
Recruitment (age 1)	-	-	27.5	23.0	25.2	30.3	30.3	26.4[1]	30.3	23.0	27.3[3]
Mean F(2-7,u)	-	-	1.7	1.3	1.2	1.2	1.3	-	1.7	1.2	1.4

[1]Predicted or assumed. [2]Over period 1983-1987. [3]GM 1983-1986. Weights in '000 t, recruitment in millions.

Catches: Catches in 1987 were at the highest level recorded in the series since 1976 (Table 3.7.6). France accounts for 93% of the landings.

Data and assessment: A preliminary analytical assessment was run with five years of catch-at-age data. VPA tuned with CPUE data for Lorient gadoid fleet.

Fishing mortality: Very high, but not very variable from year to year.

Recruitment: Catch data indicate a strong 1986 year class. No recruit indices are available.

State of stock: SSB has not varied much during the last five years (Figure 3.7.6). CPUE data also showed little variation over the same period.

Forecast for 1989: Assuming F(88) = 1.26, Catch(88) = 8,200 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	F_{max}	0.43	10.6	3.6	15.2	Large increase in SSB
B	F(87)	1.26	9.3	7.9	9.0	SSB stable
C	F_{med}	1.45	9.0	8.6	8.0	Small decline in SSB

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to no major change in SSB.

Recommendation: ACFM recommends a TAC for Divisions VIIf,g of about 7,900 t for 1989. A precautionary TAC based on recent catch levels should be set separately for other parts of Sub-area VII except Divisions VIIa,d,e.

3.7.7 Celtic Sea plaice

Source of information: Irish Sea and Bristol Channel Working Group report, September 1988 (C.M.1989/Assess:2).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	1.4	1.2	1.0	1.2	1.3	1.6	-	-	-	-	-
Agreed TAC	-	1.45	1.2	1.2	1.8	1.8	1.8	2.5	-	-	-
Reported landings	1.4	1.3	1.2	1.3	1.4	1.5	1.3	-	-	-	-
Unallocated	-	-	-	+	0.4	0.2	-	-	-	-	-
Catch used by WG	1.4	1.3	1.2	1.2	1.8	1.7	1.3	-	1.8	0.8	1.2
Sp. stock biomass[3]	2.7	2.8	2.3	2.1	3.1	3.3	3.2	3.3[1]	3.3	1.4	2.4
Recruitment (age 1)	2.2	3.2	7.7	8.5	6.8	5.1[1]	5.1[1]	5.1[1]	8.5	2.2	5.1[4]
Mean F(3-12,u)	0.49	0.80	0.49	0.71	0.48	0.60	0.53	-	0.80	0.46	0.55

[1]Predicted or assumed. [2]Over period 1977-1987. [3]Uncorrected for SOP. [4]GM 1977-1987. +Less than 100 t. Weights in '000 t, recruitment in millions.

Catches: Have fallen to 78% of the 1986 value, but have been around this level since 1980 (Table 3.7.7). Expected to rise with current levels of F.

Data and assessment: Analytical assessment with both England and Wales and Belgian catch and effort data. Sampling levels are less than those required for reliable assessment. First analytical assessment for some years.

Fishing mortality: Appears variable, but probably has more to do with the averaging procedure (Figure 3.7.7). Seems to be just below Irish Sea plaice level.

Recruitment: Short time series, but recent recruitment seems to be slightly above average.

State of stock: SSB increasing, but will gradually decline at F(87) level.

Forecast for 1989: Assuming F(88) = 0.54, Catch(88) = 1,900 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	F_{max}	0.22	2.8	0.7	3.5	Increase in SSB
B	0.6F(87)	0.32	2.7	1.0	3.1	Small increase in SSB
C	0.8F(87)	0.43	2.6	1.3	2.7	SSB unchanged
D	F(87)	0.54	2.6	1.5	2.4	SSB unchanged

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to slowly declining SSB assuming GM recruitment. No independence recruit estimates, so difficult to forecast which way SSB will go.

Recommendation: There is virtually no directed fishery for plaice in the Celtic Sea and fishing mortality is, therefore, determined mainly by the TACs on other species. If a TAC is to be set for Celtic Sea plaice, ACFM recommends that it should not be at a level which restricts fishing on other species in the Celtic Sea.

Special comments: In 1987, despite the fact that the TAC exceeded overall catches by about 40%, some national by-catch restrictions had to be implemented to limit landings. About 65% of the 1987 catch was taken by beam trawlers which mainly direct their effort on sole. The recommended fishing mortality for sole in 1989 is 20% less than the 1987 level and this would be likely to result in a reduction in fishing mortality for plaice (but by somewhat less than 20% assuming otter trawl effort remains unchanged). If discarding is to be avoided it would be advisable to set the 1989 TAC at least 40% above predicted landings, implying a TAC of about 2,000 t.

3.7.8 Celtic Sea sole

Source of information: Irish Sea and Bristol Channel Working Group report, September 1988 (C.M.1989/Assess:2).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	1.4	1.3	0.7	1.1	≤1.2	-	-	0.9	-	-	-
Agreed TAC	-	1.6	1.4	1.2	1.2	1.5	1.6	1.1	-	-	-
Actual landings	1.21	1.13	1.37	1.27	1.33	1.60	1.22	-	1.86	0.78	1.23
Sp. stock biomass	3.32	3.36	3.21	2.99	3.12	3.06	2.88	2.69[1]	5.21	2.88	3.76
Recruitment (age 2)	4.60	4.81	4.84	6.34	4.58	4.82	4.63	4.42[1]	8.26	2.83	4.42[3]
Mean F(3-9,u)	0.33	0.31	0.36	0.34	0.40	0.49	0.43	-	0.49	0.19	0.34

[1]Predicted or assumed. [2]Over period 1971-1987. [3]GM value. Weights in '000 t, recruitment in millions.

Catches: The catch of 1,215 t in 1987 was 24% lower than the 1986 figure of 1,600 t and 24% lower than the TAC of 1,600 t (Table 3.7.8).

Data and assessment: Analytical assessment using catch-at-age data from Belgium and England and Wales; tuned using Belgian beam trawl CPUE data.

Fishing mortality: A decrease of 12% in 1987 from the 1986 figure of 0.49 which was the highest in the series (Figure 3.7.8). Fishing mortality has been greater than F_{high} for the last three years.

Recruitment: The 1983, 1984, and 1985 year classes seem to be near average. No fishery-independent recruit indices are available.

State of stock: Spawning stock is declining, and is currently at the lowest level observed.

Forecast for 1989: Assuming F(88) = 0.39, Catch(88) = 1,100 t (TAC).

Option*	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	F_{max}	0.23	2,790	707	3,126	Higher catch rates; increase in SSB
B	0.8F(87)	0.35	2,681	1,012	2,715	Stabilized SSB
C	F(87)	0.44	2,604	1,217	2,449	Further decline in SSB to below historical low level

Weights in t.

Continued fishing at current levels of fishing mortality will lead to further decline in spawning stock to an unprecedented low level.

Recommendation: Fishing mortality should be reduced towards F_{med} (= 0.27). ACFM recommends a TAC for 1989 of not more than 1,000 t which would correspond to a fishing mortality similar to that which pertained during the period 1981-1985.

3.8 Sole and Plaice in the North Sea and English Channel

3.8.1 North Sea sole

Source of information: North Sea Flatfish Working Group report, October 1988 (C.M.1989/ Assess:6).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	15.0	15.0	15.0	14.0	15.0	12.0	11.0	11.0	-	-	-
Agreed TAC	15.0	21.0	20.0	20.0	22.0	20.0	14.0	14.0	-	-	-
Actual landings	15.4	21.6	24.9	26.6	24.2[3]	18.2[1]	17.3	-	26.6	15.4	20.3
Sp. stock biomass	25.3	35.4	42.8	45.9	42.4	35.4	28.0	31.3[1]	62.8	25.3	42
Recruitment (age 1)	149	153	138	72	66	111[1]	78[1]	217[1]	155	12	98
Mean F(3-10,u)	0.44	0.48	0.43	0.52	0.48	0.58	0.49	-	0.58	0.32	0.45

[1]Predicted or assumed. [2]Over period 1970-1987. [3]Minimum estimate. Weights in '000 t, recruitment in millions.

Catches: Decreased substantially in 1986 and 1987, although the exact level is uncertain due to unreported landings (Table 3.8.1).

Data and assessment: Quality of the data base has deteriorated due to uncertainties about exact catch levels, age compositions and effort. VPA results should be treated with caution. Fishery-independent data are available from beam trawl surveys and egg surveys.

Fishing mortality: VPA indicated that F increased to a historic high level around 1986 and has since been stable (Figure 3.8.1).

Recruitment: Since 1984, recruitment has been average or below except the 1987 year class which appears to be very strong.

State of stock: VPA indicated that SSB is at a historic low level below 30,000 t. The low SSB is confirmed by beam trawl survey data and data of an egg survey in 1988.

Forecast for 1989: Based on a SHOT forecast adjusting the recruitment in 1988 and 1989 and assuming F(88) = 0.49, Catch(88) = 17,500 t.

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Catch(89)	SSB(90)	
A	Signif. reduced F			14.0		Increase in SSB towards 50,000 t
B	F(88)	0.49		23.3		Continuation of SSB <50,000 t

Weights in '000 t.

Continued fishing at current levels of fishing mortality will probably lead to a continuation of a level of SSB which is below the required minimum level of 50,000 t.

Recommendation: The TAC should be set at a level at which the SSB can substantially increase to the minimum level of 50,000 t. Maintaining the TAC (14,000 t) agreed for 1987 and 1988 in 1989 should achieve a significant reduction in fishing mortality and allow the strong 1987 year class to contribute to the rebuilding of the spawning stock biomass.

Special comments: Due to data base problems, the assessment and forecast should be treated with caution. In order to maximize the benefit of the recommended reduction in the TAC regarding the rebuilding of the future spawning stock biomass, ACFM stresses that additional management measures should be considered to protect the strong 1987 year class from discarding and directed fishing while still undersized (see Special comments for North Sea plaice).

ACFM recognizes that the present mesh size regulation is not fully respected and stresses that proper enforcement will contribute substantially to protecting this year class.

3.8.2 North Sea plaice

Source of information: North Sea Flatfish Working Group report, October 1988 (C.M.1989/ Assess:6).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	105	140	164	150	130	<160	120	150	-	-	-
Agreed TAC	105	140	164	182	200	180	150	175	-	-	-
Actual landings	140	155	144	158	160[3]	165[1]	153	-	165	109	135
Sp. stock biomass	296	285	305	302	334	325	327	-	424	285	326
Recruitment (age 1)	412	994	586	651	466	1063	547	-	1063	233	512
Mean F(2-10,u)	0.42	0.47	0.46	0.44	0.44	0.55	0.55	-	0.55	0.31	0.41

[1]Predicted or assumed. [2]Over period 1970-1987. [3]Minimum estimate. Weights in '000 t, recruitment in millions.

Catches: Recent catches at a high level of around 150,000 t compared to about 70,000 t in the late 1950s. Actual catch level in 1986 and 1987 uncertain due to unreported catches (Table 3.8.2).

Data and assessment: Quality of data base has deteriorated due to uncertainties about catch levels, age composition, and effort. Results of VPA analysis should be treated with caution. Fishery-independent data available from trawl surveys and egg surveys.

Fishing mortality: The VPA indicated that the fishing mortality stabilized at a historically high level in 1986-1987 (Figure 3.8.2).

Recruitment: Is very strong in recent years with exceptional strong 1981 and 1985 year classes.

State of stock: The VPA indicated that SSB is rather stable and at present slightly above 300,000 t. Current fairly high levels of SSB are sustained by recent good recruitment, but this situation may be reversed if future recruitment declines.

Forecast for 1989: Assuming F(88) = 0.48, Catch(88) = 175,000 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A[1]	0.8F(87)	0.42	351	147[2]	377	Decrease in catch and increase in SSB
B[1]	F(88)	0.48		175[2]	348	Stable catch and SSB

[1]Analytical prediction (results were confirmed by the results of a SHOT forecast). [2]Options for actual total landings. Weights in '000 t.

Continued fishing at current levels of fishing mortality will result in the SSB in 1990 remaining at about the 1989 level.

Recommendation: Fishing mortality should be decreased to maintain a buffer in the spawning stock size well above the minimum recommended level of 300,000 t, since future recruitment may not remain at the recent high level.

Special comments: The assessment and forecast for 1989 should be treated with caution due to the data base problems.

As no new information is available on additional management measures for the plaice fishery, ACFM repeats its findings on the introduction of a PLAICE BOX in the second and third quarters (see October-November 1987 ACFM report) to protect juvenile plaice and to increase the long-term equilibrium yield and SSB of plaice by about 25% due to enhanced recruitment.

The PLAICE BOX will also strongly reduce the catches and fishing mortality of sole, particularly of 1- to 3-group fish which predominate in these coastal areas at that time, and thus enhance recruitment of sole, although no quantification has been made.

An identical gain of about 25% in recruitment of plaice may also be expected when enforcing an effective mesh size of 120 mm during the second and third quarters in this PLAICE BOX. This measure would, moreover, allow fisheries for cod, legal-sized plaice, and large soles to continue there.

In giving advice on North Sea flatfish, ACFM notes that the imposition of constraints on fishing for plaice is likely to intensify the pressure on the sole stock, catches of which have been significantly underreported in recent years. In the present relative states of the two stocks concerned, ACFM advises that the main emphasis should be placed on controlling exploitation on the sole stock, and that the likely effects of redirection of effort should be borne in mind when determining management measures with regard to plaice.

3.8.3 Sole in Division VIId

Source of information: North Sea Flatfish Working Group report, October 1988 (C.M. 1989/Assess:6).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	1.2	-	2.1	1.4	2.3	2.6	3.1	3.4	-	-	-
Agreed TAC	-	2.6	2.1	2.5	2.7	3.2	3.85	3.85	-	-	-
Actual landings	2.2	2.8	3.2	3.3	3.8	3.9	4.9	-	4.9	2.2	3.4

[1]Over period 1981-1987. Weights in '000 t.

Catches: Increased catch in 1987 from all fleets (Table 3.8.3).

Data and assessment: No analytical assessment was possible due to poor catch-at-age and effort data and unreported landings.

Fishing mortality: No information.

Recruitment: Available recruitment survey data do not allow estimates of year-class strength as they only cover a part of the stock.

State of stock: No information.

Forecast for 1989: Assuming F(88) = F(87), Catch(88) = 4,200 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	SHOT	status quo		3.8		

Weights in '000 t.

Recommendation: In the absence of further information, ACFM advises a TAC for 1989 based on the SHOT forecast of 3,800 t.

3.8.4 Sole in Division VIIe

Source of information: North Sea Flatfish Working Group report, October 1988 (C.M.1989/Assess:6).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	1.0	0.8	0.4	0.9	1.3	1.3	1.3	1.3	-	-	-
Agreed TAC	-	1.7	1.1	1.35	1.4	1.3	1.15	1.3	-	-	-
Actual landings	1.2	1.4	1.5	1.4	1.4	1.4	1.15	-	1.5	0.35	0.89
Sp. stock biomass	5.98	6.32	5.39	4.95	4.81	4.30	3.61	3.30[1]	6.32	3.01	4.55
Recruitment (age 1)	4.4	3.3	5.7	6.1	3.0	4.5	4.5	4.5[1]	8.7	2.0	4.5
Mean F(3-10,u)	0.21	0.27	0.32	0.3	0.36	0.40	0.40	-	0.40	0.11	0.21

[1]Predicted or assumed. [2]Over period 1969-1987. Weights in '000 t, recruitment in millions.

Catches: Have been in line with the TAC in recent years, although an element of misreporting by ICES division may have taken place (Table 3.8.4).

Data and assessment: Analytical age-based assessment using three UK fleet data sets. Excluding the reservation on catch reporting, data set is reasonably good.

Fishing mortality: At the 1986 level, but has shown a steady increase during 1981-1986 (Figure 3.8.4).

Recruitment: Average recruitment was assumed for 1985 and subsequent year classes, although there is some indication that 1985 may be poor.

State of stock: Yield/SSB currently at the highest level for the series. SSB predicted to fall to an historical low (with current F and recruit assumptions). However, the historic trend in SSB is largely dependent on the input Fs on the oldest age groups and should be treated with caution.

Forecast for 1989: Assuming F(88) = 0.47, Catch(88) = 1,300 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	0.6F(87)	0.24	2.9	0.67	3.2	Large reduction in catch
B	0.8F(87)	0.32		0.85	3.0	SSB held at 1989 level
C	F(87)	0.40		1.02	2.8	SSB continues to decline

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to further reduction of the already low level of SSB.

Recommendation: The TAC should not be set at a level which would bring the spawning stock biomass well below the present level. Therefore, ACFM advises that the TAC for 1989 should not exceed 1,000 t.

Special comments: The present assessment indicates substantially higher fishing mortalities in recent years compared to last year's assessment, leading to a much lower level of SSB and a different historic trend.

3.8.5 Plaice in Divisions VIId,e

Source of information: North Sea Flatfish Working Group report, October 1988 (C.M.1989/ Assess:6).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	-	-	3.5	3.5	5.4	6.2	6.8	6.9	-	-	-
Agreed TAC	-	5.5	6.5	6.0	6.5	6.9	8.3	9.96	-	-	-
Actual landings	6.5	6.4	6.3	7.3	7.3	8.4	10.3	-	10.3	6.3	7.5

[1]Over period 1981-1987. Weights in '000 t.

Catches: From 1984 onwards, a gradual increase in the catches was observed. Nominal landings in 1987 were the highest on record (Table 3.8.5).

Data and assessment: No age distribution of French landings is available. These landings account for almost 55% of the total international catches. No analytical assessment.

Recruitment: Surveys indicate that recent recruitment, especially the 1986 and 1987 year classes, might be abundant, which corresponds to trends in recruitment in North Sea plaice.

State of stock: CPUE data suggest a recent increase in the stock size.

Forecast for 1989: Assuming F(88) = F(87), Catch(88) = 11,100 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	SHOT	status quo		11.7		Slight increase in the catches

Weights in '000 t.

Recommendation: In order to maintain the exploitable biomass, effort should not be allowed to increase. ACFM advises that the 1989 TAC preferably should be set at no more than 11,700 t.

Special comments: Part of the increase in landings in recent years is related to an increase in stock size as indicated by the commercial CPUE data. Catch numbers at age indicate that recruitment to the stock is correlated with North Sea plaice with strong year classes in 1979, 1981, and 1985.

3.8.6 Sole in Divisions VIIIa,b (Bay of Biscay)

Source of information: North Sea Flatfish Working Group report, October 1988 (C.M. 1989/ Assess:6).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	-	-	-	-	-	-	-	3.7	-	-	-
Agreed TAC	-	3.1[2]	3.1[2]	3.1[2]	3.3[2]	3.3[2]	4.4	4.0	-	-	-
Actual landings	2.9	3.8	3.6	4.0	4.3	4.8	5.1	-	5.1	3.6	4.3

[1]Over period 1982-1987. [2]Sub-area VIII (EC zone). Weights in '000 t.

Catches: Have been revised compared to last year's figures (Table 3.8.6). French CPUE shows a slight decrease between 1979 and 1985 and a slight increase in 1986 and 1987.

Data and assessment: Reservation on catch reporting has to be made for the years 1979-1982. Unreported catches occur. Data base quality moderate but improving. Weight at age appears to increase in recent years. The trial assessment carried out by the Working Group could not be accepted by ACFM due to the remaining uncertainties with the data base and the unrealistically high level of fishing mortality indicated by the assessment.

Fishing mortality: No information.

Recruitment: No information.

State of stock: Commercial CPUE data indicate a rather stable stock biomass.

Forecast for 1989: Assuming Catch(88) = 4,700 t.

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Catch(89)	SSB(90)	
A	SHOT	*status quo*		4.5		

Weights in '000 t.

Recommendation: In the absence of further information, ACFM recommends that fishing effort should not be allowed to increase. Therefore, the TAC should not be set at a level higher than the *status quo* catch forecast of 4,500 t.

4 STOCKS IN NEAFC REGIONS 2 AND 3

4.1 Hake in Sub-areas IV and VI-IX

4.1.1 General comments

Separate assessments were made for the "Northern" stock (Division IVa, Sub-areas VI-VII, Divisions VIIIa,b) and for the "Southern" stock (Divisions VIIIc and IXa) of hake. Due to persisting difficulties with the interpretation of otoliths, length-based methods were used in both cases. These do not permit the kind of short-term forecasts on which TACs might be based, and reference is made to averages of recent landings when recommending TACs.

For years now, ACFM has been repeating the advice that the improvement of the exploitation patterns on both stocks is the main priority and observes that the enforcement of agreed measures still leaves much to be desired. It has good reasons to warn that the steady decline in landings from the Southern stock since 1983 will continue if no effective action is taken to protect the juvenile fish and reduce the fishing pressure. The situation that the agreed TACs for 1987 and 1988 have been artificially set close to the maximum landing figures over the recent years and seem to be unattainable in the current circumstances should also be reversed. Even though landings from the Northern stock do not show such a worrying trend, there is ample room there for improvements through an active management policy.

ACFM appreciates that the difficulties with enforcement are partly due to the multiple-species, multiple-fleet nature of the fisheries for hake, and suggests that managers might refer to Section 4.2 on Fisheries Units in Sub-areas VII and VIII for more detailed evaluations of the measures applicable to the Northern stock. There is no equivalent quantitative analysis for the Southern stock, and ACFM would like to read a detailed description of the fleets involved and of their interactions to make its own opinion on the severity of the constraints, and to assist managers with a more substantial documentation.

ACFM is concerned that the requisite data for VPA-based assessments are not available with the desired accuracy from most fleets. The lack of data on discards and underestimation of catches of undersized fish make it impossible to provide an unbiased evaluation of the situation and to anticipate the near-term changes, and this further defers the rehabilitation of the fisheries.

4.1.2 Hake - Northern stock (Division IVa, Sub-areas VI and VII, and Divisions VIIIa,b)

Source of information: Hake Assessment Working Group report, June 1988 (C.M.1988/Assess:24).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	30	30	30	30	-[2]	-[2]	-[2]	54	-	-	-
Agreed TAC[3]	-	-	-	-	-	47.36	62.36	64.86	-	-	-
Actual landings	53.9	55.0	57.7	63.2	66.0	59.4	64.0	-	66.0	50.6	57.8

[1]Over period 1978-1987. [2]Based on recent landings. [3]Sum of area TACs corresponding to Northern stock. Weights in '000 t.

Catches: Landings relatively constant during the last five years (Tables 4.1.2.1 and 4.1.2.2). Quantities discarded reached high levels in 1985 and 1986 when the abundant 1985 year class recruited, but discards in 1987 reverted to an average level.

Data and assessment: Length composition data by fleet for landings and discards in 1978-1987. Assessment by length cohort analysis. Interactive assessment of effects of technical measures by length-based computer simulation.

Fishing mortality: Highest values = 0.36 on small, immature fish, but values dependent on growth parameters.

Recruitment: Preliminary data from research vessel surveys for the 1980-1987 year classes indicate 1985 to be very abundant, 1986 poor, and others average.

State of stock: Very undesirable exploitation pattern resulting in depressed yields. High levels of discarding. No fishing on fish less than 25 cm would result in substantial (>50%) gains in yield. With the prevailing exploitation pattern, a 40% reduction in current fishing mortality would result in long-term landings of about 100,000 t, which correspond to the figures regularly observed in the 1960s and early 1970s.

Recommendation: ACFM reiterates its recommendation that current mesh-size regulations be strictly enforced, i.e., 80-mm mesh size in Sub-areas VI and VII (70 mm in Division VIIa) and 65 mm in Sub-area VIII. Consideration should also be given to increasing the minimum mesh size in the *Nephrops* fishery to 55 mm. ACFM also recommends a precautionary TAC of 54,000 t based on the average landings for the period 1978-1983, i.e., excluding those in recent years which were dependant on the recruitment of unusually abundant year classes.

4.1.3 Hake - Southern stock (Divisions VIIIc and IXa)

Source of information: Hake Assessment Working Group report, June 1988 (C.M.1988/Assess:24).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	8.5	8.5	8.5	8.5	8.5	15.0	15.0	15.0	-	-	-
Agreed TAC	-	-	-	-	-	-	25.0	25.0	-	-	-
Actual landings[2]	16.5	18.9	24.7	21.0	18.1	16.2	15.4	-	24.7	13.4	18.1

[1]Over period 1978-1987. [2]Working Group data. Weights in '000 t.

Catches: Landings have been progressively declining over the last five years (Table 4.1.3). Some discarding, but no quantitative data. A large proportion of landings are undersized fish.

Data and assessment: Length composition data by fleet for landings in 1978-1987. Assessment by length cohort analysis.

Fishing mortality: In the range 0.2-0.3, but dependent on growth parameters used.

Recruitment: No reliable estimates.

State of stock: Very unsatisfactory exploitation pattern resulting in depressed yields.

Recommendation: ACFM recommends a TAC for 1989 of 15,000 t based on the declining trend in landings in recent years and on the need to discourage fishing on undersized fish. ACFM also recommends:

- vigorous enforcement of the current legal minimum mesh sizes of 65 mm in the finfish fisheries and 50 mm in the *Nephrops* fishery;

- enforcing the existing closures of the main hake nursery ground off the Spanish coast to the trawl fishery from October to March, and introducing it on the nursery grounds off the Portuguese coast (see ICES Coop. Res. Rep. No.102, 1980, Figure 4.1.2). These areas are in depths of less than 200 m and are delineated as follows:

  $37^0 10'$N to $37^0 51'$N
  $39^0 50'$N to $40^0 20'$N
  $41^0 30'$N to $41^0 50'$N

4.2 Fisheries Units in Sub-areas VII and VIII

Source of Information: Fisheries Units in Sub-areas VII and VIII Working Group report, June 1988 (C.M.1988/Assess:25).

4.2.1 Overview

During its meeting this year, the Working Group attempted to respond as positively as possible to the requests and suggestions made by ACFM during its November 1987 meeting and in its report for 1987. Building on its own experience, the Group also pursued its efforts and reflections to provide the most relevant advice. Accordingly, the framework was set up on the following bases:

- Equilibrium conditions are essential in the length-based model used by the Group, and it is generally agreed that simulations performed under such assumptions should have some "standing value". It was agreed that the data base used last year (catches at length in 1984-1986) would not be augmented with data for 1987, in order to leave more time to improve the data base (inclusion of missing data, correction of approximations in the estimation of discards and in the allocation of data for fishery units) and to refine the assessment. When available, data for 1987 were used to confirm the options retained. The descriptions of the fisheries units were updated (Table 4.2.1).

- ICES working groups have no vocation nor expertise to conduct economic analyses. However, in a multispecies context, the evaluation of technical measures in terms of their effects on landings in weight only can be misleading since the market values of the various species considered are quite different and may also vary among fleets. The approach adopted was, therefore, to define weighting factors for the species and fishery units based on the average landing prices in the countries involved. Considering that prices do change with the size of fish and that changes in mesh size would result in changes in the length composition of landings, global indices by species would not be appropriate, and it was decided to estimate average prices at length separately for each species and fishery unit. Again, this was done for the sake of consistency and should not be taken as an infringement into the economic domain.

- ACFM recognizes that the regional approach to scientific advice on management, such as carried out by this Working Group, is a major objective for the future and should remain the priority task of the Group. It is quite concerned, however, that problems arise at times in some stocks and/or fisheries for which the managers are not provided with the necessary information and scientific evaluation by a relevant working group. This Group has tried to cover the most urgent needs and has documented the recent trends in catches and catch rates for monkfish and megrim. Other data and assessment results for individual species are given in the sections on hake (4.1), Celtic Sea cod, whiting, and sole (3.7) and sole in the Bay of Biscay (3.8). The management implications for these stocks are, however, brought together in this section.

- The length-based methods used by this Group do not permit short-term forecast nor, more generally, analyses with explicit time scales. A new model is being developed which reconciles the advantages of age-based (definite and uniform time) and length-based methods (cheaper data, adequate treatment of length dependent process) and will be implemented for future meetings. It will enable, in the first place, the evaluation of interim effects of changes in mesh sizes for each species and fishery unit.

- It has already been emphasized that the possible shifts in the fishery in response to changes in legal landing sizes were not adequately accounted for in the model used. Since such shifts are quite difficult to anticipate, the problem is likely to remain even with an improved model. The main virtue of the argument is that the effectiveness of minimum landing size regulations is now open to questions. Other related considerations examined by the Group were the bases for establishing minimum landing sizes (commercial habits, L_{50} or L_{25} of gear selection curves, etc.), and effects of a strict enforcement (no undersized fish should be landed at all).

- Last year, the difficulty in summarizing the large volume of results produced by multiple species, multi-fleet models in a comprehensive and concise form was emphasized. An attempt was made this year to design a new format for the tables of results without loss of resolution.

4.2.2 State of the stocks and fisheries

The Working Group produced a comprehensive assessment for ten species [hake, Nephrops in Divisions VIIg,h and VIIIa,b, monkfish (L. piscatorius and L. budegassa), megrim, Celtic Sea cod and whiting, sole in Divisions VIIe-g and VIIIa,b] and 16 fishery units. Average landings in weight and value in recent years for each species and fisheries unit are given in Table 4.2.2 which demonstrates the dominance of hake. It is generally considered that none of these stocks is in critical condition at present, but ACFM has emphasized for years that the exploitation patterns for most species in the area are quite unsatisfactory, and still has to state that the regulations intended to improve them are not effectively enforced.

To illustrate the point, a conventional yield per constant recruitment calculation has been made by varying the efforts relative to current levels (such as indicated by length VPA of average catches over 1984-1986) uniformly in all fishery units. The results given in Table 4.2.3 indicate that, for some of the major species, exploitation at the F_{max} level under the current exploitation patterns would imply a reduction in effort to about 60% of the current magnitude. This general conclusion should obviously be contrasted with consideration of the effects due to each fisheries unit. Taking account of the mixed-fishery context, however, it is indicated that the overall fishing mortality should not be allowed to increase in these sub-areas.

In its report for 1987, ACFM expressed its concern about the state of the stocks of monkfish L. piscatrius and L. budegassa. Quantitative data presented by the Group confirm that both catches and catch rates have been declining in recent years while the species have attracted increased fishing effort concomitant with an increase in their value. The trouble is that no realistic mesh size regulation can be envisaged to limit effectively the catches of young monkfish while permitting viable operations of the fleets, and effort limitations seem to be the only relevant measure.

ACFM was asked to advise on catch levels for monkfish and megrim in Sub-areas VII and VIII. The requisite data are still not available, however, to make such predictions. Furthermore, ACFM considers that it would be inappropriate to base a regulation of these stocks on single-species assessment since they are caught in what is largely a mixed fishery. ACFM notes that megrim and Lophius budegassa are fully exploited and L. piscatorius are overexploited in terms of yield per recruit, and that catches of these species should, therefore, not be allowed to increase. This would not be effectively achieved by setting TACs independently for these species, but would depend on the extent to which managers decide to reduce fishing effort in view of the expected long-term gains for the most important species, hake.

4.2.3 Assessment of the effects of management measures

Basically the same simulations as last year were performed on the revised data base, the changes being with the treatment of minimum landing sizes (taken to be the size L_{25} of the sorting selection ogive instead of L_{50}) and with the additional consideration of results in value. The regimes were defined in accordance with the current and envisaged regulations adopted by the Council of the EC and presented in Table 4.2.4. No evidence is available to support simulations of changes in fishing effort in any fishery.

The general conclusions are that long-term gains are expected in those regimes where mesh sizes are increased, although short-term losses may be hard for some units. Increases in minimum landing sizes, although inadequately accounted for in the simulations, result systematically in short-term and long-term losses mainly because no discards are supposed to survive except in the Nephrops fishery. Also, since the landing prices used increase with length in all species, the results in value indicate larger gains and smaller losses than those in weight when mesh sizes are increased. The over-simplification entailed in summarizing the results in this section would be in contradiction with the spirit of the exercise, and managers are invited to look carefully at the tables given in the Working Group report to make their own judgement on the effects and implications of the regulations and on the ways in which fisheries units interact. For illustration, however, the relative effects in weight and in value of enforcing the current legal mesh sizes are presented in Tables 4.2.5 and 4.2.6.

The simulations confirm that the main management issue in the area is the conflict of interests between fisheries for hake and Nephrops. It is important to notice that long-term gains are expected in all fleets following increases in mesh size, including those units affected by the measure. Managers might wish to consider the point of view that the priority given until now to avoid short-term losses in some sectors results in the others being denied potential gains in their revenue. Over the years, this represents a serious cumulated loss for the latter and appears as a penalty to those who comply with the regulations.

4.2.4 Future development

ACFM appreciates that the current assessments giving immediate and long-term effects of changes in mesh size are somewhat insufficient to establish a management policy, and that a full evaluation should include an assessment of the medium-term effects with consideration of the time lag needed to cross the status quo trajectory, and of cumulated losses over the period. If adequate data (growth parameters, length distributions at age) are gathered for the next meeting of the Group, such assessments for the same set of species and fleets as of now should be feasible with the new hybrid model in preparation.

ACFM would stress again that, whatever model is used, a permanent requisite is that the adequate data are made available. This is especially true for data on discards (volume and length or age compositions) by each fleet which are critical in the evaluation of fisheries interactions and in mesh assessments. There are also shortcomings in some landing length composition and sex ratio information. Generally, more disaggregation of landed weights and sample data by unit is required.

4.2.5 The problem of minimum landing sizes

In most cases, the regulation of minimum landing sizes is not a stand-alone measure, but is enforced in addition to minimum mesh sizes regulations. It is intended to incite fishermen to comply with the latter and, more generally, to avoid fishing in areas where small fish are concentrated. The simulations performed by the Working Group tend to demonstrate that, even in this context, the enforcement of legal landing sizes without enforcement of appropriate minimum mesh sizes results in losses of landed weight and value in the short term and in the long term whenever the fish are assumed to be dead when discarded, as is generally the case. Moreover, these losses amplify the immediate losses and diminish the expected gains following an increase of mesh sizes. These findings indicate that the choice of a minimum landing size as a management tool for conservation purposes should be carefully evaluated.

Apart from this matter of principles, attention should be paid to the technical aspects of setting the legal landing sizes, bearing in mind that a strict application entails that no undersized fish is allowed to be landed. The dilemma is to reduce the amount of regulation-induced discards to the minimum possible level when legal mesh sizes are used, and the idea, therefore, is to correlate the mesh sizes and minimum landing sizes by a simple formula.

A possible reference point which was used in some instances is the size L_{50} of the mesh selection curve for the species and gear considered, but this results in considerable discards of legally-caught fish. The smallest practical reference point on the curve is the size L_{25} which has been adopted to derive a possible set of legal landing sizes for each species and legal mesh size in each area. These are given in Table 4.2.7 together with the current legal figures. For megrim, recent experiments indicate that the selection factor for trawls should be revised to the more likely value of 3.1 and the figures calculated with this value are also given. The main observation is that this new formula would result generally in a decrease in the proposed landing sizes compared to the current legal figures.

ACFM suggests that, in its future simulations, the Working Group should adopt the L_{25} reference points as the bases for minimum landing sizes, and preferably with a knife-edge sorting selection. It may also consider the dual aspect of the problem, which is to simulate increases in the mesh sizes in some units which would also achieve the desired consistency with the existing legal minimum sizes applicable in Sub-areas VII and VIII. Other scenarios of interest might be the evaluation of the consequences of setting uniform legal mesh sizes in all fisheries units.

4.2.6 Recommendation

There is clear evidence that compliance with the existing mesh regulations would be beneficial to all the participants in the fisheries and would rule out the undue penalties for those who already comply. ACFM, therefore, recommends that the legal mesh sizes applicable to Sub-areas VII and VIII should be enforced as a priority. Managers should consider the regulation concerning the minimum landing sizes in order to bring these more in line with the minimum mesh size.

4.3 Horse Mackerel in Sub-areas IV and VI-IX

4.3.1 General comments

Total landings

The landings of horse mackerel decreased from 375,000 t in 1976 to about 100,000 t in 1982. Since then, they have increased to 231,000 t in 1987 (Table 4.3.1).

Stock units

Egg and larval distributions suggest the existence of separate spawning areas corresponding to the three geographic stocks (Southern, Western, and North Sea) of horse mackerel. This is not sufficient evidence to infer independent stocks, as adult horse mackerel are highly mobile, and these areas may represent no more than three separate areas where spawning environments are favoured by the fish. Assessment and management would be improved by knowledge of the pattern and extent of migrations among these three areas.

It is worth noting that migration of fish among the geographic areas does not imply that all horse mackerel should be managed as a unit stock. Allocation of independent TACs can provide greater protection against stock depletion.

Age determination

Problems of discrepancies among ageing criteria from different countries appear to have been solved. The criterion of using one ring per year was adopted.

4.3.2 North Sea horse mackerel (Divisions IIa, IIIa, IVa-c, VIId)

Source of information: Report of the Working Group on the Assessment of Pelagic Stocks in Divisions VIIIc and IXa and Horse Mackerel, May 1988 (C.M.1988/Assess:22).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	-	250[2]	125[2]	181[2]	18.5[3]	30[3]	30[3]	50[3]	-	-	-
Actual landings	7	5	4	26	24	21	24	-	26	4	17

[1]Over period 1982-1987. [2]Division IIa and Sub-areas IV, VI-VII (EC waters only). [3]Division IIa and Sub-area IV (EC waters only). Weights in '000 t.

Catches: The catches in 1987 were at the same level as observed in 1984-1986 (Table 4.3.2). Catch data indicate a more northern distribution of the stock in the third and fourth quarters in 1987.

Data and assessment: Length compositions available from Dutch groundfish surveys (1980-1987), Danish acoustic surveys (1985-1987), and Norwegian commercial catches (1987). Danish acoustic survey provided stock biomass estimates for the Eastern North Sea in 1985, 1986, and 1987 of 500,000 t, 523,000 t, and 207,000 t, respectively. Age composition available for 4% of the catches. No assessment possible.

Fishing mortality: No information.

Recruitment: The 1979 and 1982 year classes are strong. The 1983-1985 year classes are all weak compared to the 1982 year class. No information on the 1987 year class.

State of stock: Not known.

Forecast for 1989: Not available.

4.3.3 Western horse mackerel (Divisions VIa, VIIa-c,e-k, VIIIa,b,d,e)

Source of information: Report of the Working Group on the Assessment of Pelagic Stocks in Divisions VIIIc and IXa and Horse Mackerel, May 1988 (C.M.1988/Assess:22).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	-	250[3]	125[3]	181[3]	145[4]	123[5]	158[5]	169[5]	250	54	155
Actual landings	50	42	68	77	82	109	144	-	144	42	87
Sp. stock biomass	-	919	1,015	845	1,160	1,359	1,395	1,415[1]	1,395	845	1,116
Recruitment (age 1)	-	99	25,499	137	145	32	12	100[1]	25,499	12	4,321
Mean F(6-15,w)	-	0.04	0.11	0.09	0.06	0.09	0.09	-	0.11	0.04	0.08

[1]Predicted or assumed. [2]Over period 1982-1987. [3]Division IIa and Sub-areas IV, VI-VIII (EC waters only). [4]Division Vb (EC waters only) and Sub-areas VI-VIII. [5]Division Vb (EC waters only), Sub-areas VI and VII, and Divisions VIIIa,b,d,e. Weights in 000 t, recruitment in millions.

Catches: The catches increased in the 1970s to 215,000 t. After the introduction of the exclusive 200-mile zone in 1977, the catches dropped to a level of about 50,000 t and increased in 1987 to about 150,000 t (Tables 4.3.3.1 - 4.3.3.3) and are likely to increase in 1988 due to a more directed fishery.

Data and assessment: Analytical assessment based on catch-at-age data and estimates of SSB from egg surveys in 1983 and 1986. The validity of the estimates uncertain because fecundity and natural mortality needs to be determined accurately. Age determination method agreed. Numbers at age (up to 15+) available from 1982-1987. Age samples for 50-70% of the catches.

Fishing mortality: Fishing mortality seems rather constant due to the gradual contribution of the strong 1982 year class over this range of years. Fishing mortality could increase from 1988 onwards if poor year classes recruit.

Recruitment: During period 1960-1987, only the 1968, 1969, 1970, 1979, and 1982 year classes were considered strong; 1982 was extremely strong and 1980 and 1976 were average. Long periods of poor recruitment. After 1982 year class, only very poor year classes.

State of stock: The spawning stock biomass reached a high level in 1987 (Figure 4.3.3) due to the gradual recruitment to the spawning stock by the 1982 year class.

Forecast for 1989: Precise prediction not available.

Continued fishing at current levels of fishing mortality could lead to a decline in the SSB until such time when there is another strong year class.

Recommendation: The TAC should be set at a level not exceeding 100,000 t if catches of this order are to be sustained for about 5 years.

Special comments: At the current exploitation rate, catches of about 100,000 t should be sustainable for about 5 years. If catches are increased substantially, they will be sustainable for a proportionally shorter time. In addition, this would considerably increase the risk that the spawning stock will be insufficient to generate another large year class next time the conditions for this are favorable.

4.3.4 Southern horse mackerel (Divisions VIIIc and IXa)

Source of information: Report of the Working Group on the Assessment of Pelagic Stocks in Divisions VIIIc and IXa and Horse Mackerel, May 1988 (C.M.1988/Assess:22).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	-	-	-	-	-	72.5[3]	72.5[3]	82.0[3]	-	-	-
Actual landings	72	59	74	46	44	61	63	-	74	44	63
Sp. stock biomass	341	298	263	216	255	256	314	405[1]	341	216	278
Recruitment (age 0)	958	4,615	2,415	1,255	2,940	3,179	2,307	2,247[1]	4,615	958	2,524
Mean F(1-2,u)	0.39	0.26	0.29	0.17	0.16	0.22	0.35	-	0.39	0.16	0.26

[1]Predicted or assumed. [2]Over period 1981-1987. [3]Division VIIIc, Sub-areas IX and X, and CECAF Division 34.1.1 (EC waters only). Weights in '000 t, recruitment in millions.

Catches: Catches reached 170,000 t in the late 1970s and have declined since, reaching their lowest level in 1984-1985 (Table 4.3.3.3). The fishery takes mostly young fish and is influenced by year-class strength. Availability of older fish seems to be lower than that for juveniles.

Data and assessment: VPA is based on tuning method using bottom trawl surveys and CPUE of commercial fleet.

Fishing mortality: Strong year classes may attract effort. Fishing mortality increased in 1987.

Recruitment: The 1982 year class is strong (Figure 4.3.4), as in the Western stock. Recent recruitment estimates are imprecise. The 1986 year class also seems to be abundant.

State of stock: The 1986 year class supports the present fishery. Future fishery is likely to fluctuate with year-class strengths.

Forecast for 1989: Prediction strongly dependent on recent recruitment estimates; therefore, not very precise.

Continued fishing at current levels of fishing mortality will lead to a fluctuating fishery similar to those in recent years.

Recommendation: Fishing mortality should not be allowed to increase, corresponding to a TAC in 1989 at a level close to that agreed for 1986 and 1987.

The legal minimum mesh size of 65 mm which applies to Sub-areas VIII and IX should apply to fishing for horse mackerel in Divisions VIIIc in addition to Division IXa.

5 STOCKS IN NEAFC REGION 3

5.1 Sardine in Divisions VIIIc and IXa

5.1.1 Advice from the May 1988 ACFM meeting

Source of information: Report of the Working Group on the Assessment of Pelagic Stocks in Divisions VIIIc and IXa and Horse Mackerel, May 1988 (C.M.1988/Assess:22).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	-	-	200	120	-	90	140	150	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	214	205	181	203	204	181	169	-	214	169	194
Sp. stock biomass	605	638	580	607	606	501	377	473[1]	638	377	559
Recruitment (age 0)	17	13	33	12	9	5	14[1]	17[1]	33	8	17
Mean F(2-6,u)	0.28	0.28	0.24	0.21	0.29	0.33	0.36	-	0.36	0.21	0.28

[1]Predicted or assumed. [2]Over period 1981-1987. Weights in '000 t, recruitment in billions.

Catches: Total catches in 1987 decreased by about 11% compared to 1986 (Table 5.1). No TAC regulations have yet been implemented for this stock.

Data and assessment: VPA assessment and acoustic surveys.

Fishing mortality: Stable over the last 10 years (Figure 5.1).

Recruitment: After the very strong 1983 year class, the 1985 and 1986 year classes appear weak, but the entering 1987 year class could be strong. However, the absence of accurate 0-group estimates does not permit the actual size of the 1987 year class to be defined.

State of stock: Healthy.

Forecast for 1989: Postponed to ACFM November meeting when more accurate estimates of the 1987 year class will be available.

5.1.2 Sardine in Divisions VIIIc and IXa: Advice from the November 1988 ACFM meeting

Source of information: Report of the Working Group on the Assessment of Pelagic Stocks in Divisions VIIIc and IXa and Horse Mackerel, May 1988 (C.M.1988/Assess:22) and working document.

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	-	-	200	120	-	90	140	150	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	214	205	181	203	204	181	169	-	214	169	194
Sp. stock biomass	605	638	580	607	606	501	377[1]	382[1]	638	377	559
Recruitment (age 0)	14	10	27	11	7	5	25[1]	12[1]	27	5	14
Mean F(2-6,u)	0.28	0.28	0.24	0.21	0.29	0.33	0.36	-	0.36	0.21	0.28

[1]Predicted or assumed. [2]Over period 1981-1987. Weights in '000 t, recruitment in billions.

Catches: Total catches in 1987 decreased by about 11% compared to 1986 (Table 5.1). No TAC regulations have yet been implemented for this stock.

Data and assessment: VPA assessment and acoustic surveys.

Fishing mortality: Stable over the last 10 years (Figure 5.1).

Recruitment: After the very strong 1983 year class, the 1985 and 1986 year classes appear weak, but the entering 1987 year class could be strong. Catches of 0-group in 1987 and results of the acoustic surveys conducted in August-November 1987 by Portugal and in March 1988 by Spain and Portugal show that the strength of this year class is at about the same level as the 1983 year class, and it was assumed to be 25 billion individuals.

State of stock: The good 1987 year class is expected to increase the SSB in 1989 from its recent low level in 1987.

Forecast for 1989: Assuming F(88) = 0.36, Catch(88) = 173,000 t.

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Catch(89)	SSB(90)	
A	F(87)	0.36	462	212	428	Slight decrease in SSB in 1990
B	$F_{0.1}$	0.53	443	292	362	Strong decline in SSB

Weights in '000 t.

Recommendation: Even if the 1987 year class is stronger than the assumed 25 billion individuals, fishing mortality should not be allowed to increase above recent levels in order to prevent a further decline in the SSB. Under status quo conditions, catches in 1989 are calculated to be 212,000 t.

Special comments: ACFM considers the difficulties in predicting the abundance of young fish by acoustic methods, given that there has been considerable mismatch in time and space of the surveys in recent years. Therefore, the figure adopted for the recruitment in 1987 must be taken with caution.

5.2 Mackerel in Divisions VIIIc and IXa

Source of information: Report of the Working Group on the Assessment of Pelagic Stocks in Divisions VIIIc and IXa and Horse Mackerel, May 1988 (C.M.1988/Assess:22).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	-	-	-	-	-	24.7[2]	36.57[2]	36.57[2]	-	-	-
Actual landings	18	21	15	20	18	24	22	-	24	15	20

[1]Over period 1981-1987. [2]Division VIIIc, Sub-areas IX and X, and CECAF Division 34.1.1 (EC waters only). Weights in '000 t.

Catches: The catches in 1987 were at the same level as in 1986 (Tables 5.2.1 and 5.2.2).

Data and assessment: Data are insufficient to support an analytical assessment.

Fishing mortality: Not known.

Recruitment: From the length composition of the Spanish catches, the 1986 year class appears to be considerably stronger than the 1987 year class.

State of stock: Unknown; there is no evidence of substantial change over the past decade.

Forecast for 1989: Not available.

5.3 Anchovy in Divisions VIIIb,c (Bay of Biscay)

Source of information: Report of the Working Group on the Assessment of Pelagic Stocks in Divisions VIIIc and IXa and Horse Mackerel, May 1988 (C.M.1988/Assess:22).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	32	32	32	32	32	32	32	32	-	-	-
Actual landings	11	5	14	35	10	7	13	-	84	5	36

[1]Over period 1960-1987. Weights in '000 t.

Catches: At a very low level since 1984 (Table 5.3).

Data and assessment: Catch at age reported by Spain. Length distribution data available. No fishery-independent data available. Estimates of total mortality and growth rates in biomass by catch curves.

Fishing mortality: Reliable estimates not yet available.

Recruitment: No independent indices are available.

State of stock: The present low catches may be due to reduced recruitment and stock size, or reduced availability.

Forecast for 1989: Not available.

If the stock is depleted, continued fishing at current catch levels will lead to further depletion and a lower probability of recovery of the stock.

Recommendation: Measures for increasing the spawning stock biomass must be taken into account. A TAC for 1989 should be set so as to prevent any increase in catches above the 1985-1987 level.

Special comments: The presumed process of depletion of the stock could be due to fishing, but high natural variations in this kind of stock are very likely to occur. Until further knowledge is acquired, the expectancy of recovery of the stock should be maintained.

- A very restrictive measure, setting, for instance, a TAC for 1989 lower than 5,000 t corresponding to the minimum annual landing in the last 10 years could lead to losses in harvest if good recruitment is entering the fishery in 1989, but taking into account that the rate of increase in fecundity is far larger than natural mortality, the increase in egg production will help the recruitment for following years to succeed.

- A TAC of 13,700 t, based on the average catch over the period 1981-1987, would, in practice, imply no limit on the current levels of catch. If good recruitment appears, such as in 1984, based on the 1982 year class, this TAC could increase the probability of that year class spawning successfully in 1990.

6 STOCKS IN NEAFC REGIONS 1, 2, AND 3

6.1 Mackerel

6.1.1 Introduction

Nominal catches in the North Sea area (Sub-area IV and Division IIIa), the Norwegian Sea and off the Faroes (Divisions IIa and Vb), and the Western area (Sub-areas VI and VII and Divisions VIIIa,b) are given in Tables 6.1.1 - 6.1.5.

The two unit stocks - North Sea and Western - continue to mix during the second half of the year, particularly in the northern North Sea (Division IVa). In previous years, it has been possible to estimate the proportion of the catches attributable to each stock, using tagging data and biological information from commercial and research vessels, but it has not been possible to split the 1987 catch in this way because:

- very few returned tags could be related to fishing area with any certainty due to misreporting of a substantial part of the catches;

- the method of allocating catches based on tag returns also depends on information about the relative stock sizes;

- no North Sea egg survey was carried out in 1987 and, therefore, no estimate of the size of the North Sea stock is available;

- it is still not known whether the 1984 year class is strong in the North Sea stock.

For these reasons, the 1987 catches have been allocated to stocks by assuming that all mackerel taken in Divisions IIIa and IVb,c belonged to the North Sea stock. The proportions of North Sea mackerel caught in other fishing areas are assumed to have been insignificant.

With particular regard to the Western mackerel stock, ACFM pointed out last year that figures for spawning stock biomass derived from the triennial egg surveys could be underestimated as a result of a shortage of data on egg mortality and atresia (resorption of developing eggs in the ovary), and from spawning taking place outside the area covered by the egg survey. Overestimation, on the other hand, could be caused by the generation of new eggs in the ovary after the commencement of spawning. Research programmes have been intensified or initiated in order to specifically address these problems, and the area of the 1989 Western mackerel egg survey has been extended northwards to 56^{0}N and southwards to 44^{0}30'N (also in order to include horse mackerel spawning areas). These possible sources of error may not be significant, however, since retrospective analysis supports past estimates of stock size that have been derived from the egg survey data.

6.1.2 North Sea mackerel

6.1.2.1 Advice from the May 1988 ACFM meeting

Source of information: Mackerel Working Group report, March 1988 (C.M.1988/Assess:12).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC[3,7]	40	0	0	0	0-20	LPL	LPL	LPL	-	-	-
Agreed TAC[4]	40	25	30	32	37	55	55	55[6]	-	-	-
Actual landings[5]	66	47	48	59	33	32	13	-	201	13	87
Sp. stock biomass	189	162	168	133	76	45	?	-	436	45	-
Recruitment (age 1)	233	282	27	20	?	?	?	-	282	20	-
Mean F(3-8,u)	0.31	0.28	0.29	0.69	?	?	?	-	0.69	0.19	-

[1] Predicted or assumed. [2] Over period 1978-1987. [3] TAC for Sub-area IV and Division IIIa. [4] TACs for Sub-area IV, Divisions IIIa and IIa (EC zone). [5] Landings of North Sea stock. [6] Total TAC for Sub-area IV, of which 9,500 t permitted south of 59° and 45,500 t north of 59°; the latter has been included in the Western stock table under 1988 Agreed TAC. [7] LPL = Lowest Practicable Level. Weights in '000 t, recruitment in millions.

Catches: The assumed catch in 1987 was 13,100 t, which is the total in Divisions IVb,c and IIIa. Since it was impossible to split catches in Divisions VIa, IVa, and IIa into North Sea and Western stock, 13,100 t is an underestimate of the North Sea stock catch.

Data and assessment: No assessment done. Problems with estimating catches from stock due to overlap in distribution with Western mackerel.

Fishing mortality: Has been close to 0.3 until 1983; it has probably been much higher in recent years.

Recruitment: The recruitment in 1980-1983 has been poorer than the recruitment in the 1970s and far below the average level of the 1960s. Still impossible to estimate the recruitment of the 1984 and 1985 year classes to the spawning stock.

State of stock: The last egg survey was carried out in 1986, and the spawning stock was estimated at 45,000 t, which is the lowest since these surveys started in 1980. Since no in formation about recruitment of the 1984 and 1985 year classes is available and an egg survey was not carried out in 1987, it is impossible to give the status of the stock until after the 1988 egg survey.

Forecast for 1989: Not available.

Recommendations: ACFM will revert to the North Sea mackerel stock in November 1988, when the results of the 1988 egg survey will be available, in order to provide management advice for 1989. For 1988, ACFM repeats the recommendations made in May 1987:

a) There should be no fishing for mackerel in Divisions IVb,c at any time of year.

b) The entire North Sea area (Sub-area IV and Division IIIa) should be closed to mackerel fishing during the period 1 January - 31 July.

c) Catches in Divisions IIIa and IVa should be reduced to the lowest practical level, which from a biological point of view should be zero.

d) Any catches taken in Division IVa should in so far as possible be taken in the northern and western parts of this division.

e) The 30-cm minimum landing size at present in force in the North Sea should be maintained and the present by-catch regulations should be continued.

6.1.2.2 North Sea mackerel: Advice from the November 1988 ACFM meeting

Source of information: Mackerel Working Group report, March 1988 (C.M.1988/Assess:12) and working document.

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC[2,6]	40	0	0	0	0-20	LPL	LPL	LPL	-	-	-
Agreed TAC[3]	40	25	30	32	37	55	55	55[5]	-	-	-
Actual landings[4]	66	47	48	59	33	32	13	-	201	13	87
Sp. stock biomass	189	162	168	133	76	45	?	37	436	45	-
Recruitment (age 1)	233	282	27	20	low	low	low	-	282	20	-
Mean F(3-8,u)	0.31	0.28	0.29	0.69	?	?	?	-	0.69	0.19	-

[1]Over period 1978-1987. [2]TAC for Sub-area IV and Division IIIa. [3]TACs for Sub-area IV, Divisions IIIa and IIa (EC zone). [4]Landings of North Sea stock. [5]Total TAC for Sub-area IV, of which 9,500 t permitted south of 59° and 45,500 t north of 59°; the latter has been included in the Western stock table under 1988 Agreed TAC. [6]LPL = Lowest Practicable Level. Weights in '000 t, recruitment in millions.

Catches: The assumed catch in 1987 was 13,100 t, which is the total in Divisions IVb,c and IIIa. Since it was impossible to split catches in Divisions VIa, IVa and IIa into North Sea and Western stock, 13,100 t is an underestimate of the North Sea stock catch.

Data and assessment: No assessment done. Problems with estimating catches from stock due to overlap in distribution with Western mackerel.

Fishing mortality: Has been close to 0.3 until 1983; it has probably been much higher in recent years.

Recruitment: The recruitment in 1980-1987 has been poorer than the recruitment in the 1970s and far below the average level of the 1960s.

State of stock: The 1988 egg survey gave a spawning stock estimate of 37,000 t, which is the lowest since these surveys started in 1980. The spawning stock has steadily declined since 1972 and is now only a small percentage of the stock size in the 1960s.

Forecast for 1989: Not available.

Recommendations:

a) There should be no fishing for mackerel in Divisions IVb,c at any time of year.

b) The entire North Sea area (Sub-area IV and Division IIIa) should be closed to mackerel fishing during the period 1 January - 31 July.

c) Catches in Divisions IIIa and IVa should be reduced to the lowest practical level, which from a biological point of view should be zero.

d) Any catches taken in Division IVa should insofar as possible be taken in the northern and western parts of this division.

e) The 30-cm minimum landing size at present in force in the North Sea should be maintained and the present by-catch regulations should be continued.

Special comments: In view of the extremely small size of the North Sea stock, ACFM considers that the stock continues to need the maximum possible protection. This can only be achieved by closing mackerel fisheries in all areas where North Sea mackerel occur. From the information available, it is not possible to define these areas by firm boundaries, but in general terms, the proportion of North Sea stock mackerel in the catches in the North Sea will be lower the further north and west the catches are taken.

6.1.3 Western mackerel

Source of information: Mackerel Working Group report, March 1988 (C.M.1988/Assess:12).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC[3]	353	272	330	500	340	290	380	430	-	-	-
Agreed TAC[4]	-	406	412	443	415	367	405	573	-	-	-
Actual landings[5]	662	624	614	551	561	538	615	-	662	326	559
Sp. stock biomass	2200	2295	2505	2306	2133	1713	1784	1522[1]	3099	1713	2447
Recruitment (age 0)	6964	1015	443	6560	1383	1100[1]	3035[1]	3036[1]	6964	443	3404
Mean F(4-8,u)	0.20	0.22	0.21	0.20	0.21	0.22	0.28	-	0.28	0.11	0.20

[1]Predicted or assumed. [2]Over period 1976-1987. [3]Recom. TACs for Western area (VI, VII, VIIIa,b, Vb, IIa, and, from 1988, IV). [4]See Special comments. [5]Landings of Western stock. Weights in '000 t, recruitment in millions.

Catches: Catches increased 15% in 1987 following a decline since 1981. Since 1985, an increasing proportion of the catch has come from Divisions IVa and IIa. Considerable misreporting of catches, with misreported catches placed in Division VIa. Catches have consistently been greater than the recommended level, and TACs have not been set for the whole stock area.

Data and assessment: In general, catch-in-number data are adequate, but there are major problems in allocating catches to correct areas and stocks, mainly because of misreporting and inadequate biological material for stock separation. Analytical stock assessment, based on catch data and egg survey results.

Fishing mortality: F has been constant at about 0.21 since 1981, but increased in 1987.

Recruitment: Recruitment, as indicated from VPA, is highly variable without any trend. Since 1976, there have been four very poor year classes (1977, 1982, 1983, and 1985) and four good year classes (1979, 1980, 1981, and 1984). There is no independent method of selecting levels for predictions.

State of stock: Spawning stock has steadily declined since 1972 (Figure 6.1.3). Decline was temporarily halted in 1987 by the 1984 year class, but SSB declined again in 1988 due to excessive 1987 catch.

Forecast for 1989: Assuming F(88) = 0.31, Catch(88) = 600,000 t.

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Catch(89)	SSB(90)	
A	F_{med}	0.11	1,464	207	1,616	Slight increase in SSB; catch reduced to one-third of current level.
B	$F_{0.1}$	0.19	1,431	355	1,482	SSB decline halted; catch reduced to 60% of current level.
C	F(87)	0.28	1,398	498	1,356	SSB decline continues; catch reduced by one-sixth.

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a reduction in both catch and spawning stock biomass.

Recommendation:

1. ACFM recommends that the TAC in 1989 should not exceed 355,000 t in order to halt the decline in the spawning stock biomass. The TAC should apply to all areas in which

Western mackerel are caught, i.e., including Divisions IIa, Vb, and VIIIa,b, Sub-areas VI and VII (all for the whole year), and Division IVa from 1 August - 31 December. ACFM advice is based on the distribution and migration patterns of the stocks concerned; at present, these do not correspond to the management units employed.

2. ACFM reiterates its recommendation that the eastern boundary of the closed area in Divisions VIIe,f should be at 2°W. There is no evidence to suggest that the other boundaries of the closed area should be changed, and ACFM recommends that they remain in place.

3. ACFM reiterates its recommendation that a 30-cm minimum landing size should be implemented in all areas.

Special comments: The figures for Agreed TAC in the table at the start of this chapter cover Sub-areas II (international waters only), VI, VII, VIII (except VIIIc), XII, and XIV, and Division Vb (EC zone and EC allocation within the Faroese zone). For the years 1982 through 1987, the annual allocation to the EC in Faroese waters has been of the order of 5,000 t and has been included as such in the table.

For 1988, the agreements are as follows:

Vb (EC zone) VI, VII, VIII (except VIIIc), XII, XIV	EC	372,000	
	Norway	22,000	
	Faroes	6,000	400,000
North Sea (IV): north of 59°	Norway	32,700	
	EC	12,000[1]	
	Sweden	800	45,500
IIa (Norwegian zone and international waters):	Norway	90,000	
	EC	15,000	105,000
Vb (Faroese zone):	Norway	12,000	
	EC	5,000	
	USSR	5,000	22,000
			572,500

[1] Of which 300 t allocated to Sweden.

In the light of these agreements, the actual 1988 catch is assumed to be 600,000 t.

The 1984 year class is now seen to have been one of the strongest on record, one which could have brought about a steady increase in spawning stock biomass. Instead, the continuation of very high catches in excess of the recommended TACs, together with high fishing mortality on immature fish, has prevented this. The rebuilding potential of the four good year classes since 1978 has gone instead to maintain the short-term yield, and the spawning stock is forecast to decline still further by 1990 if the 1987-1988 level of fishing mortality continues.

The 1985 year class (1,400 million recruits) is only about half the strength of the average 1972-1984 recruitment and thus cannot be expected to contribute to any stock recovery. The available evidence indicates that the 1986 year class is also low, below the average of the series, and in the absence of a firm estimate, ACFM assumed it to be 1,100 million fish. This figure is the average strength of the five poor year classes in the series (1972, 1977, 1982, 1983, and 1985). Any error in this assumption will have to be very large to have any significant effect on the forecast, since the 1986 year class will make up only 4-7% of the annual catch over the period 1988-1990, and only 4-8% of the spawning stock biomass.

The next Western mackerel egg survey will be conducted in 1989; preliminary results will not be available until the November 1989 meeting of ACFM.

6.2 Blue Whiting

6.2.1 Blue whiting in the northern area (Sub-areas I-VI and XIV and Divisions VIIb,c)

Source of information: Blue Whiting Assessment Working Group report, September 1988 (C.M. 1989/Assess:5).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	-	1000	570-780	-	783	1000	950	832	-	-	-
Actual landings	871	545	539	611[3]	653[3]	794[3]	632[3]	-	1093	15	452
Sp. stock biomass	3536	2979	2583	2639	3458	4455	4248	4314[1]	6331	2421	4365
Recruitment (age 0)	5.7	39.4	40.9	17.7	17.3	11.0[1]	11.0[1]	11.0[1]	40.9	4.3	16.8
Mean F(4-8,u)	0.27	0.18	0.22	0.24	0.25	0.30	0.22	-	0.30	0.004	0.13

[1]Predicted or assumed. [2]Over period 1970-1987. [3]Including catches in Divisions VIIg-k.
Weights in '000 t, recruitment in billions.

Catches: After the peak in 1979/1980, landings decreased until 1983 and then increased until 1986 (Tables 6.2.1.1 - 6.2.1.5). TACs preferred by ACFM have not been reached in any year.

Data and assessment: Analytical using catch-in-number data, CPUE, and results from acoustic surveys during the spawning season.

Fishing mortality: The 1987 value at the same level as the 1982-1985 values. Recent values of F have been somewhat higher than estimated last year and are almost 50% higher than $F_{0.1}$.

Recruitment: No evidence of strong year classes since the 1983 year class, which is stronger than estimated last year. The 1984 and 1985 year classes appear to be of average strength, but the size of subsequent year classes is not yet known.

State of stock: Total stock biomass at a minimum in 1982, and spawning stock biomass in 1983. The strong 1982 and 1983 year classes then caused a steady increase up to 1986, followed by a small decrease in 1987 (Figure 6.2.1).

Forecast for 1989: Assuming F(88) = 0.17, Catch(88 = 600,000 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	$F_{0.1}$ = F(88)	0.17	4,235	631	4,032	Small decrease in SSB
B	F(87)	0.22	4,235	780	3,890	10% decrease in SSB by 1990

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a decrease in the spawning stock in 1989 and 1990 compared to 1988.

Recommendation: ACFM prefers that fishing mortality should be reduced to the $F_{0.1}$ level. corresponding to a TAC of 630,000 t in 1989.

Special comments: Catches in directed fisheries in Divisions VIIg-k are now included in the assessment of the northern stock. The use of the complete series of survey data and of catch-per-unit-effort data has resulted in a small downward revision in the estimates of stock size made in 1987. As a corollary, the fishing mortality rate now appears to be higher and is in excess of $F_{0.1}$. At present levels of fishing mortality, it is expected that the spawning stock will decrease as a result of relatively low recruitment levels. This trend is not likely to be reversed until stronger year classes recruit to the stock. The recommended level of fishing mortality for 1989 is based on the need to prevent a rapid decrease in spawning stock if recruitment continues at its recent level.

6.2.2 Blue whiting in the southern area (Divisions VIId,e,g-k and Sub-areas VIII and IX

Source of information: Blue Whiting Assessment Working Group report, September 1988 (C.M. 1989/Assess:5).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Actual landings	38.7	31.6	30.8	31.2[2]	42.8[2]	33.1[2]	32.8[2]	-	42.8	21.4	31.1

[1]Over period 1970-1987. [2]Excluding catches in Divisions VIIg-k allocated to northern stock. Weights in '000 t.

Catches: Except for 1981 and 1985 recent landings have been stable at around the long-term average (Table 6.2.2).

Data and assessment: A preliminary assessment was made using catch in numbers at age and CPUE data for the period 1981-1987. Some doubts about the validity of age determination, but catches appear to be composed mainly of young age groups (0-5).

Fishing mortality: The preliminary assessment indicates that fishing mortality may be high on 2-year-olds and older. The high apparent level of fishing mortality, however, could be an artefact caused by emigration out of the area of the fishery.

Recruitment: No information.

State of stock: Because of the doubts about the interpretation of the preliminary assessment, it is not possible to identify the state of exploitation of this stock.

Forecast for 1989: None.

Special comments: If the assessment of this stock is to be put onto a firmer basis, information on the size and distribution of the stock is required from surveys carried out on a regular basis. Because of doubts about the validity of age determination, it is recommended that an otolith exchange programme should be carried out, both between countries exploiting this stock and, for comparison, with countries exploiting the northern stock.

6.2.3 Distribution in time and space of different life history stages of blue whiting

A full description of available knowledge on the migration and distribution of each life history stage of blue whiting is published in the 1985 ACFM report. The account below gives additional information provided by the Blue Whiting Assessment Working Group in 1988 (C.M.1989/Assess:5).

1. A coordinated acoustic survey was once again carried out in the summer of 1988. For technical reasons associated with the dispersed nature of the blue whiting stock in deep water, however, the Working Group was not able to make a reliable estimate of the stock biomass from the results of this survey or to partition the estimates between zones of national jurisdiction. The survey nevertheless shows that the stock was widely distributed in the Norwegian Sea (Division IIa) and adjacent waters immediately to the south (mainly Division Vb and the northern parts of Divisions IVa and VIa) in the summer of 1988. The total area of distribution in relation to zones of national jurisdiction is shown in Figure 6.2.3. For reference, the information given in the 1986 ACFM report on the percentages of the total biomass estimates from earlier surveys in each area of national jurisdiction and in international waters is given in Table 6.2.3.1.

2. Updated information on the distribution of catches including those in 1987 is given in Table 6.2.3.2. As pointed out in the 1987 ACFM report, the information contained in this table was supplied by members of the Blue Whiting Assessment Working Group and involved making some assumptions about the division of catches between zones. The total for each year, furthermore, does not correspond exactly with officially-reported landings. As pointed out in the 1987 report, the proportion of catches taken in the fishery zone at Jan Mayen is not known for the years prior to 1981 when this zone was declared.

Table 2.1.1.1 North-East Arctic cod. Revision of catch weights and stock weights.

Age	Weight in catch					Weight in stock				
	1987		1988			1988		1989		
	Old	New	Old	New[1]	New[2]	Old	New	Old	New[1]	New[2]
3	0.44	0.34	0.49	0.28	0.36	0.30	0.21	0.30	0.20	0.20
4	0.88	0.67	1.02	0.56	0.66	0.64	0.45	0.68	0.36	0.50
5	2.04	1.49	1.76	1.01	1.16	1.27	0.84	1.41	0.67	0.88
6	3.13	2.86	3.34	2.01	2.26	2.71	1.60	2.25	1.18	1.47
7	4.18	4.56	4.18	3.86	4.22	3.97	3.41	3.97	2.43	2.93
8	-	-	-	-	-	5.50	5.14	5.50	4.31	5.03

[1] Growth in 1988 is 5.6 cm.
[2] Growth in 1988 is 9.8 cm.
Weights at age for older age groups are not revised.
Weights in kg.

Table 2.1.1.2 North-East Arctic cod. Predictions based on revised weights at age.

Prediction	1987			1988			1989
	Stock biomass	F	Catch	Stock biomass	F	Catch	Stock biomass
1987 Working Group assessment	1,499	0.80	545	1,961	0.51	530	2,219
					0.58	590	2,152
Growth as in 1987 (5.6 cm)	1,499	0.95	530	1,268	0.50	325	1,224
					0.86	500	1,041
					1.09	590	947
Growth as in 1977-1986 (9.8 cm)	1,499	0.95	530	1,268	0.50	363	1,503
					0.74	500	1,349
					0.93	590	1,248

Weights in '000 t.

Table 2.1.2.1 North-East Arctic COD.
Total nominal catch (t) by fishing areas (Norwegian and USSR coastal cod not included).

Year	Sub-area I	Division IIa	Division IIb	Total catch
1960	357,327	115,116	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	444,983
1966	292,253	134,805	56,653	483,711
1967	322,798	128,747	121,060	572,605
1968	642,452	162,472	269,254	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
1984	54,317	197,573	25,761	277,651
1985	112,605	173,559	21,756	307,920
1986[1]	157,631	202,688	69,794	430,113
1987[1]	143,418	249,408	125,539	518,365

[1] Provisional figures.

Table 2.1.2.2 North-East Arctic COD.
Nominal catch (t) by countries (Norwegian and USSR coastal cod not included) (Sub-area I and Divisions IIa and IIb combined).

Year	Faroe Islands	France	German Dem.Rep.	Germany, Fed.Rep.	Norway	Poland	United Kingdom	USSR	Others	Total all countries
1960	3,306	22,321	-	9,472	231,997	20	141,175	213,400	351	622,042
1961	3,934	13,755	3,921	8,129	268,377	-	158,113	325,780	1,212	783,221
1962	3,109	20,482	1,532	6,503	225,615	-	175,020	476,760	245	909,266
1963	-	18,318	129	4,223	205,056	108	129,779	417,964	-	775,577
1964	-	8,634	297	3,202	149,878	-	94,549	180,550	585	437,695
1965	-	526	91	3,670	197,085	-	89,962	152,780	816	444,930
1966	-	2,967	228	4,284	203,792	-	103,012	169,300	121	483,704
1967	-	664	45	3,632	218,910	-	87,008	262,340	6	572,605
1968	-	-	225	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	38,453	1,102,434
1975	11,309	28,734	9,981	30,037	277,099	7,435	101,843	343,580	19,368	829,377
1976	11,511	20,941	8,946	24,369	344,502	6,986	89,061	343,057	18,090	867,463
1977	9,167	15,414	3,463	12,763	388,982	1,084	86,781	369,876	17,771	905,301
1978	9,092	9,394	3,029	5,434	363,088	566	35,449	267,138	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
						Spain				
1981	12,825	3,106	298	2,228	277,818	14,500	5,262	83,000	-	399,037
1982	11,998	761	302	1,717	287,525	14,515	6,601	40,311	-	363,730
1983	11,106	126	473	1,243	234,000	14,229	5,840	22,975	-	289,992
1984	10,674	11	686	1,010	230,743	8,608	3,663	22,256	-	277,651
1985	13,418	23	1,019	4,395	211,065	7,846	3,335	62,489	4,330	307,920
1986[1]	18,667	591	1,543	10,092	232,096	5,497	7,581	150,541	3,505	430,113
1987[1]	15,897	1,321	986	7,040	261,892	16,223	10,177	202,314	2,515	518,365
1988	EXPECTED LANDINGS									455,500

[1] Provisional figures.

Table 2.2.1 North-East Arctic HADDOCK.
Total nominal catch (t) by fishing areas (Norwegian and USSR coastal haddock not included).

Year	Sub-area I	Division IIa	Division IIb	Total
1960	125,657	27,925	1,854	155,434
1961	165,165	25,642	2,427	193,234
1962	160,972	25,189	1,727	187,888
1963	124,774	21,031	939	146,744
1964	79,056	18,735	1,109	98,900
1965	98,505	18,640	939	118,079
1966	124,115	34,892	1,614	160,621
1967	108,066	27,980	440	136,486
1968	140,970	40,031	725	181,726
1969	88,960	40,208	1,341	130,509
1970	59,493	26,611	497	86,601
1971	56,300	21,567	435	78,302
1972	221,183	41,979	2,155	265,317
1973	283,728	23,348	2,989	320,065
1974	159,037	47,033	5,068	221,138
1975	121,686	44,330	9,726	175,742
1976	94,065	37,566	5,649	137,279
1977	72,159	28,452	9,547	110,158
1978	63,965	30,478	979	95,422
1979	63,841	39,167	615	103,623
1980	54,205	33,616	68	87,889
1981	36,834	39,864	455	77,153
1982	17,948	29,005	2	46,955
1983	7,550	13,872	185	21,607
1984	4,000	13,247	71	17,318
1985	30,385	10,774	111	41,270
1986[1]	69,865	26,006	714	96,585
1987[1]	109,121	38,704	3,040	150,865

[1] Provisional figures.

<u>Table 2.2.2</u> North-East Arctic HADDOCK.
Nominal catch (t) by countries (Norwegian and USSR coastal haddock not included) (Sub-area I and Divisions IIa and IIb combined).

Year	Faroe Islands	France	German Dem.Rep.	Germany, Fed.Rep.	Norway	Poland	United Kingdom	USSR	Others	Total
1960	172	-	-	5,597	46,263	-	45,469	57,025	125	155,651
1961	285	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	7,348	221,157
1975	299	5,191	437	15,930	55,966	1,080	28,677	65,015	3,163	175,758
1976	536	4,459	348	16,660	49,492	986	16,940	42,485	5,358	137,265
1977	213	1,510	144	4,798	40,118	-	10,878	52,210	287	110,158
1978	466	1,411	369	1,521	39,955	1	5,766	45,895	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	<u>Spain</u>	1,682	13,400	-	77,153
1982	496	53	-	1,258	41,421	-	827	2,900	-	46,955
1983	428	-	1	729	19,371	139	259	680	-	21,607
1984	297	15	4	400	15,186	37	276	1,103	-	17,318
1985	424	21	20	395	17,490	77	153	22,690	-	41,270
1986[1]	893	33	75	1,079	48,314	22	431	45,738	-	96,585
1987[1]	464	26	83	3,106	69,539	99	563	76,980	-	150,865
1988	Expected Landings									120,000

[1] Provisional figures.

Table 2.3 North-East Arctic SAITHE.
Nominal catch (tonnes) by countries in Sub-area I and Divisions IIa and IIb combined as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Denmark	-	-	-	-	-
Faroe Islands	809	1,117	532	236	339
France	4,345	2,601	1,016	194	82
German Dem.Rep.	6,484	2,435	-	-	-
Germany, Fed.Rep.	18,190	14,823	12,511	8,413	7,224
Norway	121,069	141,346	128,878	166,139	159,643
Poland	35	-	-	-	-
Portugal	203	-	-	-	-
Spain	121	685	780	-	-
UK (Engl.& Wales)	2,790	1,170	794	395	731
UK (Scotland)	37	-	-	-	1
USSR	381	3	43	121	14
Total	154,464	164,180	144,554	175,498	168,034

Country	1983	1984	1985	1986	1987[1]
Denmark	-	-	-	-	1
Faroe Islands	539	503	490	426	-
France	418	431	657	308	421
German Dem.Rep.	-	6	11	-	-
Germany, Fed.Rep.	4,933	4,532	1,837	3,470	4,912
Norway	149,556	152,818	103,899	66,152	85,744
Poland	-	-	-	-	-
Portugal	-	-	-	-	-
Spain	33	-	-	-	9
UK (Engl.& Wales)	1,251	335	202	54	54
UK (Scotland)	-	-	+	21	3
USSR	206	161	51	27	366
Total	156,936	158,786	107,147	70,458	91,510

[1] Provisional figures.

Table 2.4.1 REDFISH in Sub-areas I and II.
Nominal catch (t) by countries, Sub-area I, Divisions IIa and IIb combined as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Denmark	-	-	-	-	-
Faroe Islands	1	-	-	206	-
France	3,608	1,142	1,297	537	841
German Dem.Rep.	16,165	16,162	8,448	4,614	4,463
Germany, Fed.Rep.	11,483	11,913	7,992	4,688	3,182
Norway	7,802	9,025	8,472	9,249	10,045
Poland	2,957	261	87	26	-
Portugal	378	1,100	271	-	-
Spain	-	1,375	1,965	930	72
UK (England & Wales)	3,390	1,756	1,307	470	336
UK (Scotland)	-	-	-	-	-
USSR	78,092	70,451	72,802	81,652	112,810
Total	124,172[2]	113,620[2]	102,765[2]	102,372	131,749

Country	1983	1984	1985	1986	1987[1]
Denmark	-	-	-	-	+
Faroe Islands	-	-	-	29	450
France	798	2,970	3,326	2,719	1,616
German Dem.Rep.	3,394	4,168	3,260	1,323	417
Germany, Fed.Rep.	3,395	3,289	3,306	3,561	5,412
Norway	11,083	18,650	20,456	23,251	18,054
Poland	-	-	-	-	-
Portugal	-	1,806	2,056	1,591	1,175
Spain	222	25	38	-	25
UK (England & Wales)	182	716	167	129	229
UK (Scotland)	-	-	-	14	9
USSR	105,459	69,689	59,943	20,694	7,046
Total	124,533	101,313	92,552	53,311	34,433

[1] Provisional figures.
[2] The total figure used by the Working Group for assessments (including catches by non-members).

Table 2.4.2 REDFISH in Sub-areas I and II.
Nominal catch (t) by countries in Sub-area I as officially reported to ICES.

Country	1978	1979	1980	1981	1982
France	27	7	1	16	-
Germany, Fed.Rep.	+	-	-	7	10
Norway	1,333	1,374	736	543	732
Portugal	8	-	170	-	-
UK (England & Wales)	959	462	295	61	77
UK (Scotland)	-	-	-	-	-
USSR	2,575	639	33	1,220	1,750
Total	4,902	2,482	1,235	1,847	2,569

Country	1983	1984	1985	1986	1987[1]
France	-	-	-	-	-
Germany, Fed.Rep.	-	1	143	50	10
Norway	580	1,472	2,378	4,245	3,166
Portugal	-	-	-	-	-
UK (England & Wales)	48	22	43	32	14
UK (Scotland)	-	-	-	3	-
USSR	4,023	532	368	1,066	284
Total	4,651	2,027	2,932	5,396	3,474

[1]Provisional figures.

Table 2.4.3 REDFISH in Sub-areas I and II.
Nominal catch (t) by countries in Division IIa
as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Faroe Islands	1	-	-	206	-
France	3,575	1,134	1,296	521	841
German Dem.Rep.	12,933	12,439	7,460	2,205	2,760
Germany, Fed.Rep.	11,482	11,913	7,992	4,681	3,172
Norway	6,369	7,637	7,734	8,704	9,140
Poland	2,477	261	78	26	-
Portugal	352	1,100	89	-	-
Spain	-	1,125	1,500	620	-
UK (England & Wales)	2,067	1,195	967	409	259
UK (Scotland)	-	-	-	-	-
USSR	31,783	29,519	46,762	56,130	63,125
Total	71,039	66,323	73,878	73,502	79,297

Country	1983	1984	1985	1986	1987[1]
Faroe Islands	-	-	-	29	450
France	798	2,970	3,326	2,719	1,616
German Dem.Rep.	2,500	2,570	2,800	1,252	375
Germany, Fed.Rep.	3,395	3,288	2,972	3,319	3,562
Norway	10,500	17,111	18,062	18,704	14,715
Poland	-	-	-	-	-
Portugal	-	1,134	1,327	1,273	1,156
Spain	-	-	-	-	-
UK (England & Wales)	134	672	120	94	204
UK (Scotland)	-	-	-	11	8
USSR	82,836	63,342	59,047	19,099	5,269
Total	100,163	91,087	87,654	46,500	27,355

[1] Provisional figures.

Table 2.4.4 REDFISH in Sub-areas I and II.
Nominal catch (t) by countries in Division IIb
as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Denmark	-	-	-	-	-
Faroe Islands	+	-	-	-	-
France	6	1	-	-	-
German Dem.Rep.	3,232	3,723	988	2,409	1,703
Germany, Fed.Rep.	1	-	-	-	-
Norway	100	14	2	2	173
Poland	480	-	9	-	-
Portugal	18	-	12	-	-
Spain	-	250	465	310	72
UK (England & Wales)	364	99	45	+	+
UK (Scotland)	-	-	-	-	-
USSR	43,734	40,293	26,007	24,302	47,935
Non-members	296[2]	435[2]	124[2]	-	-
Total	48,231	44,815	27,652	27,023	49,883

Country	1983	1984	1985	1986	1987[1]
Denmark	-	-	-	-	+
Faroe Islands	-	-	-	-	-
France	-	-	-	-	-
German Dem.Rep.	894	1,598	460	71	42
Germany, Fed.Rep.	-	-	190	192	1,840
Norway	3	67	16	302	173
Poland	-	-	-	-	-
Portugal	-	672	729	318	19
Spain	222	25	38	-	25
UK (England & Wales)	-	22	4	3	11
UK (Scotland)	-	-	-	+	1
USSR	18,600	5,815	528	529	1,493
Total	19,719	8,199	1,965	1,415	3,604

[1] Provisional figures.
[2] As reported to Norwegian authorities.

Table 2.4.5 REDFISH in Sub-areas I and II.
Nominal catch (t) of *Sebastes marinus* and *Sebastes mentella* in Sub-area I and Divisions IIa and IIb combined.

Species	1978	1979	1980	1981	1982
S. marinus	31,695	26,475	23,411	20,826	16,366
S. mentella	92,477	87,145	79,354	81,546	115,383
Total	124,172	113,620	102,765	102,372	131,749

Species	1983	1984	1985	1986	1987[1]
S. marinus	19,260	28,379	29,484	30,199	24,064
S. mentella	105,273	72,934	63,068	23,112	10,369
Total	124,533	101,313	92,552	53,311	34,433

[1] Provisional figures.

Table 2.5.1 GREENLAND HALIBUT in Sub-areas I and II. Nominal catch (t) by countries (Sub-area I, Divisions IIa and IIb combined) as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Denmark	-	-	-	-	-
Faroe Islands	-	3	-	8	-
France	-	-	-	-	8
German Dem.Rep.	4,611	3,488	2,080	1,358	1,153
Germany, Fed.Rep.	321	481	303	128	18
Norway	4,082	2,843	3,157	4,201	3,206
Poland	544	106	-	-	-
Spain	-	-	-	-	-
UK (Engl.& Wales)	407	59	26	9	10
UK (Scotland)	-	-	-	-	-
USSR	14,651	10,311	7,670	9,276	12,394
Others	1	21	48	38	-
Total	24,617	17,312	13,284	15,018	16,789

Country	1983	1984	1985	1986	1987[1]
Denmark	-	-	-	-	+
Faroe Islands	-	-	-	42	7
France	67	138	239	13	15
German Dem.Rep.	1,913	2,089	3,807	2,659	1,855
Germany, Fed.Rep.	130	76	193	59	170
Norway	4,883	4,376	5,464	7,869	7,160
Poland	-	-	-	-	-
Spain	-	-	-	-	1
UK (Engl.& Wales)	2	23	5	10	61
UK (Scotland)	-	-	-	2	20
USSR	15,152	15,181	10,237	12,200	9,820
Others	-	-	-	-	-
Total	22,147	21,883	19,945	22,854	19,109

[1] Provisional figures.

Table 2.5.2 GREENLAND HALIBUT in Sub-areas I and II. Nominal catch (t) by countries in Sub-area I as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Germany, Fed.Rep.	-	-	-	19	-
Norway	1,148	727	490	641	505
UK (Engl.& Wales)	232	36	12	5	8
UK (Scotland)	-	-	-	-	-
USSR	211	182	100	564	200
Others	-	-	-	1	-
Total	1,591	945	602	1,230	713

Country	1983	1984	1985	1986[1]	1987[1]
Germany, Fed.Rep.	-	-	-	1	2
Norway	490	593	602	557	1,576
UK (Engl.& Wales)	1	17	1	5	10
UK (Scotland)	-	-	-	1	+
USSR	196	81	122	615	311
Others	-	-	-	-	-
Total	687	691	725	1,179	1,899

[1] Provisional figures.

Table 2.5.3 GREENLAND HALIBUT in Sub-areas I and II. Nominal catch (t) by countries in Division IIa as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Faroe Islands	-	3	-	8	-
France	-	-	-	-	8
German Dem.Rep.	1,398	787	570	18	73
Germany, Fed.Rep.	321	481	303	109	18
Norway	2,084	2,051	2,529	3,077	2,487
Poland	197	4	-	-	-
UK (Engl.& Wales)	82	11	9	4	2
UK (Scotland)	-	-	-	-	-
USSR	8,809	6,929	2,014	2,031	2,459
Others	1	21	48	37	-
Total	12,892	10,287	5,473	5,284	5,047

Country	1983	1984	1985	1986	1987[1]
Faroe Islands	-	-	-	6	3
France	67	138	239	13	14
German Dem.Rep.	14	189	82	55	12
Germany, Fed.Rep.	130	76	172	42	64
Norway	4,257	3,703	4,791	6,367	5,087
Poland	-	-	-	-	-
UK (Engl.& Wales)	1	1	2	5	44
UK (Scotland)	-	-	-	1	10
USSR	5,031	5,459	6,894	5,553	4,937
Others	-	-	-	-	-
Total	9,500	9,566	12,180	12,042	10,171

[1] Provisional figures.

Table 2.5.4 GREENLAND HALIBUT in Sub-areas I and II. Nominal catch (t) by countries in Division IIb as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Denmark	-	-	-	-	-
Faroe Islands	-	-	-	-	-
France	-	-	-	-	-
German Dem.Rep.	3,213	2,701	1,510	1,340	1,080
Germany, Fed.Rep.	-	-	-	-	-
Norway	850	65	138	483	214
Spain	-	-	-	-	-
Poland	347	102	-	-	-
UK (Engl.& Wales)	93	12	5	-	+
USSR	5,631	3,200	5,556	6,681	9,735
Total	10,134	6,080	7,209	8,504	11,029

Country	1983	1984	1985	1986	1987[1]
Denmark	-	-	-	-	+
Faroe Islands	-	-	-	36	4
France	-	-	-	-	1
German Dem.Rep.	1,899	1,900	3,725	2,604	1,843
Germany, Fed.Rep.	-	-	21	16	104
Norway	136	80	71	945	497
Spain	-	-	-	-	1
Poland	-	-	-	-	7
UK (Engl.& Wales)	+	5	2	+	10
USSR	9,925	9,641	3,221	6,032	4,572
Total	11,960	11,626	7,040	9,633	7,039

[1]Provisional figures.

Table 2.6.1 Nominal catches (in tonnes) of cod in ICES Sub-area XIV, 1978-1987. (Data for 1978-1981 broken down by countries are from Bulletin Statistique.)

Country	1978	1979	1980	1981	1982
Faroe Islands	6	-	-	292	-
Germany, Fed.Rep.	3,936	1,062	3,193	7,367	8,940
Greenland	1,347	2,755	1,778	890	893
Iceland	13	3	19	1	-
Norway	17	-	-	-	-
United Kingdom	41	-	-	-	-
Total	5,362	3,820	4,990	8,550	9,833
Working Group total	26,000[3,4]	34,000[3,4]	12,000[2,3]	16,000[2,3]	27,000[2,3]

Country	1983	1984	1985	1986	1987[1]
Faroe Islands	368	-	-	2	-
Germany, Fed.Rep.	8,237	6,987	2,006	4,065	5,117
Greenland	438	1,047	106	601[5]	1,541[6]
Iceland	-	-	-	-	-
Norway	-	-	-	-	-
United Kingdom	-	-	-	-	-
Total	9,043	8,034	2,112	4,668	6,658
Working Group total	13,377[3]	8,068[3]	2,112	4,668	6,658

[1] Preliminary.
[2] Including estimates of discards.
[3] Including catches reported from ICES Sub-area XII and Division Vb.
[4] Including estimates of unreported catches.
[5] Including 97 t by chartered trawlers.
[6] Including 74 t by chartered trawlers.

Table 2.7.1 Nominal catch of REDFISH (in tonnes) by countries in Division Va (Iceland) as reported officially to ICES.

Country	1976	1977	1978	1979	1980	1981
Belgium	1,522	1,395	1,549	1,385	1,381	924
Faroe Islands	211	292	242	629	1,055	1,212
Germany,Fed.Rep.	32,948	31,632	-	-	-	-
Iceland	34,028	28,119	33,318	62,253	69,780	93,349
Norway	31	87	93	43	33	32
UK	1,124	+	-	-	-	-
Total	69,864	61,525	35,202	64,310	72,249	95,517

Country	1982	1983	1984	1985	1986	1987[1]
Belgium	283	389	291	400	423	398
Faroe Islands	1,046	1,357	686	291	253	332
Germany, Fed.Rep.	-	-	-	-	-	-
Iceland	115,051	122,749	108,270	91,381	85,992	87,768
Norway	11	32	12	8	2	7
UK	-	-	-	-	-	-
Total	116,391	124,527	109,259	92,080	86,670	88,505

[1] Provisional data.

Table 2.7.2 Nominal catch of REDFISH (in tonnes) by countries in Division Vb (Faroe Islands) as reported officially to ICES.

Country	1976	1977	1978	1979	1980	1981
Denmark	–	–	–	–	–	–
Faroe Islands	33	54	1,525	5,693	5,509	3,232
France	–	1,368	448	862	627	59
Germany, Fed.Rep.	5,255	5,854	7,767	6,108	3,891	3,841
Iceland	–	–	–	–	–	–
Netherlands	–	–	+		–	–
Norway	17	10	9	11	12	13
UK	59	116	57	+	–	–
USSR	–	–	–	–	–	–
Total	5,364	7,402	9,806	12,674	10,039	7,145

Country	1982	1983	1984	1985	1986	1987[1]
Denmark	–	–	–	–	36	176
Faroe Islands	3,999	4,642	8,770	12,634	15,331	13,942
France	204	439	559	1,157	752	622
Germany, Fed.Rep.	5,230[2]	4,300	4,460	5,091	5,142	3,051
Iceland	1	–	–	–	–	–
Netherlands	–	–	–	–	–	–
Norway	7	3	1	4	2	4
UK	–	–	–	–	–	–
USSR	–	–	142	868	320[3]	111[3]
Total	9,441	9,384	13,932	19,754	21,583	17,906

[1] Provisional data. [2] Including 570 t from Sub-area VI.
[3] According to the Faroe Coast Guard.

Table 2.7.3 Nominal catch of REDFISH (in tonnes) by countries in Sub-area XIV (East Greenland) as reported officially to ICES.

Country	1976	1977	1978	1979	1980	1981
Canada	420	-	-	-	-	-
Greenland	129	1	3	-	-	1
Faroe Islands	3	19	-	-	-	18
France	-	-	-	490	-	-
German Dem. Rep.	-	-	-	-	-	-
Germany, Fed.Rep.	4,403	13,347	20,711[2]	20,428[2]	32,520[2]	42,980[2]
Iceland	7,410	81	151	-	89	-
Norway	5	112	2	-	-	-
Poland	-	-	-	-	-	-
UK	286	622	13	-	-	-
USSR	101,000	251	-	-	-	-
Total	113,656	14,433	20,880	20,918	32,609	42,999

Country	1982	1983	1984	1985	1986	1987[1]
Bulgaria	-	-	2,961[3]	5,825[3]	11,385[3]	12,270[3]
Canada	-	-	-	-	-	-
Greenland	+	1	10	5,519[4]	9,542[4]	2,912[4]
Faroe Islands	-	27	-	-	5	382[1]
France	-	-	-	-	-	-
German Dem.Rep.	-	155[3]	989[3]	5,438[3]	8,574[3]	7,023[3]
Germany, Fed.Rep.	42,815[2]	30,815[2]	14,141	5,974	5,584	4,688
Iceland	17[3]	-	-	+	-	-
Norway	-	-	15	-	-	-
Poland	581[3]	-	239[3]	135[3]	149[3]	25[3]
UK	-	-	-	-	-	-
USSR	20,217[3]	-	-	42,973[3]	60,863[3]	68,521[3]
Total	63,630	31,036	18,355	65,864	96,102	95,778
Total used in the Assessment	42,815	30,853	14,166	11,493	15,131	7,982

[1] Provisional data.
[2] Catches updated for Sub-area XII included.
[3] Catches from the oceanic stock not included in the assessments.
[4] Fished mainly by the Japanese fleet.

Table 2.7.4 Nominal catch of REDFISH (in tonnes) by country in Sub-area XII as reported officially to ICES.

Country	1982	1983	1984	1985	1986	1987
USSR	39,783	60,079	60,643	17,300	24,131	2,948

Table 2.7.5 Nominal catch of REDFISH ('000 tonnes) in Division Va by countries. Separation into the species components according to the method used by the Redfish Working Group.

Year		Belgium	Faroe Islands	German Dem.Rep.	Germany, Fed.Rep.	Iceland	Norway	Poland	UK	Total
1976	Total	1.5	0.2	-	32.9	34.0	+	-	1.1	69.7
	S.mar.	1.5	0.2		4.3	33.3			1.1	40.4
	S.ment.	-	-		28.6	0.7			-	29.3
1977	Total	1.4	0.3	-	31.6	28.1	0.1	-	-	61.5
	S.mar.	1.4	0.3		9.2	27.5	0.1			38.5
	S.ment.	-	-		22.4	0.6	-			23.0
1978	Total	1.5	0.2	-	-	33.3	0.1	-	-	35.1
	S.mar.	1.5	0.2			29.4	0.1			31.2
	S.ment.	-	-			3.9	-			3.9
1979	Total	1.4	0.6	-	-	62.3	0.1	-	-	64.4
	S.mar.	1.4	0.6			54.6	0.1			56.7
	S.ment.	-	-			7.7	-			7.7
1980	Total	1.4	1.1	-	-	69.8	+	-	-	72.3
	S.mar.	1.4	1.1			59.6				62.1
	S.ment.	-	-			10.2				10.2
1981	Total	0.9	1.2	-	-	93.4	+	-	-	95.5
	S.mar.	0.9	1.2			73.7				75.8
	S.ment.	-	-			19.7				19.7
1982	Total	0.3	1.0	-	-	115.1	+	-	-	116.4
	S.mar.	0.3	1.0			96.6	+			97.9
	S.ment.	-	-			18.5	-			18.5
1983	Total	0.4	1.4	-	-	122.7	+	-	-	124.5
	S.mar.	0.4	1.4			85.6				87.4
	S.ment.	-	-			37.1				37.1
1984	Total	0.3	0.7	-	-	108.3	+	-	-	109.3
	S.mar.	0.3	0.7			83.8	+			84.8
	S.ment.	-	-			24.5	-			24.5
1985	Total	0.4	0.3	-	-	91.4	+	-	-	92.2
	S.mar.	0.4	0.3			66.7	+			67.4
	S.ment.	-	-			24.8	-			24.8
1986	Total	0.4	0.3	-	-	86.0	+	-	-	86.7
	S.mar.	0.4	0.3			67.1	+			67.8
	S.ment.	-	-			18.9	-			18.9
1987	Total[1]	0.4	0.3	-	-	87.8	+	-	-	88.5
	S.mar.	0.4	0.3			68.5				69.2
	S.ment.	-	-			19.3				19.3

[1]Preliminary.

Table 2.7.6
Nominal catch of REDFISH ('000 tonnes) in Division Vb by countries. Separation into the species components according to the method used by the Redfish Working Group.

Year		Denmark	Faroe Islands	France	German Dem.Rep.	Germany, Fed.Rep.	Netherlands	Norway	UK	USSR	Total
1976	Total	-	+	-	-	5.3	-	+	0.1	-	5.4
	S.mar.					-			0.1		0.1
	S.ment.					5.3			-		5.3
1977	Total	-	0.1	1.4	-	5.9	-	+	0.1	-	7.5
	S.mar.		0.1	0.6		-			0.1		0.8
	S.ment.		-	0.8		5.9			-		6.7
1978	Total	-	1.5	0.4	-	7.8	-	+	0.1	-	9.8
	S.mar.		1.5	0.4		-			0.1		2.0
	S.ment.		-	-		7.8			-		6.7
1979	Total	-	5.7	0.9	-	6.1	-	+	-	-	12.7
	S.mar.		4.8	-		-					4.8
	S.ment.		0.9	0.9		6.1					7.9
1980	Total	-	5.5	0.6	-	3.9	-	+	-	-	10.0
	S.mar.		4.9	-		-		+			4.9
	S.ment.		0.6	0.6		3.9		-			5.1
1981	Total	-	3.2	+	-	3.9	-	+	-	-	7.1
	S.mar.		2.5	-		-		+			2.5
	S.ment.		0.7	+		3.9		-			4.6
1982	Total	-	4.0	0.2	-	5.2	-	+	-	-	9.4
	S.mar.		1.7	0.1		-		+			1.8
	S.ment.		2.3	+		5.2		-			7.5
1983	Total	-	4.7	0.4	-	4.3	-	-	-	-	9.4
	S.mar.		3.1	0.3		-					3.4
	S.ment.		1.6	0.1		4.3					6.0
1984	Total	-	8.8	0.5	-	4.5	-	+	-	0.1	13.9
	S.mar.		5.8	0.4		-				-	6.2
	S.ment.		3.0	0.1		4.5				0.1	7.7
1985	Total	-	12.6	1.2	-	5.1	-	+	-	0.9	19.8
	S.mar.		8.3	0.9		-				-	9.2
	S.ment.		4.3	0.3		5.1				0.9	10.6
1986	Total	+	15.4	0.8	-	5.1	-	+		0.3	21.6
	S.mar.	-	5.7	0.6		0.1		-		-	6.4
	S.ment.	+	9.7	0.2		5.0		+		0.3	15.2
1987	Total[1]	0.2	13.9	0.6	-	3.1	-	+		0.1	17.9
	S.mar.	-	5.0	0.5		0.6		-		-	6.1
	S.ment.	0.2	8.9	0.1		2.4		+		0.1	11.8

[1]Preliminary.

Table 2.7.7

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

Year		Bulgaria	Canada	Denmark (G)	Faroe Isl.	German Dem.Rep.	Germany, Fed.Rep.	Iceland	Norway	Poland	UK	USSR	Greenland	Total
1976	Total	-	0.4	0.1	+	-	4.4	7.4	+	-	0.3	101.0	-	113.6
	S.mar.	-	0.4	0.1			4.4	7.4			0.3	41.3		53.9
	S.ment.	-	-	-			-	-			-	59.7		59.7
1977	Total	-	-	+	+	-	13.3	0.1	0.1	-	0.6	0.3	-	14.4
	S.mar.	-				13.3	0.1	0.1		0.6	0.3			14.4
	S.ment.	-				-	-	-		-	-			-
1978	Total	-	-	+	-	-	20.7	0.2	+	-	+	-	-	20.9
	S.mar.	-					15.3	0.2						15.5
	S.ment.	-					5.4	-						5.4
1979	Total	-	-	-	+	-	21.1	-	-	-	-	-	-	21.1
	S.mar.	-					15.8							15.8
	S.ment.	-					5.3							5.3
1980	Total	-	-	-	-	-	32.5	0.1	-	-	-	-	-	32.6
	S.mar.	-					22.1	0.1						22.2
	S.ment.	-					10.4	-						10.4
1981	Total	-	-	-	+	-	43.0	-	-	-	-	-	-	43.0
	S.mar.	-					23.6							23.6
	S.ment.	-					19.4							19.4
1982	Total	-	-	+	-	-	42.8	+	-	0.6[2]	-	20.2[2]	-	63.6[2]
	S.mar.	-					23.5			-		-		23.5
	S.ment.	-					19.3			0.6		20.2[2]		40.1[2]
1983	Total	-			+	0.1[2]	30.8					-[2]	-	30.9[2]
	S.mar.	-	-	-		-	15.6	-	-	-	-	-		15.7
	S.ment.	-				0.1	15.2					-[2]		15.2[2]
1984	Total	3.0[2]	-	-	-	1.0[2]	14.1	+	-	0.2[2]	-	-[2]	+	18.3[2]
	S.mar.	-				-	5.0			-		-		5.0
	S.ment.	3.0[2]				1.0	9.1			0.2			-	13.3[2]
1985	Total	5.8[2]	-	-	+	5.4[2]	5.9	+	-	0.1[2]	-	43.0[2]	5.5	65.7[2]
	S.mar.	-				-	1.1			-		-	1.0	2.1
	S.ment.	5.8[2]				5.4	4.8			0.1		43.0	4.5	63.6[2]
1986	Total	11.4[2]	-	-	+	8.6[2]	5.6	-	-	0.1[2]	-	60.9[2]	9.6	96.2[2]
	S.mar.	-			+	-	1.1					-	1.9	3.0
	S.ment.	11.4[2]			+	8.6	4.5			0.1		60.9	7.7	93.2[2]
1987	Total[1]	12.3[2]	-	-	0.4	7.0[2]	4.7	-	+	+[2]	-	68.5[2]	2.9	95.9[2]
	S.mar.	-			0.1	-	0.7		-			-	0.4	1.2
	S.ment.	12.3[2]			0.3	7.0[2]	4.0		+			68.5[2]	2.5	94.7

[1] Preliminary.

[2] Catches of the oceanic stock included.

Table 2.7.8 Nominal catches of oceanic Sebastes mentella in Sub-areas XII and XIV.

Country	1982	1983	1984	1985	1986	1987
Bulgaria	-	-	2,961	5,825	11,385	12,270
German Dem.Rep.	-	155	989	5,438	8,574	7,023
Poland	581	-	239	135	149	25
USSR	59,914	60,079	60,643	60,273	84,994	71,469
Total	60,495	60,234	64,832	71,671	105,102	90,787

Table 2.8.1 GREENLAND HALIBUT. Nominal catches (tonnes) in Sub-areas V and XIV, 1978-1987, as reported to ICES.

Country	1978	1979	1980	1981	1982
Denmark	-	-	-	-	-
Faroe Islands	258	150	1,042	767	1,532
France	12	70	51	8	27
Germany, Fed.Rep.	2,726	6,461	2,318	3,007	2,581
Greenland	6	-	-	+	1
Iceland	11,319	16,934	27,838	15,455	28,300
Norway	19	1	3	2	+
UK (Engl.& Wales)	9	-	-	-	-
USSR	-	-	-	-	-
Total	14,349	23,616	31,252	19,239	32,441

Country	1983	1984	1985	1986	1987[1]
Denmark	-	-	-	-	6
Faroe Islands	1,146	2,502	1,052	857	1,087
France	236	489	845	52	4
Germany, Fed.Rep	1,142	936	863	859	564
Greenland	5	15	81	177[1]	273
Iceland	28,360	30,080	29,231	31,044	44,780
Norway	2	2	3	2	2
UK (Engl.& Wales)	-	-	-	-	-
USSR	-	-	-	-	2
Total	30,888	34,024	32,075	32,991	46,719

[1] Preliminary data.

Table 2.8.2 GREENLAND HALIBUT. Nominal catches (tonnes) in Division Vb, 1978-1987, as reported to ICES.

Country	1978	1979	1980	1981	1982
Denmark	–	–	–	–	–
Faroe Islands	2	108	951	442	863
France	12	66	51	8	27
Germany, Fed.Rep.	570	234	172	114	142
Norway	3	1	3	2	+
UK (Engl.& Wales)	8	–	–	–	–
USSR	–	–	–	–	–
Total	595	566	1,177	566	1,032

Country	1983	1984	1985	1986	1987[1]
Denmark	–	–	–	–	6
Faroe Islands	1,112	2,456	1,052	779	1,013
France	236	489	845	52	4
Germany, Fed.Rep.	86	118	227	114	110
Norway	2	2	2	2	2
UK (Engl.& Wales)	–	–	–	–	–
USSR	–	–	–	–	2
Total	1,436	3,065	2,126	947	1,137

[1] Preliminary data.

Table 2.8.3 GREENLAND HALIBUT. Nominal catches (tonnes) in Division Va, 1978-1987, as reported officially to ICES.

Country	1978	1979	1980	1981	1982
Faroe Islands	256	42	91	325	669
Iceland	11,319	16,934	27,836	15,455	28,300
Norway	13	+	–	+	–
Total	11,588	16,976	27,927	15,780	28,969

Country	1983	1984	1985	1986	1987[1]
Faroe Islands	33	46	–	–	–
Iceland	28,359	30,078	29,195	31,027[1]	44,644
Norway	+	+	1	–	–
Total	28,392	30,124	29,196	31,027	44,644

[1] Preliminary data.

Table 2.8.4 GREENLAND HALIBUT. Nominal catches (tonnes) in Sub-area XIV, 1978-1987, as reported to ICES.

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
France	-	4	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	2,156	6,227	2,146	2,893	2,439	1,054	818	636	745	454
Greenland	6	-	-	+	1	5	15	81	177[1]	273
Iceland	-	-	2	-	-	1	2	36	17[1]	136
Norway	3	-	-	-	-	-	+	-	-	-
UK (Engl.& Wales)	1	-	-	-	-	-	-	-	-	-
Total	2,166	6,231	2,148	2,893	2,440	1,060	835	935	939	863

[1] Preliminary data.

Table 2.9 Nominal catch (tonnes) of SAITHE in Division Va, 1976-1987, as reported to ICES.

Country	1976	1977	1978	1979	1980	1981
Belgium	1,615	1,448	1,092	980	980	532
Faroe Islands	3,267	3,013	4,250	5,457	4,930	3,545
France	51	-	-	-	-	-
Germany, Fed.Rep.	13,785	10,575	-	-	-	-
Iceland	56,811	46,973	44,327	57,066	52,436	54,921
Norway	5	4	3	1	1	3
UK (Engl.& Wales)	6,024	13	-	-	-	-
UK (Scotland)	443	-	-	-	-	-
Total	82,001	62,026	49,672	63,504	58,347	59,001

Country	1982	1983	1984	1985	1986	1987[1]
Belgium	203	224	269	158	218	217
Faroe Islands	3,582	2,138	2,044	1,778	2,291	2,139
France	23	-	-	-	-	-
Germany, Fed.Rep	-	-	-	-	-	-
Iceland	65,124	55,904	60,406	55,185	63,867	78,203
Norway	1	+	-	1	-	-
UK (Engl.& Wales)	-	-	-	29	-	-
UK (Scotland)	-	-	-	-	-	-
Total 1	68,933	58,266	62,719	57,101	66,376	80,559

[1] Preliminary.

Table 2.10.1

Catches of saithe, cod, and haddock in Division Vb (Faroes area) in 1981-1987 by fleet category.

Category	1981			1982			1983		
	Saithe	Cod	Haddock	Saithe	Cod	Haddock	Saithe	Cod	Haddock
Open boats	62	3,092	511	88	1,864	313	8	99	233
Longliners (≤ 100 GRT)	105	8,247	5,127	24	6,016	2,946	19	3,975	3,319
Longliners (>100 GRT)	42	3,078	1,272	20	1,440	902	28	2,987	1,250
Trawlers (4-1000 HP)	7,373	3,023	1,836	3,760	3,807	1,729	6,981	7,967	1,272
Trawlers (>1000 HP)	11,750	2,353	1,323	8,850	2,027	1,068	11,870	4,791	748
Pair trawlers (4-1000 HP)	4,346	837	626	5,527	1,405	1,149	6,435	5,358	2,662
Pair trawlers (>1000 HP)	4,435	522	295	4,961	989	774	8,450	3,550	1,198
Others	2,567	1,464	1,004	7,578	3,839	2,991	5,172	9,189	2,183
Total	29,682	22,616	11,994	30,808	21,387	11,872	38,963	37,916	12,865

Category	1984			1985			1986			1987		
	Saithe	Cod	Haddock	Saithe	Cod	Haddock	Saithe	Cod	Haddock	Saithe	Cod	Haddock
Open boats	75	75	235	94	5,960	944	110	3,203	93	235	2,345	1,665
Longliners (≤ 100 GRT)	27	6,884	3,579	22	8,351	4,771	62	5,113	6,170	46	3,434	5,932
Longliners (>100 GRT)	19	2,825	1,406	44	2,562	1,547	14	1,778	1,667	31	2,359	1,611
Trawlers (4-1000 HP)	9,820	4,908	906	3,186	2,838	678	1,211	2,150	350	1,536	1,580	627
Trawlers (>1000 HP)	17,759	4,392	886	13,963	4,300	904	10,717	2,798	526	7,763	1,879	284
Pair trawlers (4-1000 HP)	8,556	4,454	1,917	11,203	4,754	1,927	11,112	9,634	2,428	9,371	6,359	2,243
Pair trawlers (>1000 HP)	11,259	2,131	637	11,015	1,994	686	13,791	4,595	1,264	16,689	3,334	1,264
Others	6,829	11,085	2,777	4,664	10,250	4,359	3,396	5,255	2,808	1,723	3,052	1,756
Total	54,344	36,914	12,343	44,191	41,009	15,816	40,413	34,526	15,306	37,394	24,342	15,382

Table 2.10.2 Demersal effort in Division Vb_1. Trawlers 400-1800 HP. Effort = fishing days x average horsepower/1000.

Trawler HP	1982	1983	1984	1985	1986	1987
400-699	1,989	2,320	2,169	2,257	2,374	2,260
700-999	2,048	2,840	2,628	2,208	2,379	2,351
1000-1499	4,931	6,500	8,179	7,140	8,155	8,581
1500-1799	2,031	2,093	1,820	1,614	2,011	1,620
Total	10,981	13,753	14,796	13,219	14,919	14,812

Table 2.10.3 Nominal catch (t) of SAITHE in Division Vb, 1978-1987, as reported to ICES.

Country	1978	1979	1980	1981	1982
Faroe Islands	15,892	22,003	23,810	29,682	30,808
France	8,128	2,974	1,110	258	130
German Dem.Rep.	-	-	-	-	-
Germany, Fed.Rep.	1,088	581	197	20	19
Netherlands	-	-	-	-	-
Norway	1,124	1,137	62	134	15
UK (England & Wales)	557	190	13	-	-
UK (Scotland)	1,349	361	38	9	1
Total	28,138	27,246	25,230	30,103	30,973

Country	1983	1984	1985	1986	1987[1]
Denmark	-	-	-	21	255
Faroe Islands	38,963	54,344	42,874	40,413	39,823
France	180	243	839	87	69
German Dem.Rep.	-	-	31	-	-
Germany, Fed.Rep.	28	73	227	106	48
Netherlands	-	-	-	-	-
Norway	5	5	-	26	16
UK (England & Wales)	-	-	4	-	108
UK (Scotland)	-	-	630	1,340	140
Total	39,176	54,665	44,605	41,993	40,459

[1] Preliminary.

Table 2.10.4
Faroe Plateau COD. Nominal catches (t) by countries, 1974-1987, as reported to ICES.

Year	Faroe Islands	France	Germany Fed.Rep.	Norway	Poland	UK England	UK Scotland	Denmark	Others	Total
1974	12,541	567[1]	292	446	320	2,879	7,516	-	20	24,581
1975	22,608	1,531	408	1,353	432	2,538	7,815	-	90	36,775
1976	28,502	1,535	247	1,282	496	2,179	5,491	-	67	39,799
1977	28,177	1,450	332	864	-	811	3,291	-	2	34,927
1978	24,076	213[1]	71[3]	245	-	518	1,460	-	2	26,585
1979	21,774	117[1]	23[3]	274	-	263	661	-	-	23,112
1980	19,966	40[1]	-[3]	127	-	13	367	-	-	20,513
1981	22,616	47	-[3]	240	-	-	60	-	-	22,963
1982	21,387	10	-	90	-	-	2	-	-	21,489
1983	37,916	13	128	76	-	-	-	-	-	38,133
1984	36,914	34	9	22	-	-	-[4]	-	-	36,979
1985	39,422	29	5	28	-	-	-[4]	-	-	39,484
1986	34,642	4	8	204[2]	-	-	-[4]	8[1]	-	34,866
1987	24,342	2[5]	11[2]	20[2]	-	8	-[4]	30[2]	-	24,413

[1] Sub-division Vb_2 included.
[2] Preliminary.
[3] Working Group Data.
[4] Included in Sub-division Vb_2.
[5] Catches as reported to the Faroese Coastal Guard Service.

Table 2.10.5 Faroe Bank COD. Nominal catches (t) by countries, 1974-1987, as reported to ICES.

Year	Faroe Islands	France	Germany Fed.Rep.	Norway	UK England	UK Scotland	Denmark	Others	Total
1974	696	-[1]	-	-	829	503	-	40	
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	-[1]	-	183	2	1,071	-	-	5,450
1979	1,273	-[1]	-	33	-	677	-	-	1,983
1980	724	-[1]	-	54	85	340	-	-	1,203
1981	975	-	-	120	-	134	-	-	1,229
1982	2,184	-	-	16	-	152	-	-	2,352
1983	2,284	-	-	17	-	66[3]	-	-	2,367
1984	2,189	-	-	11	-	16[3]	-	-	2,216
1985	2,913	-	-	23	-	25[3]	-	-	2,961
1986	1,836	-	-	6[2]	-	63[3]	-[1]	-	1,905
1987	1,710	-	-	29[2]	-	47[3]	-[2]	-	1,786

[1] Catches included in Sub-division Vb_1.
[2] Preliminary.
[3] Catches including Sub-division Vb_1.

Table 2.10.6

Faroe Plateau HADDOCK. Nominal catches (t) by countries, 1974-1987, as reported to ICES.

Year	Faroe Islands	France	Germany Fed.Rep.	Norway	Poland	UK England	UK Scotland	Denmark	Others	Total
1974	4,538	1,461[1]	70	5	685	1,044	5,572	-	30	13,405
1975	8,625	2,173	120	56	544	1,505	4,896	-	383	18,302
1976	12,670	2,472	22	20	448	1,551	6,671	-	181	24,035
1977	19,806	623	49	46	5	707	3,278	-	26	24,540
1978	15,539	71[1]	8	91	-	48	367	-	-	16,124
1979	11,259	50[1]	2	39	-	35	212	-	-	11,597
1980	13,633	31[1]	4	9	-	6	434	-	6	14,123
1981	10,891	113	+	20	-	-	85	-	-	11,109
1982	10,319	2	1	12	-	-	1	-	-	10,335
1983	11,898	2	+	12	-	-	-[3]	-	-	11,912
1984	11,418	20	+	10	-	-	-[3]	-	-	11,448
1985	13,597	23	+	21	-	-	-	-	-	13,641
1986	13,359	8	1	37[2]	-	-	-	2[2]	-	13,407
1987	14,435[2]	8[4]	4[4]	13[2]	-	2	-[3]	8[2]	-	14,470

[1] Catches including Sub-division Vb_2.
[2] Preliminary.
[3] Catches included in Sub-division Vb_2.
[4] Catches as reported to the Faroese Coastal Guard Service.

Table 2.10.7

Faroe Bank HADDOCK. Nominal catches (t) by countries, 1974-1987, as reported to ICES.

Year	Faroe Islands	France	Germany Fed.Rep.	Norway	UK England	UK Scotland	Denmark	Others	Total
1974	273	-[1]	-	-	573	500	-	22	1,368
1975	132	125	53	-	921	1,182	-	-	2,413
1976	44	70	+	-	733	1,329	-	-	2,176
1977	273	77	-	11	4	650	-	-	1,015
1978	2,643	-[1]	-	39	-	394	-	-	3,076
1979	716	-[1]	-	-	-	105	-	-	821
1980	690	-[1]	-	8	152	43	-	-	893
1981	1,103	-	-	7	-	14	-	-	1,124
1982	1,553	-	-	1	-	48	-	-	1,602
1983	967	-	-	2	-	13[3]	-	-	982
1984	925	-	-	5	-	+[3]	-	-	930
1985	1,474	-	-	3[2]	-	25[3]	-	-	1,502
1986	1,050	-	-	10[2]	-	26[3]	-[2]	-	1,086
1987	947	-	-	14[2]	-	45[3]	-[2]	-	1,006

[1] Catches included in Sub-division Vb_1.
[2] Preliminary.
[3] Catches including Sub-division Vb_1.

Table 2.11.1

Nominal catch (tonnes) of Blue Ling in Division Va, 1977-1987, as reported to ICES.

Country	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Faroe Islands	39	38	85	183	220	224	1,195	353	59	69	50[1]
Germany, Fed.Rep.	1,253	-	-	-	-	-	-	-	-	-	-
Iceland	700	1,237	2,019	8,133	7,952	5,945	5,117	3,122	1,407	1,774	1,693
Norway	317	156	98	229	64	402	402	31	7	8	8[1]
UK (England & Wales	8	-	-	-	-	-	-	-	-	-	-
Total	2,317	1,431	2,202	8,399	8,401	6,233	6,714	3,506	1,473	1,851	1,751

[1] Preliminary.

Table 2.11.2

Nominal catch (tonnes) of Blue Ling in Division Vb, 1977-1987, as reported to ICES.

BLUE LING Vb_1

Country	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Faroe Islands	23	423	1,072	1,187	1,481	2,761	3,933	6,453	4,038	4,830	3,361
France	6,977[2]	3,369[2]	2,683[2]	2,427[2]	371	843	668	515	1,193	2,578	NA
Germany, Fed.Rep.	870	744	691	5,905	2,867	2,538	222	214	217	197	142
Norway	858	237	331	304	167	121	256	105	140	93[1]	81[1]
UK (Engl. and Wales)	4	35	-	-	-	-	-	-	-	-	-
UK (Scotland)	-	-	-	1	-	-	-	-	-	-	-
Total	8,732	4,808	4,777	9,824	4,886	6,263	5,079	7,287	5,588	7,798	3,584

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

BLUE LING Vb_2

Country	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Faroe Islands	+	7	14	36	48	128	463	757	396	81	209
France	-[2]	-[2]	-[2]	-	-	-	-	-	-	-	NA
Germany, Fed.Rep.	-	-	-	-	-	-	1	-	+	-	-
Norway	86	83	87	159	93	66	182	50	70	41[1]	90[1]
UK (Scotland)	-	-	-	1	-	-	-	-	-	-	-
Total	86	90	101	196	141	194	646	807	466	122	299

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

Table 2.11.3

Nominal catch (tonnes) of Blue Ling in Sub-area VI, 1977-1987, as reported to ICES.

BLUE LING VIa

Country	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Faroe Islands	-	-	-	-	-	-	-	-	56	-	-
France	7,940	5,495	3,064	2,124	3,338	3,430	5,233	3,653	5,670	7,628	NA
Germany, Fed.Rep.	470	2,498	993	773	335	79	11	183	5	7	45
Norway	16	19	2	10	11	16	118	45	75	47[1]	51
UK (Engl.& Wales)	556	21	279	-	-	99	13	5	2	2	1
UK (Scotland)	-	-	-	-	1	+	-	-	-	1	+
Total	8,982	8,033	4,338	2,907	3,685	3,624	5,375	3,886	5,808	7,685	51

[1] Preliminary.

BLUE LING VIb

Country	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Faroe Islands	6	3	4	-	-	-	-	133	11	1,845	350
France	36	58	652	3,827	534	263	243	3,281	7,263	2,141	NA
Germany, Fed.Rep.	-	-	187	5,526	3,944	554	38	-	31	39	356
Norway	7	8	28	8	5	13	50	43	38	66[1]	76[1]
UK (Engl.& Wales)	+	0	-	-	-	-	-	-	+	7	3
UK (Scotland)	-	-	-	+	-	1	2	-	-	1	10
Total	49	69	871	9,361	4,483	831	333	3,457	7,343	4,099	795

[1] Preliminary.
[2] Includes Division VIa.

Table 2.11.4

Nominal catch (tonnes) of Blue Ling in Sub-area XIV, 1977-1987, as reported to ICES.

BLUE LING XIVb

Country	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Germany, Fed.Rep.	491[3]	933[2]	1,026[2]	746[2]	1,206[2]	1,946[2]	621[2]	537	315	150	199
Norway	-	4	-	-	-	-	-	-	-	-	-
UK (Engl.& Wales)	-[4]	-	-	-	-	-	-	-	-	-	-
Total	491	937	1,026	746	1,206	1,946	621	537	315	150	199

[1] Preliminary.
[2] Includes Division XIVa.
[3] Reported in Bull.Stat. in Division XIVa.
[4] 6 t in Division XIVa.

Table 2.11.5

Nominal catch (tonnes) of Ling in Division Va, 1977-1987, as reported to ICES.

Country	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Belgium	442	541	508	445	196	116	128	103	59	88	157
Faroe Islands	613	534	536	607	489	524	644	450	384	556	527
France	-	-	-	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	254	-	-	-	-	-	-	-	-	2,946	4,161
Iceland	3,433	3,439	3,759	3,149	3,348	3,733	4,256	3,304	2,980	4[1]	6
Norway	506	484	399	423	415	612	115	21	17	-	-
UK (England & Wales)	-	-	-	-	-	-	-	+	+	-	-
UK (Scotland)	-	-	-	-	-	-	-	-	-	-	-
Total	5,248	4,998	5,202	4,624	4,448	4,985	5,143	3,878	3,440	3,594	4,851

[1] Preliminary.

Table 2.11.6

Nominal catch (tonnes) of Ling in Division Vb, 1977-1987, as reported to ICES.

LING Vb_1

Country	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Denmark	-	-	-	-	-	-	-	-	-	4[2]	16[1]
Belgium	-	-	-	-	-	-	-	-	-	-	2,875
Faroe Islands	1,568[2]	1,549[2]	1,919[2]	1,734	1,274	2,099	2,365	2,666	2,911[3]	2,406	n.a.
France	780[2]	625[2]	304[2]	49	13	16	155	11	40	123	-
German, Dem.Rep.	-	-	-	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	72	27	18	12	1	3	5	6	3	6	-
Norway	2,162	1,745	2,716	1,538	1,135	2,495	1,580	935	1,317	1,770[1]	943[1]
Poland	-	-	-	-	-	-	-	-	-	-	-
UK (Engl.& Wales)	60[2]	26[2]	23[2]	1	-	-	-	-	-	-	-
UK (Scotland)	413[2]	220[2]	279[2]	90	4	-	-[3]	-[3]	-[3]	-	-
Total	5,056	4,192	5,259	3,424	2,427	4,613	4,105	3,618	4,448	4,309	3,835

LING Vb_2

Country	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Faroe Islands	107	394	205	87	126	271	140	155	279[2]	177	346
France	-[2]	-[2]	-[2]	-[2]	-	-	-	-	-	-	-
German, Dem.Rep.	-	-	-	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	-	-	-	-	-	-	-	-	-	-	-
Norway	398	1,208	734	873	1,641	1,119	1,166	631	638	636[1]	959[1]
UK (Engl.& Wales)	3	2	-	5	-	-	-	-	-	-	-
UK (Scotland)	-[2]	-[2]	-[2]	121	24	94	48[3]	4[3]	2[3]	1[3]	1[3]
Total	508	1,604	939	1,086	1,791	1,484	1,354	790	919	814	1,306

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

Table 2.11.7

Nominal catch (tonnes) of Ling in Sub-area VI, 1977-1987, as reported to ICES.

LING VIa

Country	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Belgium	-	-	-	-	-	4	-	1	4	-	4[1]
Denmark	-	-	-	44[2]	-	1	-	-	-	-	1[1]
Faroe Islands	2	1	4	-	-	20	-	-	-	-	-
France	2,627	3,176	2,990	3,092	3,820	5,049	5,362	5,757	6,061	4,620	n.a.
Germany, Fed.Rep.	2	7	5	1	-	-	-	14	8	6	-
Ireland	165	39	40	34	44	34	62	49[1]	81	255	n.a.
Netherlands	1	1	-	-	-	-	-	-	-	-	-
Norway	3,566	5,937	2,778	2,932	2,150	4,499	5,943	4,667	4,777	5,314[1]	3,842[1]
Spain	422[2]	793[2]	566[2]	-	-	461	604	720	338	620	n.a.
Sweden	-	-	-	3	-	3	-	-	-	-	-
UK (Engl.& Wales)	122	227	73	85	123	201	78	101	130	151	507
UK (N.Ireland)	-	-	-	-	-	-	+	+	-	+	7
UK (Scotland)	190	286	234	207	379	188	236	341	510	284	574
Total	7,097	10,467	6,690	6,398	6,516	10,460	12,285	11,650	11,961	11,250	4,935

[1] Preliminary.
[2] Includes Division VIb.

LING VIb

Country	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Denmark	-	-	-	-[2]	-	-	-	-	-	-	-
Faroe Islands	481	219	368	236	4	123	204	153	24	6	39
France	2	3	7	3	5	13	8	34	140	24	n.a.
Germany, Fed.Rep.	-	-	-	-	+	-	-	-	-	-	-
Ireland	-	20	-	-	-	-	-	-	-	-	-
Norway	447	781	1,776	1,096	1,083	1,711	2,315	2,345	1,973	2,157[1]	1,933[1]
Spain	-[2]	-[2]	-[2]	620	590	1,911	1,889	986	2,381	2,762	n.a.
UK (Engl.& Wales)	56	49	39	+	8	4	26	28	75	109	151
UK (Scotland)	195	236	203	235	184	80	4	29	127	127	164
Total	1,181	1,308	2,393	2,190	1,874	3,842	4,446	3,575	4,720	5,185	2,287

[1] Preliminary.
[2] Includes Division VIb.

Table 2.11.8

Nominal catch (tonnes) of Ling in Sub-area XIV, 1977-1987, as reported to ICES.

LING XIVb

Country	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Faroe Islands	6	-	-	-	13	-	-	-	-	17	-
Germany, Fed.Rep.	5[3]	15[2]	952[2]	208[2]	298[2]	8[2]	1[2]	6	1	-[2]	-[2]
Norway	1	5	-	-	-	-	-	-	-	-	-
UK (Engl.& Wales)	-[4]	-	-	-	-	-	-	-	-	-	-
Total	12	20	952	208	311	8	1	6	1	17	-

[1] Preliminary.
[2] Includes Division XIVa.
[3] Reported in Bull. Stat. in Division XIVa.
[4] 11 t in Division XIVa.

Table 2.11.9

Nominal catch (tonnes) of Tusk (Cusk) in Division Va, 1977-1987, as reported to ICES.

Country	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Faroe Islands	2,818	2,168	2,050	2,873	2,624	2,410	4,046	2,008	1,885	2,811	2,734
Germany, Fed.Rep.	212	-	-	-	-	-	-	-	-	-	-
Iceland	3,122	3,352	3,558	3,089	2,827	2,804	3,469	3,430	3,068	2,549	2,984
Norway	1,796	812	845	928	1,025	666	772	254	111	21[1]	19[1]
UK (England & Wales)	-	-	-	-	-	-	-	-	+	-	-
Total	7,948	6,332	6,453	6,890	6,476	5,880	8,287	5,692	5,964	5,381	5,737

[1] Preliminary.

Table 2.11.10

Nominal catch (tonnes) of Tusk (Cusk) in Division Vb, 1977-1987, as reported to ICES.

TUSK Vb_1

Country	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Denmark	-	-	-	-	-	-	-	-	-	+[2]	2[1]
Faroe Islands	3,003	2,043[2]	3,652	4,629	2,028	4,056	3,416	4,355	4,994	3,531	4,358
France	-	25[2]	34	24	14	14	15	25	34	24	-
Germany	68	39	36	23	7	12	11	16	10	15[1]	142[1]
Norway	1,526	1,230	1,943	1,713	1,472	1,432	1,074	897	1,200	1,033[1]	865[1]
UK (Engl.& Wales)	12[2]	3[2]	1[2]	+	-	-	-	-	-	-	-
UK (Scotland)	381[2]	222[2]	252[2]	145	-	-	-[3]	-[3]	-[3]	-	-
Total	4,990	3,562	5,918	6,534	3,521	5,514	4,516	5,293	6,238	4,603	5,367

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

TUSK Vb_2

Country	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Denmark	-	-	-	-	-	-	-	-	294	-[2]	-[1]
Faroe Islands	59	454[2]	225[2]	88[2]	38	92	34	39	-	94	411
France	-	-	-	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	-	-	-	-	-	-	-	-	+	-	-
Norway	261	731	422	975	1,276	660	861	640	775	590[1]	1,257[1]
UK (Engl.& Wales)	+	-	-	+	-	-	-	-	-	-	-
UK (Scotland)	-	-	-	213	15	125	73[3]	2[3]	+	+[3]	+[3]
Total	320	1,185	647	1,276	1,329	877	968	681	1,069	684	1,668

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

Table 2.11.11

Nominal catch (tonnes) of Tusk (Cusk) in Sub-area VI, 1977-1987, as reported to to ICES.

TUSK VIa

Country	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Denmark	-	-	-	1[2]	-	+	-	-	-	-	-
Faroe Islands	-	-	3	-	-	-	-	-	-	-	-
France	-	344	296	241	322	355	418	514	767	608	NA
Germany, Fed.Rep.	4	-	3	4	1	-	-	1	1	+	-
Netherlands	-	-	-	-	-	-	-	1[1]	-	-	-
Norway	914	996	460	652	802	1,052	1,733	1,305	1,609	1,859[1]	1,238[1]
Spain	-	-	-	-	-	414	250	-	-	-	NA
Sweden	-	-	-	-	-	2	-	-	-	-	-
UK (Engl.& Wales)	19	6	4	+	1	7	1	5	1	2	9
UK (Scotland)	3	5	8	14	94	+	2	1	1	4	7
Total	940	1,352	774	912	1,220	1,830	2,404	1,826	2,379	2,473	1,254

[1] Preliminary.
[2] Includes Division VIb.

TUSK VIb

Country	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Denmark	-	-	-	-[2]	-	-	-	-	-	-	-
Faroe Islands	318	80	282	196	1	159	188	53	48	106	26
France	-	-	5	-	1	3	3	4	3	9	NA
Germany, Fed.Rep.	-	-	-	-	1	+	-	-	-	-	-
Norway	70	332	680	503	568	468	1,080	960	944	952[1]	1,384[1]
Spain	-	-	-	-	-	2,098	1,902	-	-	-	NA
UK (Engl.& Wales)	6	5	30	-	+	-	3	+	6	8	6
UK (Scotland)	133	148	178	214	181	101	22	+	14	16	15
Total	527	565	1,175	913	752	2,829	3,198	1,017	1,015	1,091	1,431

[1] Preliminary.
[2] Included in Division VIa.

Table 2.11.12

Nominal catch (tonnes) of Tusk (Cusk) in Sub-area XIV, 1977-1987, as reported to ICES.

TUSK XIVb

Country	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Faroe Islands	166	-	-	-	110	-	74	-	-	33	-
Germany, Fed.Rep.	16[3]	47[2]	27[2]	13[2]	10[2]	10[2]	11[2]	5	4	-	-
Iceland	-	-	-	-	-	-	-	-	-	-	-
Norway	40	38	-	-	-	-	-	58	-	-	-
UK (Engl.& Wales)	-[4]	+[2]	-	-	-	-	-	-	-	-	-
Total	222	85	27	13	120	10	85	63	4	33	-

[1] Preliminary.
[2] Includes Division XIVa.
[3] Reported in Bull. Stat. in Division XIVa.
[4] 1 t in Division XIVa.

Table 2.12.3 Catches north of 62°N of Norwegian spring-spawning herring (tonnes) since 1972.

Year	A	B[1]	C	D	Total	Total including unreported catches
1972	-	9,895	3,266[2]	-	13,161	13,161
1973	139	6,602	276	-	7,017	7,017
1974	906	6,093	620	-	7,619	7,619
1975	53	3,372	288	-	3,713	13,713
1976	-	247	189	-	436	10,436
1977	374	11,834	498	-	12,706	22,706
1978	484	9,151	189	-	9,824	19,824
1979	691	1,866	307	-	2,864	12,864
1980	878	7,634	65	-	8,577	18,577
1981	844	7,814	78	-	8,736	13,736
1982	983	10,447	225	-	11,655	16,655
1983	3,857	13,290	907	-	18,054	23,054
1984	18,730	29,463	339	-	48,532	53,532
1985	29,363	37,187	197	4,300	71,047	81,047
1986	71,122	55,507	156	-	126,785	136,785
1987	62,910	49,798	181	-	112,899	122,889
1988[3]	70,962	-	-	-	-	-

A = catches of adult herring in winter.
B = mixed herring fishery in autumn.
C = by-catches of 0- and 1-group herring in the sprat fishery.
D = USSR-Norway by-catch in the capelin fishery (2-group).

[1] Includes also by-catches of adult herring in other fisheries.
[2] In 1972, there was also a directed herring 0-group fishery.
[3] Preliminary up to 1 September 1988.

Table 2.12.2 Catch in numbers, millions and catch in weights, tonnes. Icelandic summer-spawning herring.

Age	1969	1970	1971	1972	1973	1974	1975
1	4.520	2.003	8.774	0.147	0.001	0.001	1.518
2	78.410	22.344	13.071	0.322	0.159	3.760	2.049
3	8.274	33.965	5.439	0.131	0.678	0.832	31.975
4	5.178	4.500	13.688	0.163	0.104	0.993	6.493
5	10.015	2.734	3.040	0.264	0.017	0.092	7.905
6	2.841	4.419	1.563	0.047	0.013	0.046	0.863
7	1.389	1.145	3.276	0.028	0.006	0.002	0.442
8	1.179	0.531	0.748	0.024	0.006	0.001	0.345
9	0.609	0.604	0.250	0.013	0.003	0.001	0.114
10	0.424	0.195	0.103	0.009	0.003	0.001	0.004
11	0.286	0.103	0.120	0.003	0.001	0.001	0.001
12	0.139	0.076	0.001	0.001	0.001	0.001	0.001
13	0.109	0.061	0.001	0.003	0.001	0.001	0.001
14	0.074	0.051	0.001	0.001	0.001	0.001	0.001
Juvenile	78.943	23.167	16.899	0.376	0.065	3.285	3.973
Adult	34.504	49.564	33.176	0.780	0.929	2.448	47.739
Total catch	20.913	15.779	10.975	0.310	0.255	1.274	13.280

Age	1976	1977	1978	1979	1980	1981	1982
1	0.614	0.705	2.634	0.929	3.147	2.283	0.454
2	9.848	18.853	22.551	15.098	14.347	4.629	19.187
3	3.908	24.152	50.995	47.561	20.761	16.771	28.109
4	34.144	10.404	13.846	69.735	60.728	12.126	38.280
5	7.009	46.357	8.738	16.451	65.329	36.871	16.623
6	5.481	6.735	39.492	8.003	11.541	41.917	38.308
7	1.045	5.421	7.253	26.040	9.285	7.299	43.770
8	0.438	1.395	6.354	3.050	19.442	4.863	6.813
9	0.296	0.524	1.616	1.869	1.796	13.416	6.633
10	0.134	0.362	0.926	0.494	1.464	1.032	10.457
11	0.092	0.027	0.400	0.439	0.698	0.884	2.354
12	0.001	0.128	0.017	0.032	0.001	0.760	0.594
13	0.001	0.001	0.025	0.054	0.110	0.101	0.075
14	0.001	0.001	0.051	0.006	0.079	0.062	0.211
Juvenile	9.573	22.321	35.502	33.011	18.438	12.764	22.889
Adult	53.439	92.744	119.396	156.750	190.290	130.250	188.979
Total catch	17.168	28.924	37.333	45.072	53.269	39.544	56.528

Age	1983	1984	1985	1986	1987
1	1.470	0.421	0.111	0.100	0.028
2	22.422	18.011	12.800	8.161	3.007
3	151.198	32.237	24.521	33.893	42.649
4	30.181	141.324	21.535	23.421	57.661
5	21.525	17.039	84.733	20.654	19.724
6	8.637	7.111	11.836	77.526	18.891
7	14.017	3.915	5.708	18.228	44.227
8	13.666	4.112	2.323	10.971	14.569
9	3.715	4.516	4.339	8.583	13.355
10	2.373	1.828	4.030	9.662	9.736
11	3.424	0.202	2.758	7.174	12.641
12	0.552	0.255	0.970	3.677	5.953
13	0.100	0.260	0.477	2.914	4.517
14	0.003	0.003	0.578	1.786	2.181
Juvenile	78.323	24.055	15.363	11.744	8.549
Adult	194.960	207.179	161.356	215.006	240.590
Total catch	58.665	50.293	49.092	65.413	73.000

Table 2.13.1 International catch of Barents Sea capelin ('000 t) in the years 1965-1988.

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	1,493	846	36	2,375
1984	811	628	42	1,481
1985	453	398	17	868
1986	72	51	-	123
1987	-	-	-	-
1988	-	-	-	-

Table 2.13.2 The total annual and seasonal catch of CAPELIN in the Iceland - Greenland - Jan Mayen area since 1964 (in '000 t).

	Winter season		Summer/autumn season				
Year	Iceland	Far/Nor	Iceland	Norway	Faroes	EEC	Total
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	-	-	-	-	-	13.0
1983	-	-	133.3	-	-	-	133.3
1984	439.6	-	425.2	104.6	10.2	8.5	988.1
1985	348.5	-	644.8	188.7	81.4		1,263.4
1986	342.0	49.9	552.3	149.7	64.4	5.3	1,163.6
1987	500.6	59.9	16.0[1]	82.0[1]	66.3[1]	-	1,019.5[1]
1988	600.6	57.3	25.0[1]	11.5[1]	47.0[1]		741.4[1]

[1] Until 24 October.

Table 3.1.2 HERRING. Catch in tonnes, 1978-1987, North Sea, Sub-area IV, and Division VIId by country. These figures do not in all cases correspond to the official statistics and cannot be used for management purposes.

Country	1978	1979	1980	1981	1982
Belgium	-	-	-	-	9,700
Denmark	4,359	10,546	4,431	21,146	67,851
Faroe Islands	40	10	-	-	-
France	2,119	2,560	5,527	15,099	15,310
Germany, Fed.Rep.	24	10	147	2,300	349
Netherlands	18	-	509	7,700	22,300
Norway	1,189	3,617	2,165	70	680
Sweden	-	-	-	-	-
UK (England)	2,843	2,253	77	303	3,703
UK (Scotland)[2]	437	-	610	45	1,780
USSR	4	162	-	-	-
Total North Sea	11,033	19,158	13,466	46,663	122,056
Total including unallocated catches	-	-	60,994	140,972	235,925

Country	1983	1984	1985	1986	1987[1]
Belgium	5,969	5,080	3,482	414	39
Denmark	10,467	38,777	129,305[1]	121,631	138,596
Faroe Islands	-	-	-	623	2,228
France	16,353	20,320	14,400	9,729	7,266
Germany, Fed.Rep.	1,837	11,609	8,930	3,934	5,552
Netherlands	40,045	44,308	79,335[1]	85,998	115,450
Norway	32,512	98,714	161,279[1]	219,598	238,678
Sweden	284	886	2,442	1,872	1,725
UK (England)	111	1,689	5,564	1,404	873
UK (Scotland)[2]	17,260	31,393	55,795	77,459	76,413
USSR	-	-	-	-	-
Total North Sea	124,838	252,776	460,532	522,662	586,820
Total including unallocated catches	305,954	317,263	534,752	543,751	621,820

[1] Preliminary.
[2] Catches of juveniles from Moray Firth not included.

Table 3.1.4.1 HERRING catches in the Baltic Sea by countries and sub-divisions, 1986 and 1987 (t). By-catch of sprat in directed herring fisheries excluded and by-catch of herring in sprat fisheries included.

Year and country	Total catch	Sub-divisions 22	23	24	25	26	27	28	29S	29N	30	31	32
1986													
Denmark	19,441	9,035	1,490	5,011	3,905	-	-	-	-	-	-	-	-
Finland	93,928	-	-	-	-	-	89	116	335	37,867	25,512	9,179	20,830
German Dem. Rep.	53,061	1,907	-	49,273	1,881	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	8,550	7,845	-	705	-	-	-	-	-	-	-	-	-
Poland	80,185	-	-	12,344	47,062	20,762	17	-	-	-	-	-	-
Sweden	39,842	-	1,365	5,946	19,315	-	7,870	1,964	51	494	2,501	336	-
USSR	115,665	-	-	-	20,090	17,430	-	28,695	23,930	-	-	-	25,520
Total	410,672	18,787	2,855	73,279	92,253	38,192	7,976	30,775	24,316	38,361	28,013	9,515	46,350
1987[1]													
Denmark	33,973	22,555	754	6,506	4,158	-	-	-	-	-	-	-	-
Finland	99,842	-	-	-	-	-	344	1,899	537	38,164	26,639	9,560	22,700
German Dem Rep.	49,880	465	-	46,802	1,991	-	611	11	-	-	-	-	-
Germany, Fed.Rep.	5,806	5,178	-	628	+	-	-	-	-	-	-	-	-
Poland	63,490	-	-	7,997	39,732	15,393	344	24	-	-	-	-	-
Sweden	35,564	-	172	7,814	15,602	88	7,738	1,606	8	311	1,905	320	-
USSR	113,844	-	-	-	8,061	24,140	3,577	32,336	24,268	-	-	-	21,462
Total	402,399	28,198	926	69,747	69,544	39,621	12,614	35,876	24,813	38,475	28,543	9,880	44,162

[1] Preliminary data.

Table 3.1.4.2 HERRING in Division IIIa. Landings in tonnes, 1978-1987. (Data mainly provided by Working Group Members).

Country	1978	1979	1980	1981	1982
Skagerrak					
Denmark	7,753	8,729	22,811	45,525	43,328
Faroe Islands	1,041	817	526	900	715
Germany, Fed.Rep.	28	181	-	199	43
Norway (Open sea)	1,860	2,460	1,350	6,330	10,140
Norway (Fjords)	2,271	2,259	2,795	900	1,560
Sweden	11,551	8,140	10,701	30,274	24,859
Total	24,504	22,586	38,183	83,768	80,645
Kattegat					
Denmark	29,241	21,337	25,380	48,922	38,609
Sweden	35,193	25,272	18,260	38.871	38,892
Total	64,434	46,609	43,640	87,833	77,501
Division IIIa total	88,938	69,195	81,823	171,601	158,146

Country	1983	1984	1985	1986	1987[1]
Skagerrak					
Denmark	54,102	64,621	88,192	94,022	105,017
Faroe Islands	1,980	891	455	520	-
Germany, Fed.Rep.	40	-	-	11	-
Norway (Open sea)	500	-	2,752	677	-
Norway (Fjords)	2,834	1,494	1,673	860	1,209
Sweden	35,176	59,195	40,349	42,996	51,184
Total	94,632	126,201	133,421	139,086	157,410
Kattegat					
Denmark	62,901	71,359	69,235	41,669	46,706
Sweden	40,463	35,027	39,829	35,852	29,844
Total	103,364	106,386	109,064	77,521	76,550
Division IIIa total	197,996	232,587	242,485	216,607	233,960

[1] Preliminary.

Table 3.1.5.1 Celtic Sea and Division VIIj HERRING landings by calendar year (t), 1977-1987. (Data provided by Working Group members.)

Year	France	Germany Fed.Rep.	Ireland	Netherlands	Unallocated	Total
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
1984	680	-	7,000	890	11,148	19,718
1985	622	-	11,000	-	4,601	16,223
1986	-	-	13,338	+	-	13,338
1987[1]	820	-	15,500	1,453	5,310	23,083

[1] Provisional.

Table 3.1.5.2 Celtic Sea and Division VIIj HERRING landings (tonnes) by season (1 April-31 March). (Data provided by Working Group members.)

Year	France	Germany Fed.Rep.	Ireland	Netherlands	Unallocated	Total
1977/1978	95	96	6,264	1,378	-	7,833
1978/1979	8	220	8,239	1,002	-	7,559
1979/1980	584	20	7,932	850	935	10,321
1980/1981	9	2	9,024	292	3,803	13,130
1981/1982	123	-	15,830	1,150	-	17,103
1982/1983	+	-	13,042	-	-	13,042
1983/1984	495	-	10,000	1,500	9,186	21,181
1984/1985	680	-	7,000	890	14,009	22,579
1985/1986	622	-	11,995	-	4,509	17,126
1986/1987	-	-	14,725	1	-	14,726
1987/1988[1]	820	-	15,500	1,453	4,444	22,217

[1] Provisional.

Table 3.1.6 Catch in weight, Division VIa (North) HERRING, 1978-1987.

Country	1978	1979	1980	1981	1982
Denmark	128	-	-	1,580	-
Faroes	-	-	-	-	74
France	1,435	3	2	1,243	2,069
Germany, Fed. Rep.	26	-	256	3,029	8,453
Ireland	-	-	-	-	-
Netherlands	5,874	-	-	5,602	11,317
Norway	4,462	-	-	3,850	13,018
UK (England)	134	54	33	1,094	90
UK (Scotland)	10,097	3	15	30,389	38,381
Unallocated	-	-	-	4,633	18,958
Total	22,176	60	306	51,420	92,360

Country	1983	1984	1985	1986	1987[1]
Denmark	-	96	-	-	-
Faroes	834	954	104	400	-
France	1,313	-	20	18	136
Germany, Fed. Rep.	6,283	5,564	5,937	2,188	1,711
Ireland	-	-	-	6,000[2]	6,800[2]
Netherlands	20,200	7,729	5,500	5,160[2]	5,212[2]
Norway	7,336	6,669	4,690	4,799	4,300
UK (England)	-	-	-	-	-
UK (Scotland)	31,616	37,554	28,065	25,294[2]	26,810[2]
Unallocated	-4,059	16,588	502	37,840[2]	18,038[2]
Total	63,523	75,154	43,814	81,699	63,007

[1] Preliminary.
[2] Including discards.

Table 3.1.7 Monthly landings (tonnes) of HERRING from the Firth of Clyde (all fishing methods combined). (Data provided by Working Group.)

Month	1976	1977	1978	1979	1980	1981
January	-[1]	-[1]	4[1]	4[1]	6[1]	15[1]
February	7[1]	-[1]	6[1]	8[1]	3[1]	15[1]
March	69[1]	-[1]	7[1]	13[1]	8[1]	14[1]
April	521	530	246	12[1]	4[1]	32[1]
May	436	44	245	4[1]	2[1]	25[1]
June	281	640	238	336	114	429
July	332	494	376	466	656	982
August	473	601	587	450	645	511
September	541	559	581	374	559	106
October	598	556	653	263	79	-[1]
November	595	560	647	1[1]	3[1]	2[1]
December	236	328	272	-[1]	2[1]	4[1]
Not known	50	35	-	-	-	-
Total	4,139	4,847	3,862	1,951	2,081	2,135

Month	1982	1983	1984	1985	1986	1987
January	2[1]	+[1]	-[1]	-[1]	-[1]	-[1]
February	16[1]	1[1]	-[1]	-[1]	-[1]	-[1]
March	1[1]	1[1]	-[1]	-[1]	-[1]	-[1]
April	2[1]	-[1]	-[1]	-[1]	-[1]	+[1]
May	615	1[1]	554	527	272[1]	112[1]
June	850	265	847	831	724	289
July	757	519	944	815	763	189
August	262	681	276	661	786	323
September	-[1]	604	246	187	555	961
October	-[1]	457	124	1[1]	218[1]	571
November	-[1]	1[1]	-[1]	-[1]	77[1]	379
December	1[1]	-[1]	-[1]	-[1]	-[1]	71
Not known	-	273[2]	247[2]	-	-	-
Total	2,506	2,803	3,238	3,022	3,395	2,895

[1] Subject to closure of directed fishery for whole or part of the month.
[2] Landed in Northern Ireland and Isle of Man.
[+] Less than 1 t.

Table 3.1.8 Estimated HERRING catches in tonnes in Divisions VIa (South) and VIIb,c, 1978-1987.

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
France	-	-	-	-	353	19	-	-	-	-
Germany Fed.Rep.	100	5	-	2,687	265	-	-	-	-	-
Ireland	19,128	18,910	27,499	19,443	16,856	15,000	10,000	13,900	15,450	15,000
Netherlands	481	1,939	1,514	2,790	1,735	5,000	6,400	1,270	1,550	1,550
UK (N. Ireland)	6	2	1	2	-	-	-	-	-	5
UK (Eng. + Wales)	-	-	-	-	-	-	-	-	-	51
Unallocated	-	1,752	1,110	-	-	13,000	11,000	8,204	11,785	18,465
Total	19,715	22,608	30,124	24,922	19,209	33,019	27,400	23,374	28,785	35,071

[1] Provisional.

Table 3.1.9 HERRING.
Total catches (t) in North Irish Sea (Division VIIa), 1978-1987.

Country	1978	1979	1980	1981	1982
France	174	455	1	-	-
Ireland	2,371	1,805	1,340	283	300
Netherlands	98	-	-	-	-
UK	8,432	10,078	9,272	4,094	3,375
Unallocated	-	-	-	-	1,180
Total	11,075	12,338	10,613	4,377	4,855

Country	1983	1984	1985	1986	1987
France	48	-	-	-	-
Ireland	860	1,084	1,000	1,640	1,200
Netherlands	-	-	-	-	-
UK	3,025	2,982	4,077	4,376	3,290
Unallocated	-	-	4,110	1,424	1,333
Total	3,933	4,066	9,187	7,440	5,823

Table 3.2.2 Industrial landings from the fisheries for SANDEEL, SPRAT, and NORWAY POUT in the North Sea ('000 t), 1974-1987.

Year	Major fisheries					By-catch Annex V species[1]	Total
		Clupeoids		Gadoid species			
	Sandeel	Sprat	Herring	Norway pout	Blue whiting		
1974	525	314	-	736	62	220	1,857
1975	428	641	-	560	42	128	1,799
1976	488	622	12	435	36	198	1,791
1977	786	304	10	390	38	147	1,675
1978	787	378	8	270	100	68	1,611
1979	578	380	15	320	64	77	1,434
1980	729	323	7	471	76	69	1,675
1981	569	209	84	236	62	85	1,245
1982	620	153	153	360	118	57	1,461
1983	537	91	155	423	118	38	1,362
1984	669	80	35	355	79	34	1,252
1985	621	50	63	197	73	29	1,033
1986[2]	851	16	40	174	37	23	1,141
1987[2]	825	32	47	147	30	25	1,106
Mean 1974-1986	630	274	45	379	70	90	1,487

[1] Anon (1984a, 1984b).
[2] Preliminary.

Table 3.2.3 Industrial landings[1] from the fisheries for SANDEEL, SPRAT, and NORWAY POUT in Division IIIa ('000 t), 1974-1987.

Year	Major fisheries					Total
		Clupeoids		Gadoid species		
	Sandeel	Sprat[2]	Herring	Norway pout	Blue whiting	
1974	8	74	76	13	-	171
1975	17	101	57	19	-	197
1976	22	59	38	42	-	161
1977	7	73	32	21	-	132
1978	23	83	16	25	-	147
1979	34	101	13	25	6	179
1980	39	87	25	26	14	191
1981	59	79	63	30	+	231
1982	18	51	54	44	5	172
1983	28	29	89	30	16	192
1984	19	40	112	46	15	224
1985	6	29	116	9	19	179
1986[4]	67	20	103	6	9	205
1987[4]	5	23	116	3	25	172
Mean 1974-1986	27	64	61	26	-	178[3]

[1] Data 1974-1984 from Anon. (1986), 1985-1987 provided by Working Group members.
[2] Landings for human consumption included.
[3] Blue whiting excluded.
[4] Preliminary.

Table 3.2.4 NORWAY POUT. Annual landings (tonnes) in Division IIIa. (Data officially reported to ICES.)

Country	1974	1975	1976	1977	1978	1979	1980
Denmark	10,669[2]	15,666[2]	40,144[2]	20,694	23,922	23,951	26,235
Norway	62[2]	925[2]	50[2]	104	362[3]	1,182	141
Sweden	-[4]	3,272	2,255	318	591[3]	32	39
Total	10,731	19,863	42,449	21,116	24,875	25,165	26,415

Country	1981	1982	1983	1984	1985	1986	1987[1]
Denmark	29,273	51,317	36,124	67,007	9,742[1]	32,056[1]	47,527
Norway	752	1,265	990	947	831	464[1]	1,540
Sweden	60	103	52	+	-	+	-
Total	30,085	52,685	37,166	67,954	10,573	32,520	49,067

[1] Preliminary.
[2] Including by-catch.
[3] Includes North Sea.
[4] Included in the North Sea.

Table 3.2.5 NORWAY POUT annual landings ('000 tonnes) in Sub-area IV by countries, North Sea, 1957-1987.

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	-	-	-	14.7
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	75.4	-	3.0	-	320.2
1980	366.2	34.1	70.2	-	0.6	-	471.1
1981	167.5	16.6	51.6	-	+	-	235.7
1982	256.3	15.4	88.0	-	-	-	359.7
1983	301.1	24.5[1]	97.3	-	+	-	422.9
1984	251.9	19.1[1]	83.8	-	0.1	-	354.9
1985	163.7	9.9	22.8	-	0.1	-	196.5
1986	146.3	6.6	21.5	-	-	-	174.4
1987	108.3	4.8	34.1	-	-	-	147.2

[1] Including by-catch.

Table 3.2.6 NORWAY POUT. Annual landings (tonnes) in Division VIa. (Data officially reported to ICES.)

Country	1974	1975	1976	1977	1978	1979	1980
Denmark	-	193	-	-	4,443	15,609	13,070
Faroes	1,581	1,524	6,203	2,177	18,484	4,772	3,530
Germany, Fed. Rep.	179	-	8	-	-	-	-
Netherlands	-	322	147	230	21	98	68
Norway	144[3]	-	82[3]	-	-	-	-
Poland	75	-	-	-	-	-	-
UK (Scotland)[2]	4,702	6,614	6,346	2,799	302	23	1,202
USSR	40	2	7,147	-	-	-	-
Total	6,721	8,655	19,933	5,206	23,250	20,502	17,870

Country	1981	1982	1983	1984	1985	1986	1987[1]
Denmark	2,877	751	530	4,301	8,574[1]	5,832[4]	37,714[4]
Faroes	3,540	3,026	6,261	3,400	998	-[1]	-
Germany, Fed. Rep.	-	-	-	70	-	-	-
Netherlands	182	548	1,534	-	139[1]	-	-
Norway	-	-	-	-	-	-	-
Poland	-	-	-	-	-	-	-
UK (Scotland)[2]	1,158	586	-	23	13	-	554
USSR	-	-	-	-	-	-	-
Total	7,757	4,911	8,325	7,794	9,697	5,832	38,268

[1] Preliminary.
[2] Amended using national data.
[3] Including by-catch.
[4] Includes Division VIb.

Table 3.2.7 SANDEEL, Division IIIa. Landings in tonnes as officially reported to ICES except where indicated.

Country	1982	1983	1984	1985	1986	1987
Denmark	21,540	34,286[1]	27,679[1]	6,271[2]	67,304[2]	3,817[2]
Norway	-	178	-	-	-	-
Sweden	5	31	-	-	-	-

[1] Estimate provided by Working Group members.
[2] Preliminary.

Table 3.2.8.1 Landings of SANDEEL from the North Sea, 1952-1987, '000 t.

Year	Denmark	Germany, Fed.Rep.	Faroes	Nether-lands	Norway	Sweden	UK	Total
1952	1.6	-	-	-	-	-	-	1.6
1953	4.5	+	-	-	-	-	-	4.5
1954	10.8	+	-	-	-	-	-	10.8
1955	37.6	+	-	-	-	-	-	37.6
1956	81.9	5.3	-	+	1.5	-	-	88.7
1957	73.3	25.5	-	3.7	3.2	-	-	105.7
1958	74.4	20.2	-	1.5	4.8	-	-	100.9
1959	77.1	17.4	-	5.1	8.0	-	-	107.6
1960	100.8	7.7	-	+	12.1	-	-	120.6
1961	73.6	4.5	-	+	5.1	-	-	83.2
1962	97.4	1.4	-	-	10.5	-	-	109.3
1963	134.4	16.4	-	-	11.5	-	-	162.3
1964	104.7	12.9	-	-	10.4	-	-	128.0
1965	123.6	2.1	-	-	4.9	-	-	130.6
1966	138.5	4.4	-	-	0.2	-	-	143.1
1967	187.4	0.3	-	-	1.0	-	-	188.7
1968	193.6	+	-	-	0.1	-	-	193.7
1969	112.8	+	-	-	-	-	0.5	113.3
1970	187.8	+	-	-	+	-	3.6	191.4
1971	371.6	0.1	-	-	2.1	-	8.3	382.1
1972	329.0	+	-	-	18.6	8.8	2.1	358.5
1973	273.0	-	1.4	-	17.2	1.1	4.2	296.9
1974	424.1	-	6.4	-	78.6	0.2	15.5	524.8
1975	355.6	-	4.9	-	54.0	0.1	13.6	428.2
1976	424.7	-	-	-	44.2	-	18.7	487.6
1977	664.3	-	11.4	-	78.7	5.7	25.5	785.6
1978	647.5	-	12.1	-	93.5	1.2	32.5	786.8
1979	449.8	-	13.2	-	101.4	-	13.4	577.8
1980	542.2	-	7.2	-	144.8	-	34.3	728.5
1981	464.4	-	4.9	-	52.6	-	46.7	568.6
1982	506.9	-	4.9	-	46.5	0.4	52.2	610.9
1983	485.1	-	2.0	-	12.2	0.2	37.0	536.5
1984	596.3	-	11.3	-	28.3	-	32.6	668.5
1985	587.6	-	3.5	-	13.1	-	17.2	621.4
1986[1]	752.5	-	4.2	-	82.1	-	12.0	850.6
1987[1]	605.4	-	18.6	-	193.4	-	7.2	824.6

[1] Preliminary.
+ = less than half unit.
- = no information or no catch.

Table 3.2.8.2 Annual landings ('000 t) of SANDEELS by area (see Figure 3.2.8) of the North Sea [Denmark, Norway, and UK (Scotland)].

Year	Area											Assessment areas[1]	
	1A	1B	1C	2A	2B	2C	3	4	5	6	Shetland	Northern	Southern
1972	98.8	28.1	3.9	24.5	85.1	0.0	13.5	58.3	6.7	28.0	0.0	130.6	216.3
1973	59.3	37.1	1.2	16.4	60.6	0.0	8.7	37.4	9.6	59.7	0.0	107.6	182.4
1974	50.4	178.0	1.7	2.2	177.9	0.0	29.0	27.4	11.7	25.4	7.4	386.6	117.1
1975	70.0	38.2	17.8	12.2	154.7	4.8	38.2	42.8	12.3	19.2	12.9	253.7	156.5
1976	154.0	3.5	39.7	71.8	38.5	3.1	50.2	59.2	8.9	36.7	20.2	135.0	330.6
1977	171.9	34.0	62.0	154.1	179.7	1.3	71.4	28.0	13.0	25.3	21.5	348.4	392.3
1978	159.7	50.2		346.5	70.3		42.5	37.4	6.4	27.2	28.1	163.0	577.2
1979	194.5	0.9	61.0	32.3	27.0	72.3	34.1	79.4	5.4	44.3	13.4	195.3	355.9
1980	215.1	3.3	119.3	89.5	52.4	27.0	90.0	30.8	8.7	57.1	25.4	292.0	401.2
1981	105.2	0.1	42.8	151.9	11.7	23.9	59.6	63.4	13.3	45.1	46.7	138.1	378.9
1982	189.8	5.4	4.4	132.1	24.9	2.3	37.4	75.7	6.9	74.7	52.0	74.4	479.2
1983	197.4	-	2.8	59.4	17.7	-	57.7	87.6	8.0	66.0	37.0	78.2	419.0
1984	337.8	4.1	5.9	74.9	30.4	0.1	51.3	56.0	3.9	60.2	32.6	91.8	532.8
1985	281.4	46.9	2.8	82.3	7.1	0.1	29.9	46.6	18.7	84.5	17.2	79.7	513.5
1986	295.2	35.7	8.5	55.3	244.1	2.0	84.8	22.5	4.0	80.3	14.0	375.1	457.4
1987	256.9	67.4	1.3	51.5	344.7	0.4	5.5	21.3	7.6	42.2	7.2	419.2	379.4

[1]Assessment areas: Northern - Areas 1B, 1C, 2B, 2C, 3.
Southern - Areas 1A, 2A, 4, 5, 6.

Table 3.2.11 SANDEEL, Division VIa. Landings in tonnes, 1982-1987, as officially reported to ICES.

Country	1982	1983	1984	1985	1986	1987
Denmark	-	-	-	-	-	-
Norway	-	-	-	-	-	-
UK (Scotland)	10,873	13,051	14,166	18,586	24,469	14,479

Table 3.2.12 Landings of SPRAT in Division IIIa and in the Norwegian fjords in Division IVa ('000 tonnes). (Data provided by Working Group members).

Year	Skagerrak				Kattegat			Div. IIIa total	Fjords of western Norway (Div.IVa East)	Grand total
	Denmark	Sweden	Norway	Total	Denmark	Sweden	Total			
1974	17.9	2.0	1.2	21.1	31.6	18.6	50.2	71.3	3.3	74.6
1975	15.0	2.1	1.9	19.0	60.7	20.9	81.6	100.6	2.9	103.5
1976	12.8	2.6	2.0	17.4	27.9	13.5	41.4	58.8	0.6	59.4
1977	7.1	2.2	1.2	10.5	47.1	9.8	56.9	67.4	5.4	72.8
1978	26.6	2.2	2.7	31.5	37.0	9.4	46.4	77.9	5.2	83.1
1979	33.5	8.1	1.8	43.4	45.8	6.4	52.2	95.6	5.0	100.6
1980	31.7	4.0	3.4	39.1	35.8	9.0	44.8	83.9	2.9	86.8
1981	26.4	6.3	4.6	37.3	23.0	16.0	39.0	76.3	3.1	79.4
1982	10.5	6.7	1.8	19.0	21.4	4.8	26.2	45.2	6.0	51.2
1983	3.4	6.4	1.9	11.7	9.1	5.7	14.8	26.5	3.0	29.5
1984	13.2	5.4	1.8	20.4	10.9	5.2	16.1	36.5	3.6	40.1
1985[1]	1.3	8.1[2]	2.5	11.9	4.6	5.4	10.0	21.9	7.1	29.0
1986[1]	0.4	6.6	1.1	8.1	0.9	9.0	9.9	18.0	1.8	19.8
1987[1]	1.4	7.1	0.4	8.9	1.4	5.5	6.9	15.8	7.2	23.0

[1] Preliminary figures.
[2] 14,000 t reported as clupeoid by-catch in the Skagerrak were not sampled, but 4,000 t of this are estimated to be sprat.

Table 3.2.13 SPRAT catches in the North Sea ('000 tonnes), 1978-1987. (Data provided by Working Group members.)

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
				Division IVa West						
Denmark	-	-	-	2.8	-	-	-	0.9	0.6	0.2
Germany, Fed.Rep.	-	-	0.1	-	-	-	-	-	-	-
Netherlands	-	-	-	-	-	-	-	6.7	-	-
Norway	1.3	-	-	-	-	-	-	-	-	-
UK (Scotland)	16.9	6.8	3.8	1.0	+	-	+	-	+	+
Total	18.2	6.8	3.9	3.8	+	-	+	7.6	0.6	0.2
				Division IVa East (North Sea) stock						
Denmark	-	-	-	-	+	-	-	+	0.2	+
Norway	0.1	+	0.4	-	-	3.0	-	-	-	-
Total	0.1	+	0.4	-	+	3.0	-	+	0.2	+
				Division IVb West						
Denmark	44.1	75.3	76.7	53.6	23.1	32.6	5.6	1.8	0.4	3.4
Faroe Islands	-	2.8[2]	2.8[2]	-	-	-	-	-	-	-
Norway	56.2	47.8	18.3	0.2	8.6	-	-	-	-	-
UK (England)	53.9	12.9	2.4	-	-	-	+	-	-	-
UK (Scotland)	14.8	5.0	2.5	0.7	0.2	+	+	-	-	0.1
Total	169.0	143.8	102.7	54.5	31.9	32.6	5.6	1.8	0.4	3.5

[1]Preliminary figures as reported.
[2]Includes Division IVb East.
[3]Includes Division IVb West.
+ = less than 0.1.
- = magnitude known to be nil.

(cont'd)

Table 3.2.13 (cont'd).

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Division IVb East										
Denmark	161.0	191.5	149.0	127.5	91.2	39.2	62.1	36.6	10.3	26.8
Germany, Fed.Rep.	-	1.8	6.1	4.8	1.5	-	0.6	0.6	0.6[3]	-
Norway	29.8	27.4	33.7	0.2	7.2	12.0	3.9	-	-	-
Sweden	-	-	0.6	-	-	-	-	-	-	-
Total	190.8	222.7	189.4	132.5	99.9	51.2	66.6	37.2	10.9	26.8
Division IVc										
Belgium	-	-	-	-	-	-	-	+	+	+
Denmark	-	1.5	6.5	4.3	2.4	1.0	0.5	+	0.1	+
France	-	-	-	-	-	-	-	-	+	-
Netherlands	-	-	-	-	-	-	0.1	-	-	-
Norway	0.2	3.1	16.2	-	3.7	-	3.5	-	-	-
UK (England)	-	1.4	4.3	14.0	14.9	3.6	0.9	3.4	4.1	0.7
Total	0.2	6.0	27.0	18.3	21.0	4.6	5.0	3.4	4.3	0.7
Total North Sea										
Belgium	+	+	-	-	-	-	-	+	+	+
Denmark	205.1	268.3	232.2	188.2	116.6	72.6	68.1	39.5	11.7	30.4
Faroe Islands	-	2.8	2.8	-	-	-	-	-	-	-
France	-	-	-	-	-	-	-	-	+	-
Germany, Fed.Rep.	-	3.8	6.2	4.8	1.5	-	0.6	-	0.6	-
Netherlands	-	-	-	-	-	-	0.1	0.6	-	0.5
Norway	87.6	78.6	68.6	0.4	19.5	12.0	7.4	6.7	-	-
Sweden	-	-	0.6	-	-	-	-	-	-	-
UK (England)	53.9	14.3	6.7	14.0	14.9	3.6	0.9	3.4	4.1	0.7
UK (Scotland)	31.7	11.8	6.3	1.7	0.2	+	+	-	+	0.2
Total	378.3	379.6	323.4	209.1	152.7	88.2	77.2	50.2	16.4	31.8

[1]Preliminary figures as reported.
\+ = less than 0.1.
\- = magnitude known to be nil.

Table 3.2.14 SPRAT in Division VIa. Landings in t.

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Denmark	259	-	-	242	-	-	-	-[1]	-	268[2]
Germany, Fed.Rep.	-	97	-	2	-	-	-	-	-	-
Ireland	533	12	1,787	790	287	-	192	51	348	-
Netherlands	46	125	428	892	2,156	1,863	-	-	-	-
Norway	-	-	-	-	24	-	-	557	-[1]	-
UK (England & Wales)	-	-	-	-	-	-	-	-	2	-
UK (Scotland)[3]	11,563	1,087	2,987	1,488	1,057	1,971	2,456	2,946	520	582
Total	12,401	1,321	5,202	3,414	3,524	3,834	2,648	3,554	870	850

[1] Preliminary figures.
[2] Includes Division VIb.
[3] Amended from national data.
Source: ICES Statistician.

Table 3.2.15 Nominal catch of SPRAT in Divisions VIId,e, 1978-1987.

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Belgium	-	-	-	-	-	3	-	-	-	-
Denmark	1,796	9,981	7,483	-	286	638	1,417	-[1]	15	250
France	225	2,373	1,867	146	44	60	47	14	15[1]	48
Germany, Fed.Rep.	34	6	52	1	-	-	-	-	-	-
Netherlands	826	441	1,401	1,015	1,533	1,454	589	-	-	-
Norway	-	-	65	-	-	-	-	-	-	-
UK (England + Wales)	2,118	2,032	6,864	10,183	4,749	4,756	2,402	3,771	1,163	2,357
Total	4,999	14,833	17,732	13,890	6,612	6,911	4,455	3,785	1,193	2,655

[1] Preliminary.

Table 3.3.1 Cod landings from the Kattegat, 1971-1987 (t).

Year	Denmark	Sweden	Fed.Rep. of Germany[1]	Total
1971	11,748	3,962	22	15,732
1972	13,451	3,957	34	17,442
1973	14,913	3,850	74	18,837
1974	17,043	4,717	120	21,880
1975	11,749	3,642	94	15,485
1976	12,986	3,242	47	16,275
1977	16,668	3,400	51	20,119
1978	10,293	2,893	204	13,390
1979	11,045	3,763	22	14,830
1980	9,265	4,206	38	13,509
1981	10,673	4,380	284	15,337
1982	9,320	3,087	58	12,465
1983	9,149	3,625	54	12,828
1984	7,590	4,091	205	11,886
1985	9,052	3,640	14	12,706
1986	6,930	2,054	112	9,096
1987[2]	11,235	2,000	76	13,311

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

[2] Preliminary.

Table 3.3.2 Cod landings from the Skagerrak, 1971-1987 (t).

Year	Open Skagerrak					Norwegian Fjords
	Denmark	Sweden	Norway	Others	Total	Norway
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	-	675	19,853	-
1978	23,614	592	-	260	24,466	1,305
1979	14,007	1,279	-	213	15,499	1,752
1980	21,551	1,712	402	341	24,006	1,580
1981	25,498	2,835	286	294	28,913	1,792
1982	23,377	2,378	314	41	26,110	1,466
1983	18,467	2,803	346	163	21,784	1,520
1984	17,443	1,981	311	156	19,891	1,187
1985	14,521	1,914	193	-	16,628	990
1986	18,424	1,505	174	-	20,103	917
1987[1]	17,824	1,800	152	-	19,776	838

[1] Preliminary.

Table 3.3.3 Nominal landings (tonnes) of HADDOCK from Division IIIa. (Bulletin Statistique.)

Year	Denmark	Norway	Sweden	Others	Total
1975	5,015	122	921	57	6,115
1976	7,488	191	1,075	301	9,055
1977	6,907	156	2,485	215	9,763
1978	4,978	168	1,435[2]	56	6,637
1979	4,120	248	361	56	4,785
1980	7,172	288	373	57	7,890
1981	9,568	271	391	120	10,350
1982	11,151	196	396	329	12,072
1983	8,670	756	608	221	10,255
1984	7,837	321	499	30	8,687
1985	7,652	279	351	15	9,314
1986	4,092	226	151	5	4,474
1987[1]	5,033	148	70	10	5,261

[1] Preliminary.
[2] Includes Divisions IVa and IVb.

Table 3.3.4 Nominal landings (tonnes) of WHITING from Division IIIa. (Bulletin Statistique.)

Year	Denmark	Norway	Sweden	Others	Total
1975	19,018	57	611	4	19,690
1976	17,870	48	1,002	48	18,968
1977	18,116	46	975	41	19,178
1978	48,102	58	899	32	49,091
1979	16,971	63	1,033	16	18,083
1980	21,070	65	1,516	3	22,654
1981	22,880	70	1,054	7	24,011
1982	13,380	40	670	13	14,103
1983	11,519	48	1,061	8	12,636
1984	12,694	51	1,168	60	13,973
1985	12,671	45	654	2	13,372
1986	15,865	64	477	1	16,390
1987[1]	16,463	29	155	35	16,682

[1] Preliminary.

Table 3.3.5 PLAICE landings from the Kattegat (tonnes).

Year	Denmark	Sweden	Germany	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	-	4,035
1982	2,717	201	-	2,918
1983	3,280	291	-	3,571
1984	3,252	323	32	3,607
1985	2,979	403	4	3,386
1986	2,488	170	+	2,658
1987[1]	2,834	250	104	3,188

[1] Preliminary.

Table 3.3.6 PLAICE landings from the Skagerrak (tonnes).

Year	Denmark	Sweden	Netherlands	Belgium	Norway	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	6,828	170	594	133	14	7,739
1984	7,560	356	1,580	27	22	9,545
1985	9,646	296	2,225	136	18	12,321
1986	10,653	215	4,024	505	24	15,421
1987[1]	11,365	250	2,170	261	25	14,071

[1] Preliminary.

Table 3.3.7 Catches (tonnes) of SOLE from Division IIIa.

Year	Denmark	Sweden	Fed.Rep.of Germany	Netherlands	Belgium	Others	Total
1952	156	51	59	-	-	-	266
1953	159	48	42	-	-	-	249
1954	177	43	34	-	-	-	254
1955	152	36	35	-	-	-	223
1956	168	30	57	-	-	-	255
1957	265	29	53	-	-	-	347
1958	226	35	56	-	-	-	317
1959	222	30	44	-	-	-	296
1960	294	24	83	-	-	-	401
1961	339	30	61	-	-	-	430
1962	356	-	58	-	-	-	414
1963	338	-	27	-	-	-	365
1964	376	-	45	-	-	-	421
1965	324	-	50	-	-	-	374
1966	312	-	20	-	-	-	332
1967	429	-	26	-	-	-	455
1968	290	-	16	-	-	11	317
1969	261	-	7	-	-	-	268
1970	183	-	-	-	-	-	183
1971	288	-	9	-	-	-	297
1972	376	-	12	-	-	-	388
1973	327	-	13	-	-	-	340
1974	449	-	9	-	-	-	458
1975	458	16	16	9	-	-	498
1976	422	11	21	155	2	-	611
1977	517	13	8	276	1	-	815
1978	502	9	9	141	-	-	661
1979	376	8	6	84	1	-	475
1980	316	9	12	5	2	-	344
1981	271	7	16	-	1	-	295
1982	210	4	8	1	1	-	224
1983	262	11	15	31	-	-	319
1984	326	13	13	54	-	-	406
1985	396	19	1	132	+	-	548
1986[1]	645	26	1	109	2	-	783[1]
1987[1]	735	19	-	70	-	-	824[1]

[1] Preliminary.
Data from Bull. Stat.

Table 3.4.2 *Pandalus borealis* landings from Divisions IIIa and IVa (eastern part) ('000 tonnes).

Year	Skagerrak, Kattegat				Division IVa Norwegian Deep			
	Denmark[1]	Norway	Sweden	Total	Denmark[1]	Norway	Sweden	Total
1970	757	982	1,827	3,566	345	747	915	2,007
1971	834	1,392	1,548	3,774	356	1,094	1,358	2,808
1972	773	1,123	1,374	3,270	244	1,354	1,150	2,748
1973	716	1,415	1,194	3,325	39	918	936	1,893
1974	475	1,186	1,483	3,144	55	623	520	1,198
1975	733	1,576	1,751	4,060	84	763	252	1,099
1976	865	2,541	2,352	5,758	339	807	177	1,323
1977	763	2,257	1,906	4,926	357	747	113	1,217
1978	757	1,925	1,529	4,211	702	515	80	1,297
1979	973	2,612	1,752	5,337	89	428	35	552
1980	1,678	3,666	2,121	7,465	-	896	38	934
1981	2,593	3,943	2,210	8,746	-	1,240	31	1,271
1982	2,623	3,693	1,359	7,675	1,083	1,349	91	2,523
1983	1,325	3,723	1,037	6,085	242	1,638	99	1,979
1984	1,641	3,509	933	6,083	159	1,245	120	1,524
1985	3,677	4,772	1,474	9,923	340	1,841	130	2,311
1986	4,102	4,795	1,306	10,203	764	1,673	157	2,594
1987[2]	3,466	5,017	1,065	9,548	1,169	2,780	249	4,198

[1] 1982-1987 total Danish catch distributed on areas according to log-book data.
[2] Preliminary.

Table 3.4.4 Landings (t) of *Pandalus borealis* from Division IVa, the Fladen Ground.

Year	Denmark	Fed.Rep.of Germany	Norway	UK (Scotland)	Total
1970	3,115	-	-	103	3,218
1971	3,216	33	-	439	3,688
1972	2,204	-	-	187	2,391
1973	157	-	-	163	320
1974	282	-	-	434	716
1975	1,308	-	-	525	1,833
1976	1,552	-	-	1,937	3,459
1977	425	-	112	1,692	2,229
1978	890	-	81	2,027	2,998
1979	565	-	44	268	877
1980	1,122	-	76	377	1,575
1981	685	-	1	347	1,033
1982	283	-	-	352	635
1983	5,729	-	8	1,827	7,564
1984	4,553	-	13	25	4,591
1985	3,649	-	-	1,341	4,990
1986	3,416	-	-	301	3,717
1987	7,326	-	-	686	8,012

Table 3.5.2 Nominal catch (in tonnes) of COD in Sub-area IV, 1978-1987. as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Belgium	17,473	12,576	9,630	8,744	6,604
Denmark	41,858	48,509	56,404	64,968	61,454
Faroe Islands	56	113	150	38	65
France	11,944	12,559	10,910	11,369	8,399
German Dem.Rep.	75	84	63	-	-
Germany, Fed.Rep.	37,040	20,411	26,343	29,741	18,525
Ireland	174	1	-	-	-
Netherlands	48,817	34,752	45,400	51,281	36,490
Norway[2]	2,747	3,575	4,506	6,766	12,163
Poland	115	142	28	7	62
Sweden	...[3]	298	293	321	453
UK (England & Wales)	59,127	54,923	49,951	59,856	54,277
UK (Scotland)	41,984	42,811	45,044	53,921	57,308
USSR	17	17	-	-	-
Total IV	261,427	230,771	248,722	287,012	255,800
WG total	260,890	248,051	260,278	300,599	255,934

Country	1983	1984	1985	1986	1987[1]
Belgium	6,704	5,804	4,815	6,604	6,722
Denmark	48,828	46,751	41,737	32,920	36,612
Faroe Islands	361	-	71	15	-
France	7,159	8,129	4,834	7,024[1,4]	6,813[4]
German Dem.Rep.	-	-	-	-	-
Germany, Fed.Rep.	20,333	13,453	7,675	7,667	9,558
Ireland	-	-	-	-	-
Netherlands	34,111	25,460	30,844	25,082	21,333
Norway[2]	6,625	7,005	5,766	6,011	4,395
Poland	75	7	-	10	13
Sweden	422	575	748	839	292[5]
UK (England & Wales)	53,860	35,605	29,692	25,361	29,187
UK (Scotland)	58,581	54,359	60,931	45,748	49,469
USSR	-	-	-	-	-
Total IV	237,059	197,148	187,113	157,281	164,394
WG total	229,499	206,014	192,253	158,348	173,585

[1] Provisional.
[2] Figures from Norway do not include cod caught in Rec. 2 fisheries.
[3] Included in Division IIIa.
[4] Includes Division IIa.
[5] Jan-Sep.

Table 3.5.3 Nominal catch (in tonnes) of HADDOCK in Sub-area IV, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Belgium	1,295	732	1,414	1,217	966
Denmark	8,093	8,248	12,928	13,198	22,704
Faroe Islands	12	7	27	46	6
France	5,122	7,208	7,407	11,966	15,988
German Dem. Rep.	37	12	36	–	–
Germany, Fed. Rep.	2,589	2,549	2,354	3,387	4,510
Ireland	101	–	–	–	–
Netherlands	857	955	1,557	2,279	1,021
Norway[2]	609	968	1,191	2,283	2,888
Poland	62	106	59	31	317
Sweden	–[3]	907	1,165	1,301	1,874
UK (England and Wales)	12,200	10,774	12,195	14,570	16,403
UK (Scotland)	58,406	54,119	64,058	82,798	107,773
USSR	54	18	–	–	–
Total IV	89,437	86,603	104,391	133,076	174,450
WG total incl. discards	163,890	141,858	217,107	206,930	225,789

Country	1983	1984	1985	1986	1987[1]
Belgium	985	494	719	317	188
Denmark	25,653	16,368	23,619[1]	16,441	7,552
Faroe Islands	51	–	5	4	–
France	11,250	8,103	5,389	7,060[1,4]	4,286[4]
German Dem. Rep.	–	–	–	–	–
Germany, Fed. Rep.	3,654	2,571	2,796	1,984	1,281
Ireland	–	–	–	–	–
Netherlands	1,722	1,052	3,875	1,627	1,087
Norway[2]	3,862	3,959	3,498	4,881[1]	2,378
Poland	150	17	–	1	–
Sweden	1,360	1,518	1,942	1,550	541[4]
UK (England and Wales)	15,476	12,340	13,614	8,137	7,211
UK (Scotland)	100,390	87,479	112,549	126,650	83,903
USSR	–	–	–	–	–
Total	164,553	133,901	168,006	168,652	108,427
WG total incl. discards	232,203	213,252	250,000	220,000	175,000

[1] Provisional.
[2] Figures from Norway do not include haddock caught in Rec. 2 fisheries.
[3] Included in Division IIIa.
[4] Includes Division IIa.
[5] Jan-Sep.

Table 3.5.4 Nominal catch (in tonnes) of WHITING in Sub-area IV, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Belgium	3,304	3,941	3,153	2,623	2,272
Denmark	15,741	41,965	17,916	16,430	27,043
Faroe Islands	42	581	21	12	57
France	22,525	27,590	23,626	24,744	23,780
German Dem. Rep.	22	5	-	-	-
Germany, Fed. Rep.	348	1,280	1,267	601	223
Ireland	38	-	-	-	-
Netherlands	11,030	13,417	14,389	14,600	12,218
Norway	64	49	27	27	17
Poland	8	3	1	-	-
Sweden	...[2]	31	16	9	11
UK (England and Wales)	7,542	7,581	6,778	5,964	4,743
UK (Scotland)	42,779	44,841	42,218	31,399	29,640
Total Sub-area IV	103,443	141,284	109,412	96,409	100,004
WG total incl. discards	179,192	236,712	215,979	182,272	131,881

Country	1983	1984	1985	1986	1987[1]
Belgium	2,864	2,798	2,177	2,275	1,436
Denmark	18,054	19,771	16,142[1]	9,076	2,005
Faroe Islands	18	-	6	-	-
France	21,263	19,209	10,853	11,840[1,3]	15,313[3]
German Dem. Rep.	-	-	-	-	-
Germany, Fed. Rep.	317	286	226	313	443
Ireland	-	-	-	-	-
Netherlands	10,935	8,767	6,973	13,741	8,535
Norway	39	88	103	84[1]	59
Poland	1	2	-	-	-
Sweden	44	53	22	33	13[4]
UK (England and Wales)	4,366	5,017	5,024	3,805	4,384
UK (Scotland)	41,248	42,967	30,398	29,113	37,507
Total Sub-area IV	99,149	98,958	71,924	70,280	69,695
WG total incl. discards	154,236	137,000	96,000	145,000	132,000

[1] Provisional.
[2] Included in Division IIIa.
[3] Includes Division IIa.
[4] Jan-Sep.

Table 3.5.5 Nominal catch (tonnes) of SAITHE in Sub-area IV and Division IIIa, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Belgium	44	14	13	12	4
Denmark	10,372	10,461	10,370	6,454	10,114
Faroe Islands	213	407	1,020	614	746
France	38,122	40,983	37,306	42,649	47,064
German Dem. Rep.	2,404	1,504	925	-	-
Germany, Fed. Rep.	25,982	18,780	11,095	8,246	13,517
Ireland	88	-	-	-	-
Netherlands	5,135	1,466	245	123	36
Norway	17,627	17,575	47,959	55,882	72,669
Poland	5,661	6,104	2,404	698	793
Sweden	990	211	342	156	372
UK (England and Wales)	8,382	6,256	4,879	4,309	5,627
UK (Scotland)	14,330	6,257	6,525	6,529	8,136
USSR	10,161	2,015	-	-	-
Sub-total	139,511	114,033	123,083	125,672	159,078
By catch from industrial fisheries:					
Denmark[2]	72	493	-	-	-
Norway[2]	2,494	1,142	363	1,280	5,003
Total	142,077	115,668	123,446	126,952	164,081
WG total	151,000	126,000	126,000	136,000	173,000

Country	1983	1984	1985	1986	1987[1]
Belgium	7	32	31	16	14
Denmark	10,530	8,526	8,431[1]	10,342	7,806
Faroe Islands	806	-	895	224	-
France	38,782	43,592	42,200	56,826[1,3]	40,867[3]
German Dem. Rep.	-	-	-	-	-
Germany, Fed. Rep.	13,649	25,262	22,551	22,277	21,771
Ireland	-	-	-	-	-
Netherlands	89	181	233	134	334
Norway	81,330	88,420	101,808	62,125[1]	59,600
Poland	415	413	-	495	832
Sweden	548	522	1,764	1,987	1,502[4]
UK (England and Wales)	6,845	8,183	5,455	4,480	1,146
UK (Scotland)	6,321	6,970	9,932	15,520	11,794
USSR	-	-	-	-	-
Sub-total	159,322	182,101	193,300[1]	174,426[1]	145,666
By catch from industrial fisheries:					
Denmark[2]	-	-	-	-	...
Norway[2]	1,445	5,616	7,895	1,126	...
Total	160,767	187,717	201,195[1]	175,552[1]	...
WG total	173,000	195,000	199,000	167,000	147,000

[1] Preliminary.
[2] Data from national labs.
[3] Includes Division IIa.
[4] Jan-Sep.

Table 3.6.2 Nominal catch (in tonnes) of COD in Division VIa, 1978-1987, as officially reported to ICES.

Country	1978	1979	1982	1981	1982
Belgium	-	4	57	30	35
Denmark	-	-	27[2]	-	3
Faroe Islands	-	40	3	-	2
France	4,499	4,590	5,495	7,601	7,160
Germany, Fed. Rep.	31	40	1	21	8
Ireland	1,214	2,237	2,331	2,725	3,527
Netherlands	3	20	1	-	-
Norway	40	32	48	40	238
Spain	108[2]	-	-	-	41
Sweden	-	-	-	-	1
UK (England and Wales)	2,082	2,348	2,302	3,187[3]	2,948
UK (Scotland)	5,539	6,929	7,603	10,339	7,969
UK (Northern Ireland)	5	2	2	7	33
Total	13,521	16,242	17,870	23,950	21,965

Country	1983	1984	1985	1986	1987[1]
Belgium	21	22	48	88	60
Denmark	-	-	-[1]	-	4[2]
Faroe Islands	-	-	-	-	-
France	8,140	7,637	7,411	8,386[1,4]	6,776[4]
Germany, Fed. Rep.	205	75	66	53	23[2]
Ireland	2,695	2,316	2,564	1,704	1,524
Netherlands	-	-	1	-	-
Norway	267	231	204	176[1]	558
Spain	52	64	28	-	...
Sweden	-	-	-	-	-
UK (England and Wales)	1,141	692	243	106	269
UK (Scotland)	8,933	9,483	8,032	4,251	11,144
UK (Northern Ireland)	37	32	17	54	138
Total	21,491	20,552	18,614	14,818[5]	20,496[6]

[1] Provisional.
[2] Includes Division VIb.
[3] Including 37 tonnes caught in Sub-area VI and landed abroad.
[4] Includes Divisions VIb and Vb.
[5] Working Group total = 12,000 t.
[6] Working Group total = 19,000 t.

Table 3.6.3 Nominal catch (in tonnes) of COD in Division VIb, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Denmark	-	-	-[2]	2	-
Faroe Islands	10	92	75	4	77
France	1	2	1	443	27
Germany, Fed. Rep.	-	111	136	-	+
Ireland	3	-	-	134	-
Norway	69	138	80	70	51
Spain	-	-	-	-	58
UK (England and Wales)	285	129	1	67	3
UK (N.Ireland	-	-	-	-	-
UK (Scotland)	384	198	370	143	157
Total	752	670	696	863	373
Country	**1983**	**1984**	**1985**	**1986**	**1987[1]**
Denmark	-	-	-[1]	-	...[2]
Faroe Islands	112	18	-	1	-
France	97	9	17	...[2]	...[2]
Germany, Fed. Rep.	195	-	3	-	...[2]
Ireland	-	-	-	-[2]	-
Norway	462	373	202	98[1]	-
Spain	42	241	1,200	1,219	...
UK (England and Wales)	163	161	114	93	42
UK (N.Ireland)	-	-	-	1	-
UK (Scotland)	35	221	437	187	280
Total	1,106	1,023	1,973	1,599	322

[1] Provisional.
[2] Included in Division VIa.

Table 3.6.4 Nominal catch (in tonnes) of HADDOCK in Division VIa, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Belgium	-	2	3	1	2
Denmark	-	37	-	-	+
Faroe Islands	-	2	-	-	-
France	4,255	4,786	2,808	3,403	3,760
Germany, Fed. Rep.	20	2	3	7	71
Ireland	441	877	726	1,891	4,402
Netherlands	13	2	2	3	391
Norway	13	9	16	29	37
Spain	-	-	-	-	97
UK (England & Wales)	2,805	1,654	1,279	1,052	2,035
UK (Scotland)	9,629	7,459	8,198	12,051	19,249
UK (Northern Ireland)	-	-	+	-	1
Total	17,176	14,830	13,935	18,437	30,045
WG total incl. discards	19,510	28,847	17,478	33,306	39,681

Country	1983	1984	1985	1986	1987[1]
Belgium	1	6	7	-	21
Denmark	-	-	-[1]	-	4[3]
Faroe Islands	-	-	-	1	-
France	4,520	4,240	5,930	3,553[1,2]	3,201[2]
Germany, Fed. Rep.	65	83	38	25	22[3]
Ireland	3,450	3,932	3,512	2,026	2,204
Netherlands	25	-	-	-	-
Norway	68	33	76	47[1]	-
Spain	201	129	166	-	...
UK (England & Wales)	1,376	1,042	348	222	356
UK (Scotland)	21,593	18,472	15,036	12,955	18,498
UK (Northern Ireland)	4	5	1	155	2
Total	31,303	27,942	25,114	18,984	24,308
WG total incl. discards	37,630	46,364	41,737	27,000	43,000

[1] Provisional.
[2] Includes Divisions VIb and Vb.
[3] Includes Division VIb.

Table 3.6.5 Nominal catch (in tonnes) of HADDOCK in Division VIb, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Denmark	-	-	-	-	-
Faroe Islands	11	20	5	1	21
France	3	4	1	10	32
Germany, Fed. Rep.	-	-	17	-	4
Ireland	61	-	-	-	-
Norway	4	16	2	10	3
Spain	-	-	6	88	121
UK (England & Wales)	2,365	1,654	6,261	9,005	3,736
UK (Scotland)	2,060	548	1,051	27	5
Total	4,504	2,242	7,343	9,141	3,992

Country	1983	1984	1985	1986	1987[1]
Denmark	-	-	-[1]	-	...[2]
Faroe Islands	3	3	1	-	-
France	48	12	116	...[1,2]	...[2]
Germany, Fed. Rep.	1	-	4	-	...[2]
Ireland	-	-	-	-	-
Norway	20	45	31	84[1]	-
Spain	79	128	892	756	...
UK (England & Wales)	113	788	1,876	703	1,121
UK (Scotland)	136	1,654	6,397	2,961	6,166
UK (Northern Ireland)	-	-	-	157	-
Total	400	2,630	9,317	4,661	7,287

[1] Provisional.
[2] Included in Division VIa.

Table 3.6.6 Nominal catch (in tonnes) of WHITING in Division VIa, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Belgium	-	-	+	-	2
Denmark	119	92	32	-	+
Faroe Islands	-	770	-	-	-
France	3,610	2,779	2,609	1,637	1,798
Germany, Fed.Rep.	2	4	1	49	53
Ireland	2,080	2,791	4,407	8,148	3,406
Netherlands	23	17	2	6	285
Spain	-	-	-	-	99
UK (England & Wales)	669	320	227	145	166
UK (Scotland)	8,174	10,613	7,386	8,519	8,419
UK (N. Ireland)	-	-	-	-	
Total	14,677	17,386	14,664	18,504	14,235
WG total	14,677	17,081	12,816	12,203	13,871

Country	1983	1984	1985	1986	1987[1]
Belgium	-	-	3	-	-
Denmark	-	-	-[1]	-	5[2]
Faroe Islands	-	-	-	-	-
France	2,029	1,887	1,502	1,998[1,3]	1,961[3]
Germany, Fed.Rep.	43	6	9	1	74[2]
Ireland	3,578	3,454	1,917	1,683	2,835
Netherlands	811	-	14	-	-
Spain	76	40	61	-	...
UK (England & Wales)	157	162	63	26	46
UK (Scotland)	10,019	11,270	9,051	5,848	7,797
UK (N. Ireland)	52	40	17	5	13
Total	16,765	16,859	12,637	9,561	12,731
WG total	15,971	15,902	13,000	8,000	10,000

[1] Provisional.
[2] Includes Division VIb.
[3] Includes Divisions VIb and Vb.

Table 3.6.7 Nominal catch (in tonnes) of WHITING in Division VIb, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Denmark	-	-	...[2]	-	-	-	-	-[1]	-	...[2]
France	-	-	3	-	-	-	3	2	...[1,2]	...[2]
Germany, Fed.Rep.	-	-	-	-	-	-	-	-	-	...[2]
Ireland	1	-	-	-	-	-	-	-	-	-
Spain	-	-	-	196	112	88	16	123	-	...
UK(Engl. & Wales)	5	1	+	-	-	+	2	+	5	1
UK(Scotland)	24	2	59	+	-	5	25	6	13	108
Total	30	3	62	196	112	93	46	131	18	109

[1]Provisional.
[2]Included in Division VIa.

Table 3.6.8 Nominal catch (tonnes) of SAITHE in Sub-area VI, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Belgium	-	1	2	2	-
Denmark	-	-	-	-	4
Faroe Islands	-	14	4	3	5
France	21,519	15,662	15,427	16,654	17,102
Germany, Fed. Rep.	604	131	49	581	441
Ireland	266	246	295	250	322
Netherlands	623	256	91	-	-
Norway	122	20	62	25	19
Spain	-	-	-	120	243
UK (England and Wales)	3,193	1,765	1,594	1,364	1,966
UK (Northern Ireland)	27	11	9	10	7
UK (Scotland)	5,181	3,602	2,902	3,117	2,141
Total	31,535	21,708	20,435	22,126	22,250
WG total	33,000	22,000	22,000	24,000	24,000
Country	**1983**	**1984**	**1985**	**1986**	**1987[1]**
Belgium	-	-	2	-	-
Denmark	-	-	-[1]	-	7
Faroe Islands	-	-	-	-	-
France	13,470	19,706	19,120	18,363[1,2]	17,019[2]
Germany, Fed. Rep.	179	713	838	2,345	2,037
Ireland	698	599	670	660	470
Netherlands	32	-	-	-	-
Norway	55	66	51	264[1]	236
Spain	330	882	624	824	...
UK (England and Wales)	2,760	1,800	1,349	1,259	124
UK (Northern Ireland)	12	49	15	21	26
UK (Scotland)	2,642	3,170	3,118	3,697	3,249
Total	26,178	26,985	25,787	27,433	23,168
WG total	29,000	22,000	27,000	42,000	31,000

[1]Preliminary.
[2]Includes Division Vb.

Table 3.6.9 Nominal catch (in tonnes) of COD in Divisions VIId,e, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Belgium	435	699	163	363	293
Denmark	2,160	2,052	660[2]	-	-
France	8,044	4,848	4,001	4,486	3,349
Netherlands	+	-	-	4	1
UK (England and Wales)	654	485	365	428	568
Total	11,293	8,084	5,189	5,281	4,211
Country	**1983**	**1984**	**1985**	**1986**	**1987[1]**
Belgium	389	346	513	658	793
Denmark	-	-	-[1]	4	+
France	3,369	2,882	2,948	12,335[1,3]	14,505[3]
Netherlands	4	-	1	66	-
UK (England and Wales)	650	518	569	1,236	1,312
Total	4,412	3,746	4,031	14,299	16,610

[1] Provisional.
[2] Includes Divisions VIIb,c.
[3] Includes all of Sub-areas VII (except Division VIIa) and VIII.

Table 3.6.10 Nominal catch (in tonnes) of WHITING in Divisions VIId,e, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Belgium	85	92	85	102	101
Denmark	1	2,585	6	2	-
France	8,010	5,352	7,690	8,842	8,051
Ireland	12	-	13	-	-
Netherlands	2	1	2	2	70
UK (England & Wales)	1,038	930	839	1,136	1,222
Total	9,148	8,960	8,635	10,084	9,444
Country	**1983**	**1984**	**1985**	**1986**	**1987[1]**
Belgium	94	83	84	67	131
Denmark	-	-	-[1]	-	-
France	5,708	7,239	8,107	11,706[1,2]	11,018[2]
Ireland	-	-	-	-	-
Netherlands	399	-	-	124	-
UK (England & Wales)	1,210	811	604	809	995
Total	7,411	8,133	8,795[3]	12,706[4]	12,144[5]

[1] Provisional.
[2] Includes all of Sub-areas VII (except Division VIIa) and VIII.
[3] Working Group total = 7,000 t.
[4] Working Group total = 8,000 t.
[5] Working Group total = 8,000 t.

Table 3.6.11.1 Nominal catch (in tonnes) of COD in Divisions VIIb,c,h-k, 1978-1987, as offically reported to ICES.

Country	1978	1979	1980	1981	1982
Belgium	-	-	-	-	-
Denmark	-	18	-	-	-
France	443	546	983	1,465	587
Germany, Fed. Rep.	-	-	7	-	-
Ireland	293	480	782	1,434	1,764
Netherlands	279	-	5	-	+
Norway	-	-	-	-	-
Poland	-	2	-	-	-
Spain	11	-	17	37	29
UK (England and Wales)	-	1	1	171	304
UK (Scotland)	2	1	12	+	-
Total	1,028	1,048	1,807	3,107	2,684

Country	1983	1984	1985	1986	1987[1]
Belgium	-	-	13	25[1]	-
Denmark	-	-	-	-	+[3]
France	636	946	1,115	...[2]	...[2]
Germany, Fed. Rep.	-	-	-	-	-
Ireland	1,192	1,211	1,176	1,283	849[4]
Netherlands	80	-	208	1	-
Norway	4	1	22	107	-
Poland	-	-	-	-	-
Spain	28	-	26	-	...
UK (England and Wales)	41	408	546	496[1]	84
UK (Scotland)	-	45	+	17	16
Total	1,981	2,611	3,106	1,929	949

[1] Provisional.
[2] Included in Divisions VIId,e.
[3] Includes Division VIIg.
[4] Divisions VIIb,c: 402 t; Divisions VIIg,h: 149 t; Divisions VIIj,k: 298 t.

Table 3.6.11.2 Nominal catch (in tonnes) of HADDOCK in Divisions VIId,e, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Belgium	-	1	+	2	1	1	-	2	1	-
Denmark	22	21	15	-	-	-	-	-[1]	-	-
France	356	333	298	421	344	232	273	138	...[2]	...[2]
Ireland	-	-	+	-	-	-	-	-	-	-
Netherlands	-	-	-	-	94	1	-	-	-	-
UK (Engl.& Wales)	22	51	59	119	60	41	26	27	21	42
Total	400	406	372	542	499	275	299	167	22	42

[1]Provisional.
[2]Included in Divisions VIIb,c,g-k.

Table 3.6.11.3 Nominal catch (in tonnes) of HADDOCK in Divisions VIIb,c,g-k, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Belgium	5	2	2	3	3
Denmark	-	1	-	-	-
France	1,479	1,931	2,219	2,571	2,005
Ireland	111	155	274	679	904
Netherlands	-	16	-	-	7
Norway	-	-	-	-	-
Spain	-	-	5	277	248
UK (England and Wales)	13	19	50	92	182
UK (Scotland)	8	22	56	4	-
Total	1,616	2,146	2,606	3,626	3,349

Country	1983	1984	1985	1986	1987[1]
Belgium	1	-	2	-	9
Denmark	-	-	-[1]	-	-
France	2,588	3,001	2,258	3,222[1,2]	3,817[2]
Ireland	941	646	794	317	286
Netherlands	-	-	-	-	-
Norway	57	17	4	86[1]	-
Spain	167	532	561	-	...
UK (England and Wales)	23	309	135	158	34
UK (Scotland)	-	63	7	57	75
Total	3,777	4,568	3,761	3,840	4,221

[1]Provisional.
[2]Includes all of Sub-areas VII and VIII.

Table 3.6.11.4 Nominal catch (in tonnes) of WHITING in Divisions VIIb,c,h-k, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Belgium	-	-	-	-	-
France	419	444	656	516	204
Germany, Fed. Rep.	45	-	+	-	-
Ireland	1,160	2,589	3,499	3,550	4,011
Netherlands	-	1	1	21	78
Spain	-	-	-	-	85
UK (England and Wales)	-	-	-	67	49
UK (Scotland)	1	1	80	1	-
Total	1,625	3,035	4,236	4,155	4,427
Country	**1983**	**1984**	**1985**	**1986**	**1987[1]**
Belgium	-	-	-	4[1]	-
France	356	398	583	...[2]	...[2]
Germany, Fed. Rep.	-	-	-	-	-
Ireland	2,590	1,872	2,719	2,165[1]	2,519[3]
Netherlands	363	169	90	7	-
Spain	91	57	76	-	...
UK (England and Wales)	18	58	165	168[1]	38
UK (Scotland)	-	4	-	-	5
Total	3,418	2,558	3,633	2,344	2,562

[1] Provisional.
[2] Included in Divisions VIId,e.
[3] Divisions VIIb,c: 1,249 t; Divisions VIIg,h: 211 t; Divisions VIIj,h: 1,059 t.

Table 3.6.11.5 Nominal catch (in tonnes) of SAITHE in Sub-area VII, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Belgium	9	9	19	12	13
Denmark	19	7	6	–	–
France	2,105	1,699	2,317	4,563	4,061
Germany, Fed. Rep.	16	3	46	–	–
Ireland	1,451	1,632	2,220	2,197	2,367
Netherlands	44	35	84	100	22
Norway	–	–	–	–	–
Spain	–	–	–	266	179
UK (England & Wales)	89	61	109	236	526
UK (Isle of Man)	–	41	19	36	34
UK (N. Ireland)	343	276	301	577	872
UK (Scotland)	106	34	56	94	119
Total	4,182	3,797	5,177	8,081	8,193

Country	1983	1984	1985	1986	1987[1]
Belgium	6	10	31	25	23
Denmark	–	–	–[1]	–	–
France	4,760	3,697	6,101	4,979[1,2]	6,065[2]
Germany, Fed. Rep.	11	5	–	–	–
Ireland	2,383	2,374	2,177	1,739	869
Netherlands	7	–	–	–	–
Norway	3	+	3	38[1]	–
Spain	70	118	118	–	...
UK (England & Wales)	235	974	722	648	158
UK (Isle of Man)	16	27	9	6	...
UK (N. Ireland)	668	411	665	635	573
UK (Scotland)	138	140	477	488	630
Total	8,297	7,756	10,303	8,558	8,318

[1] Preliminary.
[2] Includes Sub-area VIII.

Table 3.7.1 Nominal catch (t) of COD in Division VIIa, 1978-1987 as reported to ICES.

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Belgium	144	174	246	395	269	139	135	185	222	344
Denmark	-	-	-	6	-	-	-	-	-	-
France	1,022	1,125	1,009	1,178	1,066	815	912	1,782	1,480	1,373
Ireland	3,128	3,755	4,421	6,552	4,758	4,032	2,885	4,121	3,991	3,938
Netherlands	15	11	36	94	48	34	38	104	-	-
UK (England & Wales)	875	980	1,918	2,712	2,544	1,405	1,253	1,200	847	1,922
UK (Isle of Man)	-	297	232	221	161	103	98	119	80	45
UK (N. Ireland)	1,064	1,898	2,591	3,360	3,852	3,463	2,658	2,541	2,992	3,764
UK (Scotland)	79	118	286	376	583	336	669	1,038	446	574
Total	6,328	8,358	10,739	14,894	13,281	10,327	8,648	11,090	10,058	11,960
Unallocated	-57[2]	13	37	13	-	-312[2]	-265[2]	-607[2]	-206	752
Total figures used by Working Group for stock assessment	6,271	8,371	10,776	14,907	13,281	10,015	8,383	10,483	9,852	12,712

[1] Preliminary.
[2] Over reporting.

Table 3.7.2 Nominal catch (tonnes) of WHITING in Division VIIa, 1978-1987, as officially reported to ICES and Working Group estimates of human consumption and discards.

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[2]
Belgium	51	42	45	85	45	78	99	100	70	109
France	2,098	1,897	1,616	1,254	1,375	1,021	930	956	770	1,234
Ireland	4,562	3,847	5,546	5,362	4,204	3,047	4,276	5,521	3,101	4,069
Netherlands	12	11	10	12	14	18	10[1]	30	-	-
UK (Engl.+ Wales)	1,105	842	1,000	816	1,195	1,200	1,224	1,379	1,004	1,529
UK (N. Ireland)	3,089	2,946	3,954	9,052	9,927	5,218	5,660	8,382	4,940	5,160
UK (Scotland)	152	154	251	102	189	120	275	368	129	281
UK (Isle of Man)	-	372	243	346	268	127	68	57	25	-
Total human consumption	11,069	10,111	12,665	17,029	16,989	10,829	12,542	16,793	10,039	12,382
Unallocated	-665[3]	-219[3]	-	-	230	-321[3]	-981[3]	-841[3]	-47[3]	-1,827[3]
Total human consumption figures used by the Working Group for stock assessment	10,404	9,892	12,665	17,029	17,219	10,508	11,561	15,952	10,086	10,555
Estimated industrial catches (Ireland only)	927	-	-	-	-	-	-	-	-	-
Estimated discards from *Nephrops* fishery	-	-	3,302	3,577	893	1,837	3,674	2,284	2,329	4,413

[1] As reported to EC.
[2] Preliminary.
[3] Over-reporting.

Table 3.7.3 Nominal landings (t) of PLAICE in Division VIIa, 1978-1987. (Data for 1978-1986 as officially reported to ICES.)

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Belgium	109	151	214	231	130	195	118	285	384	403
France	110	152	104	51	60	99	38	110	165	105
Ireland	1,025	1,032	1,086	1,243	923	1,384[2]	1,420[2]	2,000[2]	1,858	1,946
Netherlands	15	18	60	40	29	73[2]	30[2]	1,091[2]	-	-
UK (England & Wales)	1,792	1,817	2,139	2,117	1,868	1,666	2,301	2,295	1,774	2,366
UK (Isle of Man)	-	52	20	27	12	11	11	26	12	9
UK (N. Ireland)	173	161	139	132	159	183	203	198	272	513
UK (Scotland)	89	106	141	64	47	42	86	118	119	243
Others	-	-	-	1	-	-	-	-	-	-
Total	3,313	3,489	3,903	3,906	3,228	3,653	4,207	6,123	4,584	5,585
Discards[3]	-	-	-	-	-	-	-	-	250	270
Unallocated	-82[4]	-61[4]	-	-	9	-14[4]	34	-1,048[4]	-28[4]	329
Total figures used by Working Group for stock assessment	3,231	3,428	3,903	3,906	3,237	3,639	4,241	5,075	4,806	6,184

[1] Preliminary.
[2] EC figures.
[3] Estimated discards as a result of UK (England & Wales) beam trawl by-catch restriction.
[4] Over-reporting.

Table 3.7.4 Irish Sea SOLE. Nominal catches (tonnes) 1978-1987 as officially reported to ICES.

Country	Year									
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Belgium	453	779	1,002	884	669	544	425	589	930	987
Denmark	-	-	-	15	-	-	-	-	-	-
France	65	48	41	13	9	3	10	9	17	14
Ireland	127	134	229	167	161	203	187	180	235	159
Netherlands	177	247	169	186	138	224	113	546	-	-
UK (England & Wales)	189	290	367	311	277	219	230	266	637	599
UK (Isle of Man)	-	30	18	7	10	10	6	12	1	-
UK (N. Ireland)	57	47	44	41	31	33	38	36	50	114
UK (Scotland)	30	42	68	45	44	29	17	28	46	63
Total	1,098	1,617	1,938	1,669	1,339	1,265	1,026	1,666	1,916	1,936
Unallocated	8	-3[2]	3	3	1	-96[2]	32	-520[2]	79	862
Total figures used by Working Group for stock assessment	1,106	1,614	1,941	1,667	1,338	1,169	1,058	1,146	1,995	2,798

[1] Preliminary.
[2] Over-reporting.

Table 3.7.5 Nominal catches of COD in Divisions VIIf and VIIg as used by WG in 1988.

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Belgium	88	110	172	285	172	244	229	451	372	216
France	2,567	3,244	5,036	7,473	5,984	4,602	4,900	5,237	7,050	6,372
Ireland	30	72	246	108	142	274	204	198	226	380
UK (England & Wales)	67	81	199	299	302	188	287	307	302	415
Others	-	-	7	-	-	-	-	-	-	-
Total	2,752	3,507	5,660	8,165	6,600	5,308	5,620	6,193	7,950	7,383

Table 3.7.6 Nominal catches of WHITING in Divisions VIIf and VIIg as used by the Working Group in 1988.

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Belgium	66	100	72	102	70	120	154	164	104	109
France	6,620	5,666	7,933	7,993	7,172	8,080	6,552	6,798	6,197	7,914
Ireland	12	85	211	62	62	124	299	138	138	198
UK (England & Wales)	181	147	201	309	187	162	224	175	117	265
Total	6,943	6,002	8,420	8,466	7,491	8,486	7,229	7,275	6,556	8,486

Table 3.7.7 Nominal landings (t) of PLAICE in Divisions VIIf,g, 1978-1987.

Year	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Belgium	196	171	372	365	341	314	283	357	544	576
France	527	467	706	697	568	532	558	493	598	129
Ireland	-	49	61	64	198	48	72	91	59	126
UK (Engl.+ Wales)	152	176	227	251	196	279	366	466	324	495
UK (others)	-	-	7	-	-	-	-	-	21	-
Total	875	863	1,373	1,377	1,303	1,173	1,279	1,407	1,546	1,326
Total figures used by Working Group for stock assessment	875	863	1,373	1,377	1,303	1,146	1,210	1,752	1,691	1,326

[1] Provisional.

NB: ICES receives statistics only for Divisions VIIg-k combined and not for each division separately. The figures up to 1982 are provided by members of the Working Group; from 1983, they are figures submitted to the EC by member states.

Table 3.7.8 Celtic Sea SOLE. Divisions VIIf and VIIg. Nominal landings (tonnes), 1978-1987. Data used by the Working Group.

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Belgium	506	693	981	938	819	871	786	786	1,092	704
France	160	153	141	91	100	124	115	126	92	65
Ireland	2	7	14	8	3	48	4	13	12	9
UK (Engl.& Wales)	112	101	178	175	206	330	361	403	404	437
Total	780	954	1,314	1,212	1,128	1,373	1,266	1,328	1,550	1,215

[1] Preliminary.

Table 3.8.1 Nominal catch (tonnes) of sole in Sub-area IV, 1978-1987.

Country	1978	1979	1980	1981	1982
Belgium	1,727[1]	2,044[1]	1,378	1,363	1,927
Denmark	465	313[1]	710[1]	720	522
France	346	309[1]	232[1]	193	686
Germany, Fed.Rep.	467	242[1]	338[1]	346	290
Netherlands	6,749	7,646[1]	12,695[1]	12,400	17,749
UK (Engl.& Wales)	625[1]	649	452[1]	381	403
Other countries	1	40	2	-	-
Total reported	10,308	11,243	15,807	15,403	21,579
Unreported landings	9,900	11,354	-	-	-
Grand total	20,280	22,597	15,807	15,403	21,579

Country	1983	1984	1985[2]	1986[2]	1987[1,2]
Belgium	1,861	1,860	2,390	1,033	1,644
Denmark	694	582	692	443	342
France	332	580	875	296	318
Germany, Fed.Rep.	619	1,033	303	155	210
Netherlands	16,057	15,050	14,897	9,558	10,634
UK (Engl.& Wales)	433	559	774	647	675
Other countries	-	1	3	2	4
Total reported	19,996	19,900	19,934	12,934	13,828
Unreported landings	4,943	6,706	4,310[4]	5,266	3,539[4]
Grand total	24,939	26,606	24,244	18,200	17,367

[1] Figure revised by ad hoc Flatfish Working Group 1982.
[2] Reported to ICES.
[3] Provisional.
[4] Working Group estimates.

Table 3.8.2 North Sea PLAICE.
Nominal catch (tonnes) in Sub-area IV, 1978-1987.

Country	1978	1979	1980	1981	1982
Belgium	6,231[1]	7,687[1]	7,005[1]	6,346[1]	6,755[1]
Denmark	21,285	27,497	27,057	22,026	24,532
France	750	856	711[1]	586[1]	1,046
Germany, Fed.Rep.	4,595[1]	4,315[1]	4,319[1]	3,449[1]	3,626
Ireland	-	19	-	+	-
Netherlands	28,219	38,295	39,782	40,049	41,208
Norway	13	13	15	18	17
Sweden	-	7	7	3	6
UK (Engl.& Wales)	27,862	25,825[1]	18,687[1]	17,129[1]	16,385
UK (Scotland)	3,877	4,126	4,345	4,390	4,355
Total	92,832	108,640	101,928	93,996	112,439
Unreported landings	21,152	36,707	38,023	45,751	56,619
Grand total	113,984	145,347	139,951	139,747	154,551

Country	1983	1984	1985[2]	1986[2]	1987[2,3]
Belgium	9,716	11,393	9,965	7,232	8,554
Denmark	18,749	22,154	28.236	26,332	21,591
France	1,185	604	1,010	751	1,580
Germany, Fed.Rep.	2,397	2,485	2,197	1,809	1,794
Ireland	-	-	-	-	-
Netherlands	51,328	61,478	90,950	74,447	76,612
Norway	15	16	23	21	7
Sweden	22	13	18	16	7
UK (Engl.& Wales)	13,241	12,681	11,335	12,428	14,890
UK (Scotland)	4,159	4,172	4,577	4,866	5,747
Total reported	100,812	115,715	146,114	127,902	130,782
Unreported landings	43,223	40,432	13,723[4]	37,445[4]	22,640[4]
Grand total	144,035	156,147	159,837[3]	165,347	153,422

[1]Figure revised by *ad hoc* Flatfish Working Group 1982.
[2]Reported to ICES.
[3]Provisional.
[4]Working Group estimates.

Table 3.8.3 English Channel SOLE - Division VIId.
Nominal catch (tonnes), 1974-1987.

Year	Belgium	France	Netherlands	United Kingdom	Total	Unreported	Grand total
1974	159	706[1]	3	309	940[2]	-	940[2]
1975	132	464	1	244	841	52	893
1976	203	599	-	404	1,206	90	1,296
1977	225	737	-	315	1,277	69	1,346
1978	241	782	-	366	1,389	75	1,464
1979	311	1,129	-	402	1,842	83	1,925
1980	302	1,075	-	279	1,656	63	1,719
1981	491	1,513	-	210	2,214	43	2,257
1982	526	1,828	4	379	2,737	82	2,819
1983	541	2,077	-	419	3,038	134	3,172
1984	654	1,965	-	505	3,124	162	3,286
1985	567	2,620	-	513	3,700	170	3,870
1986	882	1,660	-	540	3,082	846	3,928
1987	1,100	2,086	-	655	3,841	1,021	4,862

[1] Divisions VIId,e.
[2] Estimated.

Table 3.8.4 Division VIIe SOLE.
Nominal catches, 1972-1987 (tonnes).[3]

Year	Belgium	France	UK (Engl.+ Wales)	Other	Total
1972	6	230[1]	201	-	437
1973	2	263[1]	194	-	459
1974	6	237[1]	181	3	427
1975	3	271	215	1	491
1976	4	352	259	-	616
1977	3	331	272	-	606
1978	4	384	452	20	861
1979	1	515	663	-	1,181
1980	45	447	760	13	1,269
1981	16	411	783	-	1,215
1982	97	321	1,012	-	1,446
1983	50	405	1,043	-	1,498
1984	48	421	901	-	1,370
1985	59	440	910	-	1,409
1986[2]	63	467	858	-	1,368
1987[2]	49	476	628	-	1,152

[1] Estimated from Divisions VIId,e total.
[2] Provisional data.
[3] The table is based on figures provided by Working Group members and are not necessarily the officially reported landings.

Table 3.8.5 English Channel PLAICE. Nominal catch (tonnes) in Divisions VIId and VIIe, 1974-1987.

Year	Belgium		Denmark		France		Netherlands		UK (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]	156[3]	1,714	336	-		302	363	2,246	702
1978	161	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	1,033		-	-	3,490		-		1,742		6,265	
1984	998		-	-	4,521		-		1,777		7,296	
1985	1,076		-	-	4,279		-		1,973		7,328	
1986	1,664		-	-	4,613		-		2,138		8.415	
1987	1,962[1]		-	-	5,642[1]		-		2,676[1]		10,280[1]	

[1] Provisional.
[2] Includes Division VIIe.
[3] Includes Division VIId.

NOTE: All figures up to 1979 are from Bulletin Statistique.
All other figures from national statistics.

Table 3.8.6 Bay of Biscay SOLE. Nominal catch (tonnes) in Divisions VIIIa,b.

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Belgium	30	-	33	4	19	9	-	25	52	124
Denmark	-	5	-	-	-	-	-	-	-	-
France	2,308	2,376	2,549	2,581	1,618	2,590	2,968	3,425	4,228	4,010
Netherlands	2	-	-	13	52	32	175	169	213	145
Portugal	-	-	-	-	-	-	-	-	-	3
Spain	283	62	107	96	57	38	40	300	75	NA
UK (Engl.& Wales)	-	-	-	+	+	-	-	-	-	-
Total	2,623	2,443	2,689	2,694	1,746	2,669	3,183	3,927	4,568	
Unreported catches	NA	176	297	242	2,067	959	855	324	237	
Total	NA	2,619	2,986	2,936	3,813	3,628	4,038	4,251	4,805	5,086[1]

[1] Provisional Working Group estimate.
NA: Not available.

Table 4.1.2.1

Nominal HAKE landings ('000 t) as reported to ICES by country and sub-area, 1961-1987.

Year	Total	France					Portugal	Spain[1]					UK			Others		
		Total	IV+VI	VII	VIII	IX	IX	Total	IV+VI	VII	VIII	IX	Total	IV+VI	VII	Total	IV+VI	VII
1961	(133.4)[1]	35.0[2]	1.5	18.0	12.3	3.1	13.0	(72.4)[1]	-	-	40.6	31.8[3]	11.8	10.5	1.3	1.2	1.0	0.2
1962	(128.3)	39.5[2]	0.7	19.4	14.8	3.1	6.4	(67.8)	-	-	32.0	35.8[3]	13.7	12.3	1.4	0.9	0.6	0.3
1963	(132.5)	33.4[2]	1.5	14.9	12.4	3.2	6.9	(79.1)	-	-	39.3	39.8[3]	11.9	10.7	1.2	1.2	1.0	0.2
1964	(129.7)	30.7[2]	3.2	11.3	13.0	2.9	9.0	(79.8)	-	-	34.0	45.8[3]	9.2	8.7	0.5	1.0	0.8	0.2
1965	(120.0)	26.2[2]	3.7	11.7	10.7	-	10.4	(74.7)	-	21.0	7.1	46.6[3]	7.7	7.3	0.4	1.0	0.8	0.2
1966	(106.6)	18.1	3.0	7.6	5.5	2.0	8.3	(73.2)	-	-	27.5	45.7[3]	5.9	5.3	0.6	1.1	0.9	0.2
1967	(116.5)	25.9	2.9	9.6	11.0	2.4	7.6	(76.7)	-	-	31.6	45.1[3]	4.9	4.1	0.8	1.4	0.9	0.5
1968	(106.4)	22.5	2.5	7.8	10.2	2.0	7.2	(69.7)	-	-	32.2	37.5[3]	5.4	4.5	0.9	1.6	1.3	0.3
1969	(99.6)	21.3	2.9	7.9	8.8	1.7	6.6	(65.7)	-	-	27.1	38.6[3]	4.3	3.9	0.4	1.7	0.5	1.2
1970	(116.4)	25.7	1.5	9.8	12.8	1.5	9.3	(76.1)	-	-	34.3	41.8[3]	3.2	2.7	0.5	2.1	1.9	0.2
1971	(61.6)	23.6	0.8	9.1	13.1	0.6	8.0	(24.8)	0.9	7.8	14.0	2.1[3]	2.6	2.2	0.4	2.6	2.1	0.5
1972	108.8[4]	21.8	0.4	8.8	12.6	-	8.7	73.2[4]	1.1	4.8	32.4	17.3	2.9	2.4	0.5	2.2	2.2	-
1973	106.4	23.5	2.2	10.0	11.3	-	15.3	62.7	6.5	19.8	15.6	20.8	2.6	2.2	0.4	2.3	1.7	0.6
1974	93.8	20.1	2.5	10.2	7.3	0.1	7.8	61.7	7.1	21.9	18.5	14.1	2.4	2.0	0.4	1.8	1.3	0.5
1975	99.6	22.2	3.2	11.0	7.9	0.1	9.4	63.9	6.4	20.5	18.0	19.0	2.8	2.2	0.6	1.3	0.6	0.7
1976	88.4	18.6	3.8	10.4	4.3	0.1	7.9	58.8	4.1	20.8	20.2	13.7	2.0	1.6	0.4	1.1	0.7	0.4
1977	64.2	15.3	2.6	6.1	6.6	-	5.5	41.0	1.6	5.3	16.6	17.5	1.8	1.5	0.3	0.6	0.3	0.3
1978	47.1	18.3	2.2	7.3	8.7	-	4.4	21.7	1.3	5.0	6.6	8.8	1.9	1.6	0.3	0.8	0.5	0.3
1979	59.8	20.1	2.5	6.9	10.7	-	5.3	32.0	1.1	6.1	16.7	8.1	1.7	1.4	0.3	0.7	0.3	0.4
1980	60.7	24.1	2.8	8.5	12.8	-	6.3	26.6	0.9	2.8	15.1	7.8	2.4	1.8	0.6	1.3	0.4	0.9
1981	60.0	22.3	2.2	9.2	10.9	-	5.4	25.3	0.7	2.6	16.4	5.6	5.6[6]	2.6	2.6	1.4	0.3	1.1
1982	57.0	16.0	1.5	7.7	6.8	-	6.8	29.0	1.8	3.1	14.8	9.3	3.7[6]	1.2	2.4	1.6	0.3	1.3
1983	64.0	20.0	2.2	7.0	10.8	-	7.3	31.8	2.0	2.9	14.8	12.1	3.2	1.2	2.0	1.7	0.2	1.5
1984	76.3	19.4	3.9	6.3	9.2	-	5.0	45.4	1.0	3.3	26.2	14.9	4.6[6]	1.8	2.7	1.9	0.5	1.4
1985	75.4	26.3	6.7	4.6	15.0	-	5.4	35.6	0.8	3.6	16.3	14.9	5.5	1.7	3.8	2.6	1.2	1.4
1986[5]	70.7	19.6	10.2		9.4	-	7.9	33.4	2.0	6.1	17.1	8.2	6.2	1.9	4.3	3.6	1.5	2.1
1987[5]	-	17.7	7.0		10.7	-	6.9	-	-	-	-	-	3.8	2.0	1.8	2.7	1.3	1.4

[1] Numbers in brackets include unknown African catches for Spain (see footnote [3]).
[2] Includes small amounts unreported by area.
[3] Data refer to port of landing, not area at capture (includes African catches).
[4] Includes 17.6 thousand t for Spain which were not reported by area.
[5] Preliminary.
[6] Includes Sub-area VIII.

Table 4.1.2.2

Revised estimates of landings ('000 t) for the Northern HAKE stock (ICES Division IVa, Sub-areas VI and VII, and Divisions VIIIa,b) by country and area as determined by the Hake Working Group, 1961-1987.

Year	Total	France				Spain[1]				UK			Others		
		Total	IVa+VI	VII	VIIIa,b	Total	IVa+VI	VII	VIIIa,b	Total	IVa+VI	VII	Total	IVa+VI	VII
1961	95.6	42.0	5.3	20.7	16.0	40.6	-	-	40.6	11.8	10.5	1.3	1.2	1.0	0.2
1962	86.3	39.7	4.9	19.3	15.5	32.0	-	-	32.0	13.7	12.3	1.4	0.9	0.6	0.3
1963	86.2	33.8	4.0	16.2	13.6	39.3	-	-	39.3	11.9	10.7	1.2	1.2	1.0	0.2
1964	76.8	32.6	4.6	15.2	12.8	34.0	-	-	34.0	9.2	8.7	0.5	1.0	0.8	0.2
1965	64.7	27.9	3.3	13.0	11.6	28.1	-	21.0	7.1	7.7	7.3	0.4	1.0	0.8	0.2
1966	60.9	26.4	3.2	13.0	10.2	27.5	-	-	27.5	5.9	5.3	0.6	1.1	0.9	0.2
1967	62.1	24.2	3.2	9.9	11.1	31.6	-	-	31.6	4.9	4.1	0.8	1.4	0.9	0.5
1968	62.0	22.8	2.5	9.2	11.1	32.2	-	-	32.2	5.4	4.5	0.9	1.6	1.3	0.3
1969	54.9	21.8	3.5	10.9	7.4	27.1	-	-	27.1	4.3	3.9	0.4	1.7	0.5	1.2
1970	64.9	25.3	4.3	11.5	9.5	34.3	-	-	34.3	3.2	2.7	0.5	2.1	1.9	0.5
1971	51.3	23.4	3.3	10.7	9.4	22.7	0.9	7.8	14.0	2.6	2.2	0.4	2.6	2.1	0.5
1972	65.5	22.1	3.7	9.6	8.8	38.3	1.1	4.8	32.4	2.9	2.4	0.5	2.2	2.2	-
1973	78.3	24.0	3.2	12.3	8.5	49.4	2.4	17.9	29.1	2.6	2.2	0.4	2.3	1.7	0.6
1974	73.1	21.3	2.8	11.9	6.6	47.6	3.6	16.1	27.9	2.4	2.0	0.4	1.8	1.3	0.5
1975	72.7	22.2	3.3	12.1	6.8	46.4	4.9	15.8	25.7	2.8	2.2	0.6	1.3	0.6	0.7
1976	65.5	18.3	3.8	10.3	4.2	44.1	4.2	15.6	24.3	2.0	1.6	0.4	1.1	0.7	0.4
1977	51.9	18.5	2.8	7.4	8.3	31.0	1.6	13.0	16.4	1.8	1.5	0.3	0.6	0.3	0.3
1978	50.6	18.2	2.2	7.3	8.7	29.6	1.4	12.4	15.8	1.9	1.6	0.3	0.8	0.5	0.3
1979	51.1	20.2	2.5	6.9	10.8	28.4	(2)	(10)	16.4	1.7	1.4	0.3	0.7	0.3	0.4
1980	57.3	25.0	2.8	8.5	13.7	28.7	(2)	(12)	14.7	2.4	1.8	0.6	1.3	0.4	0.9
1981	53.9	22.8	2.2	9.3	11.3	24.6	(1)	12.6	11.0	5.2	2.6	2.6	1.4	0.3	1.1
1982	55.0	22.8	1.6	9.0	12.2	27.3	0.8	12.5	14.0	3.6	1.2	2.4	1.6	0.3	1.3
1983	57.7	23.1	2.1	7,9	13.1	29.6	0.7	14.9	14.0	3.2	1.2	2.0	1.7	0.2	1.5
1984	63.2	22.0	4.9	6.9	10.2	35.1	0.4	22.0	12.7	4.4	1.7	2.7	1.7	0.3	1.4
1985	66.0	26.1	6.6	4.8	14.7	32.5	0.4	19.3	12.8	5.5	1.7	3.8	1.9	0.5	1.4
1986	59.4	22.0	2.7	4.2	15.1	27.6	0.3	16.6	10.7	6.6	1.9	4.7	3.2	0.6	2.6
1987[2]	64.0	17.7	1.5	4.6	11.6	33.0	0.3	20.3	12.8	9.8	3.0	6.8	3.1	0.8	2.3

[1] Data for 1961-1972 not revised; revised figures for Sub-area VIII for 1973-1978 include data for Divisions VIIIa,b only.
Data for 1979-1981 are revised based on French surveillance data and supplemental catch information (see text).
[2] Preliminary.

Table 4.1.3

HAKE - Southern stock.
Revised landings estimates ('000 t) for the Southern HAKE stock (Divisions VIIIc and IXa) by country and gear as determined by the Working Group, 1972-1987.

Year	Spain						Portugal			France	Southern stock total
	Gill-net	Small gill-net	Long-line	Total artis-anal	Trawl	Total	Artis-anal	Trawl	Total	Total	
1972	-	-	-	7.1	10.2	17.3	4.7	4.1	8.8	-	26.1
1973	-	-	-	8.5	12.3	20.8	6.5	7.3	13.8	0.2	34.8
1974	2.6[1]	1.0[1]	2.2[1]	5.8	8.3	14.1	5.1	3.5	8.6	0.1	22.8
1975	3.5[1]	1.3[1]	3.0[1]	7.8	11.2	19.0	6.1	4.3	10.4	0.1	29.5
1976	3.1[1]	1.2[1]	2.6[1]	6.9	10.0	16.9	6.0	3.1	9.1	0.1	26.1
1977	1.5[1]	0.6[1]	1.3[1]	3.4	5.8	9.2	4.5	1.6	6.1	0.2	15.5
1978	1.4	0.1	2.1	3.6	4.9	8.5	3.4	1.4	4.8	0.1	13.4
1979	1.7	0.2	2.1	4.0	7.2	11.2	3.9	1.9	5.8	-	17.0
1980	2.2	0.2	5.0	7.3	5.3	12.6	4.5	2.3	6.8	-	19.4
1981	1.5	0.3	4.6	6.4	4.1	10.5	4.1	1.9	6.0	-	16.5
1982	1.3	0.4	5.3	7.0	4.4	11.4	5.0	2.5	7.5	-	18.9
1983	1.5	0.9	7.2	9.6	7.0	16.6	5.2	2.9	8.1	-	24.7
1984	1.6	0.8	8.2	10.6	4.9	15.5	4.3	1.2	5.5	-	21.0
1985	1.8	0.8	4.4	7.0	5.3	12.3	3.8	2.0	5.8	-	18.1
1986	2.1	0.8	3.5	6.4	4.9	11.2	3.2	1.8	5.0	-	16.2
1987	2.0	0.5	4.4	6.9	3.5	10.4	3.5	1.5	5.0	-	15.4

[1] Estimated.

Fishery unit	Country	Number of boats	KW	GRT	Target species	By-catch
"Western Approaches"						
1. "Long line in medium to deep water"	FRANCE	8	110 300	50	skate, dogfish ling	
	IRELAND	4	428	130	hake	ling, greater forkbeard, cod
	SPAIN	76	548	204	hake	ling
	UK	38	536	161	hake, cod	whiting
2. "Long line in shallow water"	FRANCE	8	110-300	35-50	cod	skate, dogfish, ling
	UK	20	447	151	gadoids, skates	
3. Gill net	FRANCE	30	110-300	35-50	hake	pollack
	UK	119	150	22	hake, monk	cod
4. Non-Nephrops trawling in medium to deep water	FRANCE	120	250/600	50-180	monk, megrim	hake, skates gadoids
	IRELAND	13	760	240	hake, megrim monk	cod, witch
	SPAIN	115	565	218	hake, megrim,	monk, ling, cod nephropods
	UK	66	559	200	hake, monk	megrim
5. Non-Nephrops trawling in shallow water	FRANCE	70	600	200	gadoids	monk, skates dogfish
	IRELAND	< 130	230	65 (50-175)	gadoids	megrim, monk, ray plaice, sole
	UK	208	174	30	monk, gadoids	skates, flatfish
6. Beam trawling in shallow water (B/T)	BELGIUM	15	740	–	sole	plaice, raise
	UK	91	408	78	monk, sole	megrim
7. Nephrops trawling in deep water	FRANCE	30	350	50/80	Nephrops	
	SPAIN	13	464	215	Nephrops, hake	monk, megrim,
8. Nephrops trawling in medium depth	FRANCE	100	350	50	Nephrops	hake, gadoids, monk, megrim
	IRELAND	< 25	330	≈ 70	Nephrops	whiting, hake, monk, megrim
		< 17	400	≈ 110	Nephrops	unknown
		< 20	330	≈ 60	Nephrops	hake, monk, whiting, megrim
"Bay of Biscay"						
9. Nephrops trawling in shallow and medium depths	FRANCE	330	150	30	Nephrops	hake, monk
10. Trawling in shallow and medium dephts	FRANCE	174	269 180	45 30	sole, hake, monk, cephalopods	whiting, gurnards bib, red mullet
11. Beam trawling in shallow water (B/T)	BELGIUM	7			sole	
	NETHERLANDS	± 6	1 470		sole	mixed demersal
12. Long line deep and medium depth (DM)	SPAIN	100	350	121	hake	bib, pollack
13. Gill nets in medium and shallow depths (MS)	FRANCE	20 35	130 300	10-15 60	hake	pollack
14. Trawling in deep and medium depths (DM)	FRANCE	75	250	40	monk	skates, hake, megrim
	SPAIN	78	695	244	hake	scad, monk, cephalopods

Table 4.2.1 Summary of the characteristics of each of the demersal fishery units.

SPECIES	FISH UNIT	1 Line deep 7	2 Line shal 7	3 Gill shal 7	4 Nonep deep	5 Nonep shal	6 Beam shal 7	7 Neph deep 7	8 Neph med 7	9 Trawl med 8	10 Trawl sna 8	11 Beam shal 8	12 Line deep 8	13 Gill med 8	14 Trawl deep	15 Miscell 8	16 Outsiders	TOTAL
Hake		10535 109244	65 285	518 2324	13489 40880	4507 15537	100 407	58 180	516 1660	2749 6797	4538 16215		55971 26281	3671 15114	6086 29746	2235 2234	7306 31351	62344 298260
Nephrops VII gh									4783 29631									4783 29631
Nephrops VIII ab										4244 19859								4244 19859
Monkpisc					14837 40765	2350 6395	2100 5302		2124 6464	1252 3661	510 1468				2265 8117			25439 72172
Monkbude					5007 15694	327 884	108 257		542 1650	844 2407	85 249				1140 3674			8055 24815
Megrim					12392 41611	1800 3074	699 1406		1254 2657						1657 5268			17802 54016
Codcel					1535 2210	6315 8436	521 786		2204 3054							236 422		10810 14907
Whitcel					710 560	9007 10550	213 242		1623 2240							50 39		11604 13631
Sole VIII ab				3 31	3 13	836 5699	2226 20446				2012 10738					2063 11230		4075 21968
Sole VII eg																		3068 26188
TOTAL																		

Table 4.2.2 Landings (tonnes) and total values ('000 ECU) by species and unit, upper and lower values respectively.

Effort *	.2	.4	.6	.8	.9	1	1.1	1.2	1.4
HAKE	49.5	66.47	69.75	67.22	64.94	62.34	59.57	56.73	51.12
NEPH CEL	1.77	2.98	3.82	4.39	4.61	4.78	4.93	5.03	5.2
NEPH BIS	3.468	4.5	4.66	4.51	4.38	4.24	4.1	3.96	3.67
MONK PIS	22.96	28.65	28.86	27.36	26.42	25.44	24.47	23.53	21.79
MONK BUD	4.18	6.37	7.46	7.94	8.03	8.05	8.03	7.97	7.78
MEGRIM	7.89	12.51	15.25	16.88	17.41	17.8	18.09	18.29	18.5
COD CELT	11.6	13.25	12.75	11.79	11.29	10.81	10.35	9.92	9.14
WHI CELT	12.6	13.89	13.27	12.4	11.99	11.6	11.25	10.92	10.35
SOLE BIS	3.01	4.05	4.33	4.27	4.18	4.08	3.95	3.82	3.55
SOLE CEL	2.06	2.74	2.98	3.06	3.07	3.07	3.06	3.04	3
ALL	119.05	155.4	163.16	159.82	156.32	152.22	147.8	143.23	134.11

Table 4.2.3 Long-term equilibrium yield (in thousand tonnes) varying effort under current patterns. Effort factor 1 corresponds to current levels.

SPECIES	ICES DIVISION	CURRENT MESH SIZE (mm)	CURRENT LANDING SIZE (cm)	ENVISAGED REGULATION	CONCERNED FISHERY UNIT
Hake	VIIb,c,f,g,h,j,k	80	30		1,2,3,4,5,6,7,8
	VIIe	70	30	Mesh size : 80 mm on 01/01/89	2,3,5,6
	VIII	65	24	Landing size : 27 cm on 01/01/89	9,10,12,13,14,15
Nephrops	VII	70	8.5 (25 mm Lc)		7,8
	VIII	50	7.0 (20 mm Lc)		9
Monk (both species)	VIIb,c,f,g,h,j,k	80	-		4,5,6,7,8
	VIIe	70	-	Mesh size : 80 mm on 01/01/89	6
	VIII	65	-		9,10,14
Megrim	VIIb,c,f,g,h,j,k	80	25		4,5,6,7,8
	VIIe	70	25	Mesh size : 80 mm on 01/01/89	6
	VIII	65	25		14
Cod	VIIb,c,f,g,h,j,k	80	30	Landing size : 35 cm on 01/01/89	1,2,3,4,5
	VIIe	70	30	Mesh size : 80 mm on 01/01/89	2,3,5
	VIII	65	30	Landing size : 35 cm on 01/01/89	
Whiting	VIIb,c,f,g,h,j,k	80	27		1,2,4,5,8
	VIIe	70	27	Mesh size : 80 mm on 01/01/89	2,5
	VIII	65	27		10,15
Sole	VIIb,c,f,g,h,j,k	80	24		5,6
	VIIe	70	24	Mesh size : 80 mm on 01/01/89	5,6
	VIII	65	24		10,11,15

Table 4.2.4 Summary of current and envisaged regulation as indicated in EC Official Journal N° L 288, 7 OCTOBER 1986

SPECIES	FISH UNIT	1 Line deep 7	2 Line shal 7	3 Gill shal 7	4 Nonep deep	5 Nonep shal	6 Beam shal 7	7 Neph deep 7	8 Neph med 7	9 Trawl med 8	10 Trawl sna 8	11 Beam shal 8	12 Line deep 8	13 Gill med 8	14 Trawl deep	15 Miscell 8	16 Outsiders	TOTAL
Hake	IMM	0	0	0	0	0	0	0	0	- 4	- 3		0	0	- 5	0	0	- 1
	LONG	11	11	11	11	11	11	11	11	6	7		11	11	5	10	11	9
Nephrops VII gh	IMM								0									0
	LONG								0									0
Nephrops VIII ab	IMM									-13								-13
	LONG									10								10
Monkpisc	IMM				0	0	0		0	0	0				0			0
	LONG				0	0	0		0	0	0				0			0
Monkbude	IMM				0	0	0		0	0	0				0			0
	LONG				0	0	0		0	0	0				0			0
Megrim	IMM				0	0	0		0						0			0
	LONG				0	0	0		0						0			0
Codcel	IMM				0	0	0		0							0		0
	LONG				0	0	0		0							0		0
Whitcel	IMM				0	0	0		0							0		0
	LONG				0	0	0		0							0		0
Sole VIII ab	IMM										- 6					0		- 3
	LONG										0					6		3
Sole VII eg	IMM			0	0	0	0											0
	LONG			0	0	0	0											0
TOTAL	IMM	0	0	0	0	0	0	0	0	- 7	- 4		0	0	- 3	0	0	- 1
	LONG	11	11	11	3	2	0	11	0	6	4		11	11	3	7	11	4

Table 4.2.5 Relative effects in weight of enforcing current legal mesh sizes (in %).

SPECIES	FISH UNIT	1 Line deep 7	2 Line shal 7	3 Gill shal 7	4 Nonep deep	5 Nonep shal	6 Beam shal 7	7 Neph deep 7	8 Neph med 7	9 Trawl med 8	10 Trawl sna 8	11 Beam shal 8	12 Line deep 8	13 Gill med 8	14 Trawl deep	15 Miscell 8	16 Outsiders	TOTAL
Hake	IMM	0	0	0	0	0	0	0	0	- 3	- 2		0	0	- 5	0	0	- 1
	LONG	11	11	11	11	11	11	11	11	7	8		11	11	5	10	11	11
Nephrops VII gh	IMM								0									0
	LONG								0									0
Nephrops VIII ab	IMM									-11								-11
	LONG									15								15
Monkpisc	IMM				0	0	0		0	0	0				0			0
	LONG				0	0	0		0	0	0				0			0
Monkbude	IMM				0	0	0		0	0	0				0			0
	LONG				0	0	0		0	0	0				0			0
Megrim	IMM				0	0	0		0						0			0
	LONG				0	0	0		0						0			0
Codcel	IMM				0	0	0		0							0		0
	LONG				0	0	0		0							0		0
Whitcel	IMM				0	0	0		0							0		0
	LONG				0	0	0		0							0		0
Sole VIII ab	IMM										- 2					0		- 1
	LONG										4					6		5
Sole VII eg	IMM			0	0	0	0											0
	LONG			0	0	0	0											0
TOTAL	IMM	0	0	0	0	0	0	0	0	- 7	- 2		0	0	- 3	0	0	- 1
	LONG	11	11	10	3	3	0	11	0	10	6		11	11	3	6	11	6

Table 4.2.6 Relative effects in value of enforcing current legal mesh sizes (in %).

SPECIES	ICES DIVISION	CURRENT MESH SIZE (mm)	BASIS		CURRENT LANDING SIZE (cm)
			L50	L25	
Hake	VIIb,c,f,g,h,j,k	80	30	24	30
	VIIe	70	26	21	30
	VIII	65	24	20	24
Nephrops	VII	70	35 mm Lc	20 mm Lc	8.5 (25 mm Lc)
	VIII	50	28 mm Lc	21 mm Lc	7.0 (20 mm Lc)
Monk (both species)	VIIb,c,f,g,h,j,k	80	20	16	-
	VIIe	70	18	14	-
	VIII	65	16	13	-
Megrim[1]	VIIb,c,f,g,h,j,k	80	18 (25)	15 (22)	25
	VIIe	70	16 (22)	13 (19)	25
	VIII	65	15 (20)	12 (17)	25
Cod	VIIb,c,f,g,h,j,k	80	31	29	30
	VIIe	70	27	25	30
	VIII	65	25	24	30
Whiting	VIIb,c,f,g,h,j,k	80	30	27	27
	VIIe	70	26	24	27
	VIII	65	24	22	27
Sole	VIIb,c,f,g,h,j,k	80	26	25	24
	VIIe	70	23	22	24
	VIII	65	24	23	24

Table 4.2.7 Current legal mesh size, corresponding to L_{50} and L_{25} and corresponding current legal landing size in the area of competence of the Group.

[1]Figures corresponding to a selection factor of 3.1 given in parentheses.

Table 4.3.1 Landings of HORSE MACKEREL by Sub-area (tonnes).

Sub-area	1976	1977	1978	1979	1980	1981
IV	8,668	1,326	4,920	1,412	2,151	6,826
VI	4,194	670	408	7,791	8,724	11,134
VII	177,010	28,855	26,060	43,525	45,697	34,749
VIII	129,558	124,906	83,804	47,155	37,495	40,073
IX	55,471	67,125	45,371	37,619	36,903	35,873
Total	374,901	222,882	160,563	137,502	130,970	128,655
Sub-area	1982	1983	1984	1985	1986	1987
IV	5,116	4,422	25,991	24,144	21,446	23,936
VI	5,036	24,881	31,716	32,995	20,455	34,850
VII	33,478	40,527	42,367	37,898	77,533	99,773
VIII	22,683	28,223	25,629	27,740	34,104	38,556
IX	39,726	48,733	23,178	20,237	41,787	34,243
Total	106,039	146,786	148,881	143,014	195,325	231,358

Table 4.3.2 Landings of HORSE MACKEREL in Sub-area IV by country (tonnes).

Country	1976	1977	1978	1979	1980	1981
Belgium	15	14	15	9	8	34
Denmark	-	63	1,543	496	199	3,576
Faroe Islands	116	130	3	-	260	-
France	147	325	182	221	292	2
German Dem. Rep.	4	-	-	-	-	-
Germany, Fed. Rep.	162	2	1,993	376	+	139
Ireland	-	-	-	-	1,161	412
Netherlands	82	223	106	88	101	355
Norway	4,842	450	1,037	199	119	2,292
Poland	11	6	-	-	-	-
Sweden	-	-	-	+	-	-
UK (Engl. & Wales)	11	22	36	23	11	15
UK (Scotland)	+	4	5	+	-	-
USSR	3,278	87	-	-	-	-
Total	8,668	1,326	4,920	1,412	2,151	6,826
Country	**1982**	**1983**	**1984**	**1985**	**1986**	**1987[1]**
Belgium	7	55	20	13	13	9
Denmark	1,612	1,590	23,730	22,495	18,652[2]	6,919[2,3]
Faroe Islands	2,327	-	-	-	-	-
France	567	366	827	298	947[3]	724[3]
German Dem. Rep.	-	-	-	-	-	-
Germany, Fed. Rep.	30	52	+	+	-	3
Ireland	-	-	-	-	-	-
Netherlands	559	2,029	824	160	600	850
Norway	7	322	94	171[1]	698	15,000[2,3]
Poland	-	2	-	-	-	-
Sweden	-	-	-	-	2[2]	-
UK (Engl. & Wales)	6	4	3	8	3	2
UK (Scotland)	-	-	489	998	531	438
USSR	-	-	-	-	-	-
Total	5,116	4,422	25,991	24,144	21,446	23,936

[1] Preliminary.
[2] Includes Division IIIa.
[3] Includes Division IIa.

Table 4.3.3.1 Landings of HORSE MACKEREL in Sub-area VI by country (tonnes).

Country	1976	1977	1978	1979	1980	1981
Denmark	-	-	-	443	734	341
Faroe Islands	2	-	-	-	-	-
France	293	113	91	151	45	454
Ireland	-	-	59	-	-	-
Germany, Fed. Rep.	5	-	-	155	5,550[2]	10,212[2]
Netherlands	69	19	114	6,910	2,385[2]	100[2]
Norway	90	-	-	-	-	5
Poland	48	-	-	-	-	-
Spain	175	147	91	20	-	-
UK (Engl. & Wales)	37	40	44	73	9	5
UK (Scotland)	85	105	9	39	1	17
USSR	3,390	246	-	-	-	-
Total	4,194	670	408	7,791	8,724	11,134

Country	1982	1983	1984	1985	1986	1987[1]
Denmark	2,785	7	-	-	-	769[5]
Faroe Islands	1,248	-	-	4,014	199[2]	4,450[4]
France	4	10	14	13	-[3]	-[3]
Ireland	-	15,086	13,858	27,102	28,125	29,743
Germany, Fed. Rep.	2,113[2]	4,146[2]	130[2]	191[2]	354[2]	174[2]
Netherlands	50[2]	5,500[2]	17,500[2]	18,450[2]	3,450[2]	5,750[2]
Norway	-	94	-	-	83	-
Poland	+	-	-	-	-	-
Spain	-	-	-	-	-[3]	-
UK (Engl. & Wales)	+	-	+	-	+	192
UK (Scotland)	83	38	214	1,427	138	1,027
USSR	-	-	-	-	-	-
Unallocated	-	-	-	-19,168	-13,897	-7,255
Total	5,036	24,881	31,716	32,995	20,455	34,850

[1] Preliminary.
[2] Estimated from biological sampling.
[3] Included in Sub-area VII.
[4] Includes Divisions IIIa, IVa,b and VIb.
[5] Includes Division VIb.

Table 4.3.3.2 Landings of HORSE MACKEREL in Sub-area VII by country (tonnes).

Country	1976	1977	1978	1979	1980	1981
Belgium	2	1	1	3	-	1
Denmark	-	-	2,104	4,287	5,045	3,099
France	3,800	2,448	3,564	4,407	1,983	2,800
German Dem. Rep.	92	45	-	-	-	-
Germany, Fed. Rep.	3	308	2,923	5,333	2,289	1,079
Ireland	-	1,133	3,388	-	-	16
Netherlands	280	2,088	10,556	25,174	23,002	25,000[2]
Norway	-	-	29	959	394	-
Poland	2,967	640	61	-	-	-
Spain	17,124	483	516	676	50	234
UK (Engl.& Wales)	2,014	1,343	2,918	2,686	12,933	2,520
UK (Scotland)	-	-	-	-	1	-
USSR	150,728	20,366	-	-	-	-
Total	177,010	28,855	26,060	43,525	45,697	34,749

Country	1982	1983	1984	1985	1986	1987[1]
Belgium	1	-	-	+	+	-
Denmark	877	993	732	1,377[3]	30,408[3]	27,368
France	2,314	1,834	1,802	845[3]	3,718[3]	1,479
German Dem. Rep.	-	-	-	-	-	-
Germany, Fed. Rep.	12	1,977	228	-	5	374
Ireland	-	-	65	100	703	350
Netherlands	27,500[2]	34,350[2]	38,700[2]	33,550[2]	40,750[2]	69,400[2]
Norway	-	-	-	-	-	-
Poland	-	-	-	-	-	-
Spain	104	142	560	275	125	125
UK (Engl.& Wales)	2,670	1,230	279	430	1,824	675
UK (Scotland)	-	-	1	1	+	2
USSR	-	-	-	120	-	-
Total	33,478	40,526	42,367	37,898	77,533	99,773

[1] Provisional.
[2] Estimated from biological sampling.
[3] Includes Sub-area VI.

Table 4.3.3.3 Landings of HORSE MACKEREL in Sub-areas VIII and IX by country (tonnes).

Country	1976	1977	1978	1979	1980	1981
Sub-area VIII						
Denmark	-	-	-	127	-	-
France	3,380	4,881	3,643	4,240	3,361	3,711
German Dem. Rep	14	-	-	-	-	-
Netherlands	-	-	19	-	-	-
Spain	95,401	104,812	80,139	42,766	34,134	36,362
UK (Engl.& Wales)	-	-	-	22	-	+
USSR	30,763	15,213	3	-	-	-
Total	129,558	124,906	83,804	47,155	37,495	40,073
Sub-area IX						
Poland	-	168	-	-	-	-
Portugal	51,488	51,078	30,203	24,489	25,224	23,753
Spain	3,339	981	14,787	12,880	11,679	12,120
USSR	644	14,898	381	250	-	-
Total	55,471	67,125	45,371	37,619	36,903	35,873

Country	1982	1983	1984	1985	1986	1987[1]
Sub-area VIII						
Denmark	-	-	-	-	446	3,283
France	3,073	2,643	2,489	4,305	1,578	4,175
German Dem. Rep	-	-	-	-	-	-
Netherlands	-	-	-[2]	-[2]	-[2]	-
Spain	19,610	25,580	23,119[3]	23,292[3]	31,033	31,098
UK (Engl.& Wales)	1	-	1	143	392	-
USSR	-	-	20	-	656	-
Total	22,683	28,223	25,629	27,740	34,104	38,556
Sub-area IX						
Poland	-	-	-	-	-	-
Portugal	30,886	30,951[3]	17,307[3]	9,420[3]	17,682[3]	21,444[3]
Spain	8,840	17,782[3]	5,871[3]	10,817[3]	13,477[3]	12,799
USSR	-	-	-	-	-	-
Total	39,726	48,733[3]	23,178[3]	20,237[3]	31,159[3]	34,243[3]

[1] Preliminary.
[2] Included in Sub-area VII. sampling.
[3] Data provided by the Working Group members.

Table 5.1 Total nominal catch (tonnes) of SARDINE by countries in Divisions VIIIc and IXa.

Year	Portugal	Spain			Total
	IXa	VIIIc	IXa	Total	VIIIc+IXa
1940	98,212	66,816	-	66,816	165,028
1941	76,486	27,801	-	27,801	104,287
1942	81,667	47,208	-	47,208	128,875
1943	132,924	46,348	-	46,348	179,272
1944	128,221	76,147	-	76,147	204,368
1945	109,030	67,998	-	67,998	177,028
1946	107,454	32,280	-	32,280	139,734
1947	97,967	43,459	21,855	65,314	163,281
1948	78,001	10,945	17,320	28,265	106,266
1949	35,986	11,519	19,504	31,023	67,009
1950	74,618	13,201	27,121	40,322	114,940
1951	82,527	12,713	27,959	40,672	123,199
1952	88,948	7,765	30,485	38,250	127,198
1953	96,848	4,969	27,569	32,538	129,386
1954	112,474	8,836	28,816	37,652	150,126
1955	92,330	6,851	30,804	37,655	129,985
1956	99,827	12,074	29,614	41,688	141,515
1957	112,554	15,624	37,170	52,794	165,348
1958	131,088	29,743	41,143	70,886	201,974
1959	121,025	42,005	36,055	78,060	199,085
1960	138,846	38,244	60,713	98,957	237,703
1961	139,067	51,212	59,570	110,782	249,849
1962	130,236	28,891	46,381	75,272	205,508
1963	118,567	33,796	51,979	85,775	204,342
1964	163,294	36,390	40,897	77,287	240,581
1965	137,762	31,732	47,036	78,768	216,530
1966	124,831	32,196	44,154	76,350	201,181
1967	114,696	23,480	45,595	69,075	183,771
1968	79,526	24,690	51,828	76,518	156,044
1969	64,103	38,254	40,732	78,986	143,089
1970	69,158	28,934	32,306	61,240	130,398
1971	84,408	41,691	48,637	90,328	174,736
1972	87,528	33,800	45,275	79,075	166,603
1973	100,825	44,768	18,523	63,291	164,116
1974	75,071	34,536	13,894	48,430	123,501
1975	95,877	50,260	12,236	62,496	158,373
1976	79,649	51,901	10,140	62,041	141,690
1977	79,819	36,149	9,782	45,931	125,750
1978	83,553	43,522	12,915	56,437	139,990
1979	91,294	18,271	43,876	62,147	153,441
1980	106,302	35,787	49,593	85,380	191,682
1981	113,253	35,550	65,330	100,880	214,133
1982	100,859	31,756	71,889	103,645	204,504
1983	85,922	32,374	62,843	95,217	181,149
1984	95,110	27,970	79,606	107,576	202,686
1985	111,709	25,907	66,491	92,398	204,107
1986	103,451	39,195	37,960	77,155	180,606
1987	90,214	36,377	42,234	78,611	168,735

Table 5.2.1 Landings (tonnes) of MACKEREL in Division VIIIc, 1976-1987.

Country	1976	1977	1978	1979	1980	1981
Spain	18,480	19,852	18,543	15.013	11,316	12,834
Total	18,480	19,852	18,543	15,013	11,316	12,834
Country	1982	1983	1984	1985	1986	1987[1]
Spain	15,621	10,390	13,852	11,810	16,533	15,982
Total	15,621	10,390	13,852	11,810	16,533	15,982

[1] Preliminary.

Table 5.2.2 Landings (tonnes) of MACKEREL in Sub-area IX, 1976-1987.

Country	1976	1977	1978	1979	1980	1981
Portugal	2,595[2]	1,743[2]	1,555[2]	1,071[2]	1,929[2]	3,108[2]
Spain	2,520	2,935	6,221	6,280	2,719	2,111
Poland	-	8	-	-	-	-
USSR	466	2,879	189	111	-	-
Total	5,581	7,565	7,965	7,462	4,648	5,219
Country	1982	1983	1984	1985	1986	1987
Portugal	3,018[2]	2,239[2]	2,250	4,178[2]	5,565[3]	5,525[3]
Spain	2,437	2,224	4,206	2,000[2]	1,837[2]	491[1]
Poland	-	-	-	-	-	-
USSR	-	-	-	-	-	-
Total	5,455	4,463	6,456	6,178	7,402	6,016[1]

[1] Preliminary.
[2] Working Group estimate.
[3] Official numbers.

Table 5.3 European anchovy in Sub-area VIII[1] (in tonnes).

Country and division	Year						
	1960	1961	1962	1963	1964	1965	1966
France, VIIIb	1,085	1,494	1,123	652	1,973	2,615	839
Spain, VIIIb,c	57,000	74,000	58,000	48,000	75,000	81,000	47,519
Total	58,085	75,494	59,123	48,652	76,973	83,615	48,358
Country and division	1967	1968	1969	1970	1971	1972	1973
France, VIIIb	1,812	1,190	2,991	3,665	4,825	6,150	4,395
Spain, VIIIb,c	39.363	38,429	33,092	19,820	23,787	26,917	23,614
Total	41,175	39,619	36,083	23,845	28,612	33,067	28,009
Country and division	1974	1975	1976	1977	1978	1979	1980
France, VIIIb	3,835	2,913	1,095	3,807	3,683	1,349	1,564
Spain, VIIIb,c	27,282	23,389	36,166	44,384	41,536	25,000	20,538
Total	31,117	26,302	37,261	48,191	45,219	26,349	22,102
Country and division	1981	1982	1983	1984	1985	1986	1987
France, VIIIb	1,021	381	1,911	1,656	1,915	1,740	3,505
Spain, VIIIb,c	9,794	4,610	12,242	33,468	8,481	5,612	9,863
Total	10,815	4,991	14,153	35,124	10,396	7,352	13,368

[1] Until 1986, taken from Anon. (1988 WP).

Table 6.1.1 Nominal catch (t) of MACKEREL in the North Sea, Skagerrak, and Kattegat (Sub-area IV and Division IIIa) 1978-1987. (Data submitted by Working Group members.)

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1,2]
Belgium	10	10	5	55	102	93	68	-	49	14
Denmark	18,068	19,171	13,234	9,982	2,034	11,285	10,088	12,424	23,368	28,217
Faroe Islands	33,911	28,118	1,770	-	720	-	-	1,356	-	-
France	3,452	3,620	2,238	3,755	3,041	2,248	-	322	1,200	1,466
German Dem. Rep.	233	-	-	-	-	-	-	-	-	-
Germany, Fed. Rep.	284	211	56	59	28	10	112	217	1,853	494
Ireland	-	-	738	733	-	-	-	-	-	-
Netherlands	1,065	1,009	853	1,706	390	866	340	726	1,949	2,761
Norway	82,959	90,720	44,781	28,341	27,966	24,464	27,311	30,835	50,600	108,250
Sweden	4,501	3,935	1,666	2,446	692	1,903	1,440	760	1,300	2,458
UK (Engl.& Wales)	142	95	76	6,520	16	16	2	143	18	94
UK (Scotland)	3,704	5,272	9,514	10,575	44	4	13	7	541	19,286
USSR	488	162	-	-	-	-	-	-	-	-
Unallocated + discards	-	500	-	3,216	450	96	202	3,656	7,431	10,789
Total	148,817	152,823	87,931	67,388	35,483	40,985	39,576	50,124	88,309	173,829

[1] Preliminary.
[2] May include catches taken in Division IIa.

Table 6.1.2

Nominal catches (t) of MACKEREL in the Norwegian Sea (Division IIa) and off the Faroes (Division Vb) 1978-1987.

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[3,4]
Denmark[2]	-	-	-	801	1,008	10,427	11,787	7,610	1,653	3,133
Faroe Islands[1]	283	6	270	-	180	-	138	-	-	-
France[2]	2	-	-	6	8	-	-	16	-	-
Germany, Fed. Rep.[2]	-	-	-	51	-	5	-	-	99	-
German Dem. Rep.[2]	53	174	2	-	-	-	-	-	16	292
Norway[1]	3,867	6,887	6,618	12,941	34,540	38,453	82,005	61,065	85,400	25,000
Poland[2]	-	-	-	-	231	-	-	-	-	-
UK (Engl. & Wales)[1]	1	-	-	255	-	-	-	-	-	-
UK (Scotland)[2]	-	-	296	968	-	-	-	-	2,131	157
USSR[2]	-	5	1,450	3,640	1,641	65	4,292	9,405	11,813	18,604
Total	4,206	7,072	8,340	18,662	37,608	48,950	98,222	78,096	101,112	47,186

[1] Data provided by Working Group members.
[2] Data reported to ICES.
[3] Preliminary.
[4] Includes catches probably taken in the northern part of Division IVa.

Table 6.1.3 Nominal catch (tonnes) of MACKEREL in the Western area (Sub-areas VI and VII and Divisions VIIIa,b). (Data estimated by Working Group.)

Country	1978	1979	1980	1981	1982
Belgium	1	3	3	-	-
Denmark	8,677	8,535	14,932	13,464	15,000
Faroe Islands	15,076	10,609	15,234	9,070	11,100
France	34,860	31,510	23,907	14,829	12,300
Germany, Fed.Rep.	28,873	21,493	21,088	29,221	11,200
Ireland	27,508	24,217	40,791	92,271	109,700
Netherlands	50,815	62,396	91,081	88,117	67,200
Norway	1,900	25,414	25,500	21,610	19,000
Poland	-	92	-	1	-
Spain	599	543	3,684	1,365	-
UK (England + Wales)	213,344	244,293	150,598	75,722	82,900
UK (N. Ireland)	46	25	-	4,153	9,600
UK (Scotland)	103,671	103,160	108,372	109,153	147,400
USSR	-	-	-	-	-
Unallocated	-	54,000	98,258	140,322	97,300
Total, ICES members	485,370	586,290	593,448	599,298	582,800
Discard	50,700	60,600	21,600	42,300	24,900
Grand total	536,070	646,890	615,048	641,598	607,700

Country	1983	1984	1985	1986	1987 [1,2]
Belgium	+	+	-	+	-
Denmark	15,000	200	400	300	100
Faroe Islands	14,900	9,200	9,900	1,400	7,100
France	11,000	12,500	7,400	11,200	11,100
Germany, Fed.Rep.	23,000	11,200	11,800	7,700	13,300
Ireland	110,000	84,100	91,400	74,500	89,500
Netherlands	73,600	99,000	37,000	58,900	31,700
Norway	19,900	34,700	24,300	21,000	21,600
Poland	-	-	-	-	-
Spain	-	100	+	-	-
UK (Engl. & Wales)	62,000	30,000	9,600	9,100	26,000
UK (N. Ireland)	800	1,100	-	1,700	300
UK (Scotland)	120,100	167,200	196,300	143,700	180,400
USSR	+	200	+	-	-
Unallocated	105,500	18,000	75,100	51,000	25,800
Total, ICES members	555,800	467,500	463,200	380,500	406,900
Discard	11,300	12,100	4,500	-	-
Grand total	567,100	479,600	467,700	380,500	406,900

[1] Preliminary.
[2] Includes catches misreported from Division IVa.

Table 6.1.4 Quarterly catches (t) of mackerel by division or sub-area in 1987.

Division/Sub-area	1	2	3	4	Total
IIa + IVa + Vb	1	256	159,287	166,457	326,001[2]
IIIa	1	715	9,065	237	10,018
IVb + IVc	-	274	1,570	1,236	3,080
VI	105,455	665	1,934	80,294	188,348
VII	78,787	15,024	3,999	3,150	100,960[1]
VIIIa + VIIIb	1	75	-	-	76
Total	184,245	17,009	175,855	251,374	628,483

[1] Includes French catches from Sub-area VI and Divisions VIIIa,b, d,e.
[2] Includes 128,000 t misreported in Division VIa.

Table 6.1.5 Total estimated catches for both the North Sea and Western mackerel stocks (t).

Year	North Sea stock	Western stock	Total
1976	297,700	507,200	804,900
1977	241,050	326,000	567,050
1978	185,200	503,900	689,100
1979	210,050	605,750	806,800
1980	106,550	604,750	711,300
1981	65,900	661,750	727,650
1982	57,000	623,800	680,800
1983	42,750	614,300	657,050
1984	66,500	550,900	617,400
1985	34,600	561,300	595,900
1986	32,250	537,350	569,600
1987	13,100[1]	615,400[1]	628,500

[1] Provisional estimate, see Section 3.8.

Table 6.2.11 Landings (tonnes) of BLUE WHITING from the main fisheries, 1978-1987.

Area	1978	1979	1980	1981	1982
Norwegian Sea fishery (Sub-areas I + II and Divisions Va, XIVa + XIVb)	236,226	741,042	766,798	520,738	110,685
Fishery in the spawning area (Divisions Vb, VIa, VIb and VIIb + VIIc)	229,228	284,547	250,693	288,316	316,566
Icelandic industrial fishery (Division Va)	9,484	2,500	-	-	-
Industrial mixed fishery (Divisions IVa-c,Vb,IIIa)	99,874	63,333	75,129	61,754	117,578
Subtotal northern fishery	574,812	1,091,422	1,092,620	870,808	589,919
Southern fishery (Sub-areas VIII + IX, Divisions VIId,e + VIIg-k)	33,898	27,176	29,944	38,748	31,590
Total	608,710	1,118,598	1,122,564	909,556	621,509

Area	1983	1984	1985	1986	1987[1]
Norwegian Sea fishery (Sub-areas I + II and Divisions Va, XIVa + XIVb)	52,961	65,932	90,742	160,061	123,042
Fishery in the spawning area (Divisions Vb, VIa, VIb and VIIb + VIIc)	361,537	421,865[2]	464,263[2]	534,253[2]	445,879[2]
Icelandic industrial fishery (Division Va)	7,000	-	-	-	-
Industrial mixed fishery (Divisions IVa-c,Vb,IIIa)	117,737	122,806	97,769	99,580	62,689
Subtotal northern fishery	539,235	604,678	644,899	757,370	631,610
Southern fishery (Sub-areas VIII + IX, Divisions VIId,e + VIIg-k)	30,835	31,173[3]	42,817[3]	33,081[3]	32,796[3]
Total	570,070	635,851	687,716	790,451	664,406

[1] Preliminary.
[2] Including directed fishery also in Divisions VIIg-k and Sub-area XII.
[3] Excluding directed fishery also in Divisions VIIg-k.

Table 6.2.1.2 Landings (tonnes) of BLUE WHITING from the Norwegian Sea (Sub-areas I and II, Divisions Va, XIVa and XIVb) fisheries, 1978-1987, as estimated by the Working Group.

Country	1978	1979	1980	1981	1982
Denmark	-	-	-	-	473
Faroes	2,810	762	-	11,131	-
France	-	-	-	5,093	2,067
German Dem.Rep.	7,301	22,502	14,234	15,607	3,042
Germany, Fed.Rep.[2]	8,421	1,157	8,919	17,385	890
Greenland	-	-	-	-	-
Iceland	17,756	12,428	4,562	4,808	-
Norway	-	33,588[3]	902	187	-
Poland	5,083	4,346	11,307	2,434	443
UK (Engl.& Wales)	11	-	-	-	-
USSR	194,844	666,259	726,874	464,093	103,770
Total	236,226	741,042	766,798	520,738	110,685

Country	1983	1984	1985	1986	1987[1]
Denmark	-	93	-	-	-
Faroes	11,316	-	-	-	9,290
France	2,890	-	-	-	-
German Dem.Rep.	5,553	8,193	1,689	3,541	1,010
Germany, Fed.Rep.[2]	2	35	75	106	-
Greenland	-	-	-	10	-
Iceland	-	105	-	-	-
Norway	5,061	689	-	-	-
Poland	-	-	-	-	56
UK (Engl.& Wales)	-	-	-	-	-
USSR	28,141	56,817	88,978	156,404	112,686
Total	52,961	65,932	90,742	160,061	123,042

[1] Preliminary.
[2] Including catches off East Greenland (Division XIVb) (698 t in 1978, 204 t in 1979, and 8,757 t in 1980).
[3] Including purse seine catches of 29,162 t of juvenile blue whiting.

Table 6.2.1.3 Landings (tonnes) of BLUE WHITING from directed fisheries in the spawning area (Divisions Vb, VIa,b, VIIb,c and since 1984 Divisions VIIg-k and Sub-area XII), 1978-1987, as estimated by the Working Group.

Country	1978	1979	1980	1981	1982
Denmark	23,498	21,200	19,272	11,361	23,164
Faroes	39,491	35,780	37,488	23,107	38,958
France	-	-	-	-	1,212
German Dem.Rep.	1,714	172	181	6,562	7,771
Germany, Fed.Rep.	6,363	3,304	709	935	701
Iceland	7,537	4,864	5,375	10,213	1,689
Ireland	-	-	-	-	-
Netherlands	1,172	154	-	222	200
Norway	116,815	186,737	133,754	166,168	169,700
Poland	2,469	4,643	-	2,279	-
Spain	14	-	-	-	-
Sweden	6,260	-	3,185	-	-
UK (Engl.& Wales)	5,287	4,136	3,878	6,000	-
UK (Scotland)	1,599	1,466	6,819	2,611	-
USSR	17,009	22,091	40,032	58,858	73,171
Total	229,228	284,547	250,693	288,316	316,566
Country	**1983**	**1984**	**1985**	**1986**	**1987[1]**
Denmark	28,680	26,445	21,104	11,364	2,655
Faroes	56,168	62,264	72,316	80,564	70,625
France	3,600	3,882	-	-	-
German Dem.Rep.	3,284	1,171	6,839	2,750	3,584
Germany, Fed.Rep.	825	994	626	-	266
Iceland	1,176	-	-	-	-
Ireland	-	-	668	16,440	3,300
Netherlands	150	1,000	1,801	8,888	5,627
Norway	185,646	211,773	234,137	283,162[2]	191,012
Poland	-	-	-	-	-
Spain	318	-	-	-	-
Sweden	-	-	-	-	-
UK (Engl.& Wales)	-	33	-	-	3
UK (Scotland)	-	-	-	3,472	3,310
USSR	81,690	114,303	126,772	127,613[3]	165,497
Total	361,537	421,865	464,263	534,253	445,879

[1] Preliminary.
[2] Including directed fishery also in Division IVa.

Table 6.2.1.4 Landings (t) of BLUE WHITING from the Icelandic mixed industrial trawl fisheries in Division Va, 1978-1987.

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Iceland	9,484	2,500	-	-	-	7,000	-	-	-	-

Table 6.2.1.5 Landings (tonnes) of BLUE WHITING from the mixed industrial fisheries and caught as by-catch in ordinary fisheries in Divisions IIIa, IVa-c, Vb and IIa, 1978-1987, as estimated by the Working Group.

Country	1978	1979	1980	1981	1982
Denmark	54,804	28,932	49,947	35,066	34,463
Faroes	1,177	1,489	1,895	3,133	27,269
France	-	-	-	-	1,417
German Dem.Rep.[2]	988	49	-	-	-
Germany, Fed.Rep.[2]	1,514	13	252	-	93
Ireland	-	-	-	2,744	-
Netherlands	-	-	-	18,627	47,856
Norway	39,989	30,930	21,962[3]	-	-
Poland[2]	601	-	-	229	550
Spain	-	-	-	-	-
Sweden[4]	648	1,249	1,071	1,955	1,241
UK (Engl.& Wales)[2]	+	-	-	-	4,689
UK (Scotland)	153	37	2	-	-
USSR[2]	-	634	-	-	-
Total	99,874	63,333	75,129	61,754	117,578

Country	1983	1984	1985	1986	1987[1]
Denmark	38,290	48,939	35,843	57,315	28,541
Faroes	12,757	9,740	3,606[5]	5,678[5]	7,051[5]
France	249	-	-	-	-
German Dem.Rep.[2]	-	-	-	-	53
Germany, Fed.Rep.[2]	-	566	52	-	62
Ireland	-	-	-	-	-
Norway	62,591	58,038	54,522	26,941	24,969
Netherlands	-	122	130	1,114	-
Poland[2]	-	-	-	-	-
Spain	-	-	-	-	-
Sweden[4]	3,850	5,401	3,616	8,532	2,013
UK (Engl.& Wales)[2]	-	-	-	-	-
UK (Scotland)	-	-	-	-	-
USSR[2]	-	-	-	-	-
Total	117,737	122,806	97,769	99,580	62,689

[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.
[5] Including catches in Division Vb.

Table 6.2.2 Landings (tonnes) of BLUE WHITING from the southern areas (Sub-areas VIII and IX and Divisions VIIg-k and VIId,e and since 1984, the Divisions VIIg-k are not included), 1978-1987, as estimated by the Working Group.

Country	1978	1979	1980	1981	1982
Germany, Fed.Rep	25	-	-	-	-
Ireland	-	1	-	-	-
Netherlands	7	-	31	633	200
Poland	53	-	-	-	-
Portugal	2,381	2,096	6,051	7,387	3,890
Spain[2]	31,428	25,016	23,862	30,728	27,500
UK (Scotland)	-	63	-	-	-
USSR	4	-	-	-	-
Total	33,898	27,176	29,944	38,748	31,590

Country	1983	1984	1985	1986	1987[1]
Germany, Fed.Rep.	50	-	-	-	-
Ireland	-	-	-	-	-
Netherlands	-	-	-	-	-
Norway	-	-	-	-	4
Poland	-	-	-	-	-
Portugal	4,748	5,252	6,989	8,116	9,148
Spain[2]	26,037	25,921	35,828	24,965	23,644
UK (Scotland)	-	-	-	-	-
USSR	-	-	-	-	-
Total	30,835	31,173	42,817	33,081	32,796

[1] Preliminary.
[2] Significant quantities taken in Divisions VIIg-k not included in the table are discarded every year.

Table 6.2.3.1 Biomass estimates of BLUE WHITING obtained during the summer acoustic surveys in the Norwegian Sea[2], 1980-1986, divided into national zones, expressed as percentages of total.

Area	1980	1981	1982	1983	1984	1985	1986
International	18.9	26.0	14.7	5.6	4.8	8.2	8.4
Svalbard[1]	5.4	2.0	1.1	1.1	0.1	-	0.1
Jan Mayen	16.8	8.8	5.9	3.4	0.6	2.5	2.3
Norway	40.7	38.7	45.9	38.2	39.2	22.7	54.5
Iceland	8.6	14.2	10.8	25.0	18.4	13.7	6.8
Greenland	0.1	-	-	-	-	0.9	-
Faroe Islands	4.7	8.3	16.9	19.4	25.9	37.4	19.2
EEC	4.8	2.0	7.7	7.2	11.1	14.7	7.8
Sweden	-	-	-	-	-	-	0.9

[1] Spitsbergen, Bear Island, and Hopen Island.
[2] Divisions IIa and Vb, together with adjacent parts of Divisions IVa, Va, VIa, and XIVa (with part of Division IIIa in 1986).

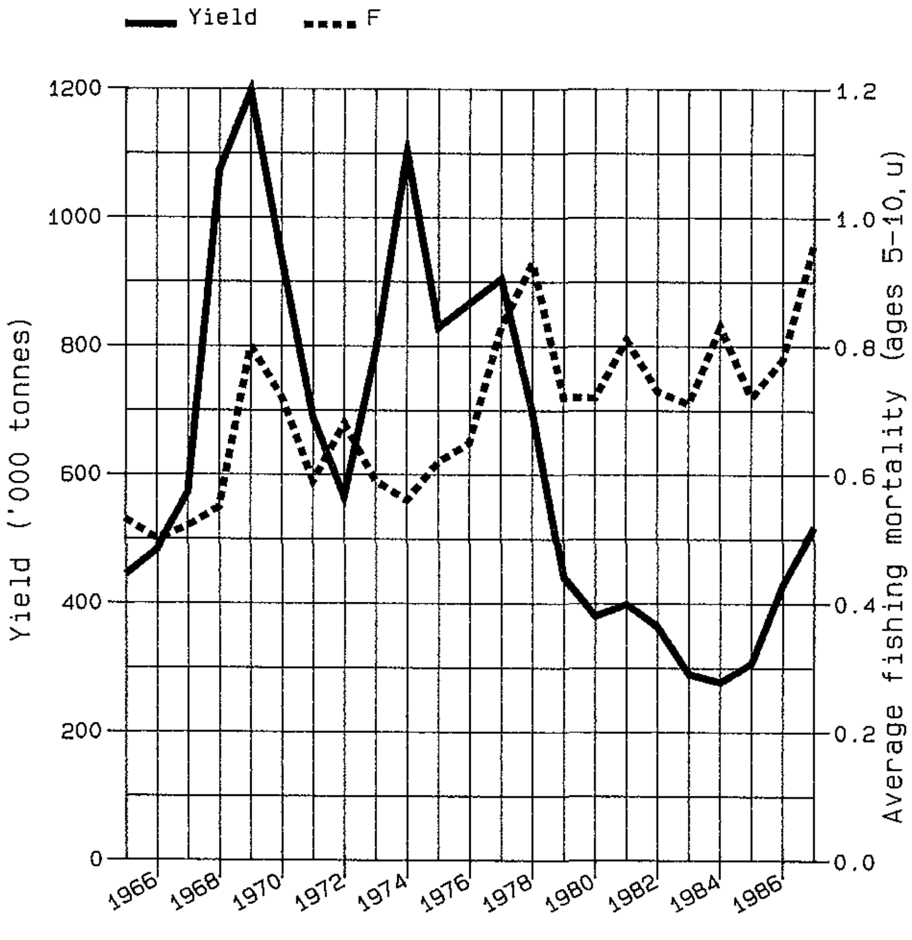
Table 6.2.3.2 Total catches of BLUE WHITING in 1978-1987 divided into areas within and beyond areas of national fisheries jurisdiction of NEAFC contracting parties. Percentage in ( ).

Year	Inter-national	Svalbard	Jan Mayen	Norway	Iceland	Greenland	Faroes	EEC	Total (t)	Total from off. data (t)	%
1978	136,504	-	-	67,391	26,444	6,580	195,361	102,523	534,803	574,812	93.0
	(25.52)			(12.60)	(4.94)	(1.23)	(36.53)	(19.17)			
1979	614,734	-	-	75,545	15,117	204	224,201	164,388	1,094,189	1,091,422	100.3
	(56.18)			(6.90)	(1.38)	(0.02)	(20.49)	(15.02)			
1980	567,693	-	-	152,095	4,562	8,757	164,342	130,417	1,027,866	1,092,620	94.1
	(55.23)			(14.80)	(0.44)	(0.85)	(15.99)	(12.69)			
1981	168,681	-	123,000	215,004	7,751	-	174,801	164,475	853,712	870,808	98.0
	(19.76)		(14.41)	(25.18)	(0.91)		(20.48)	(19.27)			
1982	22,993	-	-	130,435	5,797	-	125,072	247,884	532,181	544,919	97.7
	(4.32)			(24.51)	(1.09)		(23.50)	(46.58)			
1983	15,203	-	-	109,675	7,000	-	91,804	294,981	518,663	539,235	96.2
	(2.93)			(21.15)	(1.35)		(17.70)	(56.87)			
1984	18,407	-	-	150,603	105	-	124,905	282,418	576,438	586,504	98.3
	(3.19)			(26.13)	(0.02)		(21.67)	(48.99)			
1985	38,978	-	-	114,785	-	-	196,003	292,345	642,111	644,899	99.6
	(6.07)			(17.88)			(30.52)	(45.53)			
1986	20,665	-	-	187,768	-	116	171,074	375,257	754,880	757,370	99.7
	(2.74)			(24.87)		(0.02)	(22.66)	(49.71)			
1987	103,535	-	-	109,201	-	-	135,980	234,249	582,830	631,610	92.3
	(17.76)			(18.74)			(23.31)	(40.19)			

Figure 2.1

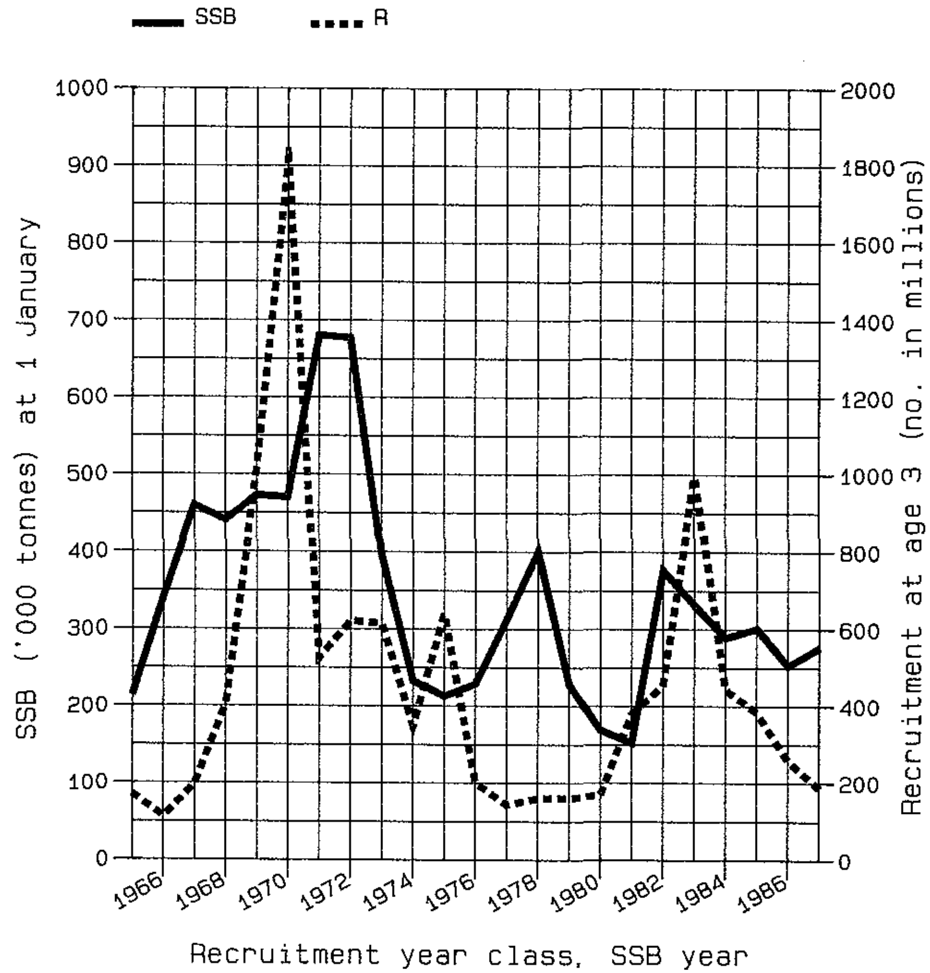
FISH STOCK SUMMARY
STOCK: North-East Arctic Cod
14-10-1987

Trends in yield and fishing mortality (F)



A

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

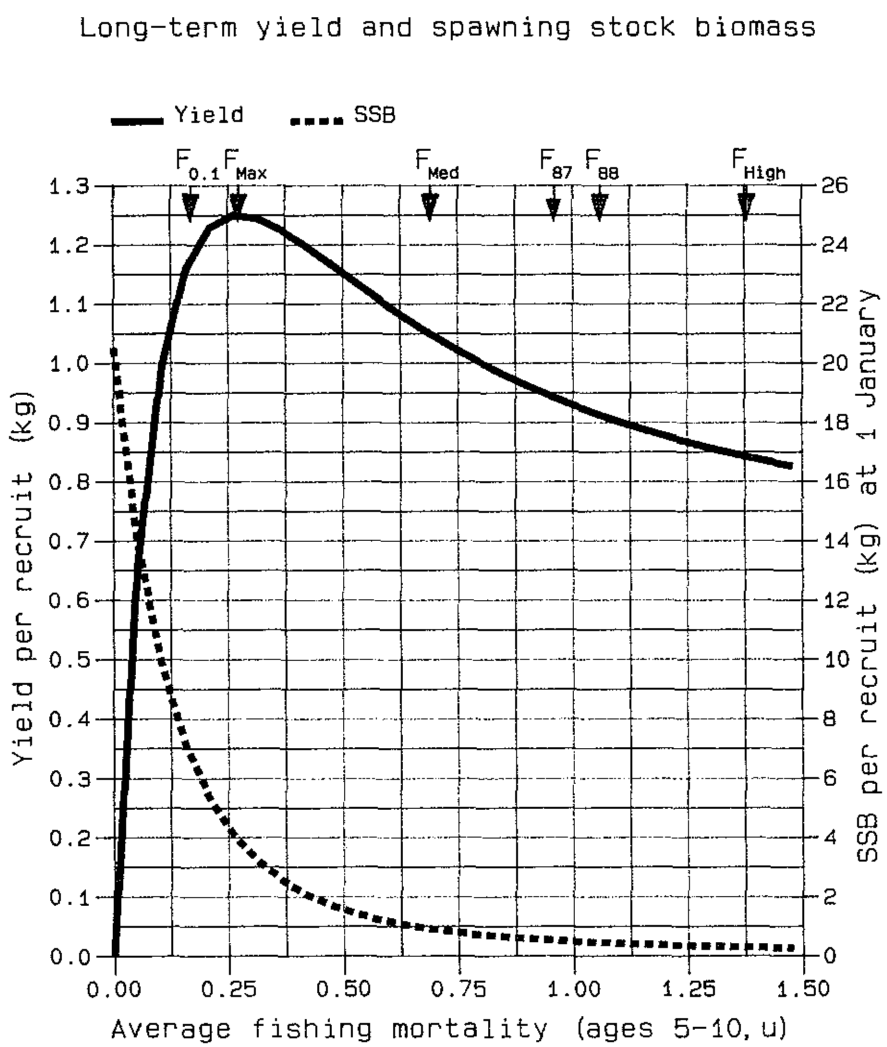


B

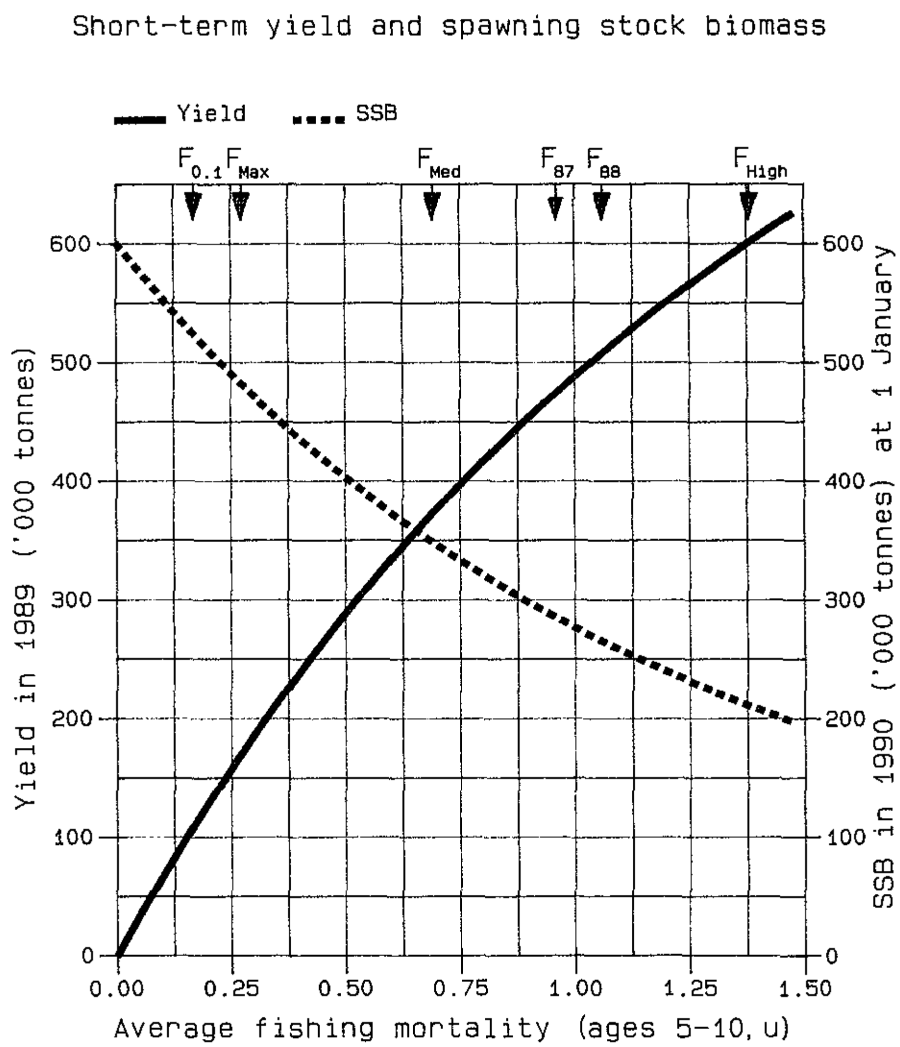
cont'd.

Figure 2.1 cont'd.

FISH STOCK SUMMARY
STOCK: North-East Arctic Cod
14-10-1987



C

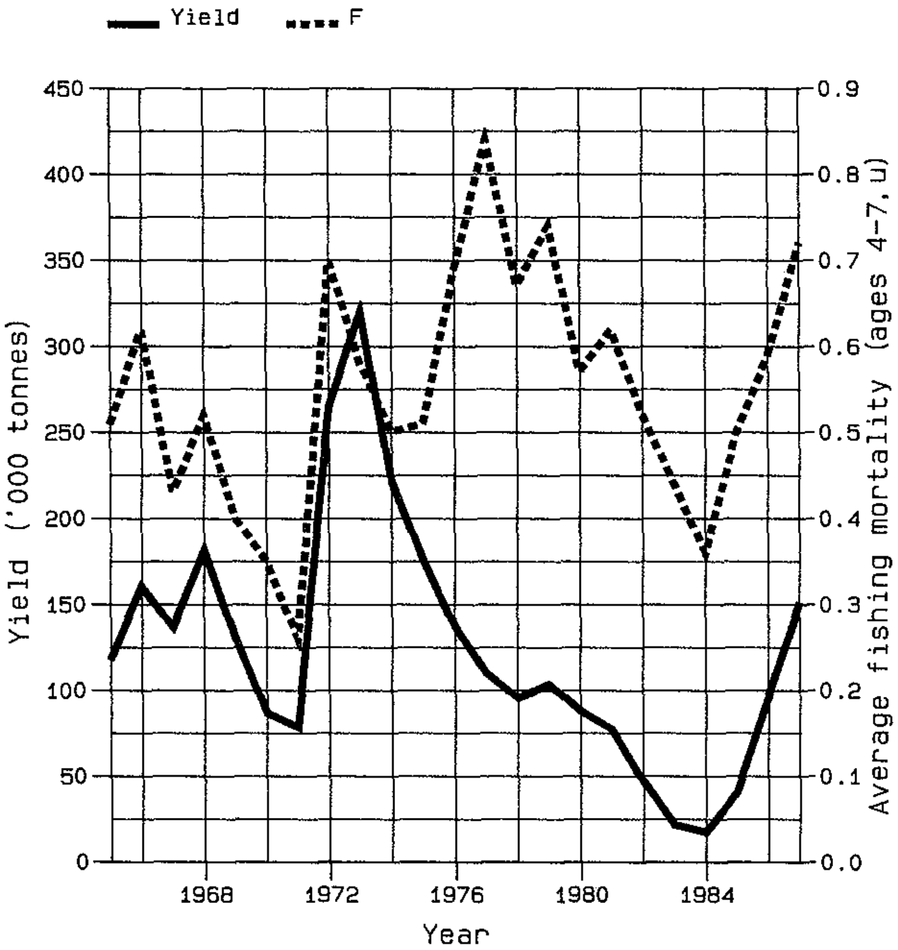


D

Figure 2.2

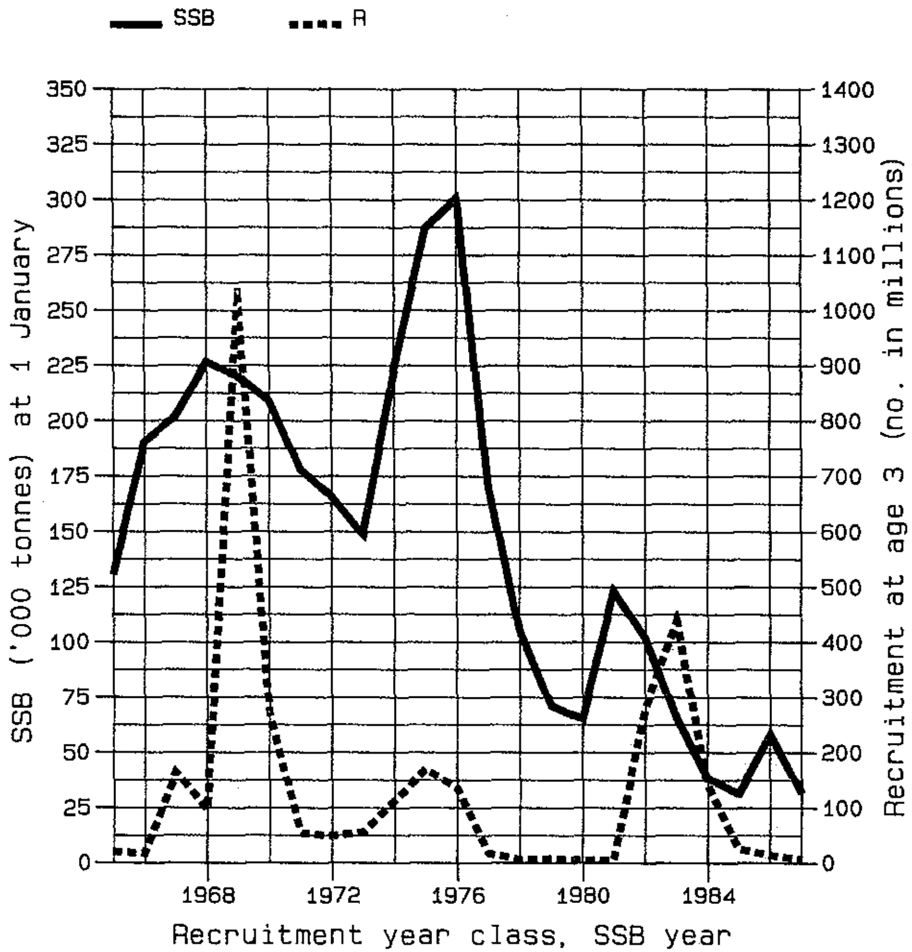
FISH STOCK SUMMARY
STOCK: North-East Arctic Haddock
25-10-1988

Trends in yield and fishing mortality (F)



A

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



B

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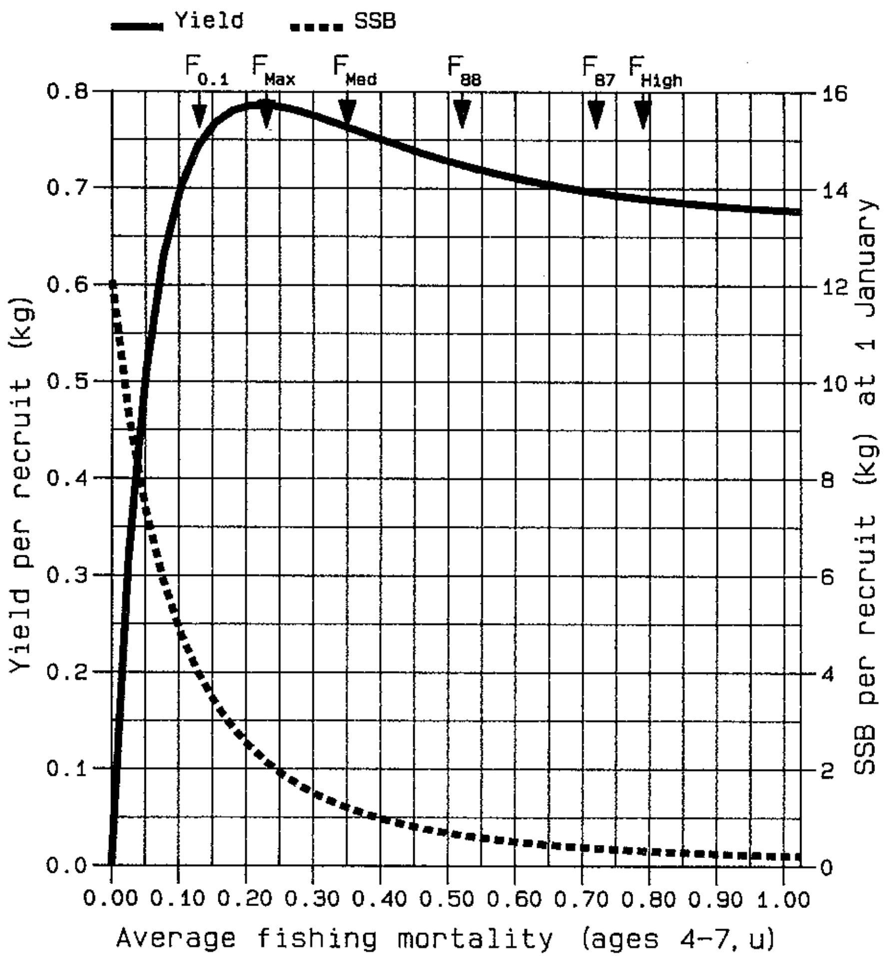
Figure 2.2 cont'd.

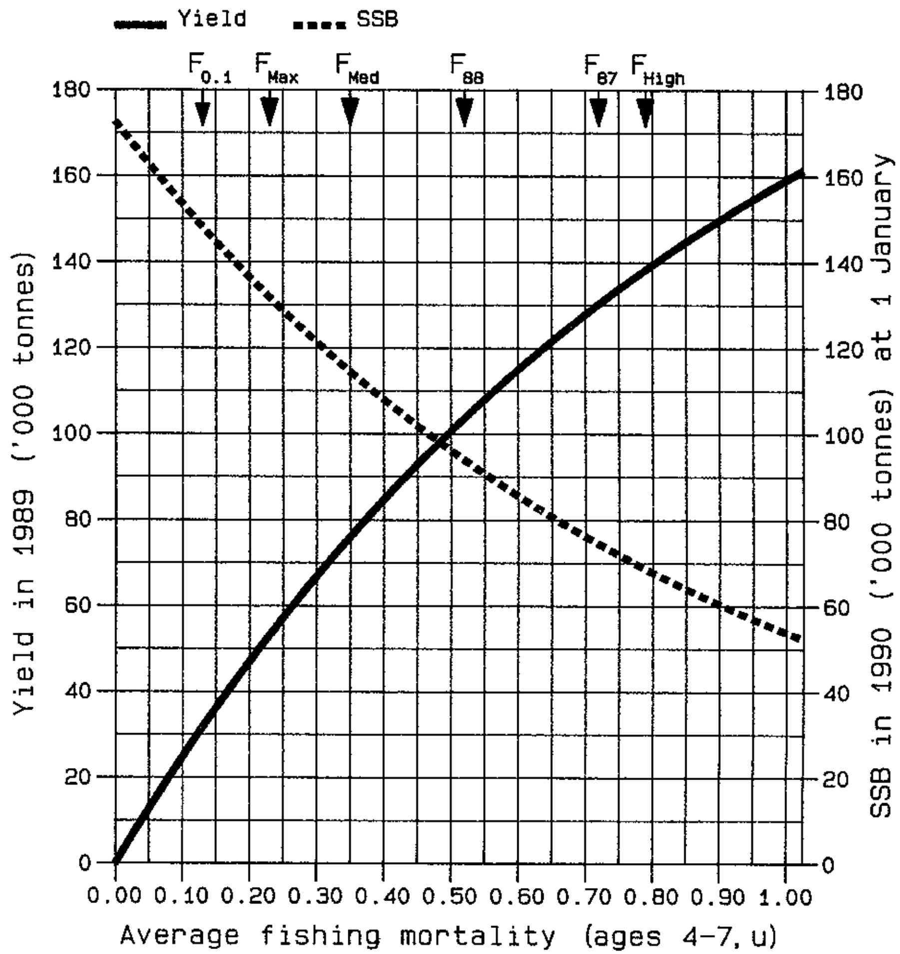
FISH STOCK SUMMARY
STOCK: North-East Arctic Haddock
25-10-1988

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass

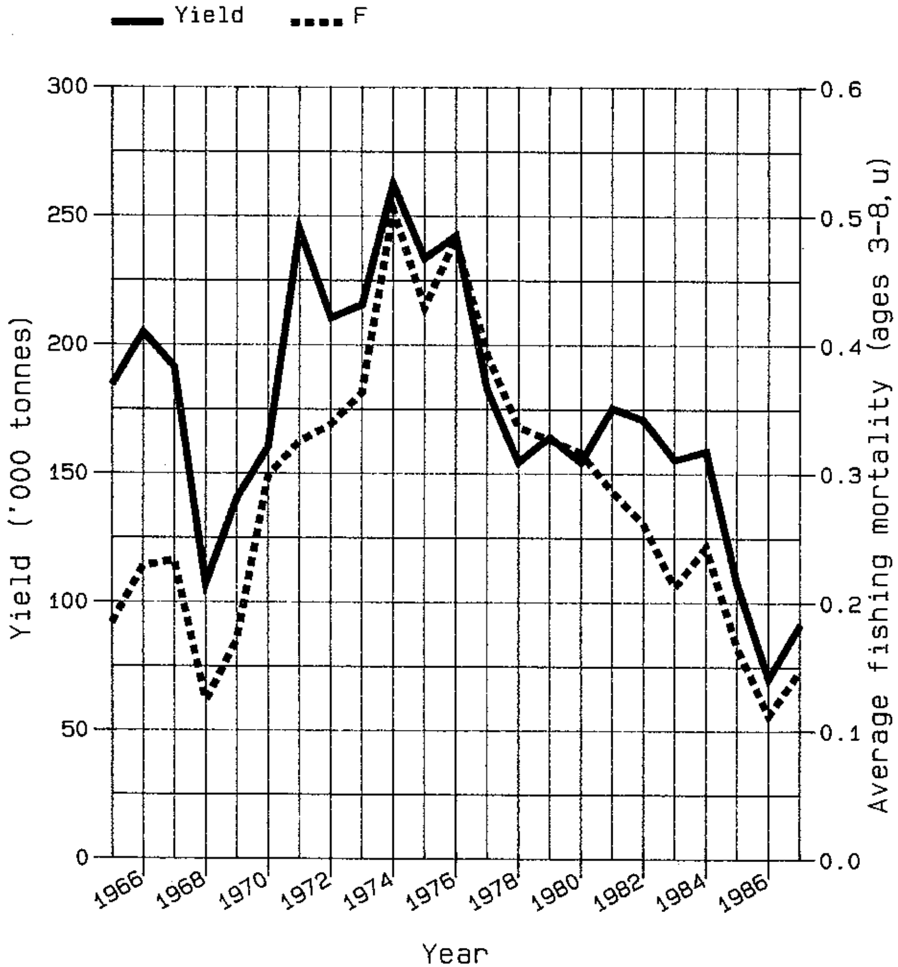


D

Figure 2.3

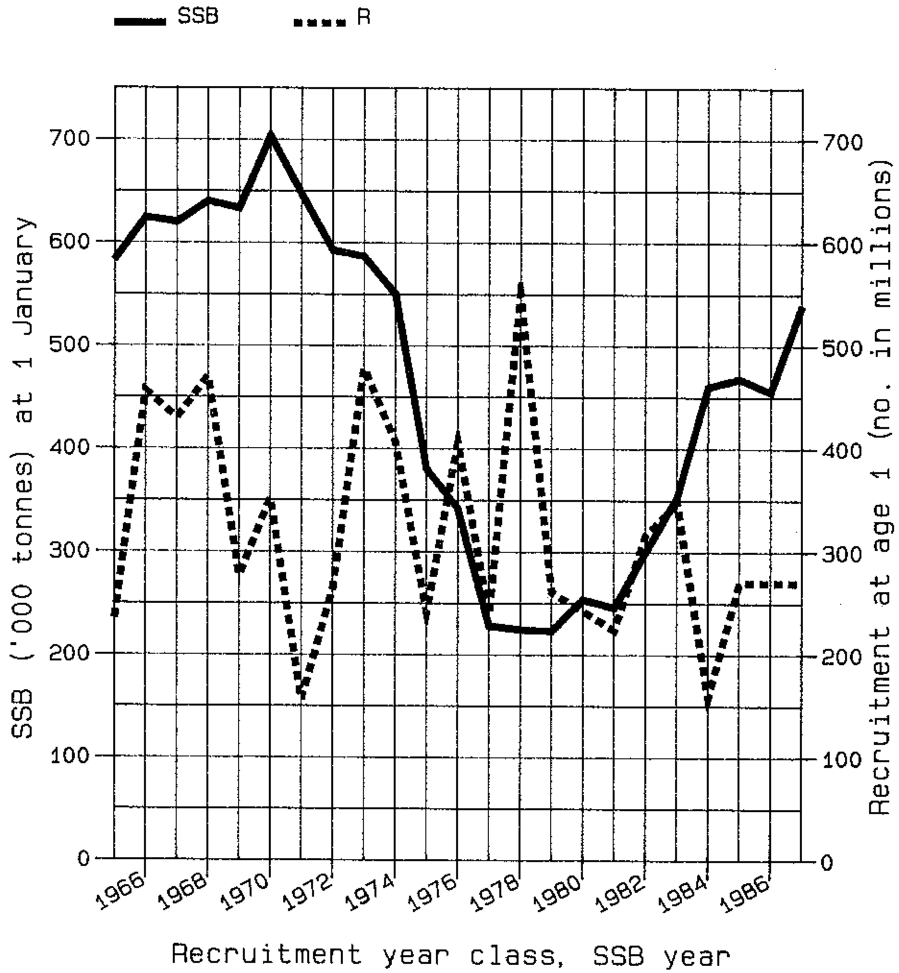
FISH STOCK SUMMARY
STOCK: North-East Arctic Saithe
26-10-1988

Trends in yield and fishing mortality (F)



A

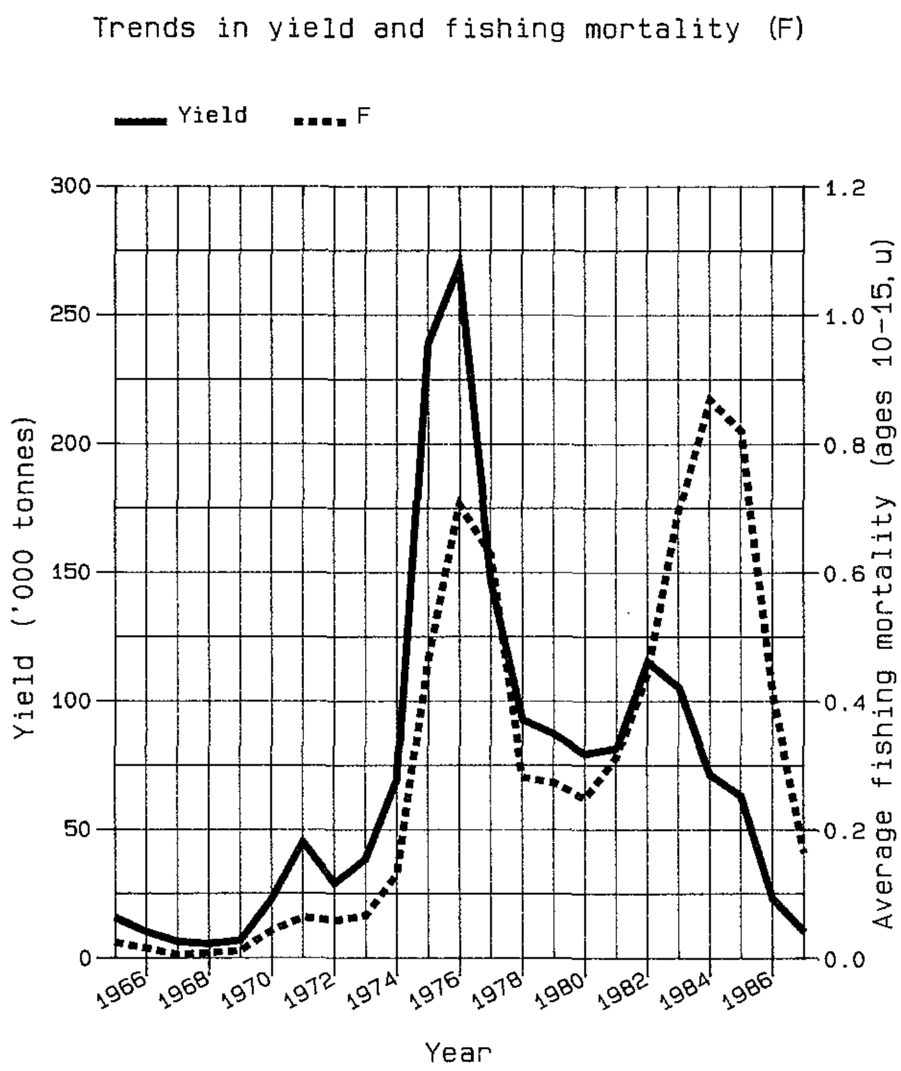
Trends in spawning stock biomass (SSB) and recruitment (R)



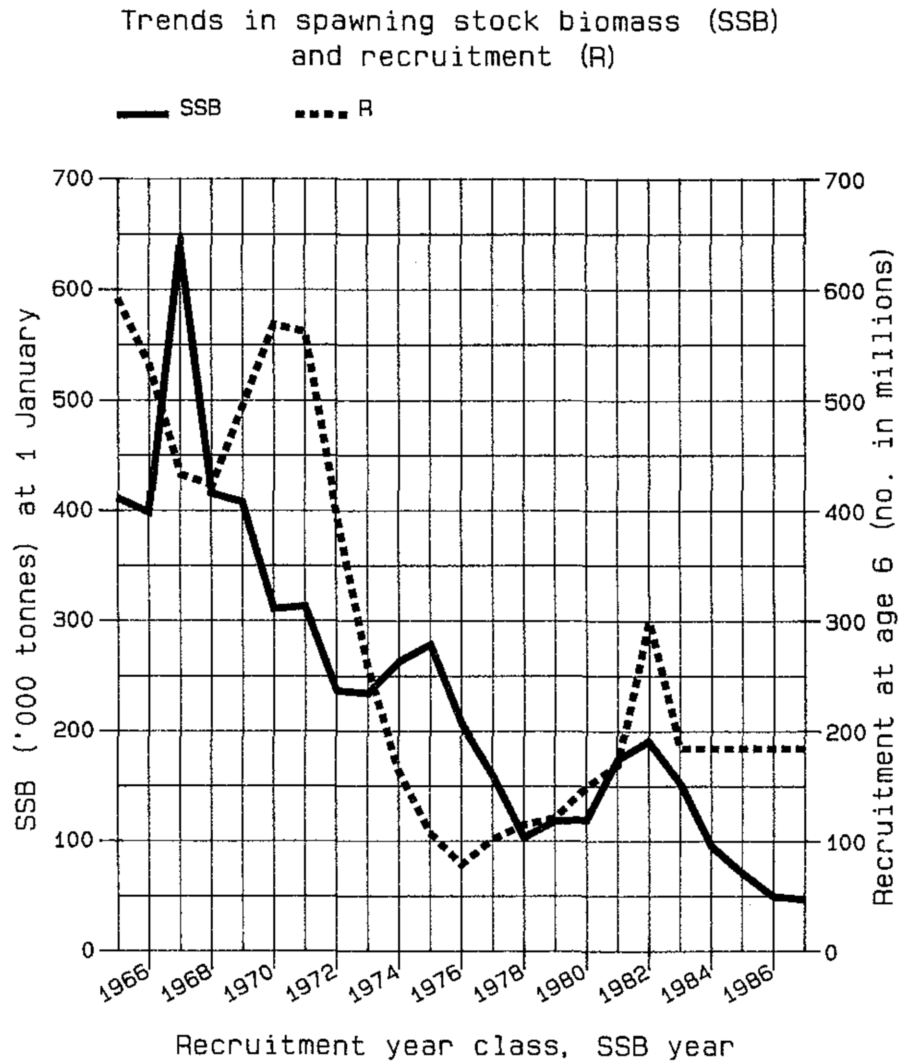
B

Figure 2.4.1

FISH STOCK SUMMARY
STOCK: Sebastes Mentella in areas IIA and IIB
26-10-1988



A



B

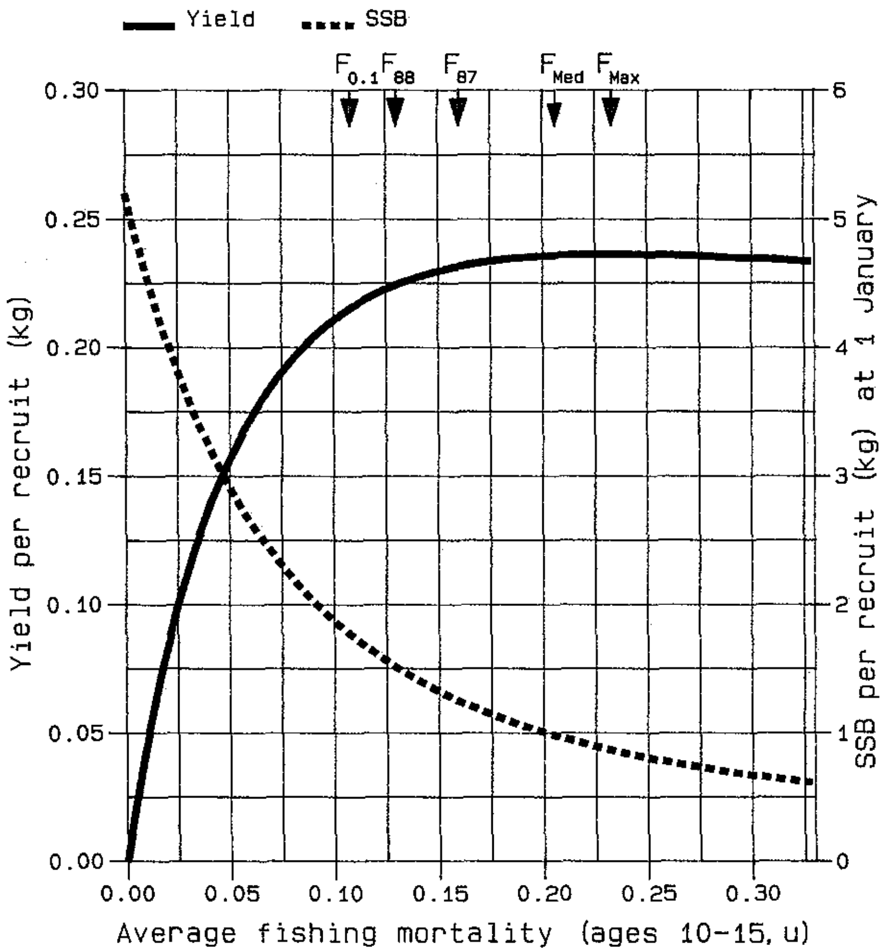
cont'd.

FISH STOCK SUMMARY

Figure 2.4.1 cont'd. STOCK: Sebastes Mentella in areas IIA and IIB

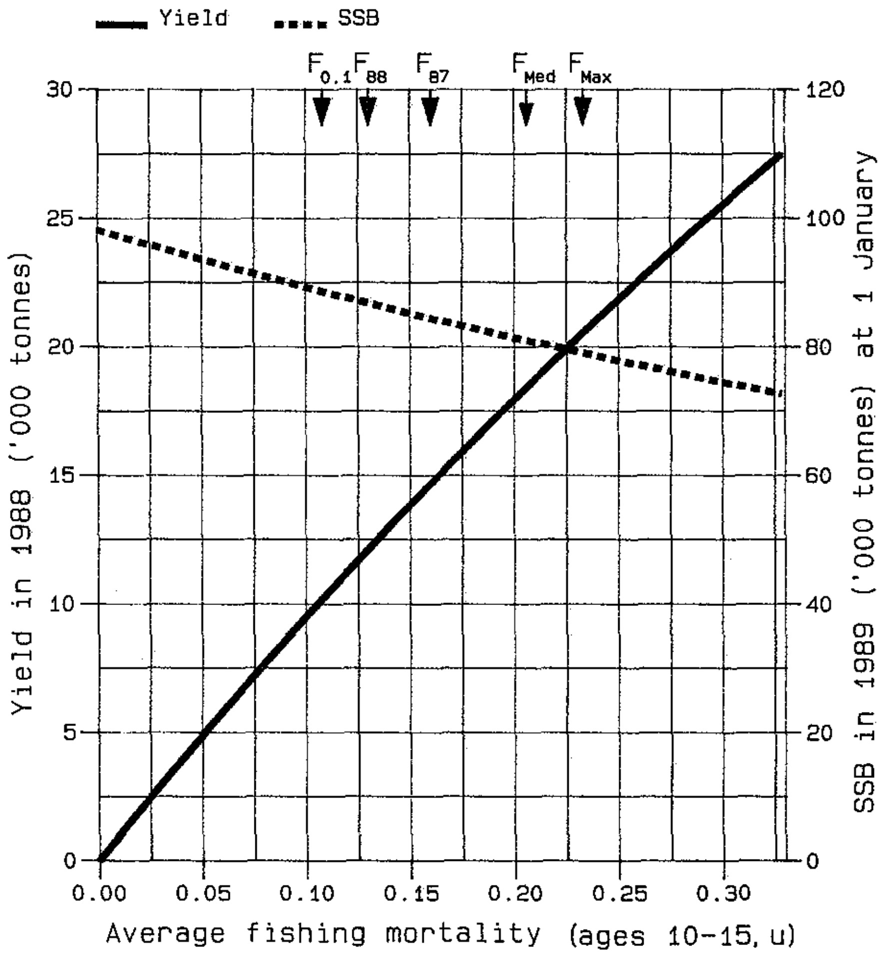
26-10-1988

Long-term yield and spawning stock biomass



C

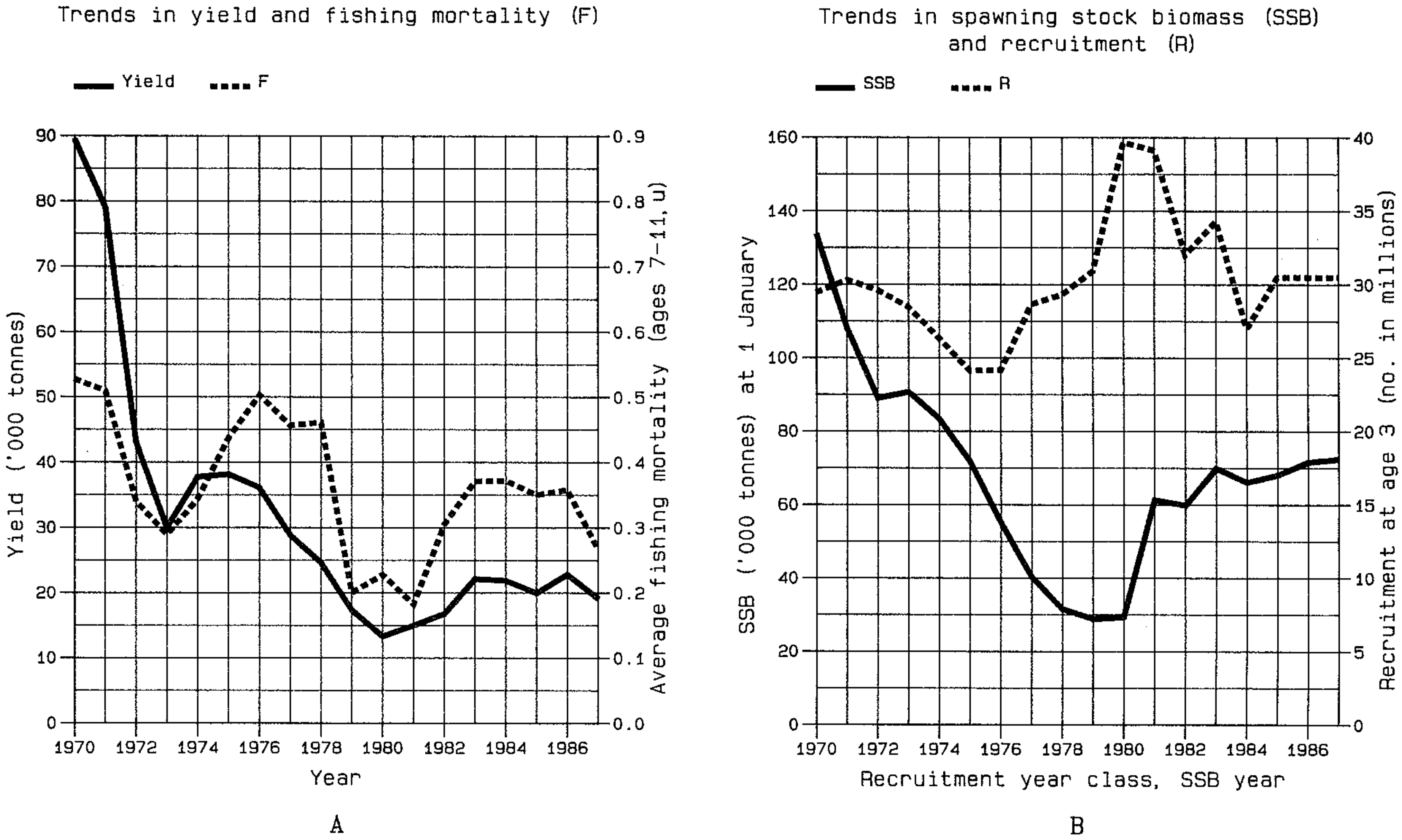
Short-term yield and spawning stock biomass



D

Figure 2.5

FISH STOCK SUMMARY
STOCK: Greenland Halibut in fishing areas I and II
26-10-1988

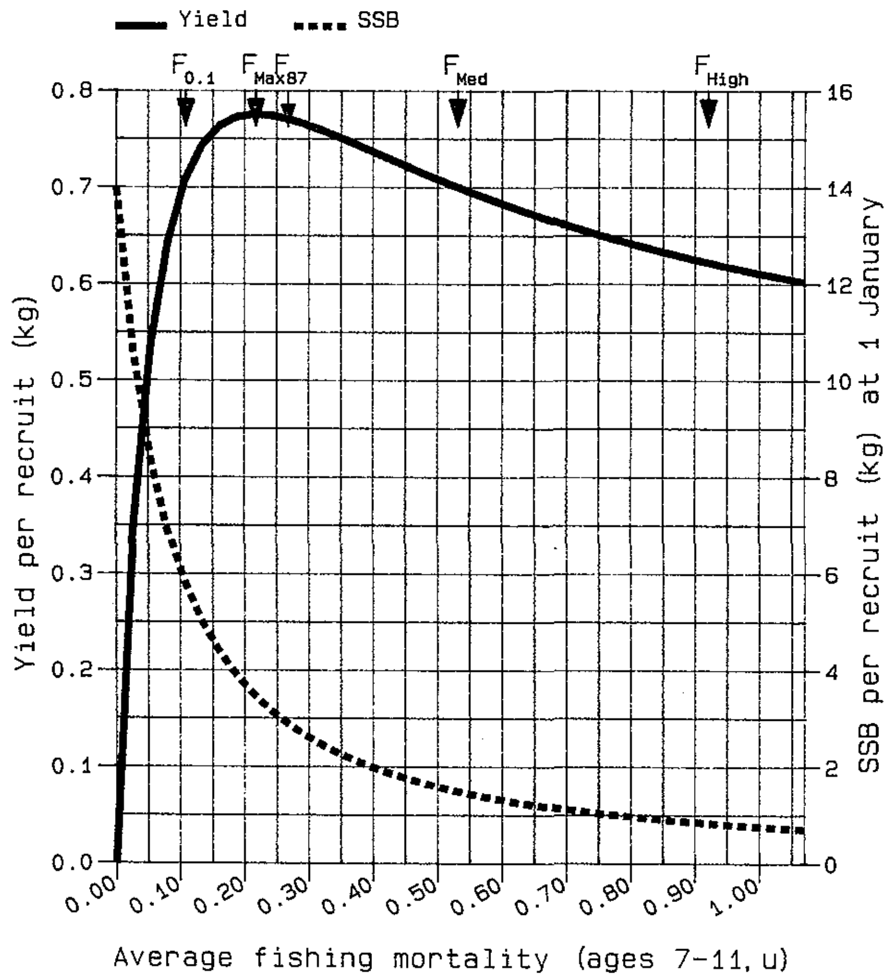


cont'd.

FISH STOCK SUMMARY

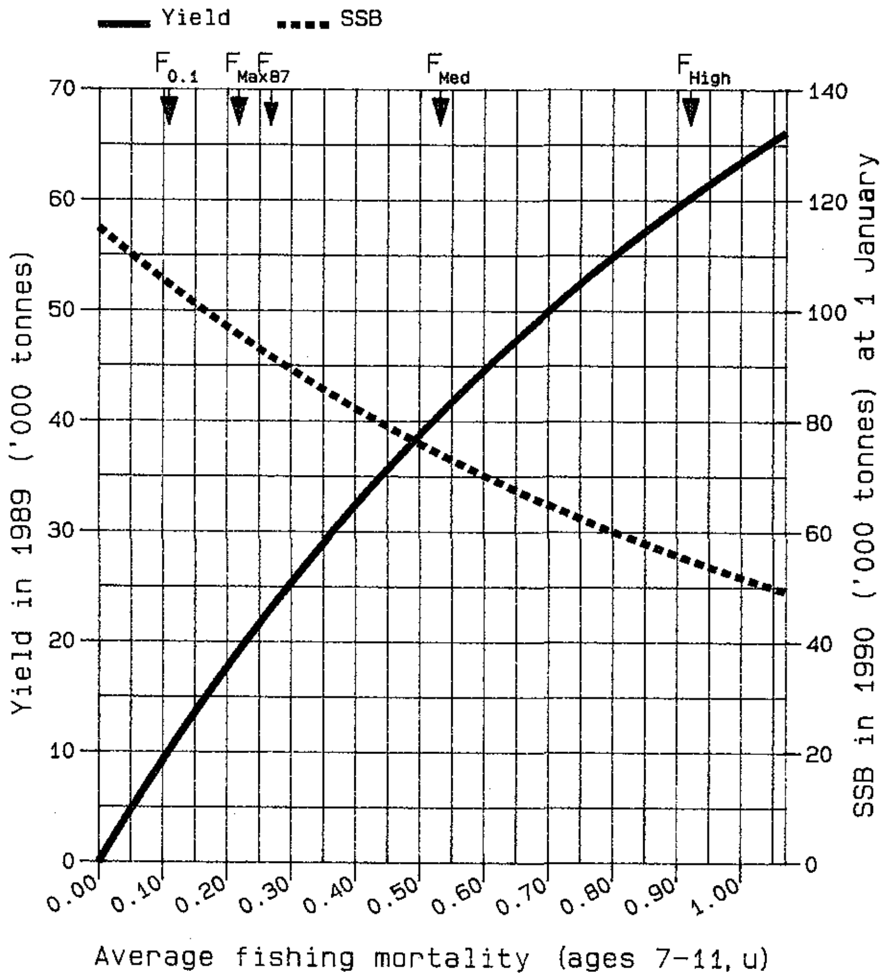
Figure 2.5 cont'd. STOCK: Greenland Halibut in fishing areas I and II
26-10-1988

Long-term yield and spawning stock biomass



C

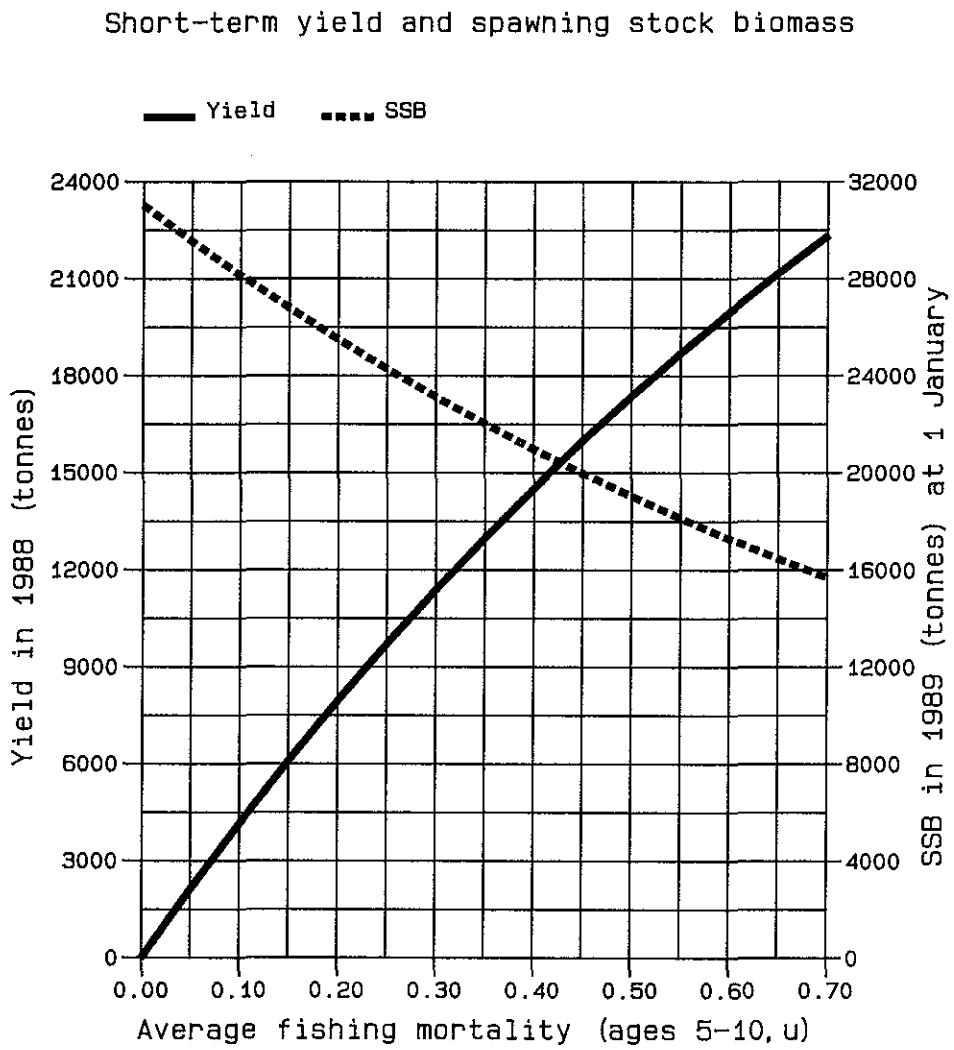
Short-term yield and spawning stock biomass



D

Figure 2.6.1

FISH STOCK SUMMARY
STOCK: East Greenland Cod
25-02-1988

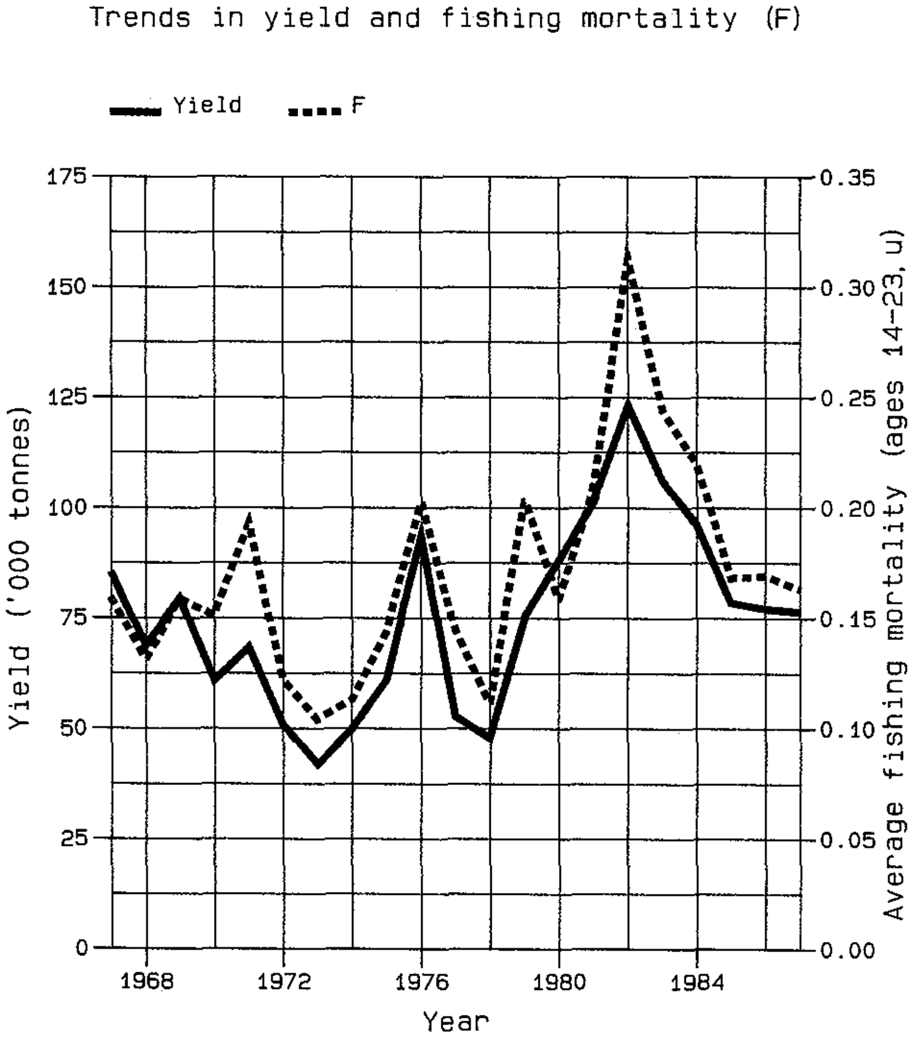


The calculated SSB in 1989 does not include estimates of immigrants in 1989.

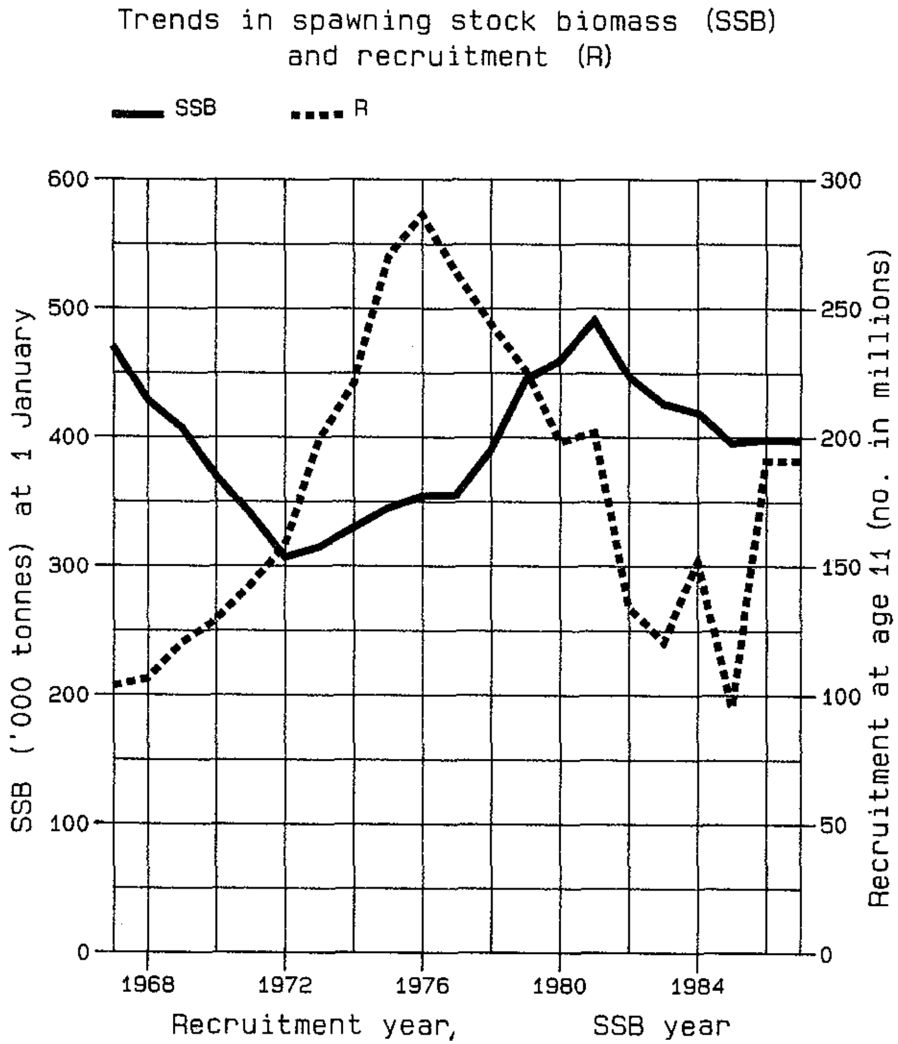
FISH STOCK SUMMARY

Figure 2.7.1 STOCK: Sebates Marinus in fishing areas V and XIV

24-10-1988



A



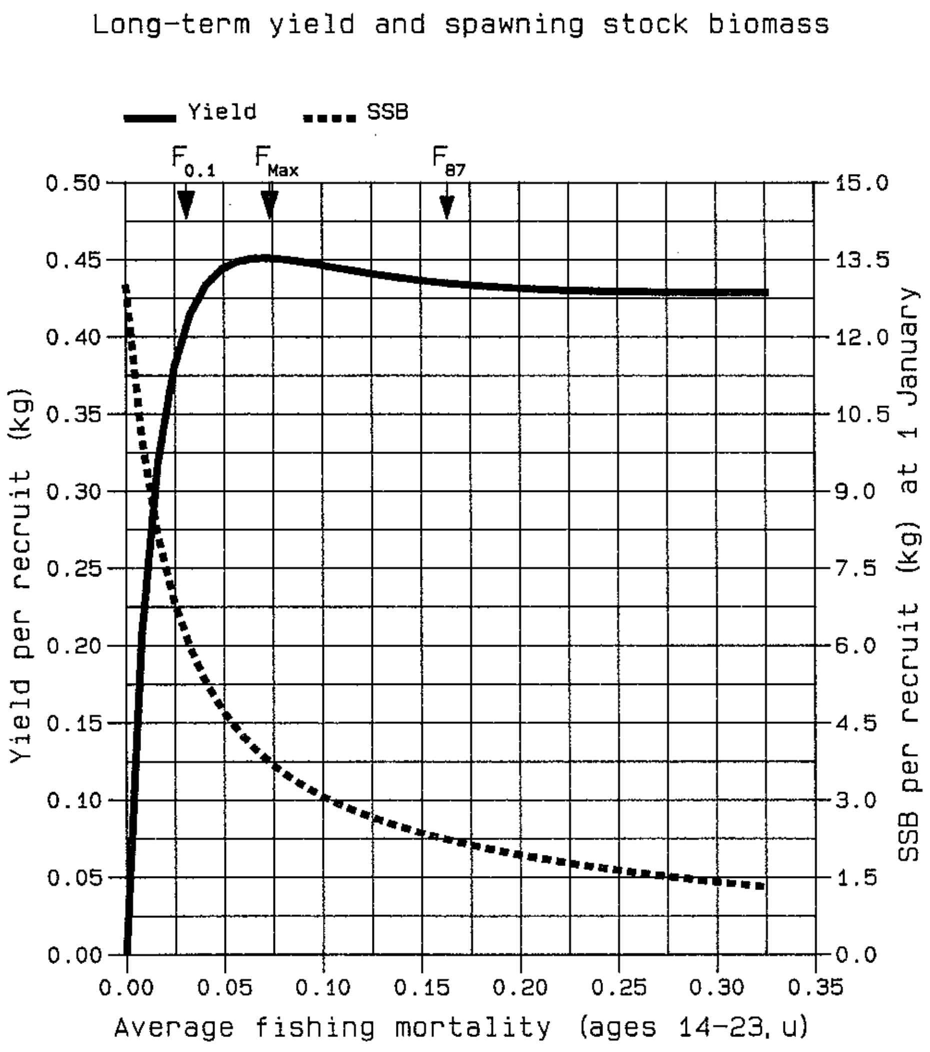
B

cont'd.

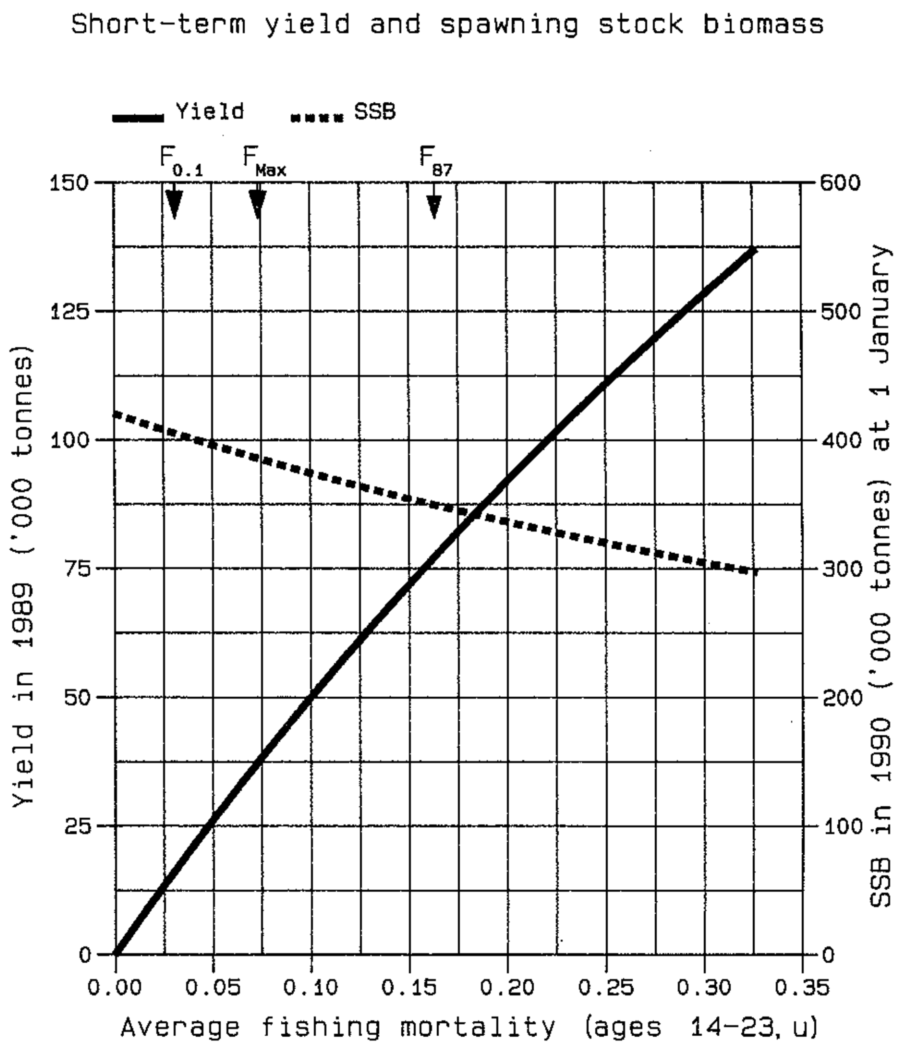
FISH STOCK SUMMARY

Figure 2.7.1 cont'd. STOCK: Sebates Marinus in fishing areas V and XIV

24-10-1988



C

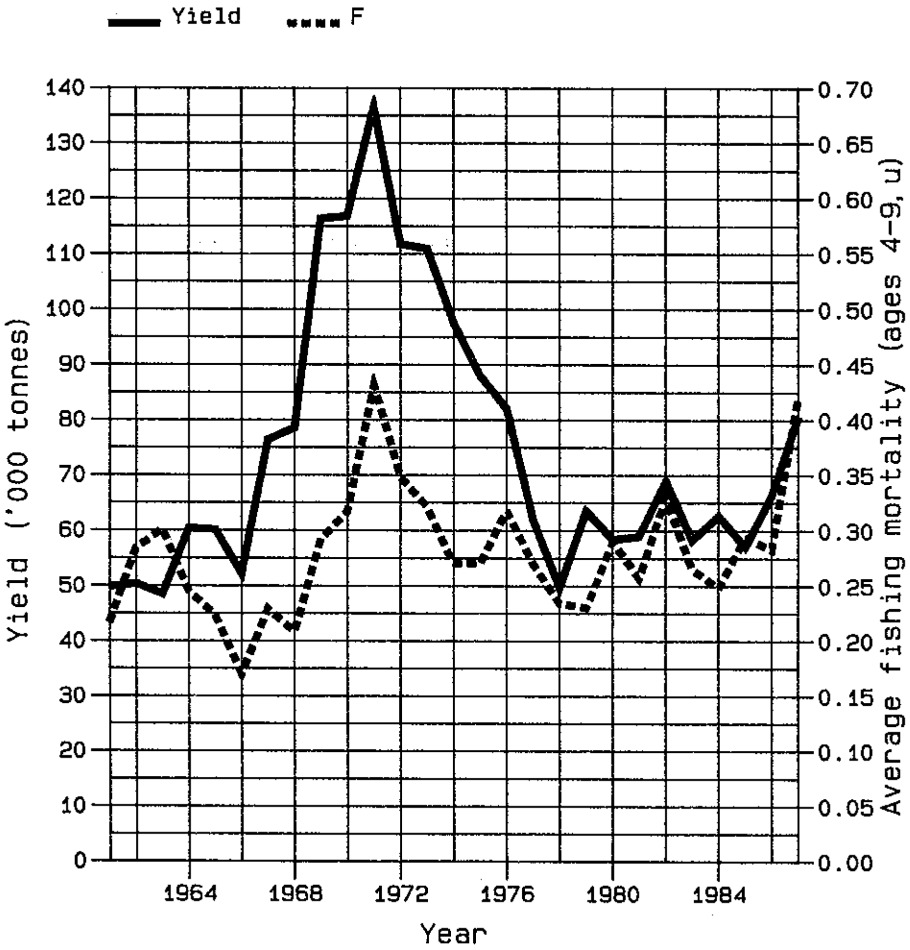


D

Figure 2.9

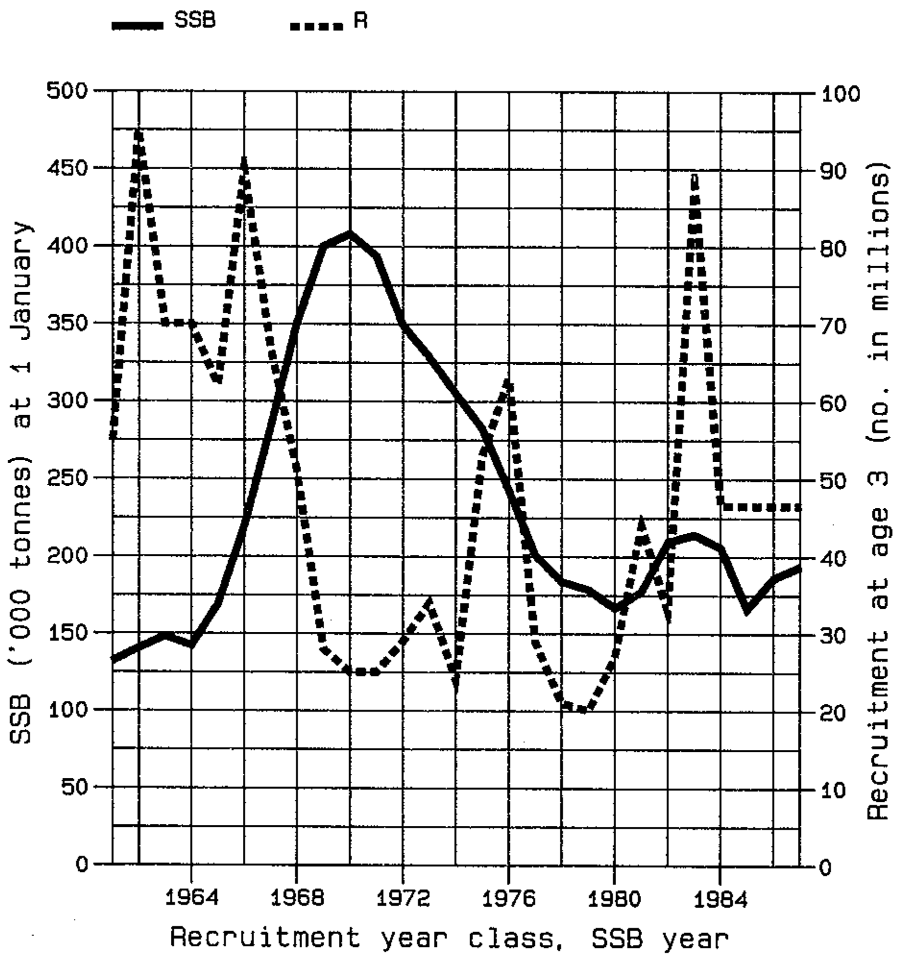
FISH STOCK SUMMARY
STOCK: Icelandic Saithe
23-09-1988

Trends in yield and fishing mortality (F)



A

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



B

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Figure 2.9 cont'd.

FISH STOCK SUMMARY
STOCK: Icelandic Saithe
23-09-1988

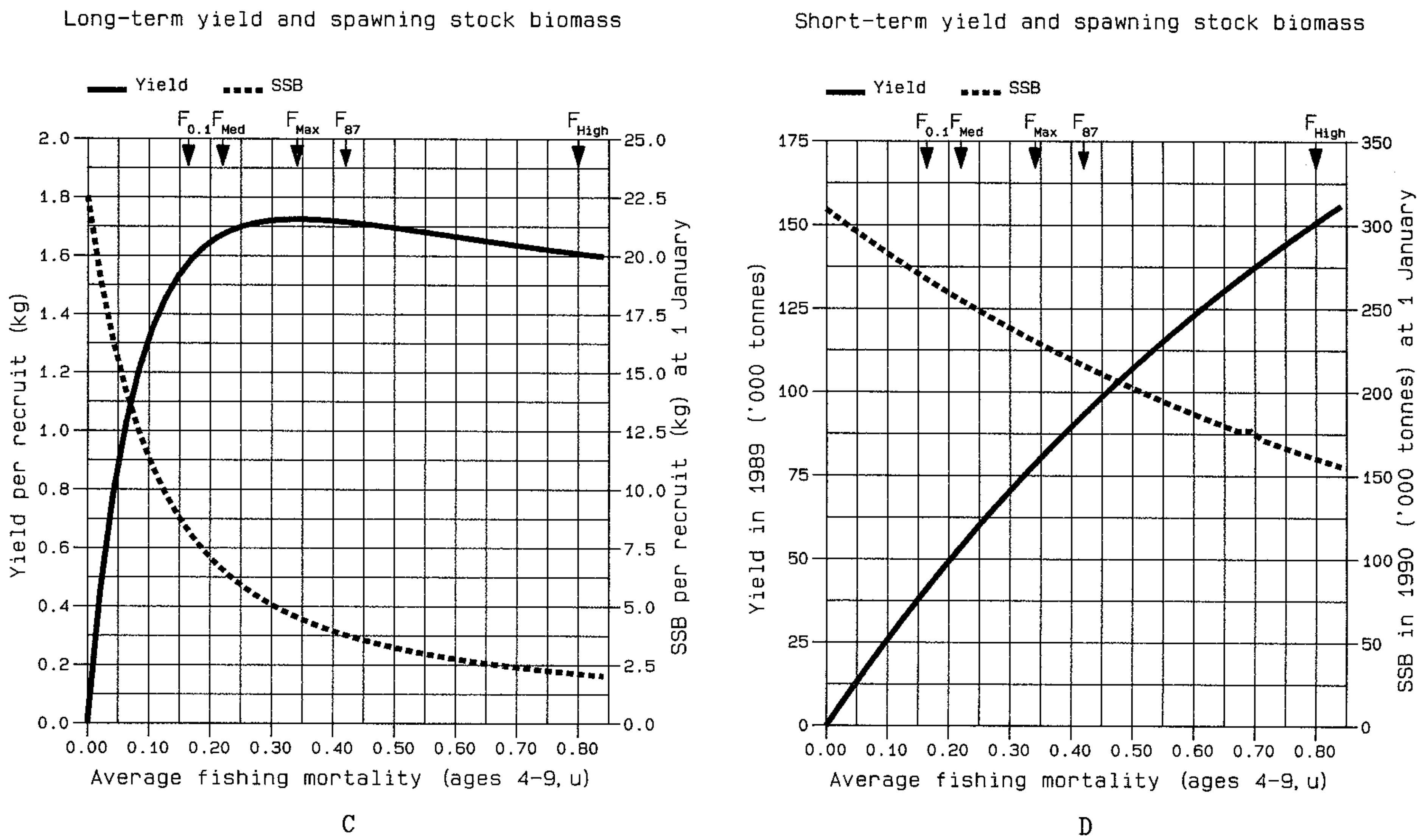
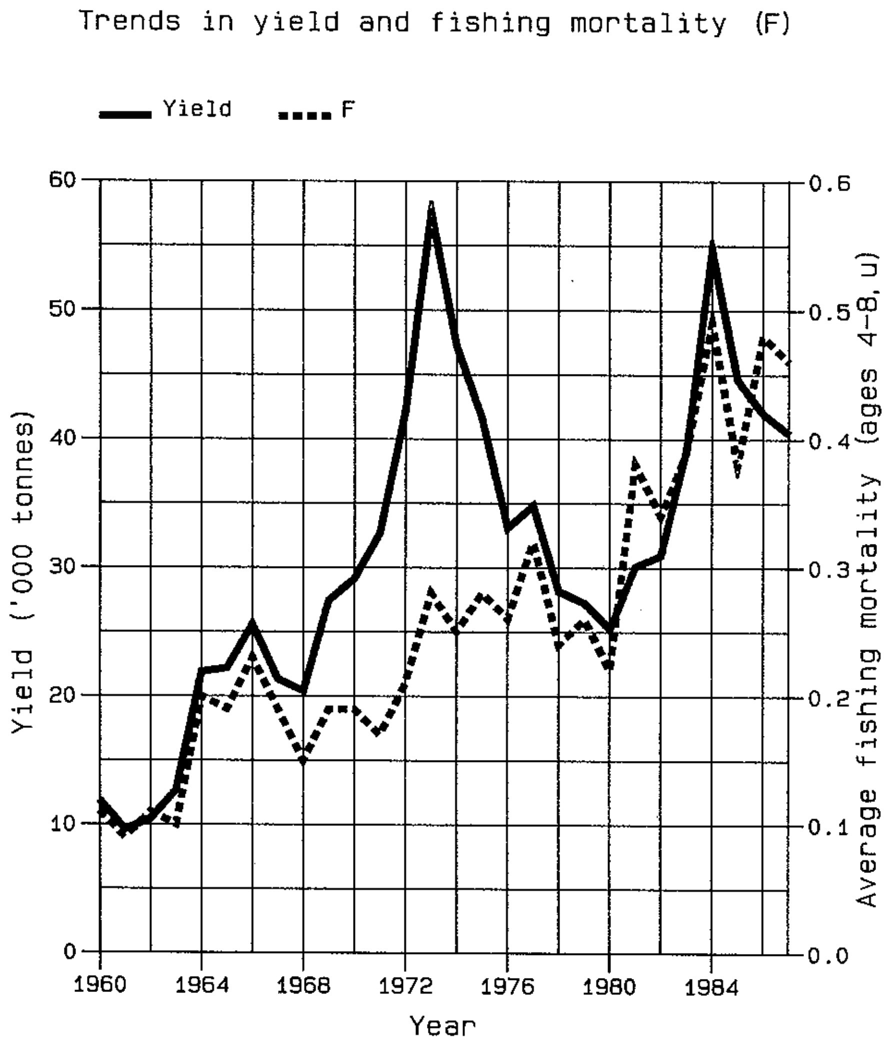
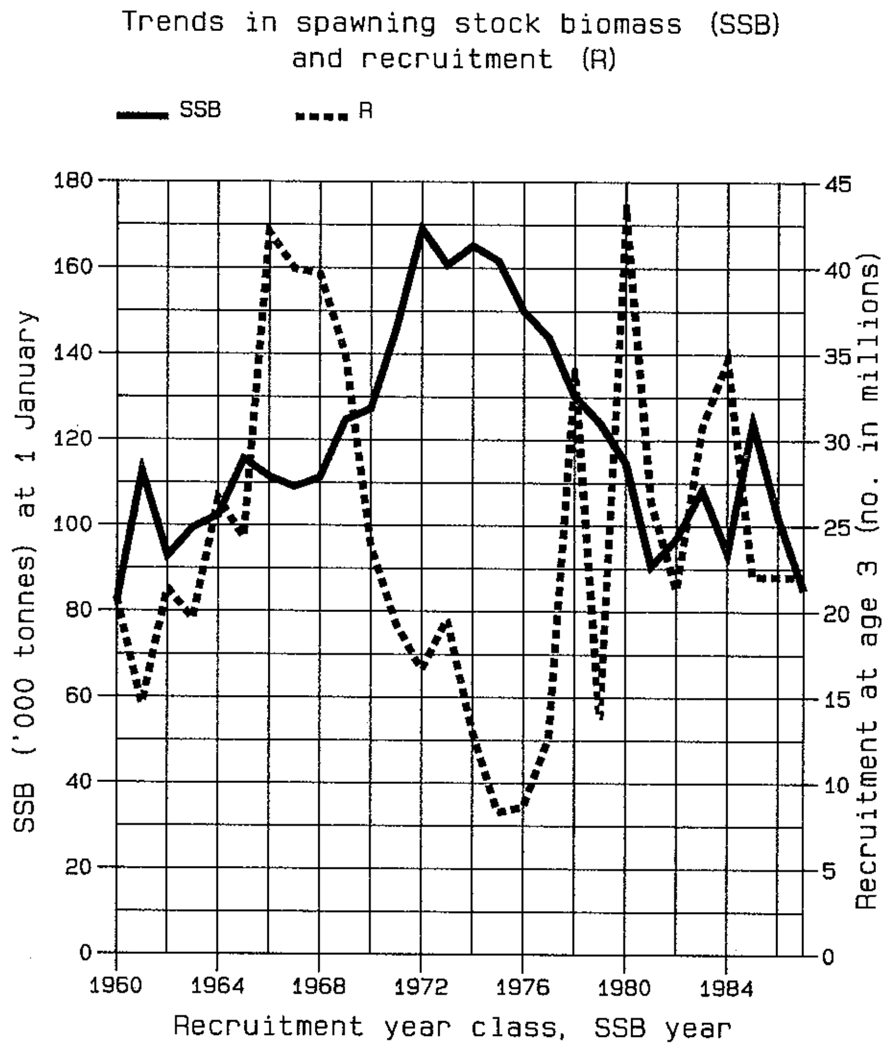


Figure 2.10.1

FISH STOCK SUMMARY
STOCK: Faroe Saithe
10-11-1988



A



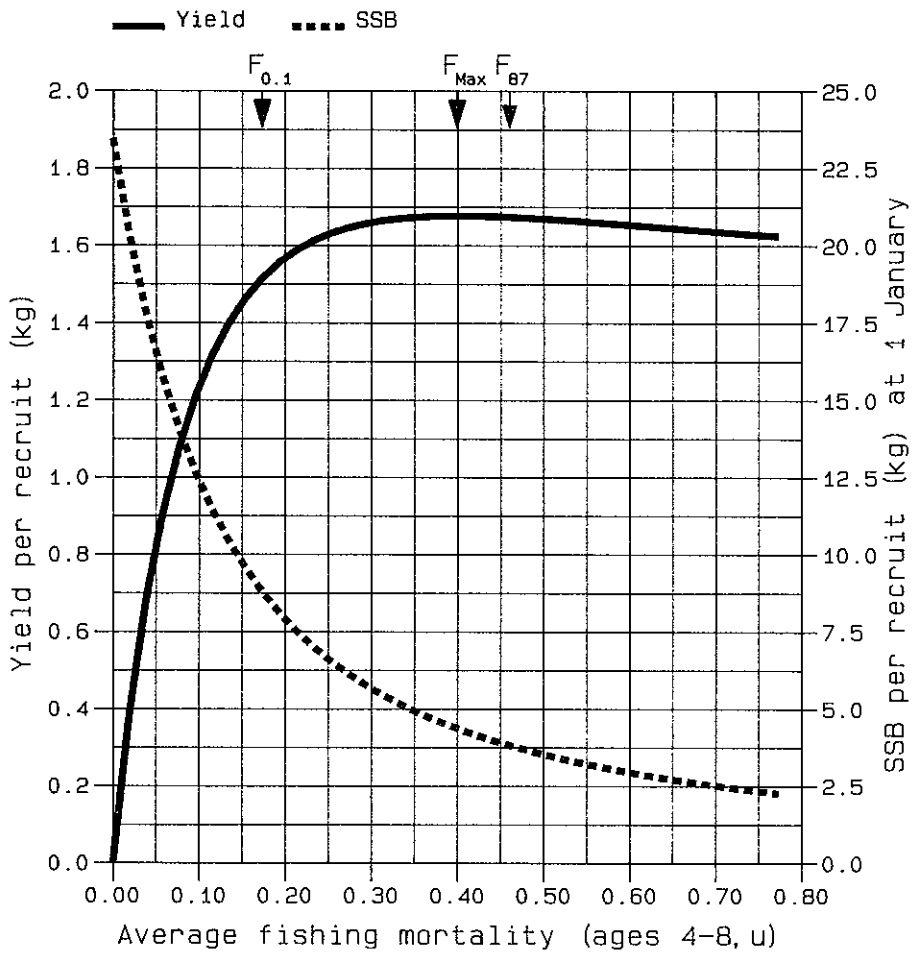
B

cont'd.

Figure 2.10.1 cont'd.

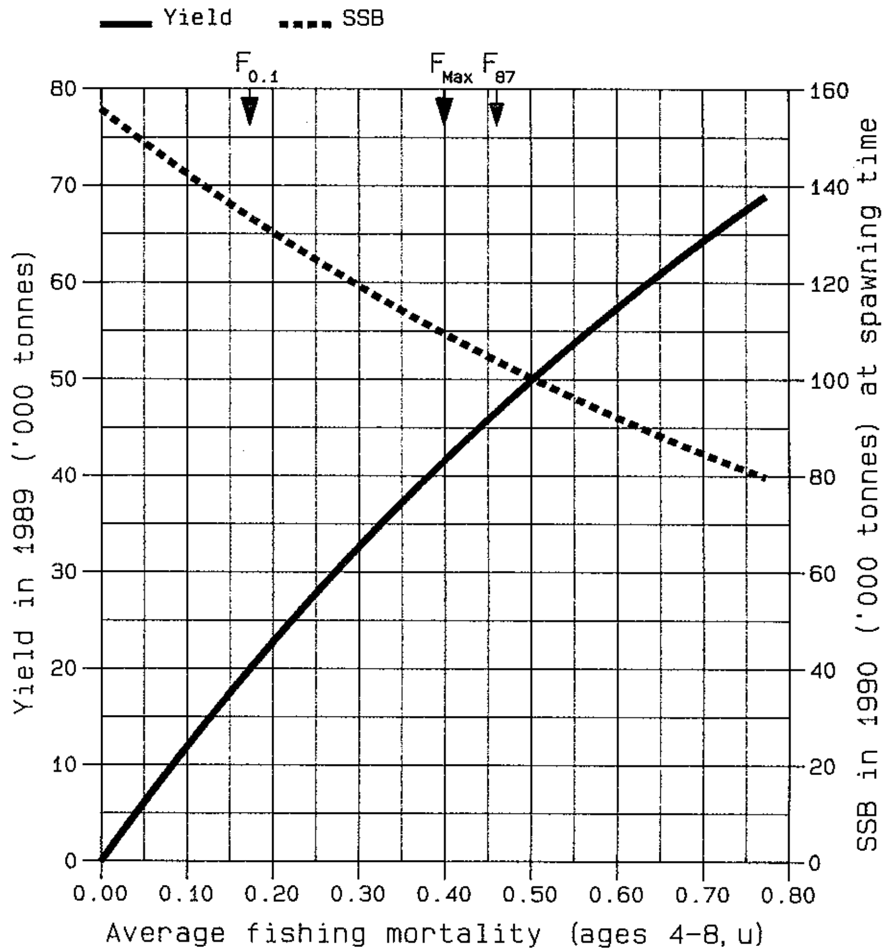
FISH STOCK SUMMARY
STOCK: Faroe Saithe
10-11-1988

Long-term yield and spawning stock biomass



C

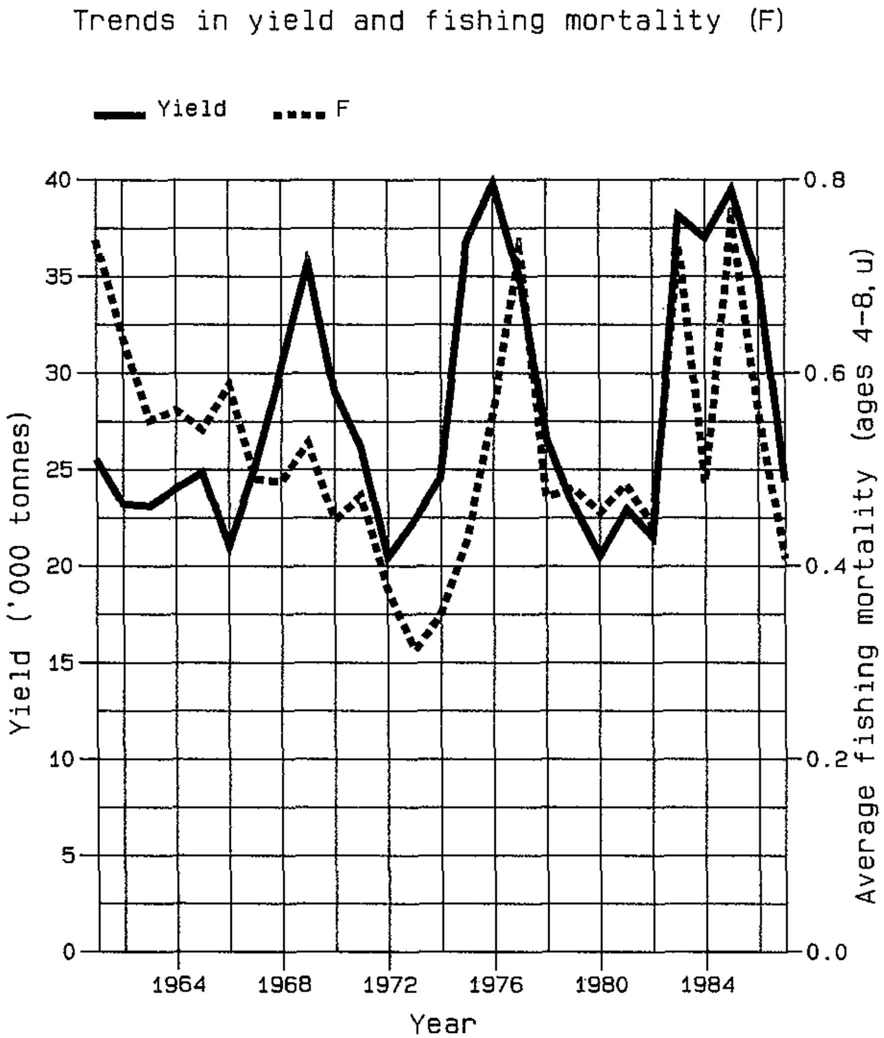
Short-term yield and spawning stock biomass



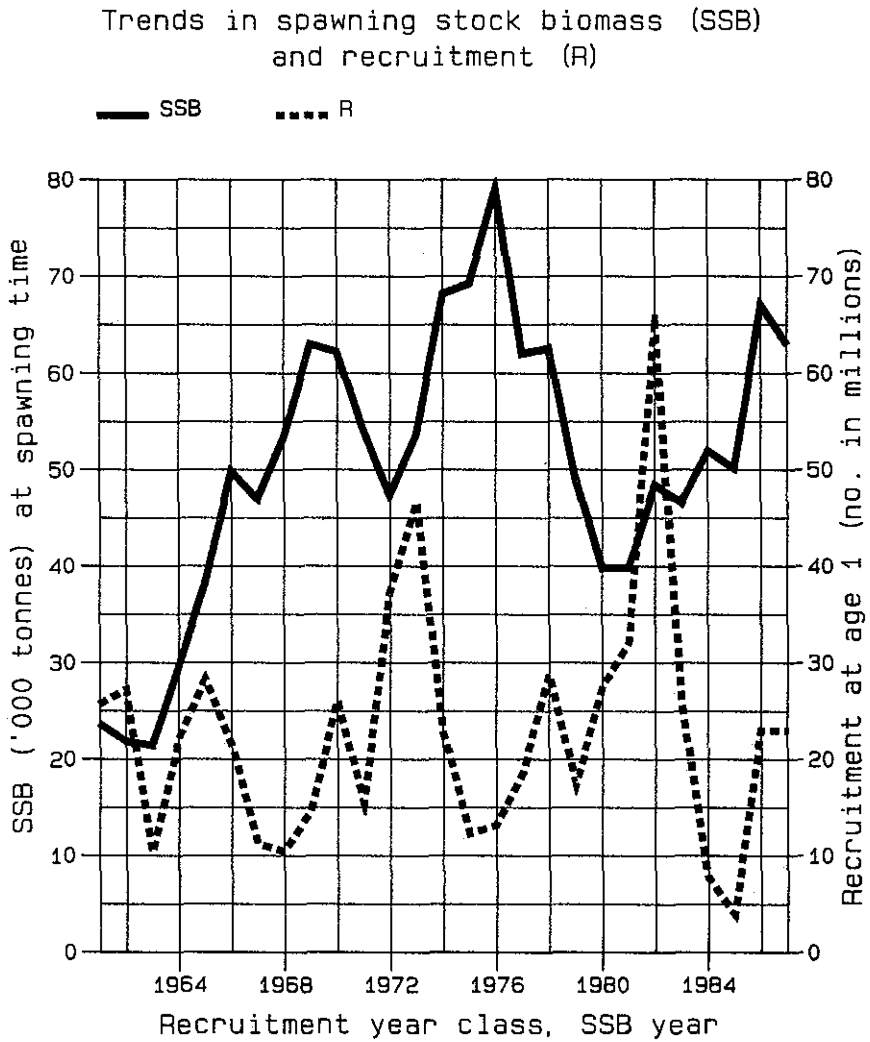
D

Figure 2.10.2

FISH STOCK SUMMARY
STOCK: Cod in the Faroe Plateau
24-10-1988



A



B

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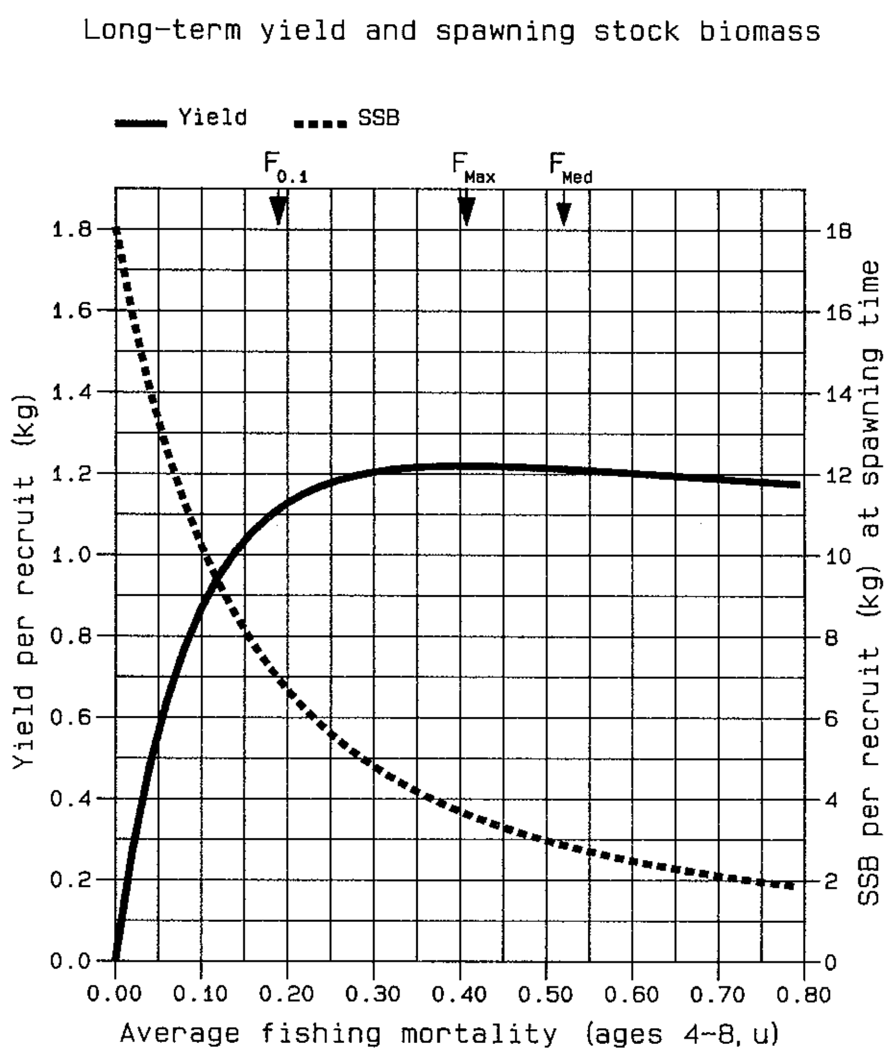
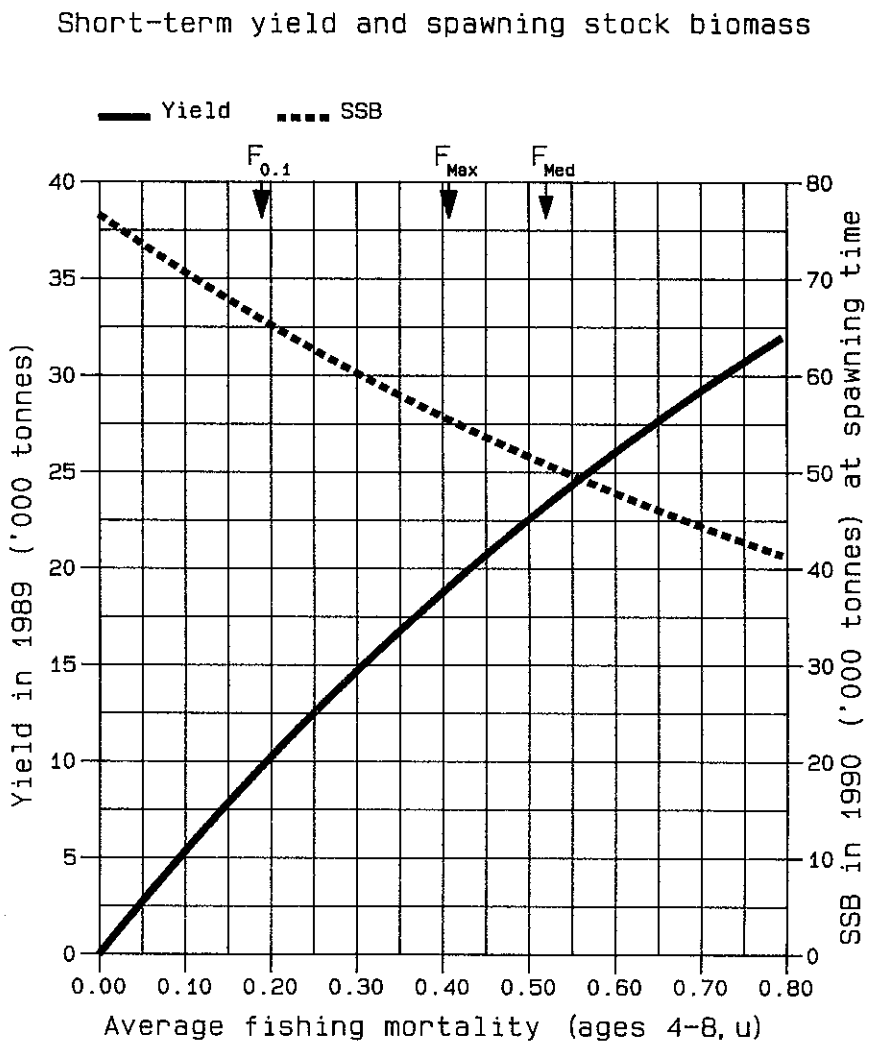
Figure 2.10.2 cont'd.

FISH STOCK SUMMARY
STOCK: Cod in the Faroe Plateau
24-10-1988



C



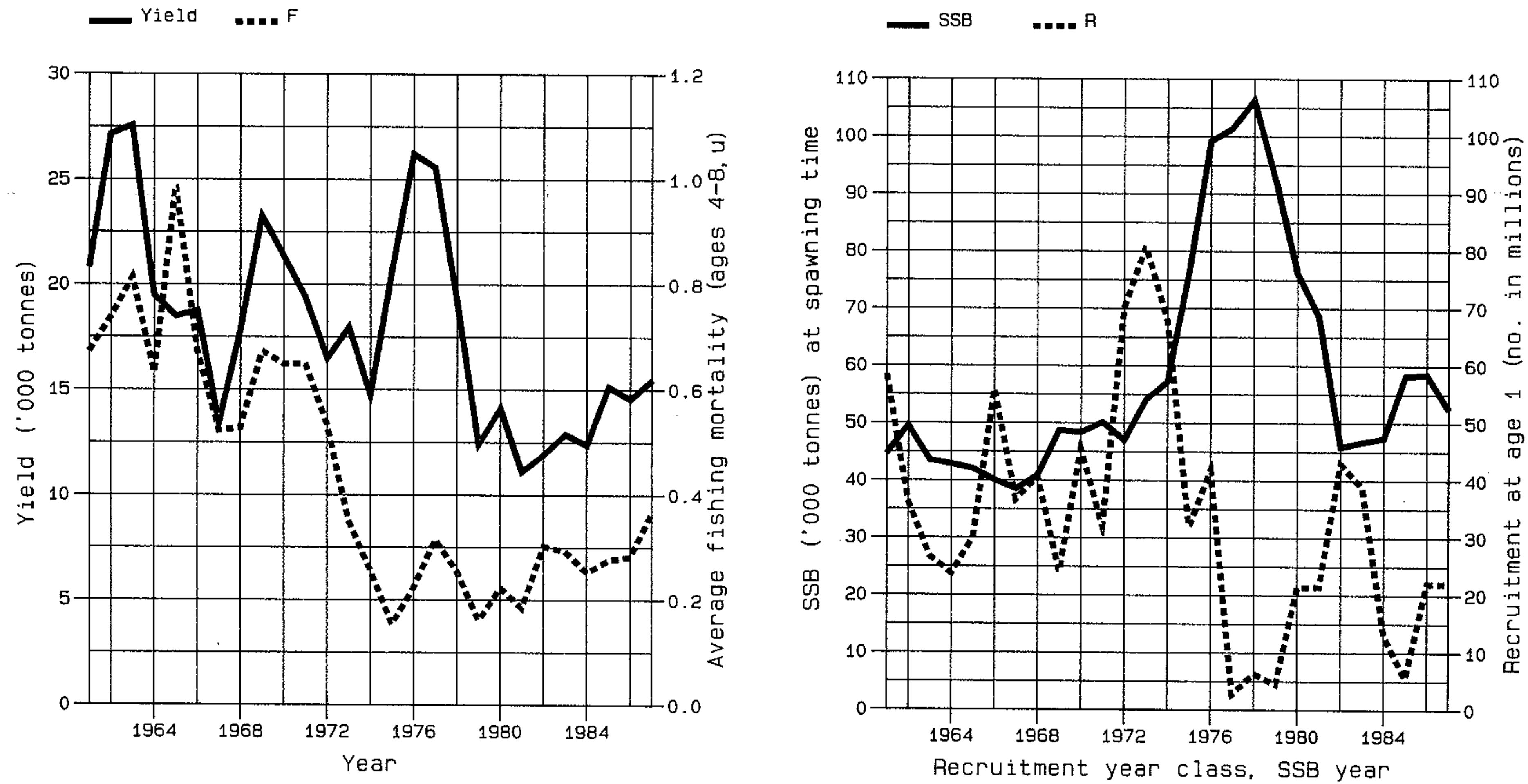
D

FISH STOCK SUMMARY
STOCK: Haddock in the Faroe Region
24-10-1988

Figure 2.10.3

Trends in yield and fishing mortality (F)

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



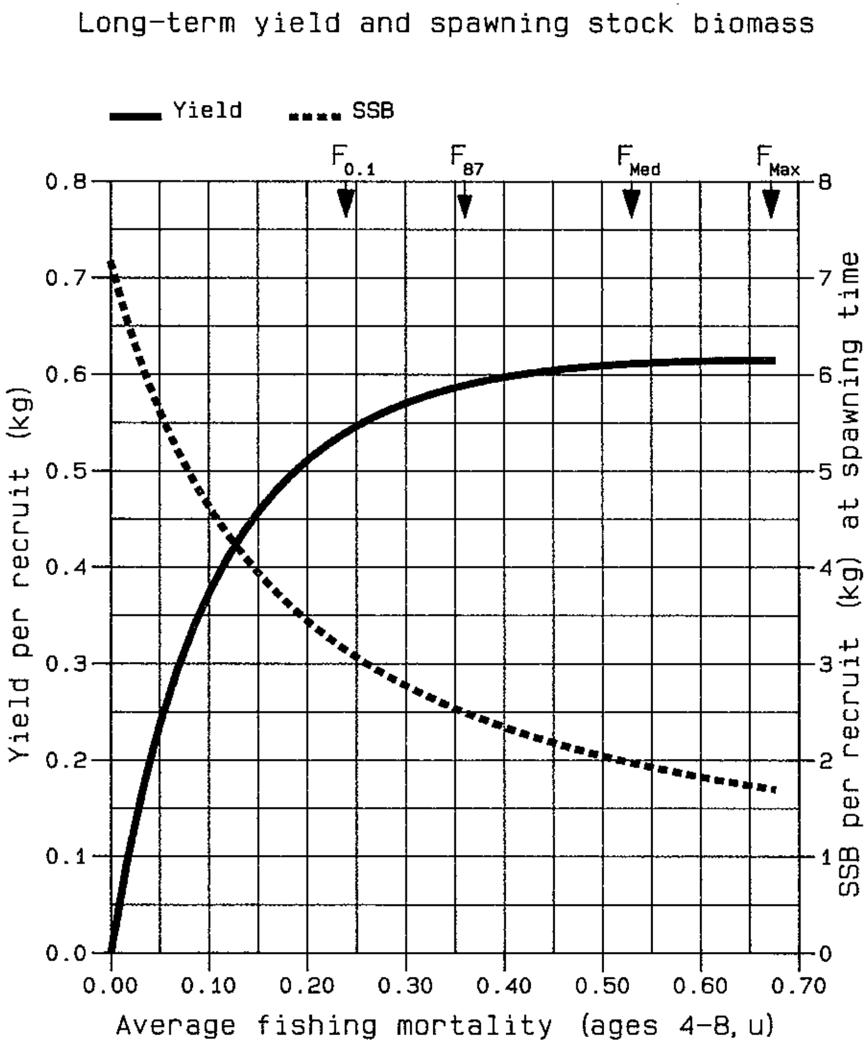
A

B

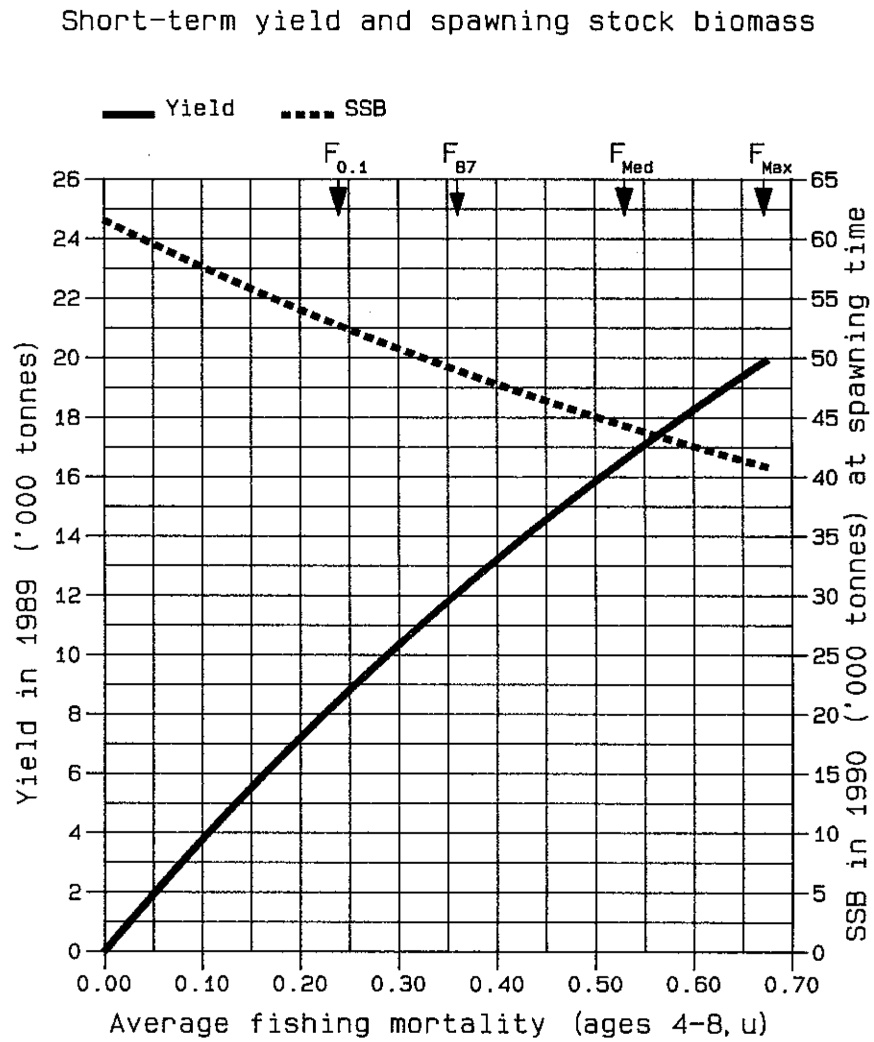
cont'd.

Figure 2.10.3 cont'd.

FISH STOCK SUMMARY
STOCK: Haddock in the Faroe Region
24-10-1988



C



D

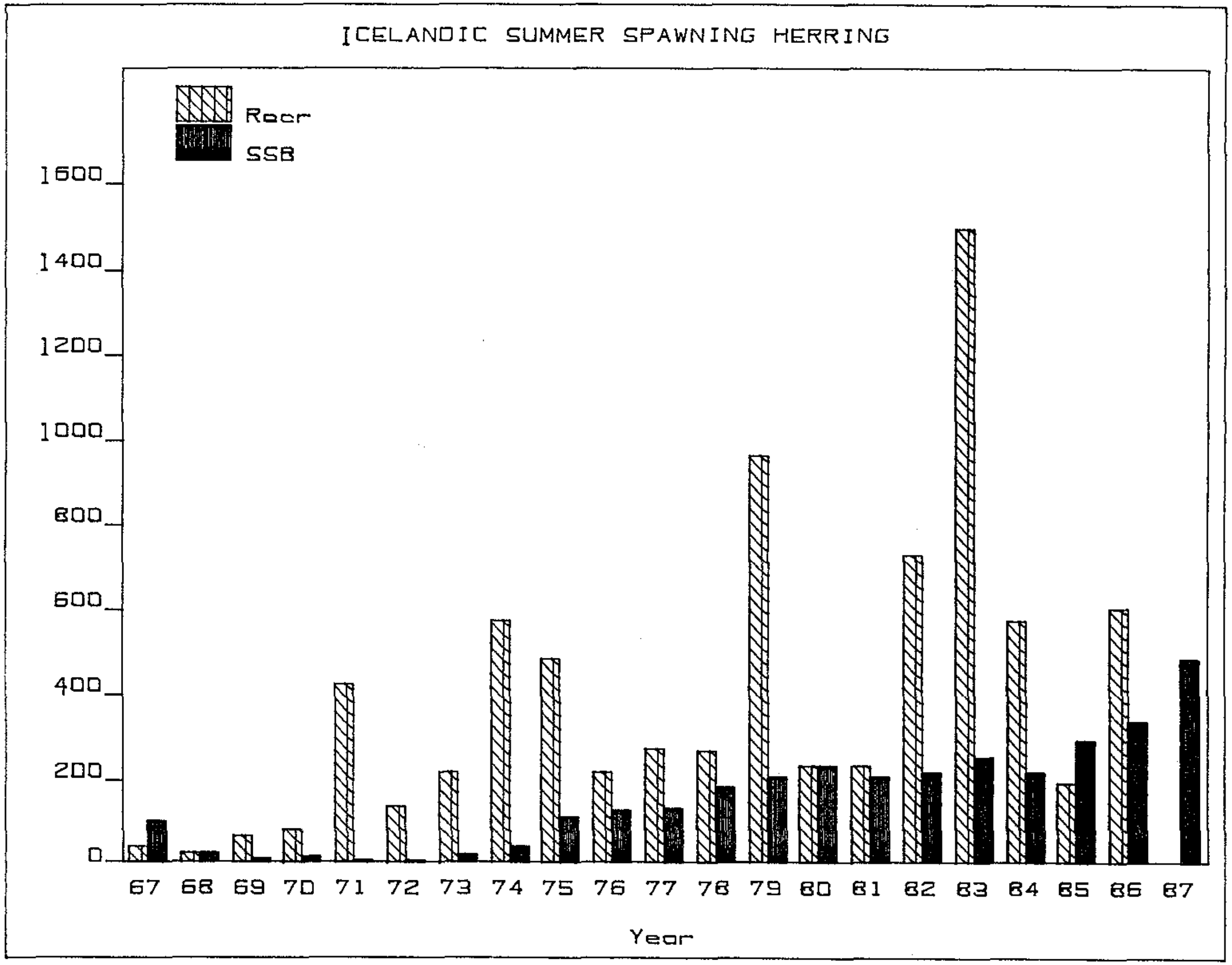
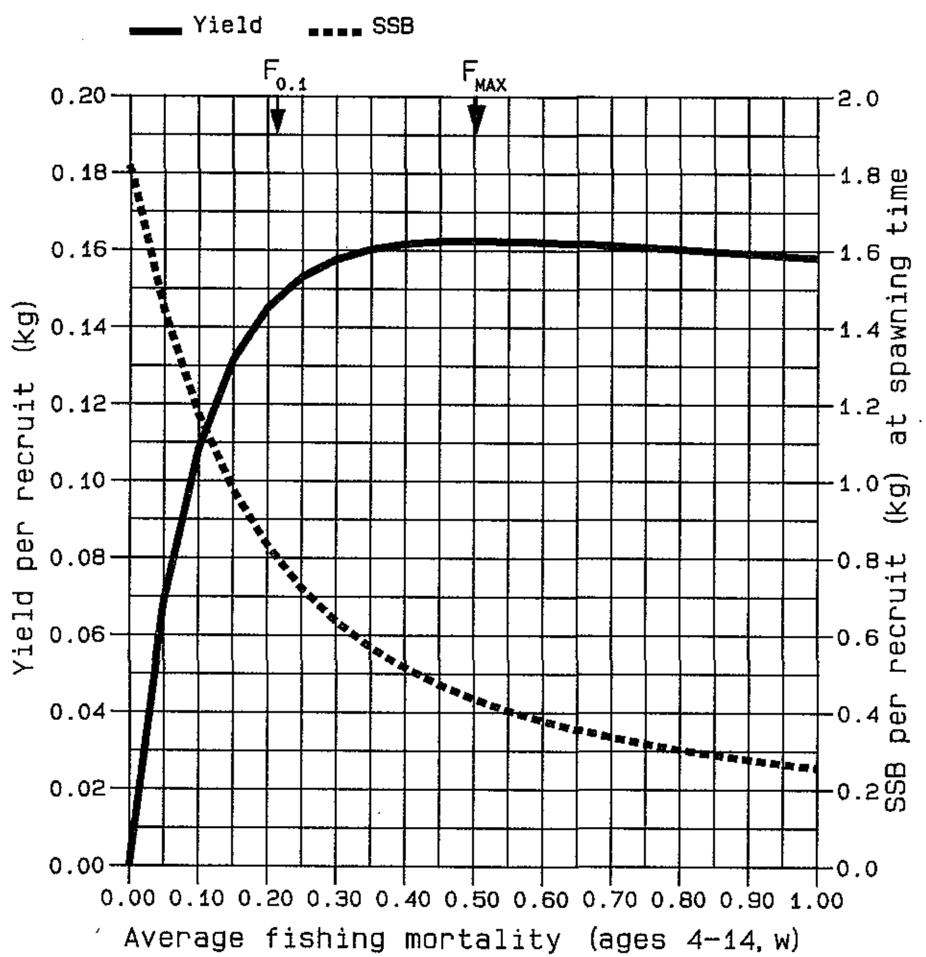


Figure 2.12.2.1 Trends in spawning stock biomass (SSB) and recruitment (Recr) for the Icelandic summer-spawning herring. Recruitment, year class as number of 1-ringers (millions). SSB, year in '000 t.

Figure 2.12.2.2

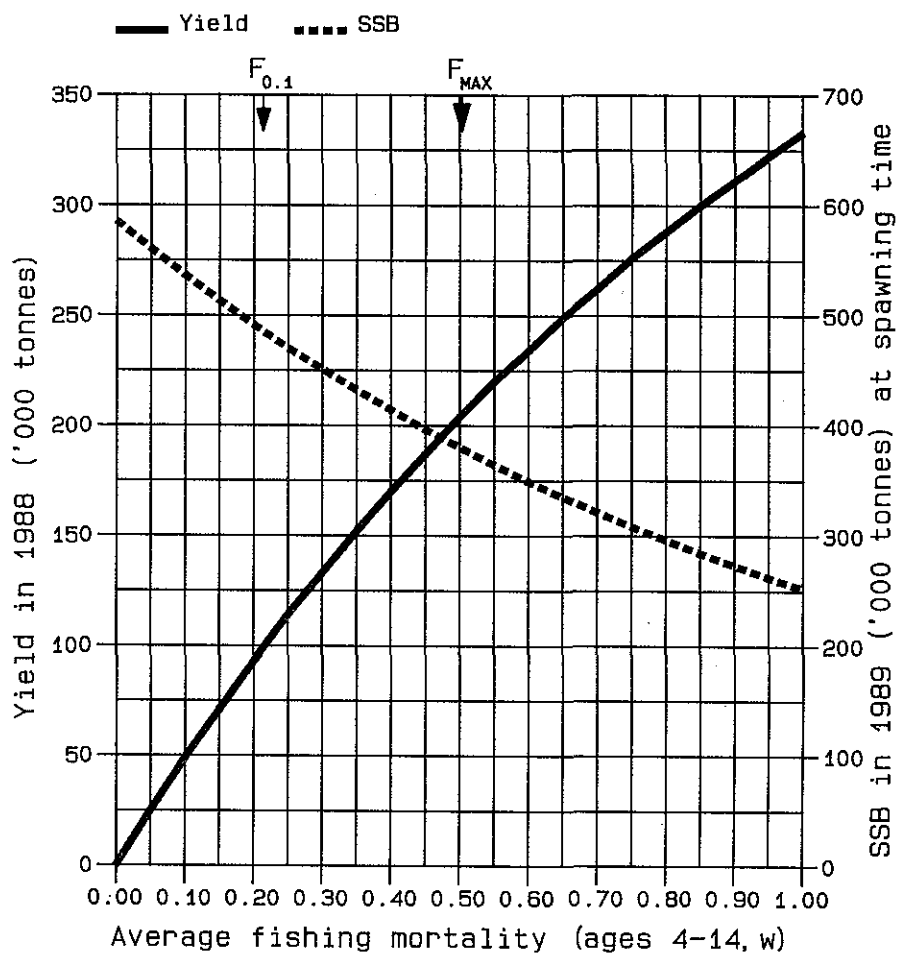
FISH STOCK SUMMARY
STOCK: Herring – Va (Summer)
22-04-1988

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass

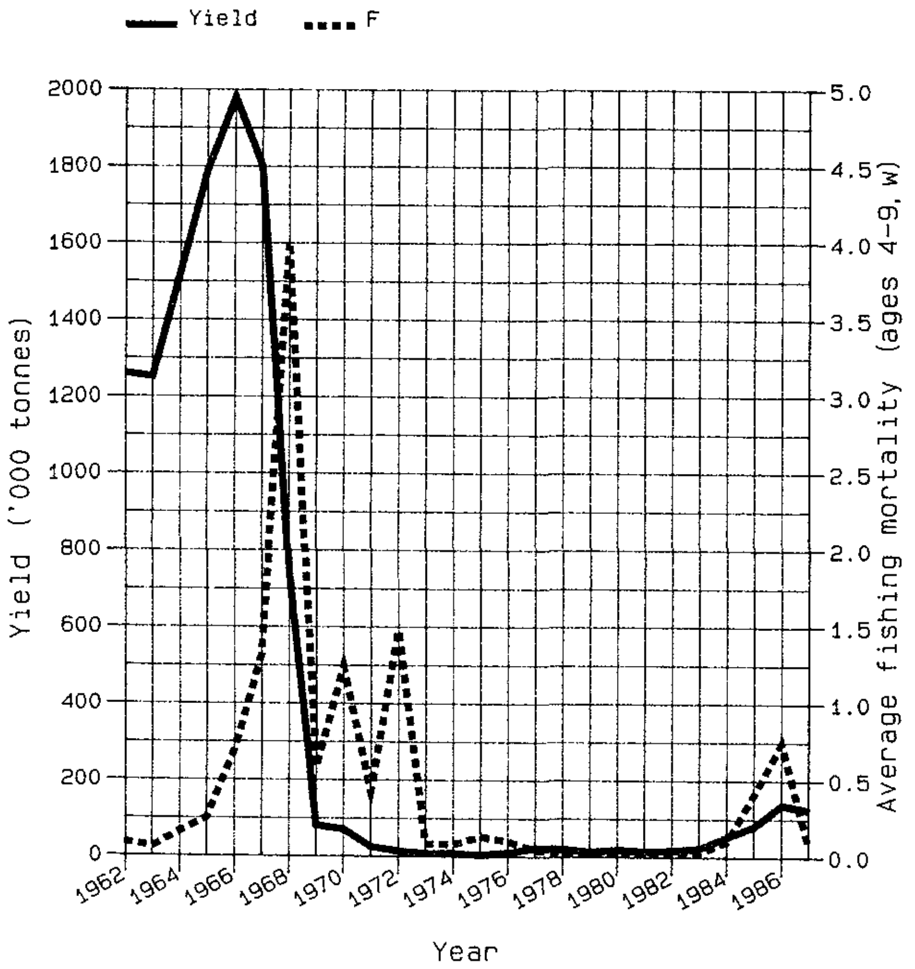


D

Figure 2.12.3

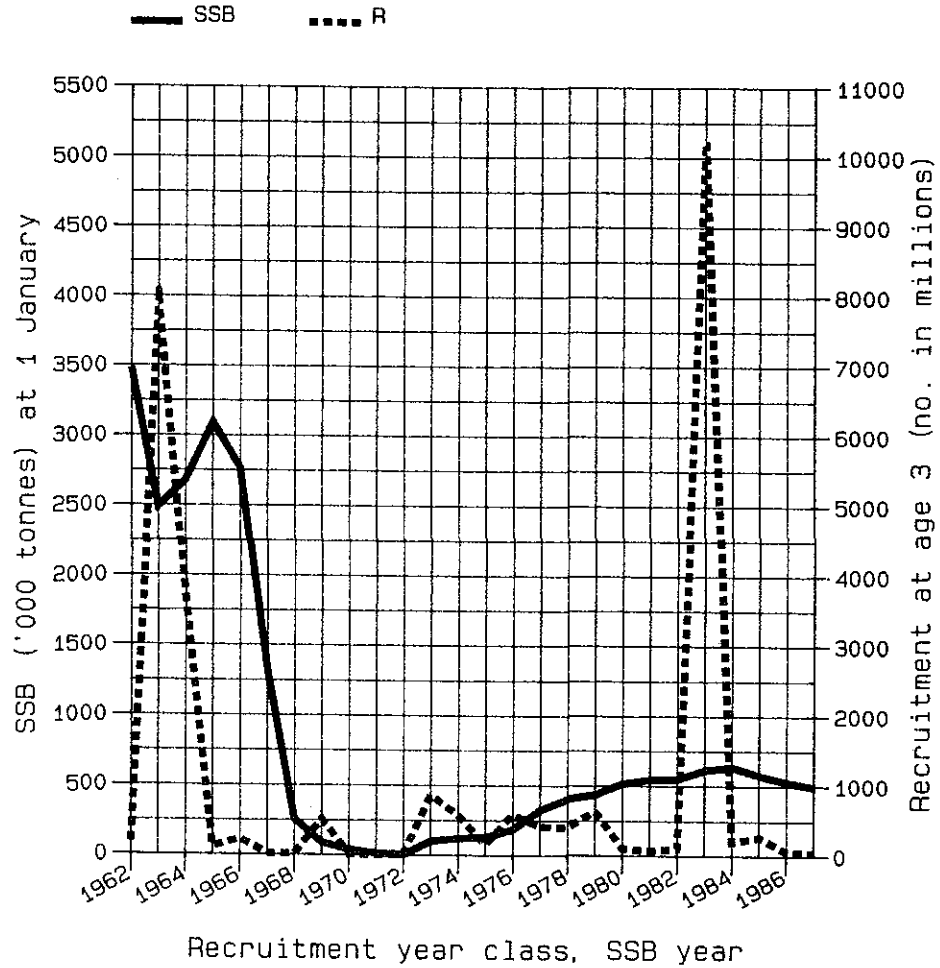
FISH STOCK SUMMARY
STOCK: Norwegian Spring-Spawning Herring
31-10-1988

Trends in yield and fishing mortality (F)



A

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



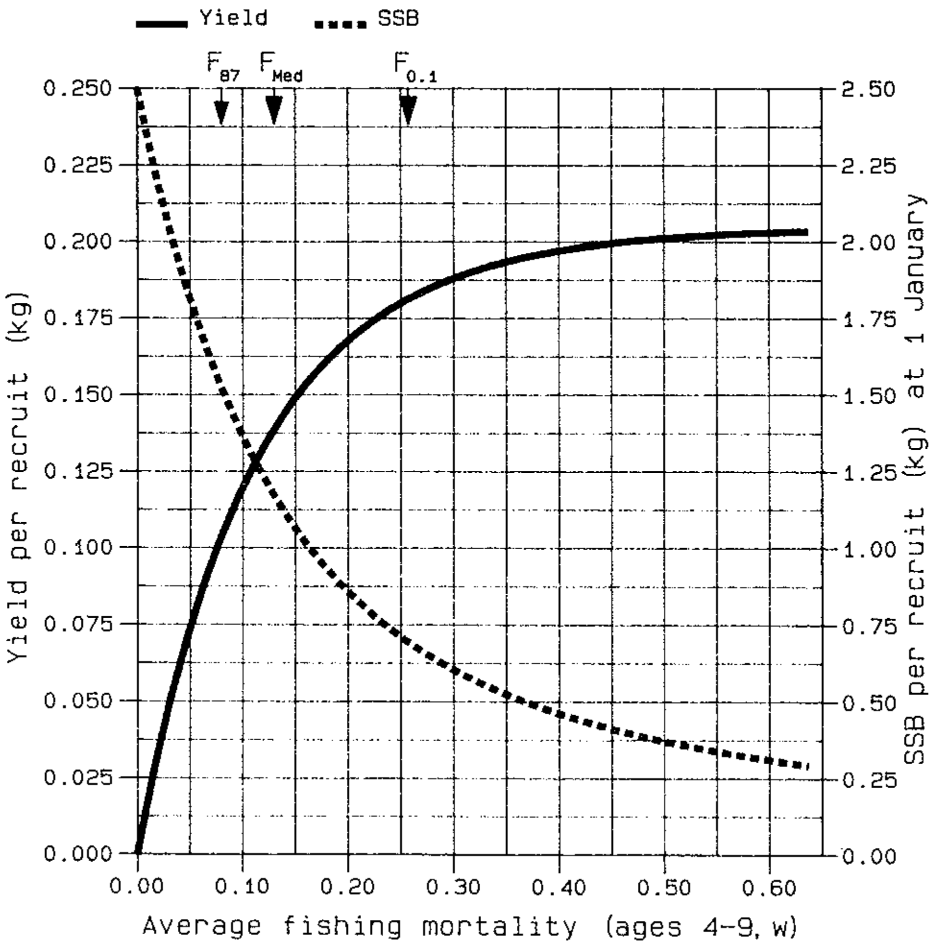
B

ctd.

Figure 2.12.3 cont'd.

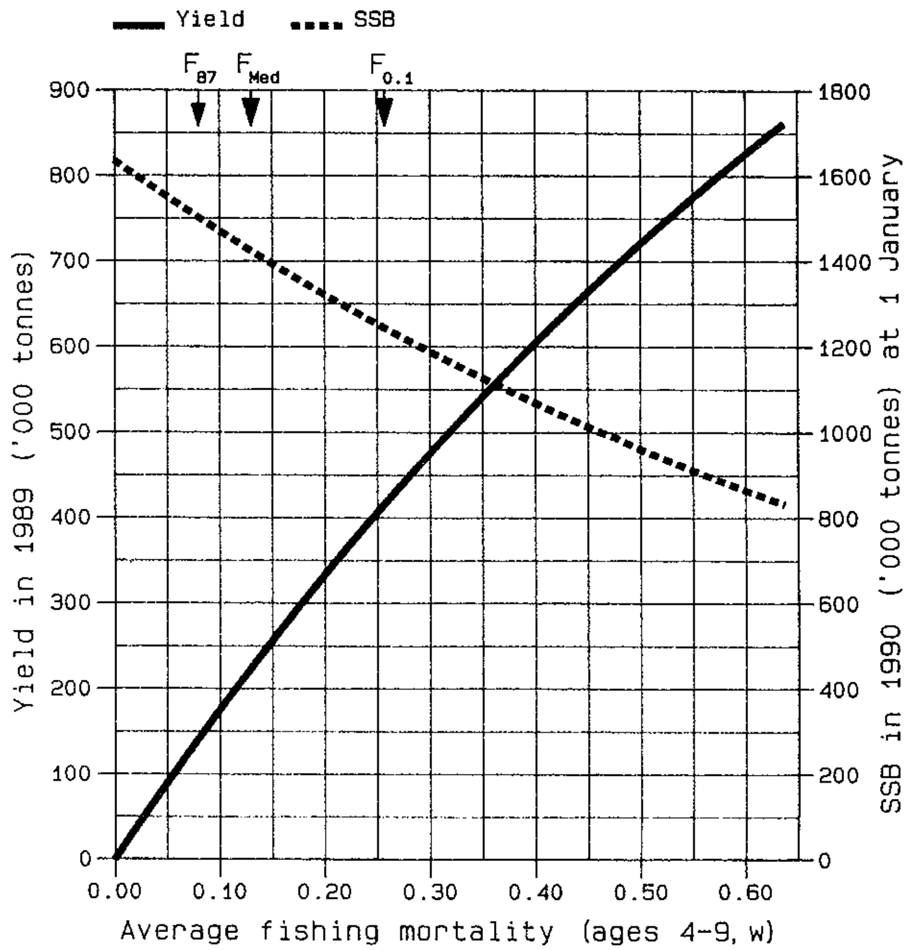
FISH STOCK SUMMARY
STOCK: Norwegian Spring-Spawning Herring
31-10-1988

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass

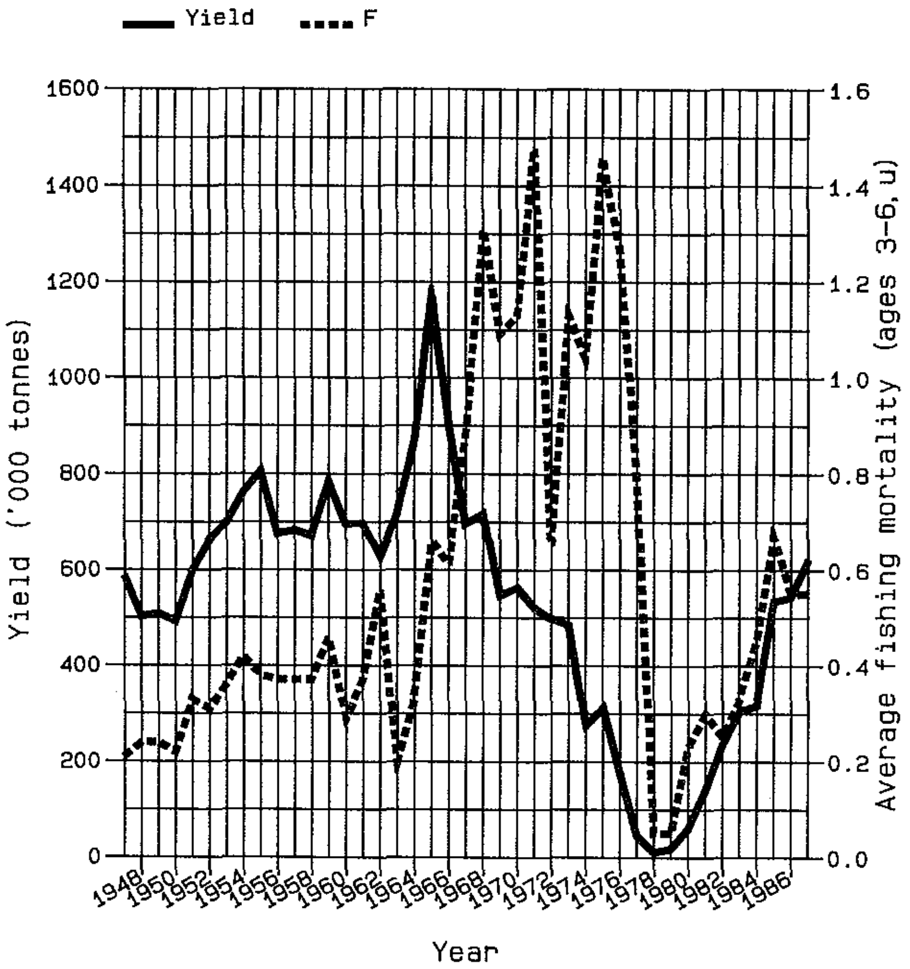


D

Figure 3.1.2

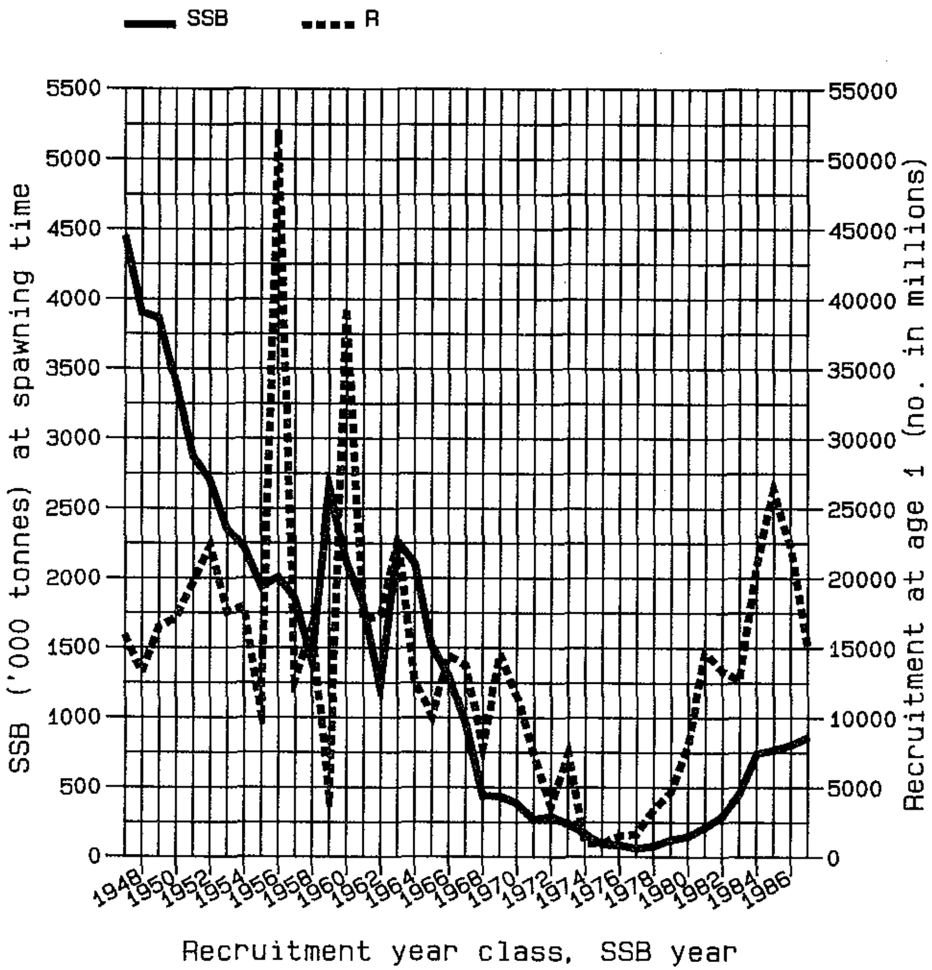
FISH STOCK SUMMARY
STOCK: Herring - Total North Sea
21-04-1988

Trends in yield and fishing mortality (F)



A

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



B

cont'd.

FISH STOCK SUMMARY

Figure 3.1.2 cont'd. STOCK: Herring - Total North Sea

21-04-1988

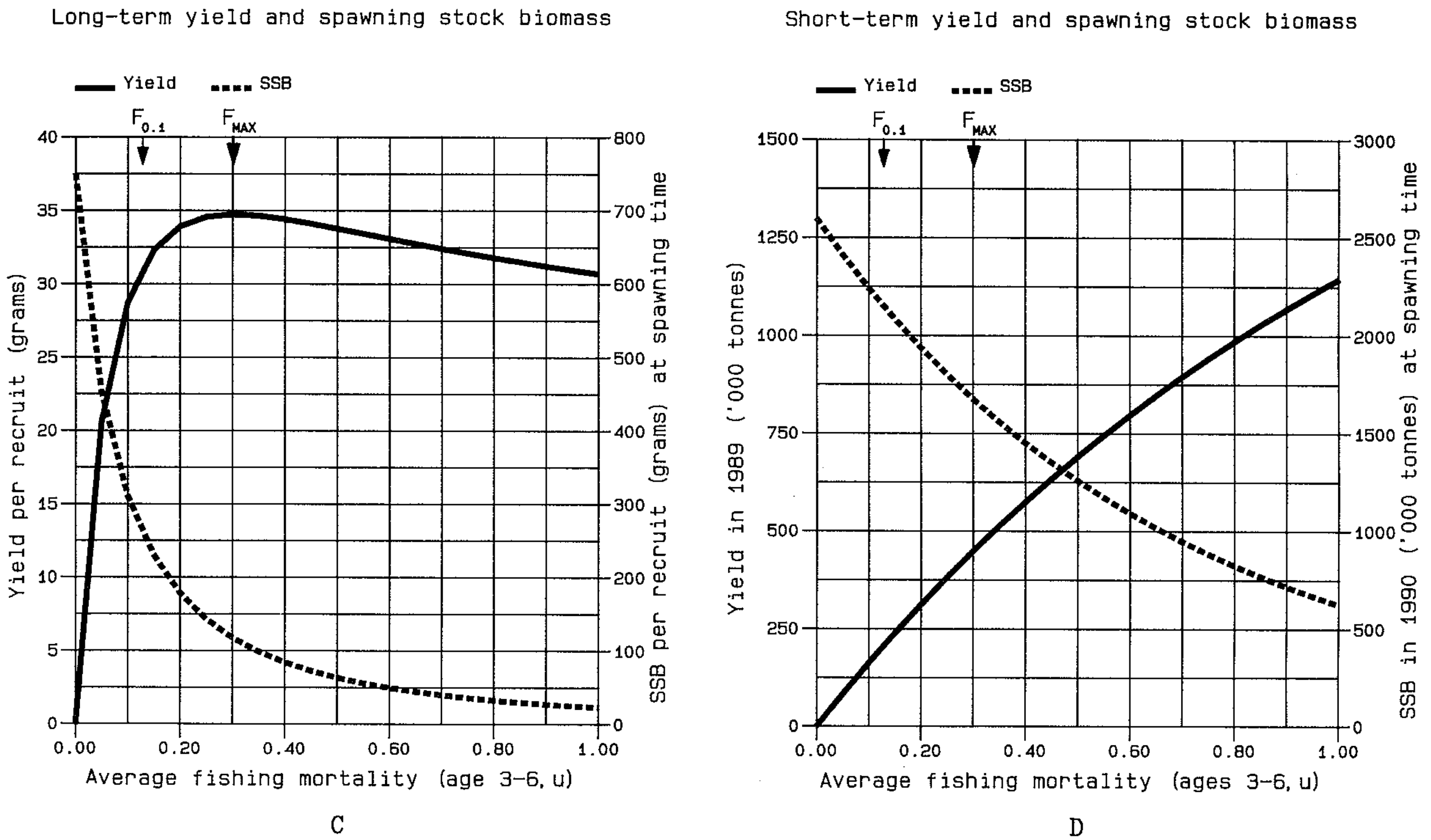
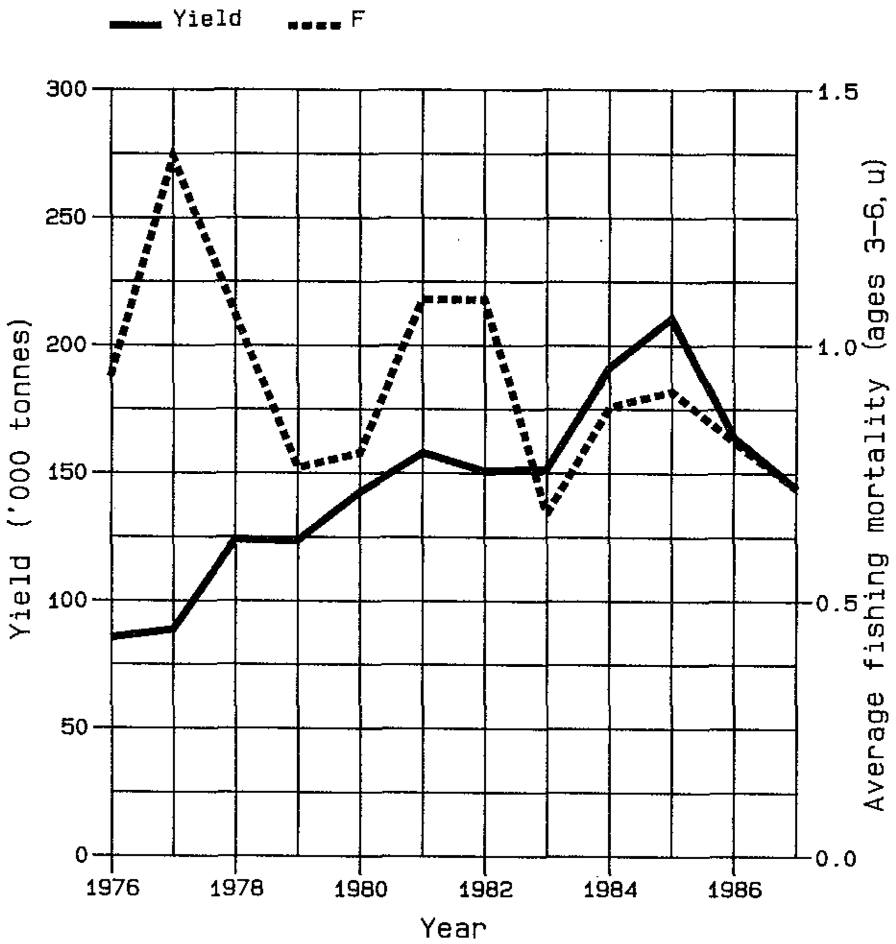


Figure 3.1.4

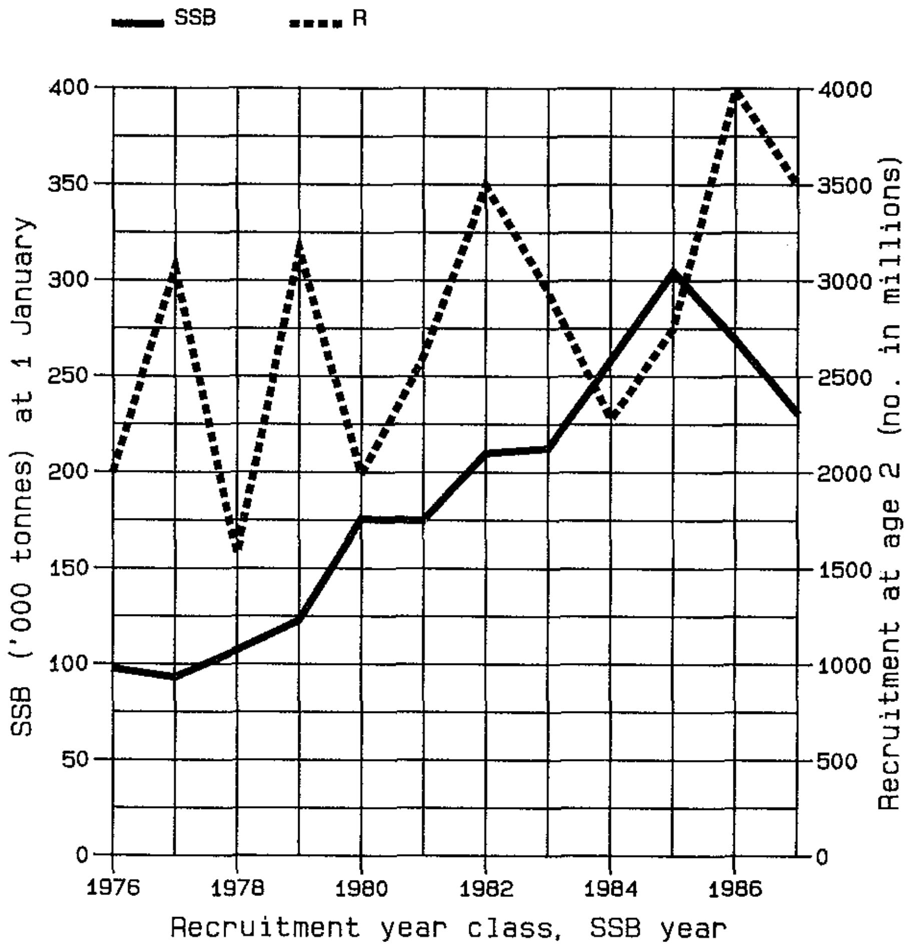
FISH STOCK SUMMARY
STOCK: Herring in the Western Baltic and Kattegat
28-04-1988

Trends in yield and fishing mortality (F)



A

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



B

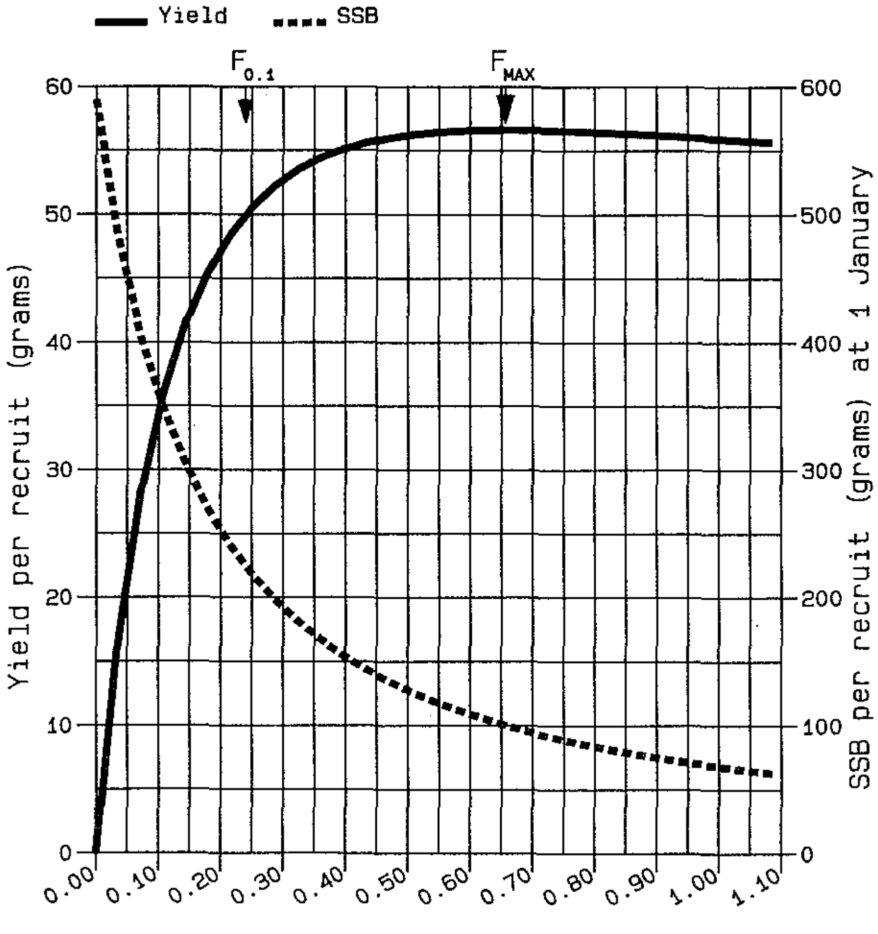
(cont'd)

FISH STOCK SUMMARY

Figure 3.1.4 (cont'd) STOCK: Herring in the Western Baltic and Kattegat

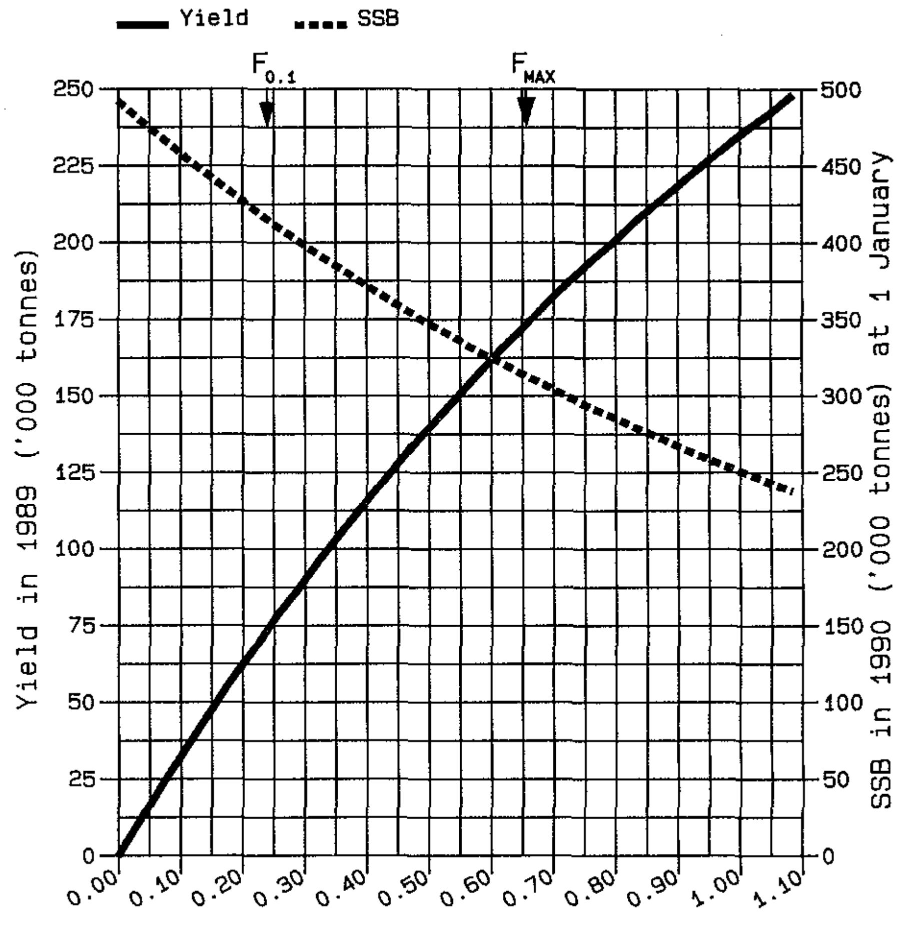
28-04-1988

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass



D

Figure 3.1.5 Recommended seasonal closures of herring spawning grounds in the Celtic Sea and Division VIIj herring stock.

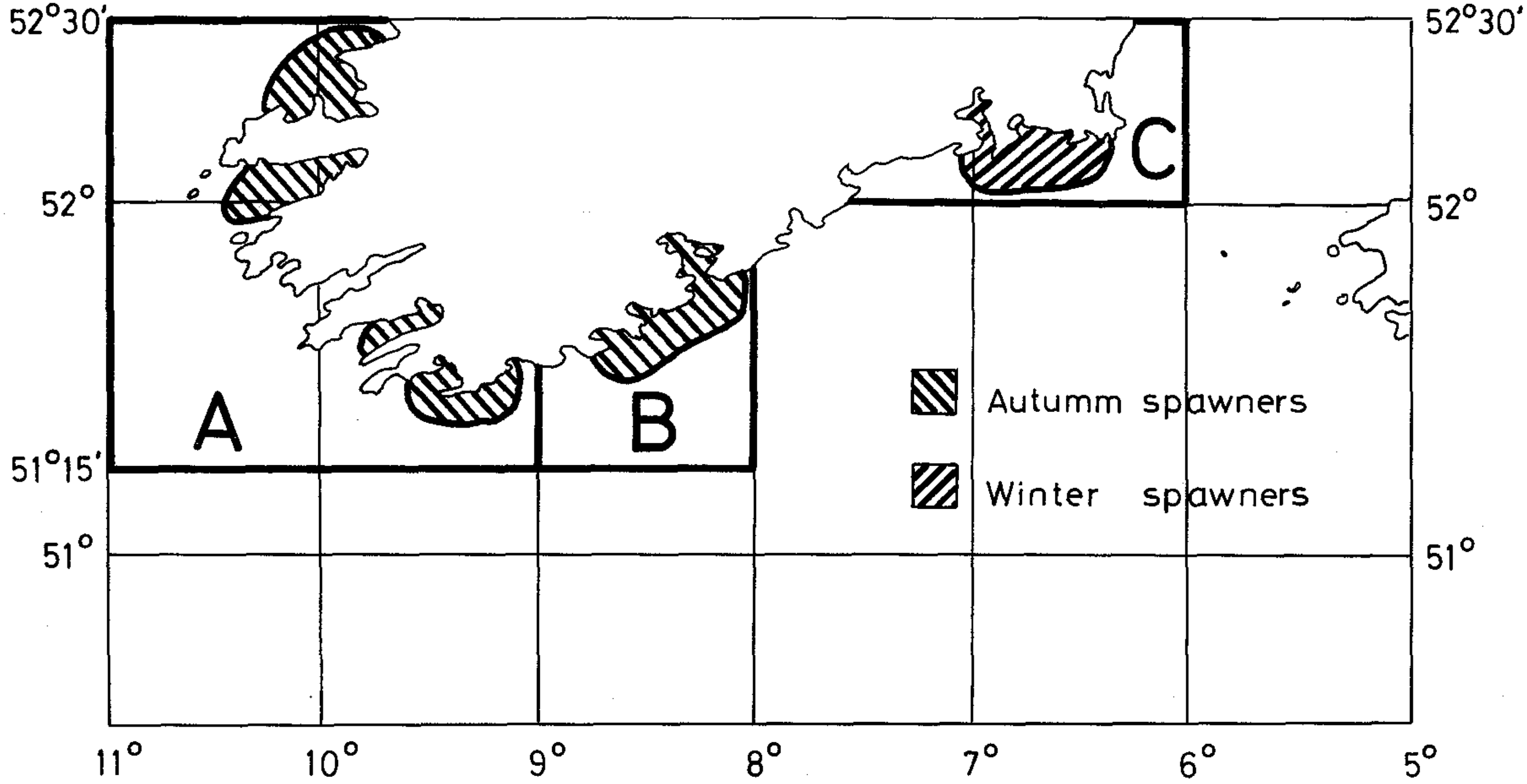
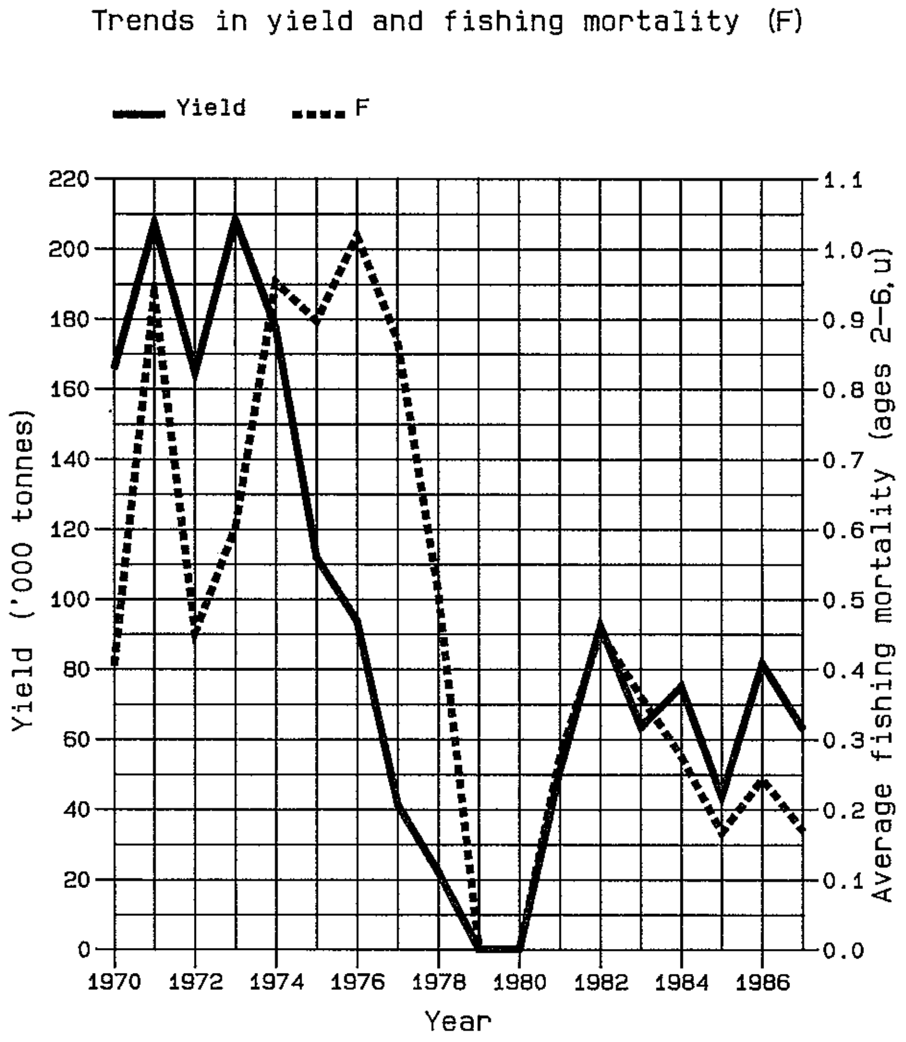
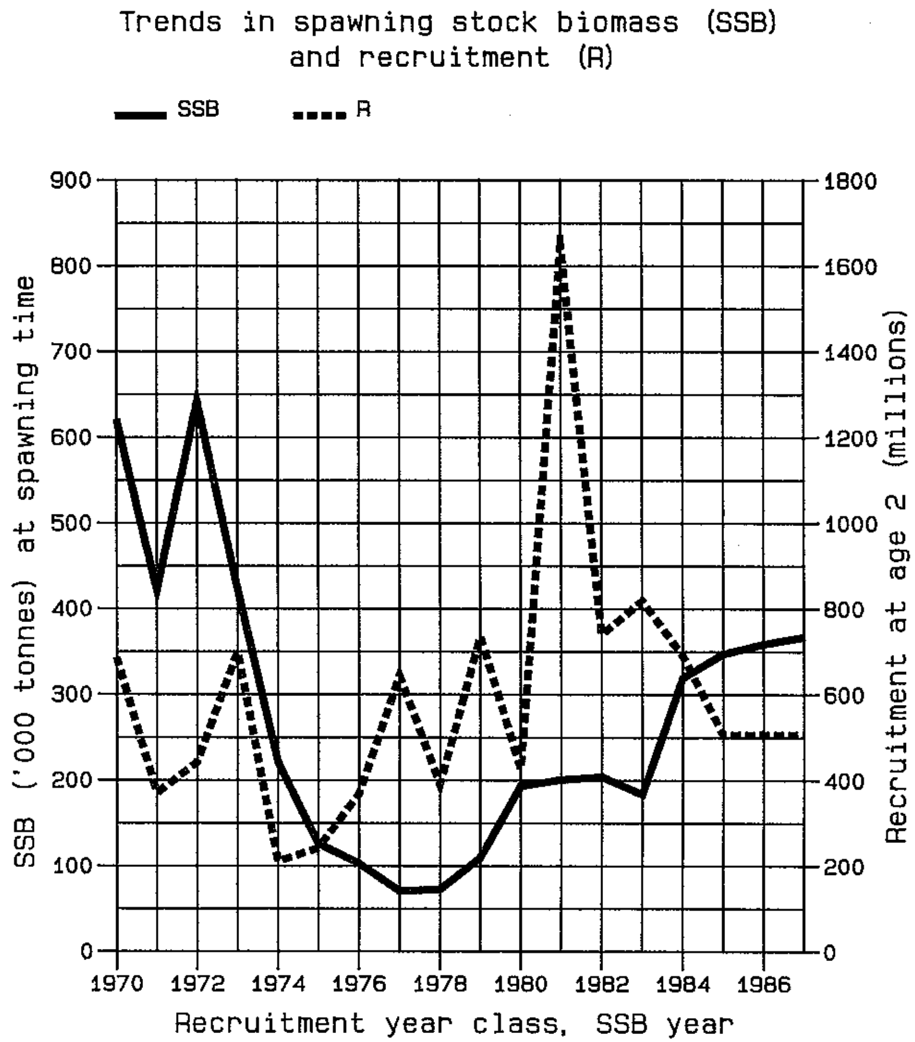


Figure 3.1.6

FISH STOCK SUMMARY
STOCK: Herring - VIa North
21-04-1988



A



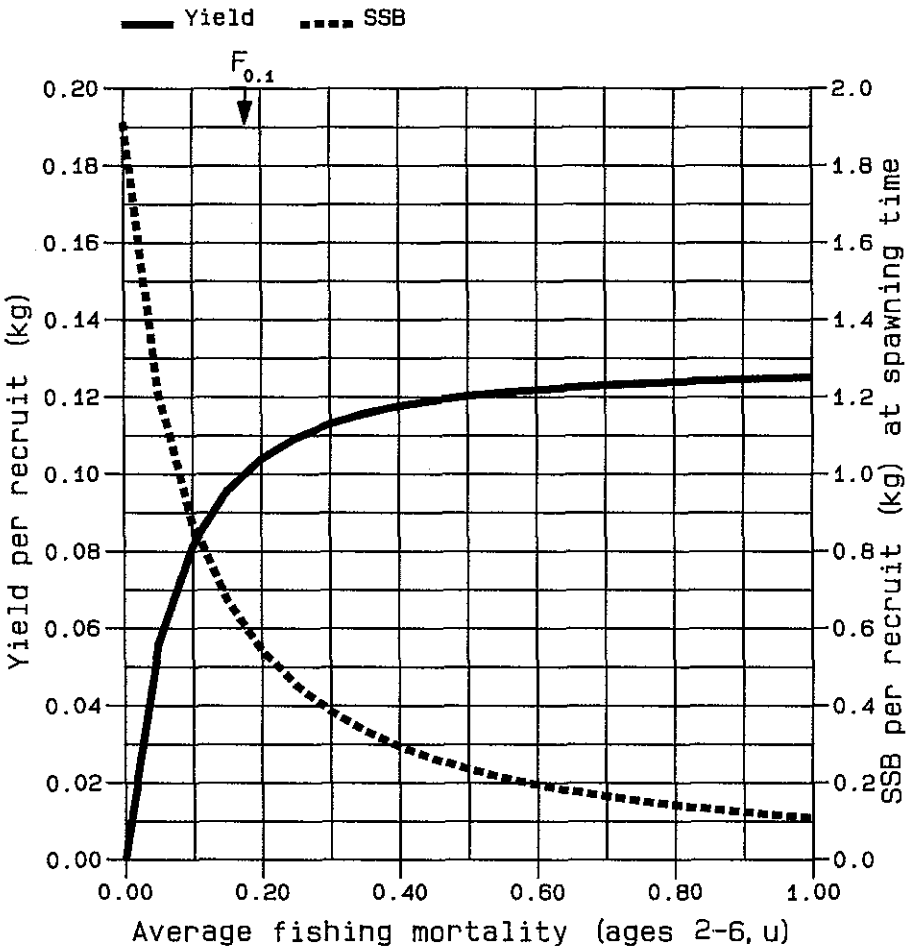
B

cont'd.

FISH STOCK SUMMARY
STOCK: Herring - VIa North
21-04-1988

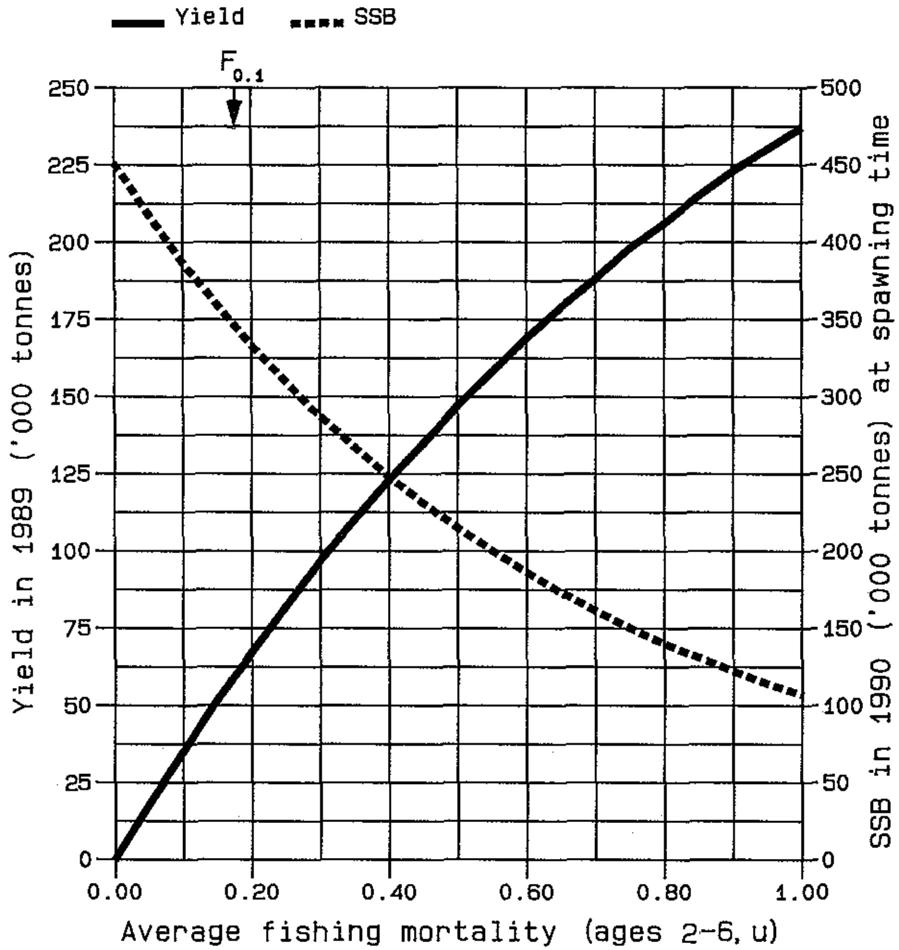
Figure 3.1.6 cont'd.

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass



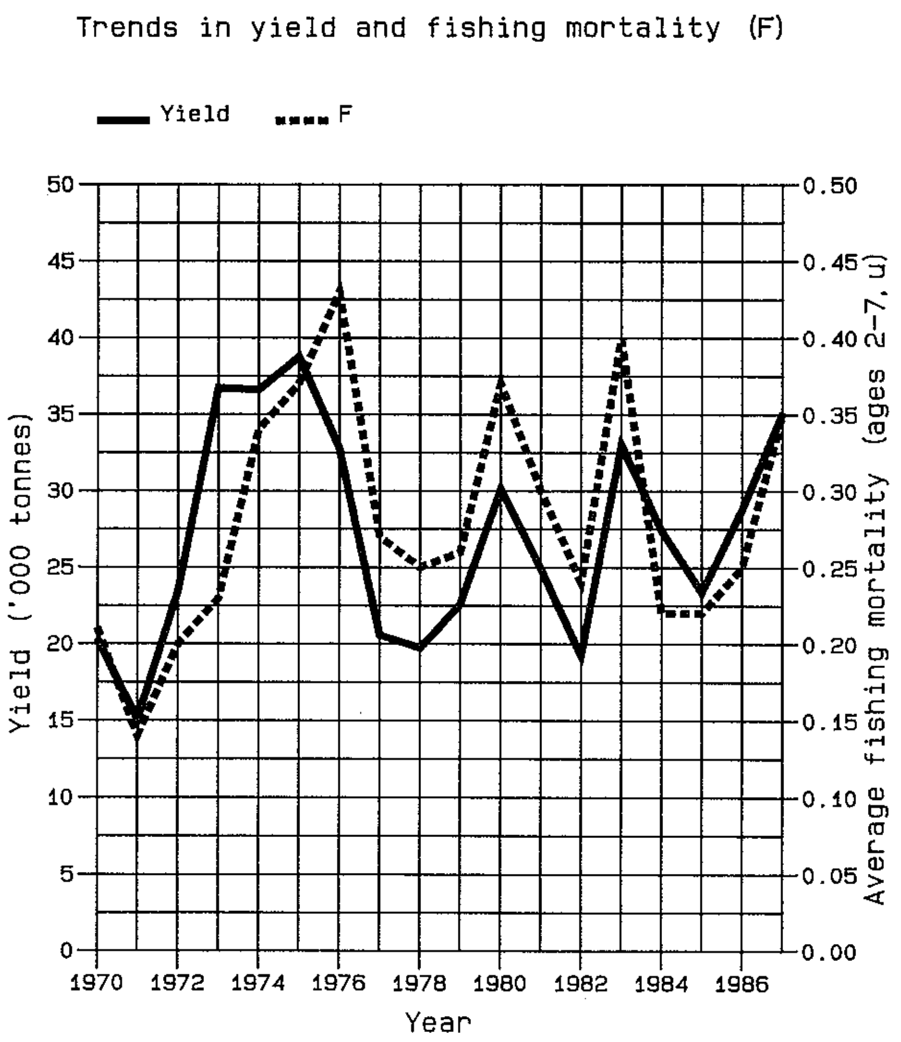
D

FISH STOCK SUMMARY

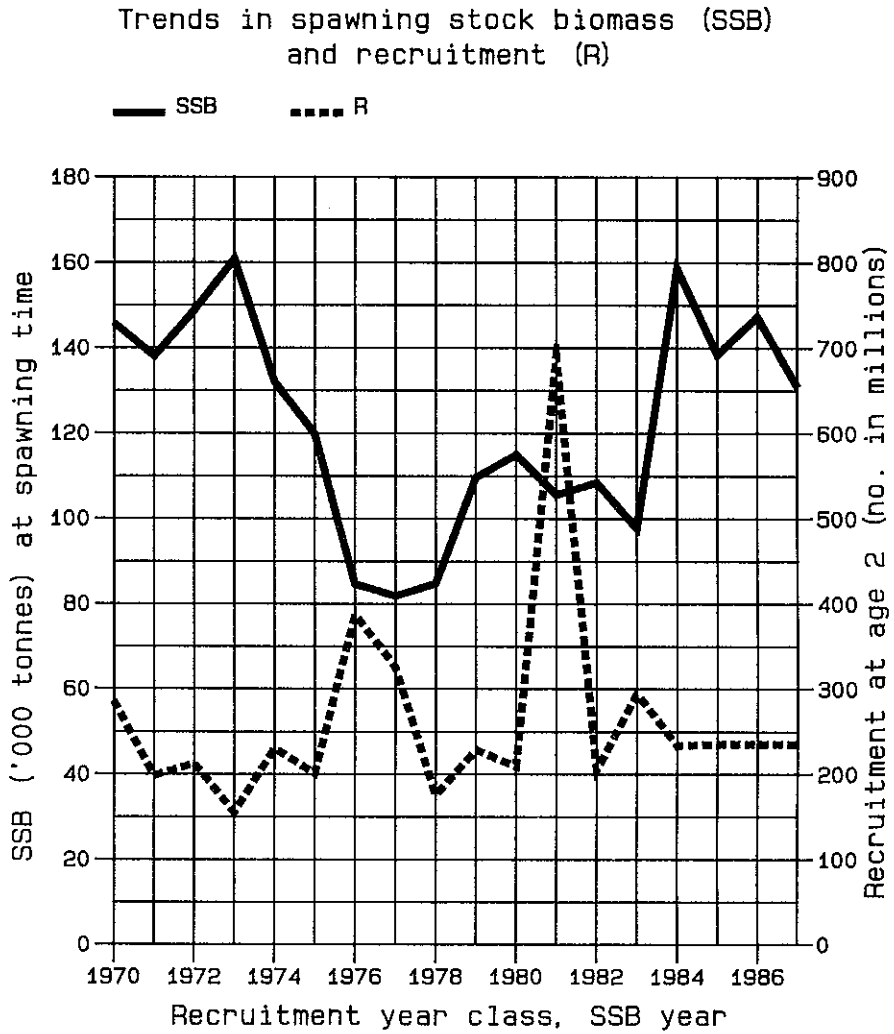
STOCK: Herring – VIa (South) and VIIb,c

Figure 3.1.8

22-04-1988



A

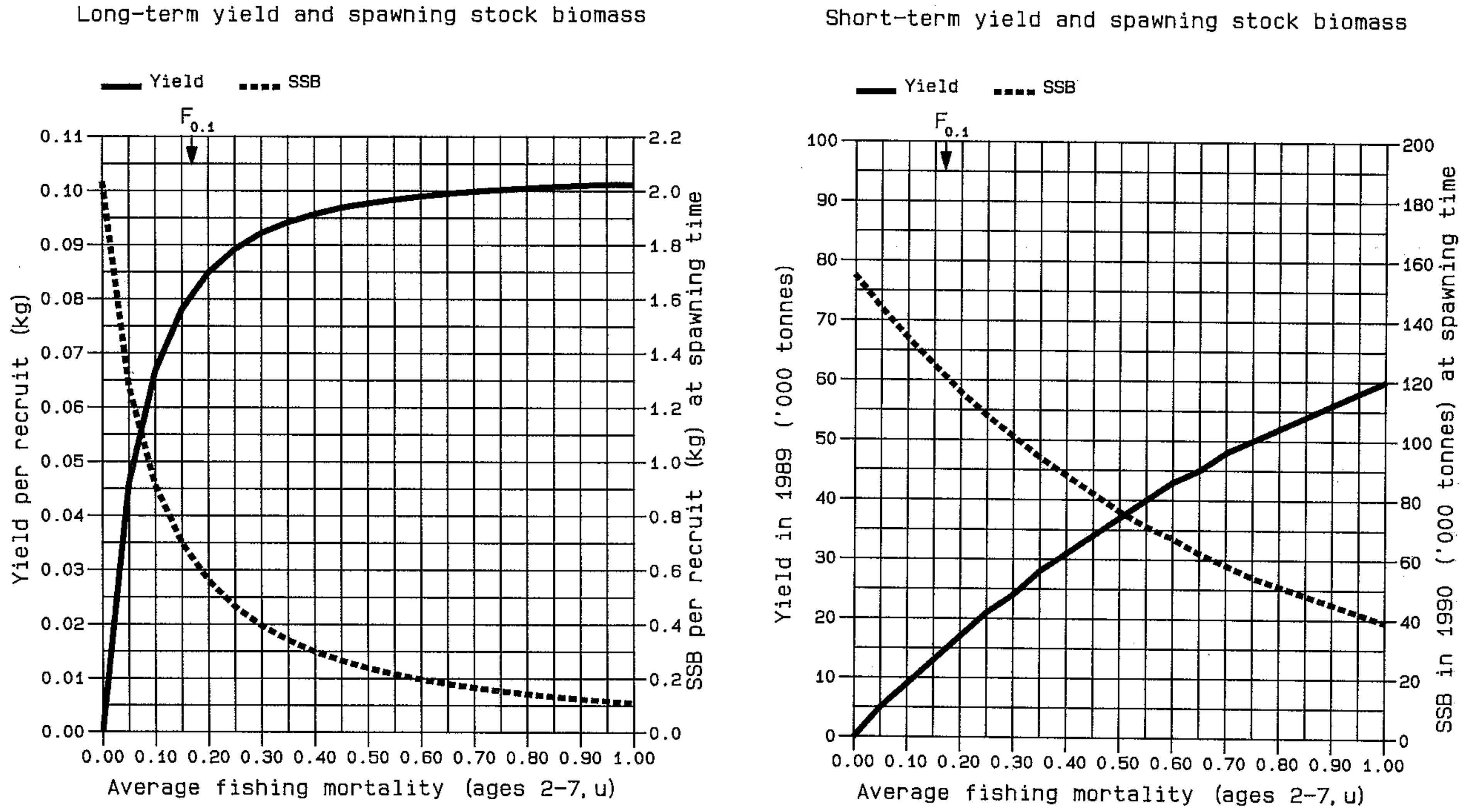


B

cont'd.

FISH STOCK SUMMARY
STOCK: Herring - VIa (South) and VIIb,c
22-04-1988

Figure 3.1.8 (cont'd)



C

D

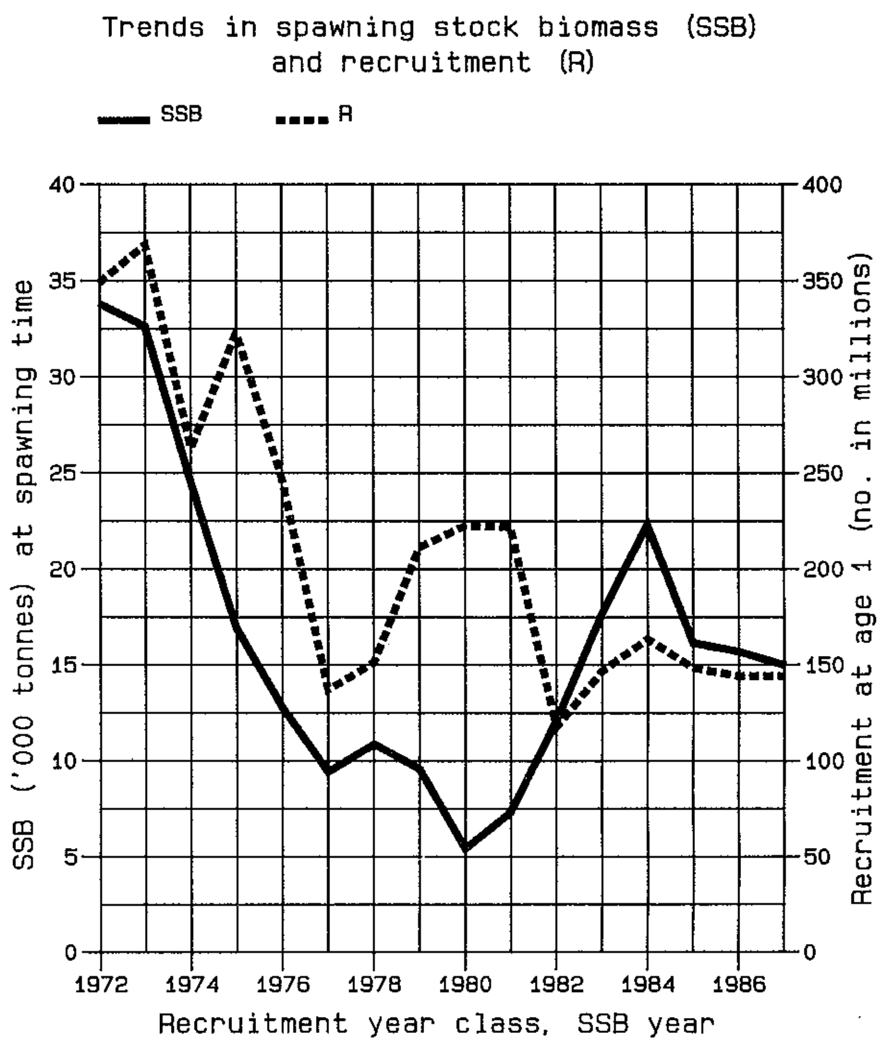
FISH STOCK SUMMARY

STOCK: Herring - Northern Irish Sea

Figure 3.1.9

22-04-1988

A



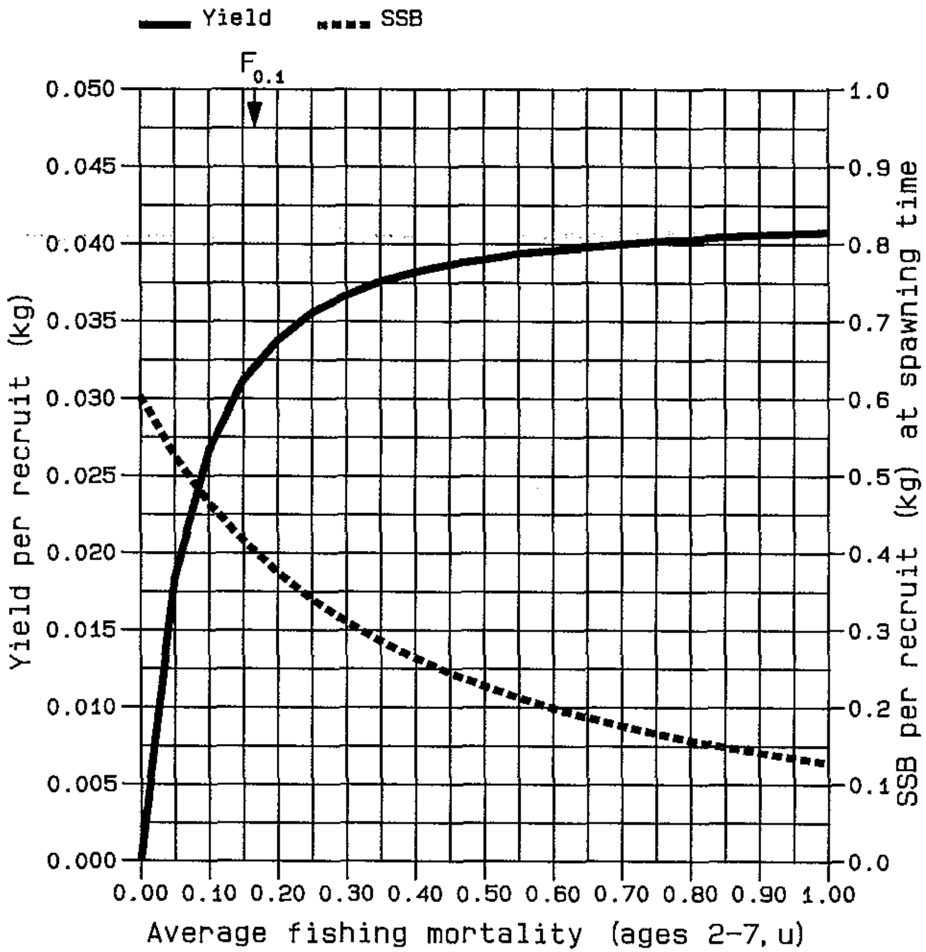
B

cont'd.

FISH STOCK SUMMARY
STOCK: Herring - Northern Irish Sea
22-04-1988

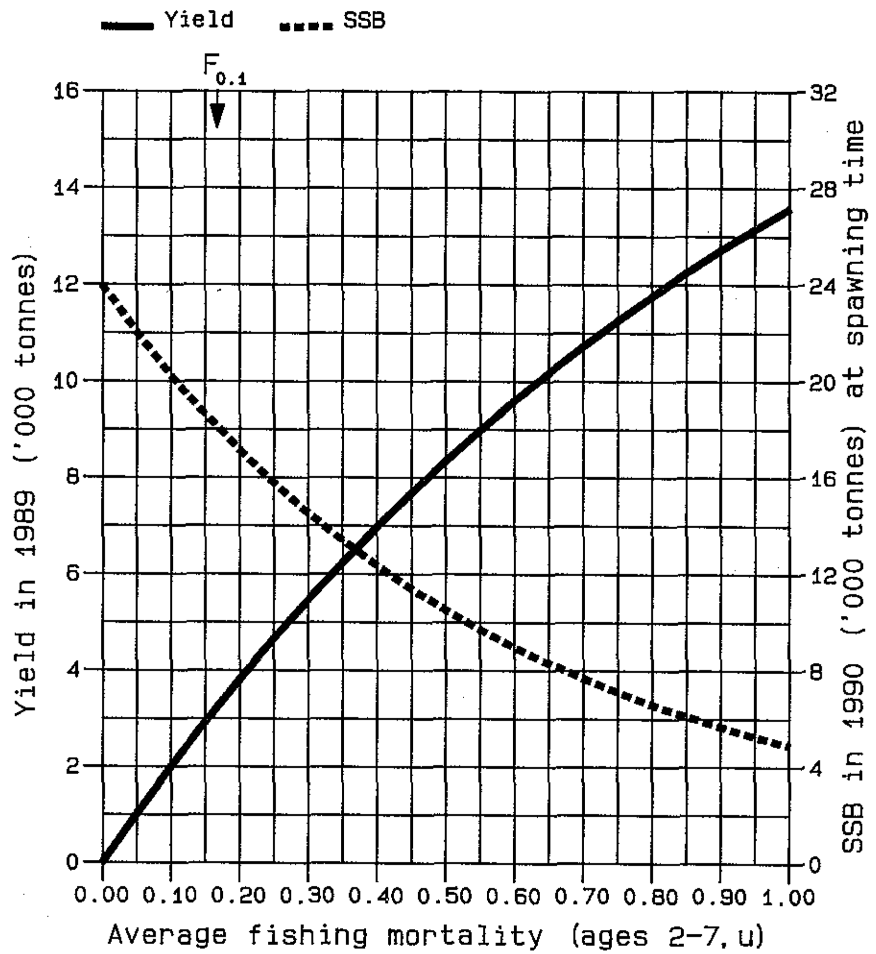
Figure 3.1.9 cont'd.

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass



D

Figure 3.2.8 Danish SANDEEL areas and assessment areas used by the Working Group.

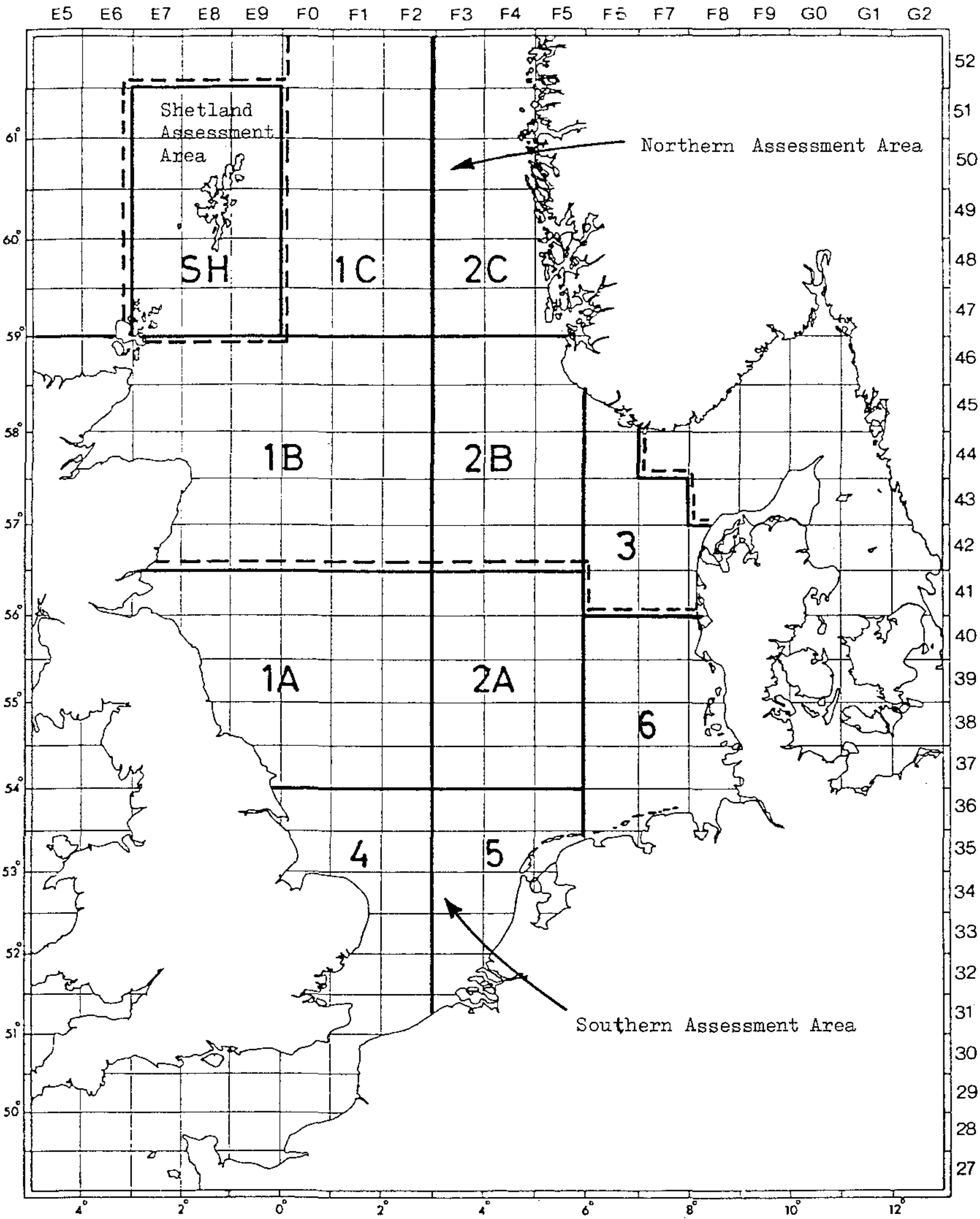
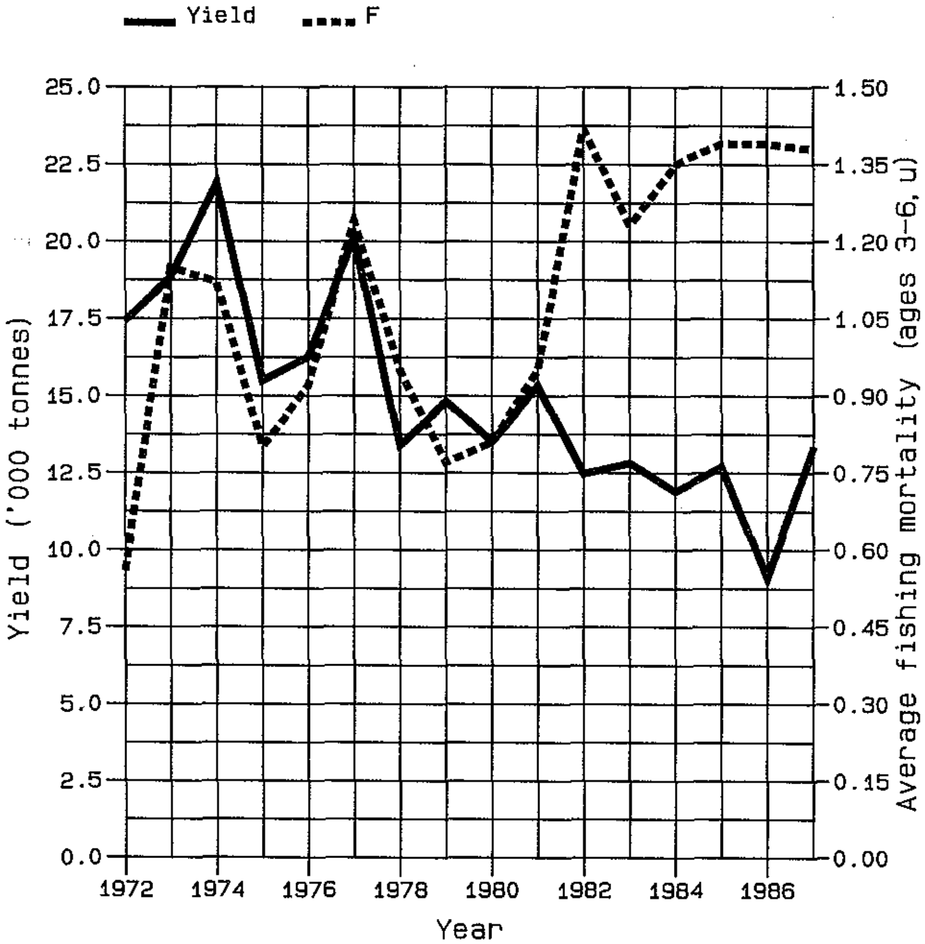


Figure 3.3.1

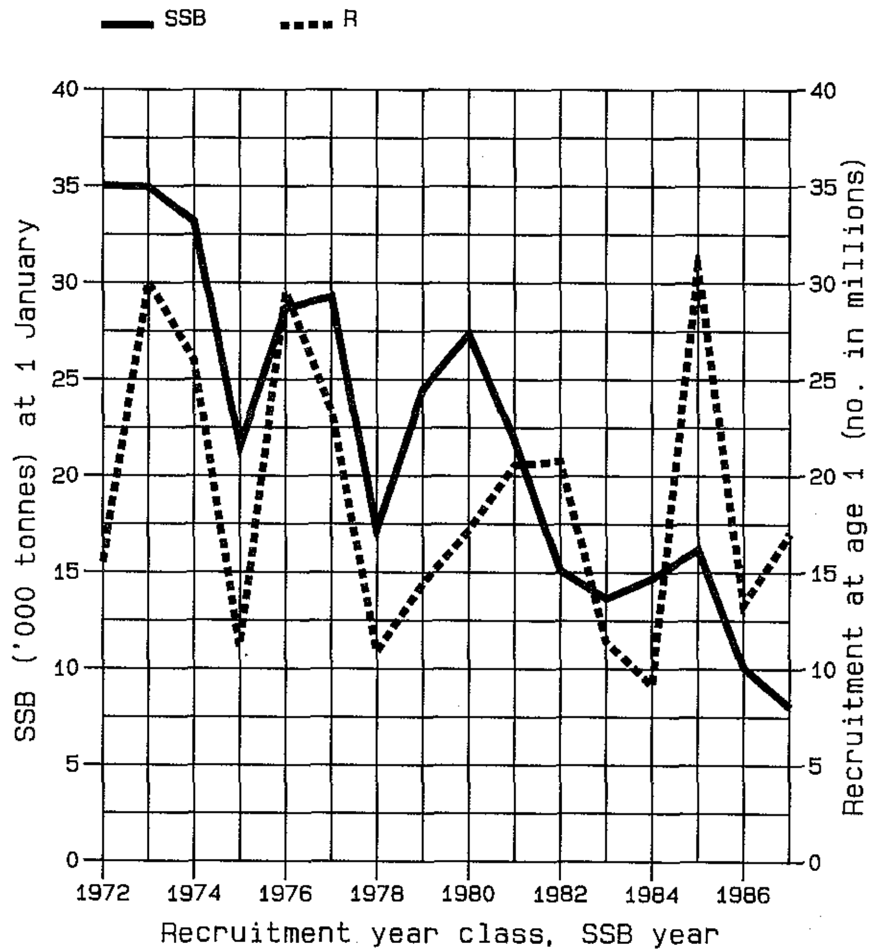
FISH STOCK SUMMARY
STOCK: Cod in the Kattegat
24-03-1988

Trends in yield and fishing mortality (F)



A

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



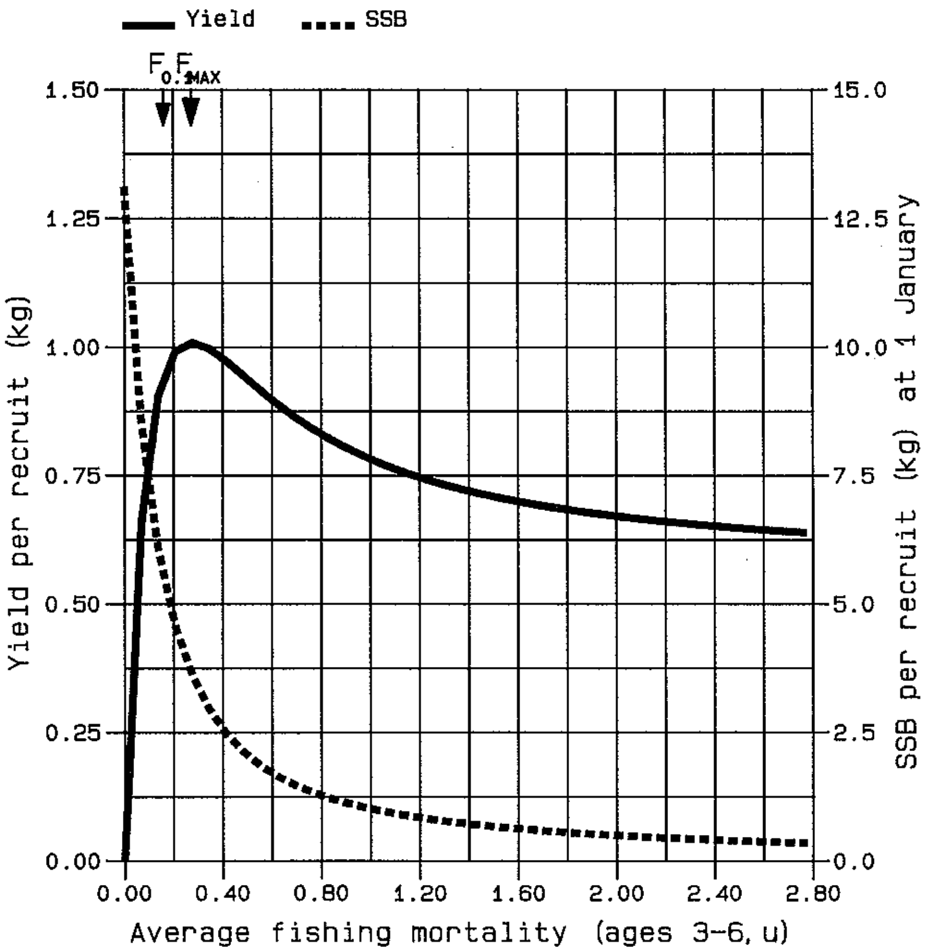
B

cont'd.

Figure 3.3.1 (cont'd)

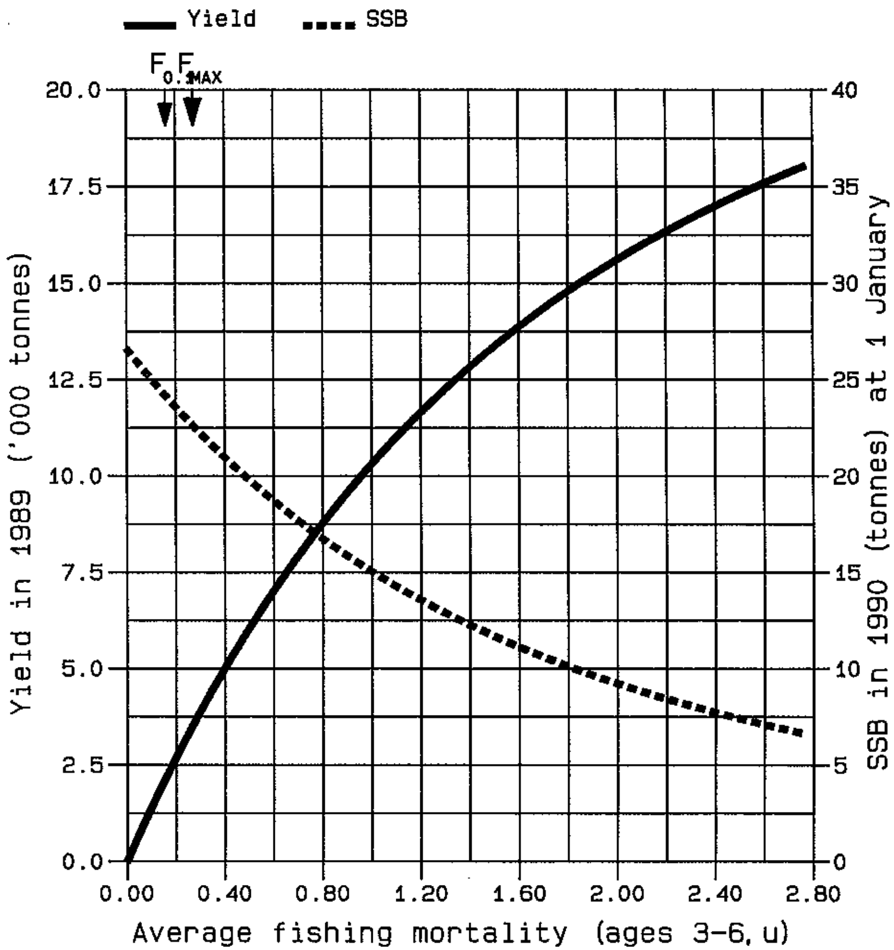
FISH STOCK SUMMARY
STOCK: Cod in the Kattegat
24-03-1988

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass

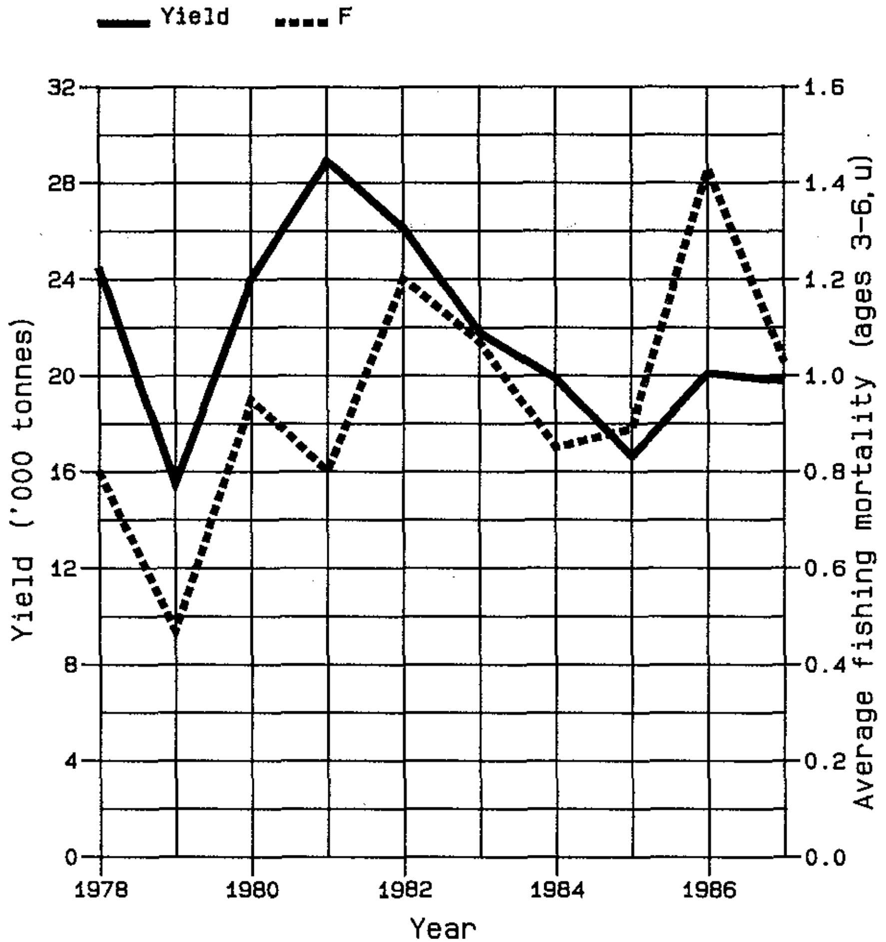


D

Figure 3.3.2

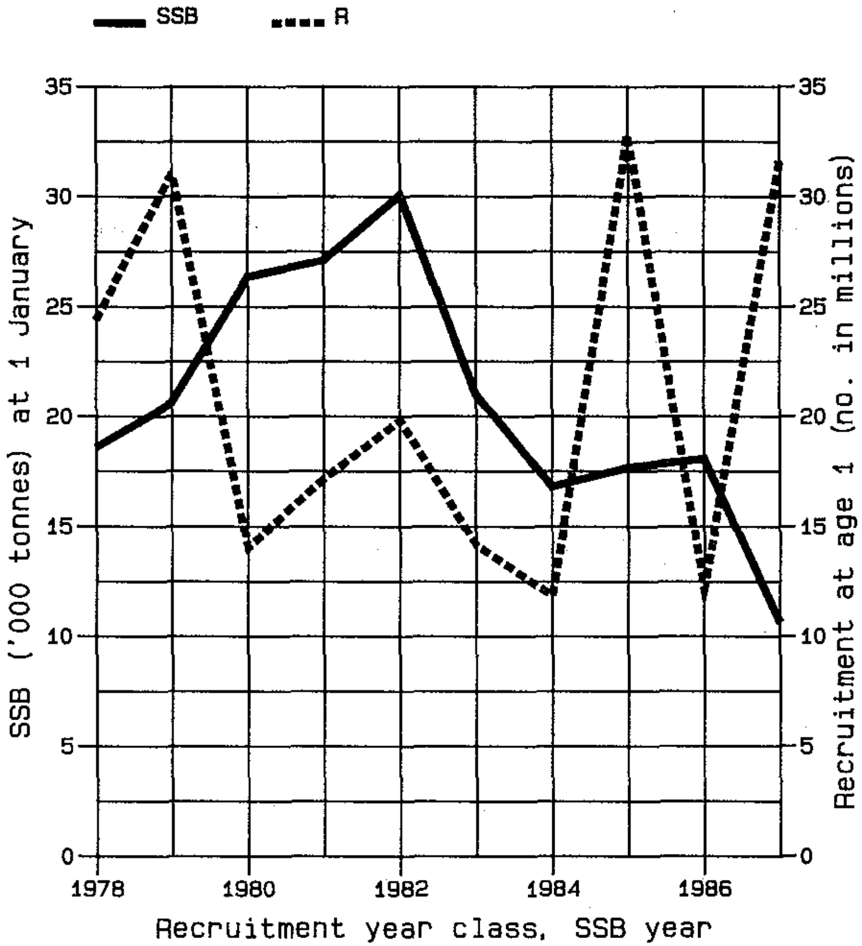
FISH STOCK SUMMARY
STOCK: Cod in the Skagerrak
24-03-1988

Trends in yield and fishing mortality (F)



A

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



B

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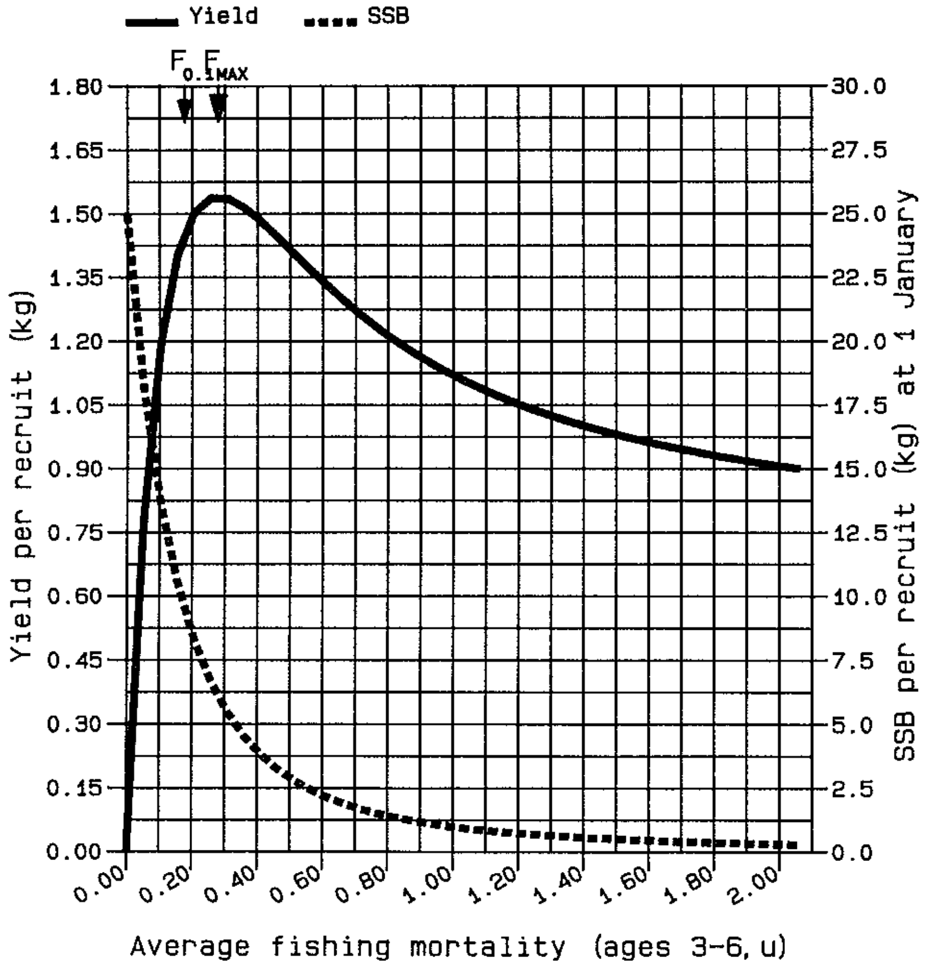
Figure 3.3.2 (cont'd)

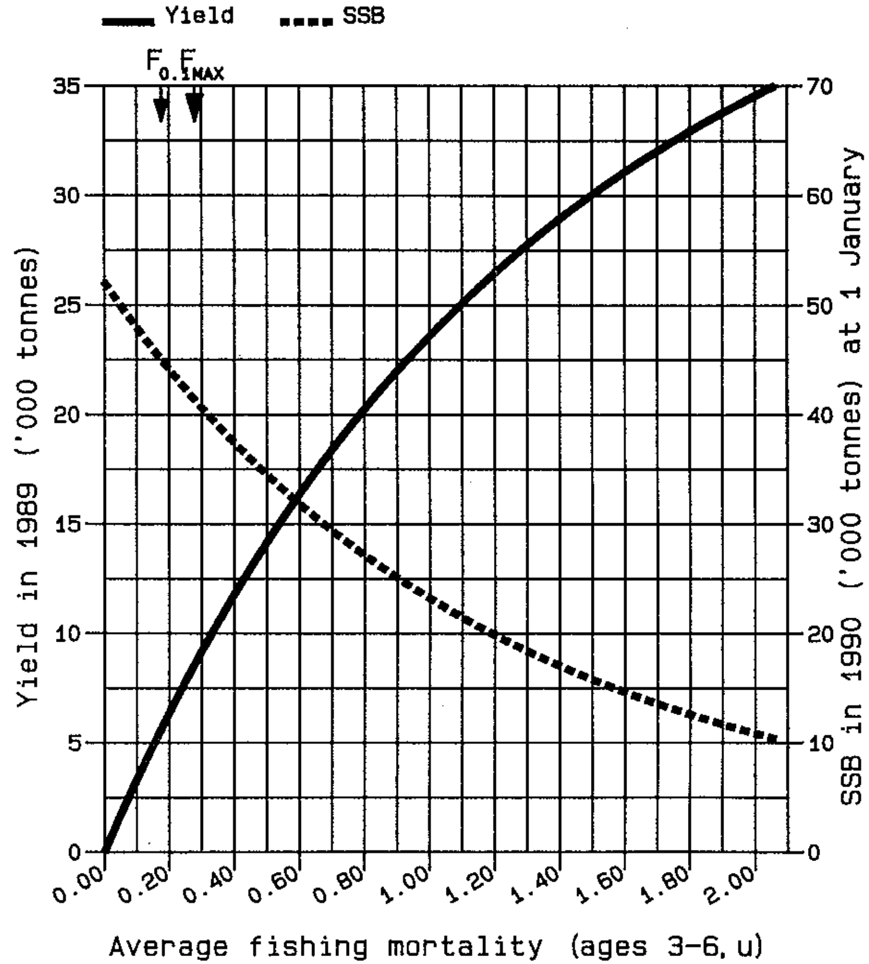
FISH STOCK SUMMARY
STOCK: Cod in the Skagerrak
24-03-1988

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass

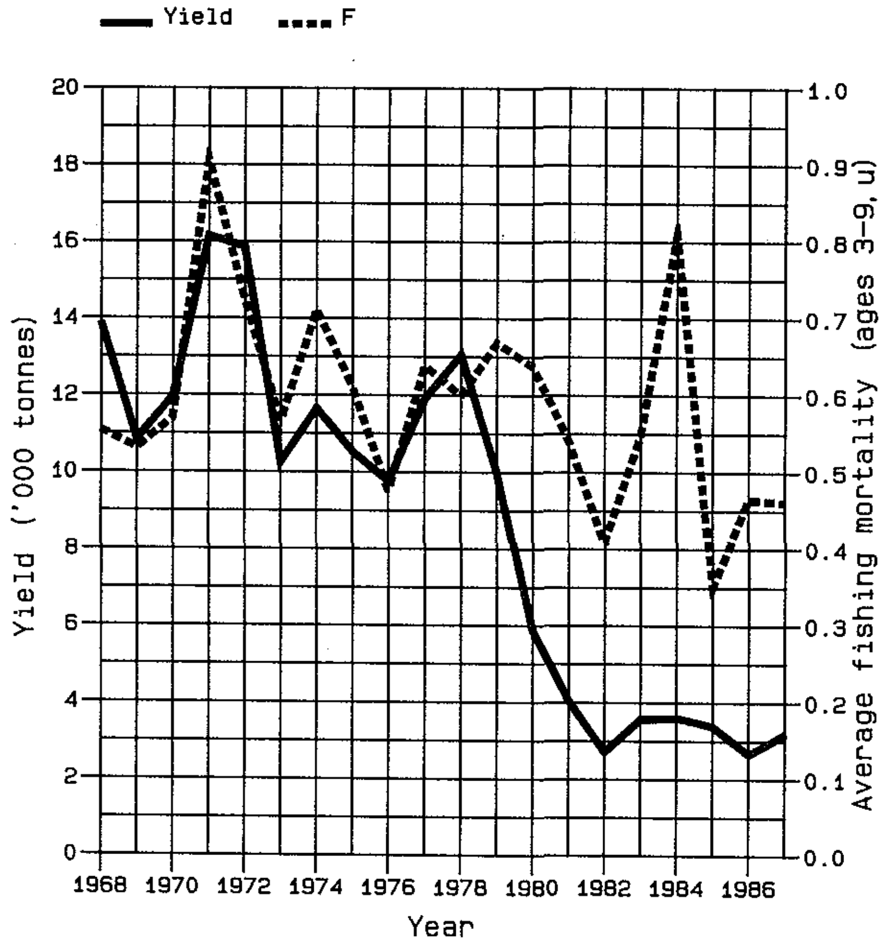


D

Figure 3.3.5

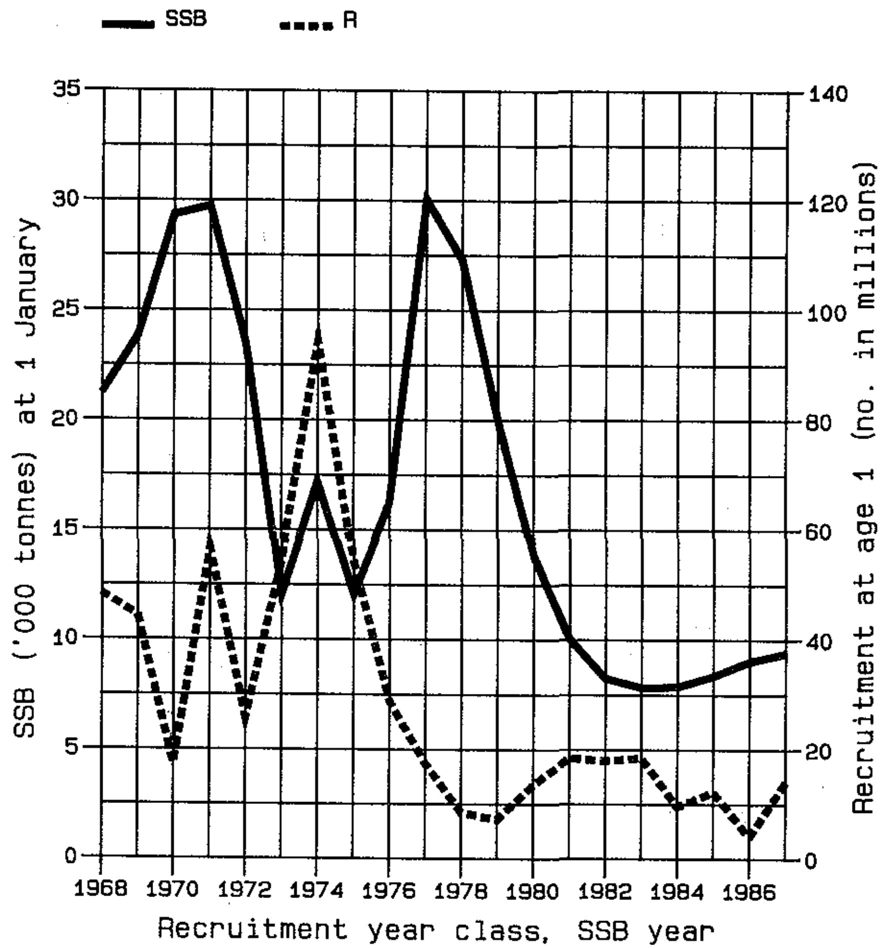
FISH STOCK SUMMARY
STOCK: Plaice in the Kattegat
24-03-1988

Trends in yield and fishing mortality (F)



A

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



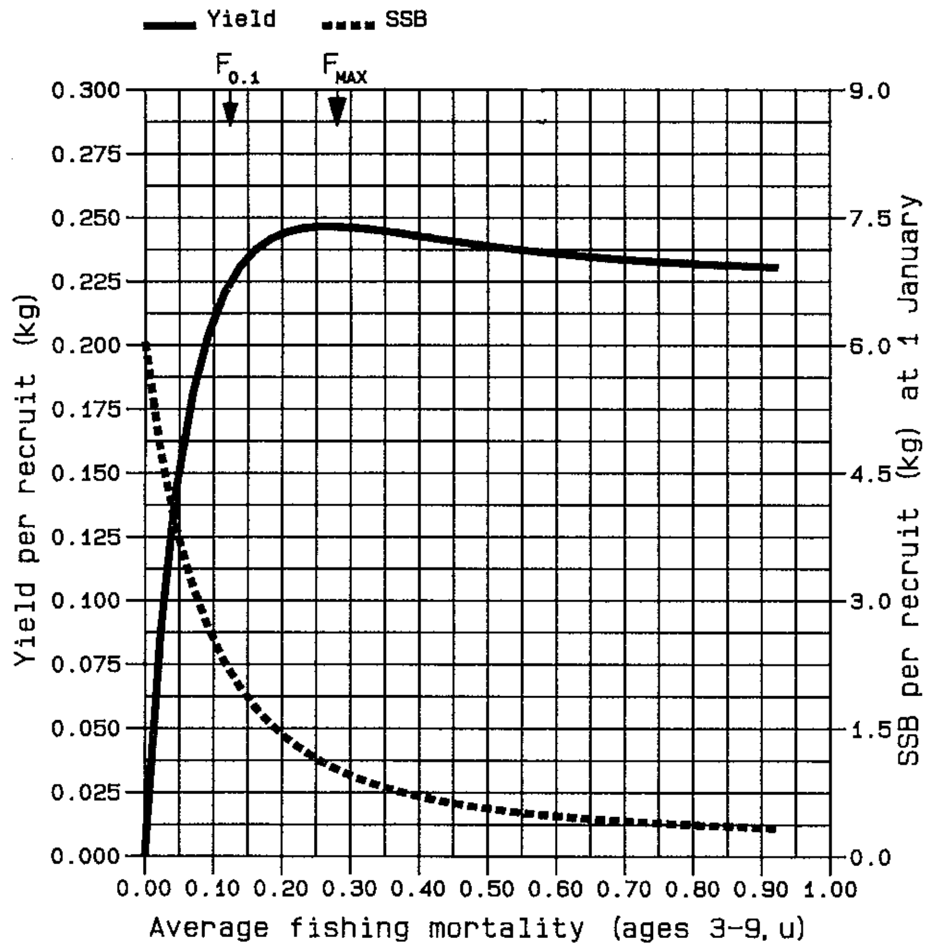
B

cont'd

Figure 3.3.5 (cont'd)

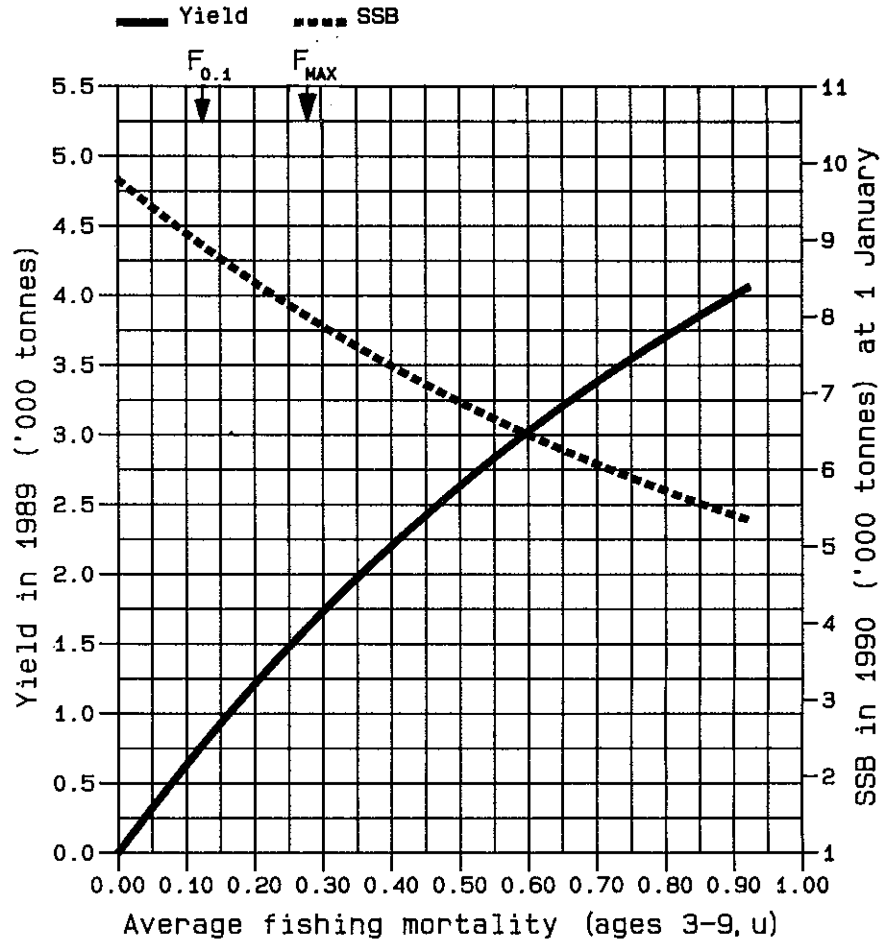
FISH STOCK SUMMARY
STOCK: Plaice in the Kattegat
24-03-1988

Long-term yield and spawning stock biomass



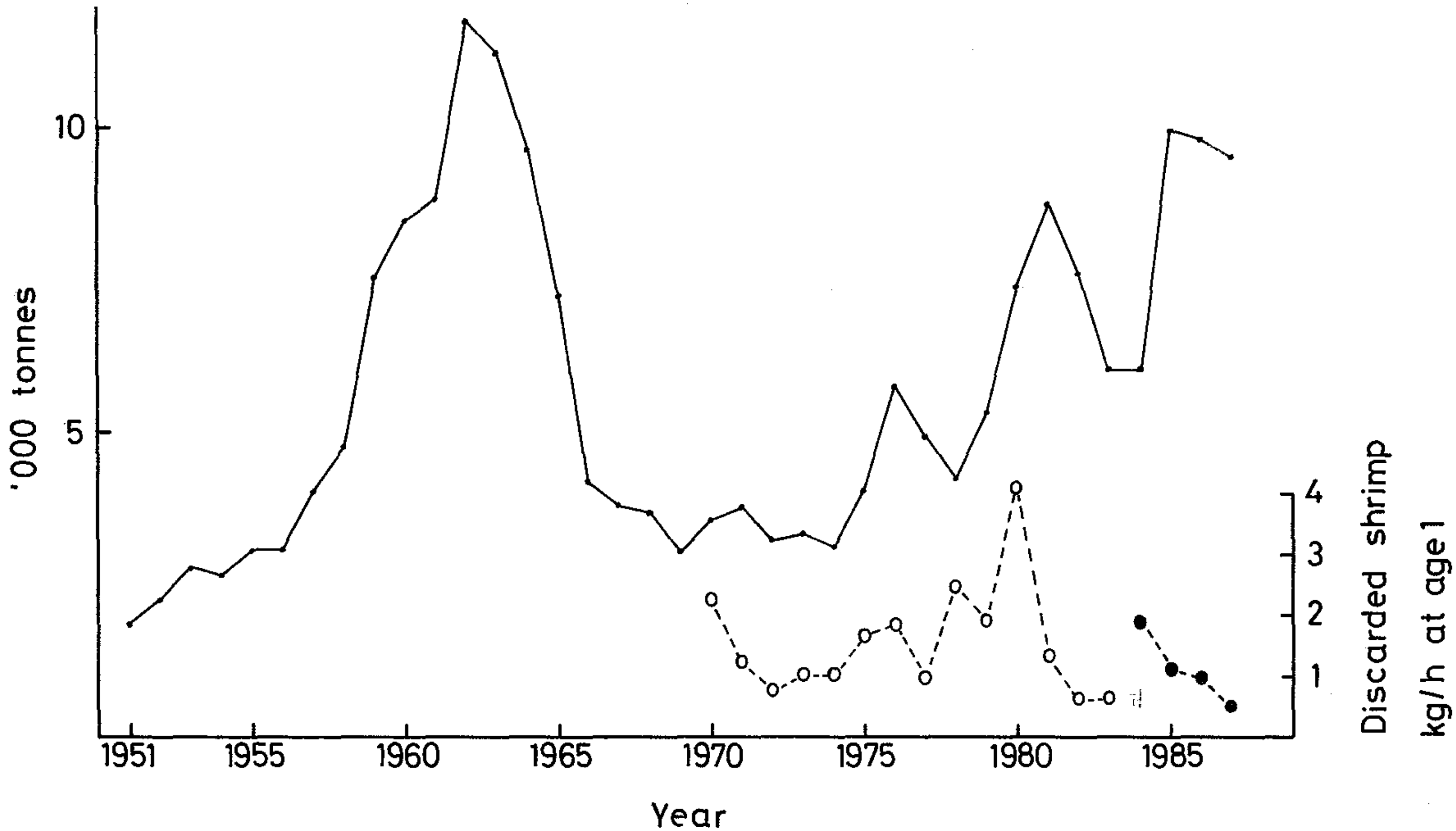
C

Short-term yield and spawning stock biomass



D

Figure 3.4.2 Total landings in Division IIIa, and discarding rate (kg/hr) in the SW fishery in May–June. Source: 1951–1969 Bull.Stat.; 1970–1987 WG reports.



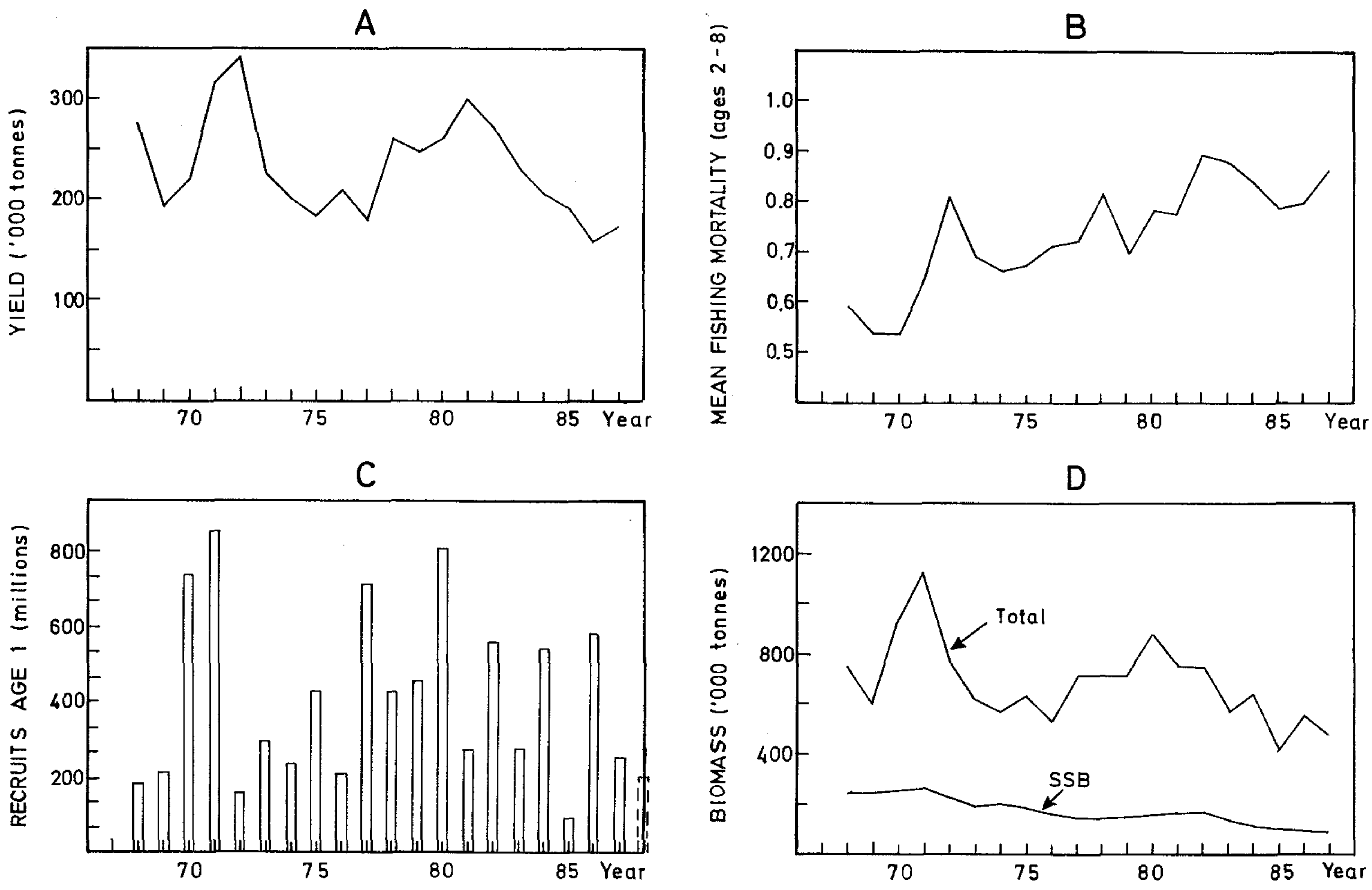


Figure 3.5.2.1 North Sea Cod.

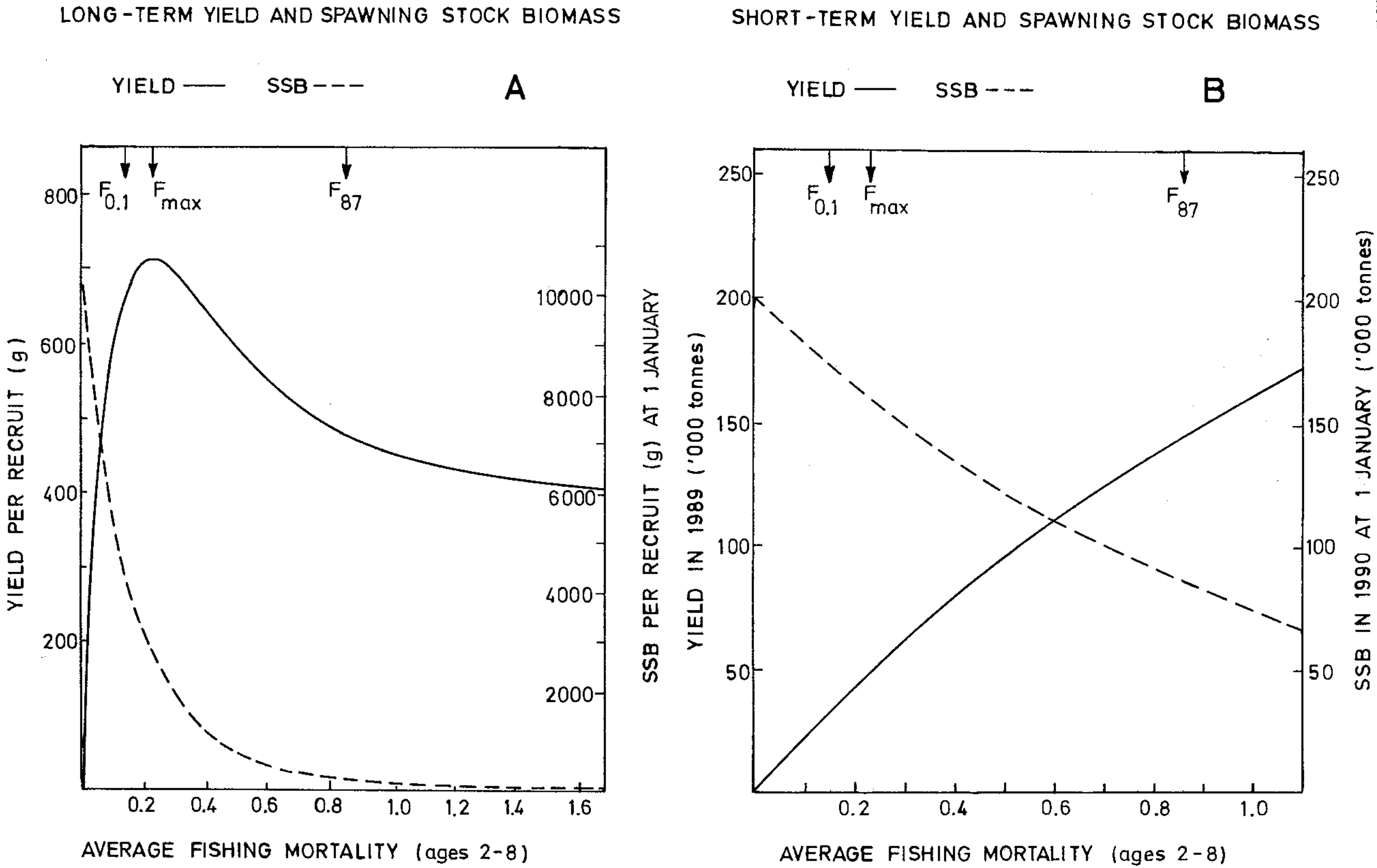
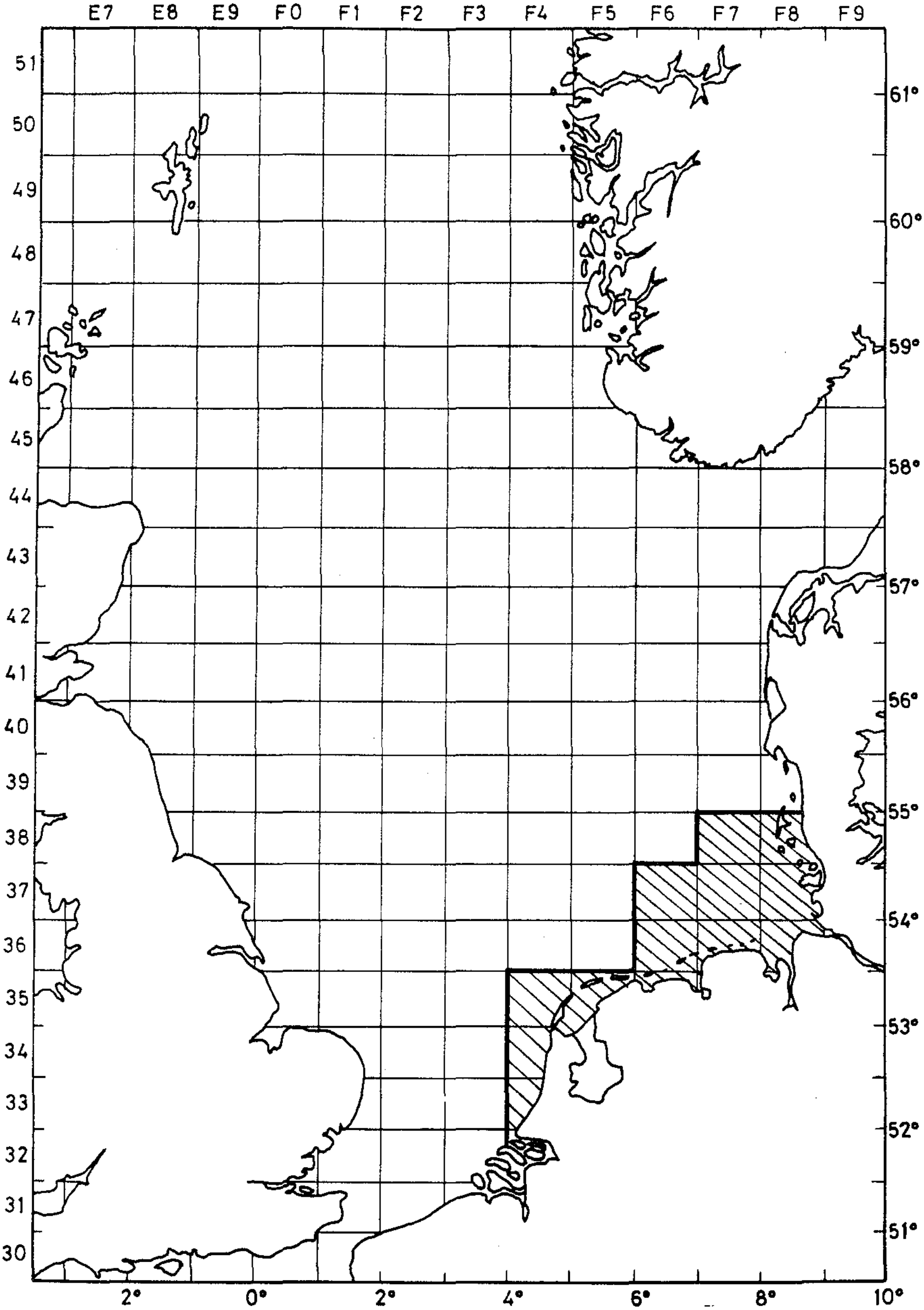


Figure 3.5.2.2 North Sea Cod.

Figure 3.5.2.3 Cod box (hatched area) in effect in 1988.



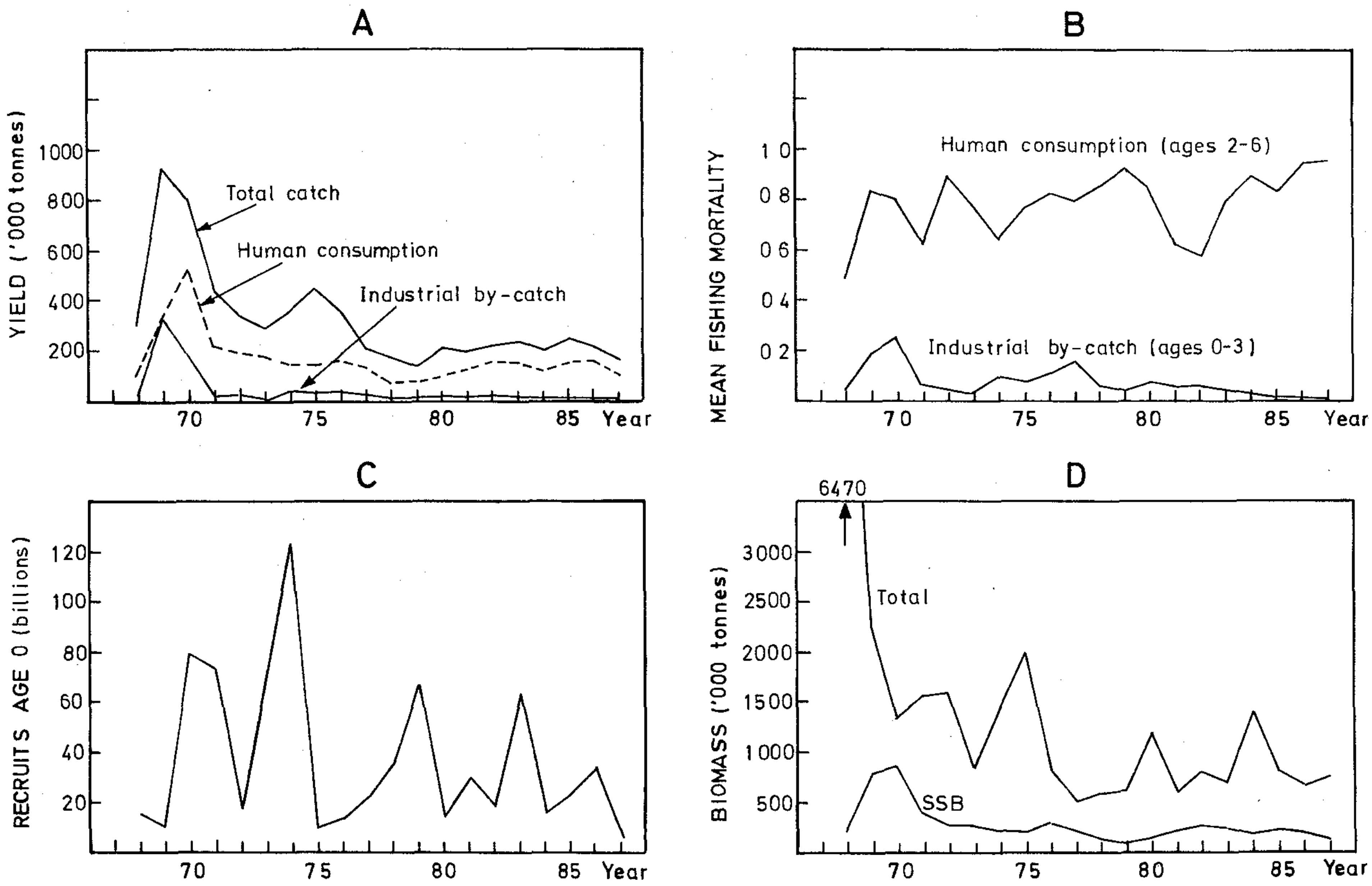


Figure 3.5.3.1 North Sea Haddock.

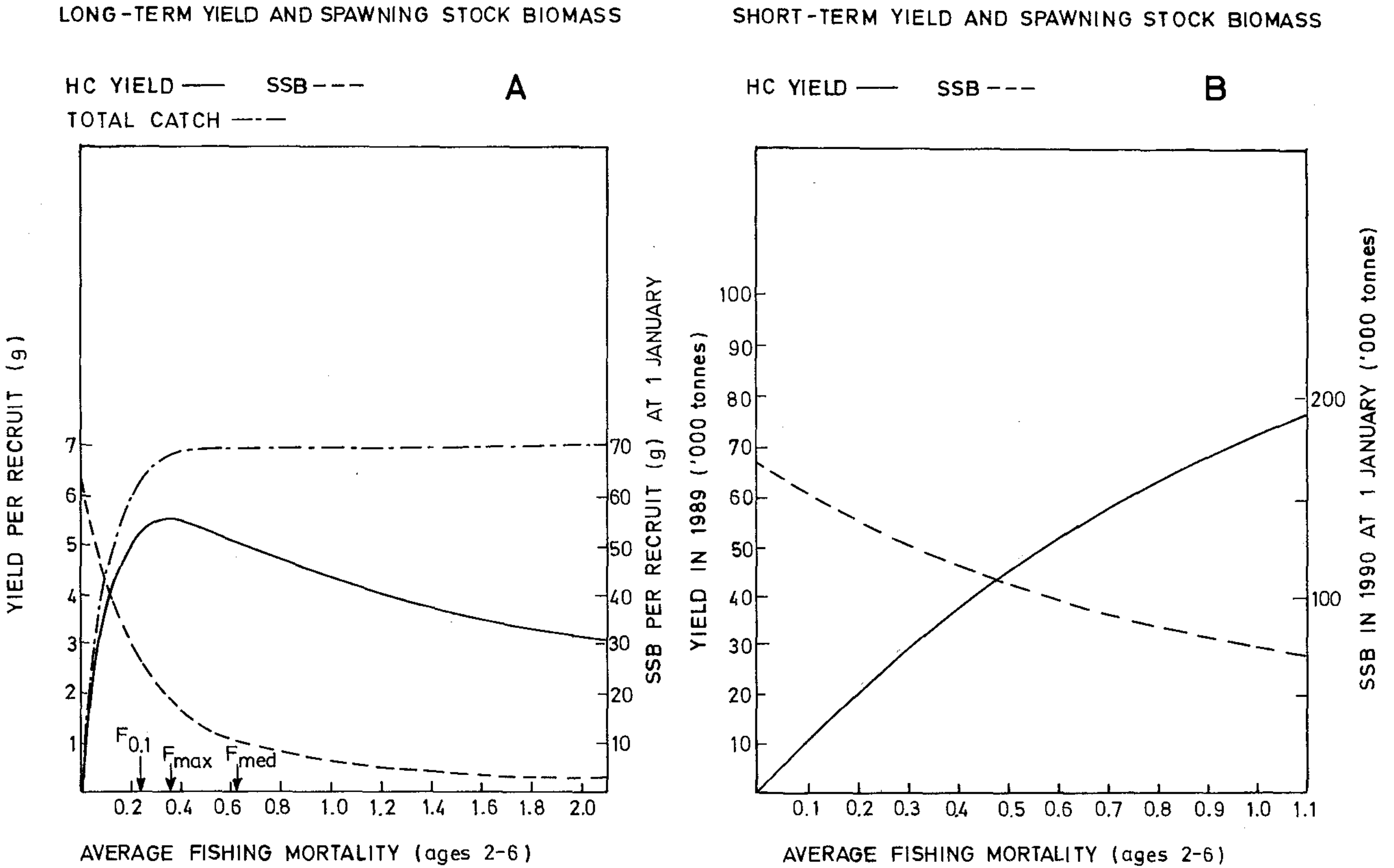


Figure 3.5.3.2 North Sea Haddock.

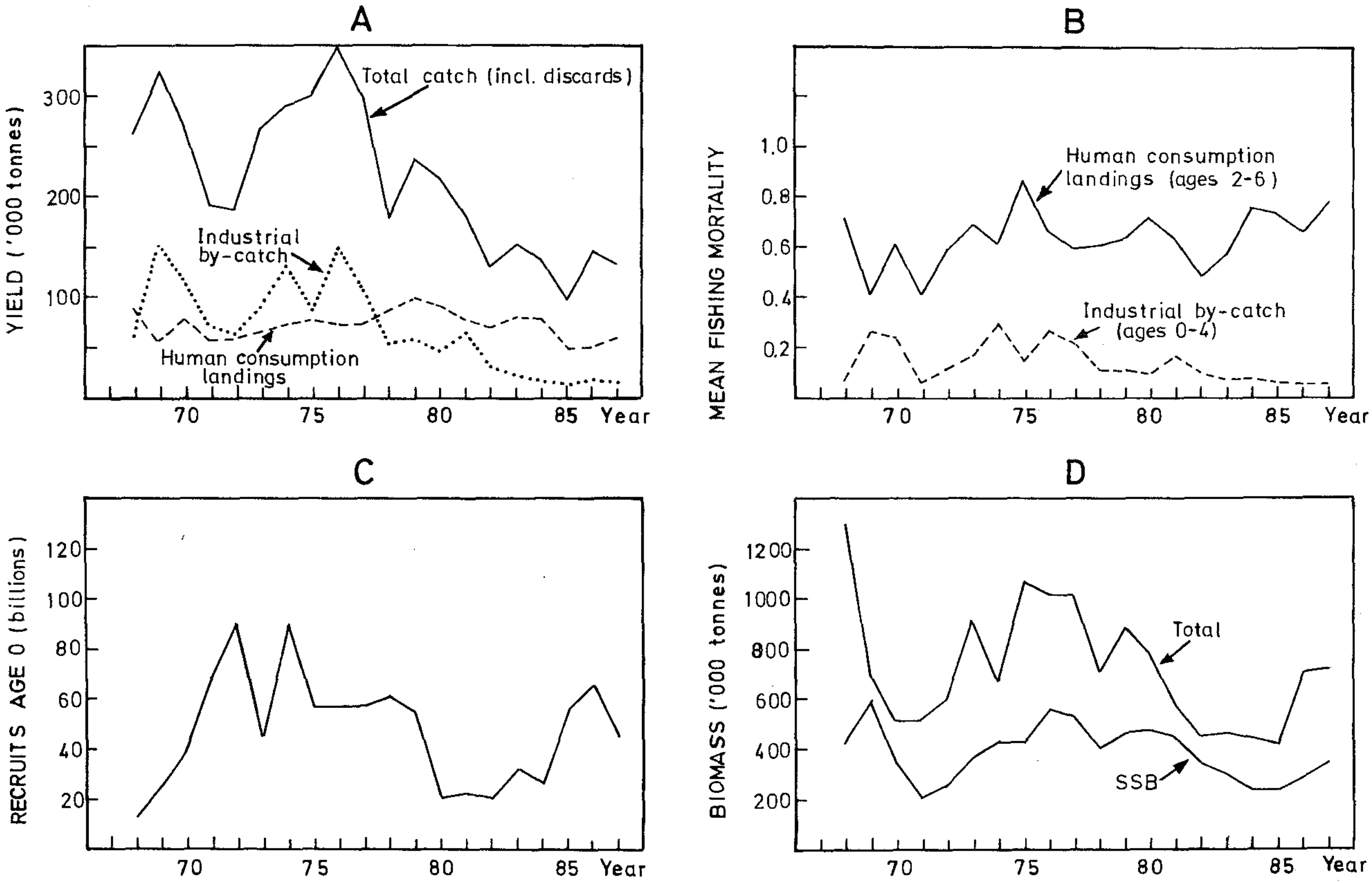


Figure 3.5.4.1 Whiting in Sub-area IV.

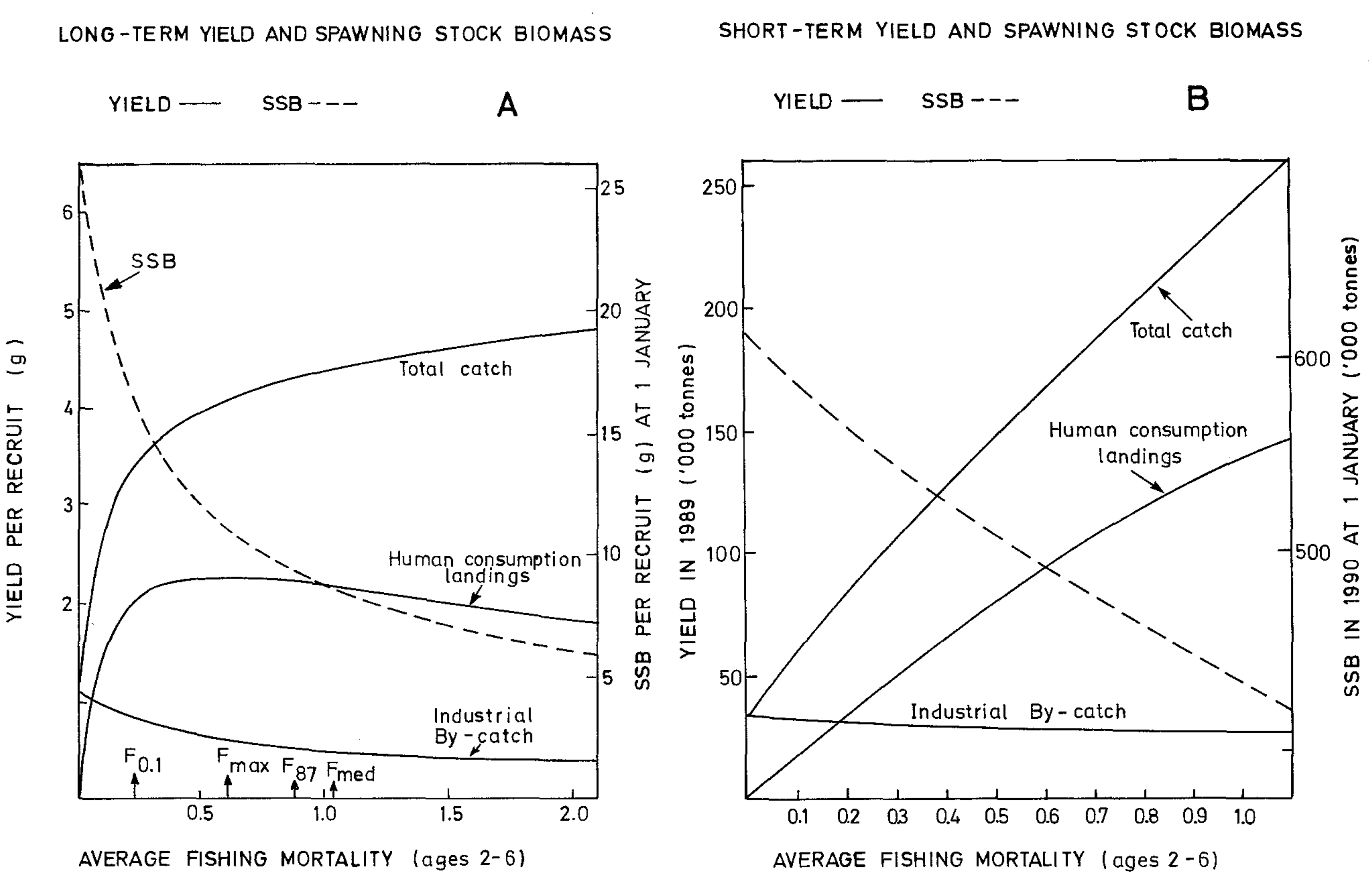


Figure 3.5.4.2 North Sea Whiting in Sub-area IV.

Figure 3.5.5.1 North Sea Saithe.

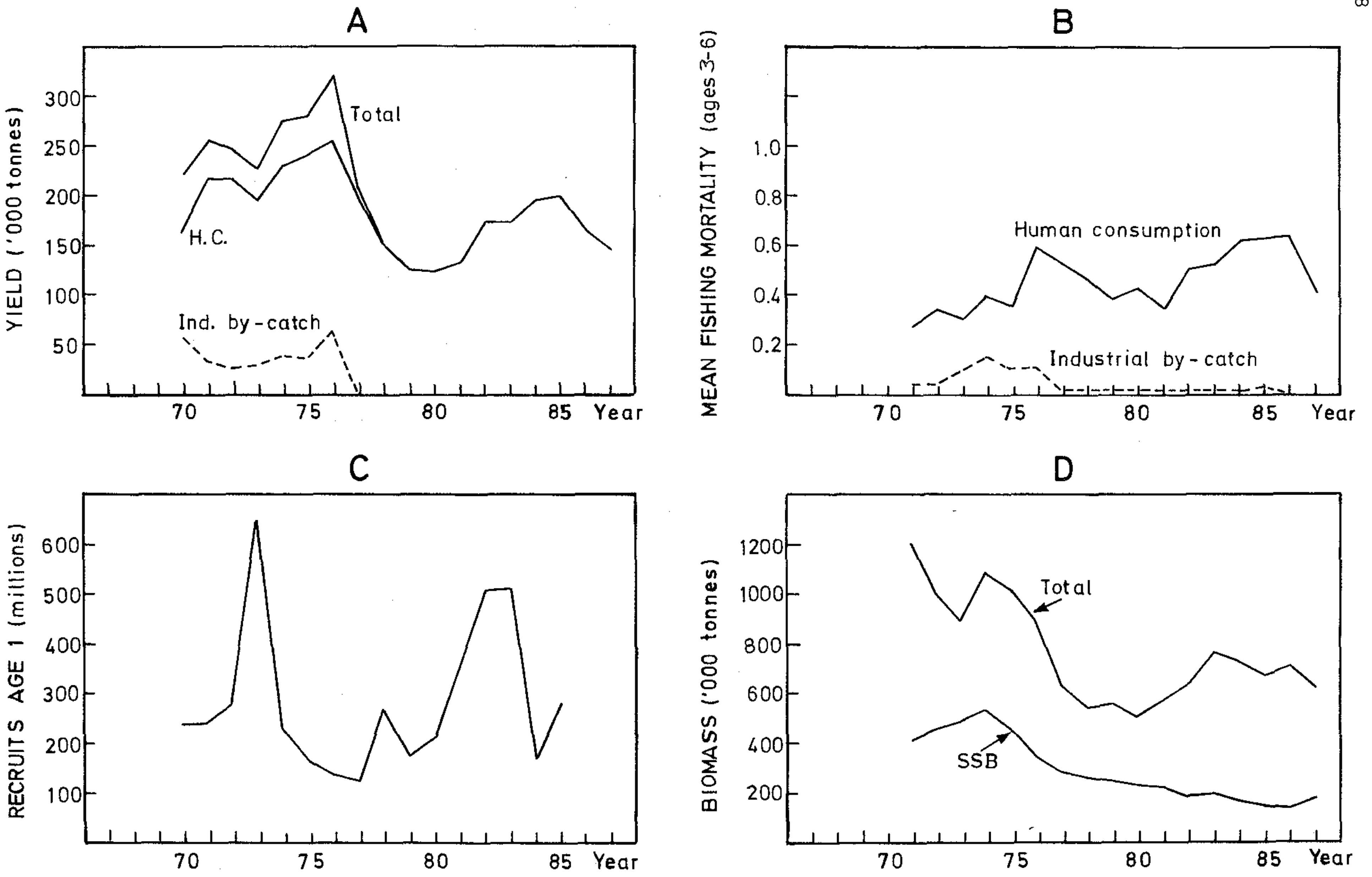


Figure 3.5.5.2 North Sea Saithe.

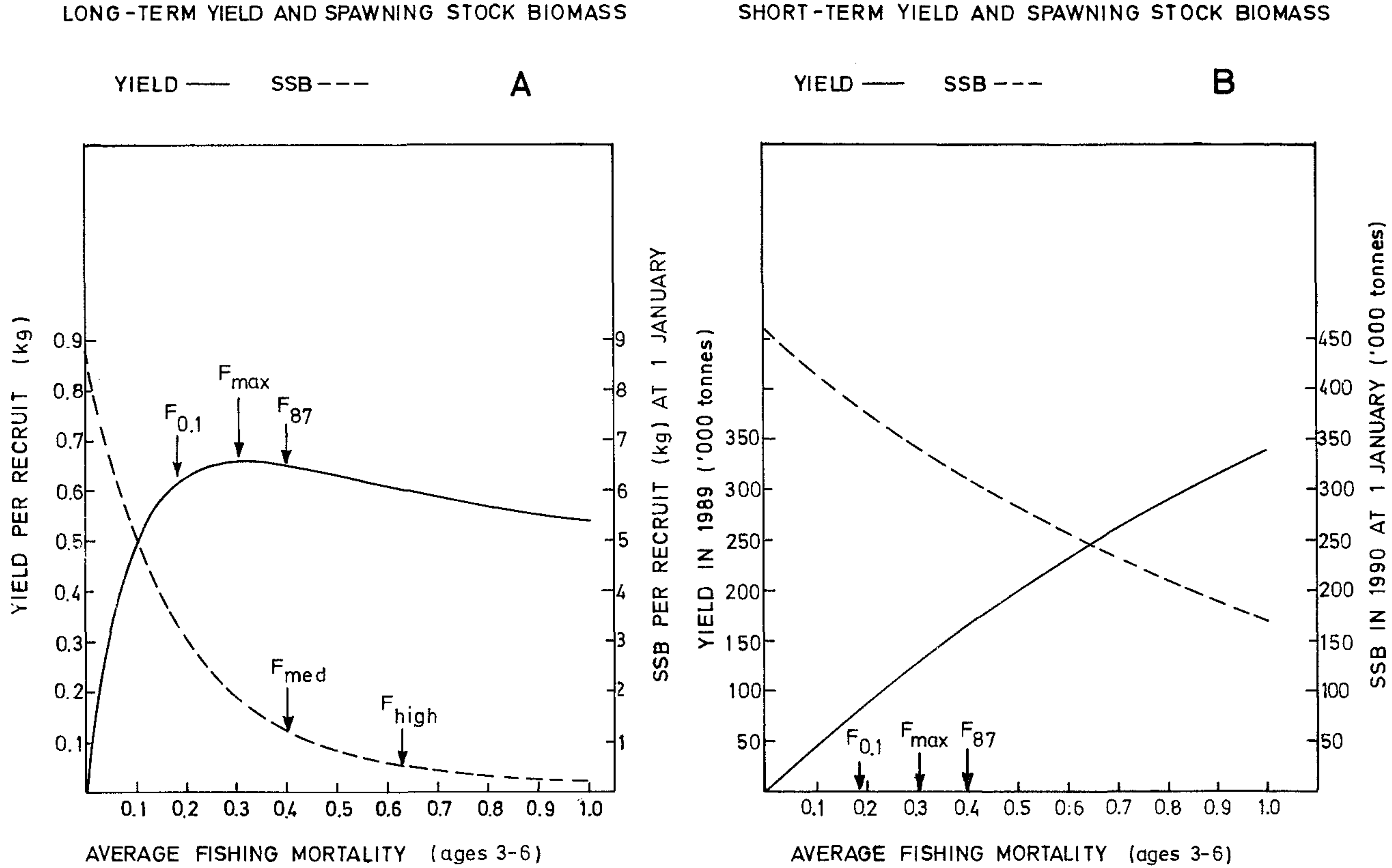


Figure 3.6.2.1 Cod in Division VIa (West of Scotland).

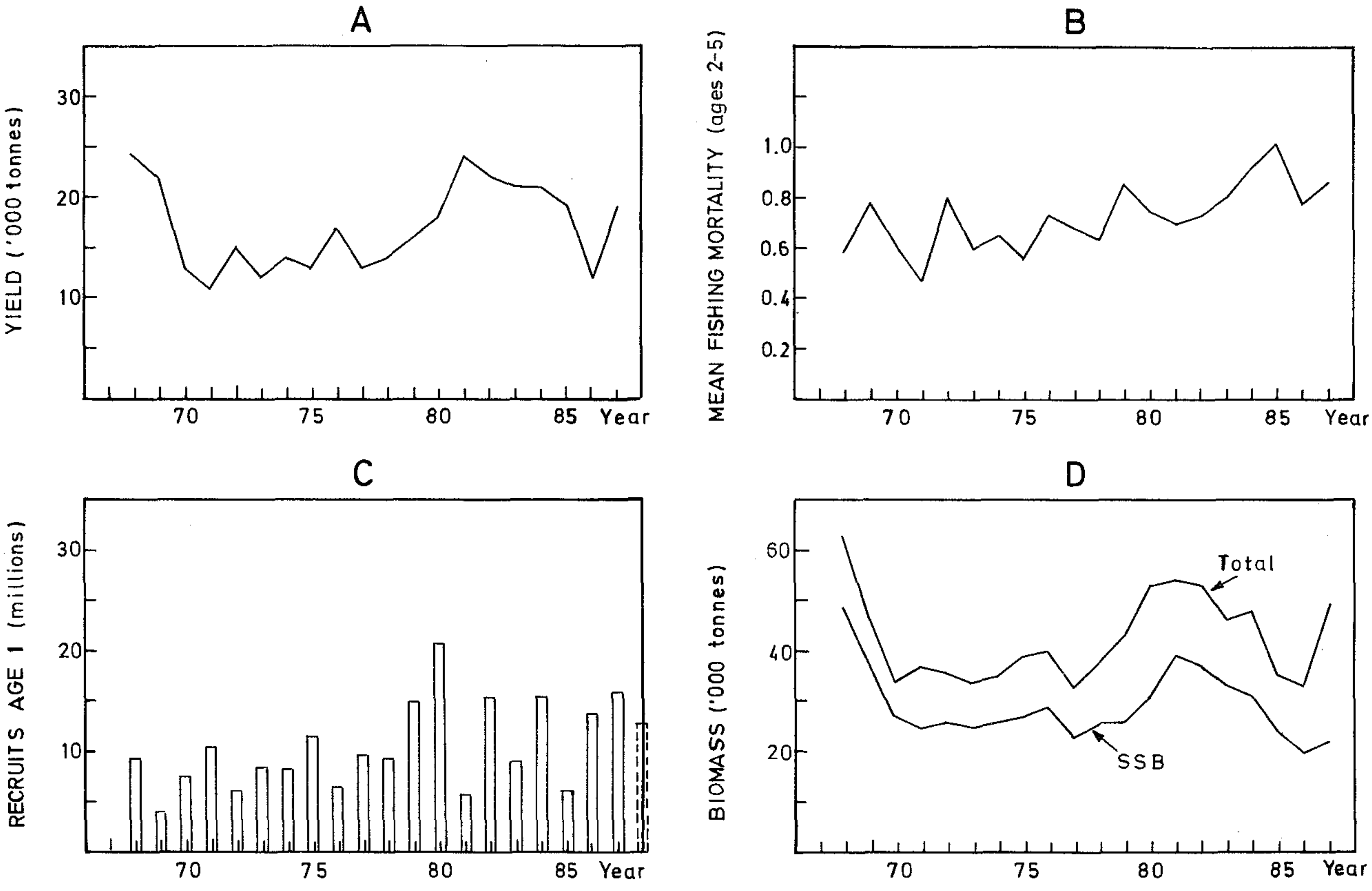


Figure 3.6.2.2 Cod in Division VIa.

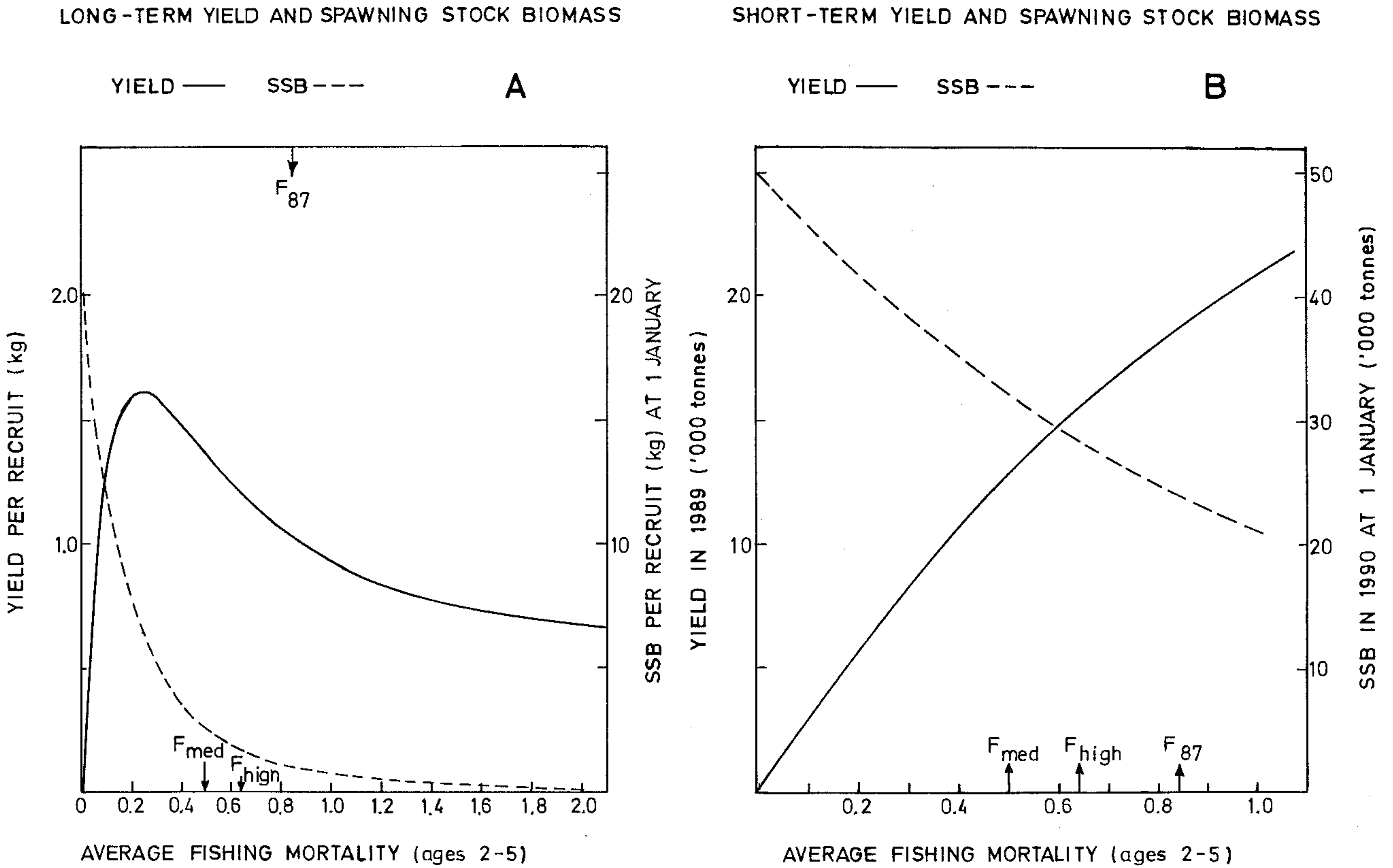


Figure 3.6.4.1 Haddock in Division VIa.

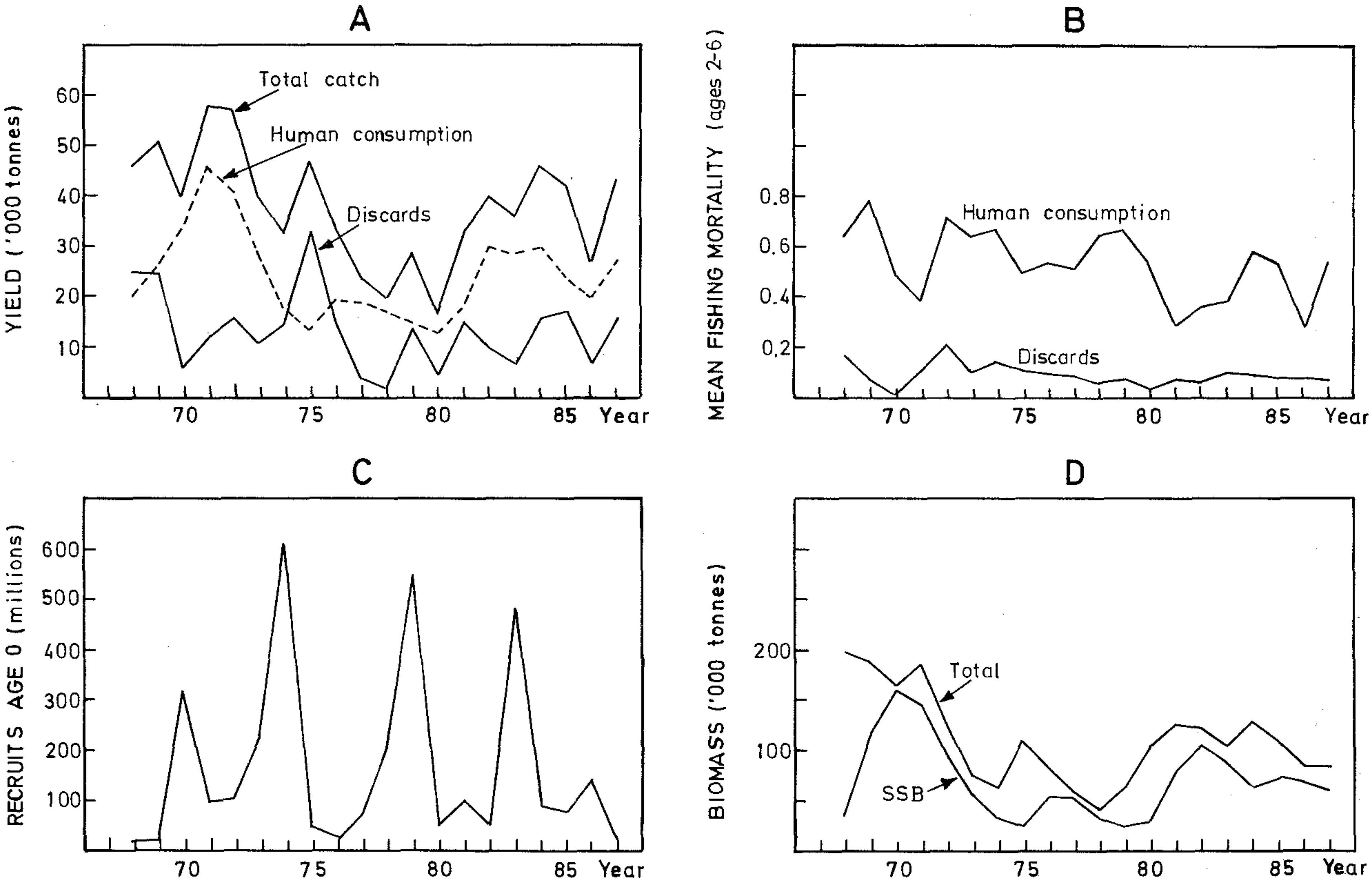
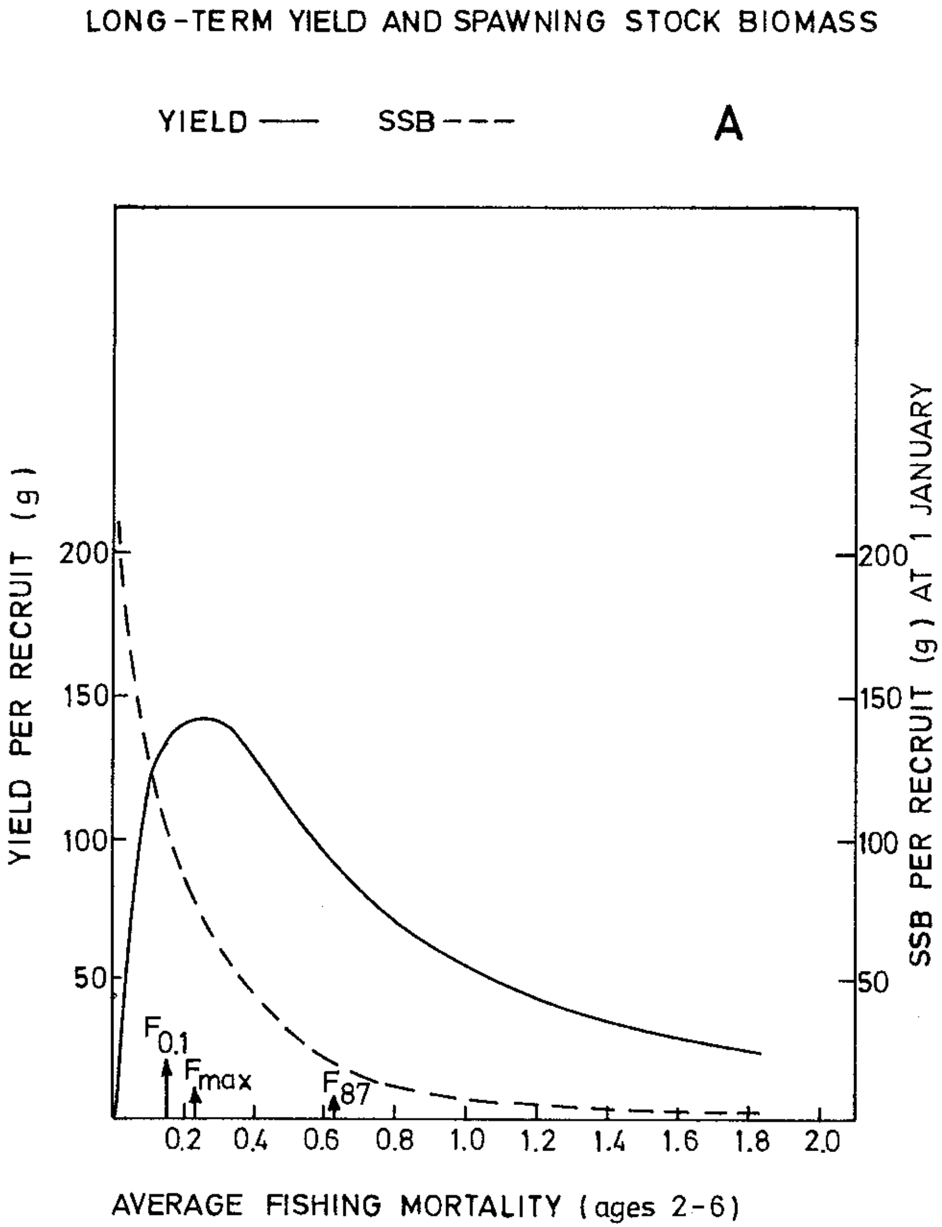


Figure 3.6.4.2 Haddock in Division VIa.



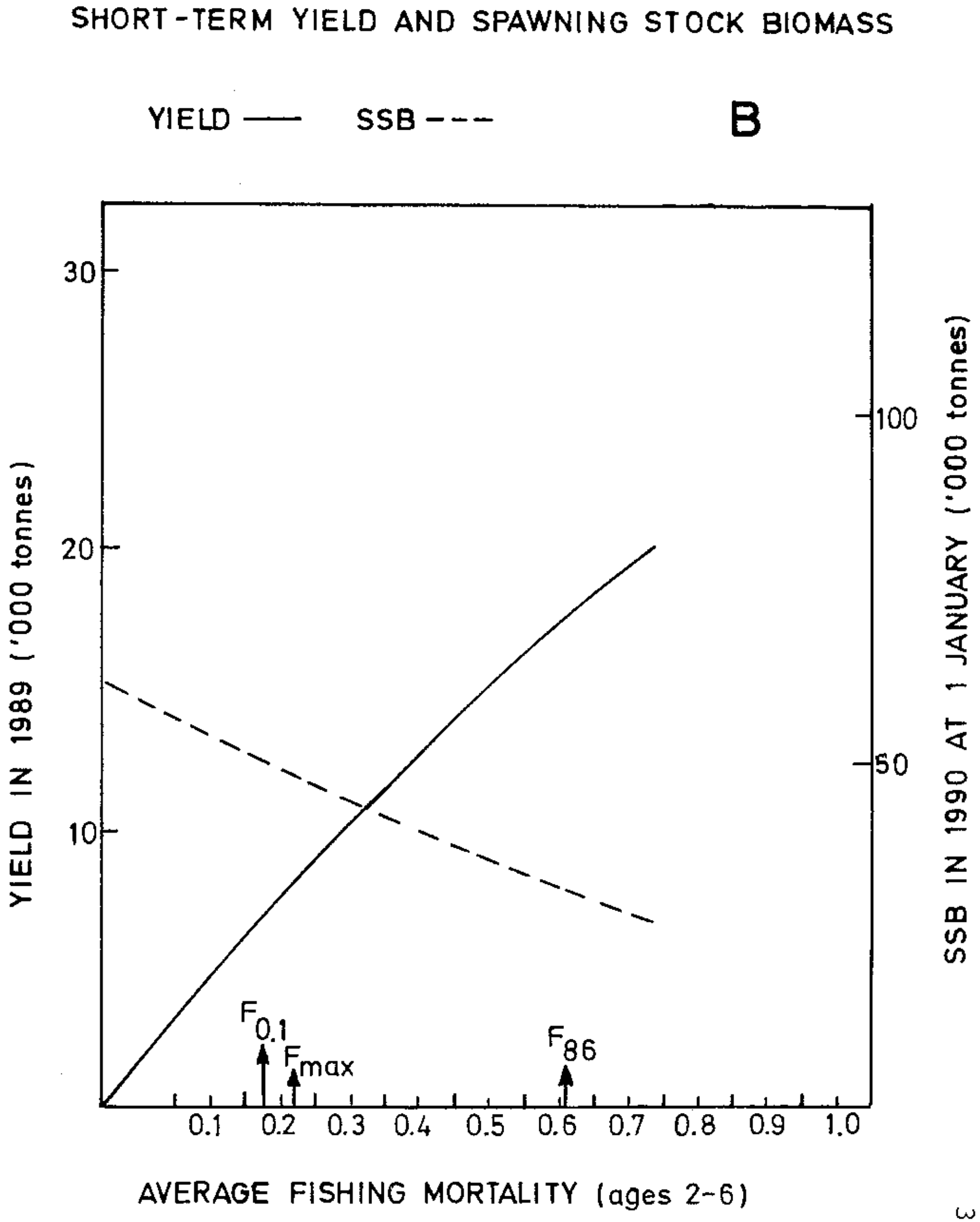


Figure 3.6.6.1 Whiting in Division VIa.

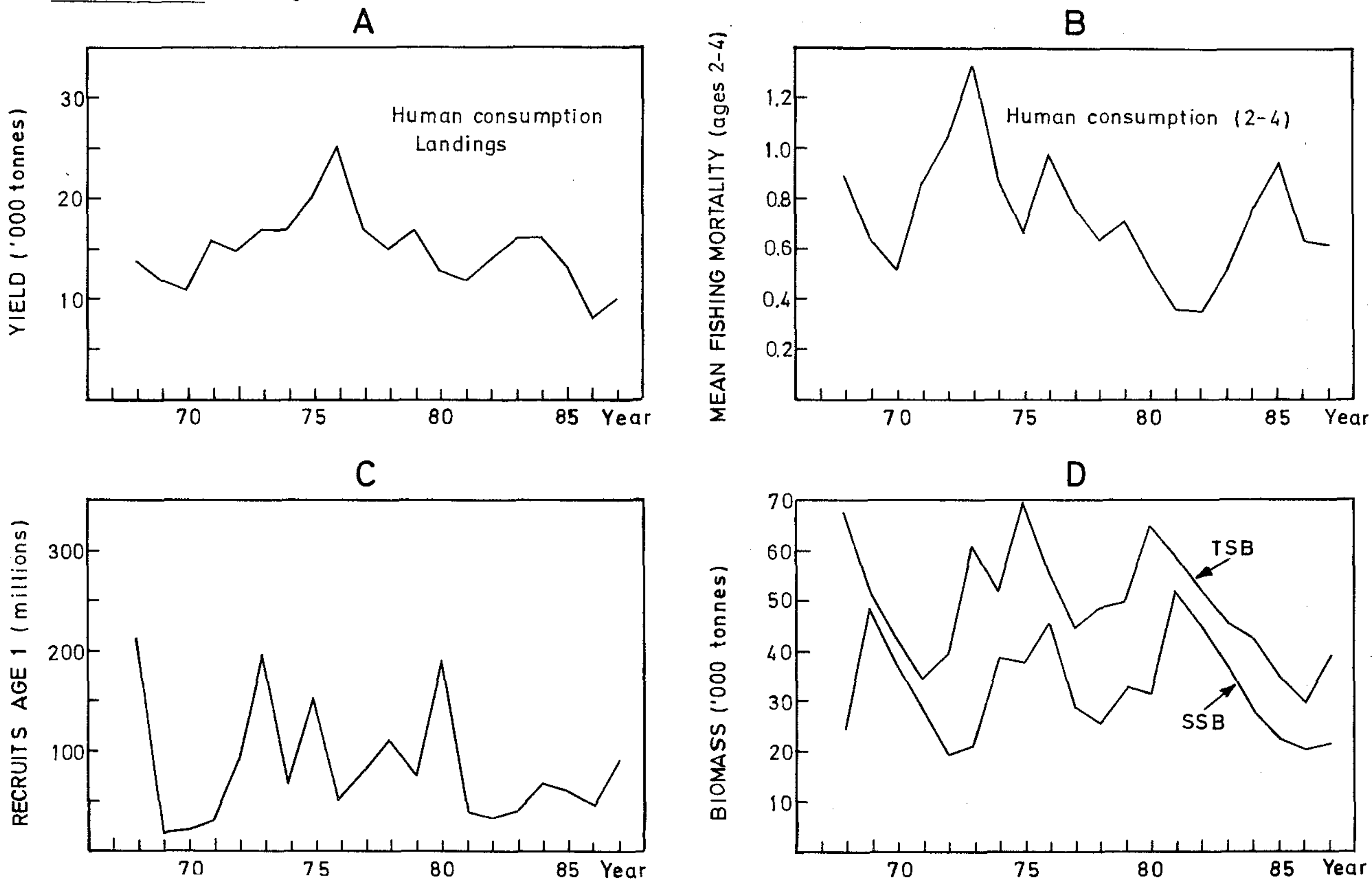


Figure 3.6.6.2 Whiting in Division VIa.

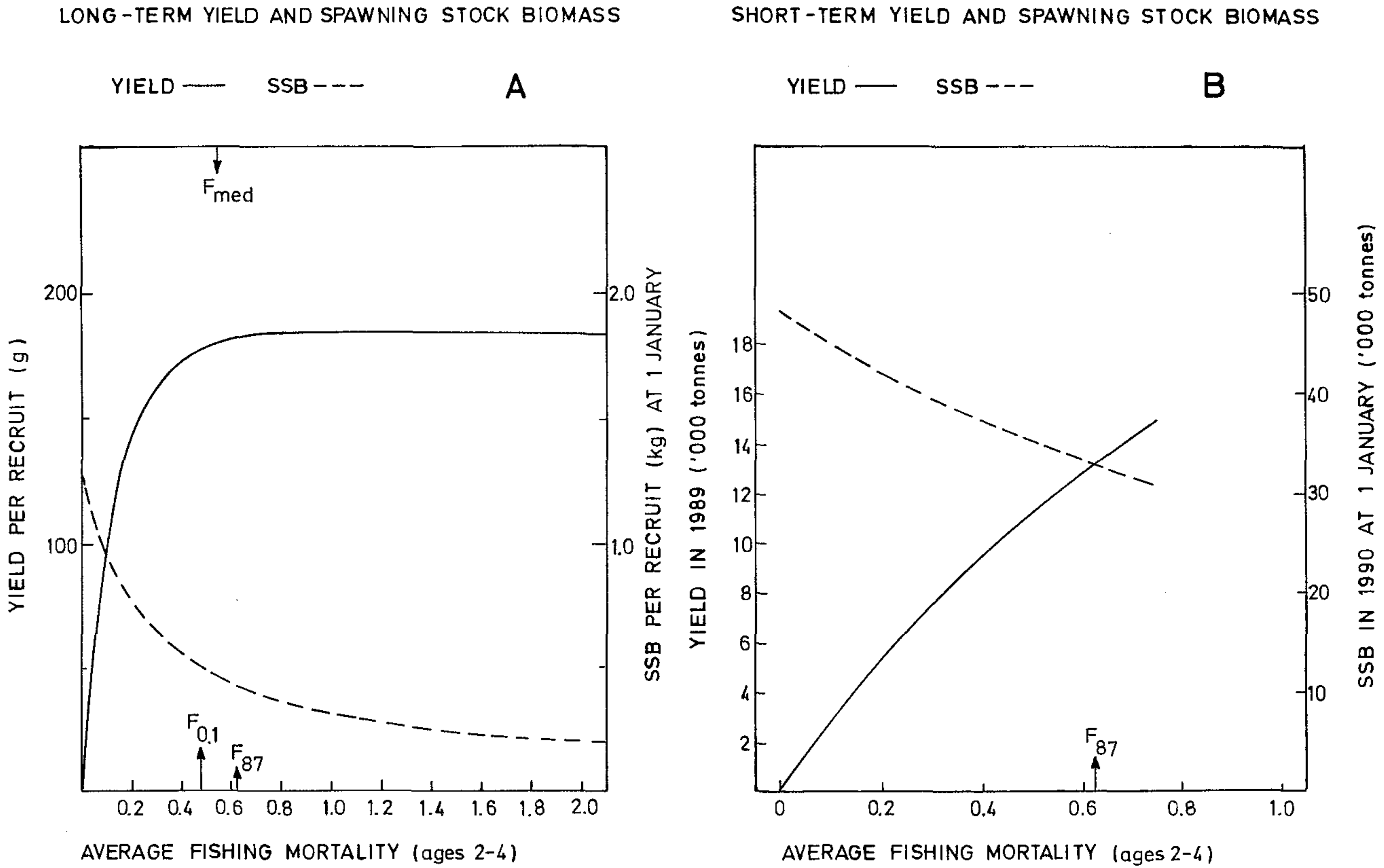


Figure 3.6.8.1 Saithe in Sub-area VI.

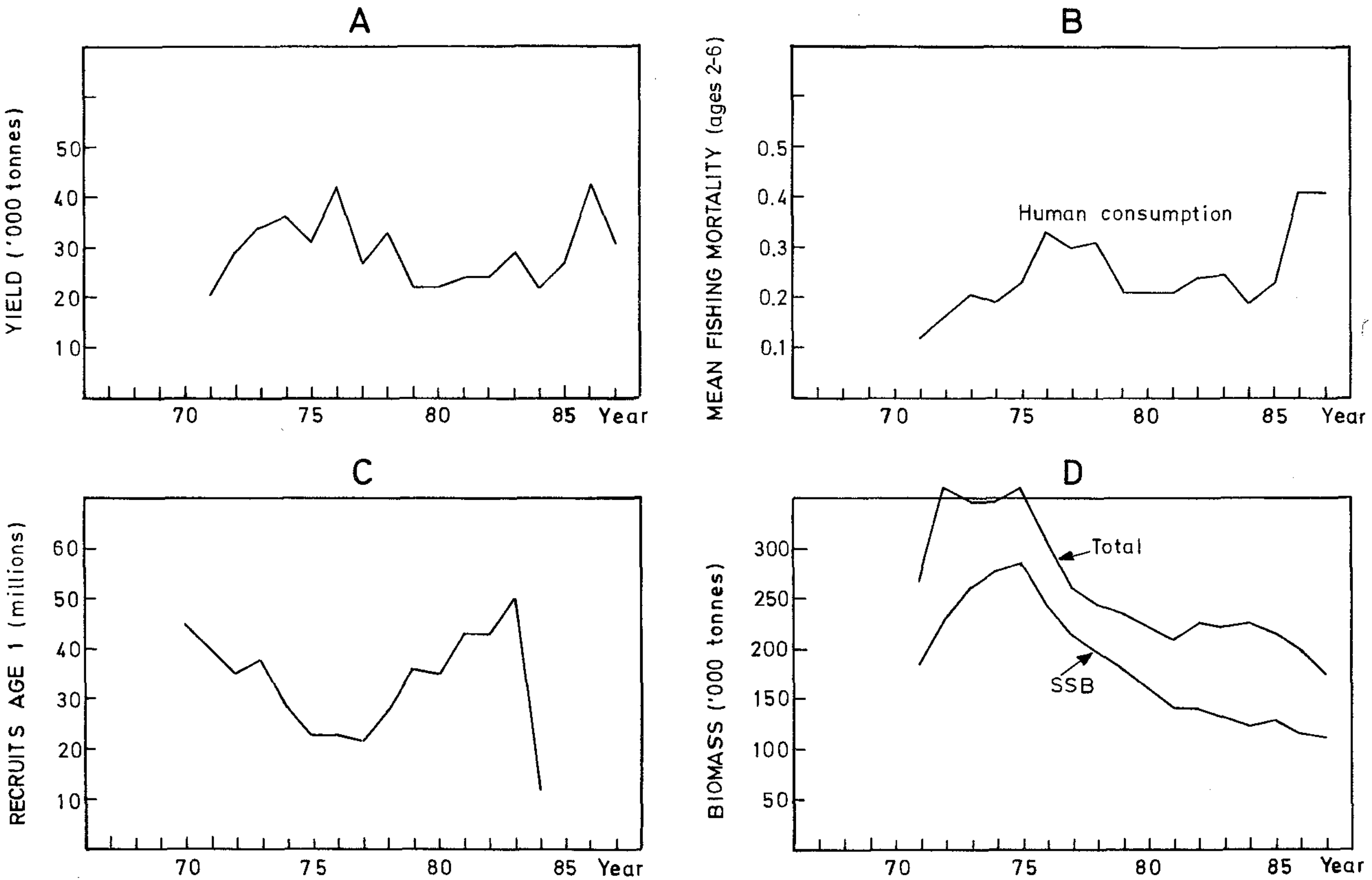
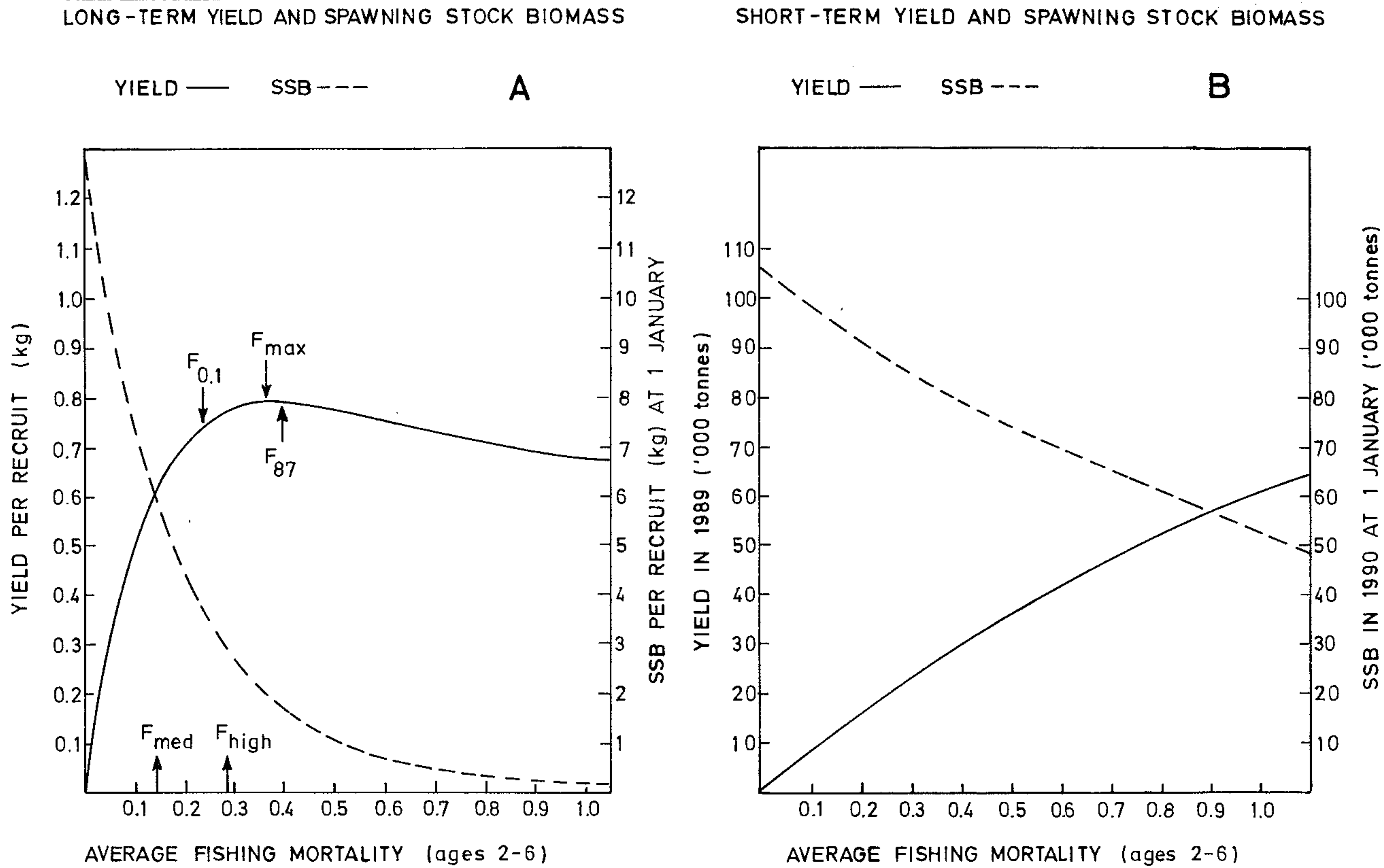


Figure 3.6.8.2 Saithe in Sub-area VI.



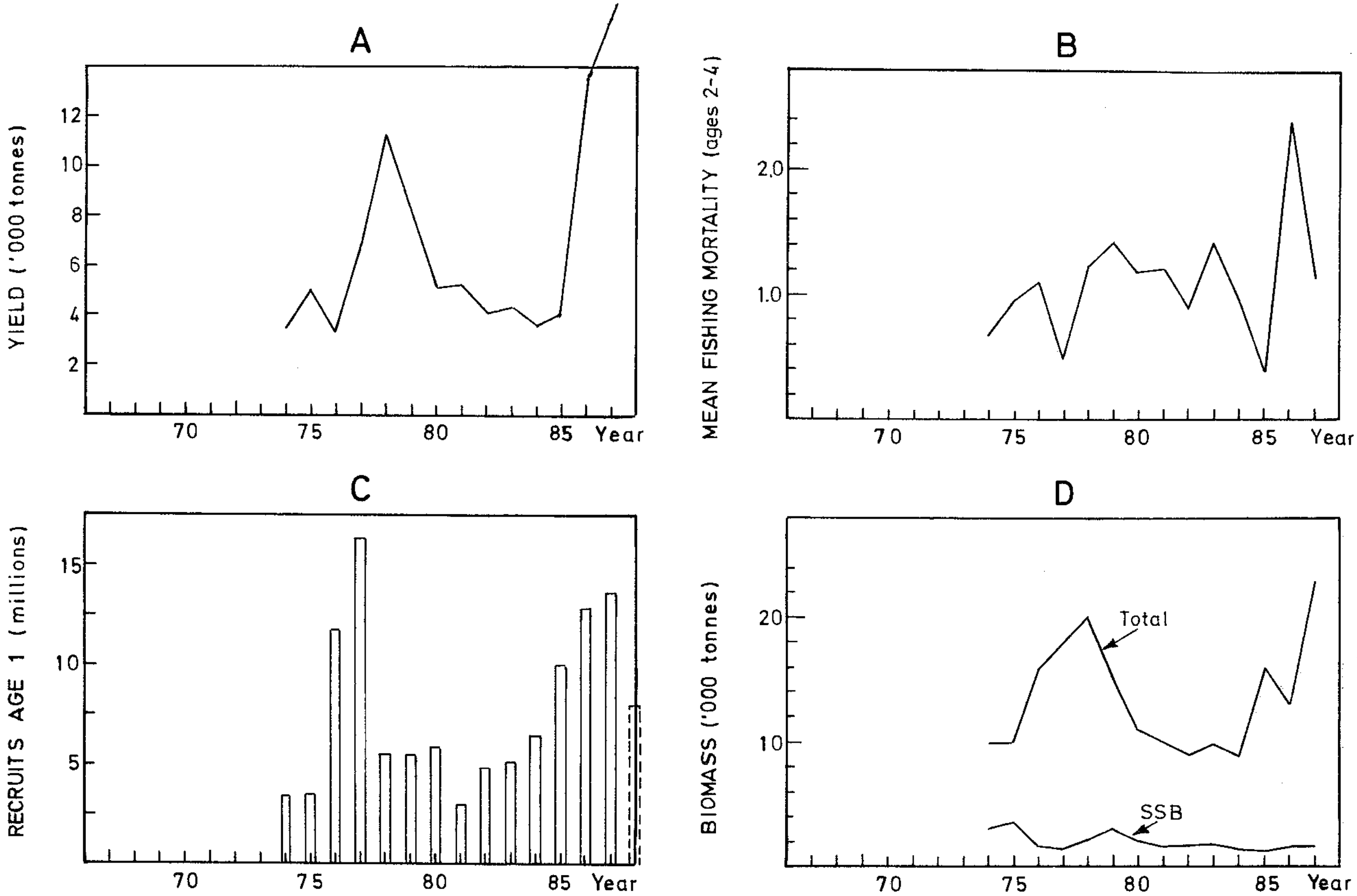


Figure 3.6.9 Cod in Divisions VIId,e.

Figure 3.6.10.1 Whiting in Divisions VIId,e.

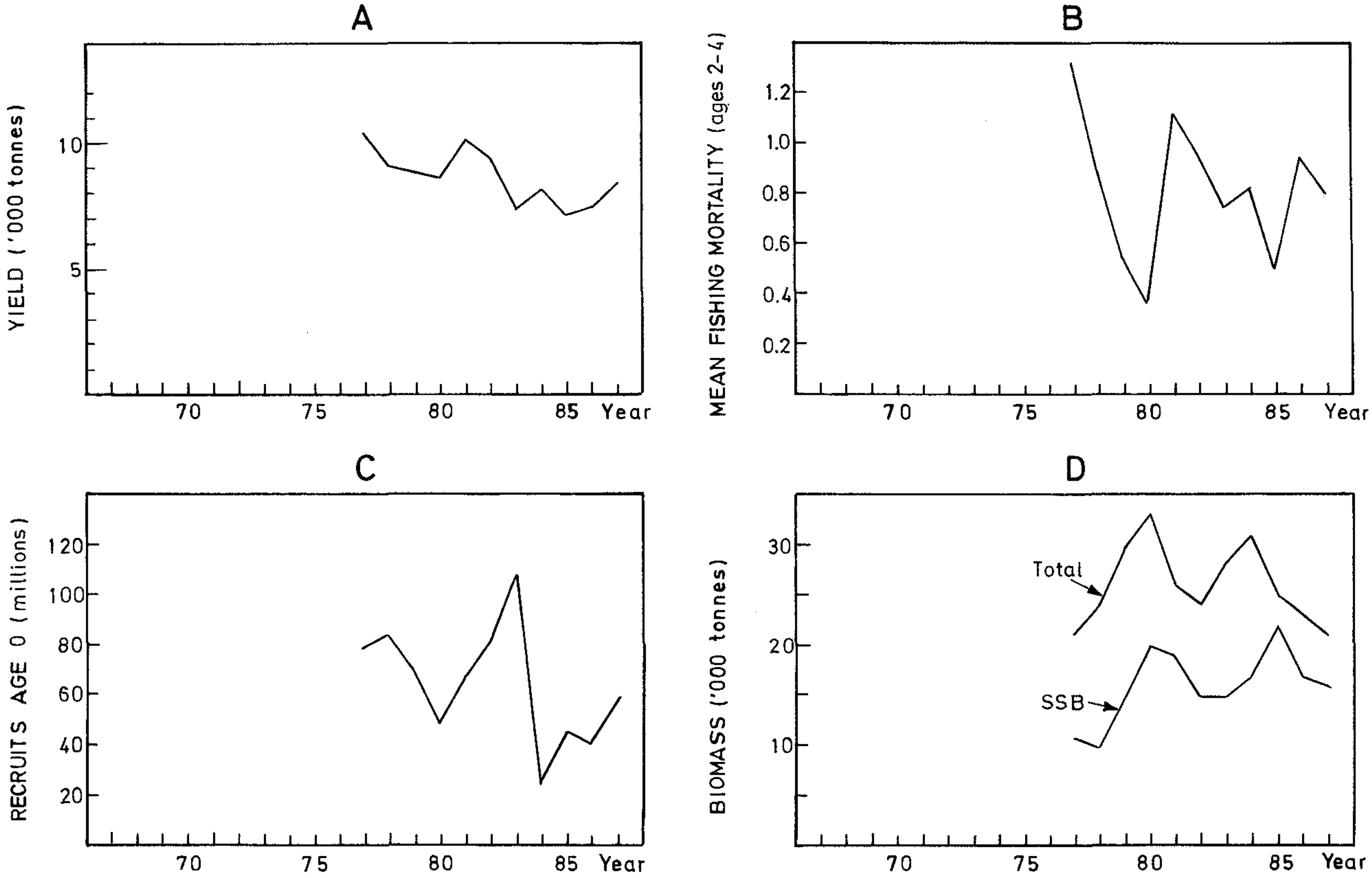
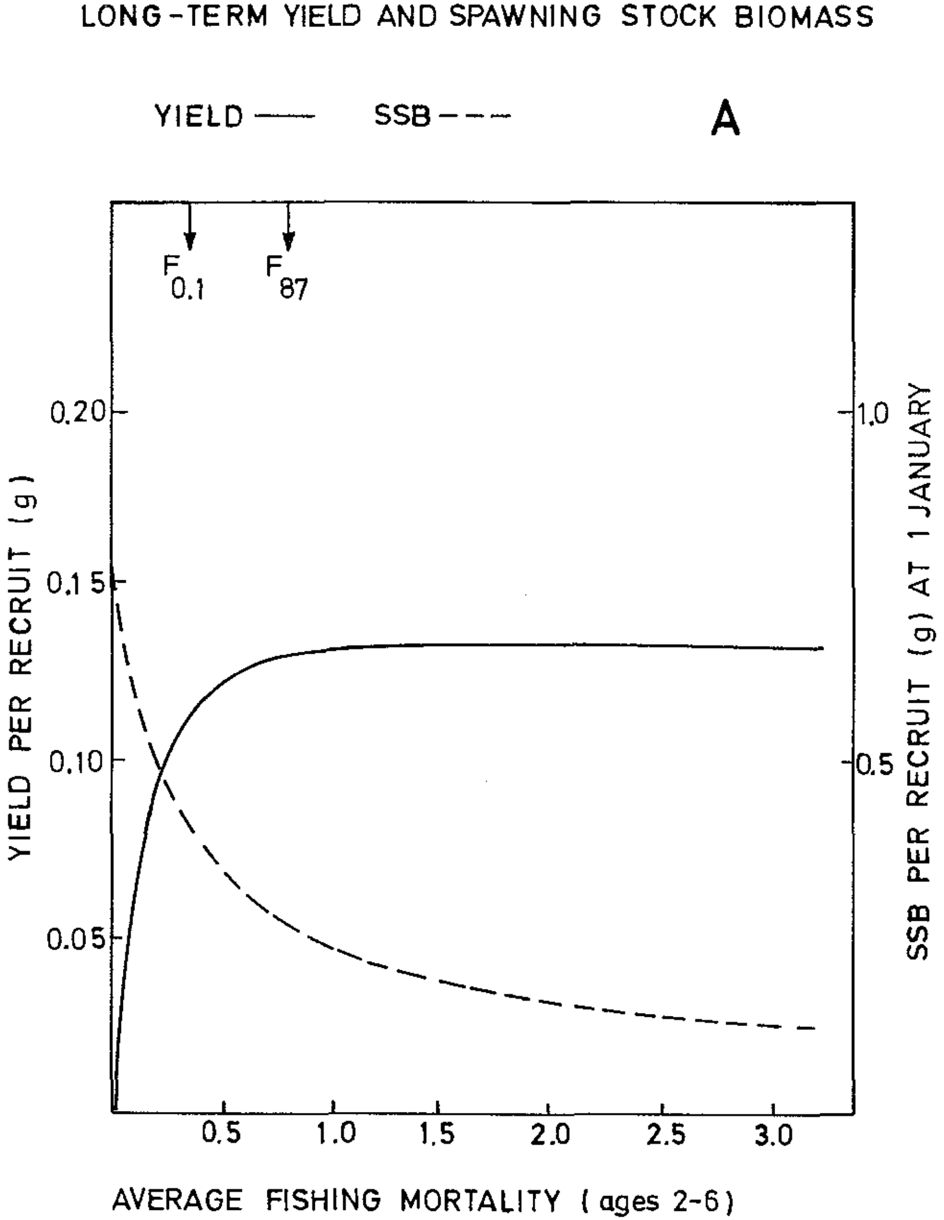


Figure 3.6.10.2 Whiting in Divisions VIId,e.



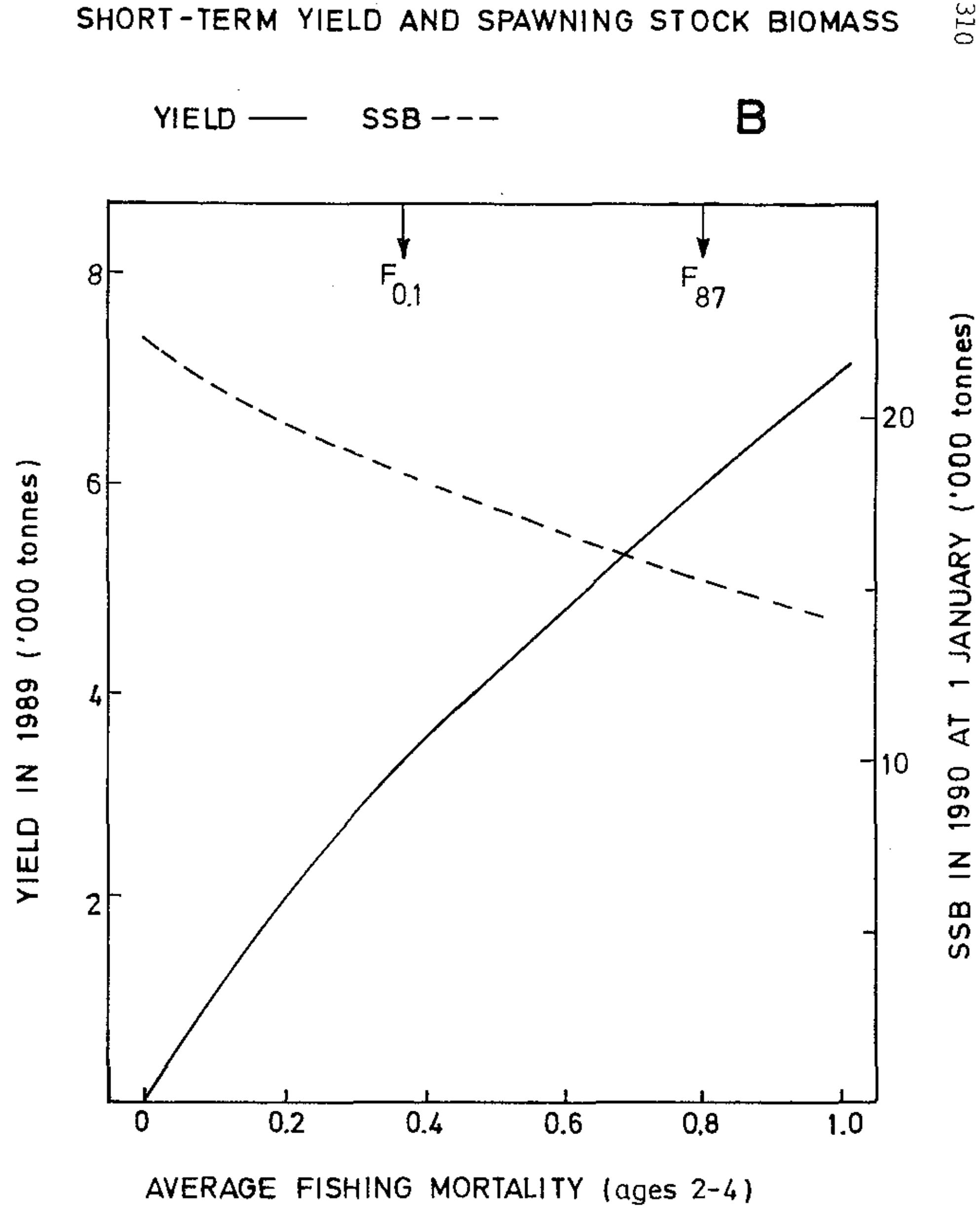
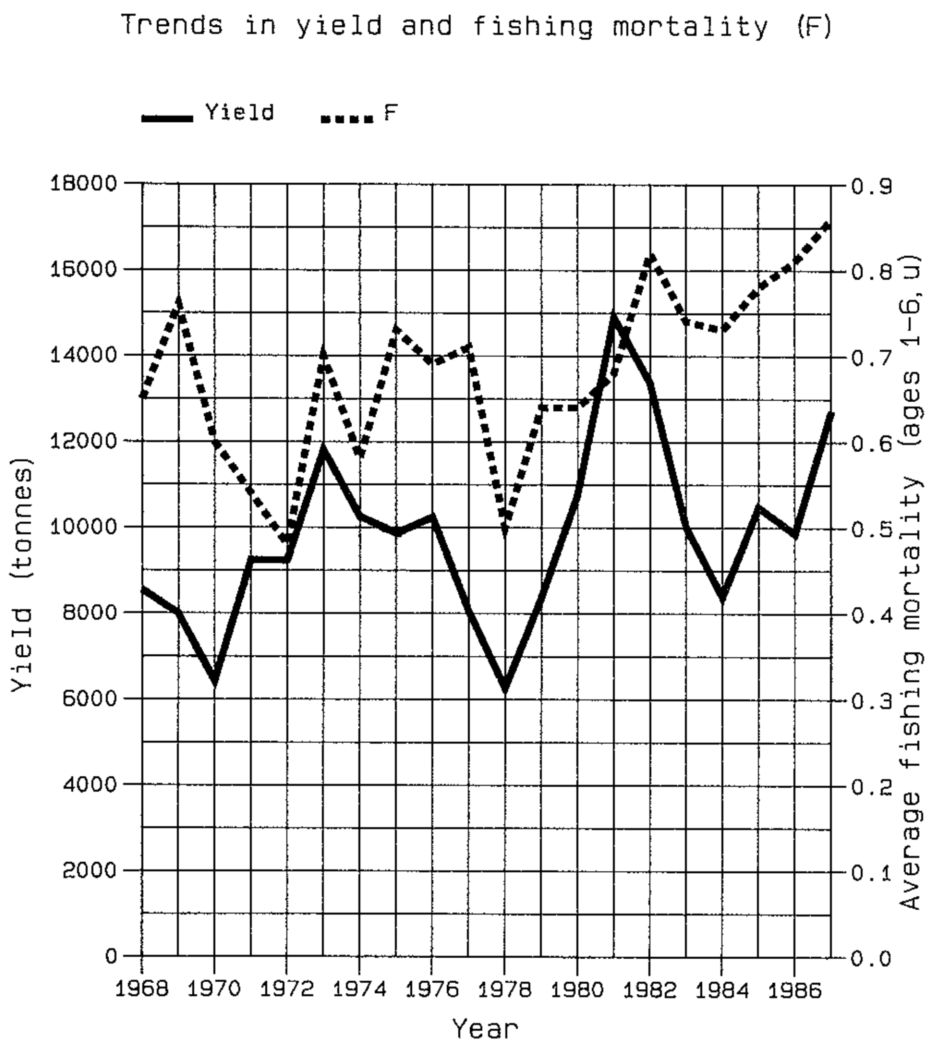
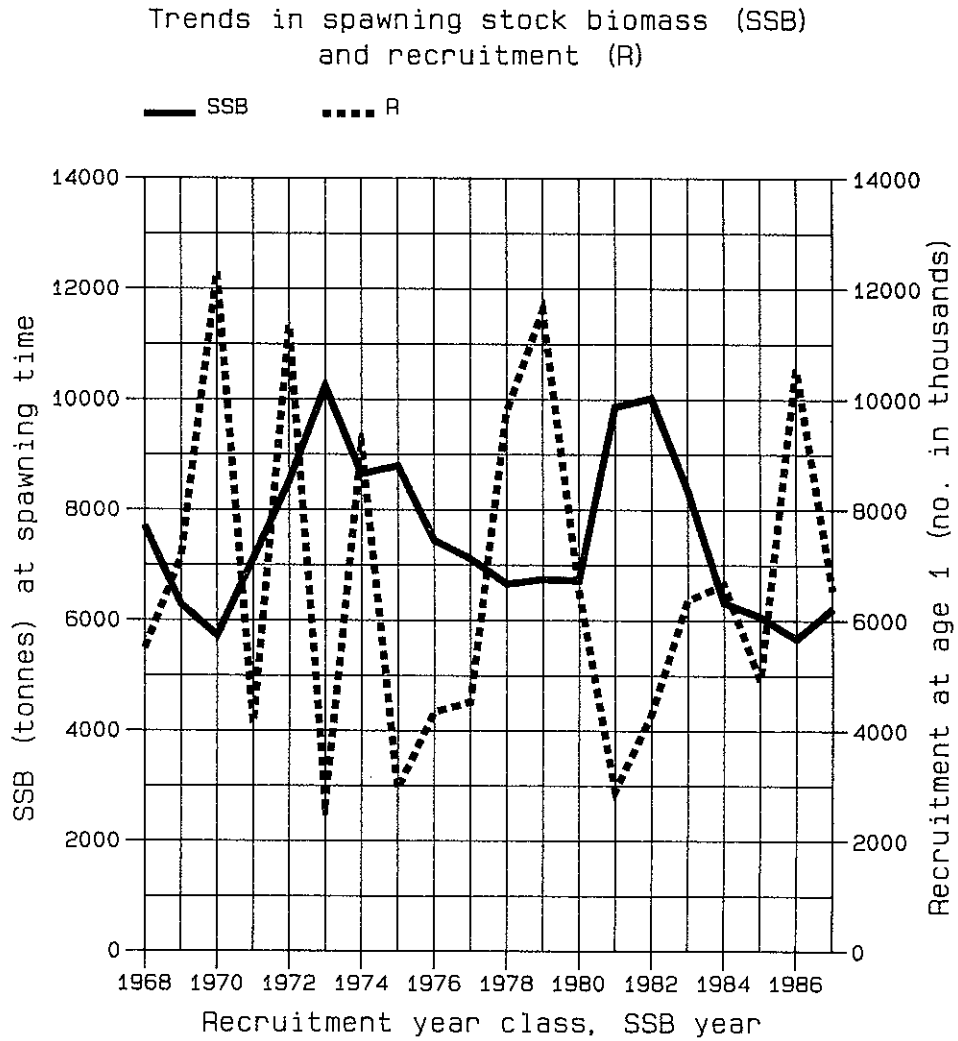


Figure 3.7.1

FISH STOCK SUMMARY
STOCK: Irish Sea Cod
03-10-1988



A



B

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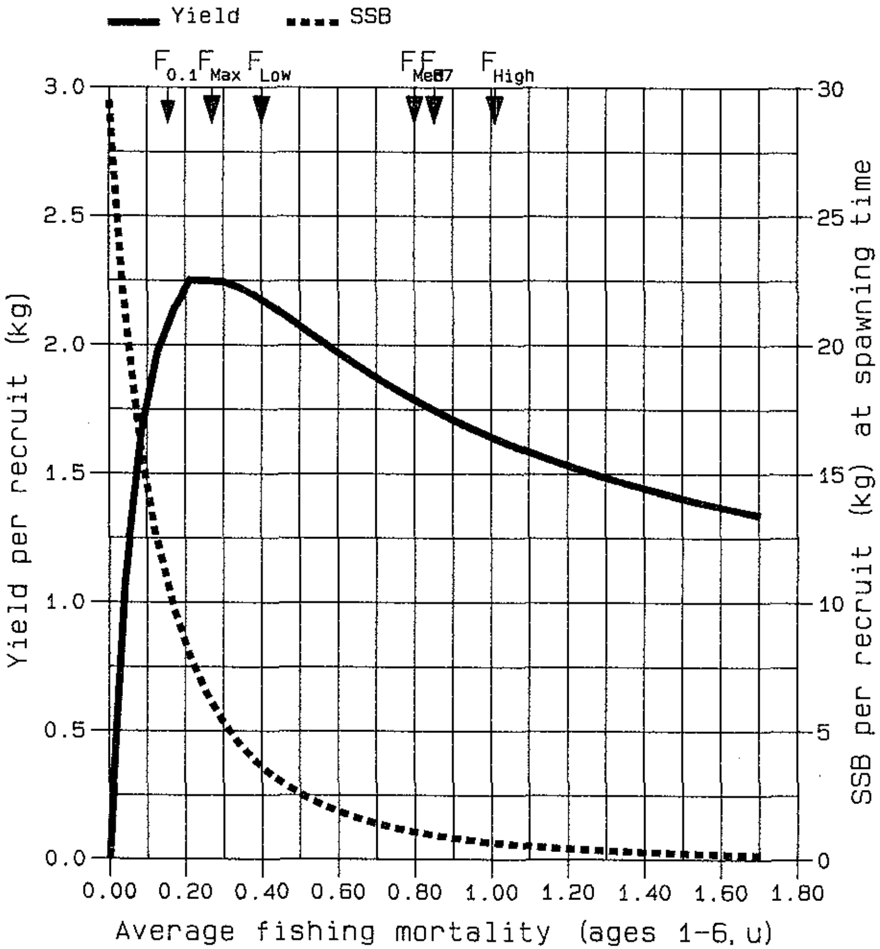
Figure 3.7.1 (cont'd)

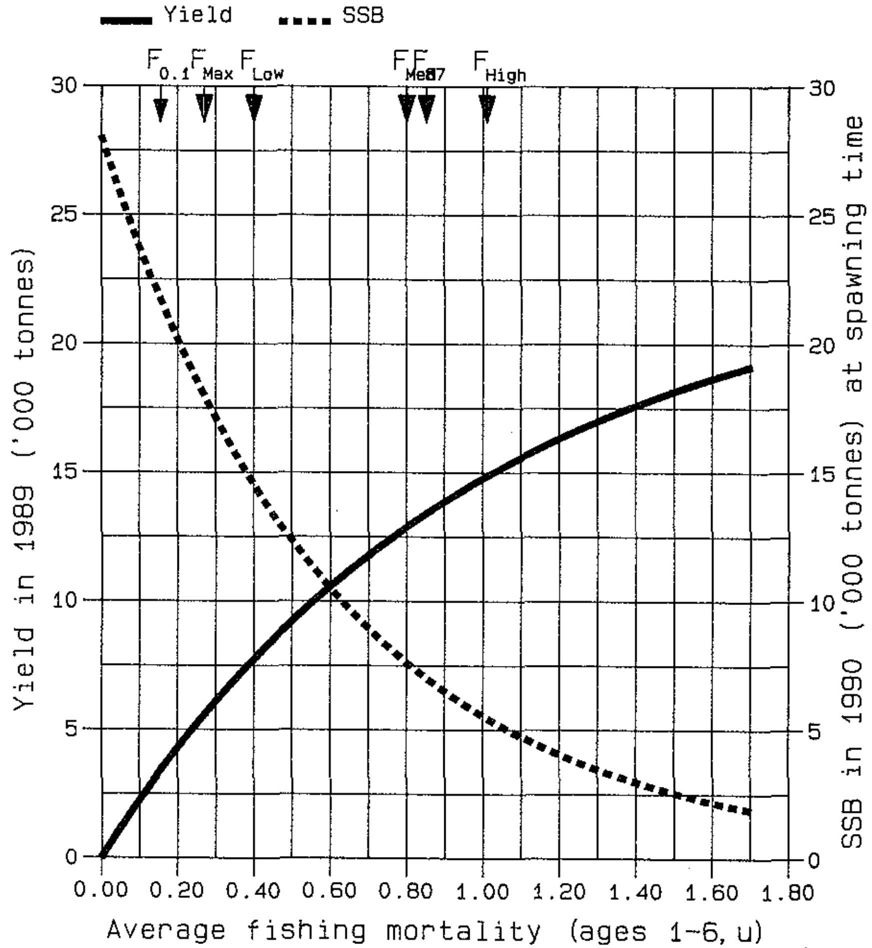
FISH STOCK SUMMARY
STOCK: Irish Sea Cod
03-10-1988

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass

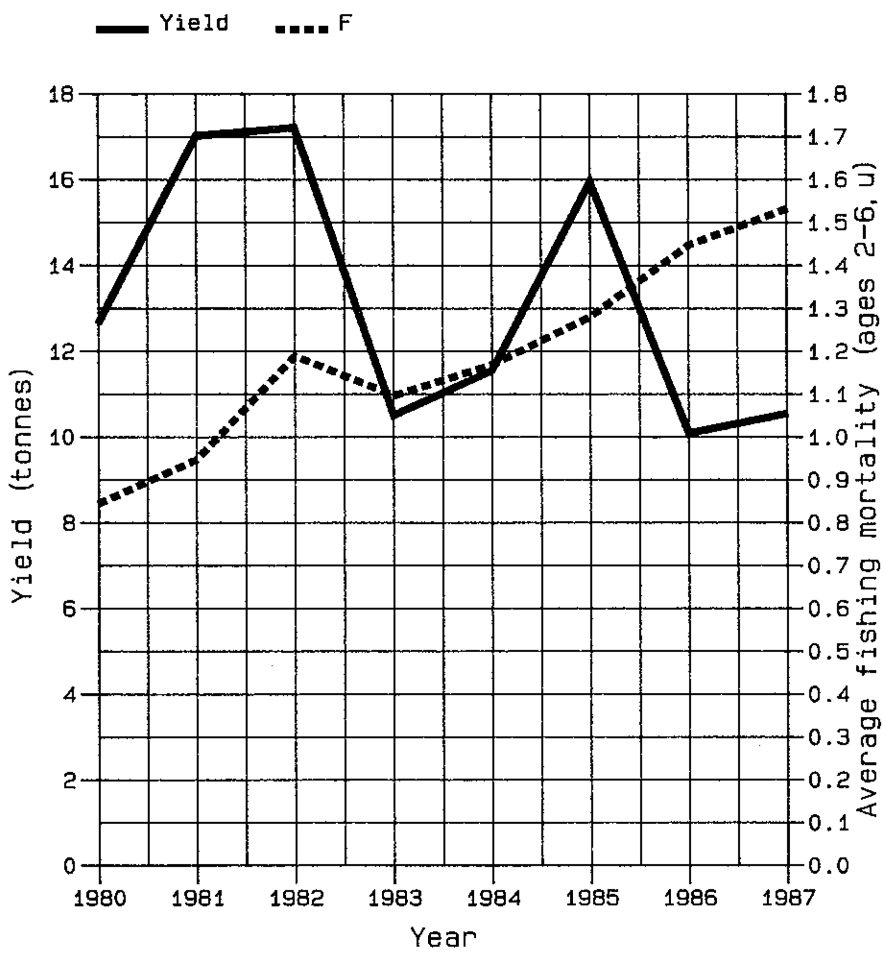


D

Figure 3.7.2

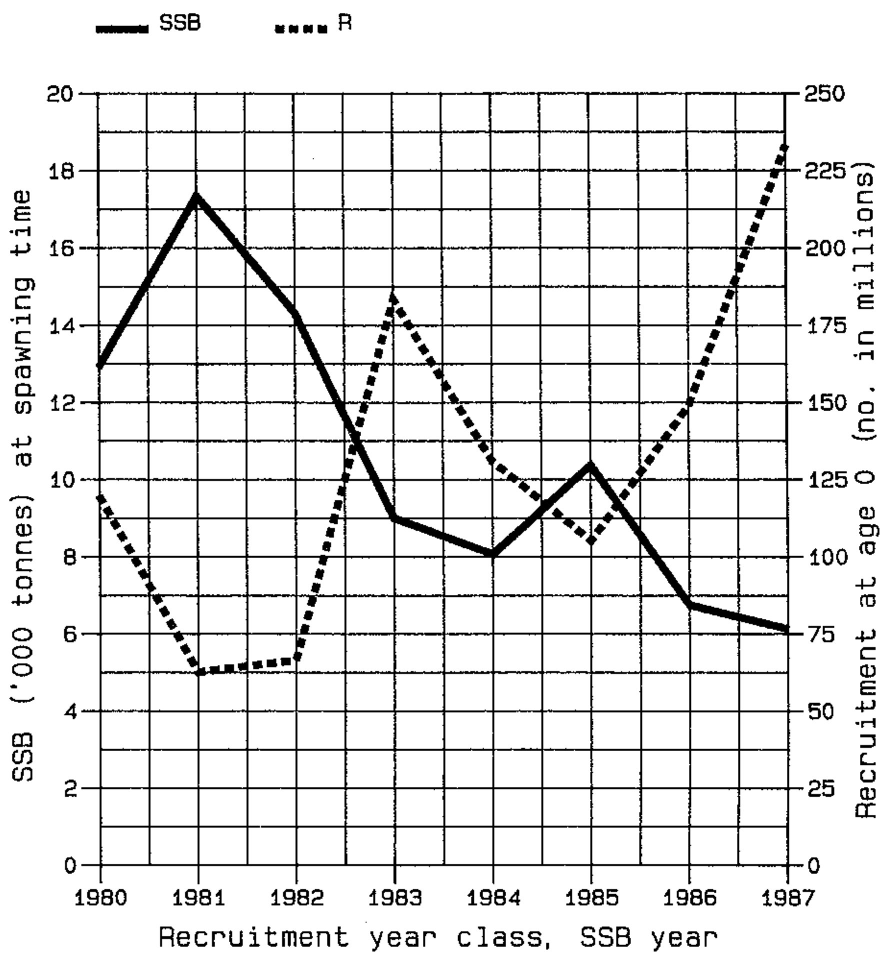
FISH STOCK SUMMARY
STOCK: Irish Sea Whiting
03-10-1988

Trends in yield and fishing mortality (F)



A

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



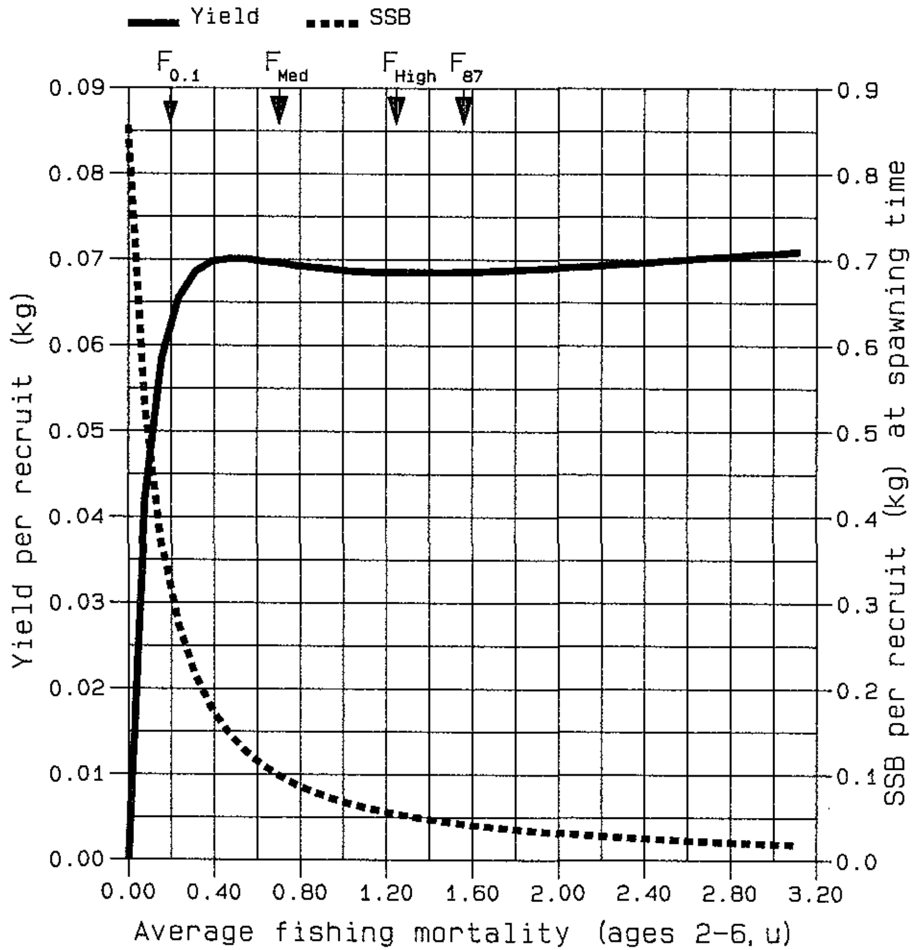
B

cont'd

Figure 3.7.2 (cont'd)

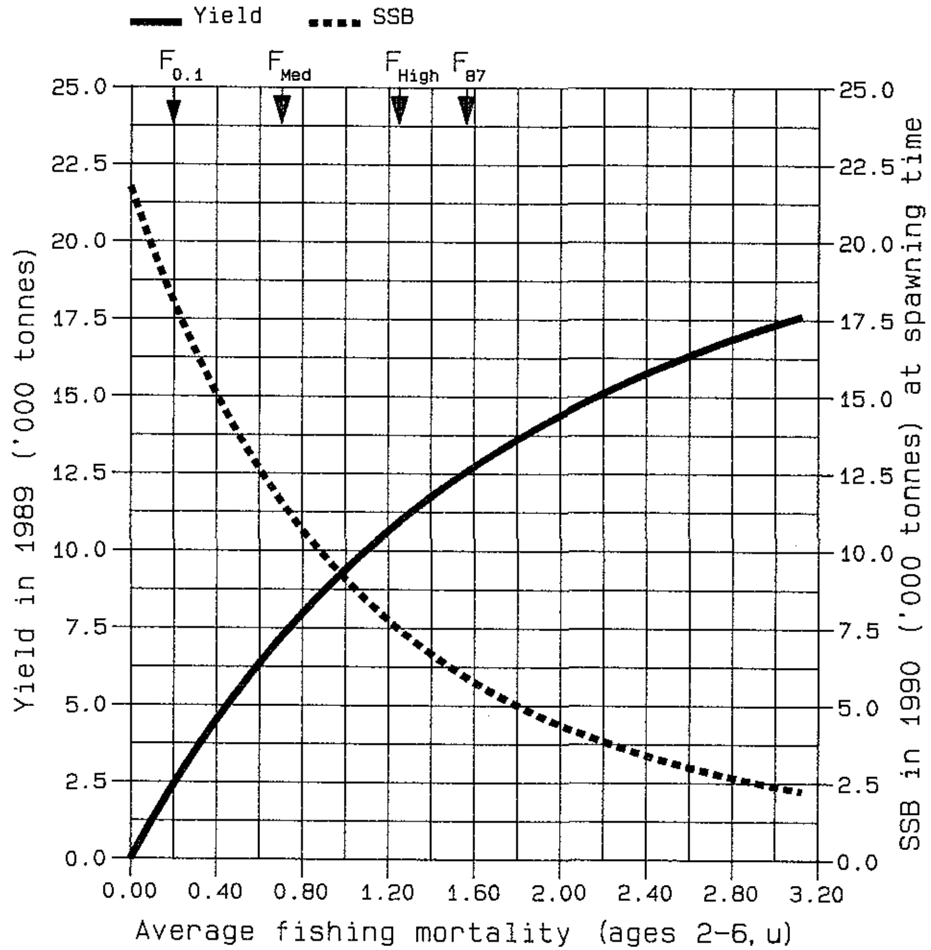
FISH STOCK SUMMARY
STOCK: Irish Sea Whiting
03-10-1988

Long-term yield and spawning stock biomass



C

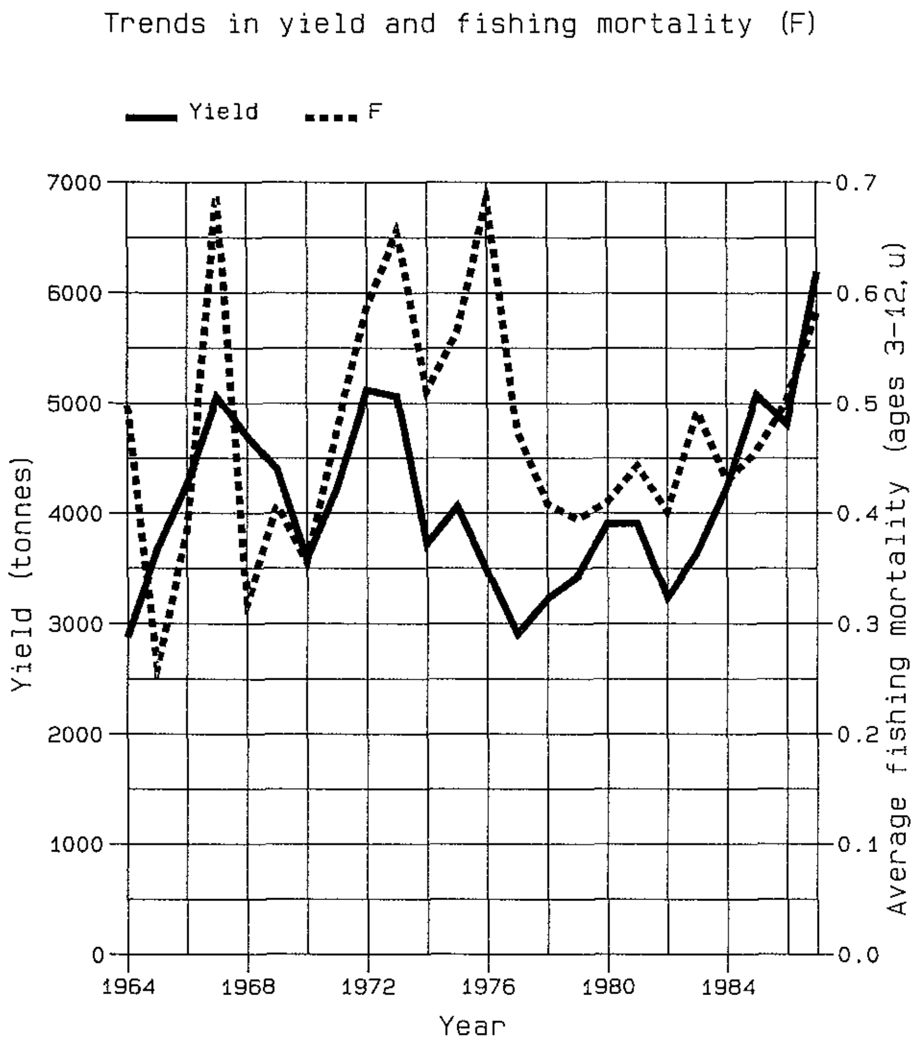
Short-term yield and spawning stock biomass



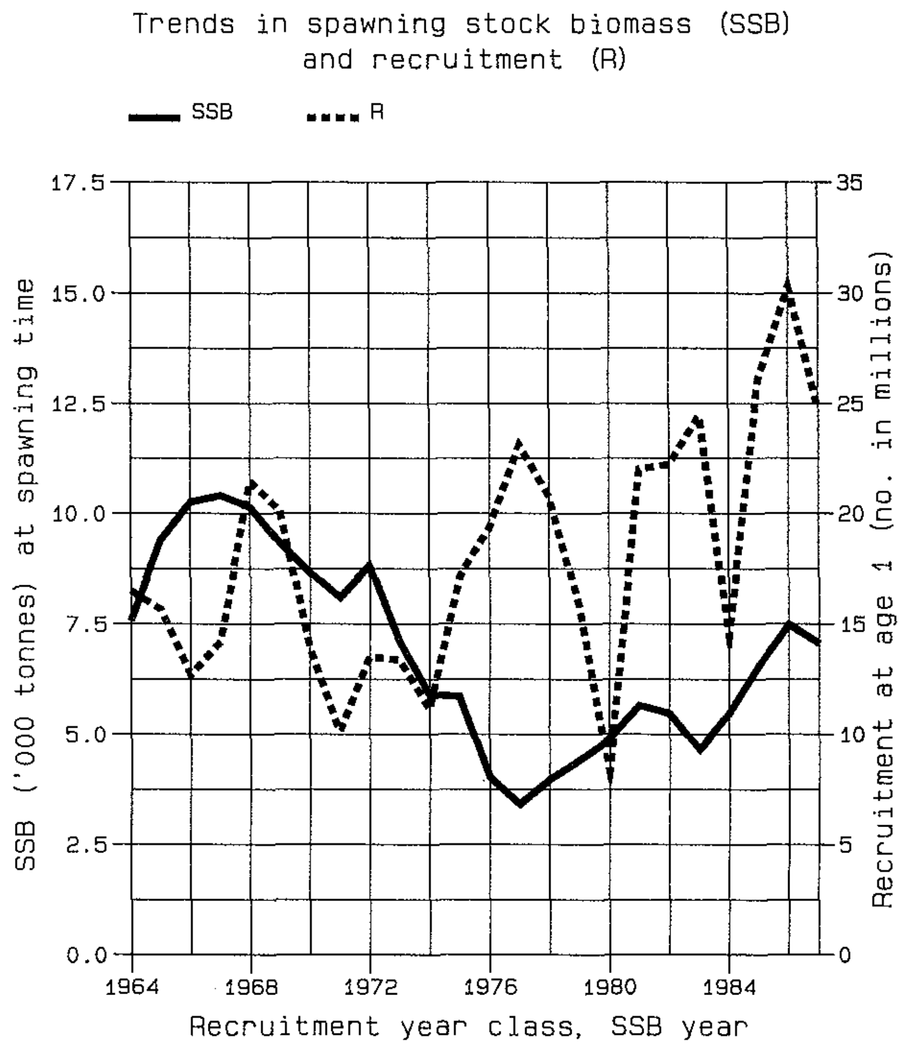
D

Figure 3.7.3

FISH STOCK SUMMARY
STOCK: Irish Sea Plaice
03-10-1988



A



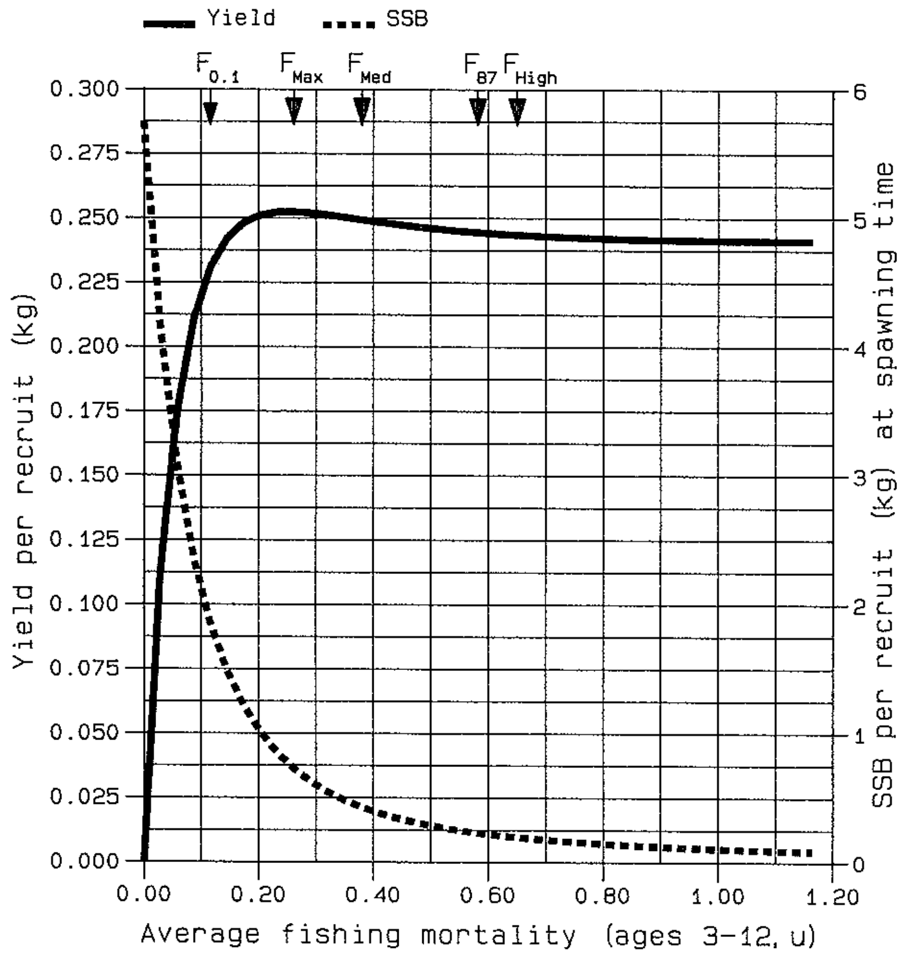
B

cont'd

Figure 3.7.3 (cont'd)

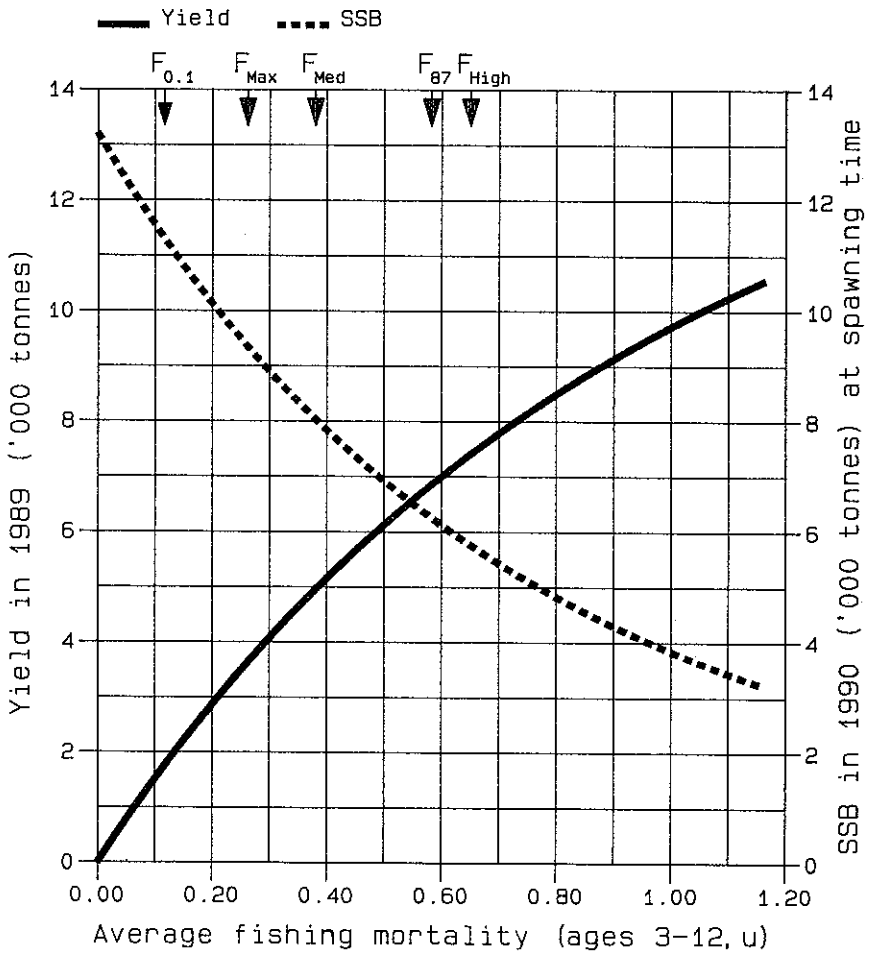
FISH STOCK SUMMARY
STOCK: Irish Sea Plaice
03-10-1988

Long-term yield and spawning stock biomass



C

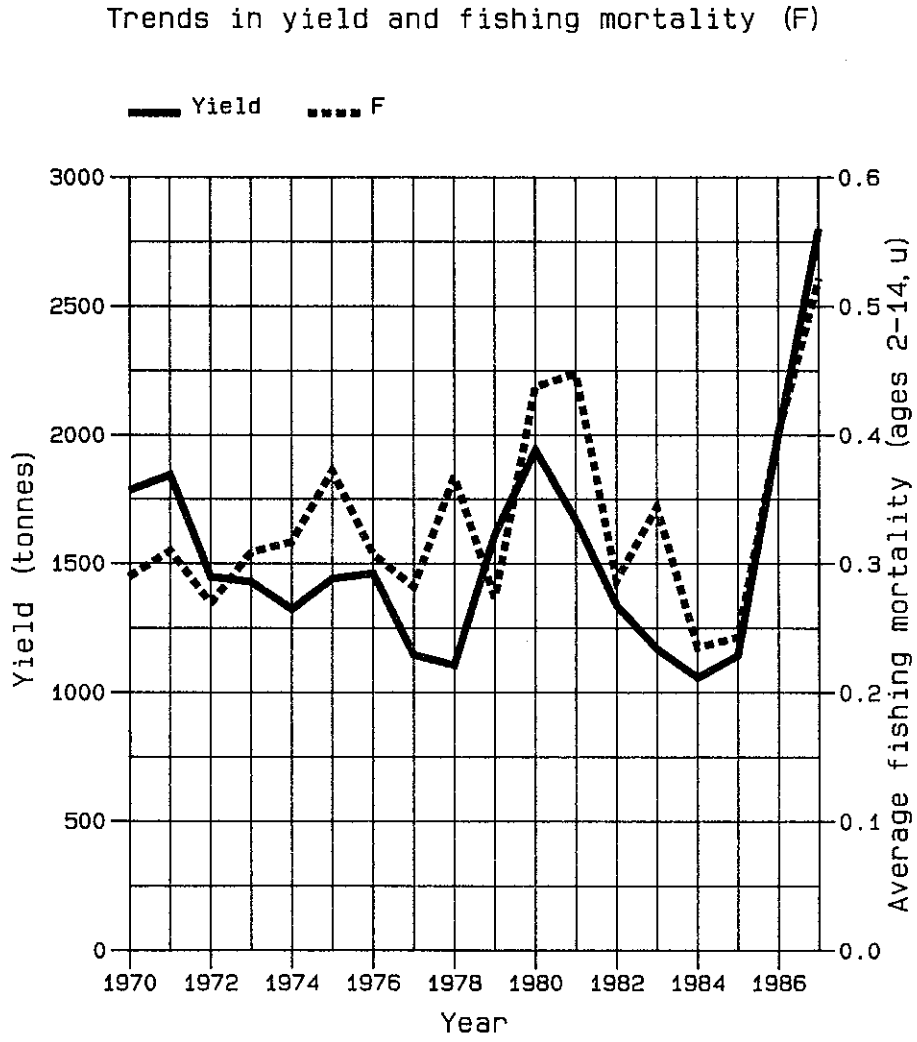
Short-term yield and spawning stock biomass



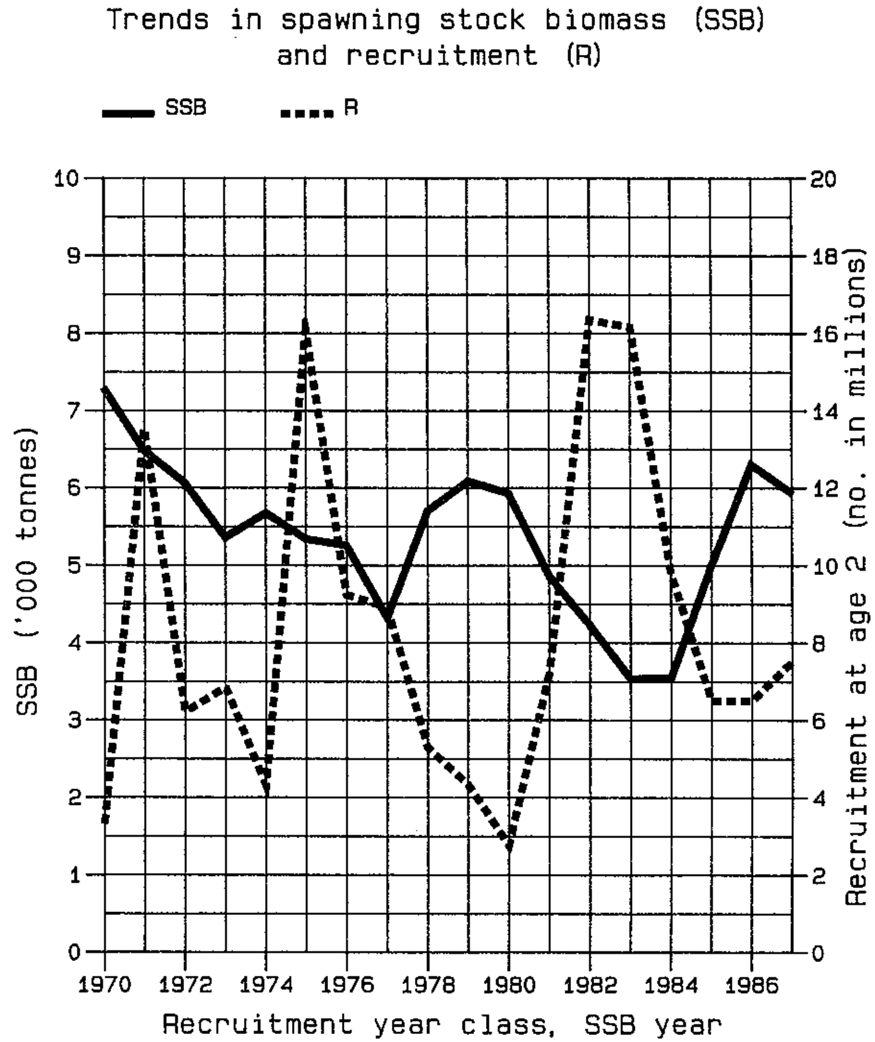
D

Figure 3.7.4

FISH STOCK SUMMARY
STOCK: Irish Sea Sole
03-10-1988



A



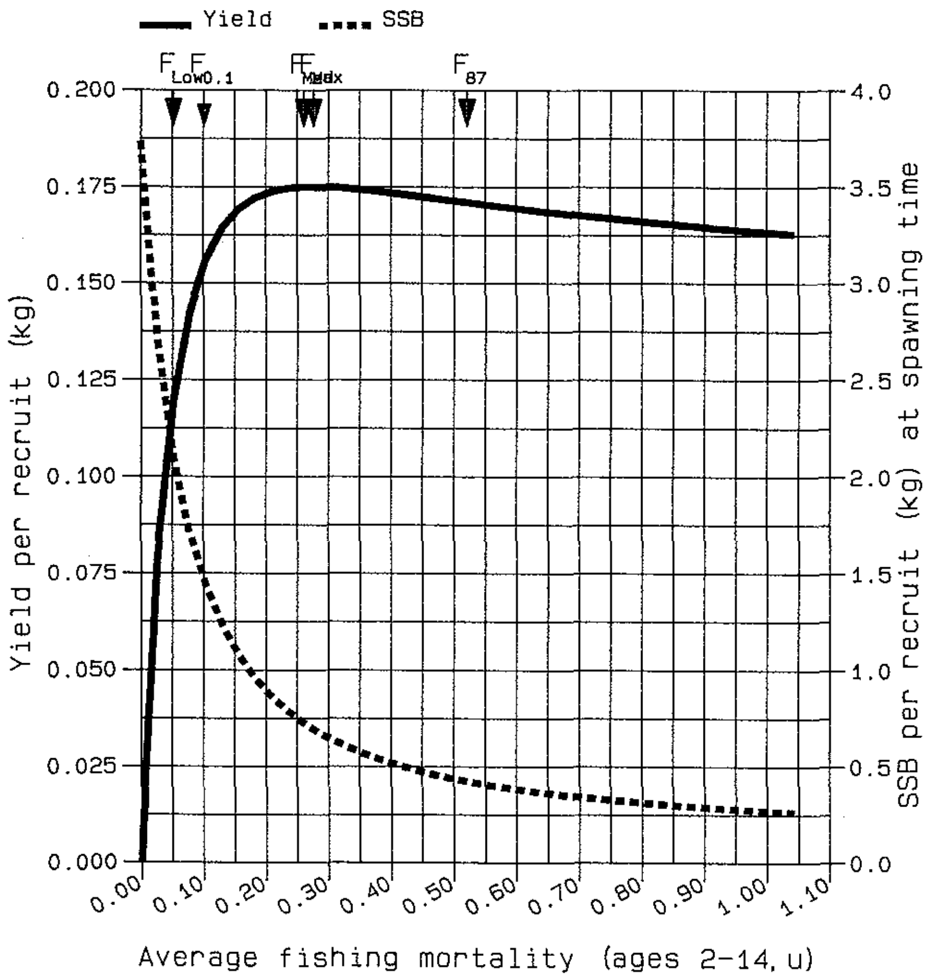
B

cont'd

Figure 3.7.4 (cont'd)

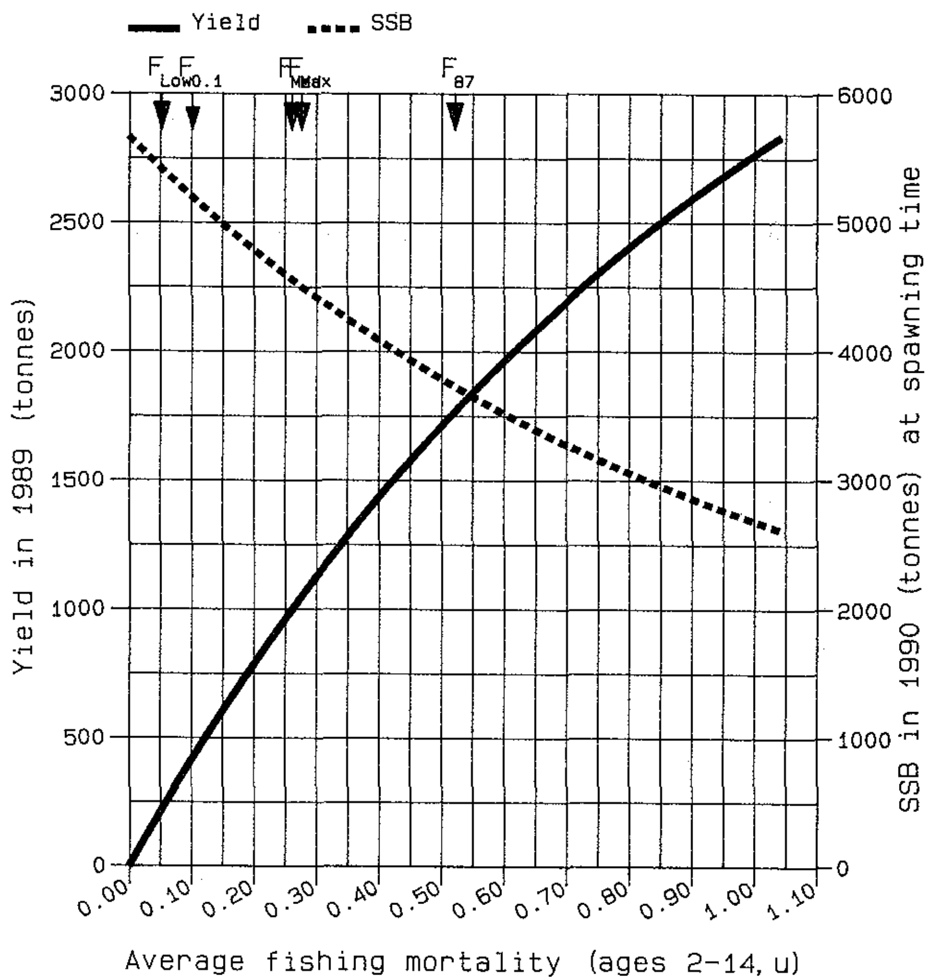
FISH STOCK SUMMARY
STOCK: Irish Sea Sole
03-10-1988

Long-term yield and spawning stock biomass



C

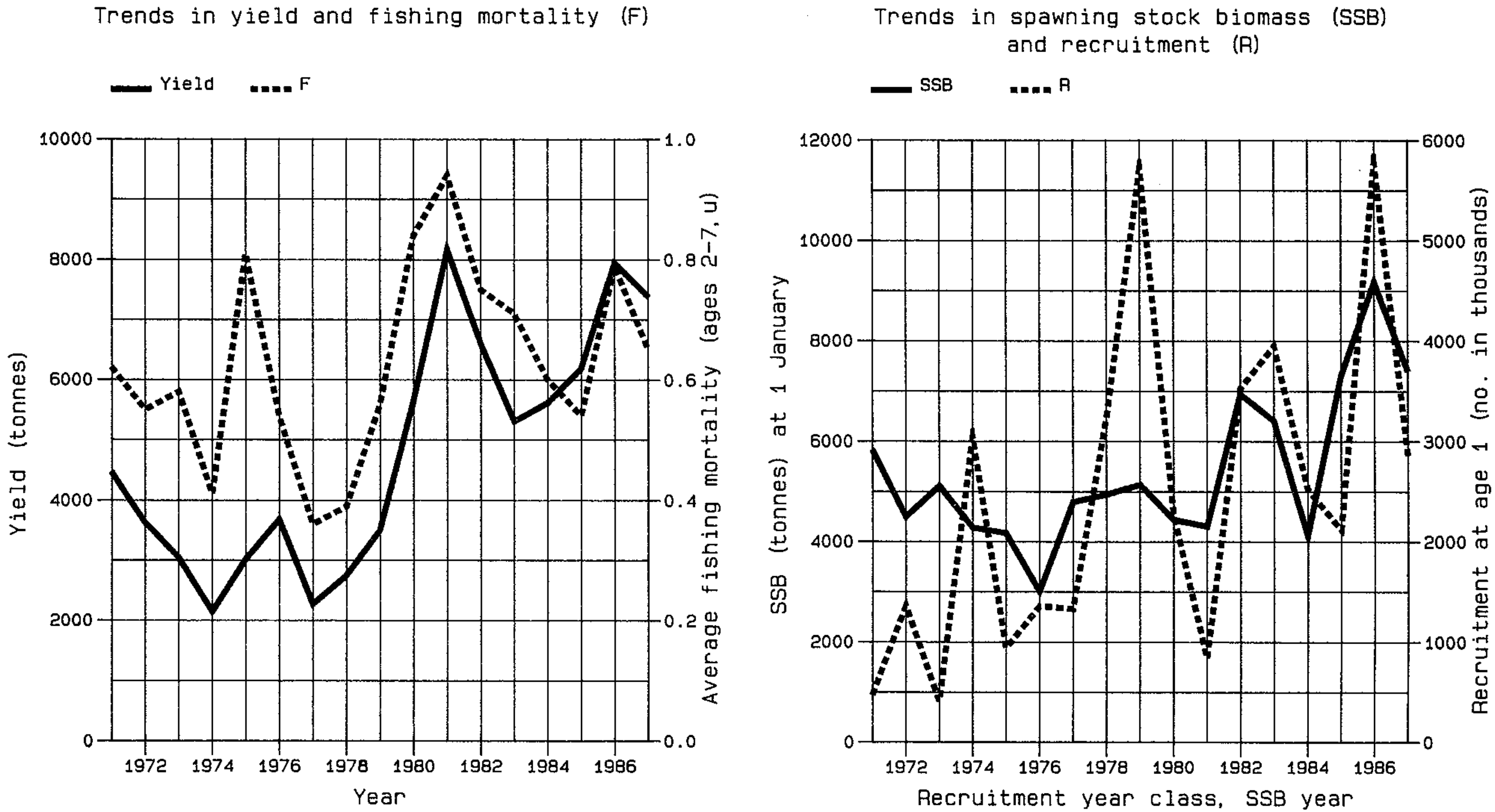
Short-term yield and spawning stock biomass



D

Figure 3.7.5

FISH STOCK SUMMARY
STOCK: Celtic Sea Cod
03-10-1988



A

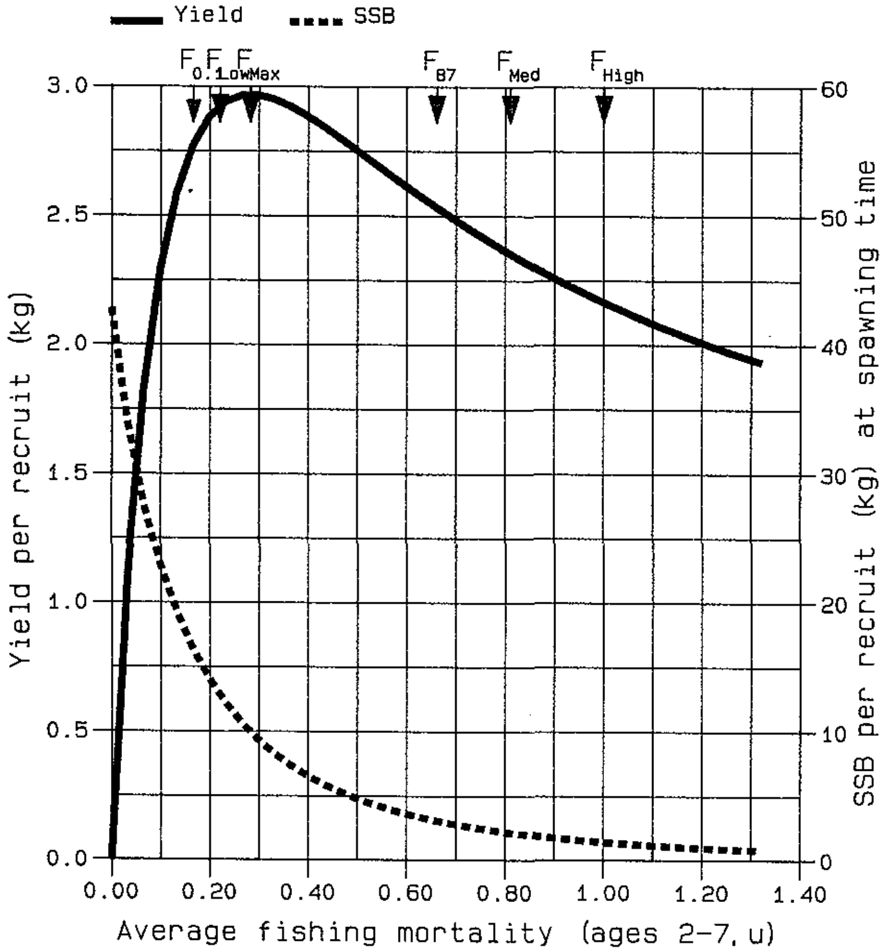
B

cont'd

Figure 3.7.5 (cont'd)

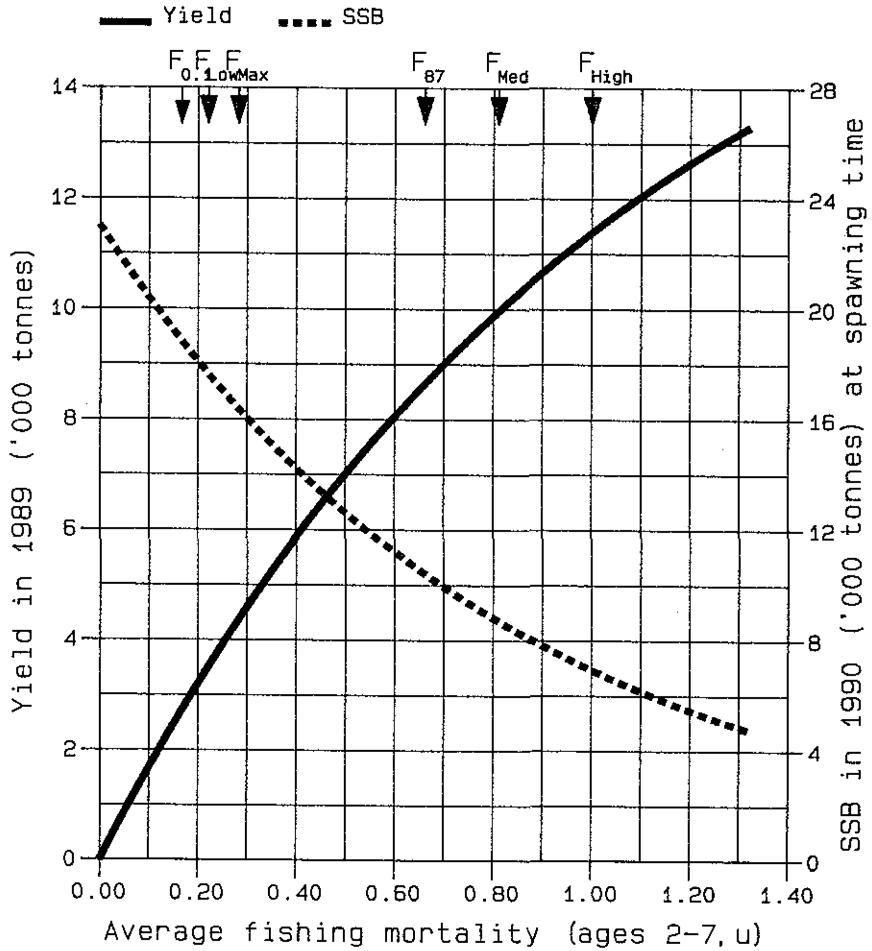
FISH STOCK SUMMARY
STOCK: Celtic Sea Cod
03-10-1988

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass

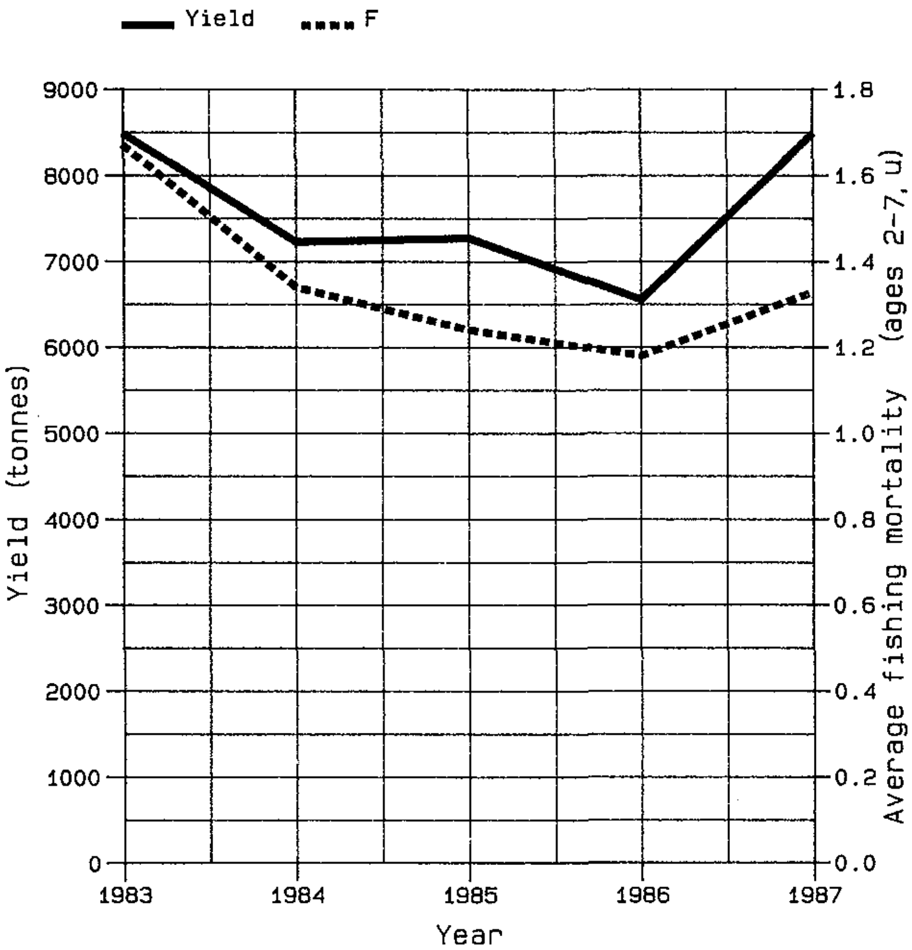


D

Figure 3.7.6

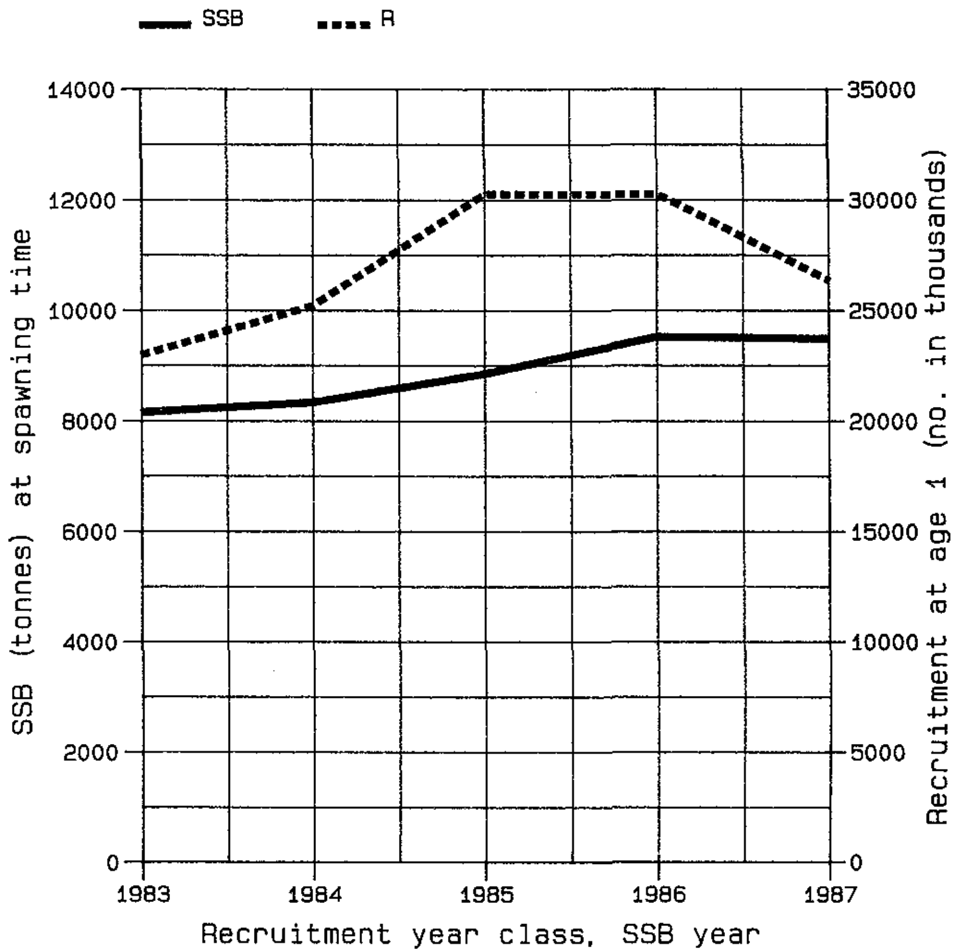
FISH STOCK SUMMARY
STOCK: Celtic Sea Whiting
03-10-1988

Trends in yield and fishing mortality (F)



A

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



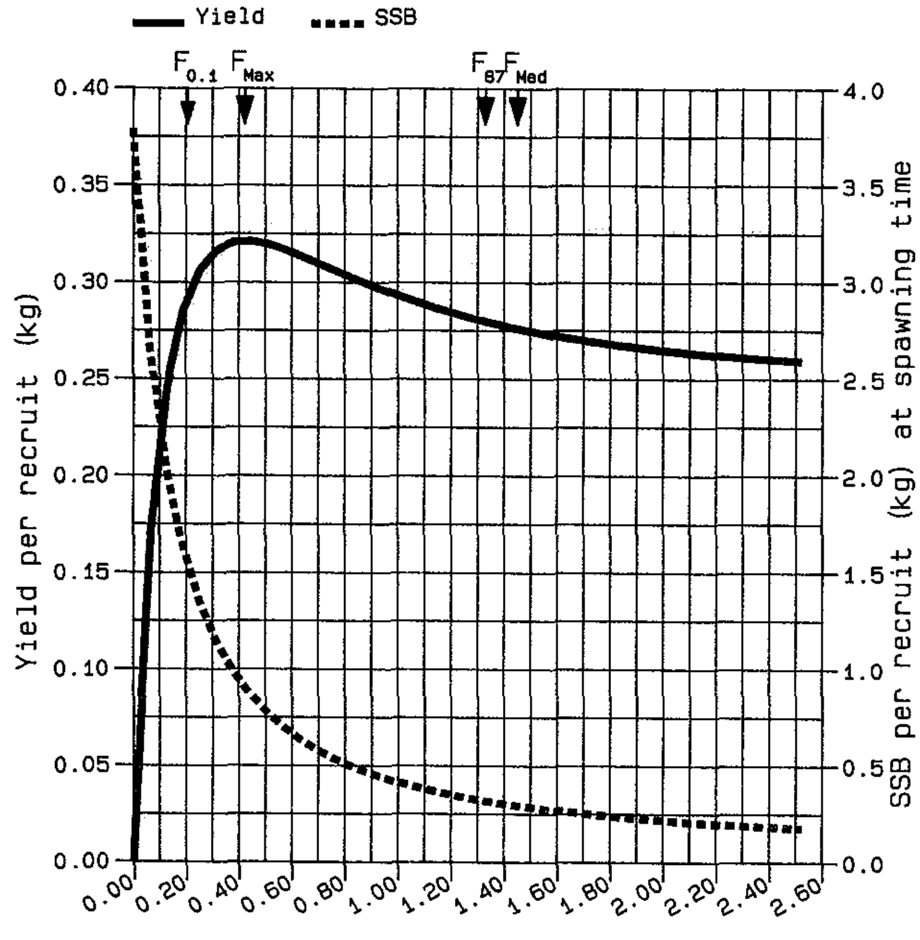
B

cont'd

Figure 3.7.6 (cont'd)

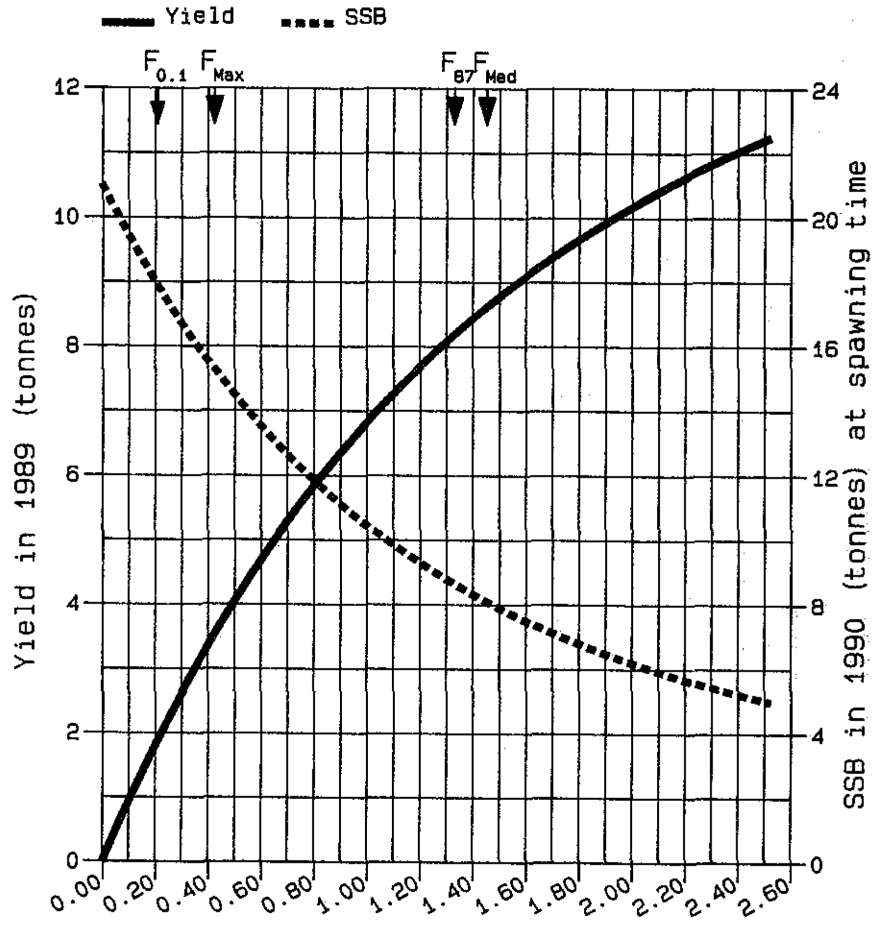
FISH STOCK SUMMARY
STOCK: Celtic Sea Whiting
03-10-1988

Long-term yield and spawning stock biomass



C

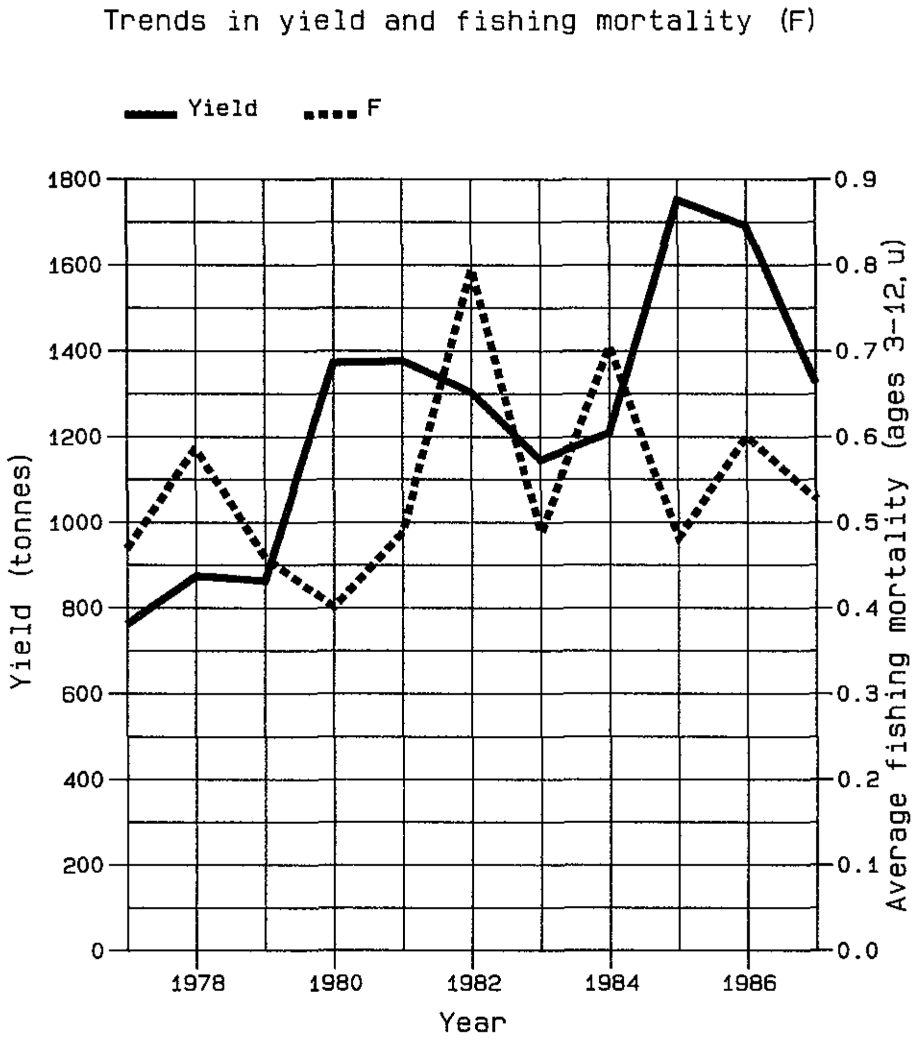
Short-term yield and spawning stock biomass



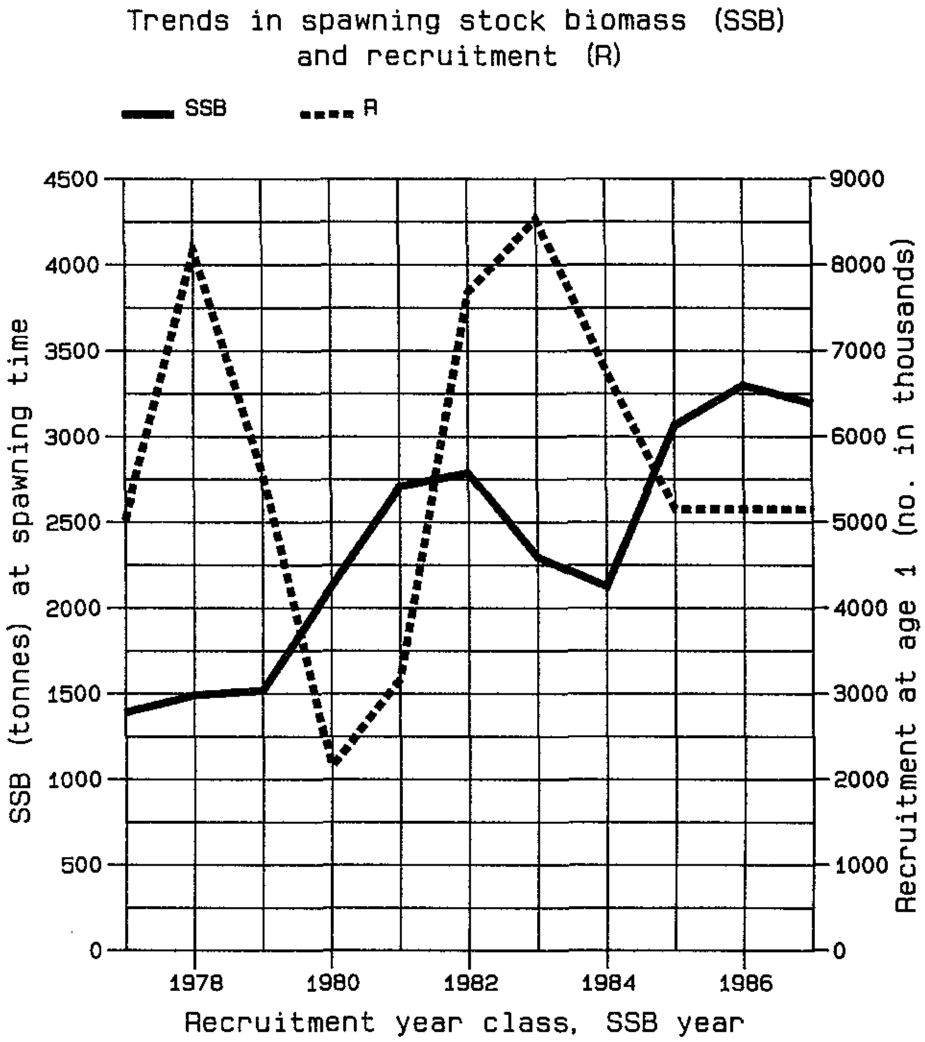
D

Figure 3.7.7

FISH STOCK SUMMARY
STOCK: Celtic Sea Plaice
03-10-1988



A



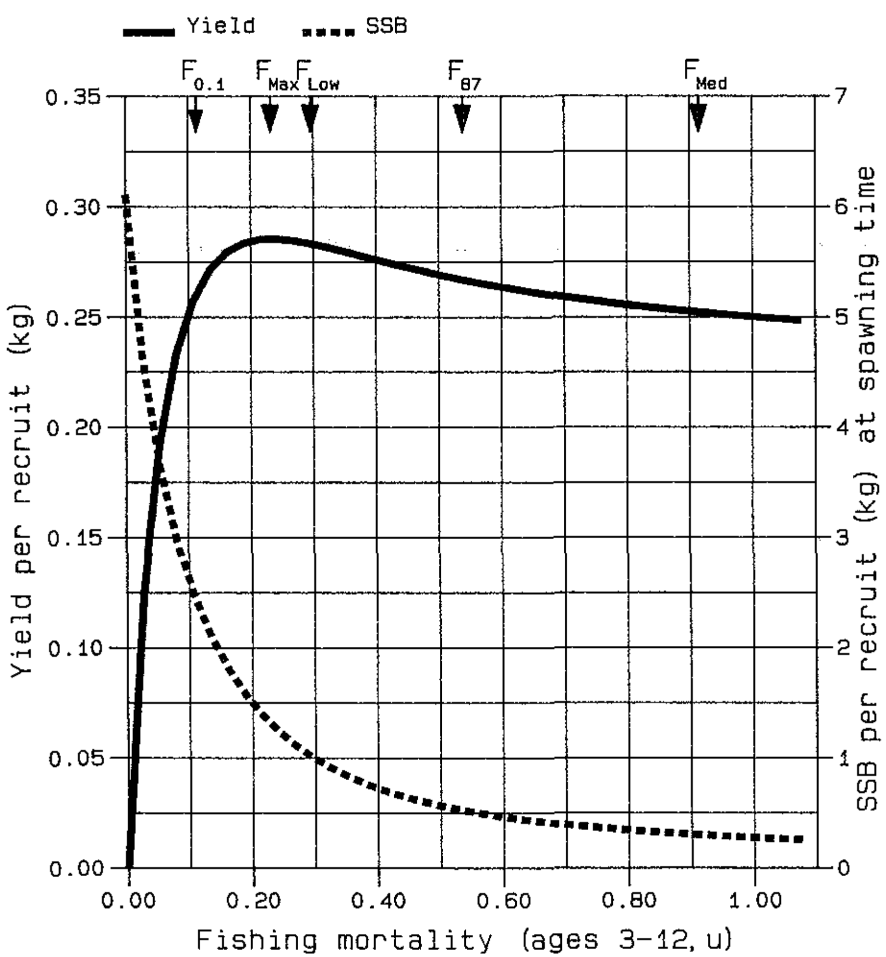
B

cont'd

Figure 3.7.7 (cont'd)

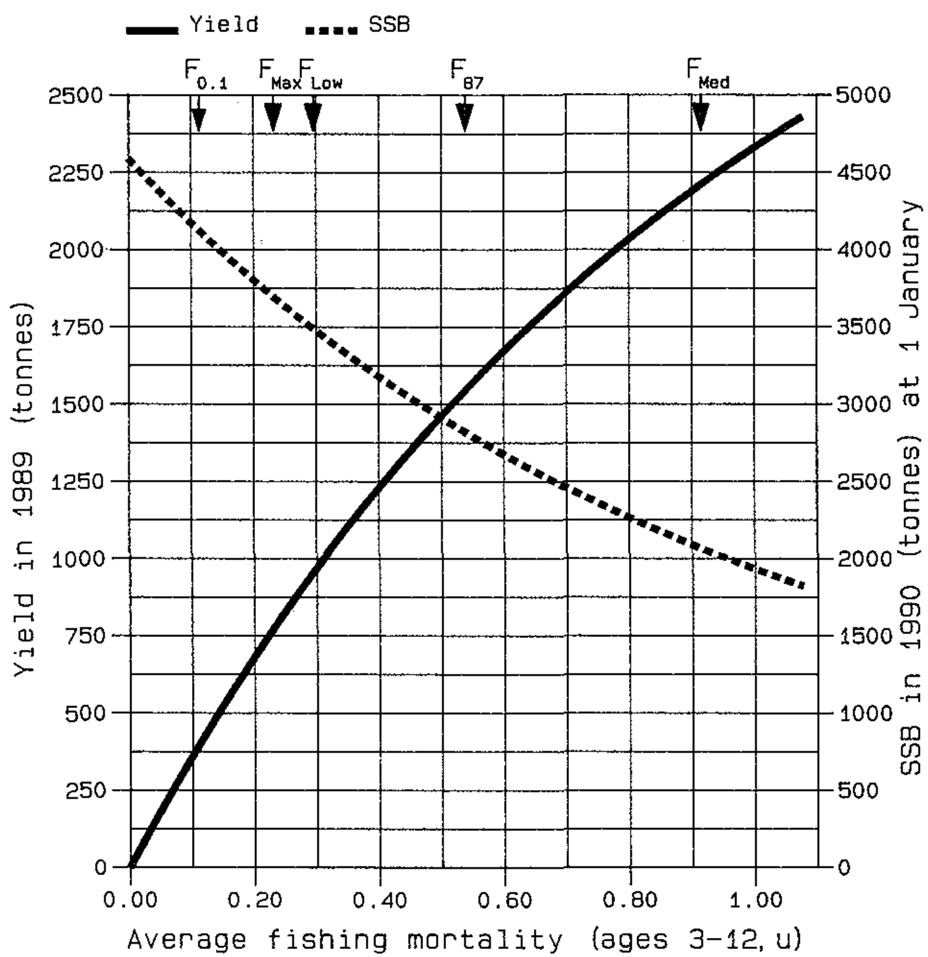
FISH STOCK SUMMARY
STOCK: Celtic Sea Plaice
03-10-1988

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass

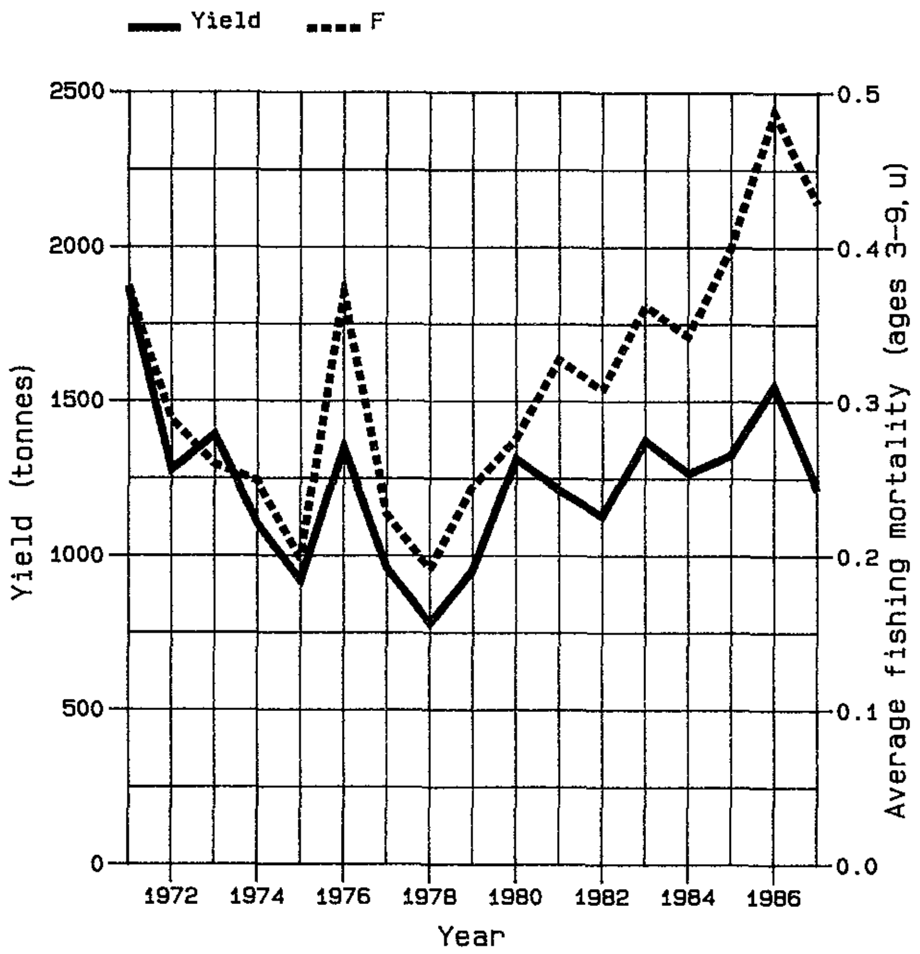


D

Figure 3.7.8

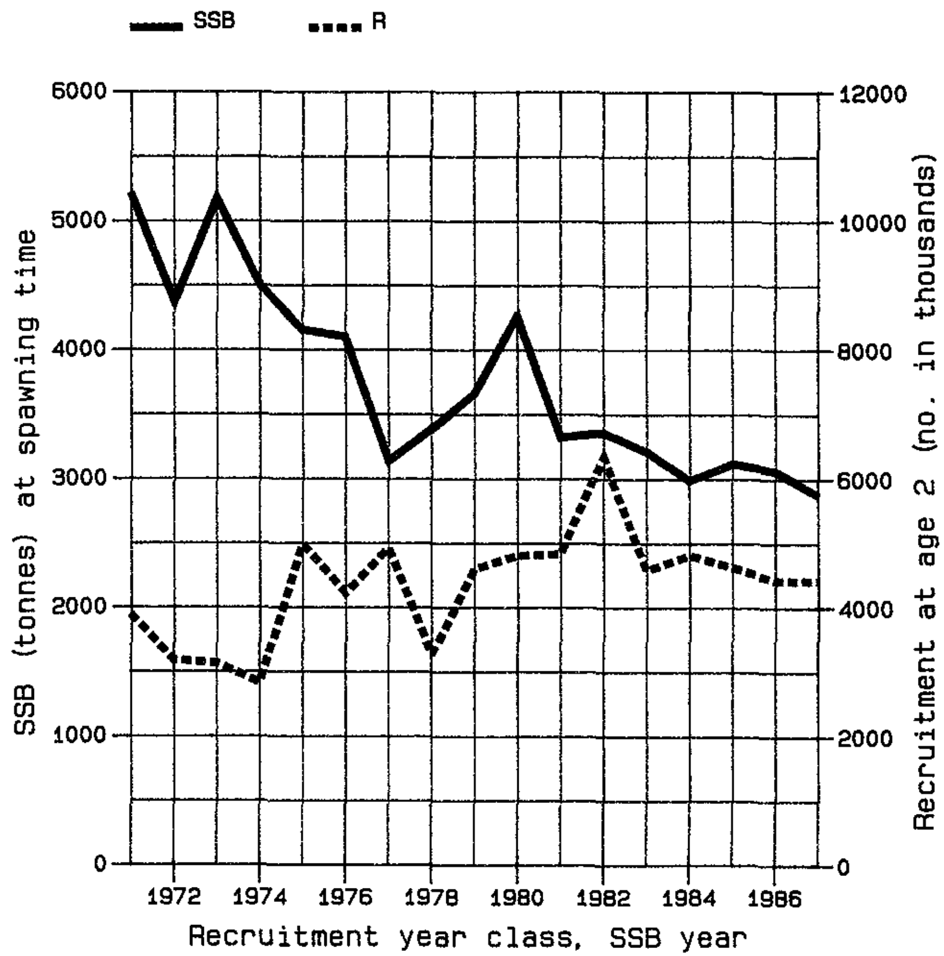
FISH STOCK SUMMARY
STOCK: Celtic Sea Sole
03-10-1988

Trends in yield and fishing mortality (F)



A

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



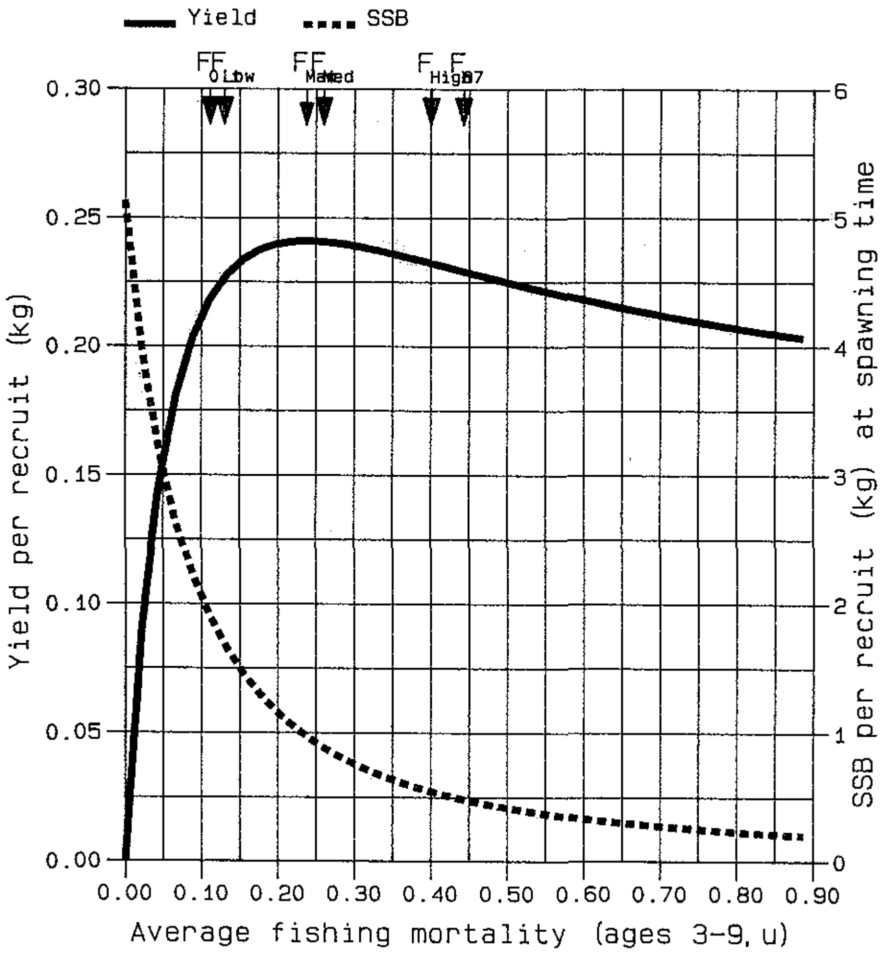
B

cont'd

Figure 3.7.8 (cont'd)

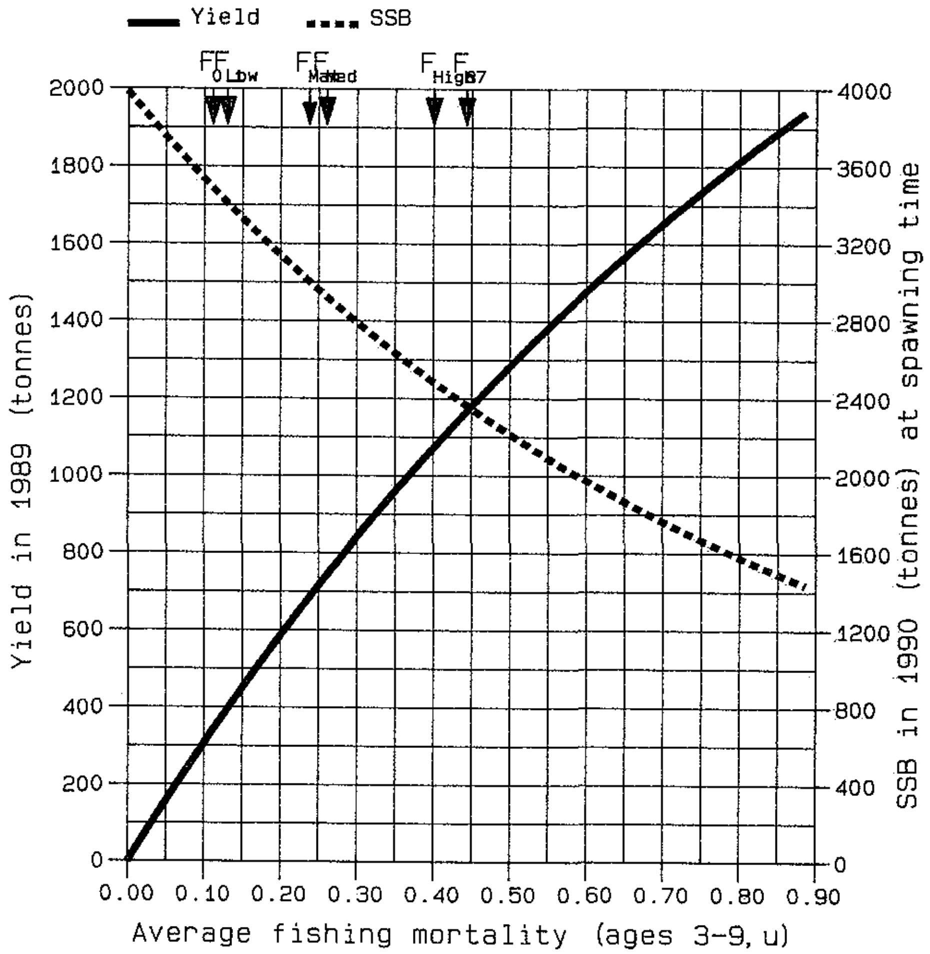
FISH STOCK SUMMARY
STOCK: Celtic Sea Sole
03-10-1988

Long-term yield and spawning stock biomass



C

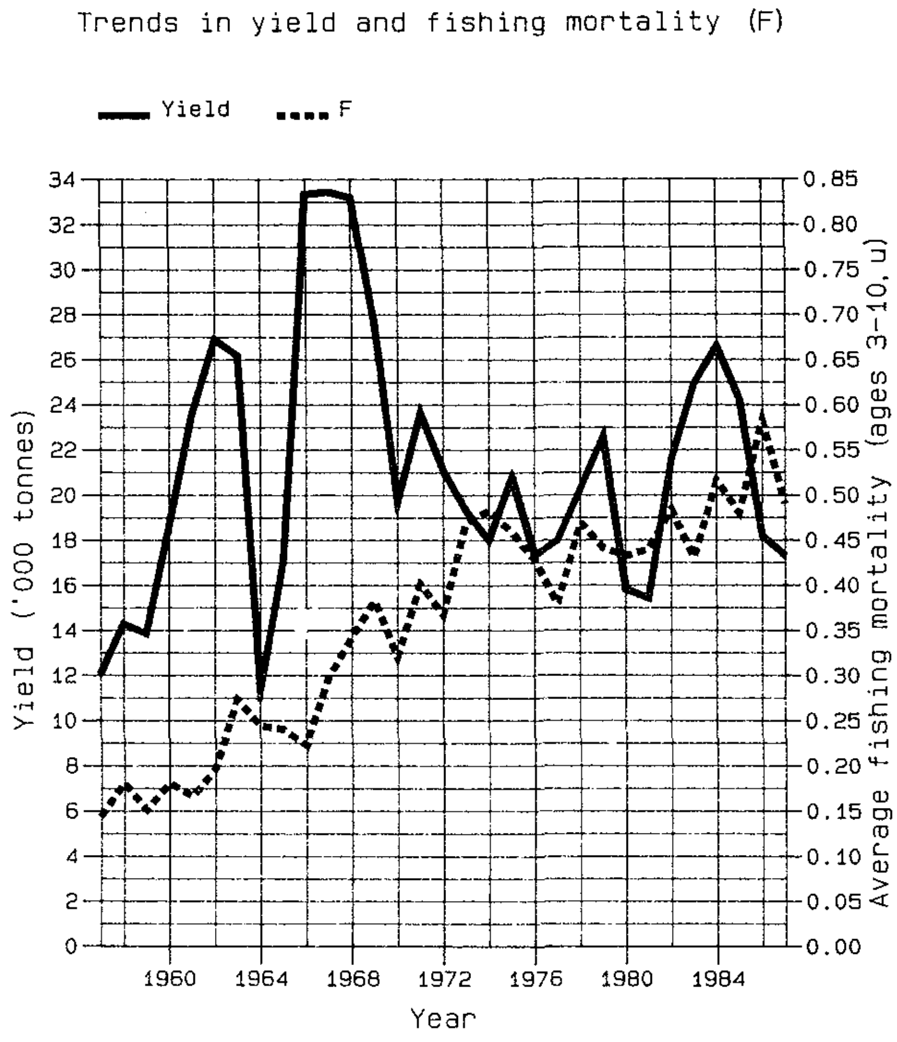
Short-term yield and spawning stock biomass



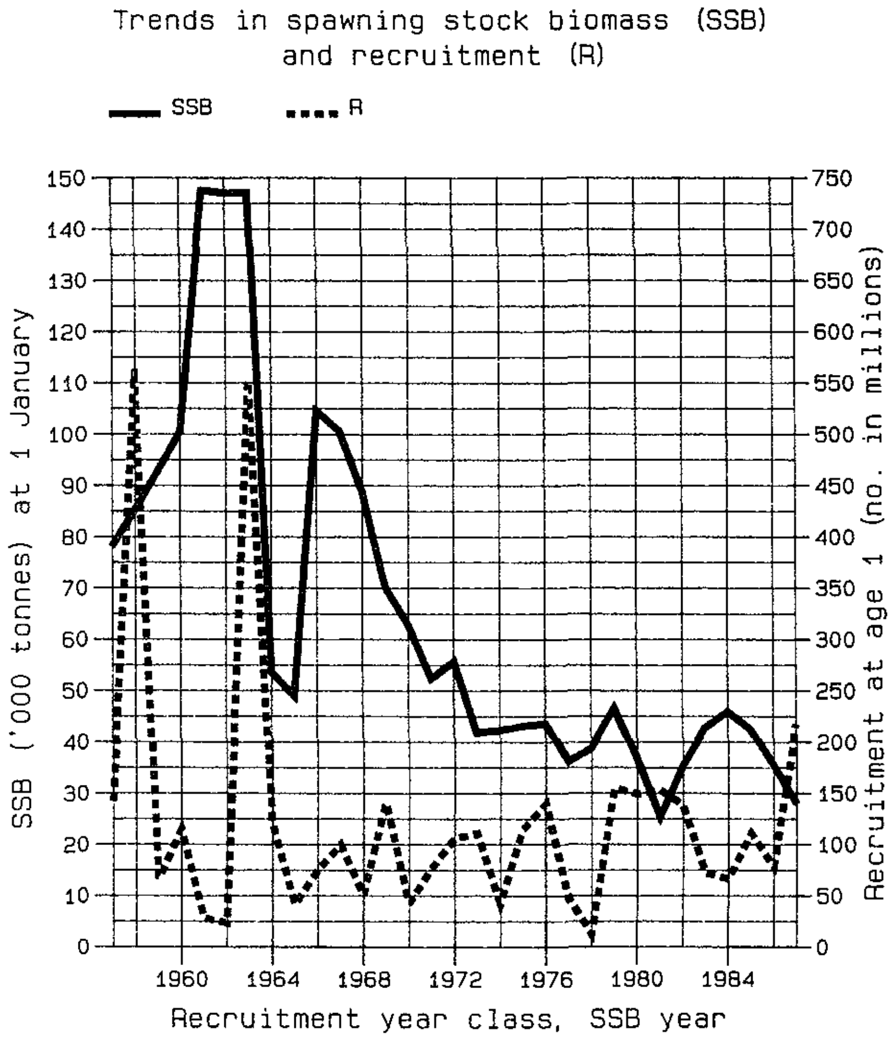
D

Figure 3.8.1

FISH STOCK SUMMARY
STOCK: North Sea Sole
28-10-1988



A



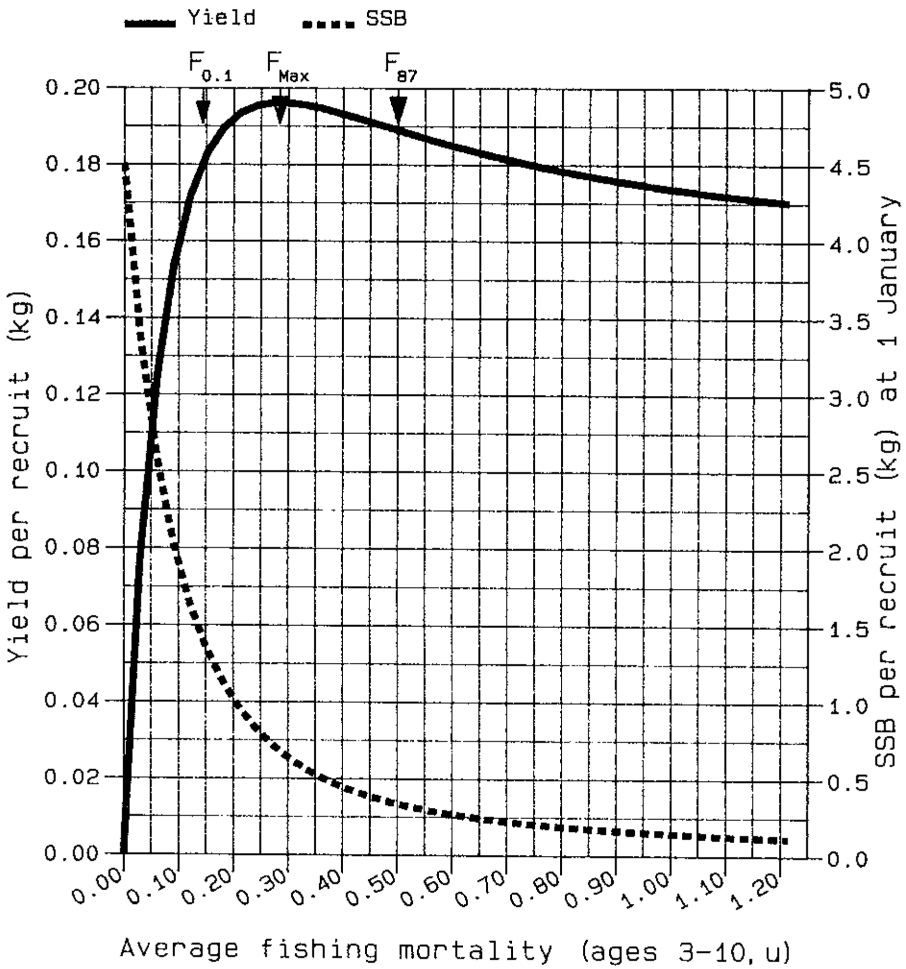
B

cont'd.

Figure 3.8.1 cont'd.

FISH STOCK SUMMARY
STOCK: North Sea Sole
28-10-1988

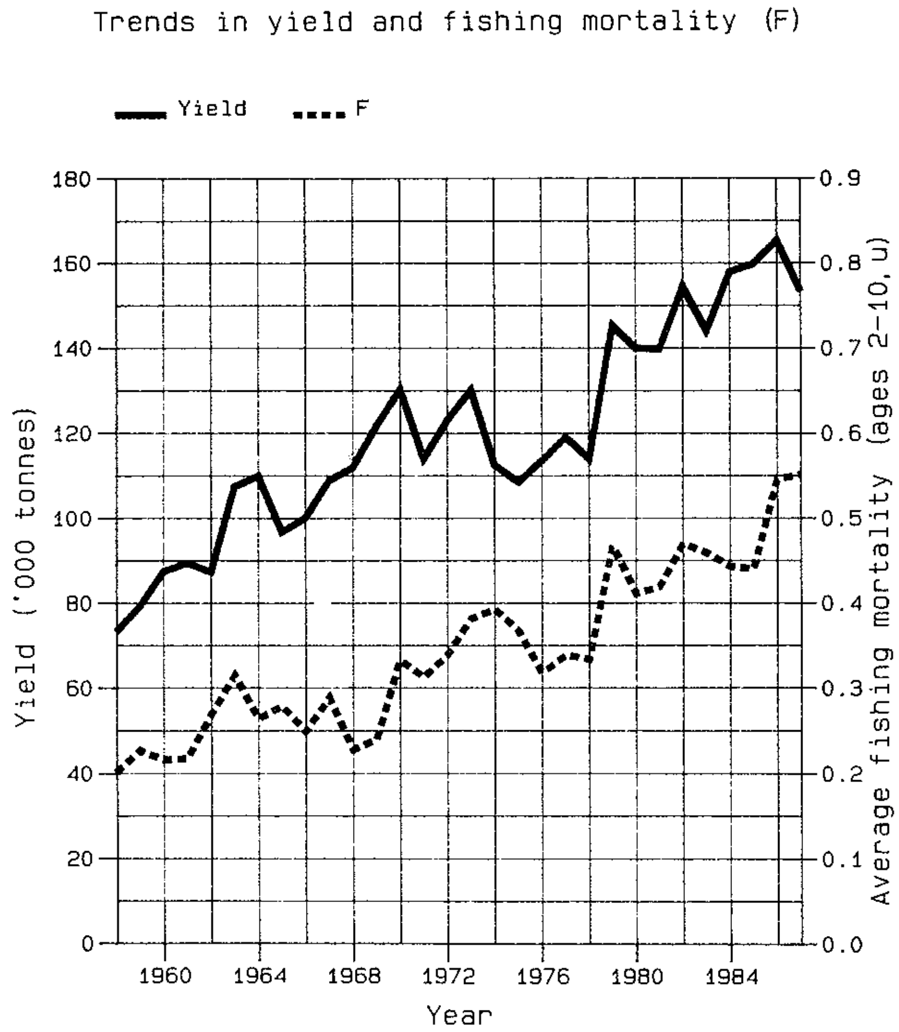
Long-term yield and spawning stock biomass



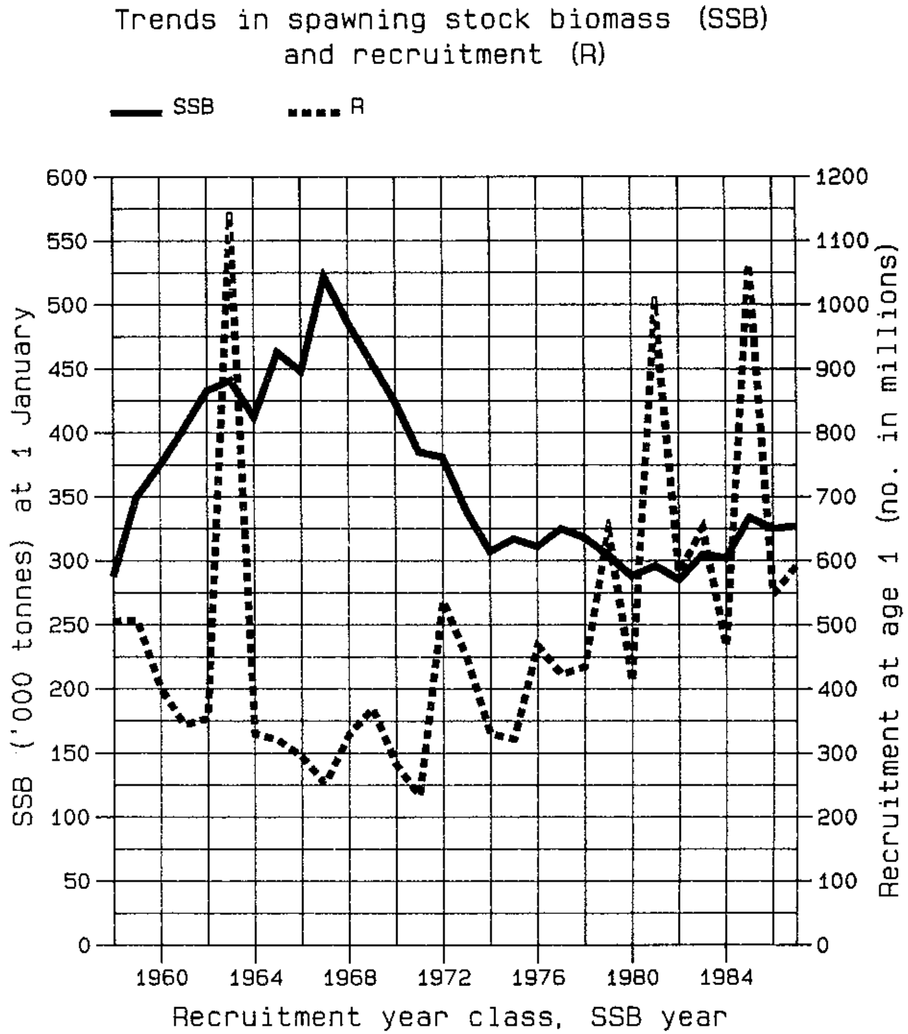
C

Figure 3.8.2

FISH STOCK SUMMARY
STOCK:North Sea Plaice
28-10-1988



A



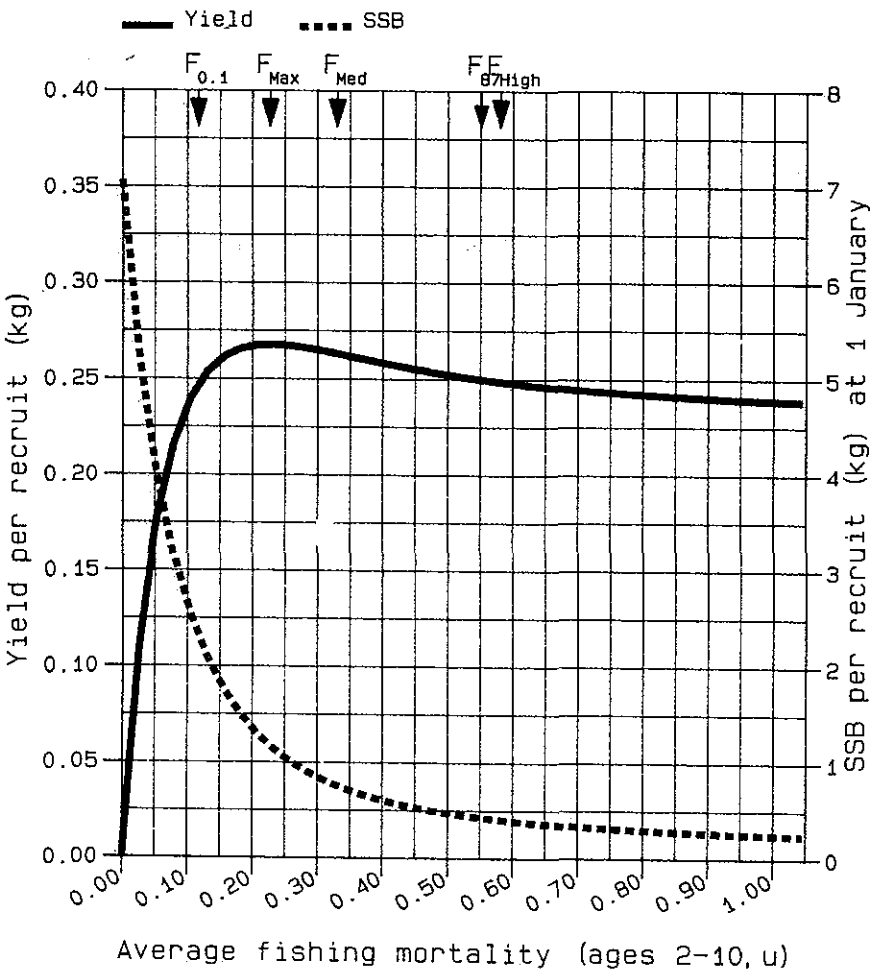
B

cont'd.

Figure 3.8.2 cont'd.

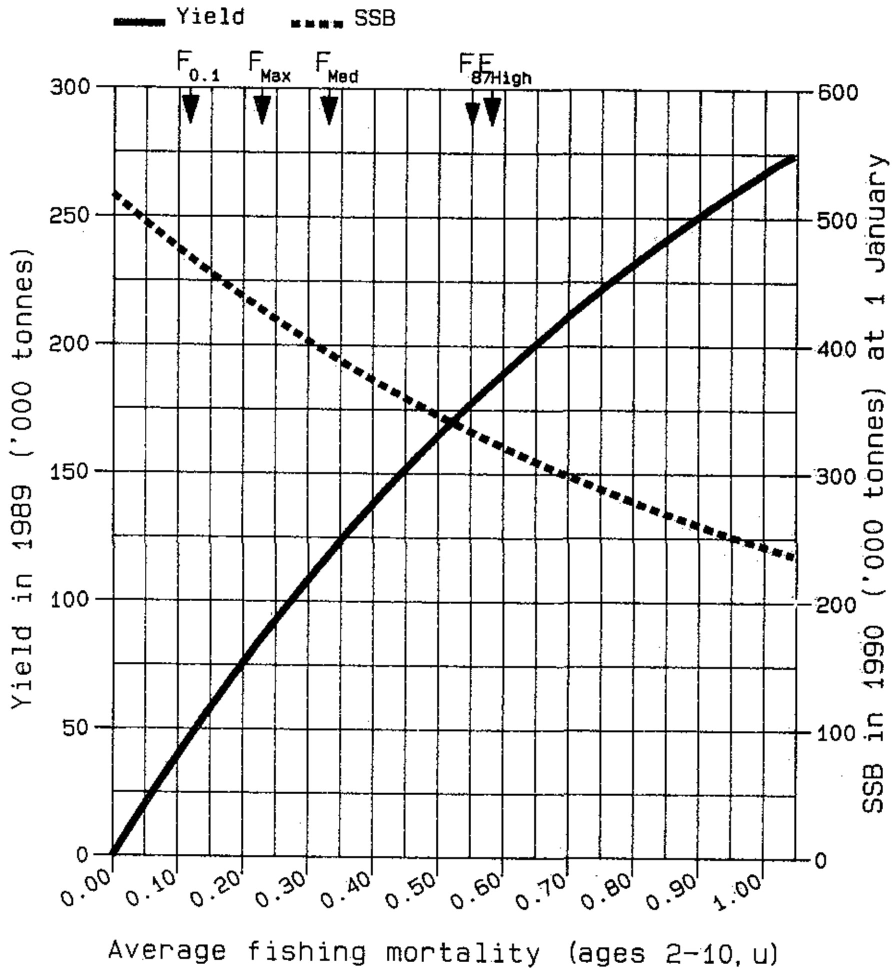
FISH STOCK SUMMARY
STOCK:North Sea Plaice
28-10-1988

Long-term yield and spawning stock biomass



C

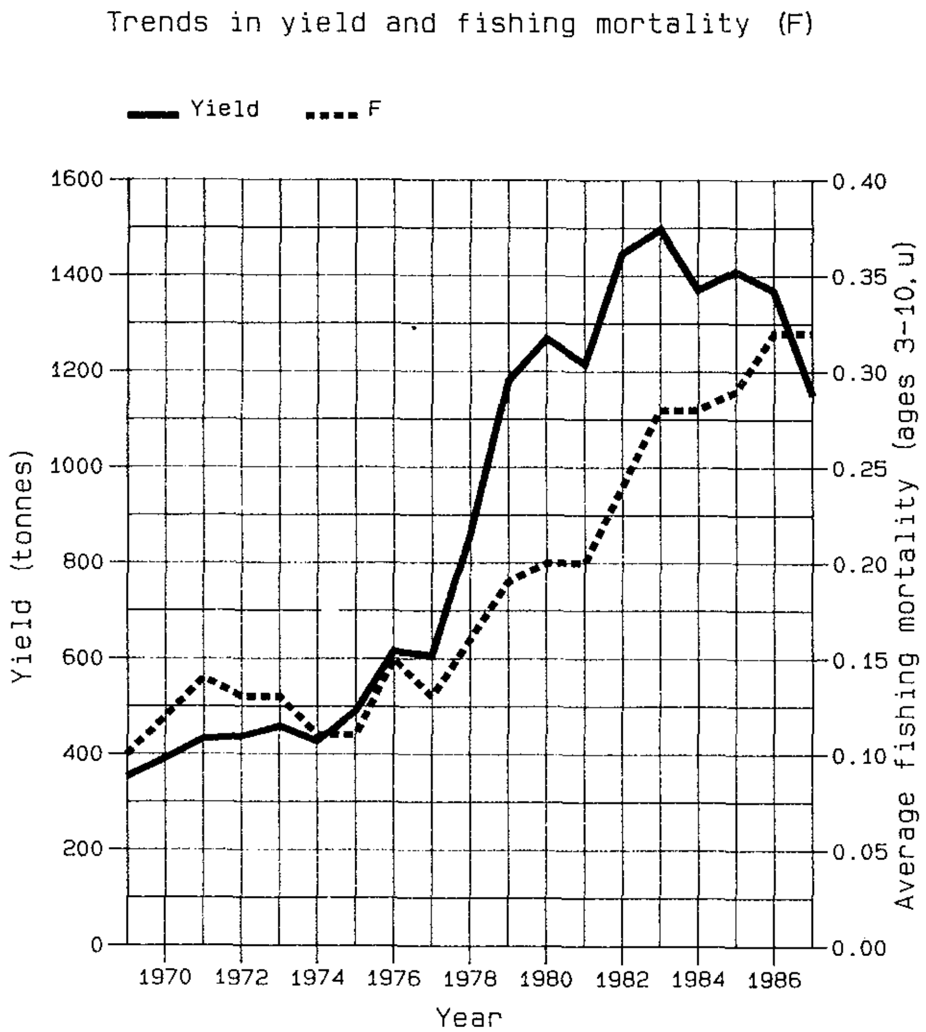
Short-term yield and spawning stock biomass



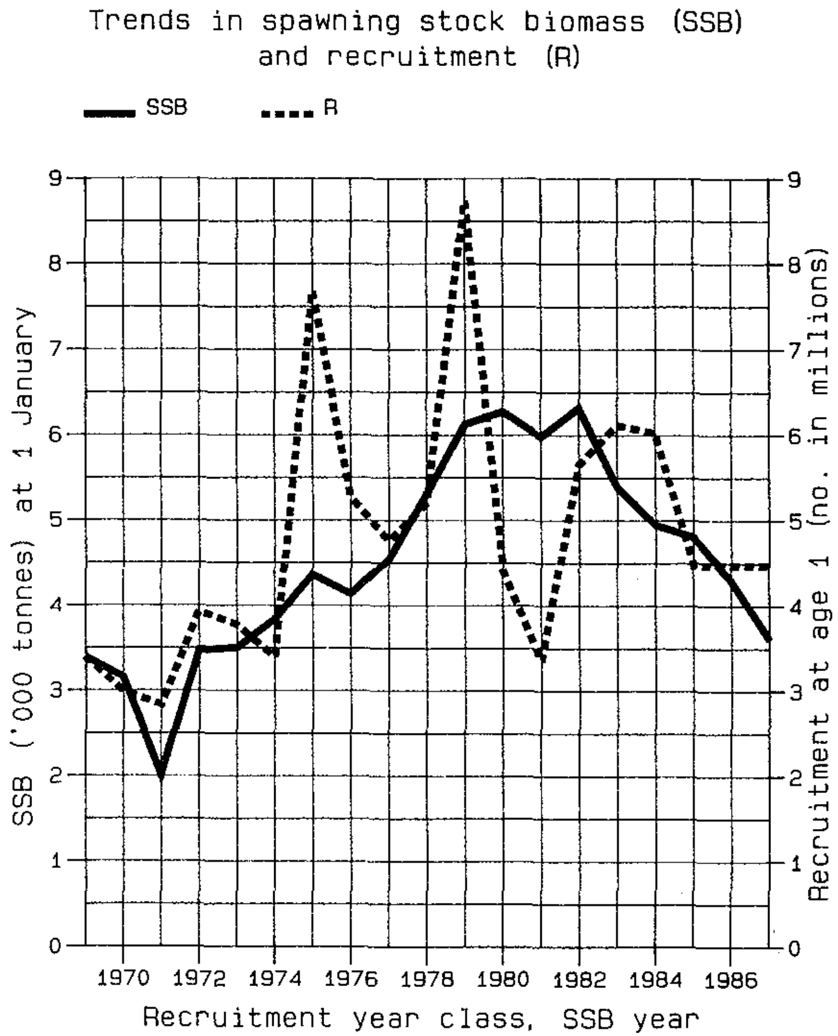
D

Figure 3.8.4

FISH STOCK SUMMARY
STOCK: Division VIIe Sole
28-10-1988



A



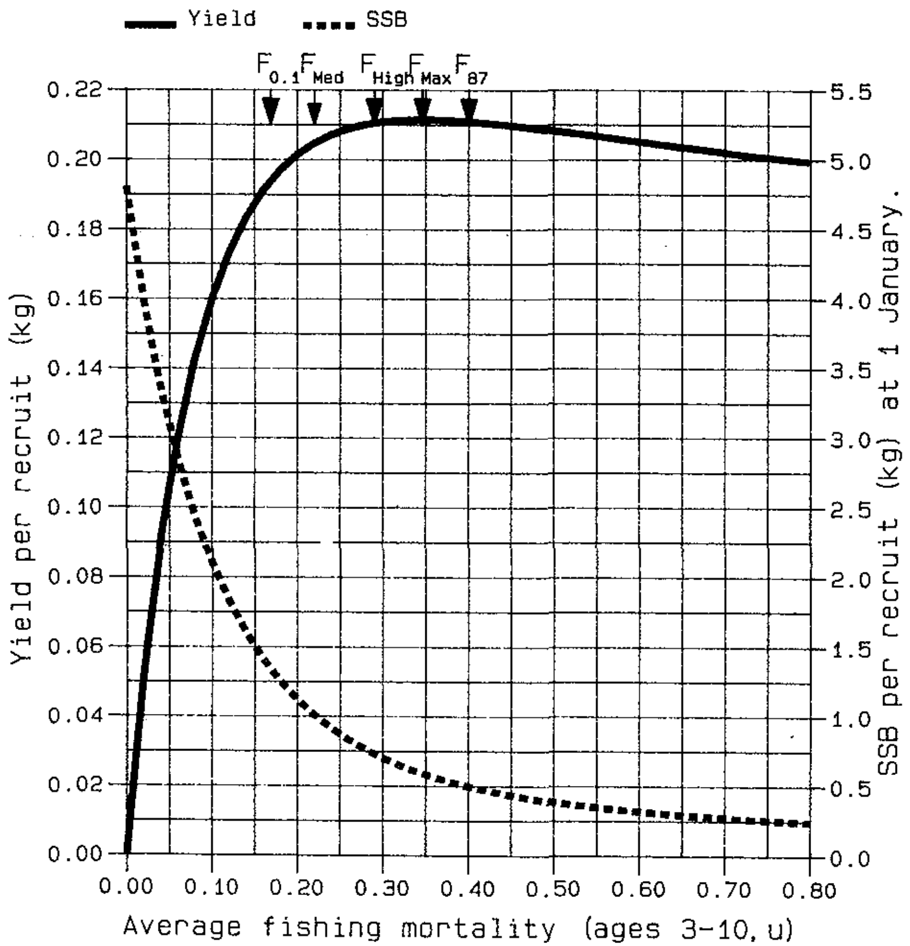
B

cont'd.

Figure 3.8.4 cont'd.

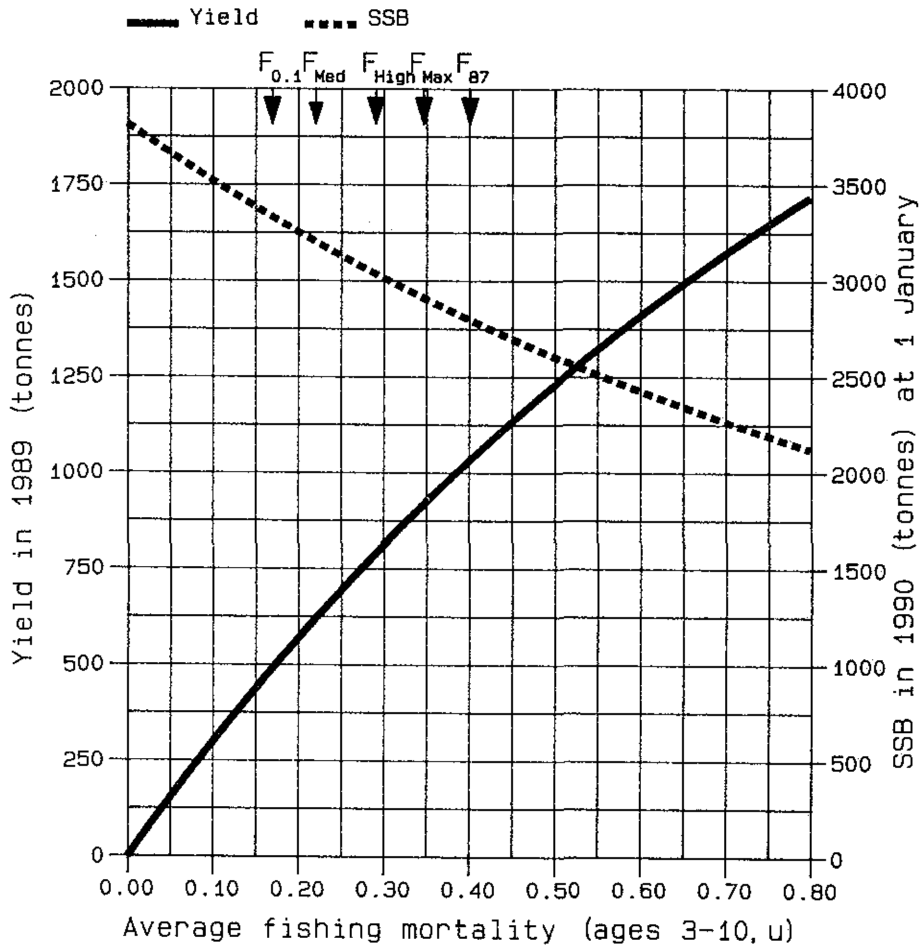
FISH STOCK SUMMARY
STOCK: Division VIIe Sole
28-10-1988

Long-term yield and spawning stock biomass



C

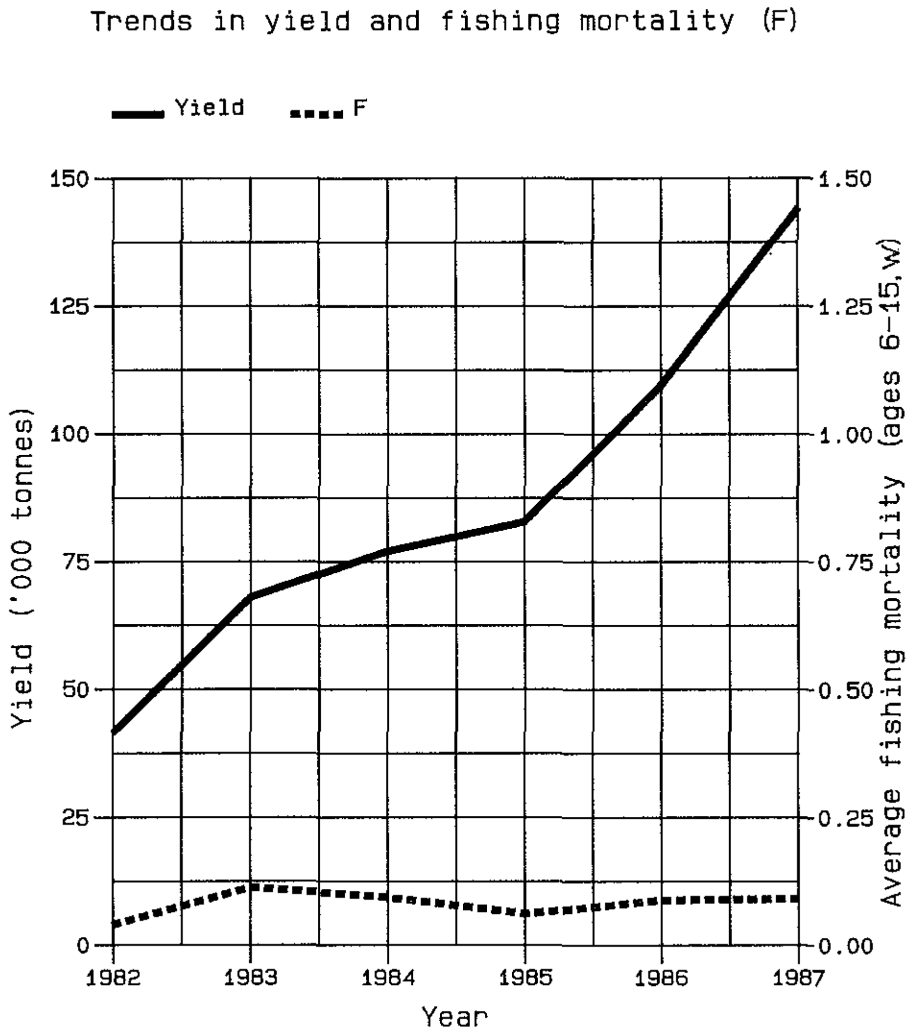
Short-term yield and spawning stock biomass



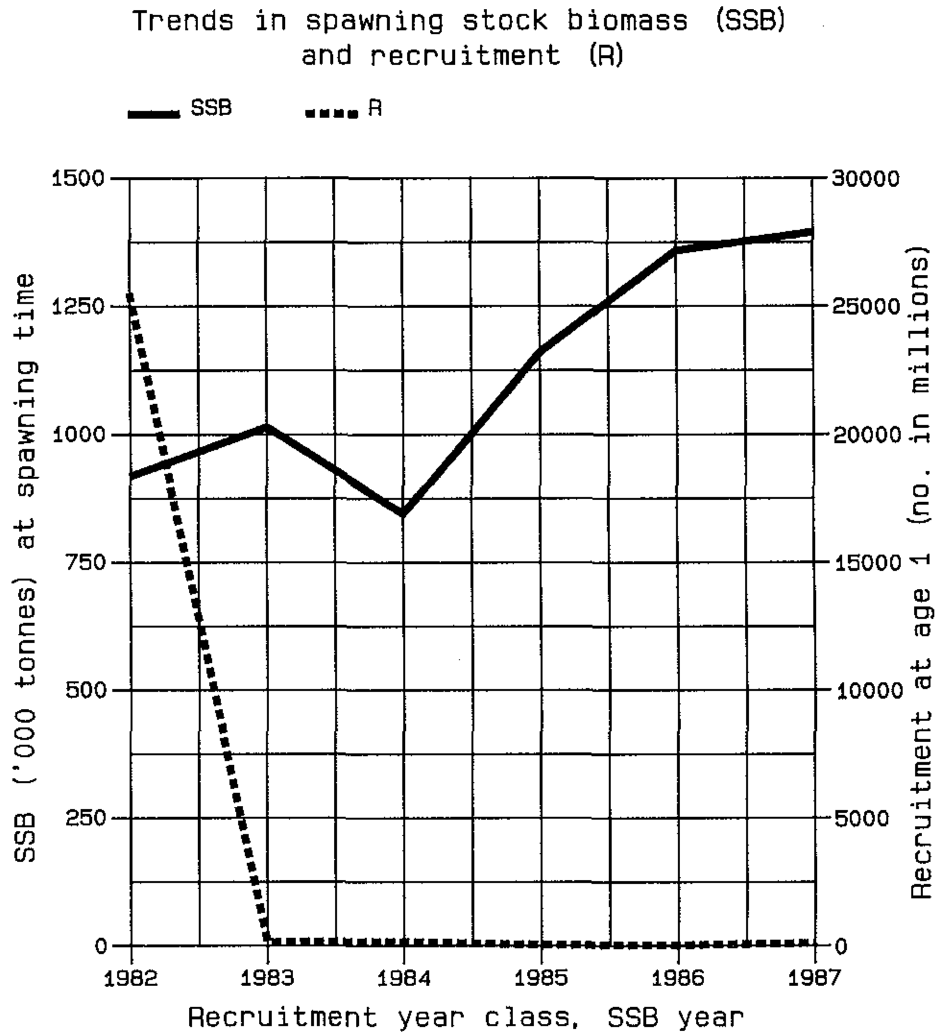
D

Figure 4.3.3

FISH STOCK SUMMARY
STOCK: Western Horse Mackerel
16-05-1988



A

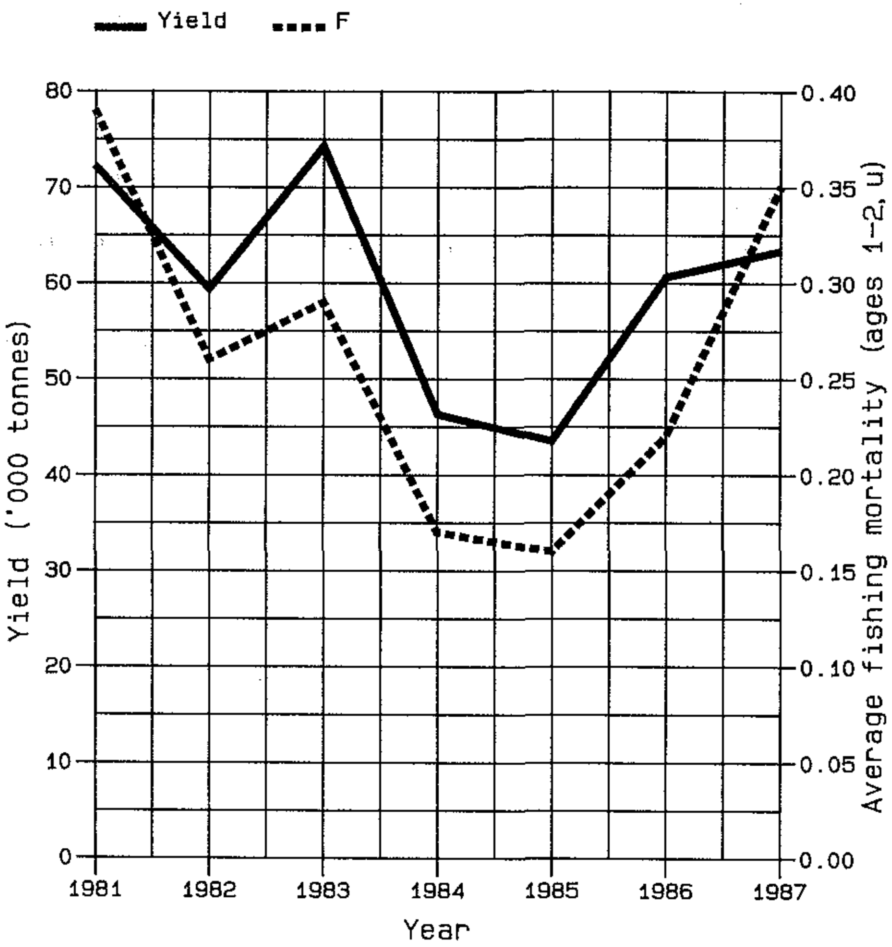


B

Figure 4.3.4

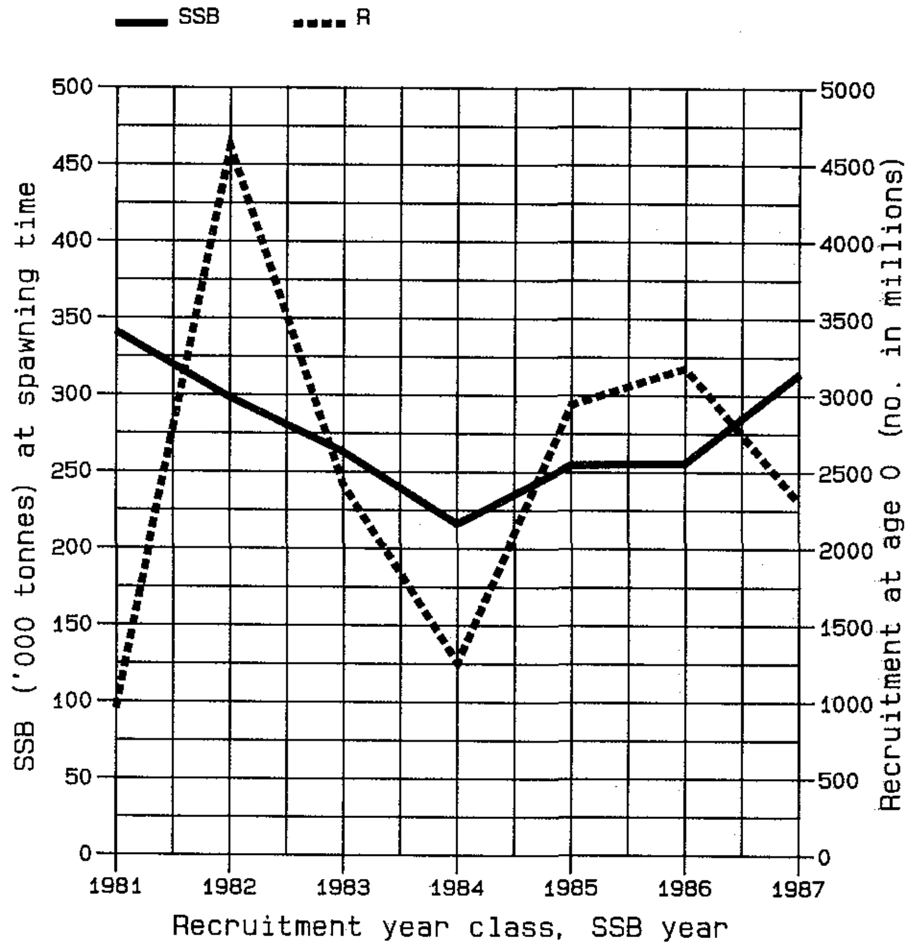
FISH STOCK SUMMARY
STOCK: Southern Horse Mackerel
16-05-1988

Trends in yield and fishing mortality (F)



A

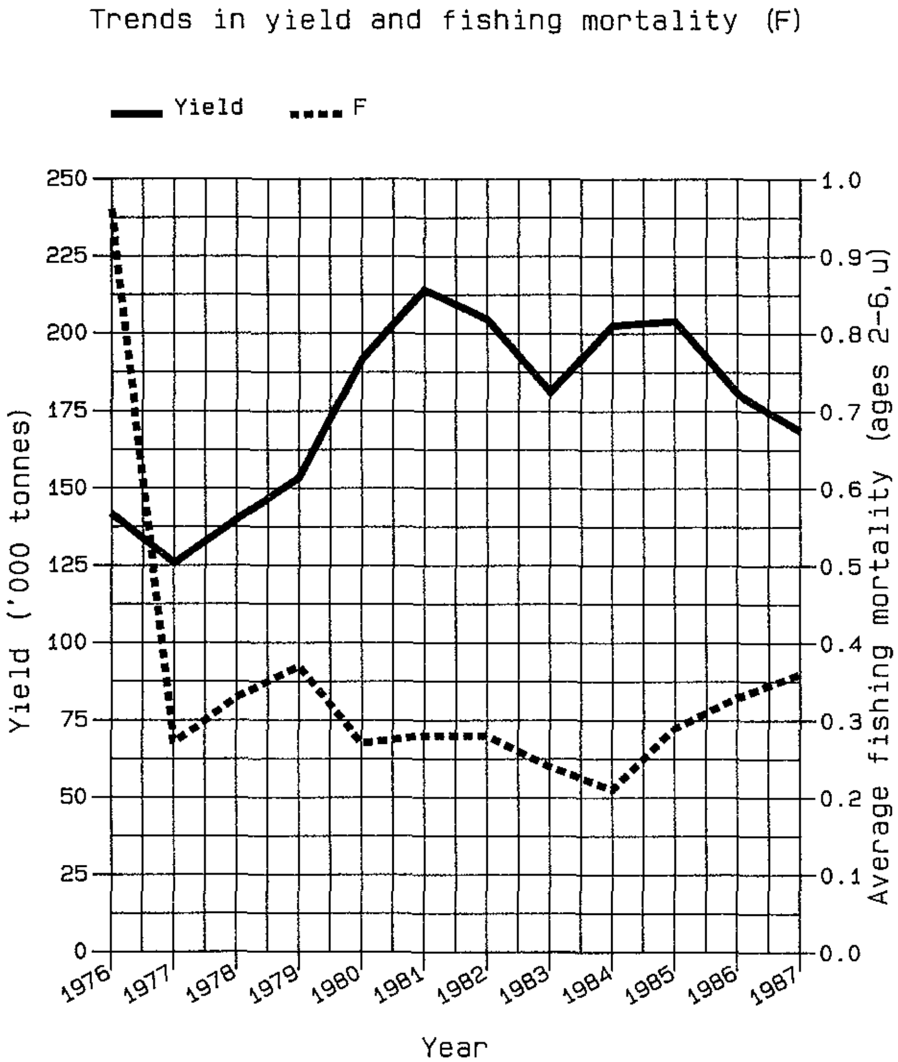
Trends in spawning stock biomass (SSB)
and recruitment (R)



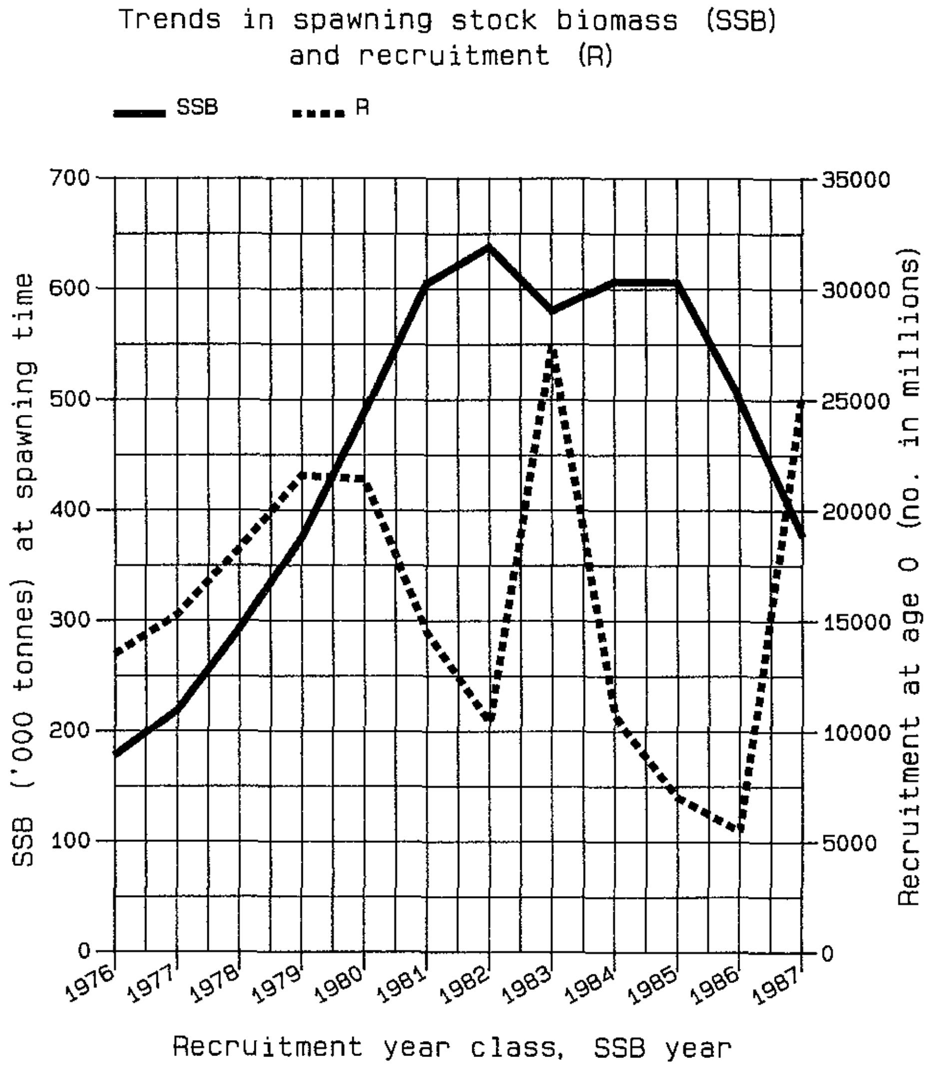
B

Figure 5.1

FISH STOCK SUMMARY
STOCK: Sardine - VIIIc and IXa
08-11-1988



A



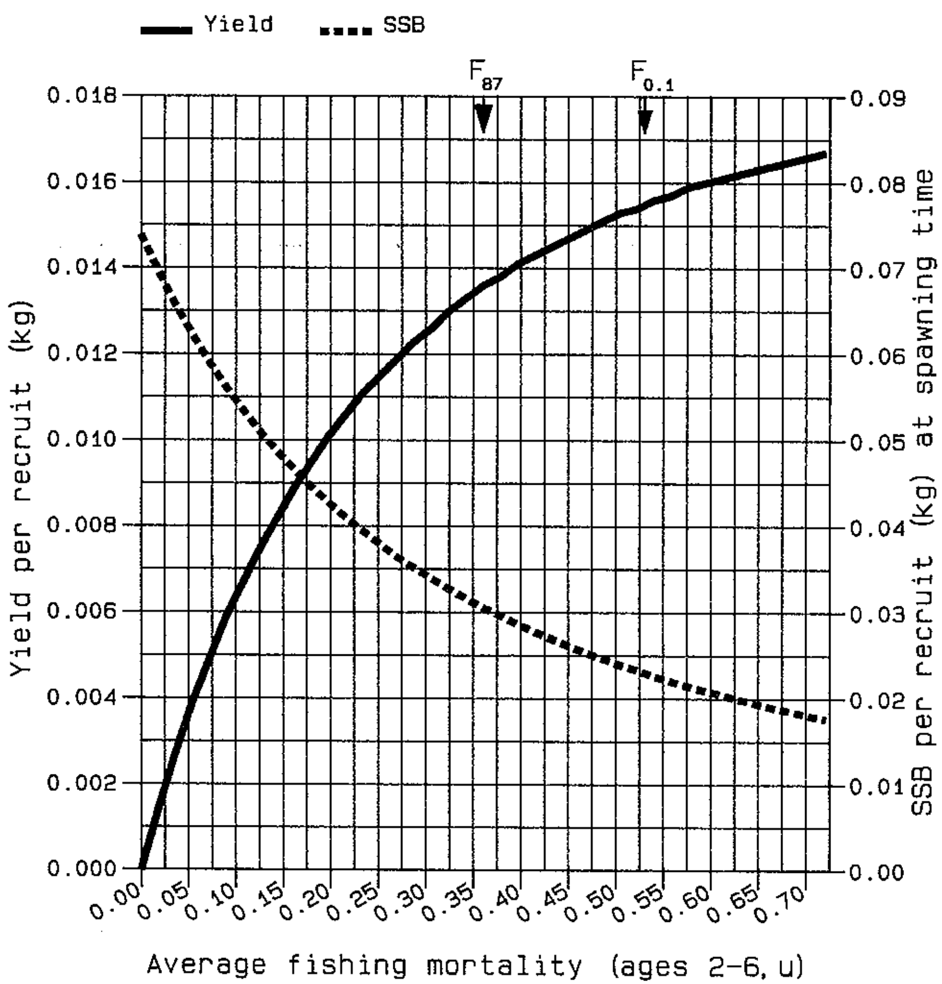
B

cont'd

Figure 5.1 (cont'd)

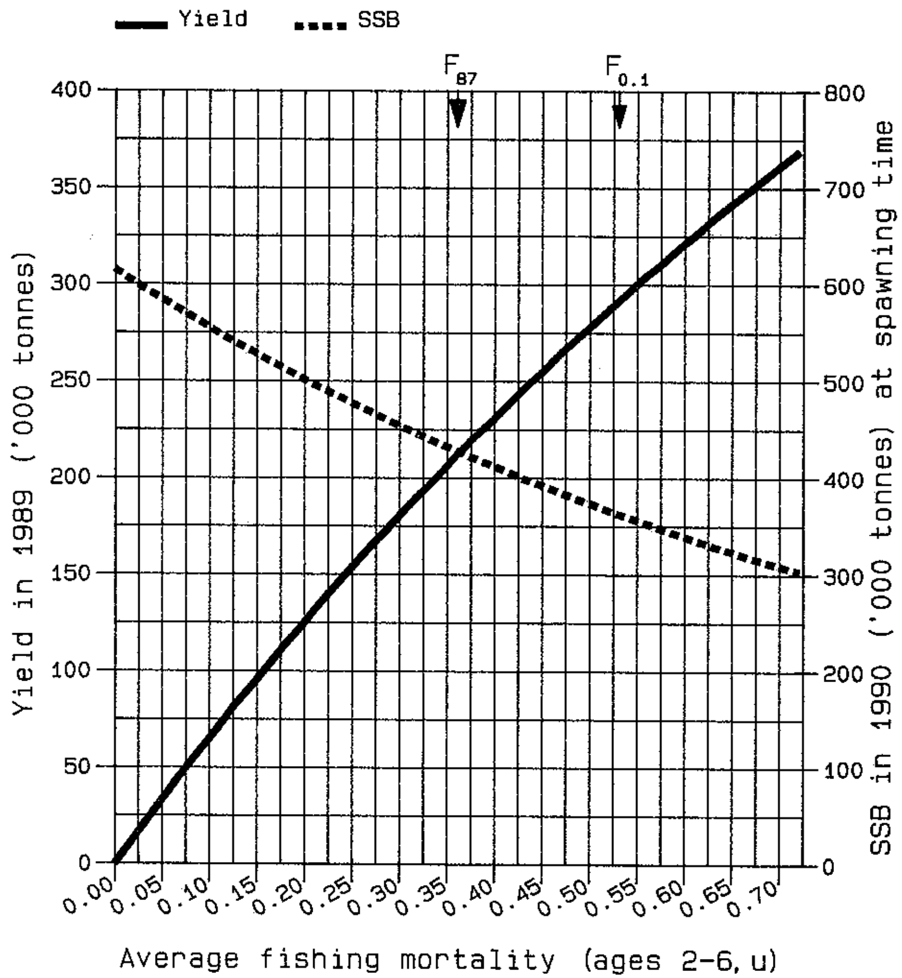
FISH STOCK SUMMARY
STOCK: Sardine - VIIIc and IXa
08-11-1988

Long-term yield and spawning stock biomass



C

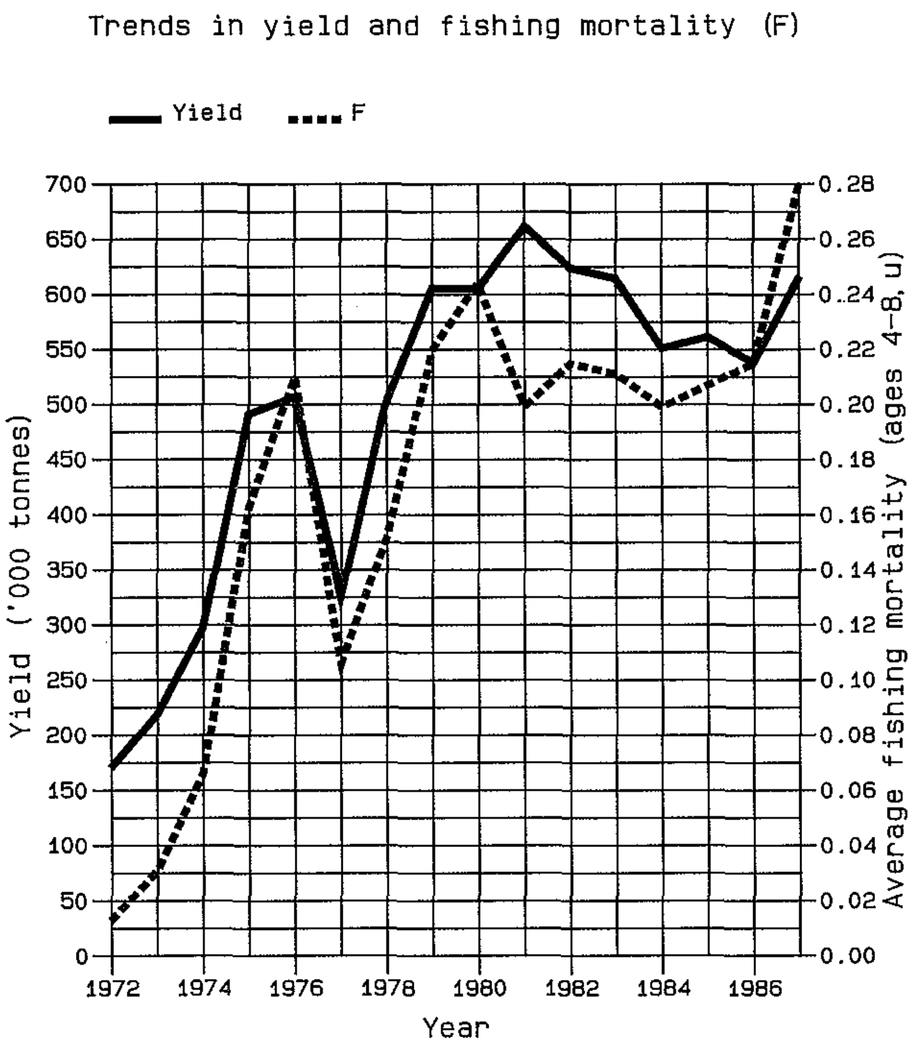
Short-term yield and spawning stock biomass



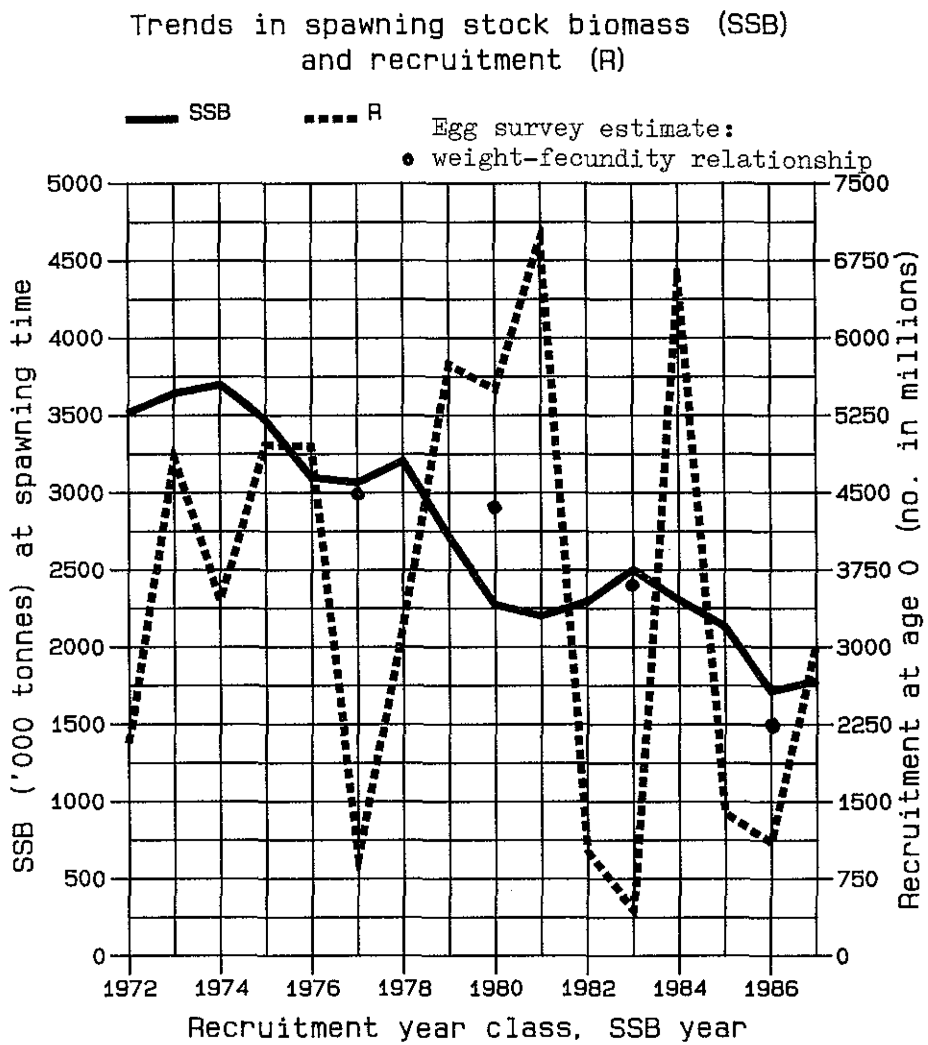
D

Figure 6.1.3

FISH STOCK SUMMARY
STOCK: Mackerel, Western Stock
18-05-1988



A



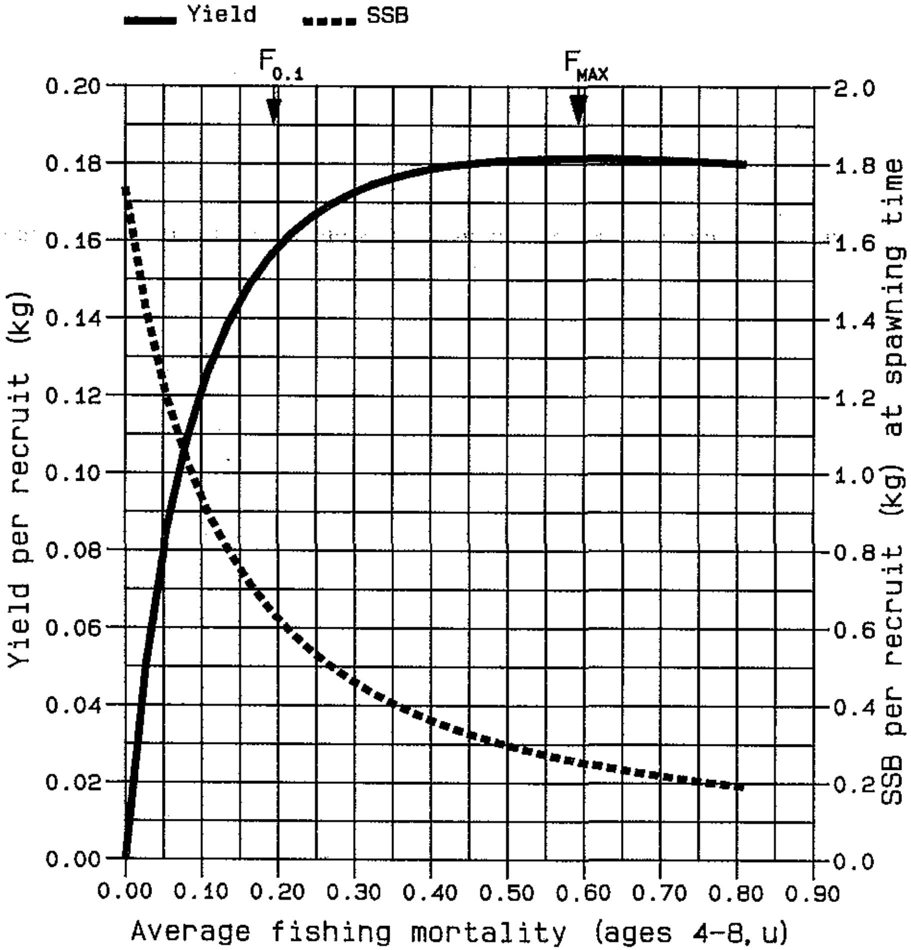
B

cont'd.

Figure 6.1.3 cont'd.

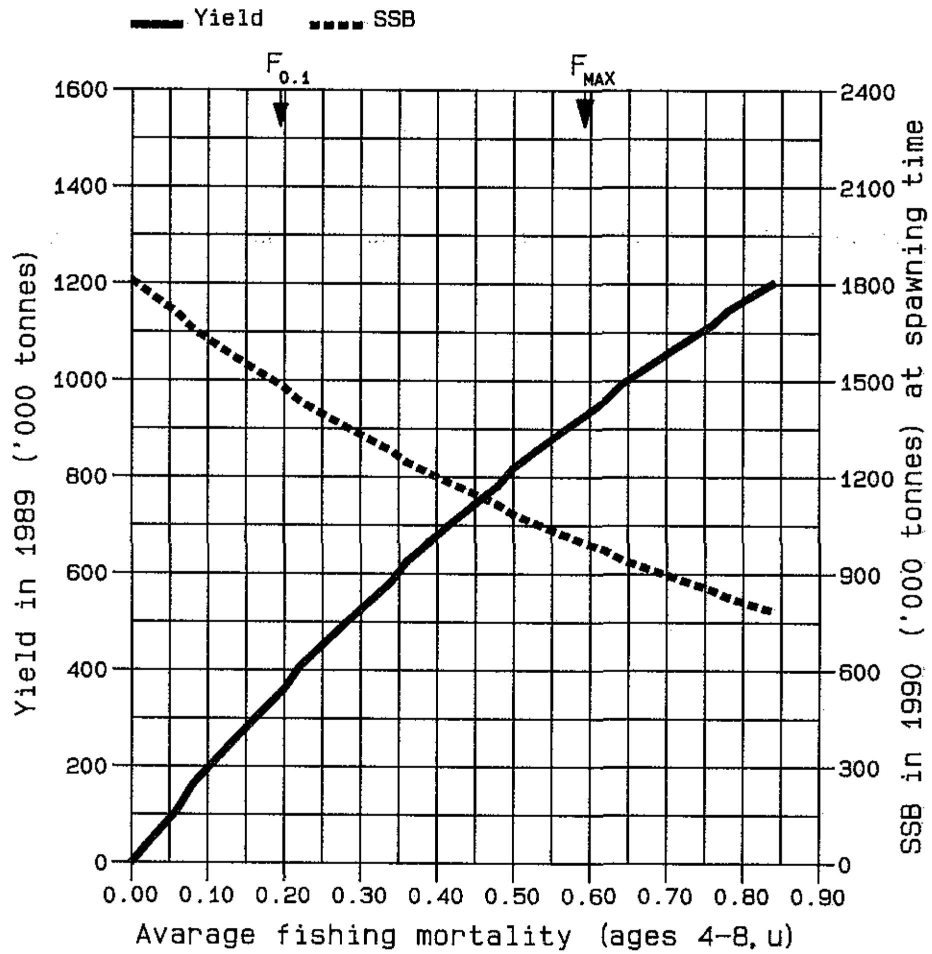
FISH STOCK SUMMARY
STOCK: Mackerel, Western Stock
18-05-1988

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass



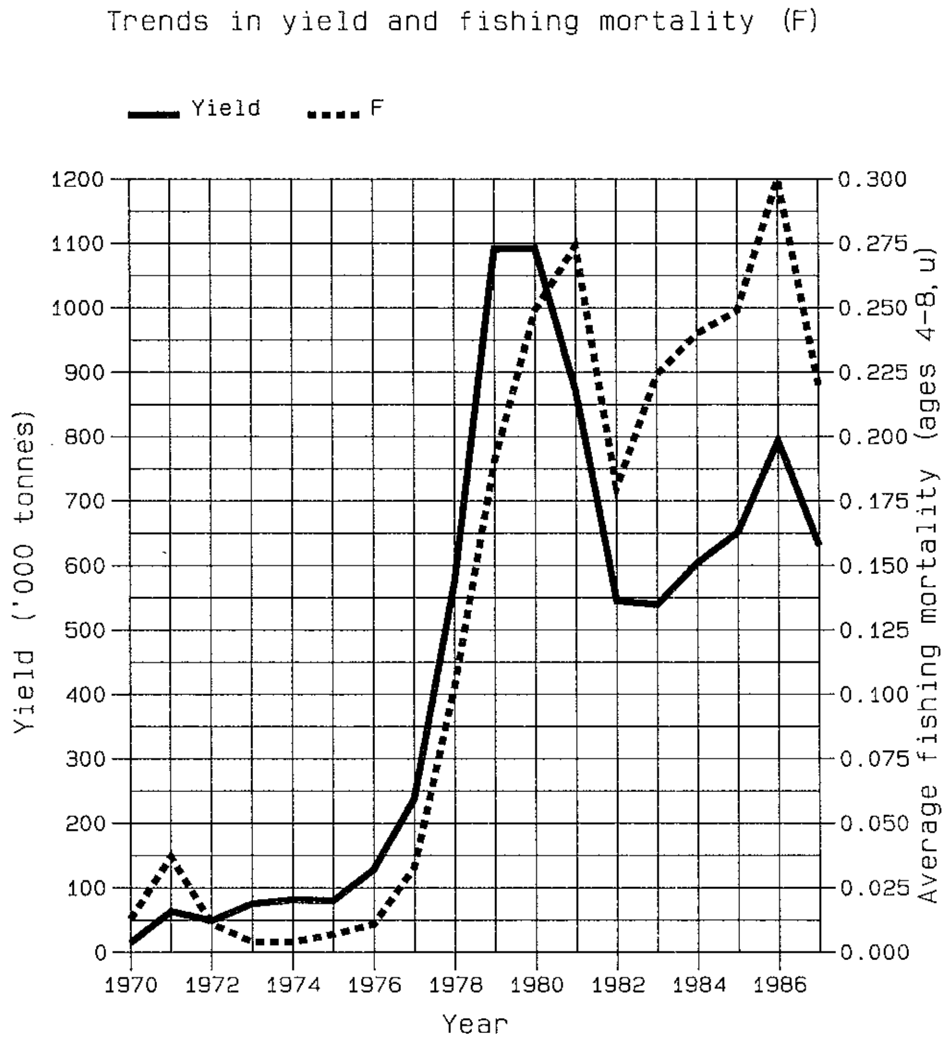
D

Figure 6.2.1

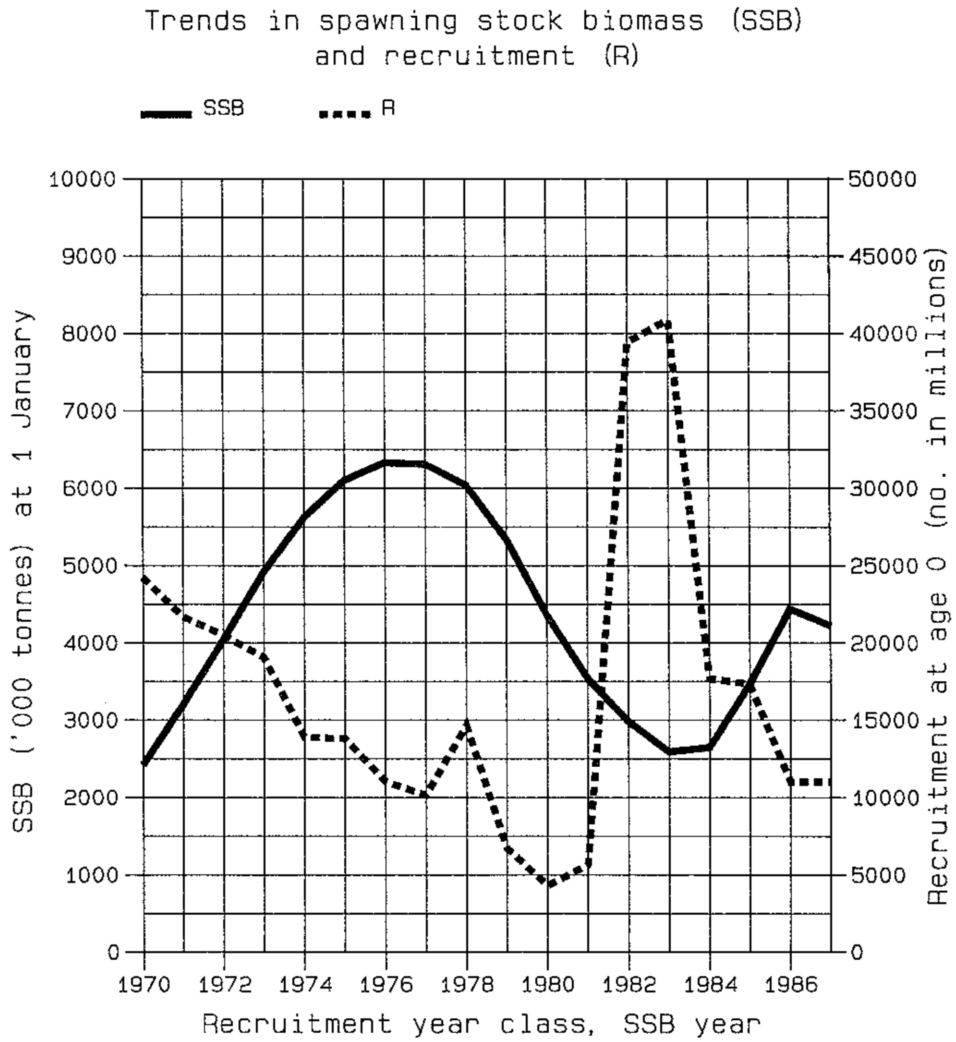
FISH STOCK SUMMARY

STOCK: Blue Whiting – Northern Area

19-10-1988



A



B

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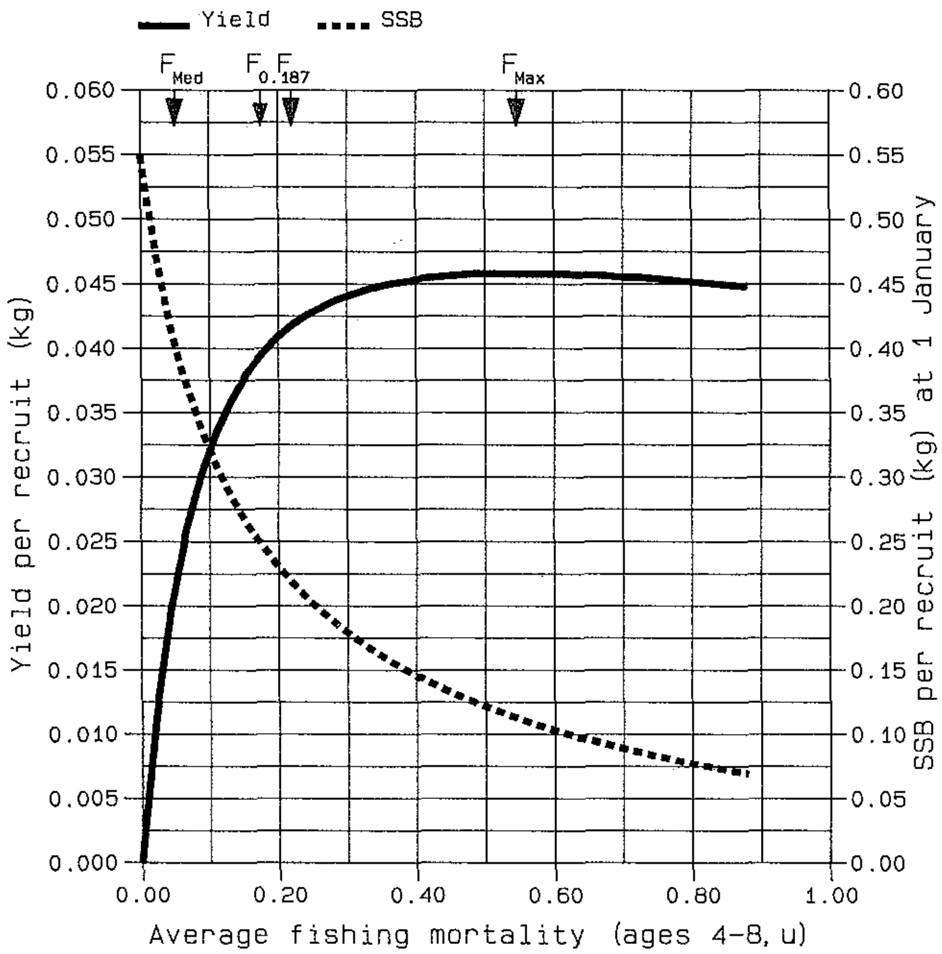
Figure 6.2.1 cont'd.

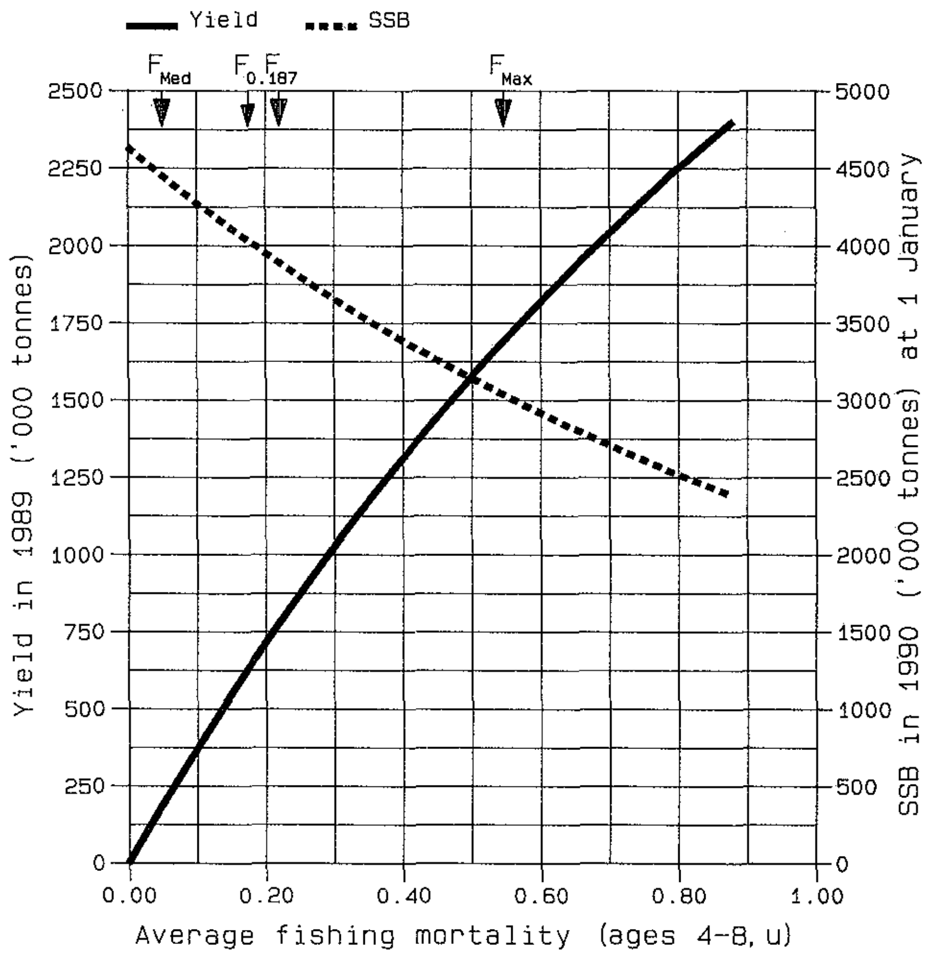
FISH STOCK SUMMARY
STOCK: Blue Whiting - Northern Area
19-10-1988

Long-term yield and spawning stock biomass



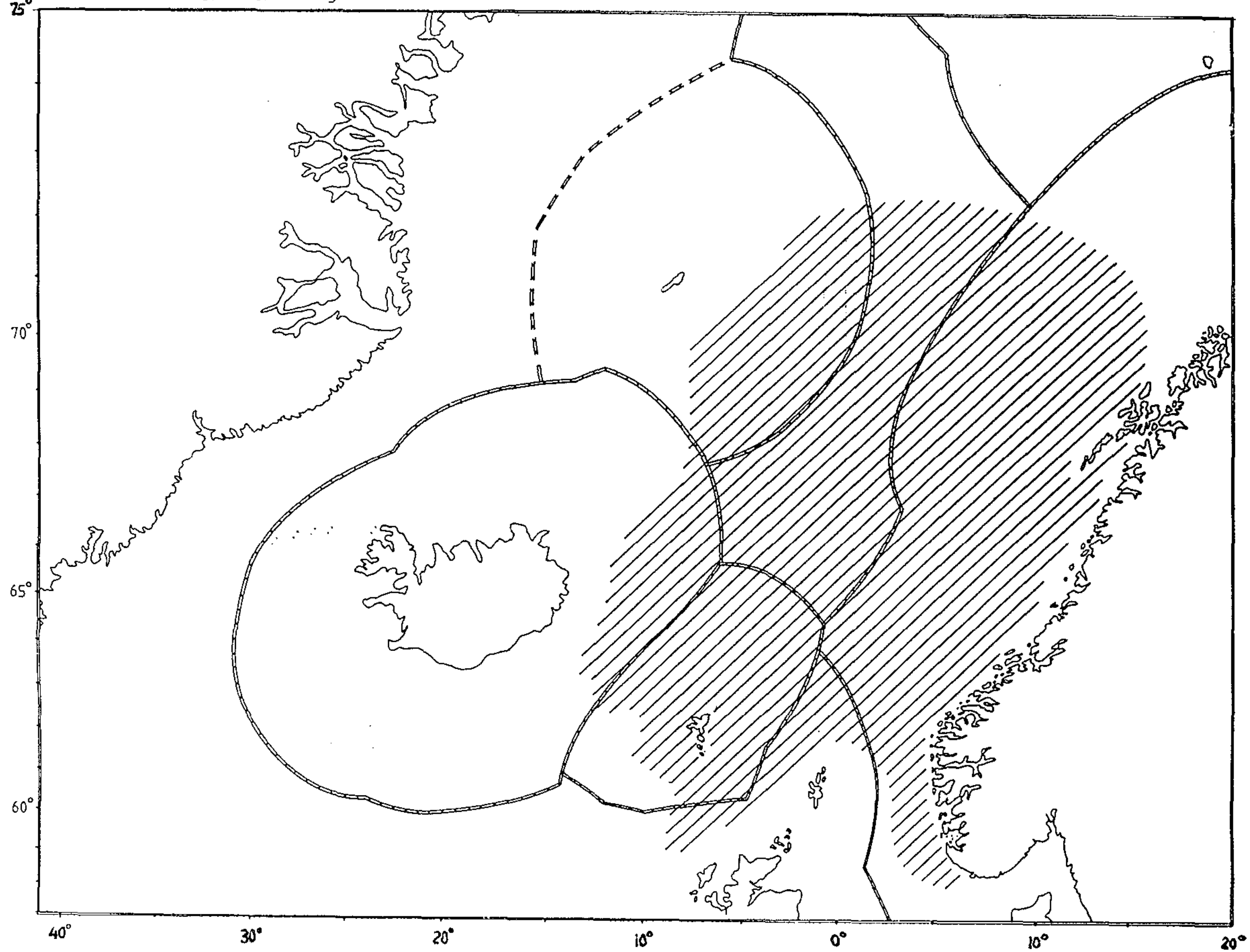
C

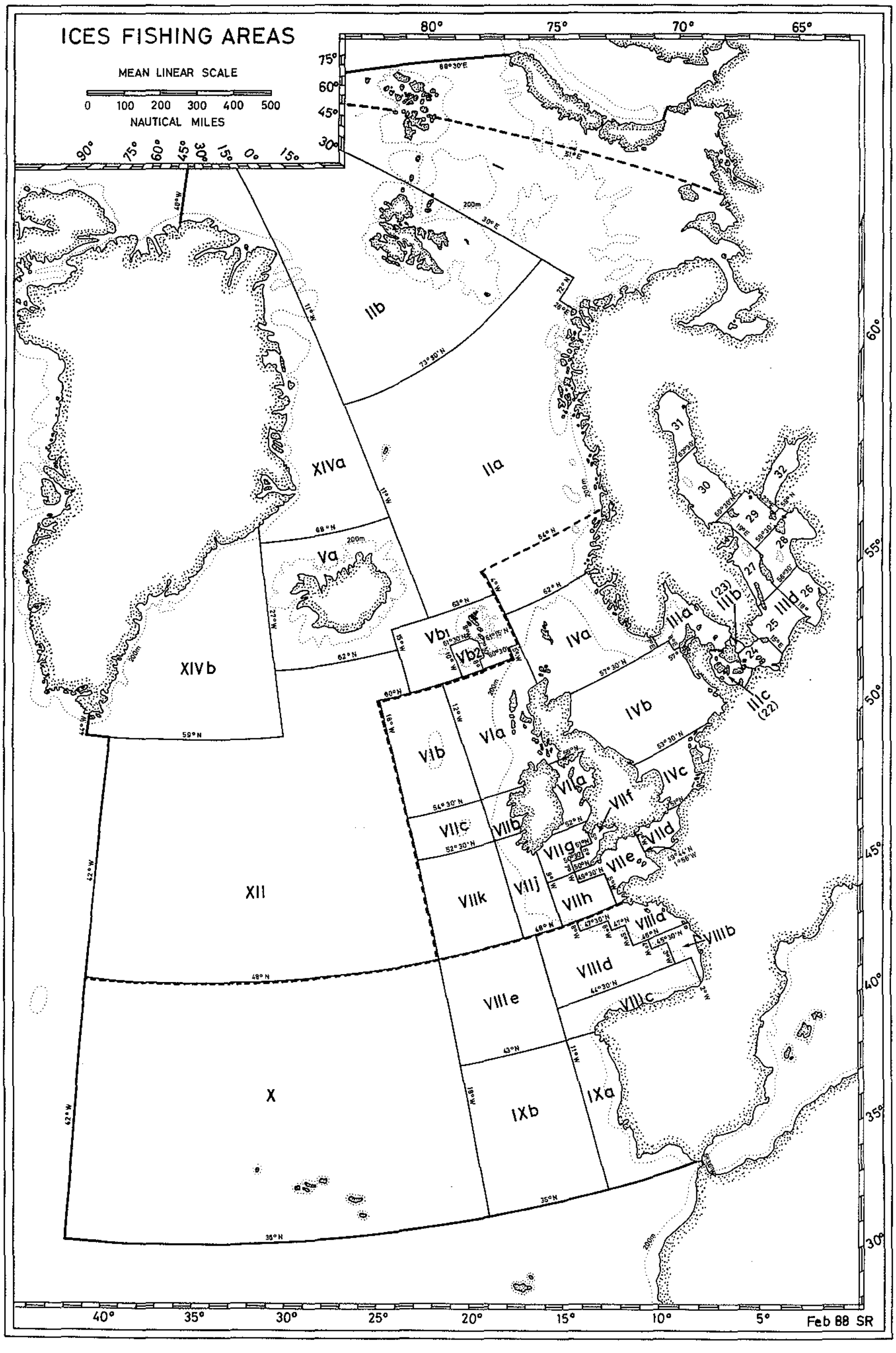
Short-term yield and spawning stock biomass



D

Figure 6.2.3 Area of blue whiting distribution observed (shaded) during the summer 1988 surveys, together with boundaries of national jurisdiction.




ICES FISHING AREAS
MEAN LINEAR SCALE
0 100 200 300 400 500
NAUTICAL MILES
IIb
IIa
XIVa
XIVb
Va
Vb1
Vb2
IVa
IVb
IVc
IIIa
IIIb (23)
IIIc (22)
IIId
24
25
26
27
28
29
30
31
32
VIa
VIb
VIIa
VIIb
VIIc
VIId
VIIe
VIIf
VIIg
VIIh
VIIj
VIIk
VIIIa
VIIIb
VIIIc
VIIId
VIIIe
IXa
IXb
X
XII
Feb 88 SR

REPORT TO THE INTERNATIONAL BALTIC SEA FISHERY COMMISSION

1 REVIEW OF NOMINAL CATCHES IN THE BALTIC AREA, 1963-1987

A general review of officially-reported catches in the Baltic is given in Tables 1.1 - 1.5. These are the catches officially reported to ICES by national statistical offices for publication in the Bulletin Statistique.

In the assessments, the working groups try to estimate discards (landings which are not officially reported) and the composition of by-catches. These amounts are included in the estimates of total catch for each stock and are used in the assessments; thus, they appear in the tables and figures produced by the working groups. These estimates vary considerably between different stocks and fisheries, being negligible in some cases and constituting important parts of the total removals from other stocks. Further, the catches used by the working groups are broken down into sub-divisions, whereas the officially-reported figures are reported by the larger Divisions IIIb,c, and d.

The trends in Tables 1.1 - 1.5 may not, therefore, correspond with those on which assessments have been based, and are presented for information only, without any comment from ACFM.

The catch data used in the assessments are given in the table section on pages 365-379.

2 GENERAL ADVICE TO THE INTERNATIONAL BALTIC SEA FISHERY COMMISSION

ACFM provided biological advice on stocks of cod, herring, sprat, and salmon as requested by the International Baltic Sea Fishery Commission. The recommendations for a rational management of the stocks are based on the same basic criteria as in past years. Generally, the advice is provided in relation to biological reference points which give guidelines for levels of fishing mortality that will ensure high long-term, sustainable yields in the future. Recent trends in the development of spawning stock biomass and recruitment levels are also taken into account in the management considerations.

<u>ACFM recommends again that in order to achieve proper management of the resources, it is necessary to set separate TACs for each stock unit area</u>.

It must also be pointed out that zones of national fisheries jurisdiction have generally little relevance to stock boundaries. Under these circumstances, there exists a considerable danger to the rational management of stocks occurring in two or more zones if catch quotas based on national zones are set independently.

3 BALTIC PELAGIC STOCKS

3.1 Herring

Catch statistics presented to the Working Group for 1986 and 1987 include herring catches from mixed fisheries and exclude sprat catches in the directed herring fisheries (Table 3.1). The final figure for the 1986 herring catch amounted to about 410,000 t which is a decrease of 10% since 1985. The preliminary data for 1987 indicated a total catch of 402,000 t. Catches in Sub-division 22 increased by 10,000 t, whereas the catches in Sub-division 25 decreased by about 20,000 t. In the Central Baltic, the catches increased, but were kept on the 1986 level in the Northern Baltic proper, the Gulf of Bothnia, and the Gulf of Finland.

As in 1984-1986, the herring catches in 1987 were considerably less than the TAC set by the International Baltic Sea Fishery Commission (489,700 t).

The proportion of autumn-spawning herring is still low in the Baltic. Therefore, in the assessments, the catches of autumn herring have been added to the catches of spring-spawning herring.

3.1.1 Herring in Sub-divisions 22-24 and Division IIIa

Source of information: Report of the Working Group on Assessment of Pelagic Stocks in the Baltic, April 1988 (C.M.1988/Assess:18). Report of the Herring Assessment Working Group for the Area South of 62°N, April 1988 (C.M.1988/Assess:17).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC (IIIa)[3]	-	40	40[4]	40[4]	80	132	112	99	138	40	-
Agreed TAC (IIIa)[3]	-	60	59	58	117	46	138	138	138	46	-
Actual landings (Baltic)[5]	158	151	152	191	211	164	145	166	211	145	167
Actual landings (IIIa)[6]	172	158	198	233	242	217	234	-	242	158	208
Sp. stock biomass	175	210	213	258	305	269	231	253[1]	305	175	237
Recruitment (2-ring)	3160	1988	2597	3495	2940	2274	2748	3991[1]	3495	1988	2743
Mean F(3-6,u)	1.09	1.09	0.67	0.88	0.91	0.81	0.72	-	1.09	0.67	0.88

[1]Predicted or assumed. [2]Over period 1981-1987. [3]Adult herring fishery in Division IIIa only. [4]TAC for 1 Sep-31 Aug. [5]Includes Sub-divisions 22-24, 2-group and older from Division IIIa, and transferred amounts from North Sea. [6]Includes landings of juvenile herring in mixed clupeoid fishery. Weights in '000 t, recruitment in millions.

Catches: The catches (in tonnes) went down in 1987 (Tables 3.1 and 3.1.1), but not the catches in number. The mean weight at age of the herring was very low in 1987.

Data and assessment: An analytical assessment using four young fish indices and four acoustic indices.

Fishing mortality: Decreasing since 1985, but still 10% above F_{max} (Figure 3.1.1).

Recruitment: Three year classes above average (2-group in 1987, 1988, and 1989).

State of stock: The stock is still at a high level compared to the previous 15 years. Sign of further increasing stock.

Forecast for 1989: Assuming F(88) = 0.72, Catch(88) = 166,000 t.

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Catch(89)	SSB(90)	
A	$F_{0.1}$	0.24	297	73	415	Sharp reduction in catch and effort and rapid increase in SSB
B	F_{max}	0.66		174	316	Small increase in catch and large increase in SSB

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to an increase in SSB and catch because of large year classes.

Recommendation: The TAC for 1989 should not exceed 174,000 t for the total adult spring-spawning stock. The TAC for "mixed clupeoids" in Division IIIa should be set at not more than 80,000 t in 1989.

Special comments: A part of the stock is caught in the North Sea, another in Division IIIa, and only in Sub-divisions 22-24 are all herring catches from this stock. Therefore, recommendations for this stock are very difficult to make.

The assessment of the spring-spawning stock known to migrate between the Western Baltic and Division IIIa was carried out on data from Division IIIa and Sub-divisions 22, 23, and 24.

Insufficient data on the numbers at age and racial composition of catches of juvenile herring in Division IIIa prevented an assessment of the exploitation level on the youngest age groups, and the combined assessment was based on catch data for 2-ring and older spring-spawning herring.

Racial investigations of the vertebral number of herring caught in the eastern part of the North Sea showed that, in the last part of May and in June, July, August, and September, all 3-group and older herring were of Skagerrak-Kattegat and Western Baltic stock origin. Therefore, a proportion of the catch in the eastern part of the North Sea was included in the assessment of the combined stock. The amount transferred was 6,968 t in 1984, 17,386 t in 1985, 19,654 t in 1986, and about 14,000 t in 1987.

To provide the management bodies with separate catch options for Sub-divisions 22-24 and for Division IIIa, ACFM has calculated the proportion of the catch in the combined area that will be taken in the two areas assuming that the relative levels of fishing mortality and exploitation pattern in the two management areas remain the same as in recent years. For the F_{max} option given above, the share of the catch in the two areas in 1988 and 1989 will be as follows (in '000 t):

Year	Total catch in combined area	Predicted catch in Sub-divisions 22-24	Predicted catch in adult herring fishery in Division IIIa
1988	166	83	83
1989	174	90	84

The predicted catches given in the table above include 2-group and older herring. The directed fishery for adult herring takes, however, an unavoidable by-catch of smaller juvenile herring. The amount of juvenile herring in the directed fishery for adult herring should be added to the catch predictions in Sub-divisions 22-24. For 1989, this component is predicted to be 10,000 t.

The total catch of 0- and 1-group herring in Sub-divisions 22-24 increased from around 6,000 t in 1986 to around 20,000 t in 1987. A large part of this comes from the small-meshed fishery catching a mixture of sprat and herring. The Danish sprat catches decreased from 6,000 t in 1986 to 2,300 t in 1987, and this shows that the small-meshed fishery in 1987 took a higher proportion of juvenile herring than sprat. ACFM is concerned by the signs that the industrial fishery in recent years has increased its exploitation of juvenile herring in the Southwestern Baltic.

As in 1986, the TAC of 80,000 t in the fishery for mixed clupeoids in Division IIIa was exceeded, the total catch of juvenile herring in this fishery being estimated at around 116,000 t. Since these herring which, to a large extent, recruit to the North Sea stocks, are not included in the assessment of any stock, it is not possible to give analytical advice for this fishery. However, ACFM reiterates its opinion that adherence to a TAC of 80,000 t would be a significant step forwards controlling the catches of juvenile herring in this area and recommends that the TAC be set at this level again in 1989.

3.1.2 Herring in Sub-division 25-27

Source of information: Report of the Working Group on Assessment of Pelagic Stocks in the Baltic, April 1988 (C.M.1988/Assess:18).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	115	130	132	150	147	190	200	161	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	164	180	174	147	154	139	122	-	194	122	164
Sp. stock biomass	813	735	810	807	643	596	545[1]	572[1]	1014	545	787
Recruitment (age 0)	6787	6246	7358	7731	3700	3597[1]	6650[1]	6650[1]	10868	3597	6374
Mean F(1-8,u)	0.15	0.13	0.14	0.13	0.17	0.17	0.18	-	0.18	0.12	0.15

[1]Predicted or assumed. [2]Over period 1977-1987. Weights in '000 t, recruitment in millions.

Catches: Decreasing since 1984 due to declining mean weights. Catch in number, however, has not decreased.

Data and assessment: VPA calibrated by stock estimates from yearly acoustic surveys.

Fishing mortality: Some increase in last three years towards the level of $F_{0.1}$.

Recruitment: Recruitment data lacking. Both 1985 and 1986 year classes can be small.

State of stock: SSB decreased by about 50% since mid-1970s (Figure 3.1.2). Mean weights at age decreased about 30% since 1982 and, therefore, spawning stock in numbers has been almost constant.

Forecast for 1989: Assuming F(88) = 0.17, Catch(88) = 133,000 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	F(88)	0.17	510	133	518	Slight increase in SSB
B	$F_{0.1}$	0.20	506	150	500	Further decrease in SSB

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a continuously low level of the SSB.

Recommendation: ACFM prefers a catch in 1989 of not more than 133,000 t in order to reduce the decline in spawning stock biomass.

Special comments: Separate assessments for the coastal and the open-sea herring in Sub-divisions 25-27 were again carried out in 1988. Catches from Poland and the USSR were allocated to stock components by otolith typing as in earlier years. This method has not, however, been adopted in the laboratories in Denmark and Sweden. The catches from these countries were, therefore, split into coastal and open-sea herring using the same rather crude methods as in earlier years.

The summed results from the separate assessments can be checked against those of the combined assessment for the status quo catches in 1988 and 1989; the combined assessment gives a catch of 133,000 t for both 1988 and 1989 and the sum for the two separate assessments gave 125,000 and 137,000 t.

ACFM agreed that the traditional assessment of the combined coastal and open-sea stocks of Sub-divisions 25-27 carried out in 1988 is more reliable as the basis for its management advice than the two separate assessments. However, the two stocks have differences in biological characters and exploitation pattern. Therefore, in principal, they should be managed separately. To enable reliable separate assessments of the stocks, all laboratories working on herring in Sub-divisions 25-27 should supply the Working Group with the following data:

- catches in numbers split into the two components by uniform methods;
- information on recruitment for both stocks;
- acoustic survey data for both stocks.

3.1.3 Herring in Sub-divisions 28 and 29S (excluding Gulf of Riga)

Source of information: Report of the Working Group on Assessment of Pelagic Stocks in the Baltic, April 1988 (C.M.1988/Assess:18).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	28	28	32	40	40	-	-	-	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	35.1	44.0	47.6	44.7	40.0	38.2	47.8	-	47.8	32.6	40.6
Sp. stock biomass	470	423	448	468	482	456	425	444[1]	486	352	433
Recruitment (age 0)	8716	6697	13922	7501	2606	10520	4864	6956[1]	13922	2601	6905
Mean F(2-7,u)	0.08	0.10	0.12	0.10	0.11	0.10	0.12	-	0.16	0.08	0.11

[1]Predicted or assumed. [2]Over period 1975-1987. Weights in '000 t, recruitment in millions.

Catches: In the 1980s, catches have been generally higher than in the 1970s. The maximum catch was in 1987.

Data and assessment: The VPA estimate of stock size has been calibrated to the acoustic stock estimates. Data on recruitment are lacking.

Fishing mortality: Less than $F_{0.1}$, which is estimated to be 0.35.

Recruitment: The 1986 year class was good, but 1985 and 1987 year classes were poor, as judged from neighbouring areas.

State of stock: Stable (Figure 3.1.3).

Forecast for 1989: Assuming F(88) = 0.11, Catch(88) = 46,000 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	$\bar{F}$(84-87)	0.11	433	44	422	SSB rather stable

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a rather stable stock condition.

3.1.4 Herring in the Gulf of Riga

Source of information: Report of the Working Group on Assessment of Pelagic Stocks in the Baltic, April 1988 (C.M.1988/Assess:18).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	15	12	<13	<12	<16	<12	<12	6	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	16.8	12.8	15.5	15.8	15.6	16.9	12.9	-	28.5	12.8	18.1
Sp. stock biomass	44	40	46	38	48	50	31	49[1]	50	31	43
Recruitment (age 0)	1974	1662	2412	875	383	2742	736	1370[1]	3991	383	1584
Mean F(4-7,u)	0.64	0.56	0.51	0.82	0.71	0.87	0.64	-	1.05	0.45	0.69

[1]Predicted or assumed. [2]Over period 1975-1987. Weights in '000 t, recruitment in millions.

Catches: Catches have declined from almost 17,000 t in 1986 to 13,000 t in 1987, largely due to strict fishery regulations. Also in 1987, very low mean weights at age were observed.

Data and assessment: Separable VPA. 0- and 1-groups tuned against young fish survey results.

Fishing mortality: On the level of F_{med}.

Recruitment: Rich 1986 year class, 1985 and 1987 year classes poor (Figure 3.1.4).

State of stock: Because of maturation of good 1986 year class, SSB in 1988 will remain near 50,000 t, but will diminish in 1989-1990.

Forecast for 1989: Assuming F(88) = 0.64, Catch(88) = 16,000 t.

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Catch(89)	SSB(90)	
A	$F_{0.1}$	0.29	44	8	51	SSB increases
B	F(87) ~ F_{med}	0.64	42	16	42	SSB at previous level

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to some decrease in SSB in 1989-1990.

Recommendation: ACFM recommends a reduction in fishing mortality towards the $F_{0.1}$ level.

3.1.5 Herring in Sub-divisions 29NE and 30E

Source of information: Report of the Working Group on Assessment of Pelagic Stocks in the Baltic, April 1988 (C.M.1988/Assess:18).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	62[3]	63[3]	65	67	57	54	52	≤63	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	49	55	59	64	65	63	64	-	65	46	55
Sp. stock biomass	319	304	320	321	298	319	334	302[1]	394	298	347
Recruitment (age 0)	5.2	5.9	9.8	8.3	2.4	4.3	2.9	5.2[1]	9.8	2.2	5.2
Mean F(3-8,u)	0.15	0.17	0.17	0.22	0.20	0.20	0.21	-	0.22	0.12	0.16

[1] Predicted or assumed. [2] Over period 1974-1985. [3] Includes Sub-division 31E. Weights in '000 t, recruitment in billions.

Catches: Catches have increased since 1984 due to the increased fishing effort.

Data and assessment: Analytical assessment using catch-in-number data and catch-per-unit effort.

Fishing mortality: The fishing mortality has increased to a level slightly above $F_{0.1}$.

Recruitment: The 1983 and 1984 year classes are estimated to be strong, and the 1985-1987 year classes are below average.

State of stock: The spawning stock has been rather stable (Figure 3.1.5). A decrease is expected due to the 1985-1987 year classes.

Forecast for 1989: Assuming F(88) = 0.21, Catch(88) = 62,000 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	$F_{0.1}$	0.20	283	56	265	Declining SSB with all three options
B	F(87)	0.21	283	58	263	
C	1.2F(87)	0.25	281	68	252	

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a declining spawning stock biomass due to the 1985-1987 year classes.

Recommendation: The present fishing mortality, corresponding to a TAC for 1989 not exceeding 58,000 t, is close to the $F_{0.1}$ level and should not be allowed to increase.

3.1.6 Herring in Sub-division 31E

Source of information: Report of the Working Group on Assessment of Pelagic Stocks in the Baltic, April 1988 (C.M.1988/Assess:18).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	62[3]	63[3]	10	9	9	-[4]	9	13	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	8	9	7	10	9	9	10	-	10	5	8
Sp. stock biomass	35	41	38	38	44	46	42	39[1]	51	35	42
Recruitment (age 1)	0.3	0.2	1.0	0.7	0.3	0.4	0.4	0.2[1]	1.1	0.2	0.5
Mean F(3-8,u)	0.23	0.22	0.20	0.13	0.19	0.22	0.24	-	0.28	0.13	0.21

[1]Predicted or assumed. [2]Over period 1974-1985. [3]Includes Sub-divisions 29NE and 30E. [4]Precautionary TAC based on recent catch levels. Weights in 000 t, recruitment in billions.

Catches: Catches increased in the 1970s and have been rather stable in the 1980s.

Data and assessment: Analytical assessment using catch-in-number data and catch-per-unit effort.

Fishing mortality: Fishing mortality has varied in accordance with the catches.

Recruitment: The 1982 year class was strong. The 1984-1987 year classes are below average.

State of stock: Spawning stock biomass has varied without obvious trend (Figure 3.1.6). A decrease is expected due to the 1984-1987 year classes.

Forecast for 1989: Assuming F(88) = 0.24, Catch(88) = 9,000 t.

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Catch(89)	SSB(90)	
A	$F_{0.1}$	0.18	36	7	35	Declining SSB with all three options
B	F(87)	0.24		9	32	
C	1.2F(87)	0.29		10	31	

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a declining spawning stock biomass due to the 1984-1987 year classes.

Recommendation: The present fishing mortality is above the $F_{0.1}$ level. ACFM prefers this stock to be managed at that level and consequently recommends that the TAC for 1989 should not exceed 7,000 t.

Special comments: Although the same basic data have been used to assess this stock both in 1987 and in 1988 (i.e., catch in numbers at age and estimates of total effort expressed as trap net units), the results have varied considerably. Spawning stock sizes and recruitment levels for 1985-1987 were almost halved, and the fishing mortalities nearly doubled. The cause for this instability seems to be the rather weak correlation between estimates of effort and fishing mortality.

3.1.7 Herring in Sub-divisions 29NW, 30W, and 31W

Source of information: Report of the Working Group on Assessment of Pelagic Stocks in the Baltic, April 1988 (C.M.1988/Assess:18).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[1]	Min[1]	Mean[1]
Recomm. TAC	-	8	8	8	10	-[2]	-[2]	10	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	8.2	7.5	9.8	6.8	4.3	3.7	3.0	-	9.8	3.0	6.9

[1]Over period 1976-1987. [2]Precautionary TAC based on recent catch levels. Weights in '000 t.

Catches: Catches have been declining since the beginning of this decade. The effort exerted on this stock by Swedish fishermen is now very small, reflecting the low price on these generally small fish.

Data and assessment: Age sampling is scanty and not sufficient for an analytical assessment.

Fishing mortality: Probably very low, judging from the comparatively high proportion of old fish (10-15 years) in the catches.

Recruitment: No information.

State of stock: Probably healthy.

Forecast for 1989: Not available.

Recommendation: A precautionary TAC based on recent catch levels.

3.1.8 Herring in the Gulf of Finland

Source of information: Report of the Working Group on Assessment of Pelagic Stocks in the Baltic, April 1988 (C.M.1988/Assess:18).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	50	54	55	40	45	<39	<41	21	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	45.2	44.6	56.8	49.6	49.1	46.4	44.2	-	56.8	39.4	47.6
Sp. stock biomass	98	108	136	125	124	116	102	103[1]	151	97	123
Recruitment (age 0)	4410	3131	5363	3559	884	5421	2442	3572[1]	6063	884	3576
Mean F(2-5,u)	0.45	0.30	0.38	0.38	0.32	0.42	0.49	-	0.49	0.30	0.39

[1]Predicted or assumed. [2]Over period 1975-1987. Weights in '000 t, recruitment in millions.

Catches: Catches declined by around 25% from 1983-1987.

Data and assessment: Total effort estimated by CPUE data was used to calibrate a separable VPA. Some data on larval abundance and abundance of larval food used for estimation of the 1987 year class.

Fishing mortality: Higher than F_{max} and between F_{med} and F_{high}.

Recruitment: The 1986 year class appeared as abundant in the VPA, but the 1985 and 1987 year classes are poor.

State of stock: The decrease in SSB continues, and the 1987-1988 values are among the lowest on record (Figure 3.1.8). Although the 1986 year class is estimated to be above average, the SSB is predicted to decrease further in 1989 and 1990.

Forecast for 1989: Assuming F(88) = 0.49, Catch(88) = 48,000 t.

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Catch(89)	SSB(90)	
A	$F_{0.1}$	0.22	92	21	110	Some increase in SSB
B	0.8F(87)	0.39	92	35	96	SSB remains at the low 1989 level
C	F(87)	0.49	91	43	88	SSB declines further

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a substantial decrease in the stock size.

Recommendation: ACFM recommends that the fishing mortality in 1989 should be reduced towards the $F_{0.1}$ level in order to reverse the decline in spawning stock biomass. ACFM reiterates its concern with the exploitation pattern on this stock. Fishing mortality on younger age groups should be decreased. Possible means to achieve this could include increased mesh size in herring trawls, closing young fish nursery areas, etc.

Special comments: The 1986 year class appears to be above the long-term average level (5,400 million as compared to 3,600). Since this estimate is mainly based on the level of average fishing mortality on age group 1, it may well be overestimated.

3.2 Sprat

The total catches increased 17% from 75,784 t in 1986 to 88,607 t in 1987 (Table 3.2). The catches doubled in Sub-division 26 and rose also in Sub-division 25. In Sub-divisions 22, 24, and 28, the landings diminished, whereas in Sub-divisions 29 and 32, they remained at the previous level. The 1987 catch was well below the TAC of 117,200 t set by the IBSFC for 1987 for the total Baltic.

3.2.1 Sprat in Sub-divisions 22-25

Source of information: Report of the Working Group on Assessment of Pelagic Stocks in the Baltic, April 1988 (C.M.1988/Assess:18).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	15	0	0	50[3]	60[4]	16.0	16.0	-	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	14.0	14.3	14.0	11.3	15.8	23.2	21.2	-	39.4	11.3	21.0
Sp. stock biomass	55.6	109.1	194.9	287.3	265.3	183.7	138.7	133.0[1]	287.3	21.2	119.0
Recruitment (age 0)	11.3	30.3	14.6	6.2	3.6	6.4	9.8	9.9[1]	30.3	2.5	9.6
Mean F(1-5,u)	0.38	0.51	0.16	0.07	0.05	0.13	0.14	-	0.78	0.05	0.36

[1]Predicted or assumed. [2]Over period 1975-1987. [3]Whole Baltic. [4]Includes Sub-divisions 26 and 28. Weights in '000 t, recruitment in billions.

Catches: Catches exceeded 20,000 t in both 1986 and 1987 and reached the same level as in 1978.

Data and assessment: Analytical assessment using acoustic data.

Fishing mortality: Lower than $F_{0.1}$ (0.616) and F_{med} (0.199).

Recruitment: The year classes since 1984 have been below average.

State of stock: The increase in SSB caused by good recruitment in 1980-1983 stopped in 1984 (Figure 3.2.1). SSB has been declining since.

Forecast for 1989: Assuming F(88) = 0.16, Catch(88) = 20,000 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	F(87)	0.14	138	16	145	Slight increase in SSB
B		0.31	130	35	124)	Continued decline in SSB
C		0.44	125	46	112)	

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a slight increase in spawning stock and nearly the same total biomass.

Recommendation: The fishing mortality on this stock is low compared to $F_{0.1}$ and catches, consequently, could be increased without endangering the prospects for future catches. If, however, the objective for the management of the pelagic stocks in the area is to restrict catches of juvenile herring in the mixed sprat and herring fisheries in order not to adversely affect recruitment to the herring stocks, this could be achieved by a continuation of the present low fishing mortality on sprat.

3.2.2 Sprat in Sub-divisions 26 and 28

Source of information: Report of the Working Group on Assessment of Pelagic Stocks in the Baltic, April 1988 (C.M.1988/Assess:18).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	31	0	0	50[3]	60[4]	-	-	-	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	17.8	23.5	13.5	31.1	43.0	42.0	56.6	-	93.8	13.5	46.2
Sp. stock biomass	37.2	66.5	82.6	156.1	208.7	208.8	172.1	241.0[1]	282.7	37.2	147.4
Recruitment (age 0)	11.6	55.1	33.9	20.7	10.1	55.7	22.1	21.4[1]	56.7	4.6	25.7
Mean F(2-6,u)	0.19	0.26	0.04	0.19	0.18	0.19	0.28	-	0.63	0.05	0.32

[1]Predicted or assumed. [2]Over period 1975-1987. [3]Whole Baltic. [4]Includes Sub-divisions 22-25.
Weights in '000 t, recruitment in billions.

Catches: Catches have increased from 1984 onwards.

Data and assessment: Analytical assessment using acoustic data.

Fishing mortality: Low (1987 F = 0.28) as compared with $F_{0.1}$ (0.751).

Recruitment: The 1986 year class was estimated to be large by the 1987 acoustic survey and the 1987 to be average.

State of stock: Increase from 1982 to 1988 (Figure 3.2.2).

Forecast for 1989: Assuming F(88) = 0.21, Catch(88) = 60,000 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	F(87)	0.28	234	68	201	SSB will decline under
B	$\bar{F}$(78-85)	0.36	225	86	182	both options

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a decrease in SSB in 1989-1990 to the pre-1985 levels.

Special comments: The catches predicted for 1988 and 1989 are, to a large extent (50% and 40%, respectively), dependent on the estimate of the 1986 year class. ACFM advises that the 1989 catches should not be increased above the present level until the size of this year class has been confirmed.

3.2.3 Sprat in Sub-divisions 27 and 29-32

Source of information: Report of the Working Group on Assessment of Pelagic Stocks in the Baltic, April 1988 (C.M.1988/Assess:18).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	14	0	0	50[3]	8	-	-	-	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Actual landings	17.4	11.0	8.9	9.9	10.7	10.4	10.7	-	67.5	9.9	27.8
Sp. stock biomass	66.4	62.2	75.7	83.0	92.3	93.4	94.3	88.0[1]	246.6	62.2	123.3
Recruitment (age 0)	2.7	8.2	2.9	7.8	1.0	4.7	4.0	4.0[1]	32.8	0.8	5.9
Mean F(2-7,u)	0.34	0.23	0.23	0.16	0.15	0.13	0.12	-	0.44	0.12	0.28

[1]Predicted or assumed. [2]Over period 1975-1987. [3]Whole Baltic. Weights in '000 t, recruitment in billions.

Catches: Stable on low level in 1982-1987.

Data and assessment: Analytical assessment using acoustic data.

Fishing mortality: Low (1987 F = 0.12), well below $F_{0.1}$ (0.508).

Recruitment: Generally on the average level for the low stock size (1979-1987).

State of stock: Stable at a low level of abundance (Figure 3.2.3).

Forecast for 1989: Assuming F(88) = 0.13, Catch(88) = 10,000 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	≈F(87)	0.13	88	10	87	Stable SSB

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a stable stock size at a low abundance level.

Recommendation: Fishing mortality should be maintained at the current level.

Special comments: The SSB is underestimated in the assessment (the estimation is based on an acoustic survey conducted only in a part of the area).

The stock will probably be fished in 1989 mainly as by-catch in the herring fishery.

4 BALTIC DEMERSAL STOCKS

4.1 Cod

Total landings of cod in the Baltic have declined steadily from a high of 443,530 t in 1984 to 246,553 t in 1987, the lowest level since 1978 (Tables 4.1.1 and 4.1.2).

4.1.1 Cod in Sub-divisions 22 and 24

Source of information: Report of the Working Group on Assessment of Demersal Stocks in the Baltic, April 1988 (C.M.1988/Assess:20).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	27	29	<54	-[4]	<33	<24	9	16	-	-	-
Agreed TAC	227[3]	-	-	-	-	-	-	-	-	-	-
Actual landings	51	46	47	48	39	26	28	-	51	26	44
Sp. stock biomass	41	39	41	38	39	23	15	31[1]	47	29	40
Recruitment (age 1)	73	77	93	30	21	92	42	11[1]	116	11	70
Mean F(2-7,u)	1.06	0.81	0.91	0.85	1.16	1.49	1.13	-	1.49	0.69	0.93

[1]Predicted or assumed. [2]Over period 1976-1985. [3]For total Baltic Sea. [4]ACFM recommended that F should be reduced. Weights in '000 t, recruitment in millions.

Catches: Catch level stable over a 20-year period up to 1984. In 1986 and 1987, catches declined substantially and reached lowest level on record in 1986 (Table 4.1.3). No agreed TAC exists.

Data and assessment: Age composition data covered ~ 80% of catches. VPA tuning by effort data (four indices). Exploitation pattern from separable VPA. Recruitment estimates from young fish surveys (four indices).

Fishing mortality: F in 1985-1987 highest in time series. F in 1986 is not supported by effort data. F in 1987 exceeds by far the reference points $F_{0.1}$, F_{max}, and F_{med} and is at the F_{high} level.

Recruitment: Recruitment in 1983-1987 at low level, except for the 1985 year class. The 1987 year class is very poor.

State of stock: SSB on downward trend since 1985. In 1987, it was lowest on record (Figure 4.1.1).

Forecast for 1989: Assuming F(88) = 0.90, Catch(88) = 32,000 t.

Option	Basis	F(89)	Predicted SSB(89)	Predicted Catch(89)	Predicted SSB(90)	Consequences/implications
A	0.4F(87)	0.45	28	14	29	Stabilization of SSB on a low level.
B	0.6F(87)	0.67		19	24	Further decline in SSB.
C	0.8F(87)	0.90		23	19	
D	F(87)	1.12		26	16	

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to depletion of stock.

Recommendation: ACFM recommends a reduction in fishing mortality of 60%, and the catch should not be higher than 14,000 t in 1989.

4.1.2 Cod in Sub-divisions 25-32

Source of information: Report of the Working Group on Assessment of Demersal Stocks in the Baltic, April 1988 (C.M.1988/Assess:20).

Year	1981	1982	1983	1984	1985	1986	1987	1988	Max[2]	Min[2]	Mean[2]
Recomm. TAC	170	-	-	<274	<162	<232	<245	150	-	-	-
Agreed TAC	227[3]	-	-	-	-	-	-	-	-	-	-
Actual landings	329	314	329	395	316	251	217	-	395	154	270
Sp. stock biomass	780	777	770	764	598	426	358	321[1]	812	358	647
Recruitment (age 2)	646	643	427	276	227	231	253	329[1]	771	227	467
Mean F(3-7,u)	0.72	0.70	0.64	0.81	0.69	1.00	0.87	-	1.00	0.48	0.68

[1]Predicted or assumed. [2]Over period 1976-1985. [3]For total Baltic Sea. Weights in '000 t, recruitment in millions.

Catches: Catches over the period 1980-1985 were at a high level and well above the long-term average. In 1986 and 1987, a substantial decrease was observed (Table 4.1.4), and a further decline is expected in 1988. No agreed TAC exists.

Data and assessment: Analytical assessment based on catch-at-age data. VPA tuning is based on effort data and recruitment indices from young fish survey. M changed from 0.3 to 0.2.

Fishing mortality: Fishing mortality has decreased slightly in 1987, but has been between 0.8 and 1.0 for the last few years, substantially higher than previous levels. The average F in 1987 is higher than the reference points $F_{0.1}$ and F_{max}, and near F_{med}.

Recruitment: Recruitment level of 1975-1981 year classes was high. From 1982 year class onwards, lower recruitment figures were observed.

State of stock: In the period 1980-1985, the stock was at a very high level. From 1984 onwards, a sharp decrease in stock size occurred (Figure 4.1.2).

Forecast for 1989: Assuming F(88) = 0.71, Catch(88) = 159,000 t.

Option	Basis	F(89)	Predicted			Consequences/implications
			SSB(89)	Catch(89)	SSB(90)	
A	0.6F(87)	0.53	367	143	440	SSB increases 20% in 1990
B	0.8F(87)	0.71		179	398	SSB increases slightly in 1990
C	F(87)	0.88		210	362	SSB in 1990 at 1989 level

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a slight increase in the stock.

Recommendation: ACFM recommends that fishing mortality in 1989 be reduced by 20% from the 1987 level and that the catch in 1989 should not exceed 179,000 t. This level of catch will result in an increase in the spawning stock biomass in 1990 to the previously-estimated threshold level of about 400,000 t.

Special comments: The recent investigation of natural mortality and the analyses show that the value of M used from the middle of the 1970s (M = 0.3) is somewhat too high and should be set at 0.2. Also, a new analysis was carried out recently to calculate the maturity ogive.

The two new findings were used in this year's assessment and this caused a reduction in the total and spawning stock biomasses of about 24%, but this has no influence on the prediction of catches.

5 BALTIC SALMON STOCKS

Source of information: Baltic Salmon and Trout Assessment Working Group report, April 1988 (C.M.1988/Assess:19).

5.1 Salmon in the Main Basin and the Gulf of Bothnia (Sub-divisions 24-31)

5.1.1 Revision and calibration of the assessment model

The 1987 report gave too high escapement because, in the calibration of the assessment model, unreported tag recaptures were not taken into account. A new version of the assessment model was developed by splitting it into various stages of the salmon life history. When using a correction factor for unreported tag recaptures (39% unreported), the escapement simulated in the model reflects well the catches in the breeding fishery.

Distributions of reported and simulated catches

Age	River Lule recaptures[1]	Model catches
Post-smolt	?	5.2
First winter	2.2	4.9
Grilse	5.5	3.8
Second winter	73.8	72.0
Third spring spawners	8.2	5.9
Third winter	10.0	6.5
Fourth spring spawners	3.0	1.7

[1] Fish below 1 kg are excluded.

5.1.2 Landings and recruitment

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Landings (t)	2,400	2,584	2,030	2,350	3,534	3,937	3,341	3,490[1]	-
Recruitment (ASU)[2]									
Wild	1.26	1.26	1.26	1.25	0.95	0.95	0.92	0.92	0.92[1]
Artificial	2.92	2.68	2.84	3.08	3.53	3.96	4.72	4.93	4.77[1]
Total	4.18	3.94	4.10	4.33	4.48	4.91	5.64	5.85	5.69[1]

[1] Preliminary.
[2] Millions.

Offshore catches in the Gulf of Bothnia have decreased remarkably since 1985 (Table 5.1.1).

The recruitment originates from hatcheries and from 20 rivers still having naturally reproducing salmon stocks.

The Baltic rivers having wild salmon stocks in the middle of the 1980s.

Area	Country		
	Finland	Sweden	USSR
Sub-division 31	Tornionjoki Simojoki	Torne Sangisån Kalix Råne Pite Åby Byske Kåge Rickleån[1] Vindel Øre Lögde	
Sub-division 30		Ljungan[1]	
The Main Basin		Emån Mörrumsån	Salaca Daugava Gauja Venta

[1]The present existence is uncertain.

The estimate of natural smolt production was 0.92 million ASU in 1987, with a proposal of about the same level in 1988.

Hatchery-reared smolt production was 4.93 million ASU in 1987 and 4.72 million ASU in 1986. The increase was mainly due to production in Finnish and Swedish hatcheries.

5.1.3 Fishing effort

The fishing effort in the Main Basin, which reached a maximum in the late 1960s resulting in corresponding high catches, has since then slightly decreased resulting in a lower catch level until 1983 (Figure 5.1.1). Though the effort continued to decline, the catches did not react correspondingly, but increased significantly. The efficiency of the drift net fishery has probably been improved in recent years, but is not considered to be fully responsible for an increase in the catches from a level of about 1,700 t to about 2,800 t in the Main Basin area.

5.1.4 Catch options

The present exploitation rate for fisheries for ages A1+ - A3+ and the coastal fishery for spawning migrators was calibrated as 0.75. With the present exploitation pattern, the escapement of spawners to the breeding fisheries is 0.26%. This low escapement is not sufficient to fulfill the needs of hatcheries. An increase in escapement to 0.43% should be sufficient for the breeding purposes. This would imply a reduction in the exploitation rate of all main fisheries to 0.7.

Exploitation rate	Escapement %	Catch (tonnes)
0.75[1]	0.26	3,266
0.70[2]	0.43	3,340
0.65[2]	0.65	3,400
0.60[2]	0.92	3,450
0.55[2]	1.24	3,300
0.50[2]	1.37	3,000

[1] Present situation, year 0.
[2] Simulated long-term effects, year 1 ->.

This level of escapement is too low to guarantee an increase in the escapement to the rivers of wild stocks. Therefore, ACFM recommends that the exploitation rate in all the main fisheries should be lowered to 0.65. This would give an escapement of at least 0.65% in the reared river stocks.

The same level of escapement is also achieved by a decrease in the fishery for the A1+ salmon to 0.5 instead of the present 0.75 exploitation rate.

Exploitation rate	Escapement %	Catch (tonnes)
0.75[1]	0.26	3,226
0.65[2]	0.42	3,480
0.60[2]	0.50	3,590
0.55[2]	0.58	3,700
0.50[2]	0.65	3,812

[1] Present situation, year 0.
[2] Simulated long-term effect, year 1 ->.

The effect of these reductions in the fishery on wild stocks can be determined after careful monitoring of the situation in the rivers. Therefore, the long-term management recommendations should be based on the river studies.

If a reduced exploitation rate is in effect in 1989, there will be an increase in the total catch in weight in 1990 although the exploitation rate would be kept at the same lower level. This is caused by the very fast growth of salmon during the feeding migration. The result that the reducing of fishing mortality causes increasing catches has also been obtained by yield/recruit analyses.

To decrease the fishing for the A1+ salmon, the minimum mesh size in drift nets should be increased. To determine the suitable mesh size, net selection experiments are recommended. In this connection, the longline fishery for small salmon should be restricted and a corresponding minimum size of salmon specified.

5.1.5 Forecast for 1989

A reduced exploitation rate to 0.65 in all fisheries would mean a catch of 2,900 t in 1989. To guarantee the positive effect on the salmon survival, a TAC expressed in numbers is preferred. The TAC in numbers for 1989 should be 850,000 salmon.

5.2 Neva Salmon Stock in the Bothnian Sea (Sub-division 30)

5.2.1 Landings and recruitment

The salmon catch in Sub-division 30 is partly based on releases of River Neva salmon in that area.

Catches based on tagging experiments are shown in the text table below.

Item	1980	1981	1982	1983	1984	1985	1986	1987	1988
Catches (t[1])	...	...	...	...	...	100	120	120	80
Recruitment ASU[2]	11	17	54	157	337	469	321	577	600

[1] Calculated.
[2] Thousands.

The average of 400,000 ASU was used for the year 1989 for the assessment.

5.2.2 Catch options

Based on tagging experiments in 1979-1986, the average yield of the releases of Neva salmon into Sub-division 30 was 140 kg/1,000 ASU. Besides the known poor growth of Neva salmon in this area, the background of these low stocking results is unknown. The yield of Neva salmon stockings in 1984-1989 to the Bothnian Sea was estimated to be 70-110 t in 1989 (20,000-32,000 salmon) which should be added to the catches from the Gulf of Bothnia when discussing catch regulatory measurements.

5.3 Salmon in the Gulf of Finland (Sub-division 32)

5.3.1 Landings and recruitment

The catches are mainly based on artificial smolt production.

Item	1980	1981	1982	1983	1984	1985	1986	1987	1988
Landings (t)	71	73	133	196	239	318	397	354	...
Recruitment ASU[1]	190	252	391	476	476	593	584	630	628

[1] Thousands.

Salmon smolt production of wild origin has been estimated to be about 20,000 (40,000 ASU) from the rivers in the Gulf of Finland. There is also natural smolt production in the USSR rivers in Sub-division 28. According to taggings, some of these salmon migrate to the Gulf of Finland. Total smolt production for the Gulf of Finland was estimated to be 630,000 ASU in 1987.

5.3.2 Fishing effort

The Finnish coastal fishery has been established to be at the level which should secure the desired escapement of breeders for Finnish hatcheries. The effort by the Finnish longline fishery has slightly decreased in 1986. The drift net effort of the USSR fishery increased in 1984-1987 in comparison to previous years.

5.3.3 Assessment type

The catch prognosis has been calculated on the basis of total recruitment in ASU in 1984-1988 and tagging results for the corresponding year classes.

5.3.4 Forecast for 1989

The catch prognosis for 1989 predicts 375-440 t (80,000-100,000 salmon). The lower figure is calculated on the basis of total recruitment in ASU in 1984-1989 and tagging results. In the higher figure, an estimated rate of unreported tag recaptures is taken into account.

5.3.5 Catch options

In the Rivers Kymi and Neva, the number of spawners is expected to be sufficient for breeding purposes. In other rivers, there is a shortage of salmon spawners. The migration behaviour and scale structure of salmon originating from these rivers are unknown. In the Finnish longline fishery, there have been no salmon of wild origin during recent years. However, in the samples in 1987,there existed 5% salmon of wild origin. In the catch samples in the coastal fishery, the proportion of wild salmon was 9%. The origin of these salmon is unknown.

The catch prognosis for 1989 is 375-440 t, continuing at the current level of fishing. However, it has been demonstrated by yield/recruit analyses that the total catch would be about one-third higher if the fish are caught about half a year later than in the present offshore fishery.

5.4 Drift Net Selection Experiment

The most recent year classes (1984 and 1985) have experienced very favourable growth conditions and the average size of a 2-winter salmon of these year classes is about 5 cm longer than usual. At least partly because of the selectivity properties of the drift nets, the mortality of 2-winter salmon has recently increased substantially, as can be seen in commercial catches.

It has been suggested that a mesh size increase would be beneficial to the spawning escapement of Baltic salmon.

Data on the selective properties of drift nets in current use are either old or concern comparisons between longline and drift net fisheries. These comparisons refer to the winter period when salmon behaviour differs from autumn when the drift net fishery peaks, and hence these estimates may not be entirely satisfactory. Therefore, a controlled experiment is necessary.

Objectives

1. Estimate the selection properties of drift gill nets operated from commercial fishing vessels.

2. Estimate CPUE as well as size composition of the salmon catches for various mesh sizes.

3. The study should center around a 170-mm mesh size.

4. Investigate whether commercial fishing will experience any problems if a mesh change was introduced.

Description of the experiment

The experiment will equip one or two commercial fishing vessels with nets 60, 170 and 180-mm mesh, and catches will be measured and recorded, net by net. Additional information should also be be obtained; however,the detailed set-up is left to later when the experiment is funded.

The experiment is designed to take place in September-October on traditional salmon fishing grounds, e.g., in the former White Zone east of Gotland.

Manual for the experiment

The first task after deciding to carry out the experiment is to form a planning group which should specify the work in detail.

Recommendation

ACFM recommends that this drift net selection experiment be initiated at the latest, in 1989.

5.5 Feeding Areas of Wild Salmon in the Baltic Sea

A proposal has been put forward to restrict fishing in those areas of the Main Basin where fish from wild stocks occur to a high degree.

The tag recoveries of Rivers Torne, Simojoki, Emån, and Mörrum concentrate east of Gotland in the former White Zone and northeast of Bornholm. However, these are the areas where hatchery-reared fish also seem to concentrate. Tagging results gave no indication of certain areas with a higher proportion of wild fish than hatchery-reared stocks.

5.6 Coded-Wire Tagging Programme

No international coded-wire tagging programmes were initiated in 1988. Pilot programmes have been continued in Finland and in the USSR. It is recommended that participants from other countries initiate national programmes on tagging and scanning of salmon with coded-wire tags and that adipose finclipping as a marking technique should primarily be used for such programmes. It is also recommended that member countries should establish a sampling programme which should reveal the percentage of adipose finclipped salmon in the catches.

Table 1.1 Nominal fish catches in the Baltic from 1973-1987 (in '000 t). Anadromous species, except salmon, not included. (Data as officially reported to ICES.)

Year	Species							Total
	Cod	Herring	Sprat	Flatfish	Salmon	Freshwater species	Others	
1973	189	404	213	18	2.7	23	55	905
1974	189	407	242	21	2.9	21	54	937
1975	234	415	201	24	2.9	20	60	957
1976	255	393	195	19	3.1	21	46	932
1977	213	413	211	22	2.4	22	42	925
1978	196	420	132	23	2.0	22	44	839
1979	273	459	78	24	2.3	20	47	903
1980	392	465	58	19	2.5	21	29	987
1981	383	432	47	17	2.4	19	31	931
1982	366	453	48	17	2.3	18	30	934
1983	380	474	31	16	2.6	18	20	942
1984	446	437	54	15	4.0	18	17	991
1985	348	442	71	17	4.3	16	16	914
1986	273	411	78	18	3.7	13	19	816
1987[1]	235	290	91	16	3.0	12	24	671

[1] The figures for 1987 are preliminary and exclude catches from Finland.

Table 1.2 Nominal catch (tonnes) of HERRING in Divisions IIIb,c,d, 1963-1987. (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[1]	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[2]	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
1983	32,657	98,390	51,991	9,273	82,329	86,561	112,370	473,571
1984	32,272	97,277	50,073	8,166	78,326	65,519	105,577	437,210
1985	27,847	98,999	51,607	9,079	85,865	57,554	110,783	441,734
1986	21,598	94,045	53,061	9,382	77,109	39,909	115,665	410,769
1987	23,284[3]	-[4]	50,037	6,199	60,616	36,446	113,844	-[4]

[1] Including Division IIIa.
[2] Large quantity of herring used for industrial purposes is included with "Unsorted and Unidentified Fish".
[3] Preliminary.
[4] Not available.

Table 1.3 Nominal catch (tonnes) of SPRAT in Divisions IIIb,c,d, 1963-1987. (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[1]	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
1983	2,861	855	2,693	550	8,492	1,747	13,725	30,923
1984	3,450	2,436	2,762	642	10,954	7,807	25,891	53,942
1985	2,417	2,923	1,950	638	22,156	7,111	34,003	71,198
1986	5,693	3,237	2,514	392	26,967	2,573	36,484	77,860
1987	8,617[2]	-[3]	1,308	392	34,887	870	44,888	-[3]

[1] Including Division IIIa.
[2] Preliminary.
[3] Not available.

Table 1.4 Nominal catch (tonnes) of COD in Divisions IIIb,c,d, 1963-1987. (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[1]	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[2]
1981	93,155	5,681	12,938	15,082	120,942	44,300	87,746	382,609[3]
1982	98,230	8,126	11,368	19,247	92,541	44,807	86,906	365,525[4]
1983	108,862	8,927	10,521	22,521	76,474	54,876	92,248	380,024[5]
1984	121,297	9,162	9,886	39,632	93,429	65,788	100,761	446,309[6]
1985	107,614	7,224	6,593	24,199	63,260	54,723	78,127	347,630[7]
1986	98,081	4,831	3,179	18,243	43,237	48,804	52,148	273,119[8]
1987	85,517[9]	-[10]	5,114	17,127	32,667	50,186	39,203	-[10]

[1] Including Division IIIa.
[2] Includes catches by the Faroe Islands of 1,250 t and United Kingdom (England & Wales) of 2,901 t.
[3] Includes catches by the Faroe Islands of 2,765 t.
[4] Includes catches by the Faroe Islands of 4,300 t.
[5] Includes catches by the Faroe Islands of 6,065 t.
[6] Includes catches by the Faroe Islands of 6,354 t.
[7] Includes catches by the Faroe Islands of 5,890 t.
[8] Includes catches by the Faroe Islands of 4,596 t.
[9] Preliminary.
[10] Not available. Preliminary catches by the Faroe Islands 4,863 t.

Table 1.5 Nominal catch (tonnes) of FLATFISH in Divisions IIIb,c,d 1963-1987. (Data as officially reported to ICES.)

Year	Denmark	Finland	German Dem.Rep.	Germany Fed.Rep.	Poland	Sweden	USSR	Total
1963	9,888	-	3,390	794	2,794	1,026	1,460[1]	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[2]	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
1983	6,000	368	3,957	751	2,809	217	2,371	16,473
1984	5,165	329	3,173	662	3,865	176	1,859	15,229
1985	6,506	391	4,290	542	3,533	170	1,528	16,960
1986	6,808	105	3,480	494	5,044	250	1,438	17,619
1987	5,727[3]	-[4]	2,457	757	4,468	273	2,194	-[4]

[1] Including Division IIIa.
[2] Excluding subsistence fisheries.
[3] Preliminary.
[4] Not available.

Table 3.1 HERRING catches in the Baltic Sea by countries and sub-divisions, 1986 and 1987 (t). By-catch of sprat in directed herring fisheries excluded and by-catch of herring in sprat fisheries included.

Year and country	Total catch	Sub-divisions 22	23	24	25	26	27	28	29S	29N	30	31	32
1986													
Denmark	19,441	9,035	1,490	5,011	3,905	-	-	-	-	-	-	-	-
Finland	93,928	-	-	-	-	-	89	116	335	37,867	25,512	9,179	20,830
German Dem. Rep.	53,061	1,907	-	49,273	1,881	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	8,550	7,845	-	705	-	-	-	-	-	-	-	-	-
Poland	80,185	-	-	12,344	47,062	20,762	17	-	-	-	-	-	-
Sweden	39,842	-	1,365	5,946	19,315	-	7,870	1,964	51	494	2,501	336	-
USSR	115,665	-	-	-	20,090	17,430	-	28,695	23,930	-	-	-	25,520
Total	410,672	18,787	2,855	73,279	92,253	38,192	7,976	30,775	24,316	38,361	28,013	9,515	46,350
1987[1]													
Denmark	33,973	22,555	754	6,506	4,158	-	-	-	-	-	-	-	-
Finland	99,842	-	-	-	-	-	344	1,899	537	38,164	26,639	9,560	22,700
German Dem. Rep.	49,880	465	-	46,802	1,991	-	611	11	-	-	-	-	-
Germany, Fed.Rep.	5,806	5,178	-	628	+	-	-	-	-	-	-	-	-
Poland	63,490	-	-	7,997	39,732	15,393	344	24	-	-	-	-	-
Sweden	35,564	-	172	7,814	15,602	88	7,738	1,606	8	311	1,905	320	-
USSR	113,844	-	-	-	8,061	24,140	3,577	32,336	24,268	-	-	-	21,462
Total	402,399	28,198	926	69,747	69,544	39,621	12,614	35,876	24,813	38,475	28,543	9,880	44,162

[1]Preliminary data.

Table 3.1.1 HERRING in Division IIIa. Landings in tonnes, 1978-1987. (Data mainly provided by Working Group Members).

Country	1978	1979	1980	1981	1982
Skagerrak					
Denmark	7,753	8,729	22,811	45,525	43,328
Faroe Islands	1,041	817	526	900	715
Germany, Fed.Rep.	28	181	-	199	43
Norway (Open sea)	1,860	2,460	1,350	6,330	10,140
Norway (Fjords)	2,271	2,259	2,795	900	1,560
Sweden	11,551	8,140	10,701	30,274	24,859
Total	24,504	22,586	38,183	83,768	80,645
Kattegat					
Denmark	29,241	21,337	25,380	48,922	38,609
Sweden	35,193	25,272	18,260	38.871	38,892
Total	64,434	46,609	43,640	87,833	77,501
Division IIIa total	88,938	69,195	81,823	171,601	158,146

Country	1983	1984	1985	1986	1987[1]
Skagerrak					
Denmark	54,102	64,621	88,192	94,022	105,017
Faroe Islands	1,980	891	455	520	-
Germany, Fed.Rep.	40	-	-	11	-
Norway (Open sea)	500	-	2,752	677	-
Norway (Fjords)	2,834	1,494	1,673	860	1,209
Sweden	35,176	59,195	40,349	42,996	51,184
Total	94,632	126,201	133,421	139,086	157,410
Kattegat					
Denmark	62,901	71,359	69,235	41,669	46,706
Sweden	40,463	35,027	39,829	35,852	29,844
Total	103,364	106,386	109,064	77,521	76,550
Division IIIa total	197,996	232,587	242,485	216,607	233,960

[1] Preliminary.

Table 3.2 SPRAT catches in the Baltic Sea by country and sub-division, 1986 and 1987 (t). By-catch of herring in directed sprat fisheries excluded and by-catch of sprat in herring fisheries included.

Year and country	Total catch	Sub-division										
		22	23	24	25	26	27	28	29	30	31	32
1986												
Denmark	5,954	4,816[2]	-	-	1,138	-	-	-	-	-	-	-
Finland	3,237	-	-	-	-	-	-	-	2,178	2	-	1,057
German Dem. Rep.	2,514	256	-	2,258	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	473	472	-	1	-	-	-	-	-	-	-	-
Poland	23,653	-	-	765	11,292	11,596	-	-	-	-	-	-
Sweden	3,469	-	239	217	1,936	-	63	1,010	-	4	-	-
USSR	36,484	-	-	-	-	10,003	-	19,353	5,191	-	-	1,937
Total	75,784	5,544	239	3,241	14,366	21,599	63	20,363	7,369	6	-	2,994
1987[1]												
Denmark	2,593	2,456	-	-	137	-	-	-	-	-	-	-
Finland	3,238	-	-	-	-	-	-	21	2,162	3	-	1,052
German Dem. Rep.	1,307	4	-	1,303	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	1,125	1,123	-	2	-	-	-	-	-	-	-	-
Poland	32,003	-	-	90	15,398	16,515	-	-	-	-	-	-
Sweden	3,453	-	-	242	481	727	46	1,957	-	-	-	-
USSR	44,888	-	-	-	-	25,602	-	11,824	5,693	-	-	1,769
Total	88,607	3,583	-	1,637	16,016	42,844	46	13,802	7,855	3	-	2,821

[1] Preliminary data.
[2] Sub-division 24 included.

Table 4.1.1 Total catch of COD by countries in Sub-divisions 22-32.

Year	Denmark	Finland	German Dem.Rep.	Germany, Fed.Rep.	Poland	Sweden	USSR	Faroe Islands	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	30,806	47,702	18,127	29,680	-	211,097
1978	50,611	1,437	9,345	15,122	64,113	16,793	37,200	-	194,621
1979	59,704	2,938	8,997	19,375	79,754	23,093	75,034	3,850	272,745
1980	75,529	5,962	7,406	18,407	123,486	33,201	124,350	-	388,341
1981	92,648	5,681	12,936	18,281	120,901	44,330	87,746	-	382,523
1982	91,927	8,126	11,368	21,860	92,541	46,548	86,906	2,723	361,999
1983	107,624	8,927	10,521	25,154	76,474	53,740	92,248	3,063	377,751
1984	113,701	9,358	9,886	41,125	93,429	65,927	100,761	9,343	443,530
1985	107,627	7,224	6,593	31,798	63,260	54,723	78,127	6,826	356,178
1986[1]	98,464	5,633	3,179	22,422	43,236	49,572	52,148	8,846	283,500
1987[1]	91,217	6,241	5,114	18,816	32,667	47,429	39,203	5,866	246,553

[1] Provisional data.

Table 4.1.2 Total catch of COD in Sub-divisions 22-32.

Year	Denmark				Faroe Islands	Finland			
	22	23	24	25-28	25-28	29	30[2]	31	32
1971	16,831	-	6,884	23,116	-	-	53	-	-
1972	17,717	-	7,928	34,072	-	-	76	-	-
1973	21,400	-	9,195	35,455	-	-	95	-	-
1974	18,300	-	7,482	32,028	-	-	160	-	-
1975	15,981	-	7,500	39,043	-	270	8	-	20
1976	19,764	712	9,682	47,412	-	81	24	-	182
1977	17,726	1,166	10,213	44,400	-	85	26	-	199
1978	12,641	1,177	6,527	30,266	-	249	323	6	859
1979	16,093	2,029	7,232	34,350	3,850	707	518	16	1,697
1980	16,033	2,425	7,367	49,704	-	2,163	880	45	2,874
1981	15,502	1,473	7,152	68,521	-	3,036	684	11	1,950
1982	11,669	1,638	7,469	71,151	2,723	4,557	1,368	42	2,159
1983	14,100	1,257	7,861	84,406	3,063	5,322	2,013	36	1,556
1984	13,867	1,703	8,042	90,089	9,343	5,433	2,741	7	1,177
1985	15,563	1,076	7,461	83,527	6,826	4,646	1,706	7	865
1986	8,914	748	7,281	81,521	8,846	3,571	1,306	2	754
1987[1]	8,323	1,516	5,987	75,391	5,866	4,330	1,103	3	805

Year	Federal Republic of Germany					German Democratic Republic						
	22	24	25	26	28	22	24	25	26	27	28	29
1971	11,686	1,796	1,300	1,466	-	3,602	4,405	1,950	983	-	37	-
1972	10,531	1,782	3,193	10	-	4,560	5,105	1,950	2,072	-	33	-
1973	12,833	900	9,100	5,200	673	4,004	4,370	4,065	1,912	-	57	-
1974	9,998	395	5,242	5,769	820	3,028	5,431	1,469	996	-	52	-
1975	12,415	497	8,809	1,975	1,184	3,471	2,571	3,320	5,250	50	60	20
1976	12,312	581	7,526	4,490	1,717	1,292	3,290	800	3,150	10	10	-
1977	10,807	879	3,649	13,803	1,668	977	2,471	324	5,996	73	1,119	7
1978	9,972	880	2,178	1,793	299	1,619	5,466	414	1,714	1	131	-
1979	8,910	688	7,616	2,149	12	1,024	6,570	54	1,301	1	46	1
1980	5,968	689	10,985	673	92	880	4,700	5	1,818	-	3	-
1981	9,095	2,165	7,021	-	-	1,743	9,916	2	1,275	-	-	-
1982	7,394	666	13,069	662	69	1,787	8,828	-	728	-	25	-
1983	8,937	323	14,179	1,599	116	1,441	7,656	-	1,402	-	22	-
1984	11,340	208	21,048	7,926	603	1,774	6,319	-	1,793	-	-	-
1985	4,992	531	12,733	11,572	1,970	1,508	3,870	-	1,215	-	-	-
1986	2,236	666	10,545	8,399	576	825	2,173	1	180	-	-	-
1987[1]	3,611	645	7,757	5,009	1,794	504	4,392	1	217	-	-	-

cont'd.

Table 4.1.2 (cont'd.)

Year	Poland 25[4]	Poland 26	Sweden 23	Sweden 24	Sweden 25	Sweden 26	Sweden 27[3]	Sweden 28	Sweden 29	Sweden 30	Sweden 31
1971	27,581	26,570	-	1,419	13,132	-	833	240	-	46	-
1972	24,926	32,167	-	1,277	13,842	-	876	440	-	36	-
1973	29,010	20,780	-	1,655	15,224	-	971	485	-	54	-
1974	25,221	23,429	-	1,937	11,950	-	1,682	825	-	41	-
1975	35,373	33,945	-	1,932	12,511	-	2,052	1,367	103	-	-
1976	26,082	44,384	-	1,800	14,109	-	1,979	2,180	115	5	-
1977	18,172	29,530	550	1,516	11,775	-	2,584	1,560	120	22	-
1978	31,161	32,952	600	1,730	9,017	26	3,207	1,740	417	55	1
1979	40,146	39,608	700	1,800	13,628	50	3,458	2,665	641	145	6
1980	50,832	72,654	1,300	2,610	18,694	88	6,014	3,185	790	516	4
1981	50,698	70,203	900	5,700	24,600	260	7,200	4,450	712	500	8
1982	41,830	50,711	140	7,933	20,429	2,279	4,109	9,264	687	1,669	38
1983	35,153	41,321	120	6,910	27,630	1,810	6,490	9,200	1,260	320	-
1984	35,261	58,168	228	6,014	33,493	4,413	8,223	11,947	1,338	271	-
1985	19,332	43,928	263	4,895	22,737	8,170	7,068	9,523	1,115	929	23
1986	18,297	24,939	227	3,622	19,214	7,764	7,554	9,606	1,233	298	54
1987[1]	12,254	20,413	137	4,314	15,173	7,833	5,708	7,507	903	5,817	37

Year	USSR 25	USSR 26	USSR 27	USSR 28	USSR 29	USSR 32	Total
1971	-	16,115	-	4,795	-	-	164,840
1972	-	23,951	-	6,189	-	-	192,733
1973	-	8,768	1	11,250	50	14	197,521
1974	811	18,633	-	17,677	1,010	-	194,386
1975	946	17,884	3	28,677	1,735	44	239,016
1976	8,855	25,302	126	14,645	106	13	252,736
1977	390	17,880	4	11,304	91	11	211,097
1978	12	18,010	78	18,623	166	311	194,621
1979	13	30,776	-	39,875	1,575	2,795	272,745
1980	7	45,734	-	59,892	4,575	14,142	388,341
1981	2	44,254	-	32,195	3,733	7,562	382,523
1982	5	33,221	-	40,876	3,308	9,496	361,999
1983	-	33,600	-	39,464	6,095	13,089	377,751
1984	-	39,871	-	43,802	6,185	10,903	443,530
1985	-	32,096	-	27,137	8,822	10,072	356,178
1986	-	22,818	-	21,840	3,289	4,201	283,500
1987[1]	-	22,652	-	11,457	1,654	3,440	246,553[5]

[1] Provisional.
[2] Finland: 1971-1974, sub-divisions combined.
[3] Sweden: 1971-1974, sub-divisions combined.
[4] Poland: some by-catches from Division 24 included.
[5] Sum of figures used in assessments.

Table 4.1.3 Total catch of COD in Sub-divisions 22, 23, and 24.

Year	Denmark	German Dem.Rep.	Germany, Fed.Rep.	Sweden	Total			
	22+24	22+24	22+24	24	22	23	24	22+24
1965	19,457	9,705	13,530	2,182	27,867	-	17,007	44,874
1966	20,500	8,393	11,448	2,110	27,864	-	14,587	42,451
1967	19,181	10,007	12,884	1,996	28,875	-	15,193	44,068
1968	22,593	12,360	14,815	2,113	32,911	-	18,970	51,881
1969	20,602	7,519	12,717	1,413	29,082	-	13,169	42,251
1970	20,085	7,996	14,589	1,289	31,363	-	12,596	43,959
1971	23,715	8,007	13,482	1,419	32,119	-	14,504	46,623
1972	25,645	9,665	12,313	1,277	32,808	-	16,092	48,900
1973	30,595	8,374	13,733	1,655	38,237	-	16,120	54,357
1974	25,782	8,459	10,393	1,937	31,326	-	15,245	46,571
1975	23,481	6,042	12,912	1,932	31,867	-	12,500	44,367
1976	29,446	4,582	12,893	1,800	33,368	712	15,353	48,721
1977	27,939	3,448	11,686	1,516	29,510	1,716	15,079	44,589
1978	19,168	7,085	10,852	1,730	24,232	1,777	14,603	38,835
1979	23,325	7,594	9,598	1,800	26,027	2,729	16,290	42,317
1980	23,400	5,580	6,652	2,610	22,881	3,725	15,366	38,247
1981	22,654	11,659	11,260	5,700	26,340	2,373	24,933	51,273
1982	19,138	10,615	8,060	7,933	20,850	1,778	24,896	45,746
1983	21,961	9,097	9,260	6,910	24,478	1,377	22,750	47,228
1984	21,909	8,093	11,548	6,014	26,981	1,931	20,583	47,564
1985	23,024	5,378	5,523	4,895	22,063	1,339	16,757	38,820
1986	16,195	2,998	2,902	3,622	11,975	975	13,742	25,717
1987[1]	14,310	4,896	4,256	4,314	12,438	1,653	15,338	27,776

[1]Provisional data.

Table 4.1.4 Total catch of COD in Sub-divisions 25-32.

Year	Denmark	Finland	German Dem.Rep.	Germany, Fed.Rep.	Poland	Sweden	USSR	Faroe Islands	Total
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	19,120	47,702	16,061	29,680	-	164,792
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	3,850	227,699
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	2,723	314,475
1983	84,406	8,927	1,424	15,894	76,474	46,710	92,248	3,063	329,146
1984	90,089	9,358	1,793	29,577	93,429	59,685	100,761	9,343	394,035
1985	83,527	7,224	1,215	26,275	63,260	49,565	78,127	6,826	316,019
1986[1]	81,521	5,633	181	19,520	43,236	45,723	52,148	8,846	256,808
1987[1]	75,391	6,241	217	14,560	32,667	42,978	39,203	5,866	217,123

[1] Provisional data.

Table 5.1.1 Annual nominal catches in tonnes of Baltic salmon in 1978-1987. (S = Sea; C = Coastal; R = River).

Year	Baltic Main Basin (Sub-divisions 24-29)							
	Denmark	Finland		Fed.Rep.of Germany	Poland	Sweden	USSR	
	S	S	C	S	S	S	S	C/R
1978	810	191	-	22	4	252	90	48
1979	815	199	-	31	4	264	167	29
1980	849	305	-	40	22	325	303	16
1981	844	302	-	43	45	401	282	17
1982	604	212	-	20	38	375	275	31
1983	697	189	-	25	76	370	362	105
1984	1,145	263	2	32	72	549	491	89
1985	1,345	303	24	30	162	842	426	90
1986	848	425	4	41	137	771	414	130
1987[1]	949	330	5	26	267	887	555	63

Year	Gulf of Bothnia (Sub-divisions 30-31)							Gulf of Finland (Sub-division 32)					Total
	Denmark	Finland			Sweden			Finland			USSR		
	S	S	C	R	S	C	R	S	C	R	S	C/R	
1978	-	127	145	-	18	212	40	68	1	-	-	6	2,040
1979	-	172	121	-	20	171	35	63	3	-	-	4	2,098
1980	-	162	148	-	23	172	35	51	2	-	11	7	2,469
1981	-	190	157	-	26	242	35	65	1	-	5	2	2,657
1982	-	177	133	-	-	135	30	102	27	-	-	5	2,164
1983	-	193	161	-	-	140	32	129	65	-	-	2	2,546
1984	-	454	245	-	-	140	52	165	62	-	12	-	3,773
1985	-	262	297	4	-	114	38	143	149	2	22	2	4,191
1986	-	156	215	2	-	157	41	222	120	2	52	1	3,738
1987[1]	-	70	220	2	-	93	23	200	120	2	32	-	3,844

[1] Preliminary data. 5% of the Swedish catches stated for the Main Basin have been taken in Sub-division 30. (See notes on next page.)

NOTES TO TABLE 5.1.1

Data from Denmark, Federal Republic of Germany, Poland, and Sweden have been converted from gutted to ungutted weight by the factor 1.1, an approximation to the equation: w ungutted = 1.0972 w gutted estimated by Thurow (1965).

Data from Denmark (before 1983), Federal Republic of Germany, Finland, and the USSR offshore catches include sea trout of an order of 3%, 3%, 10%, and 3%, respectively.

The sea 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 along 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.

The main part of the coastal and 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 some non-commercial catches. In the Gulf of Finland, such catches comprise one third of the total yield.

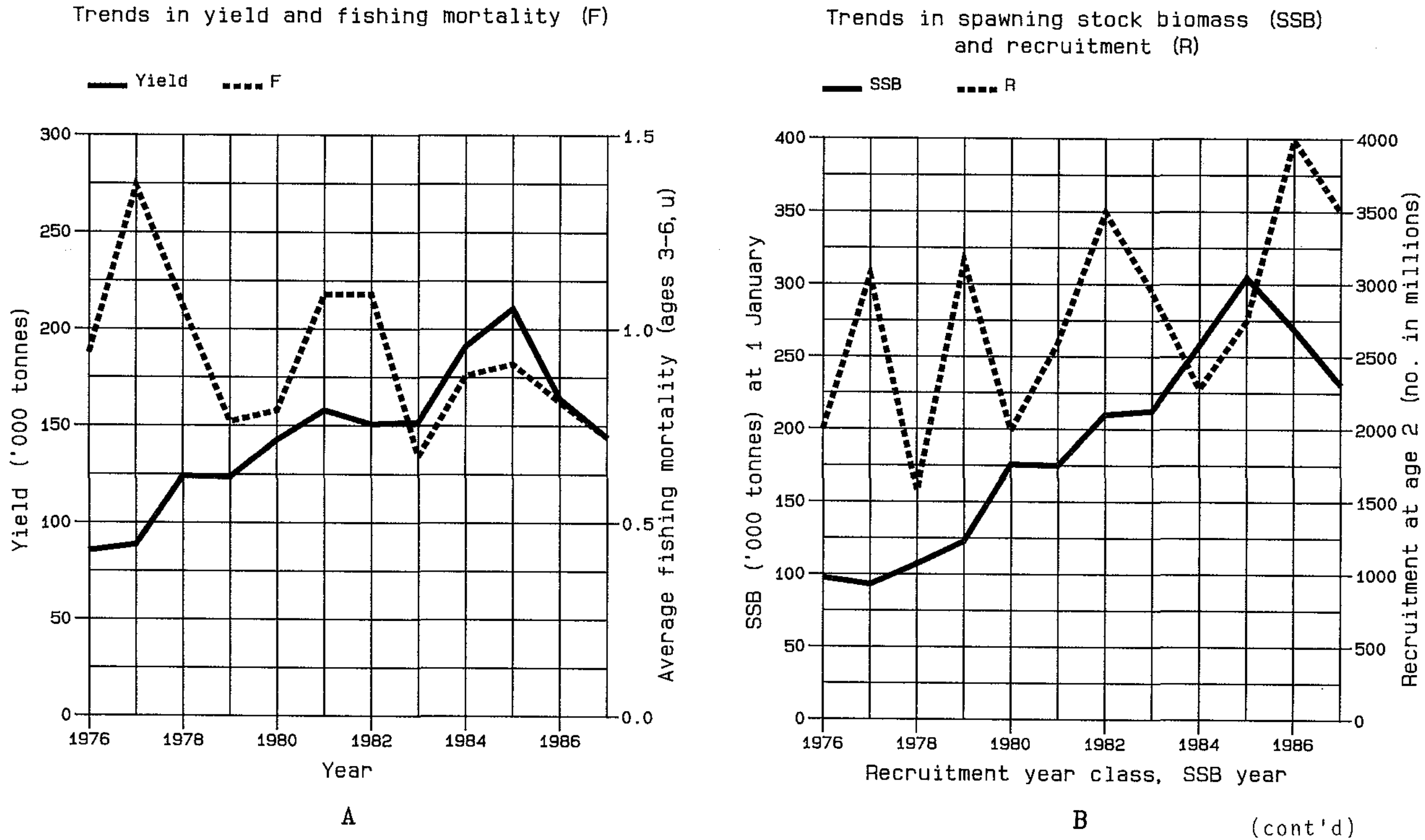
The Finnish catches in the rivers were not estimated before 1985.

FISH STOCK SUMMARY

Figure 3.1.1

STOCK: Herring in the Western Baltic and Kattegat

28-04-1988

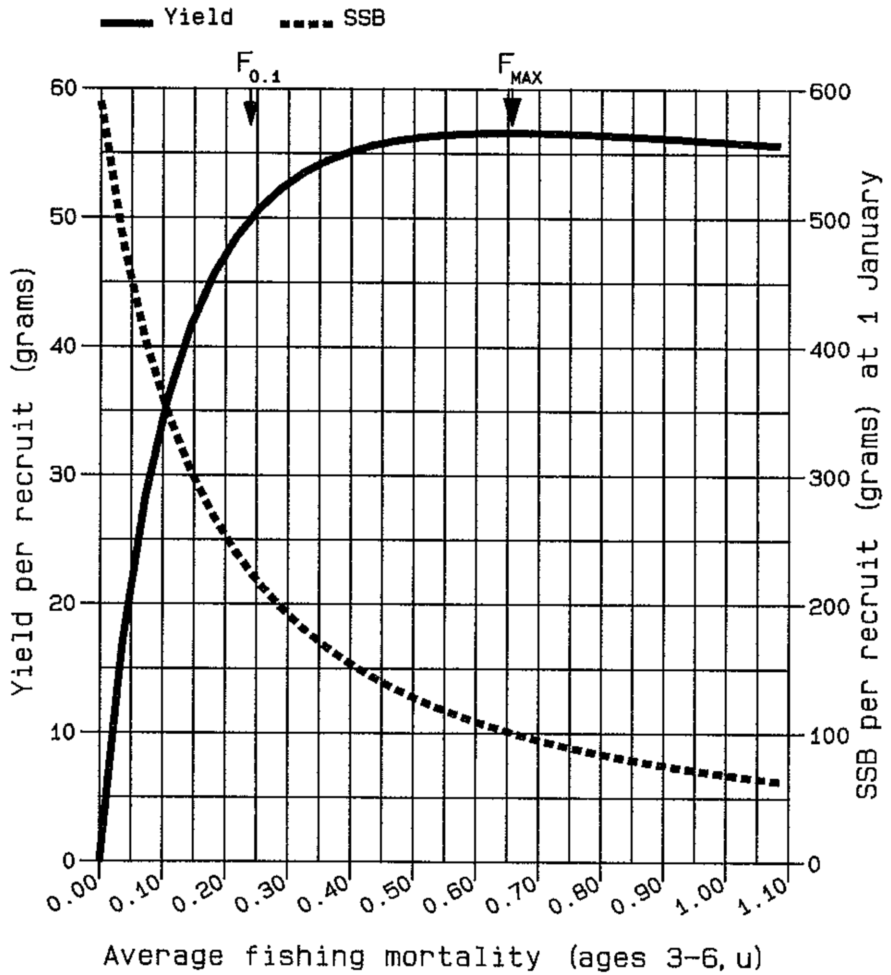


(cont'd)

Figure 3.1.1 (cont'd)

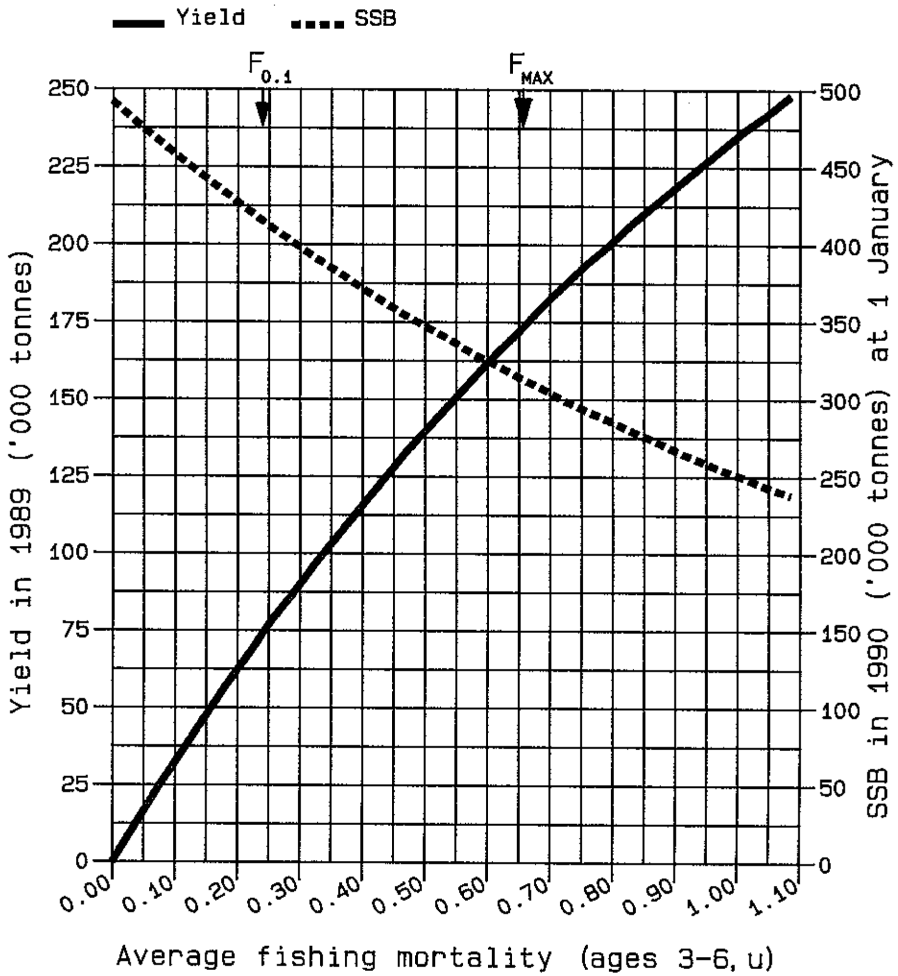
FISH STOCK SUMMARY
STOCK: Herring in the Western Baltic and Kattegat
28-04-1988

Long-term yield and spawning stock biomass



C

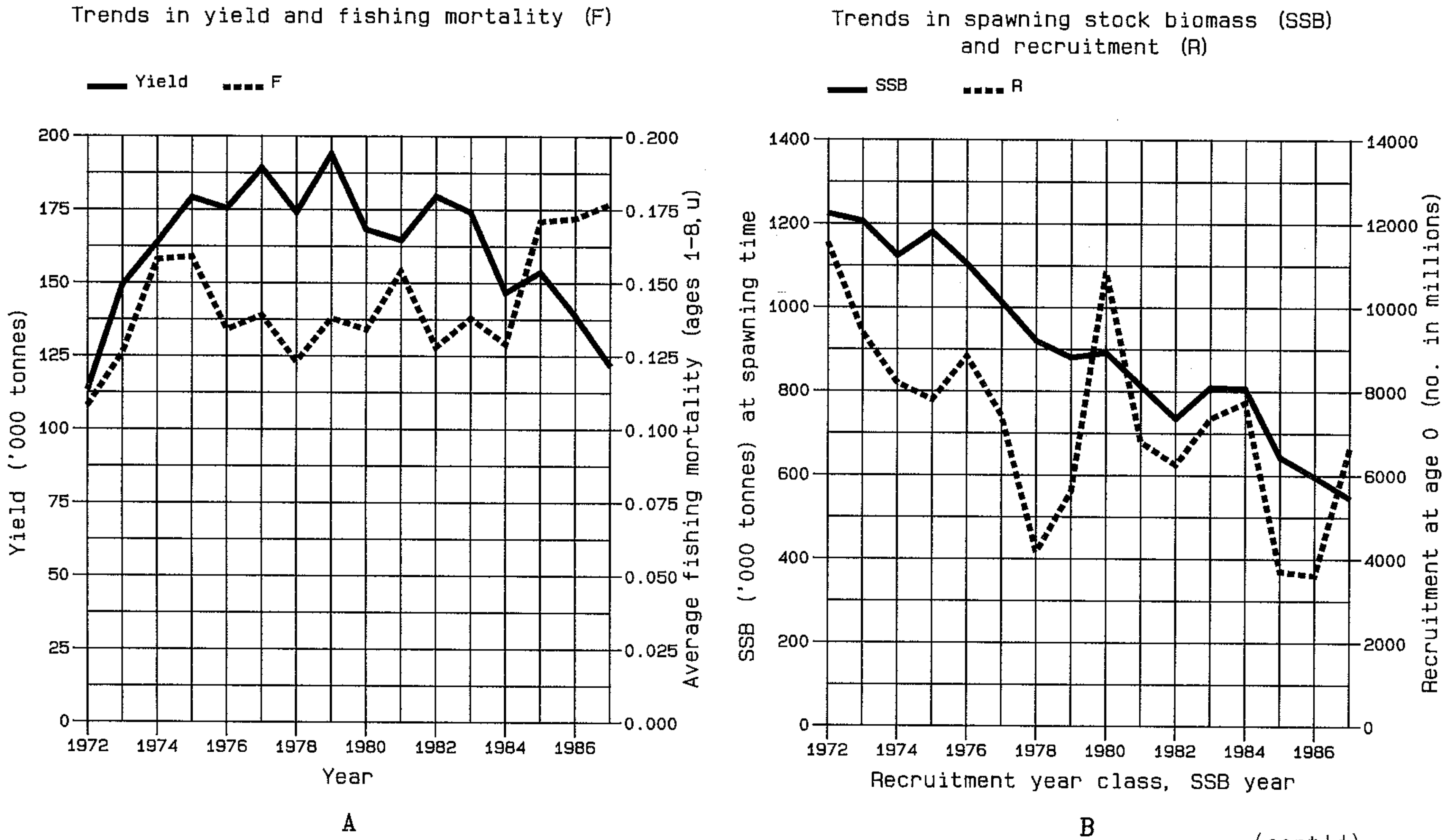
Short-term yield and spawning stock biomass



D

Figure 3.1.2

FISH STOCK SUMMARY
STOCK: Herring in the Southern Central Baltic
28-04-1988



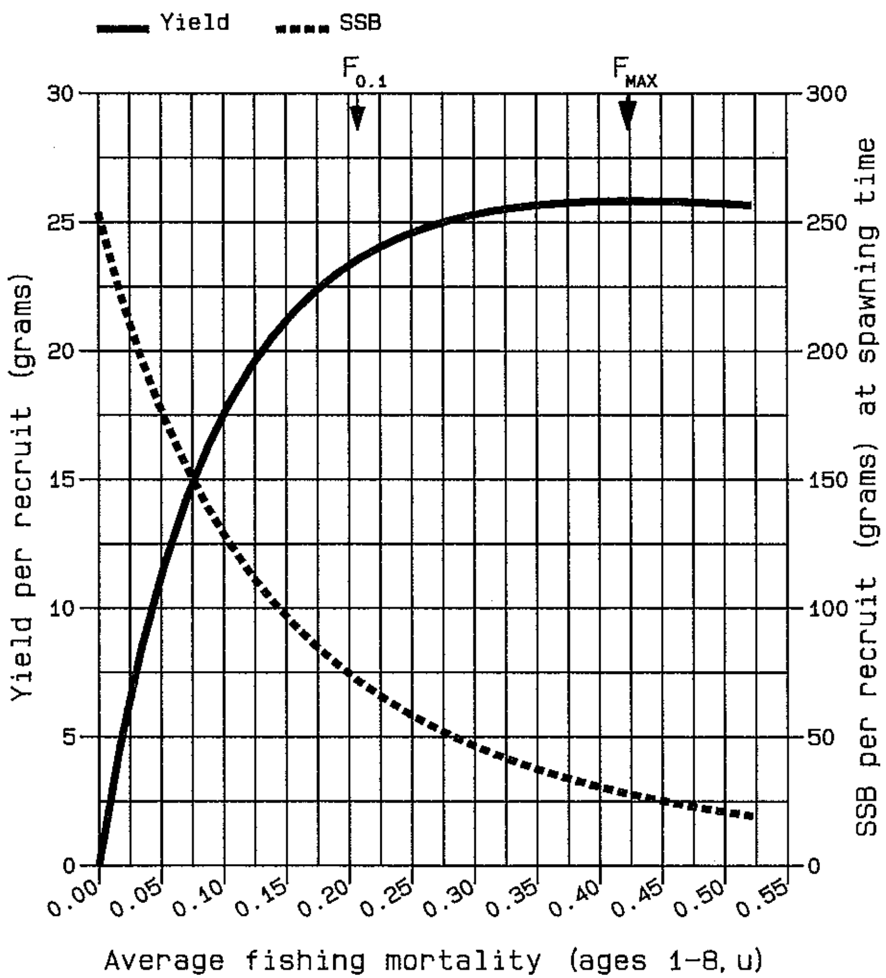
(cont'd)

FISH STOCK SUMMARY

Figure 3.1.2 (cont'd) STOCK: Herring in the Southern Central Baltic

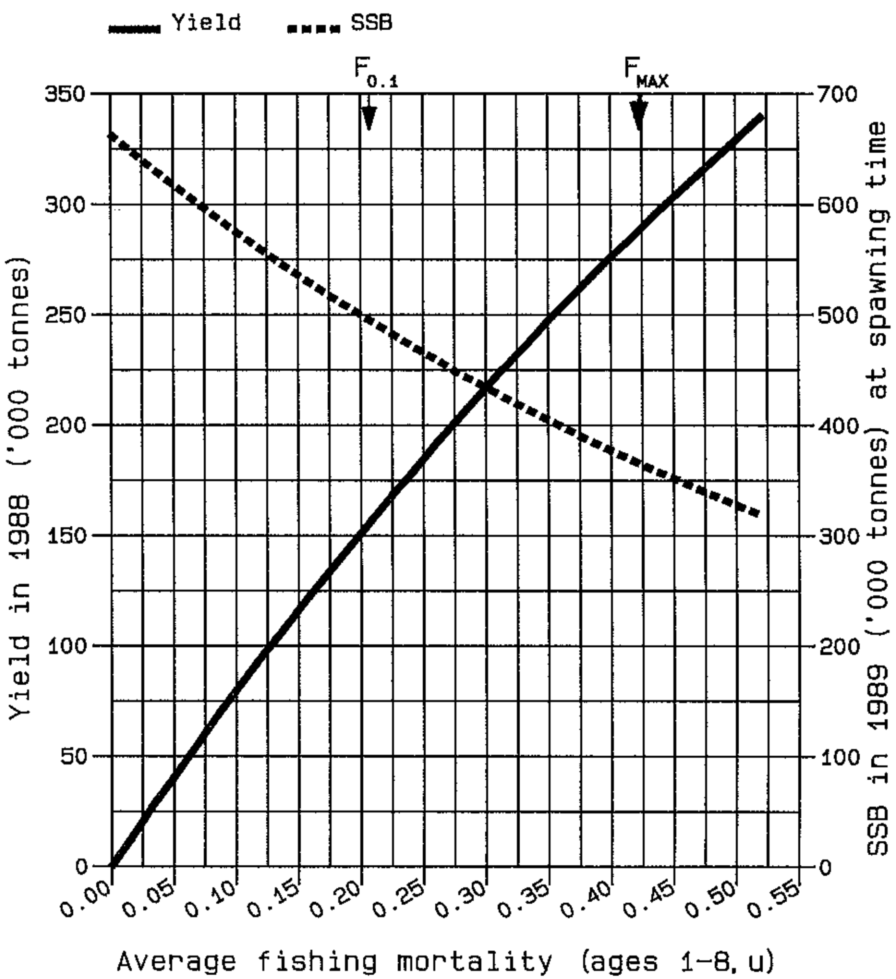
28-04-1988

Long-term yield and spawning stock biomass



C

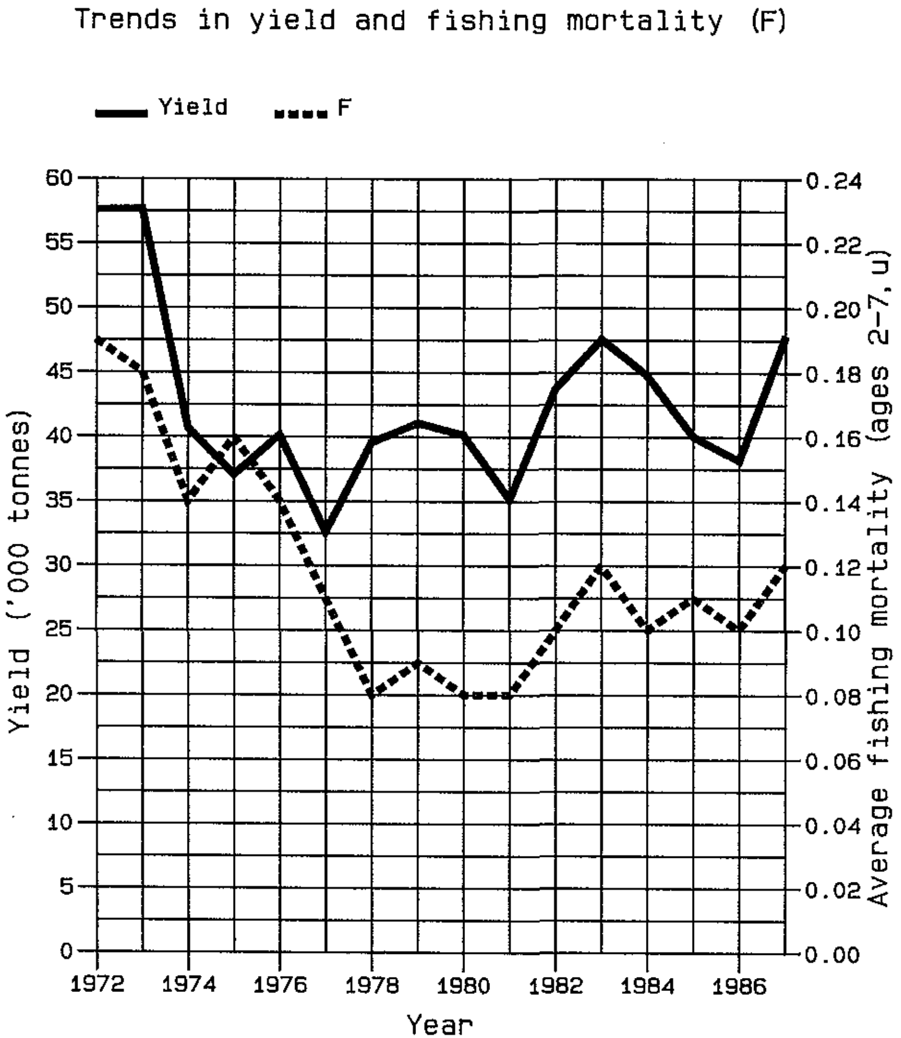
Short-term yield and spawning stock biomass



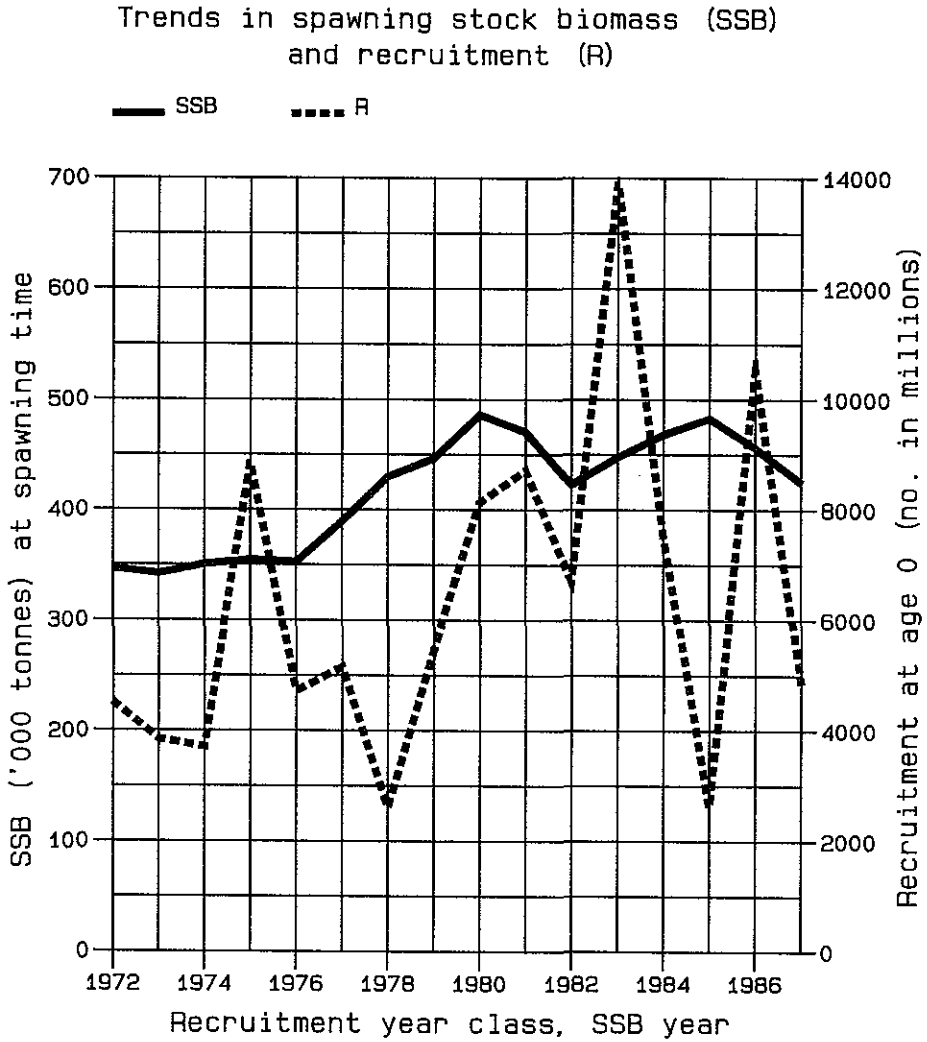
D

Figure 3.1.3

FISH STOCK SUMMARY
STOCK: Herring - 28 and 29S
28-04-1988



A

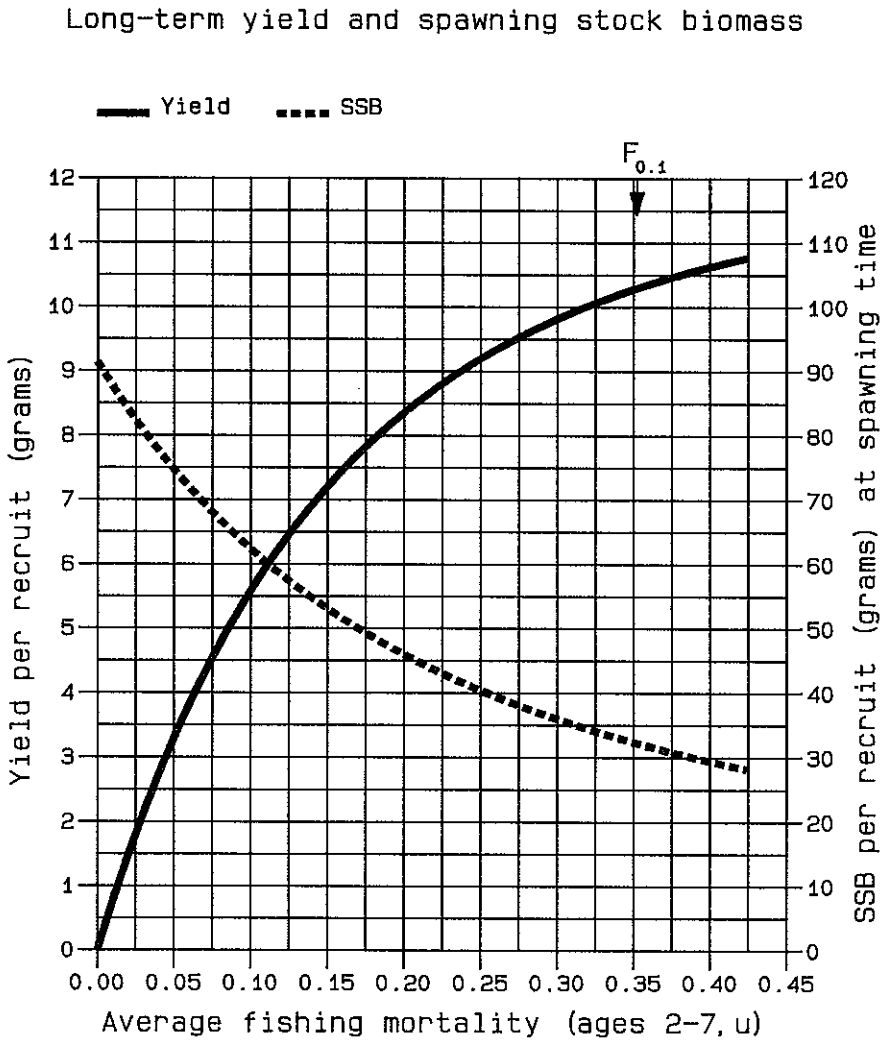


B

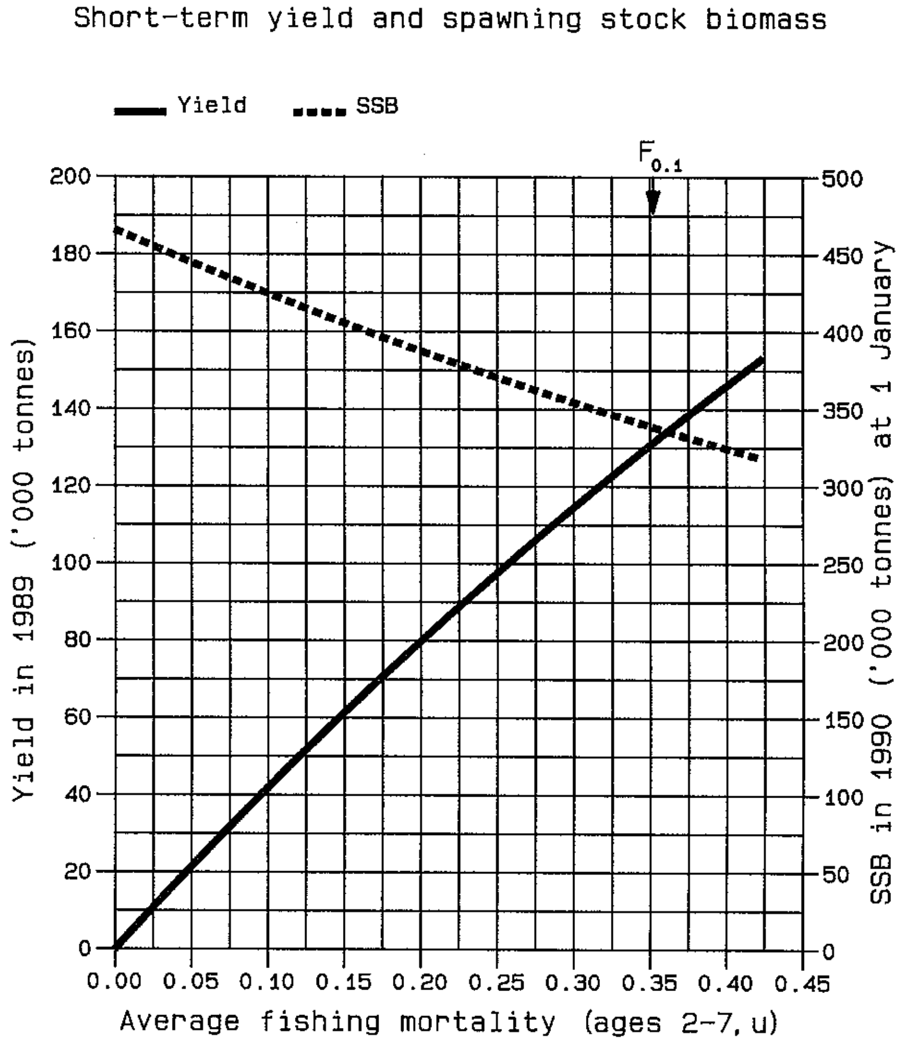
(cont'd)

Figure 3.1.3 (cont'd)

FISH STOCK SUMMARY
STOCK: Herring – 28 and 29S
28-04-1988



C

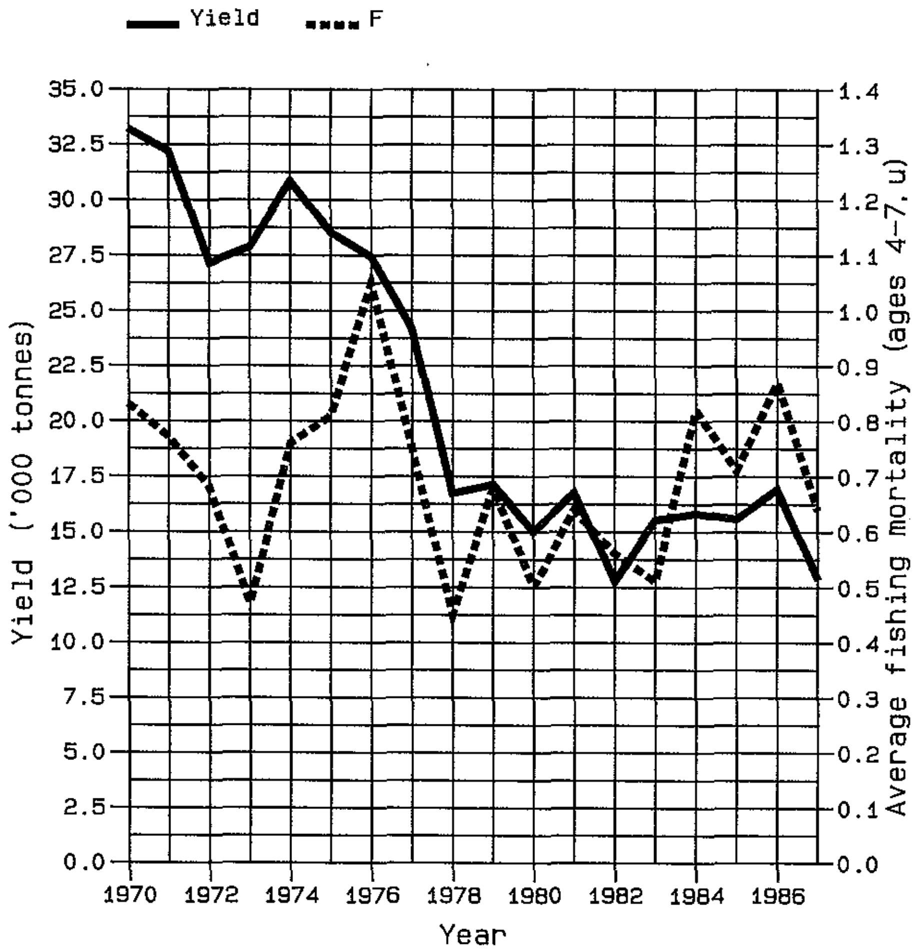


D

Figure 3.1.4

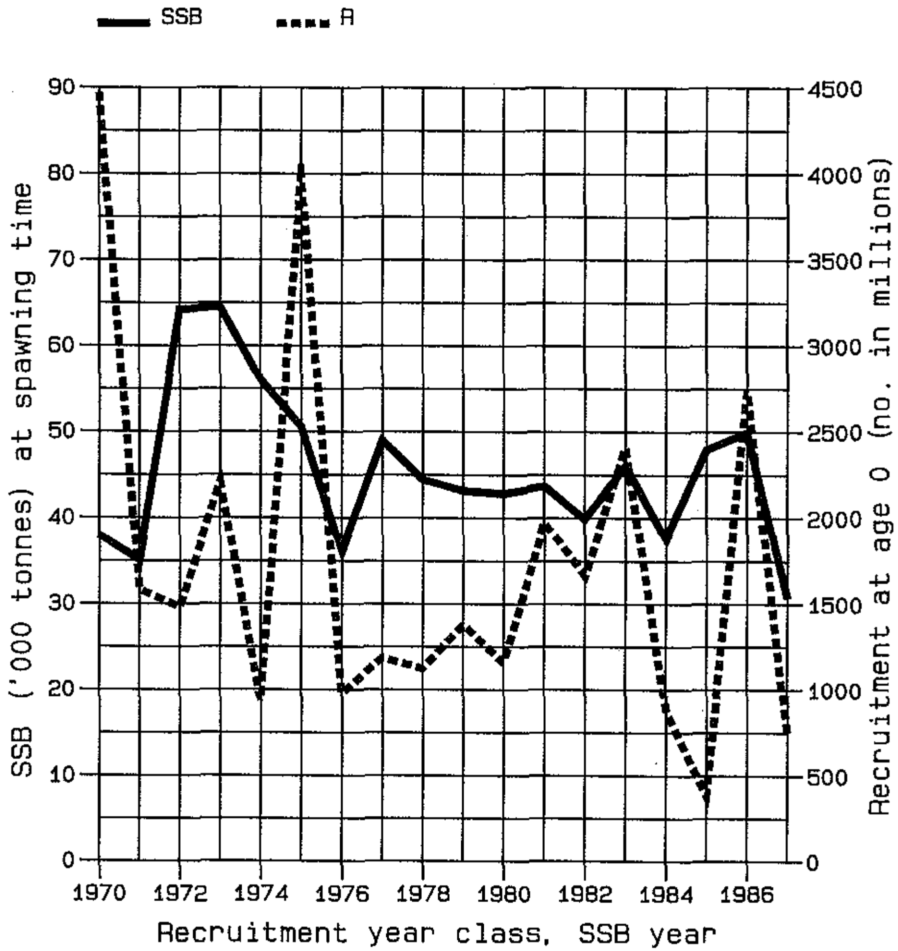
FISH STOCK SUMMARY
STOCK: Herring - Gulf of Riga
28-04-1988

Trends in yield and fishing mortality (F)



A

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



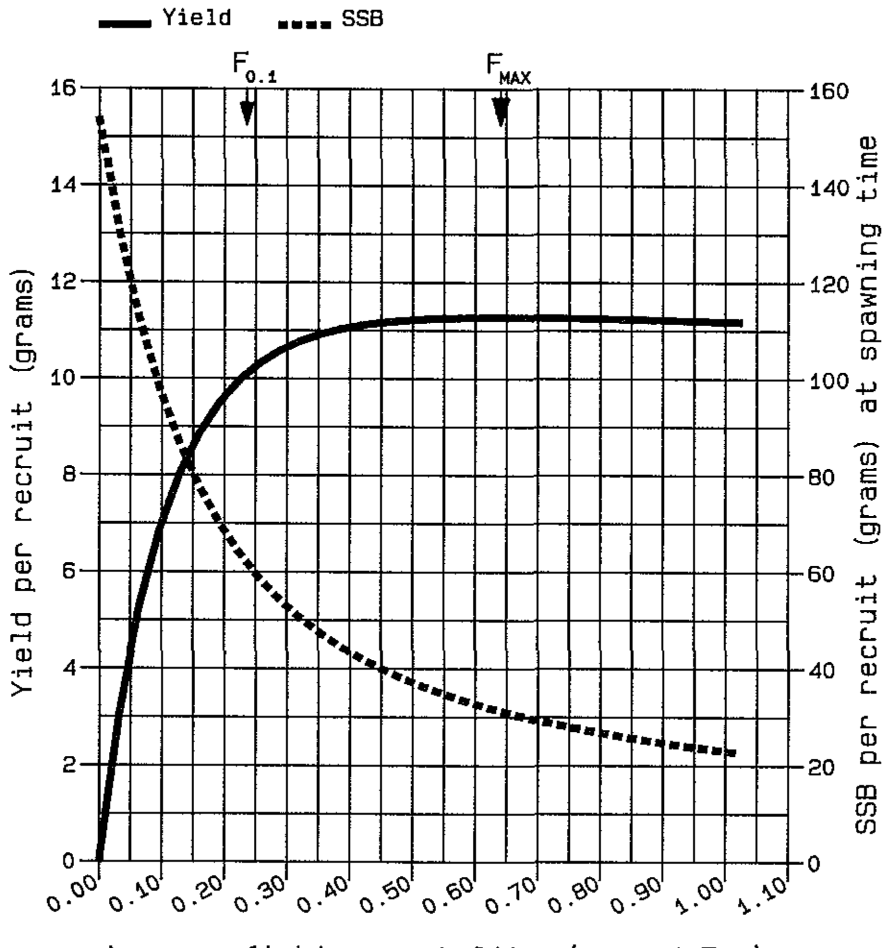
B

(cont'd)

Figure 3.1.4 (cont'd)

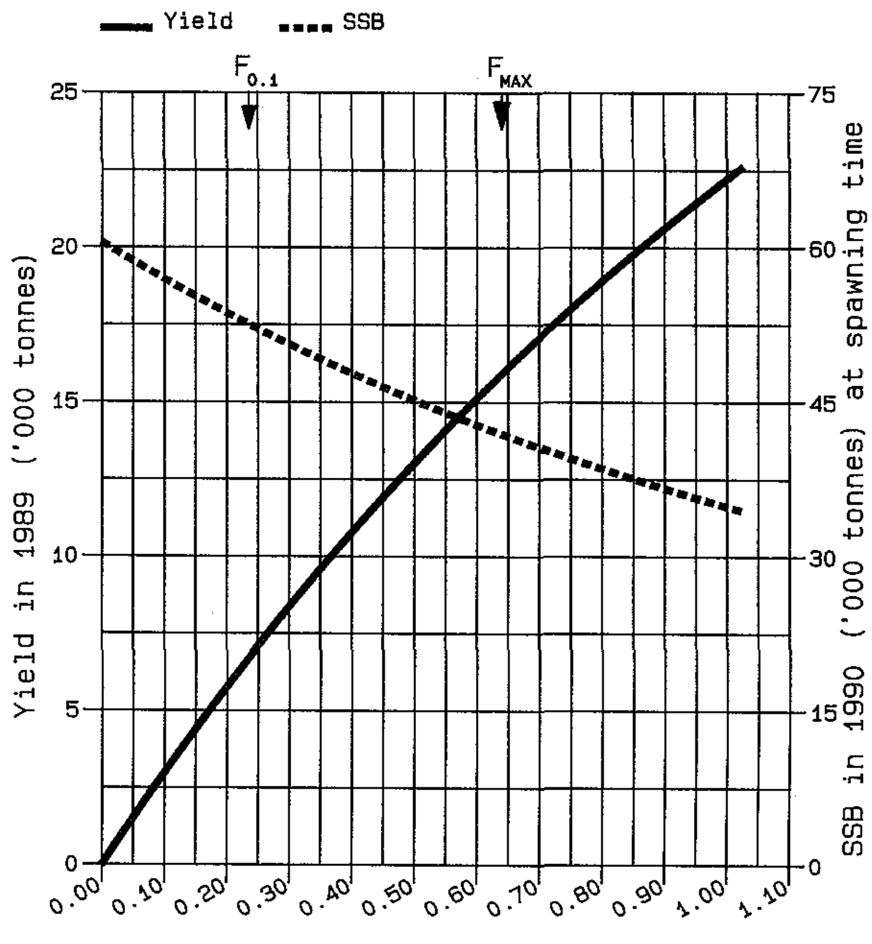
FISH STOCK SUMMARY
STOCK: Herring - Gulf of Riga
28-04-1988

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass

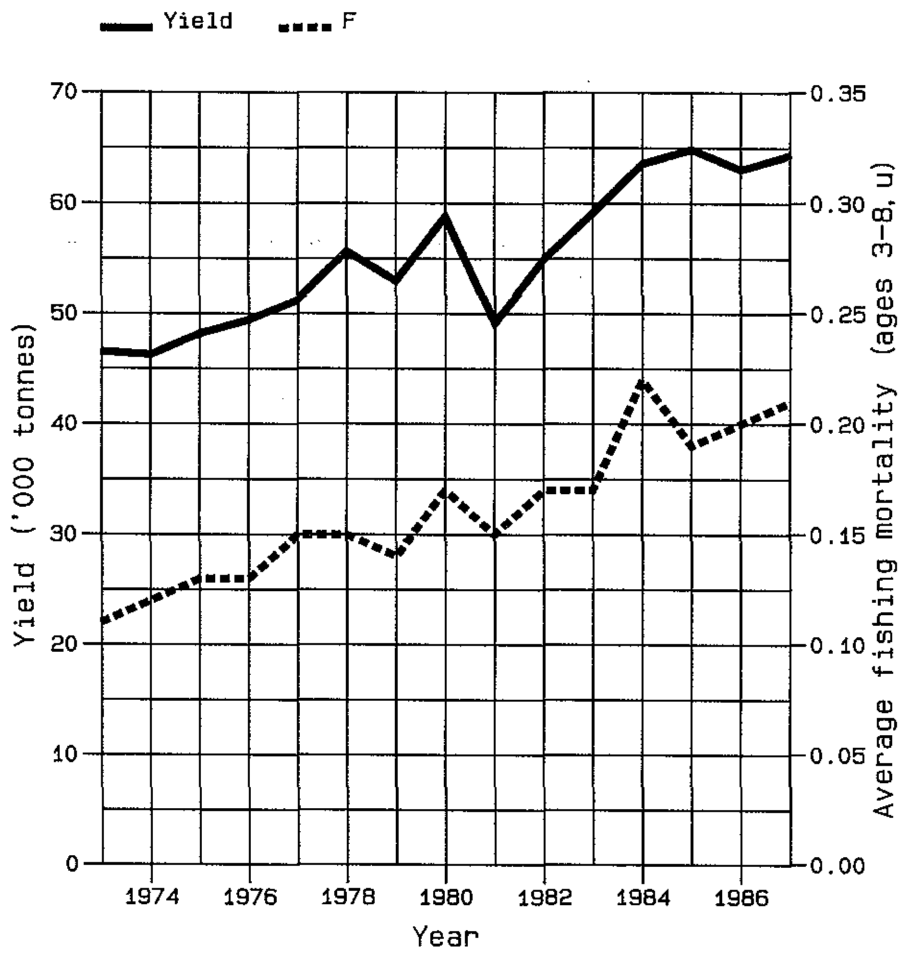


D

FISH STOCK SUMMARY
STOCK: Herring - 29NE and 30E
28-04-1988

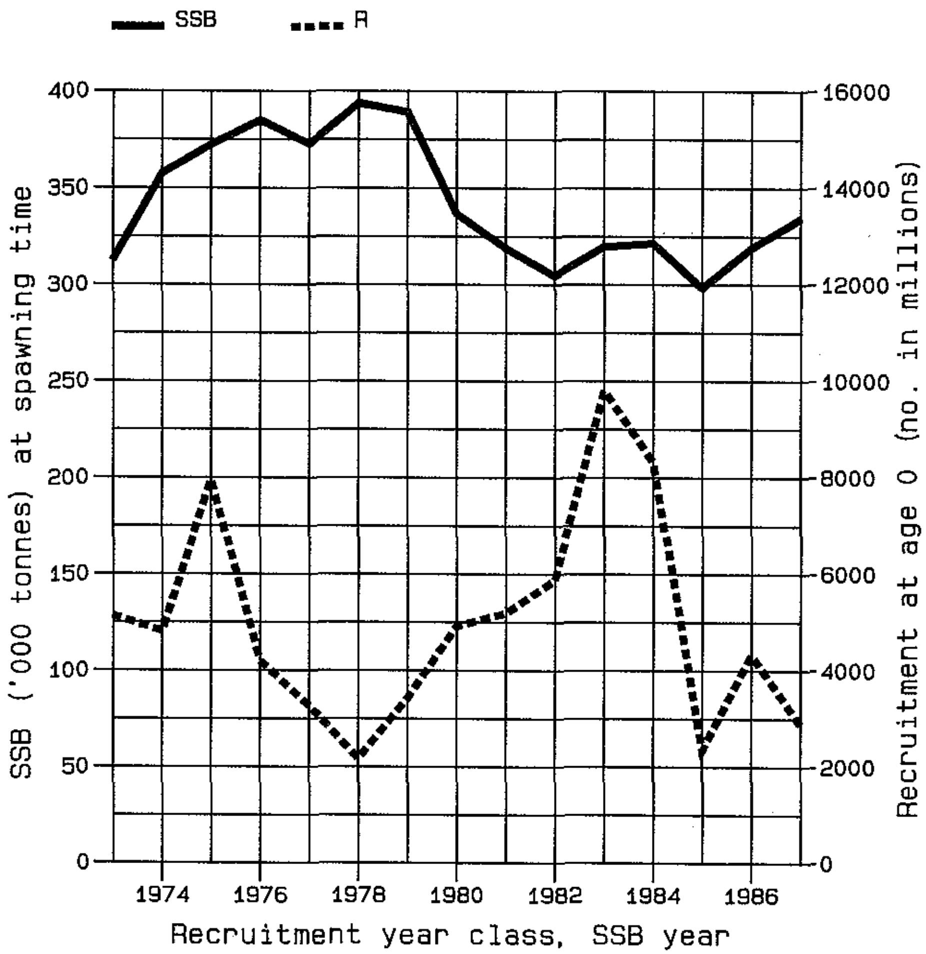
Figure 3.1.5

Trends in yield and fishing mortality (F)



A

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



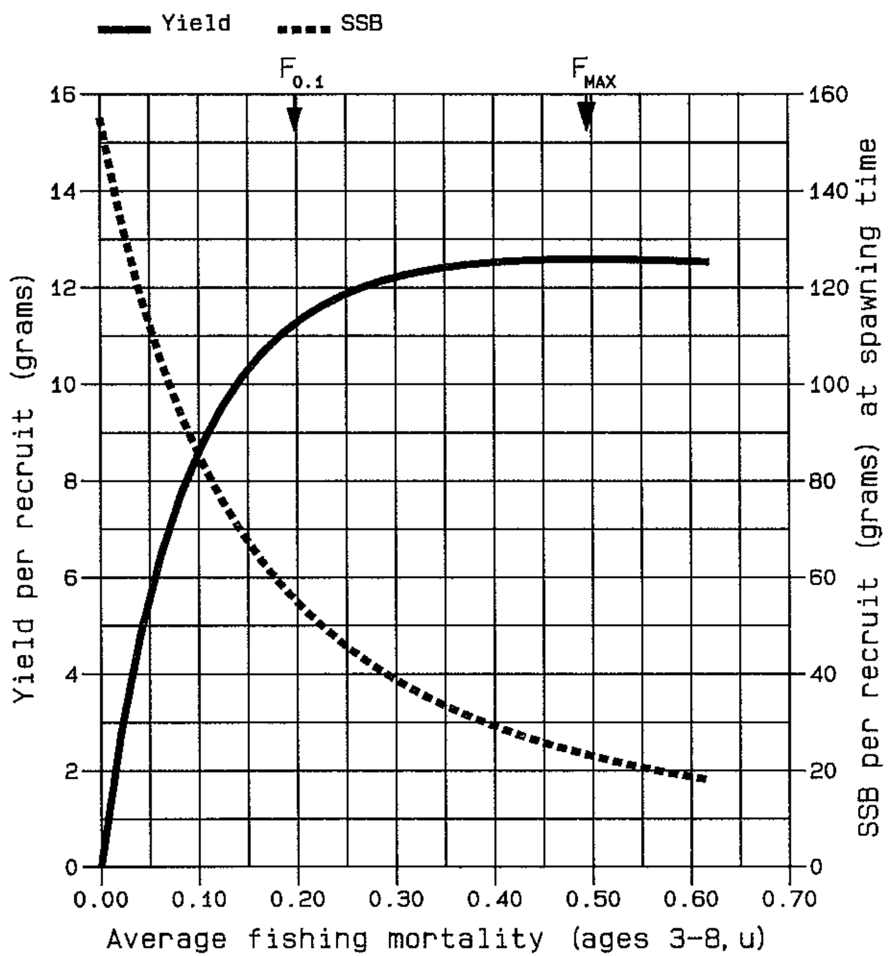
B

(cont'd)

Figure 3.1.5 (cont'd)

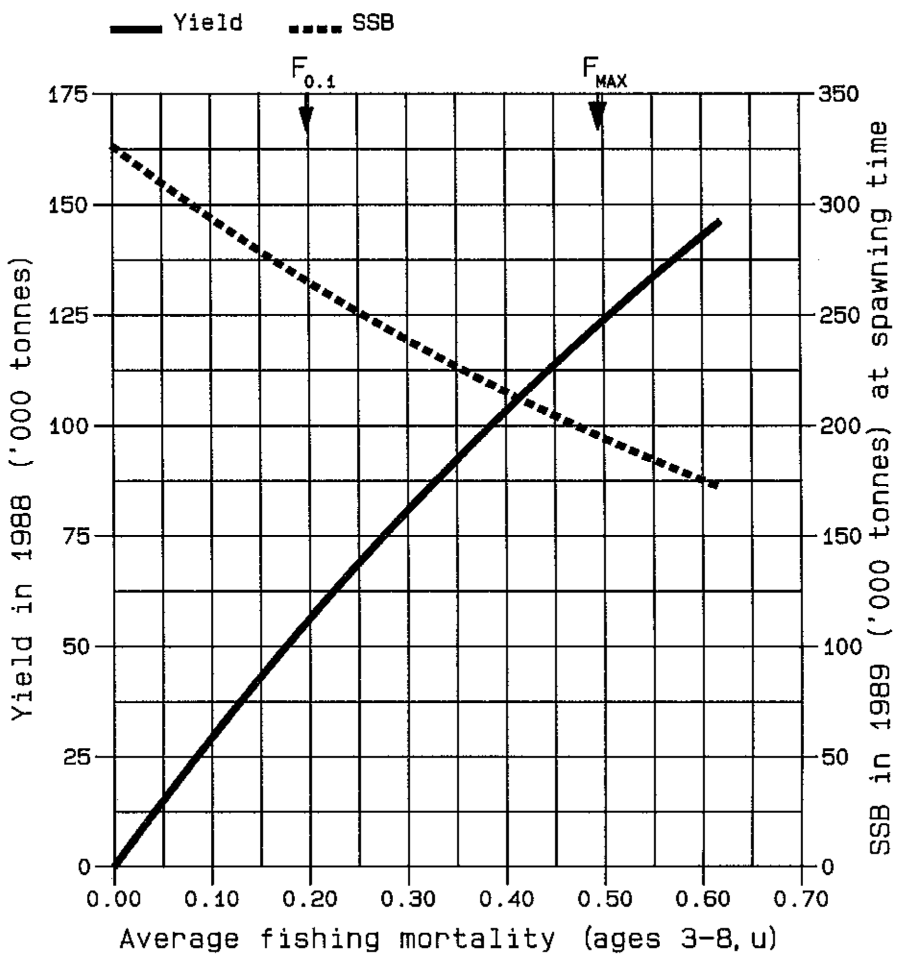
FISH STOCK SUMMARY
STOCK: Herring – 29NE and 30E
28-04-1988

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass

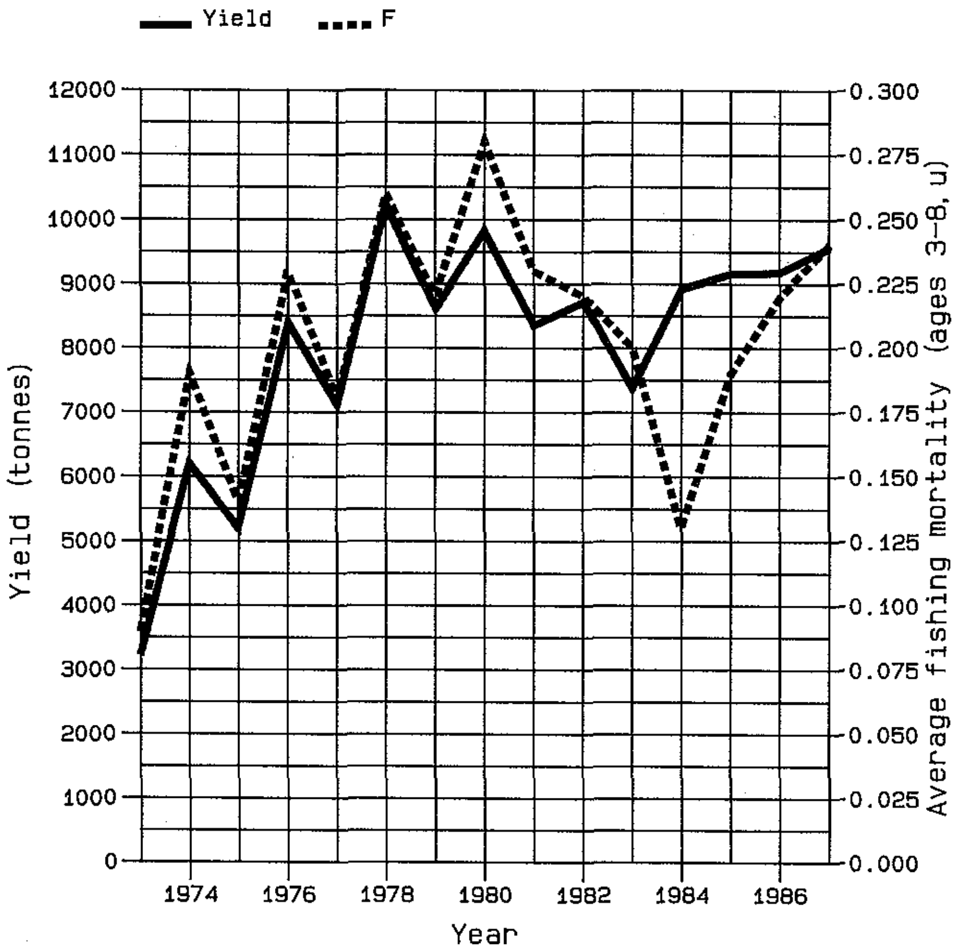


D

Figure 3.1.6

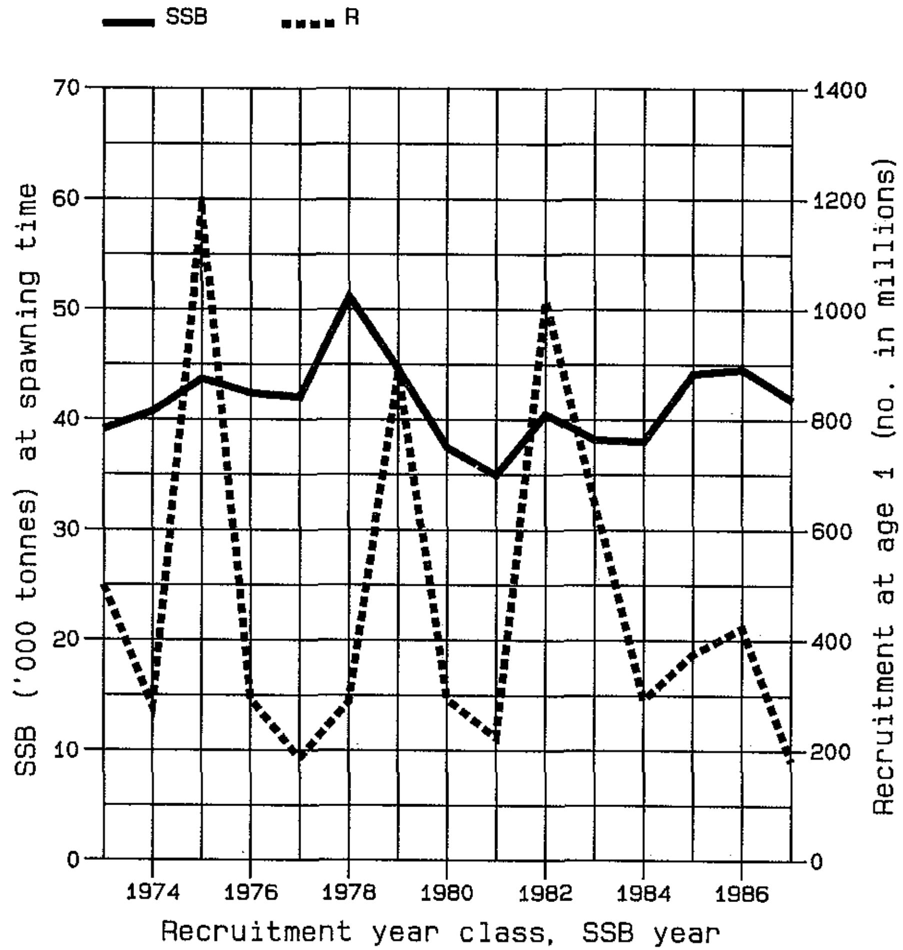
FISH STOCK SUMMARY
STOCK: Herring - 31E
2-05-1988

Trends in yield and fishing mortality (F)



A

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



B

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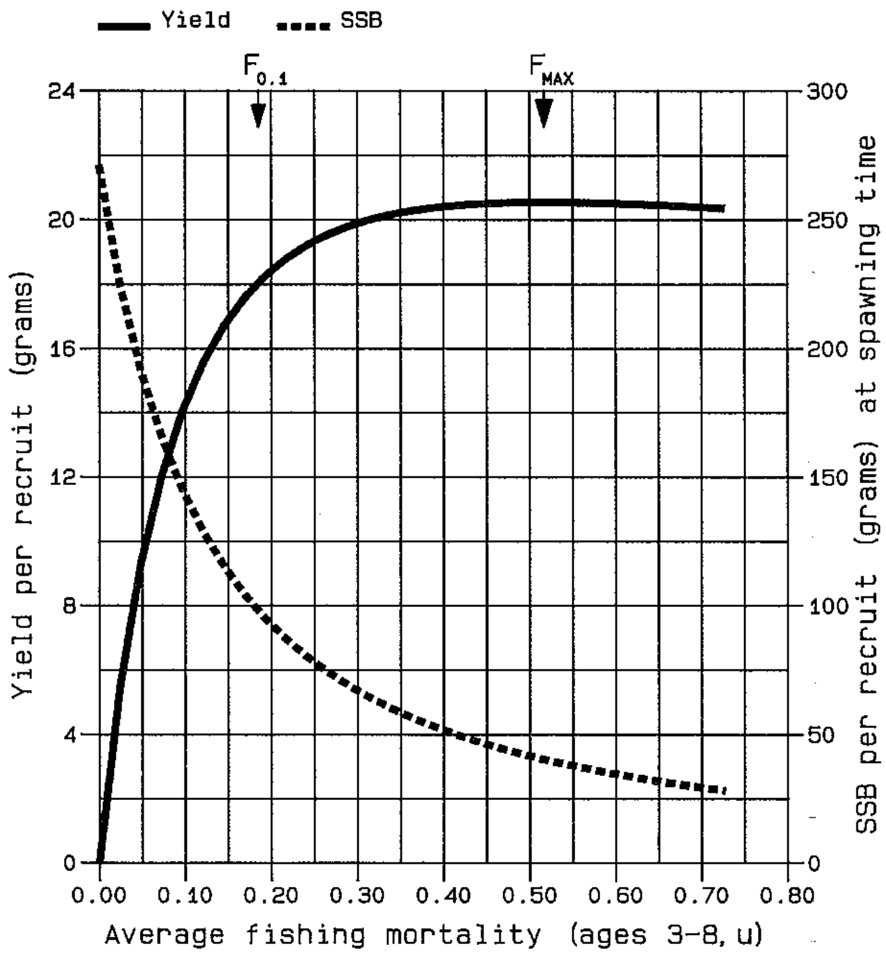
Figure 3.1.6 (cont'd)

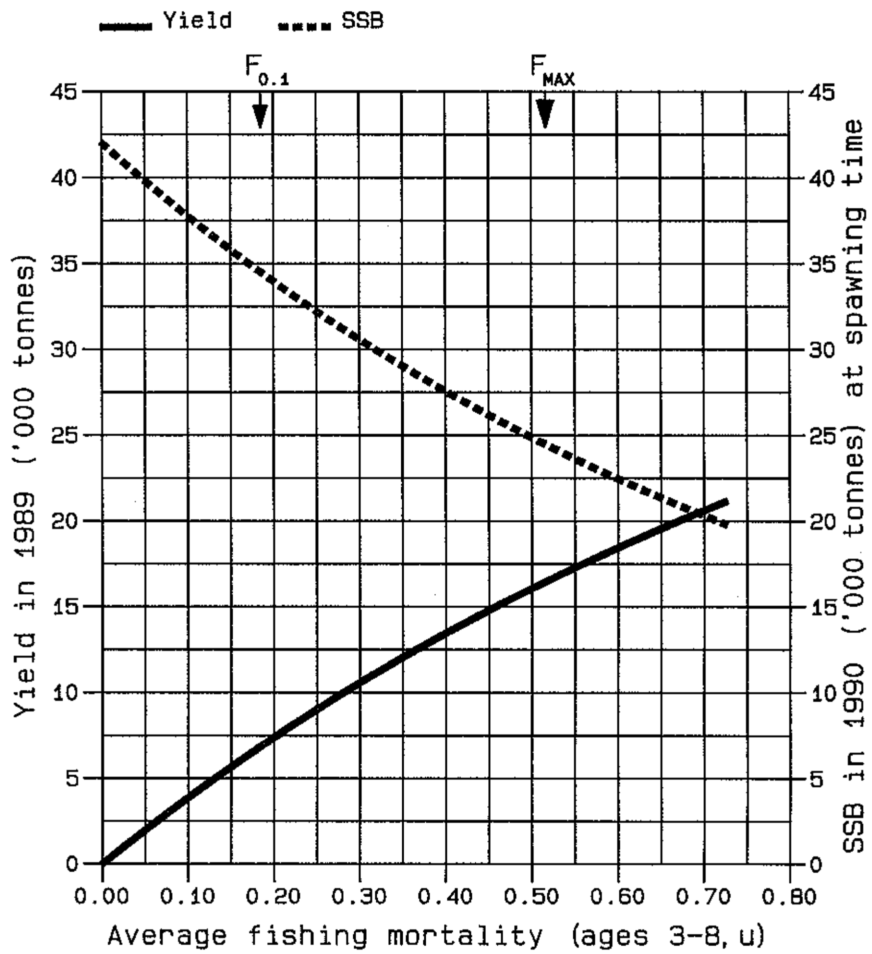
FISH STOCK SUMMARY
STOCK: Herring – 31E
2-05-1988

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass

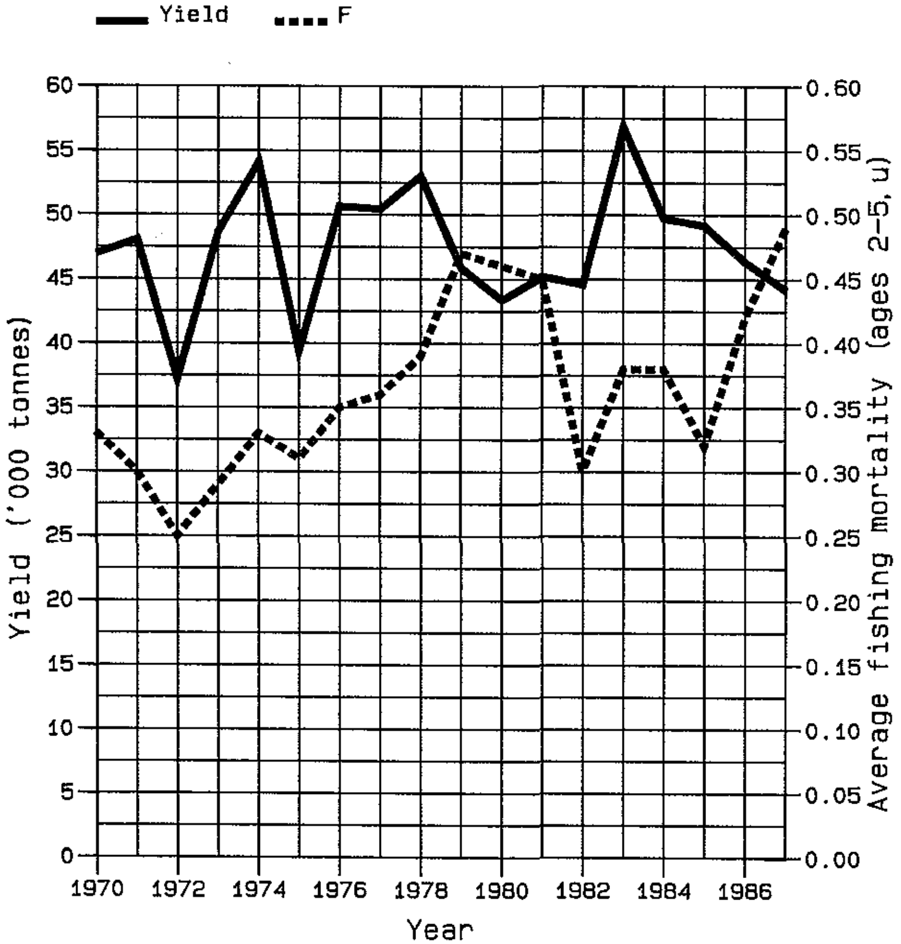


D

Figure 3.1.8

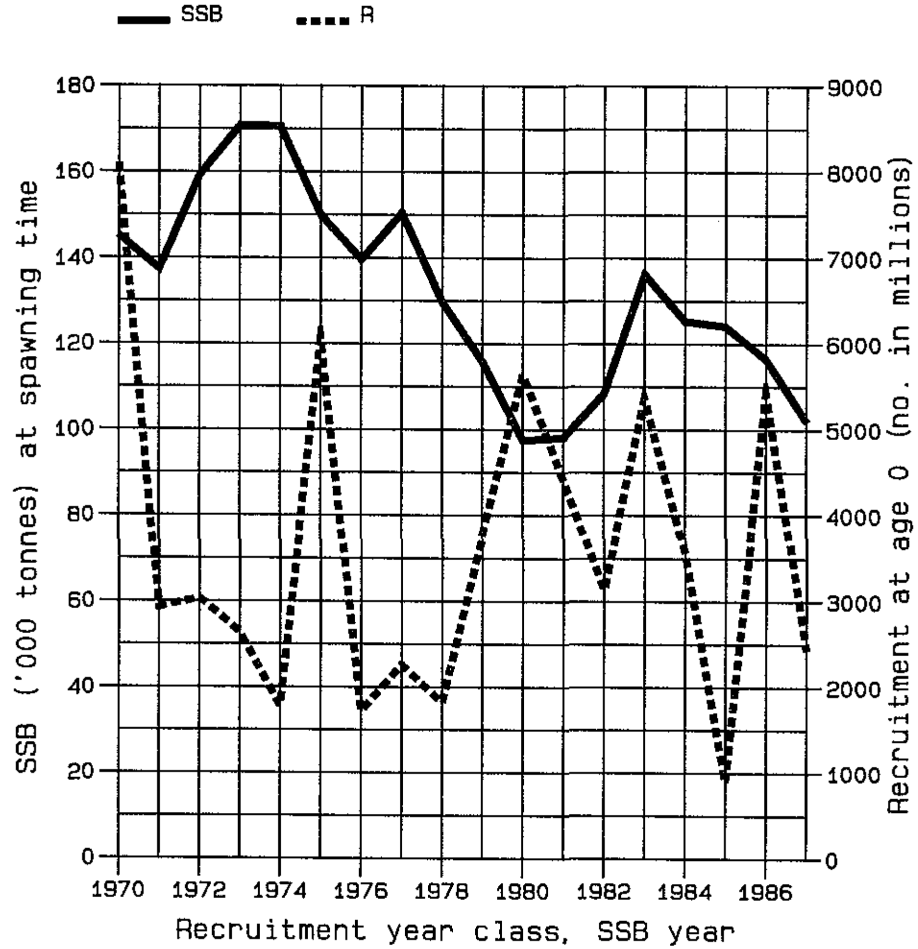
FISH STOCK SUMMARY
STOCK: Herring - Gulf of Finland
02-05-1988

Trends in yield and fishing mortality (F)



A

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



B

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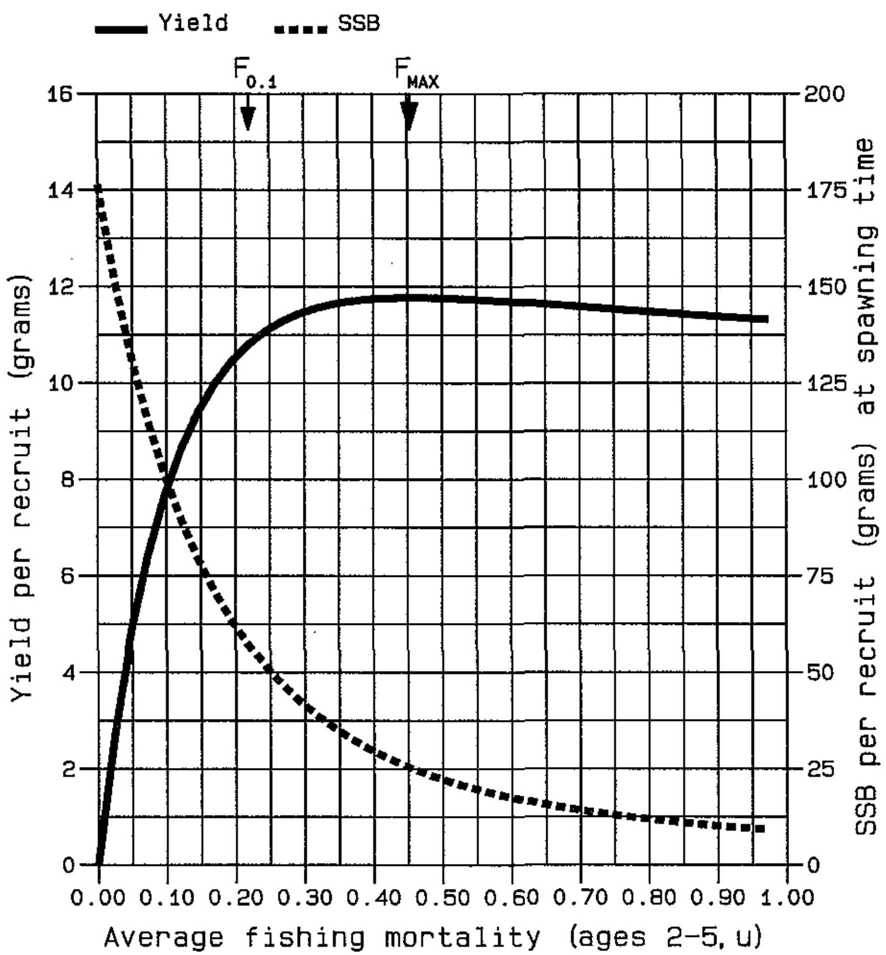
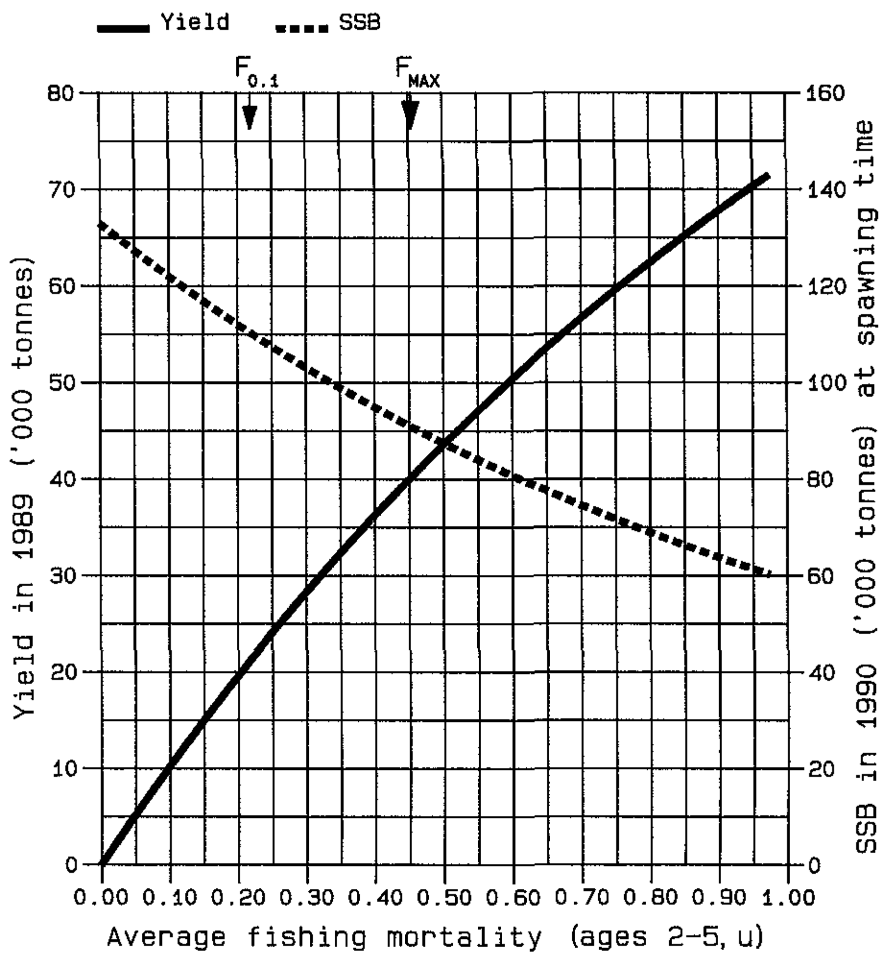
Figure 3.1.8 (cont'd)

FISH STOCK SUMMARY
STOCK: Herring - Gulf of Finland
02-05-1988



C

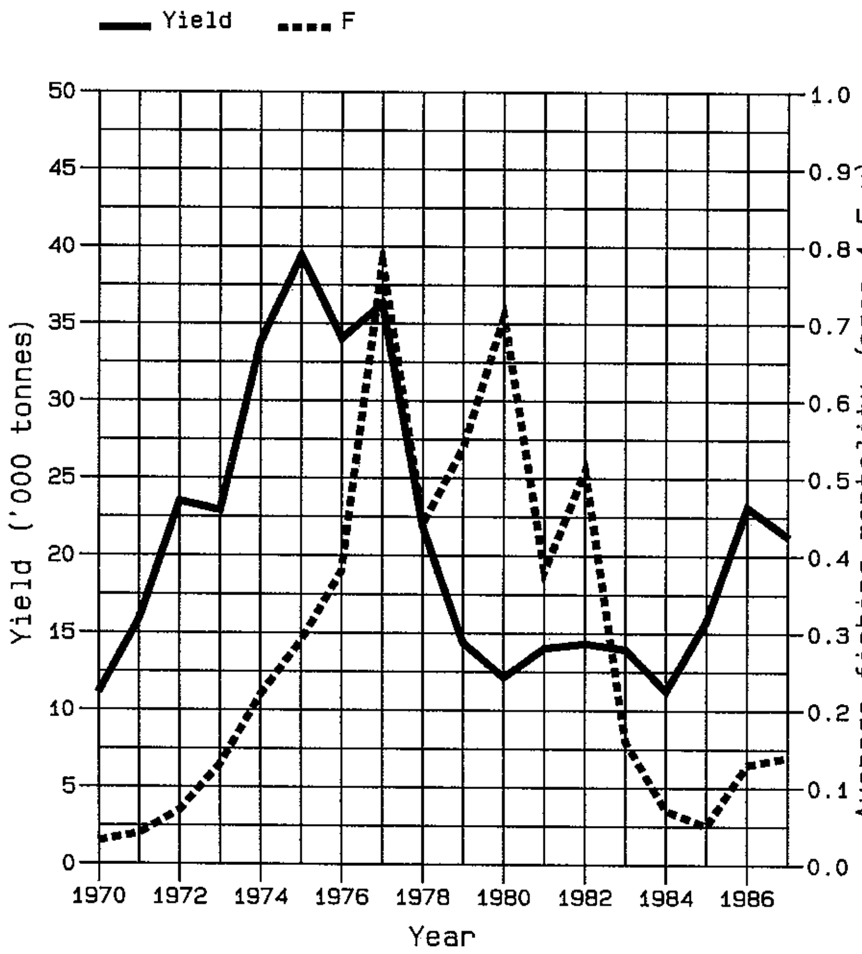


D

Figure 3.2.1

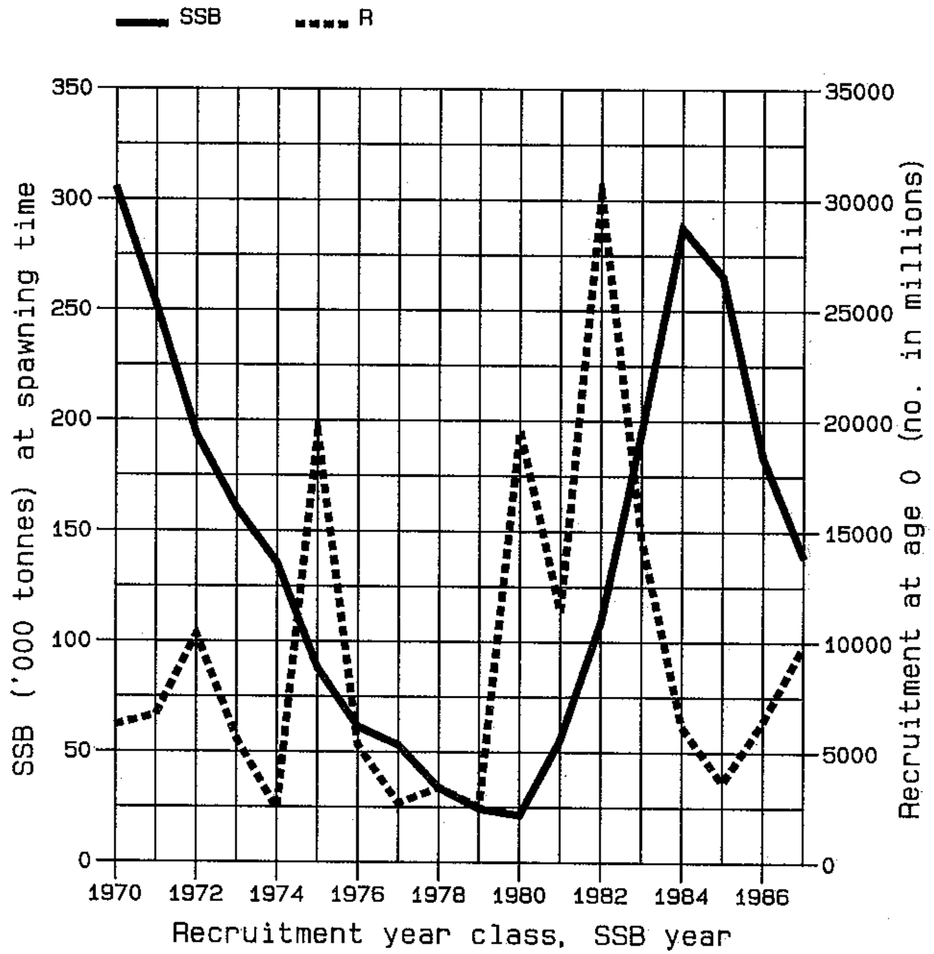
FISH STOCK SUMMARY
STOCK: Sprat - 22-25
02-05-1988

Trends in yield and fishing mortality (F)



A

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

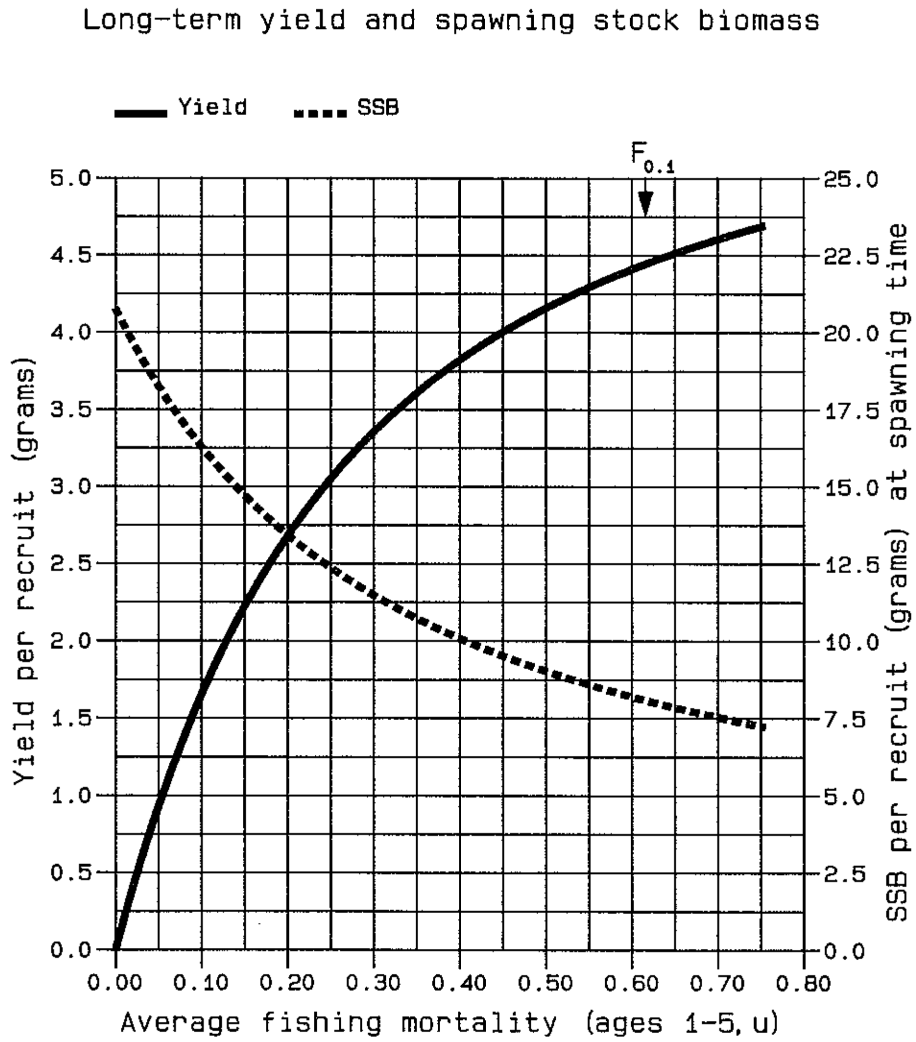


B

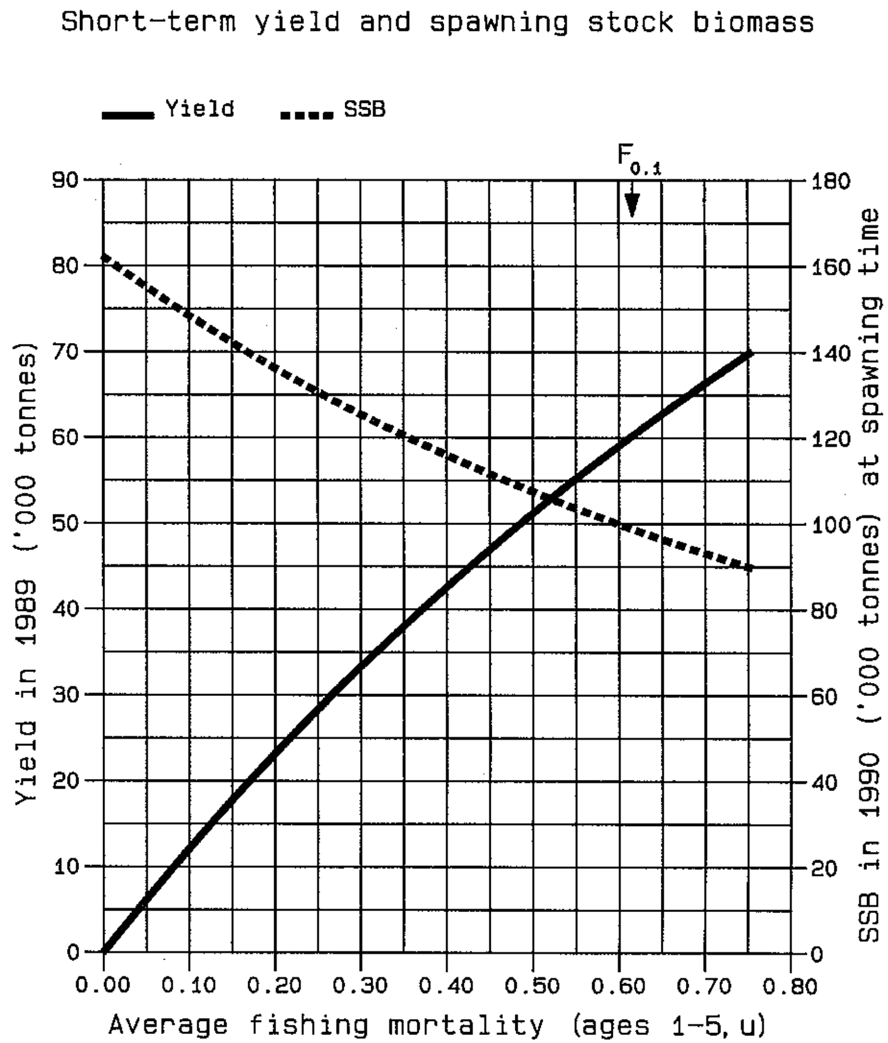
(cont'd)

Figure 3.2.1 (cont'd)

FISH STOCK SUMMARY
STOCK: Sprat - 22-25
02-05-1988



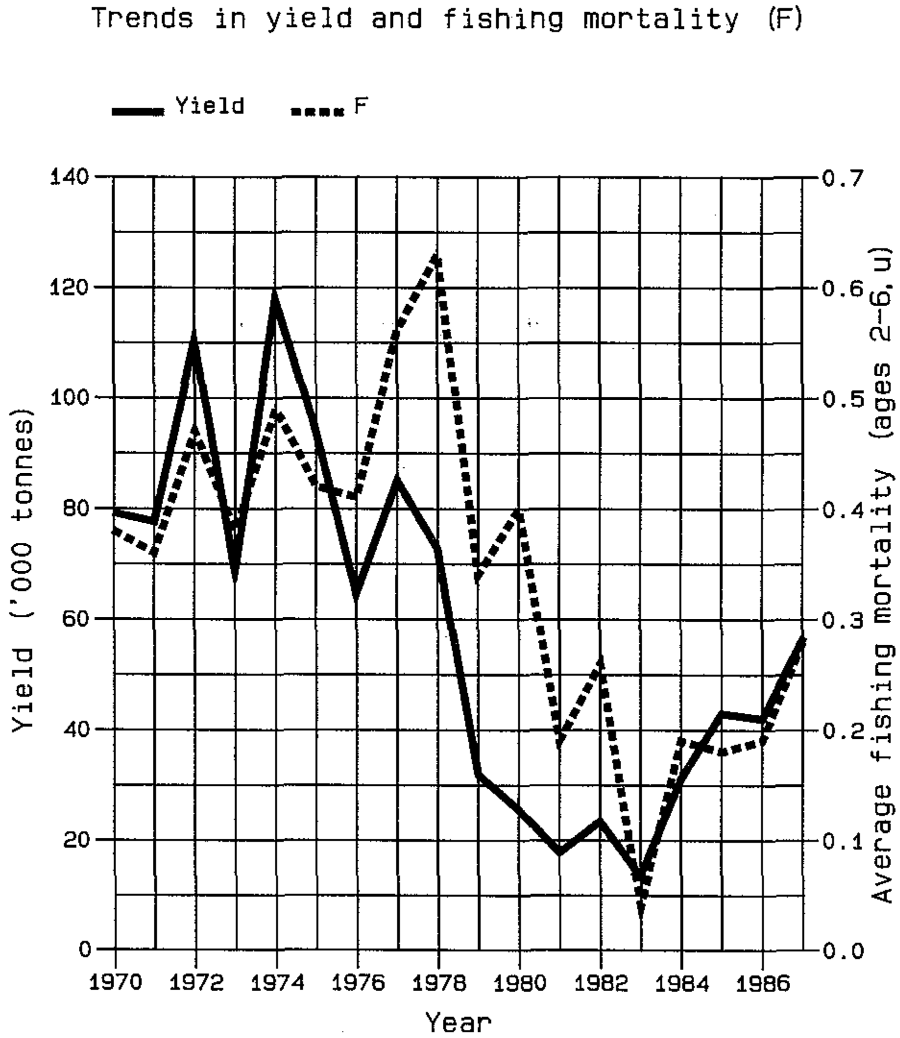
C



D

Figure 3.2.2

FISH STOCK SUMMARY
STOCK: Sprat - 26 and 28
02-05-1988



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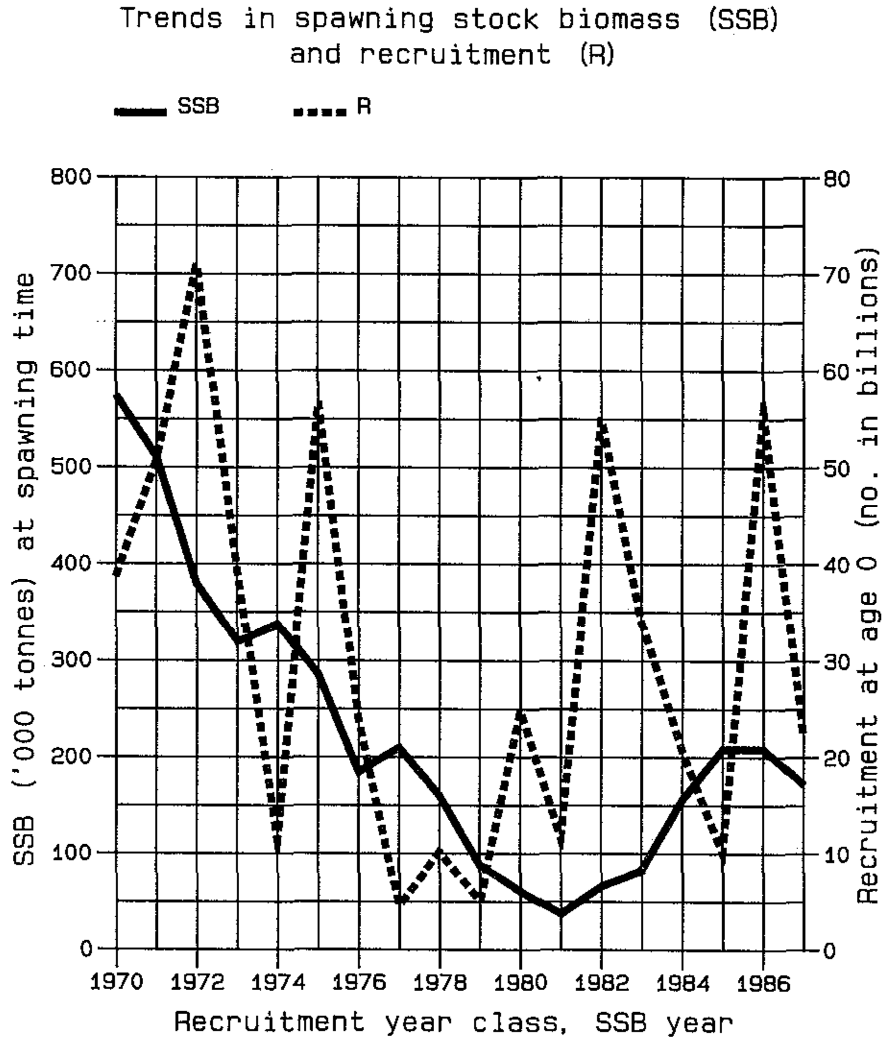

B

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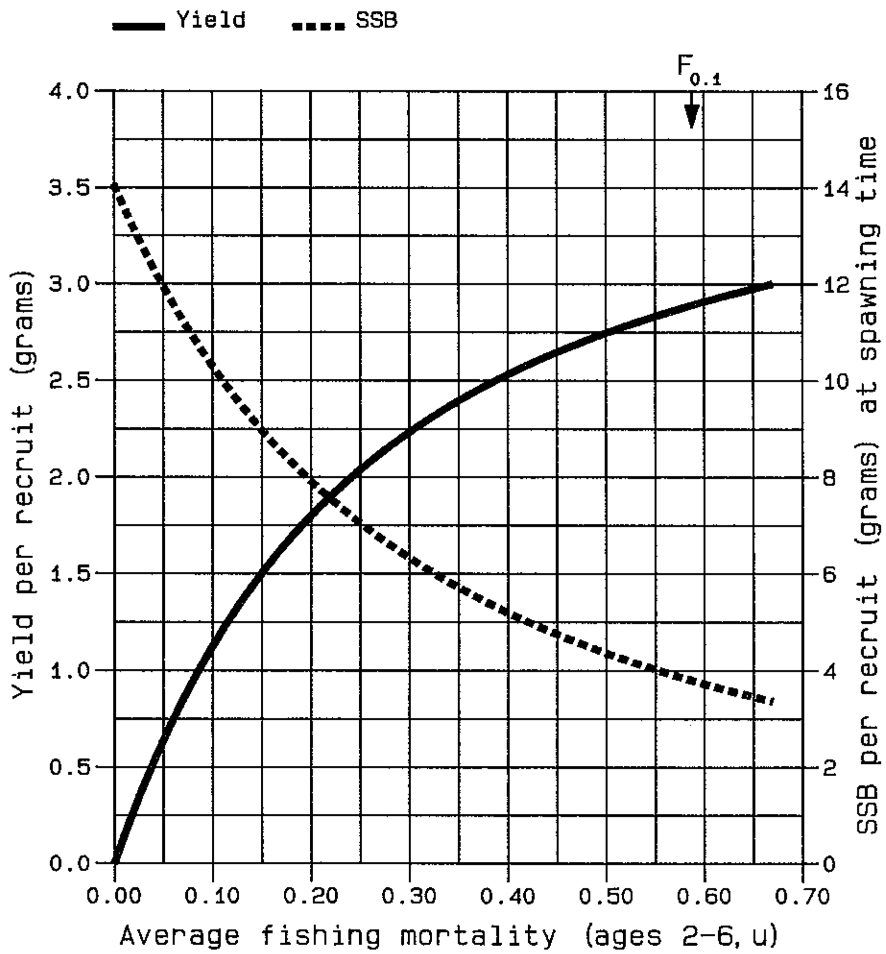
Figure 3.2.2 (cont'd)

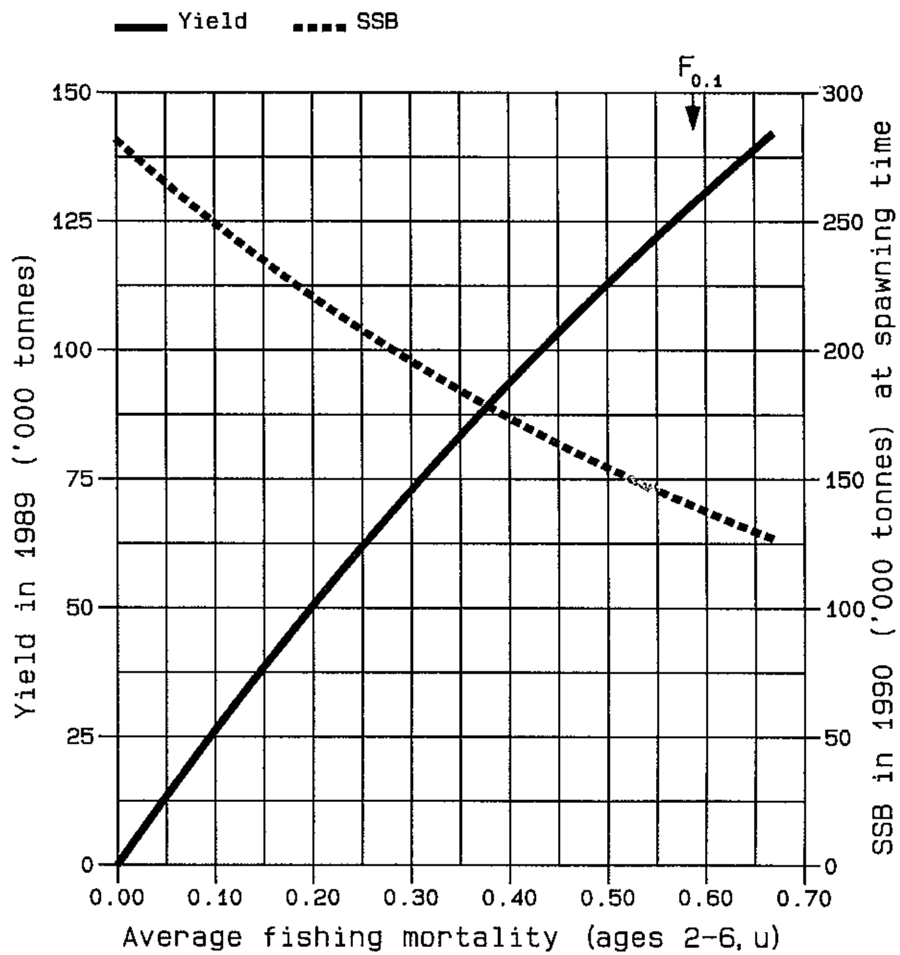
FISH STOCK SUMMARY
STOCK: Sprat – 26 and 28
02-05-1988

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass

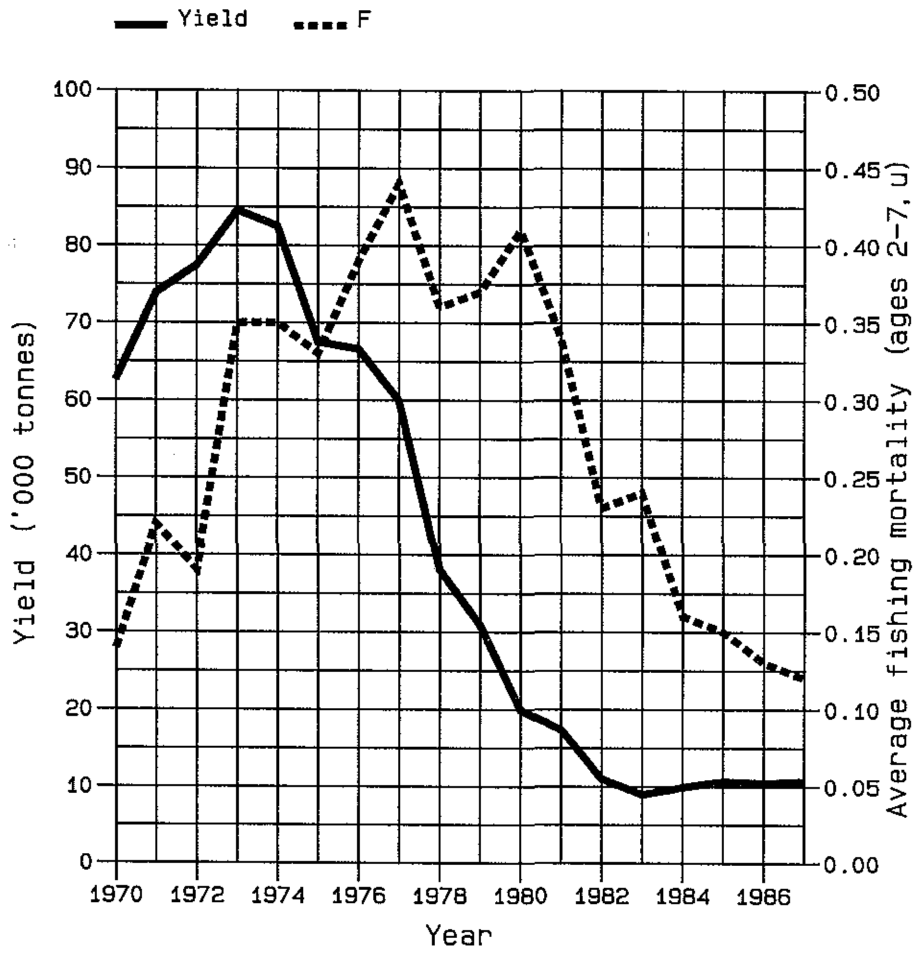


D

Figure 3.2.3

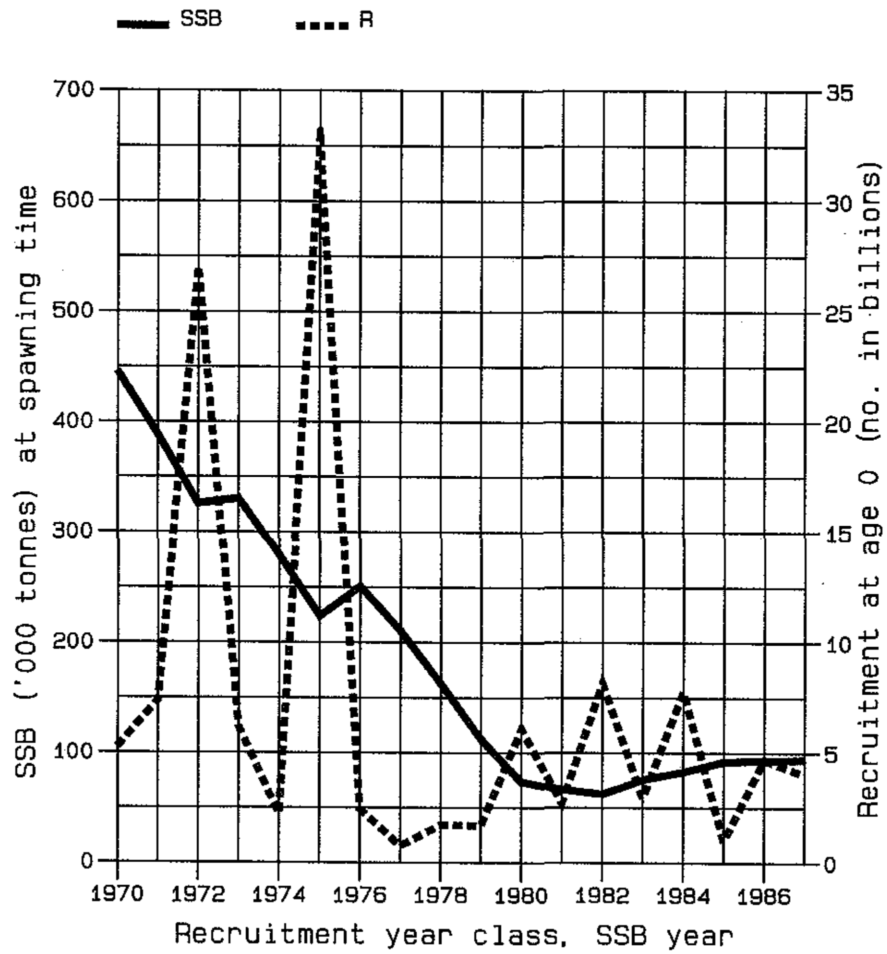
FISH STOCK SUMMARY
STOCK: Sprat: 27 and 29-32
02-05-1988

Trends in yield and fishing mortality (F)



A

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

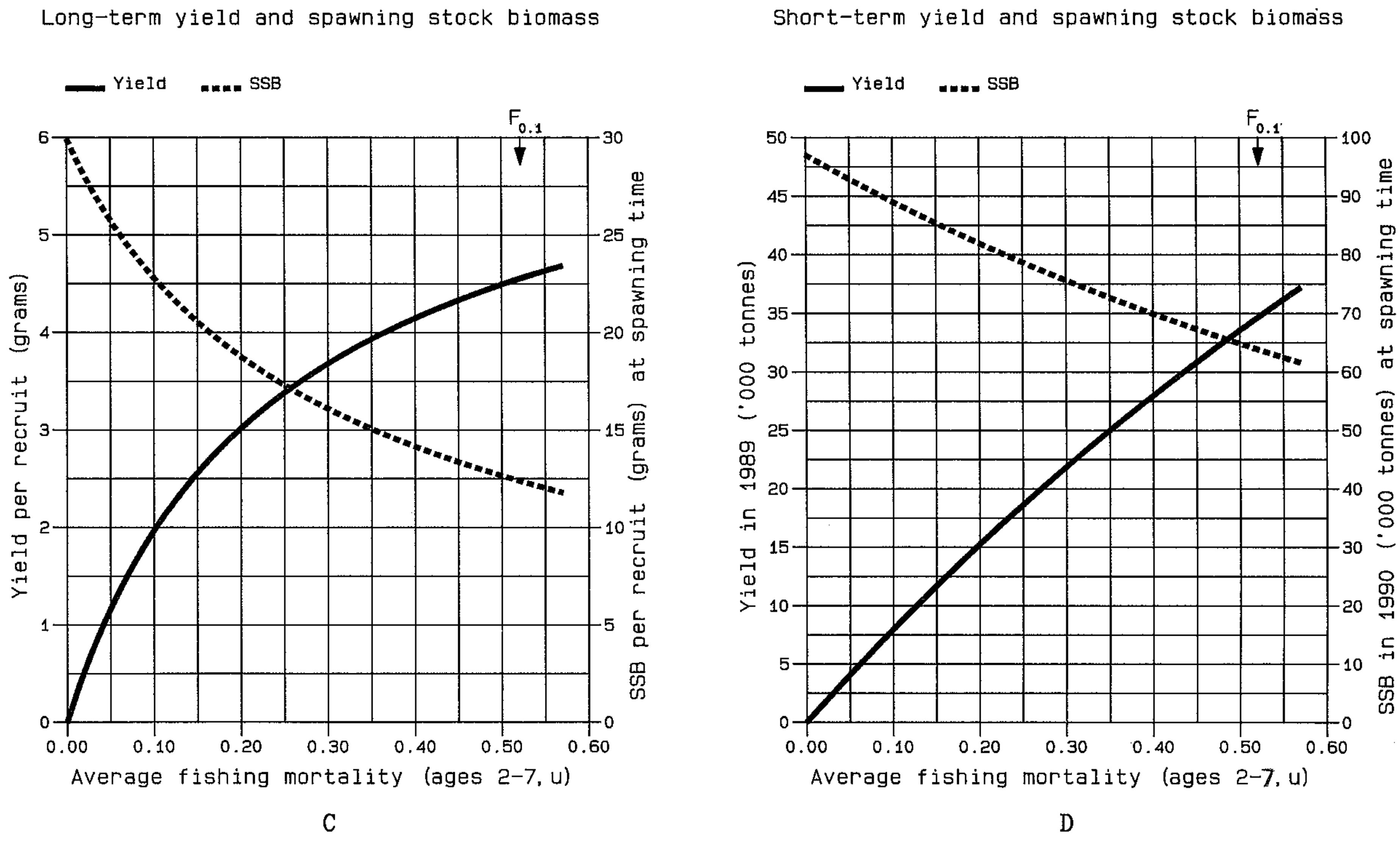


B

(cont'd)

Figure 3.2.3 (cont'd)

FISH STOCK SUMMARY
STOCK: Sprat: 27 and 29-32
02-05-1988

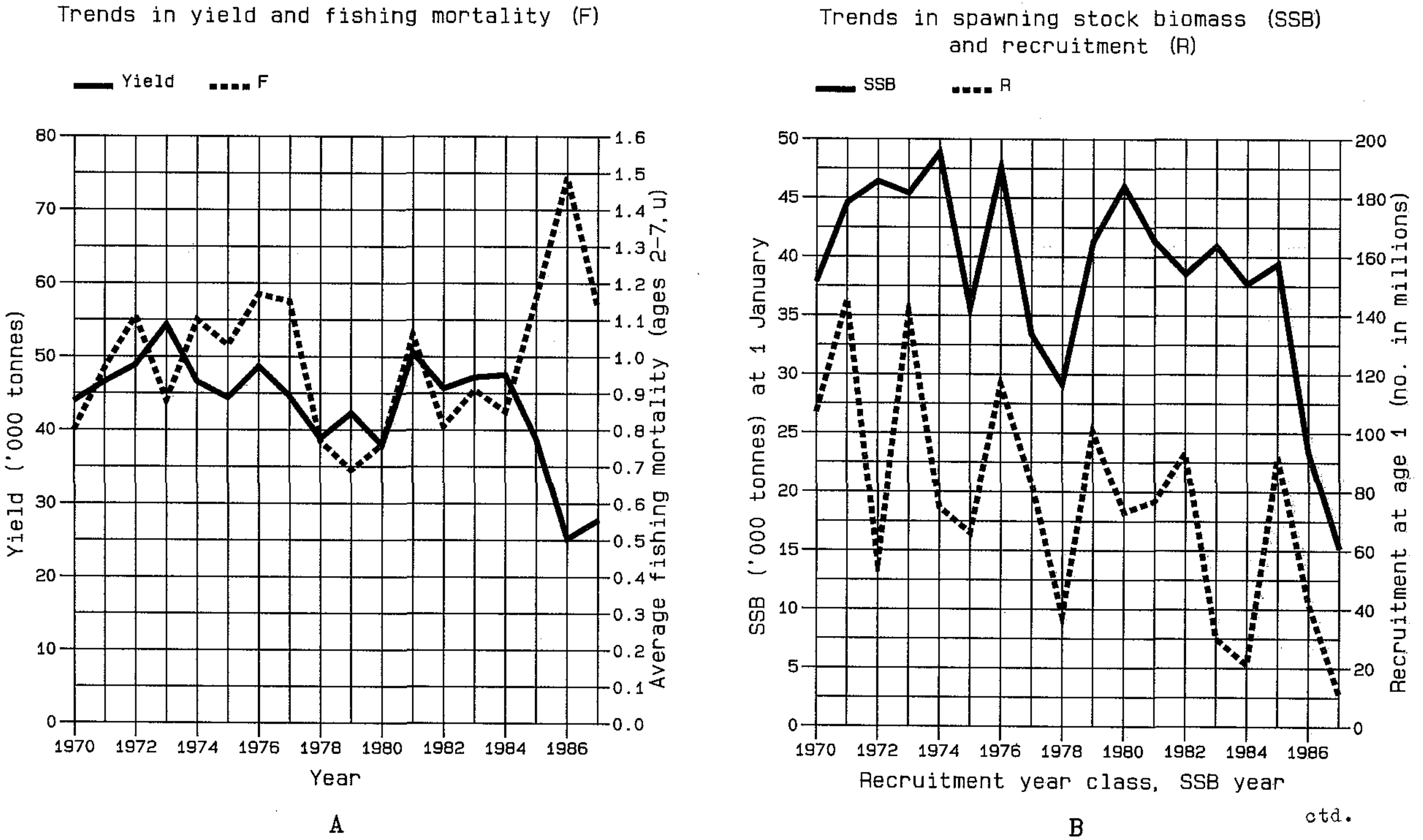


FISH STOCK SUMMARY

STOCK: Baltic Cod - 22 and 24

Figure 4.1.1

30-05-1988

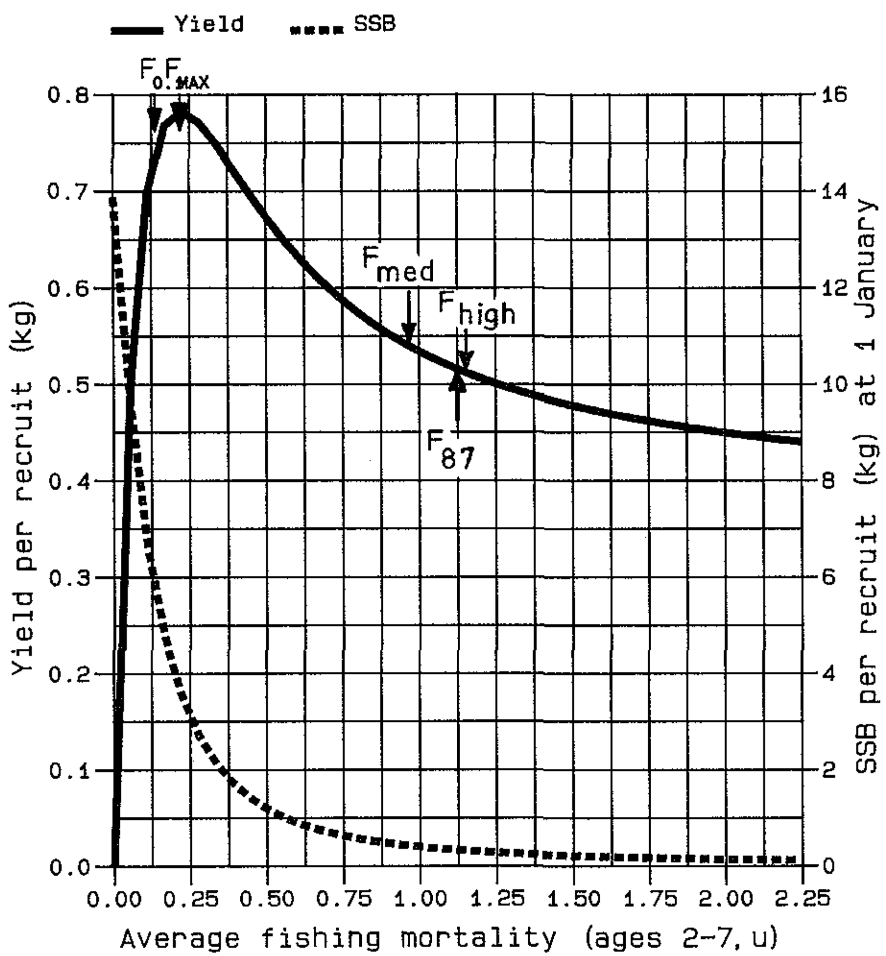


ctd.

FISH STOCK SUMMARY
STOCK: Baltic Cod - 22 and 24
30-05-1988

Figure 4.1.1 (cont'd)

Long-term yield and spawning stock biomass



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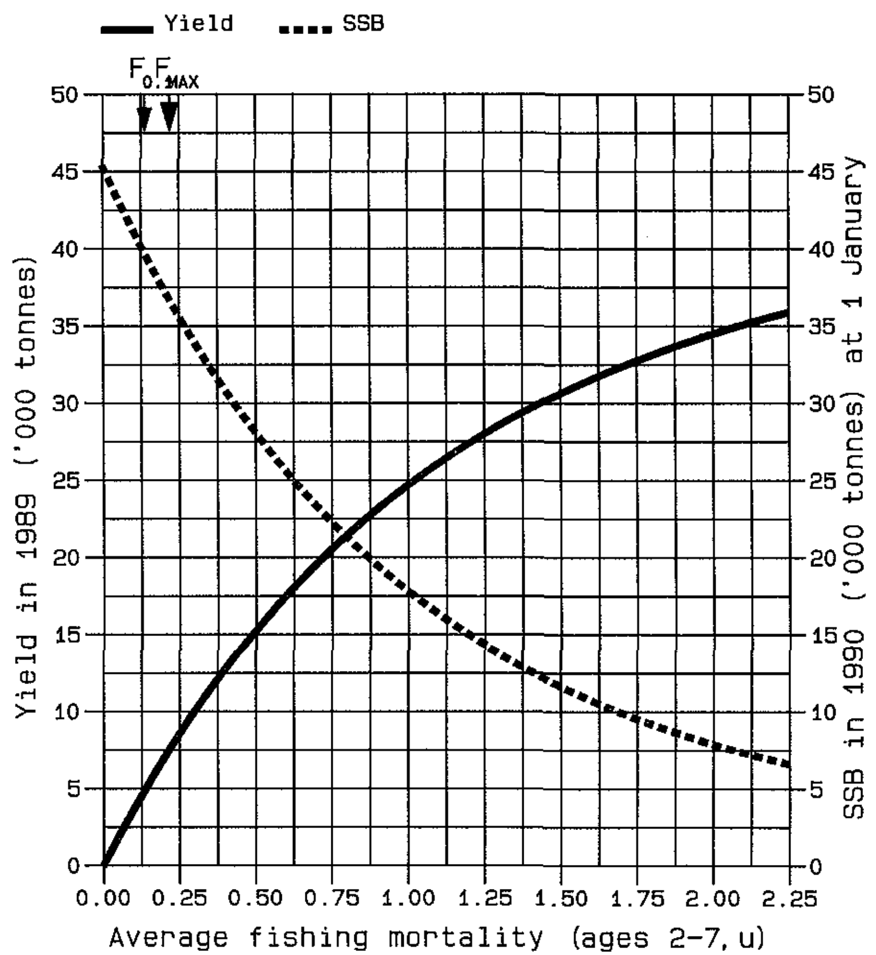
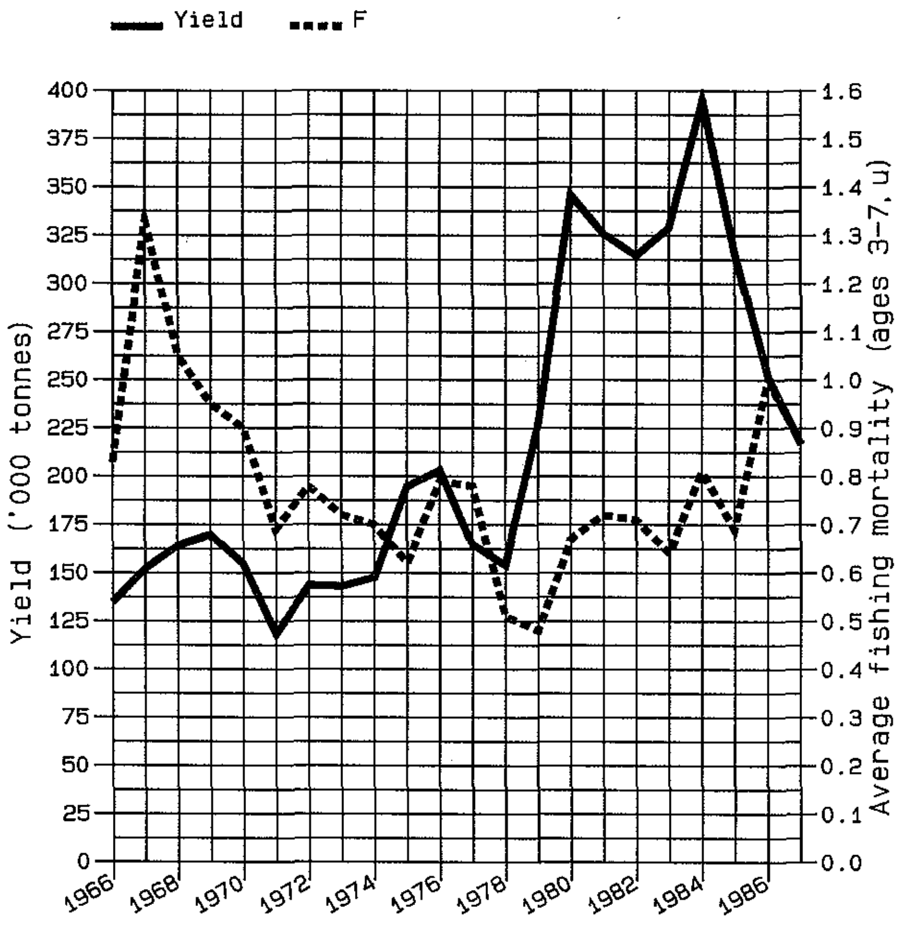
Short-term yield and spawning stock biomass



D

FISH STOCK SUMMARY
STOCK: Baltic Cod - 25 to 32
30-05-1988

Figure 4.1.2



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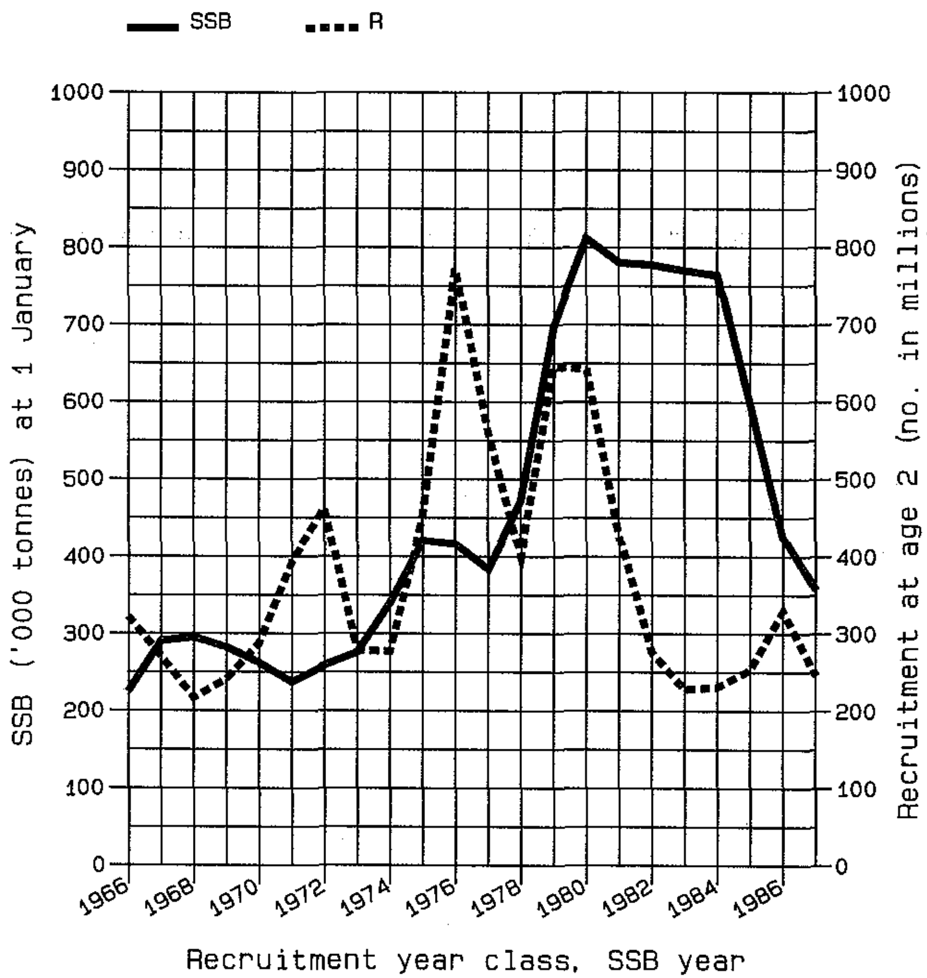

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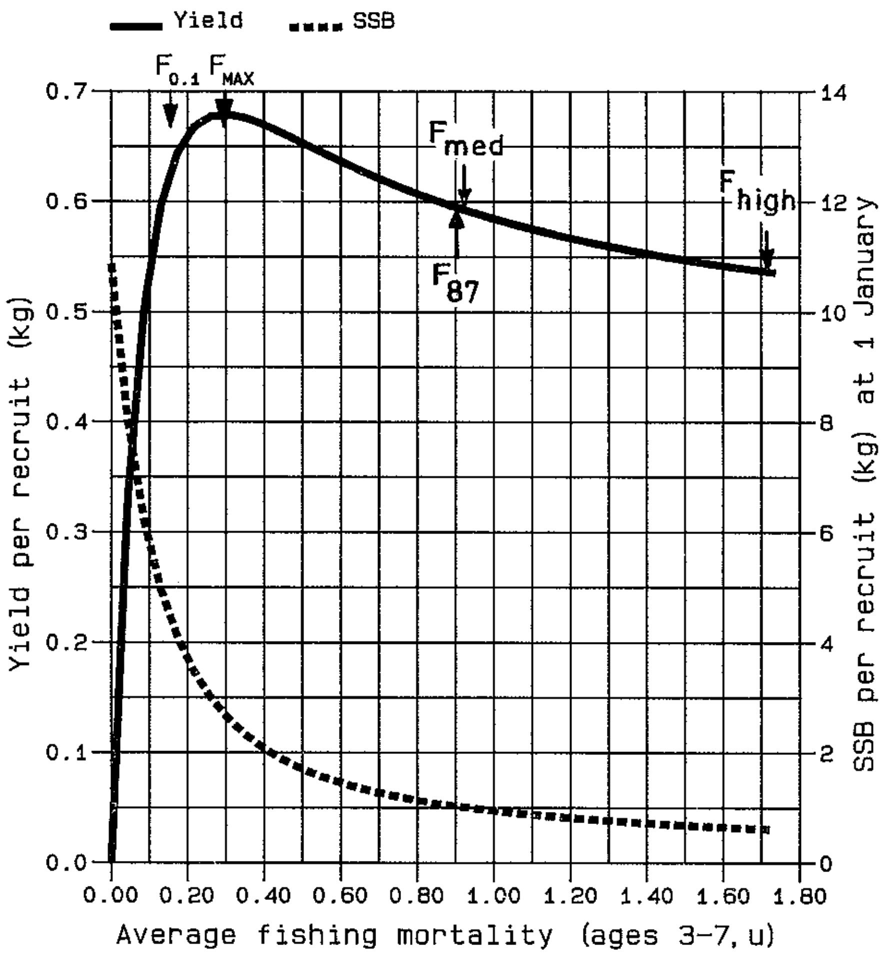
FISH STOCK SUMMARY
STOCK: Baltic Cod - 25 to 32
30-05-1988

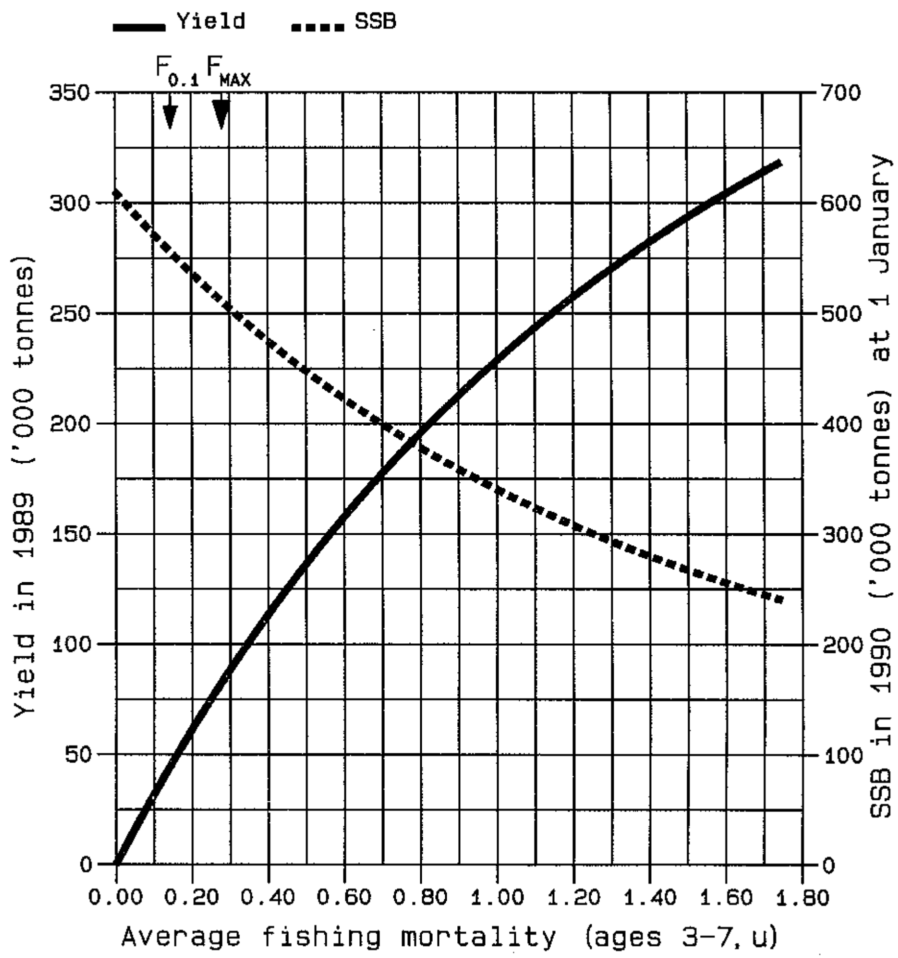
Figure 4.1.2 (cont'd)

Long-term yield and spawning stock biomass



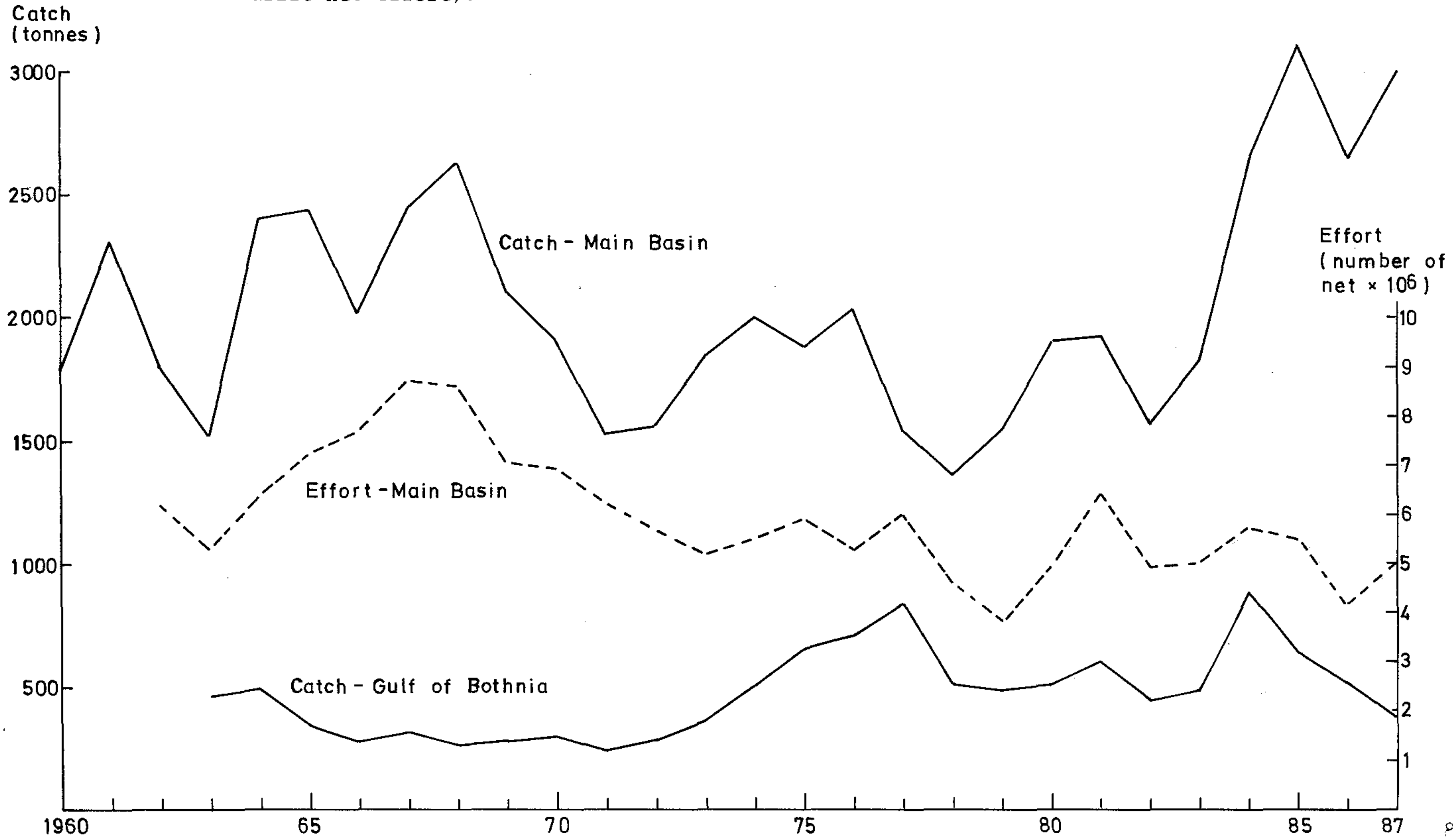
C

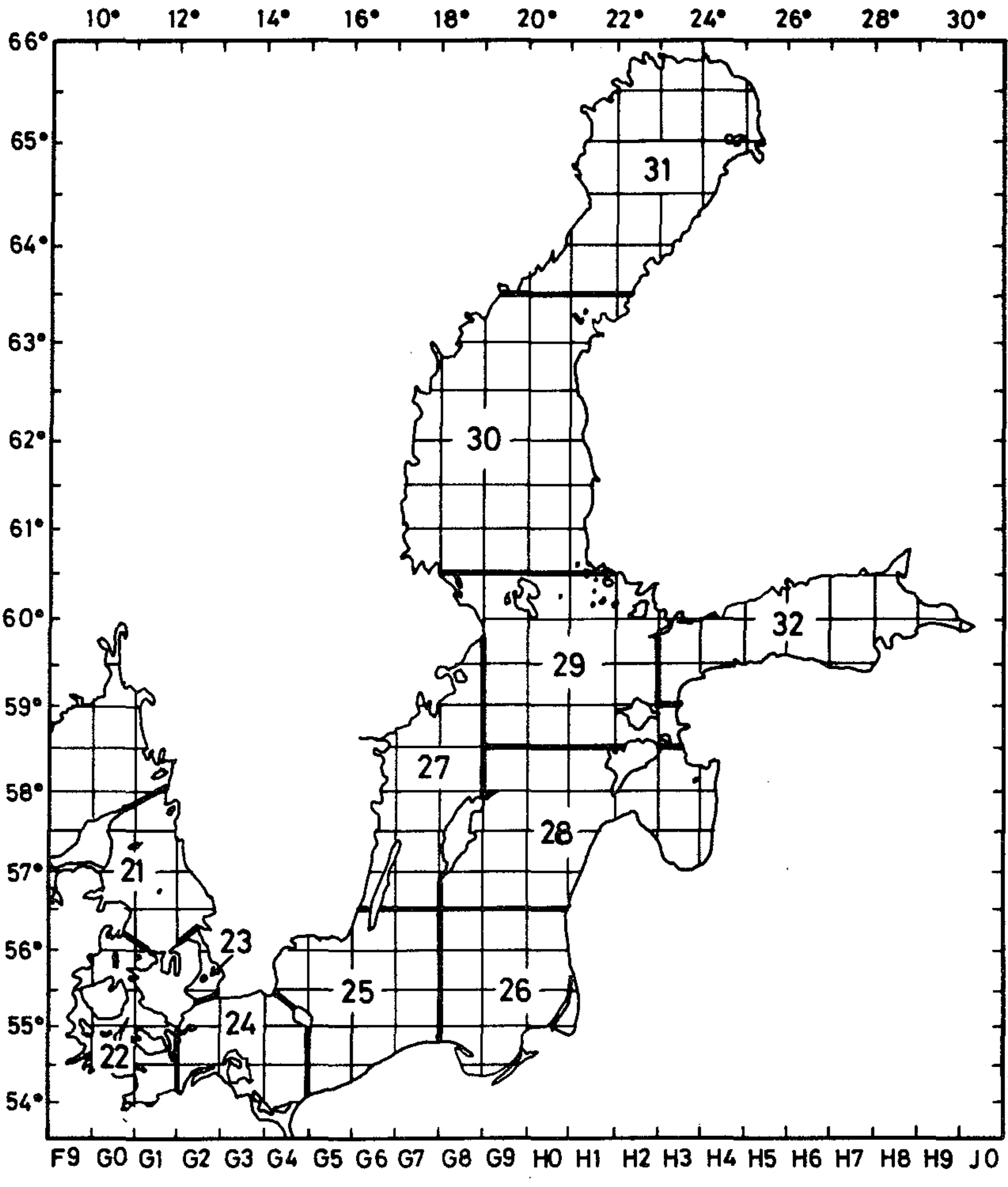
Short-term yield and spawning stock biomass



D

Figure 5.1.1 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 (longline effort converted to drift net effort).





Baltic Fishing Areas

REPORT TO THE NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION COUNCIL

1 INTRODUCTION

Questions of interest to a particular Commission, such as the description of high seas fisheries, appear in the section dealing with questions of interest to that Commission, while all questions dealing with homewater fisheries appear in Section 7. Many of the questions posed related to more than one Commission area, and these are answered separately. In this summary, the tables, figures, and appendices referred to are from the Working Group report (Doc. C.M.1988/Assess:16).

2 CATCHES OF NORTH ATLANTIC SALMON

2.1 Nominal Catches

Nominal catches of salmon by country (in tonnes round fresh weight) for 1961-1987 are presented in Table 1. The catches in homewaters broken down into grilse and salmon are shown in Table 2. Figures for 1987 (6,511 t) are provisional, but it appears likely that, when confirmed, they will show a decrease from 1986 except for Canada and Finland, where they are expected to increase.

Lack of information on fishing effort presents major difficulties in interpreting the catch data.

Unreported catches were considered an important component in stock assessment, and it was agreed that methods of assessing unreported catches should be investigated. Unreported catches were defined as:

> harvests which are caught and retained but do not enter into reported catch statistics; such harvests could be either legal or illegal but would not include catch-and-release mortalities whether they arise from nets or angling gear. Such estimates would not include fish retained by public or private agencies for broodstock purposes.

Although some countries could not provide data, the unreported catches for all countries were considered to be of the order of 3,000 t, which is 500 t less than the corresponding amount for 1986.

ACFM notes with concern the importance of non-reported catches, and urges participants to continue to make every possible effort to obtain and contribute such data in accordance with normal ICES procedure.

2.2 Catches in Numbers by Sea Age and Weight

Reported national data from several countries are summarized in Table 3. In most countries, the decline in the reported 1987 homewater catches occurred in both the 1-sea-winter (1SW) and multi-sea winter (MSW) age groups.

3 FRAMEWORK FOR SCIENTIFIC ADVICE ON MANAGEMENT OF SALMON

3.1 Introduction

NASCO asked ICES to discuss scientifically-based approaches for managing salmon in the context of existing fisheries.

There are two aspects to this subject: firstly, to establish a practical management strategy, and secondly, to describe a possible scientific approach to provide supporting advice. The Working Group recognized three principal aims in the management of Atlantic salmon: conservation of stocks, optimization of yields, and minimization of the variability of the yield from each fishery.

> Conservation can best be achieved by controlling fishing mortality to ensure an adequate number of spawners in each river system to optimize production each year, and this must be the first priority of salmon management.
>
> It is likely to be difficult to optimize yields in mixed-stock fisheries because individual stocks or stock complexes will vary in their availability to the fisheries. The stocks or stock complexes having the largest proportion of their extant numbers available to the fishery will experience the highest exploitation rates and must, therefore, be the key to optimizing exploitation in the fishery. The varying relative productivity of the stocks or stock complexes further adds to the difficulties of managing mixed-stock fisheries.
>
> Wide annual variation in the yield in each fishery may have socio-economic implications that must be considered.

It is fundamental to rational management that scientists estimate a target number of spawners of each sea age or stock component which should be attained each year. This number can be converted into a target "spawning biomass" using appropriate mean weights.

Management strategy should either:

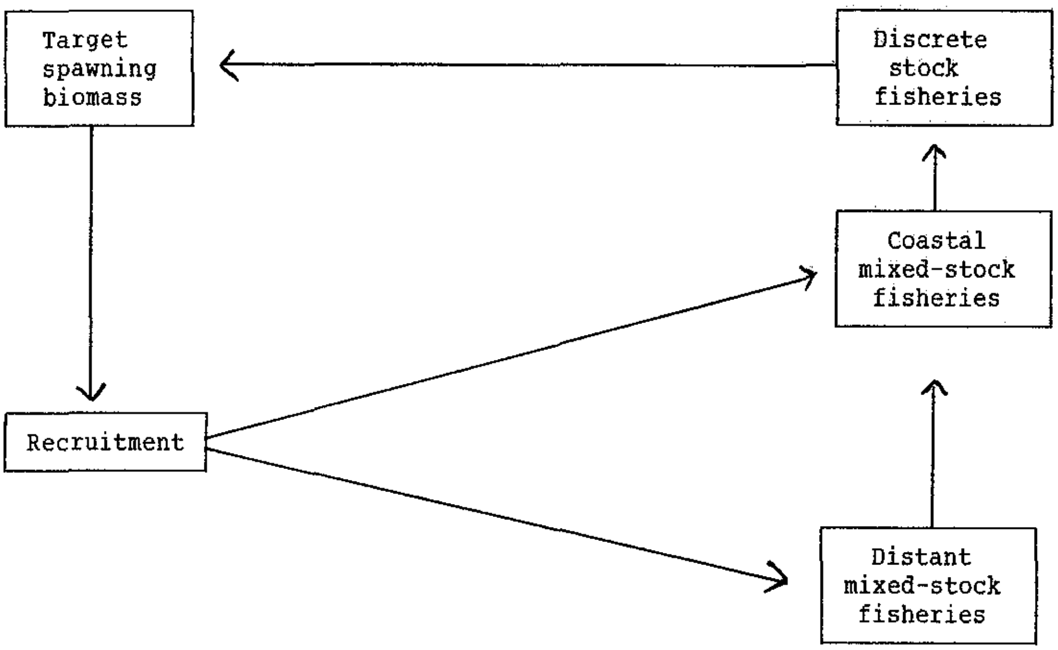
1) permit annual adjustments to harvest levels in all fisheries, or

2) fix the combined harvest of all fisheries at a level sufficiently low to achieve the target spawning biomass of each stock component within normal variations in production, or

3) fix the harvest in mixed-stock fisheries at a level sufficiently low to allow final adjustments to the spawning escapement of each stock component in or close to the river of origin.

3.2 A Conceptual Framework

The diagram below illustrates the type of relationship that could exist between fisheries that must be managed in order to achieve target spawning biomass.



Several models are available which, given sufficient data, can be used to estimate target spawning biomass or production and to assess the effects of varying fishing mortality in one fishery on the harvest in other fisheries and on spawning biomass (see Section 3.6).

3.3 Techniques to Attain Target Spawning Biomass

The ideal system for managing salmon would be to forecast the abundance of all stocks prior to the start of the fisheries each year and then allocate catches to the fisheries on the basis of the distribution of the fish and target spawning escapement.

Existing salmon fisheries cannot be managed within such an ideal framework. Two approaches were discussed which could be used to achieve sufficient spawning escapement for some stock complexes.

A. Real-time management of fisheries

This method utilizes information on stock abundance, either before the fishery commences or while it is in progress. This information is used to close or regulate mixed-stock or discrete fisheries if the abundance of selected stocks or stock components is equal to or less than a predefined target. The method requires:

a) estimates of salmon abundance during the fisheries;

b) techniques to identify stocks;

c) models for estimating the impact of management measures on the predefined abundance targets;

d) enforcement mechanisms for implementation of management measures.

B. Management based on historical performance of the fisheries

This management strategy is the one most commonly used at present. The major difficulty with it is that it only reacts to conservation and fishery problems after they occur and operates by trial and error. The method requires:

a) historical data on spawning escapements for a number of stocks;

b) data by stock or stock complex on the contribution to mixed-stock fisheries.

3.4 Proposed Approach to Management

The primary goal of management to ensure target spawning biomass can be achieved by setting harvests in mixed-stock fisheries at a level which would ensure that the number of salmon returning to the vicinity of the river of origin each year is greater than that required for spawning. Adjustments would then be made to fisheries in or near the rivers to ensure that target spawning biomass is attained.

It is not feasible to develop a management strategy or assess its effectiveness by determining the spawning biomass or the fishing mortality of all stocks. Annual assessments and calculations of these parameters should be made on "indicator stocks". An "indicator stock" may be an individual stock or a group of stocks which can represent the stocks in a larger geographic area. For "indicator stocks", it will be necessary to annually estimate the spawning escapement, the fishing mortality in the various fisheries, and the abundance of salmon returning to discrete stock fisheries.

3.5 Estimation of Target Spawning Biomass and Production

There are several approaches which can be used to estimate target spawning biomass when it is not possible to directly obtain reliable figures. One approach would be to apply estimates of densities at various life stages, or adult production from stocks which have similar biological characteristics, i.e., use values from "indicator stocks". Another approach would be to use values from the scientific literature.

3.6 Fisheries Model

Models could be developed for salmon stocks for which sufficient data exist. Eventually these individual models could be linked in order to develop a cohesive picture of interactions among fisheries and used to judge the effectiveness of management measures.

3.6.1 Spreadsheet system

A spreadsheet system available at ICES Headquarters was used by the Working Group to implement a preliminary descriptive salmon model, using standard measures of catches and abundance, traps, tag recaptures, etc. to develop most, but not all, of the necessary parameters for the model.

The model calculates the abundance and catches in each time step; all fish available in the previous time period are accounted for. Examples are shown in Tables 4 and 5 and in Figures 1 and 2.

3.6.2 Fisheries models for selected stocks

The Working Group also examined two conceptual approaches to reducing exploitation on selected salmon stocks. The first, real-time management, is discussed in Section 3.3 above. The second, linear programming, was used to develop time and area closures which minimizes interceptions in mixed-stock fisheries. By adjusting the necessary constraints, the model can provide an objective standard against which management measures can be evaluated.

3.7 Summary

These models are preliminary and may not be available in the immediate future, but, nevertheless, they are the first steps in such descriptions of salmon fisheries in the North Atlantic. The marine life history model is not predictive but given the appropriate parameter sets, it can provide a descriptive view of the interactions of the various fisheries and spawning escapements.

3.8 ACFM Comments

ACFM notes and commends the constructive discussion on scientifically-based approaches for managing salmon. The Working Group cannot, however, be expected to select overall objectives of management, since this involves the resolution of social and political conflicts, which are beyond its competence. ACFM, therefore, suggests that the Working Group should continue to develop methods for evaluating the consequences (in terms of yield, stocks size, etc.) of management options involving modest changes in the level of exploitation in the main fishery sectors. NASCO should consider how it could make use of such assessments in choosing among such management options, taking into account the biological importance of spawning stock, as discussed by the Working Group.

ACFM also notes the research priorities listed in Section 9 of the Working Group report, which reflect the proposed approach to scientific management, and the data requirements given in Appendix 5 of the Working Group report. ACFM requests that countries make every effort to initiate such research and obtain and contribute such data at future meetings of the North Atlantic Salmon Working Group.

4 QUESTIONS OF INTEREST TO THE WEST GREENLAND COMMISSION OF NASCO

4.1 The Fisheries in 1987

The fishery at West Greenland is described below, and the fisheries in homewaters are described in Section 7.

4.1.1 Description of the fishery at West Greenland

The fishery opened on 25 August and ended on 7 October. The agreed TAC was 850 t, adjusted to 935 t for the opening date of 25 August. The nominal catch was 966 t, exceeding the quota by 31 t.

The TAC was divided into a "free quota" of 533 t available to all licensed fishermen and a "small-boat quota" of 356 t for boats less than 30 feet, which was allocated to districts. The remaining 46 t was reserved for a longline fishery and as a buffer for the total fishery. The "free quota" catch was 614 t and exceeded the quota by 81 t.

In total, 77% or 744 t was taken by boats smaller than 30 feet operating in the inshore area, and logbooks indicate that a great part of the catches taken by larger boats was from the inshore area.

In 1987, the greatest landings were recorded in NAFO Divisions 1C-1E, which differs from 1986 when the highest divisional catch was taken in Division 1F.

The bulk of the catch is taken with drift nets which have a target mesh size of 140 mm stretched. On average, the small boats used 40 nets, each 25 m long, per fishing day while the bigger boats used an average of 99 nets per day. Compared with procedures formerly used by the big drifters, the fishermen now patrol their nets more frequently to remove salmon and, in most cases, nets are cleared before the gear is hauled. This should have reduced non-catch fishing mortality.

Of the 350 boats supplied with logbooks, 60 boats provided effort and catch information (Table 8). The figures from 1986 are updated in Table 9. The information available is limited but shows that catch per unit of effort was lower in 1987 than in 1986.

During the first 7 days and the first 14 days of the fishery, the landings were lower than in 1986, which may indicate that salmon were less available to the fishery in 1987.

4.1.2 Composition and origin of catch

In 1987, samples of salmon (678 North American and 678 European) caught between 1980 and 1986 were used to develop a data base for discriminating salmon at West Greenland. One character previously used to develop the discriminant function had to be excluded in 1987. The samples caught at West Greenland in 1987 identified to continent of origin by the presence of a tag or by protein electrophoresis indicated a misclassification rate of 18.6 and an error rate of $\pm$ 4.0.

Applying the discriminant function to catch samples at West Greenland gave an estimated proportion of 59% North American or a corresponding catch of 556 t (179,918 salmon) and 41% European or a corresponding catch of 411 t (126,395) salmon.

The proportion of North American fish ranged from 47% in Division 1F to 68% in Division 1D.

The number of Maine-origin salmon by statistical area caught at West Greenland in 1967-1986 is shown in Table 12. Since the imposition of a quota in 1976, the catch has averaged about 1,460 salmon.

In 1987, 146 fish tagged with coded-wire tags (CWTs) were recovered out of 25,047 salmon (8.2% of the catch) examined. The tags (see Table 14) originated in five countries: Scotland 2 (1%), England and Wales 17 (12%), Canada 21 (14%), Ireland 24 (16%), and USA 82 (56%).

Valid estimates of harvest can be derived at the tag scanning levels being achieved following the methods developed for external tags (Anon., 1986a).

Comparisons of continent of origin identifications made by examining the levels of mitochondrial DNA polymorphism among Atlantic salmon stocks were in agreement with those derived from electrophoretic techniques.

Image processing techniques for stock identification, utilizing scales or otoliths, have yielded encouraging preliminary results but require further research.

4.1.3 Biological characteristics

The results of the discriminant function analysis were used to divide samples in NAFO Divisions 1B and 1D-F into North American and European components. As previously observed, the North American 1SW salmon were significantly shorter and lighter than their European counterparts. The sea and smolt age composition of samples are summarized in Tables 16a, 16b, and 17. The mean smolt age of 2.8 years observed in the samples of North American origin is similar to the 1986 value of 2.86 years. The mean smolt age of 2.02 years observed in samples of European origin is slightly higher than that observed in 1986 (1.98).

The sea age compositions in 1987 (Tables 16a and 16b) were 97.0%, 2.0%, and 1%, of 1SW, 2SW salmon, and previous spawners, respectively.

4.1.4 Stock abundance and exploitation

In 1987, an improved technique based on estimates of run size and harvest of Maine-origin salmon was used to develop preliminary estimates of the exploitation rate and population size of 1SW salmon at West Greenland. A limitation of the previous model was that it assumed that all fish returning to Maine rivers were available for exploitation in the Greenland summer fishery. Simulations using the modified model suggested that exploitation rates in 1986 had probably increased and that population size had decreased in West Greenland compared with 1985 values, but the magnitude could not be quantified. This inference from the model is not consistent with the apparent high abundance in the 1986 fishery as assessed by the catch levels in the first two weeks of the season as well as by CPUE data. Low catch rates of 2SW salmon in some Canadian and USA rivers, however, did support the model simulation.

4.2 Accuracy of Age Determination of Hatchery Origin Salmon at West Greenland

Estimates of the harvest of USA fish at West Greenland derived from the "proportional harvest method" (Anon., 1986b) were about four times higher than estimates from a model based on Carlin-tag recoveries. The method was sensitive to the proportion of the harvest of North American fish estimated to be river age 1, and the accuracy of these estimates was investigated. The Working Group concluded that the river age of salmon of North American origin could be determined without undue bias.

4.3 Effectiveness of Management Measures in the Fishery at West Greenland

Prior to 1984, the quota for the West Greenland salmon fishery for many years was 1,190 t (or its equivalent adjusted by season opening date). Since 1984, the quota has been lower, and for 1986 and 1987 it was set to be equivalent to 850 t in terms of numbers of fish if the season had opened on 1 August.

The Working Group concluded that significant reductions have taken place in both the average quota (lower by 26%) and the total weight of harvest (lower by 21%) for the years 1985-1987 compared to 1978-1982 (Table 18). Total harvest in Greenland averaged 308,000 during recent years, which is about 58,000 fish less than when the quota was 1,190 t.

5 QUESTIONS OF INTEREST TO THE NORTH-EAST ATLANTIC COMMISSION OF NASCO

5.1 The Fisheries in the 1986/1987 Season, and in 1987

The fishery at Faroes is described below, and descriptions of homewater fisheries are given in Section 7.

5.1.1 Description of the fishery at Faroes

The landings in 1987 amounted to 510 t, which was 20 t less than in 1986 (Table 19, which is a corrected version of previous tables). The nominal landings by seasons broken down into numbers and weight by sea-age group are given in Table 3. Catch in number by statistical rectangle for the 1986/1987 season is presented in Figure 3. The number of discards was estimated to be 7.4% of the catch.

5.1.2 Fishing effort

The average CPUE in the 1986/1987 season was the highest annual figure recorded (Figure 4 and Table 20).

5.1.3 Origin of salmon in the Faroese fishery

In 1987, tagging data from external and coded-wire tags indicated that the recapture rates per 1,000 fish tagged have decreased in Scotland, Ireland, Iceland, and England/Wales. It was noted that tags from the USSR have been found in the fishery.

As in 1986, the number of recoveries of Norwegian Carlin tags relative to the number released indicated that salmon of Norwegian origin are by far the largest component of the Faroese fishery.

5.1.4 Abundance and exploitation

Data from the River Imsa tagging experiments indicate that the exploitation of this stock in the Faroese area in the 1986/1987 season was similar to previous years (Tables 23 and 24). Estimates of the exploitation rate on the extant stock range from 0-4% on 1SW salmon and 13-63% on 2SW salmon.

5.2 Effort Control in the Faroese Fishery

Catch limitation (quota) should provide a constant fishing mortality if recruitment remains constant, while effort control might stabilize the fishing mortality if the proportion of the extant stock available to the fishery remains constant. It was not possible, however, to evaluate the relative effects of effort and quota control on fishing mortality in the Faroese fishery zone.

5.3 Contribution of Hatchery-Reared Salmon and Fish Farm Escapees to the Salmon Fishery

Based on scale samples from the Faroese fishery in the 1986/1987 season, 2.6-3.6% of the fish were classified as hatchery reared. The range estimated from samples presented in 1987 was 0-13%.

5.4 Acoustic Survey at the Faroes

A feasibility study on the use of acoustic techniques to estimate the numbers of salmon in the Faroes fishery zone is to be carried out in February or April 1989. The Marine Laboratory in Aberdeen (Scotland) and the Marine Research Institute in Bergen (Norway) have agreed to supply acoustic experts to take part in the experiments and assist with data analysis. The equipment and research vessel will be made available by the Faroese Laboratory.

5.5 Effectiveness of Management Measures in the Faroese Fishery

Since 1987 was the first year of effort control, it is not yet possible to assess the effect of this measure on either the Faroese or homewater fisheries.

5.6 Recommendations

ACFM endorses the recommendations of the Study Group on the Norwegian Sea and Faroese Salmon Fishery given in Appendix 4 of the Working Group report.

6 QUESTIONS OF INTEREST TO THE NORTH AMERICAN COMMISSION OF NASCO

6.1 The Fisheries in 1987

The fisheries in Canada and USA are described under homewater fisheries in Sections 7.1 and 7.11.

6.2 Effectiveness of Management Measures

6.2.1 USA

In 1987, a mandatory registration system for all salmon >64 cm in total length caught by anglers was instituted. This is expected to improve the reporting rate for salmon taken in the Maine sport fishery. The management measures initiated in 1985 (Anon., 1987b) are still in effect and have achieved a 50% reduction in the exploitation rate of MSW salmon in the Penobscot River.

6.2.2 Canada

The management measures imposed in Canada in 1984 and 1985 were described in Anon. 1986a and 1987b). Preliminary 1987 figures suggest that the complete closure of some fisheries resulted in a decrease in harvest of 258 t of MSW and 25 t of 1SW salmon. The delayed opening of the season reduced the 1987 catch by 92 t of MSW and 7 t of 1SW salmon.

In 1987, legislation requiring market tagging of salmon in the Newfoundland/Labrador commercial fishery came into effect. No information was presented to quantify the impact of this.

6.2.3 Effect of Canadian management measures on USA stocks

It is noted (Anon., 1987b) that area closures and season reductions for 1984 and 1985 should have resulted in an 11% reduction in the harvest of Maine-origin salmon. The closure of the autumn fishery on 15 October 1986 should account for 29% of the 1SW Maine-origin salmon caught in the Newfoundland/Labrador fisheries. The percentages are not additive, however.

The number of Penobscot River MSW fish considered to be both available and vulnerable to distant commercial fisheries in 1986 was 2.5 times more than the average for 1981-1986. Although based on only a single observation, results are consistent with the objective of the management measure which closed the Newfoundland fall fishery.

To assess the combined effect of all measures taken by Canada for 1984-1986, the estimated harvest of 1SW Maine-origin salmon in Newfoundland/Labrador was compared to the Maine run size of 2SW salmon the following year. For the years 1967-1983, the ratio of Newfoundland harvest to homewater run size averaged 0.53, while the value for 1984-1986 was 0.35 (Table 30). The reduced harvest in Newfoundland is consistent with the expected impact of the closure of the fall fishery by Canada in 1986.

Tag recovery information from the provinces of New Brunswick, Nova Scotia, and Quebec should be examined next year to provide a more complete analysis of the impact of these management measures.

6.3 Numbers of Salmon of USA Origin in Canadian Fisheries

6.3.1 Historical catches in Newfoundland/Labrador commercial fisheries by 1SW salmon which originated in USA

Revised harvest estimates by year and standard week are given in Table 32 and an annual summary in Table 33. The estimates are derived using the same parameters as in 1987 (Anon., 1987b) and the most up-to-date information on tagged and untagged 2SW salmon returning to Maine rivers. The overall change in the estimates across all years is only 0.3%.

The estimated harvest of Maine-origin salmon in Newfoundland and Labrador during 1986 was substantially lower for recent years (Table 33). The higher proportion of harvest in Area O and a lower proportion in Area B, compared to previous years, is consistent with the closure of the fall fishery.

An estimated 254 1SW salmon of Connecticut River origin were harvested in Newfoundland/ Labrador in 1986 compared to an estimated 649 1SW fish in 1985.

6.3.2 Historical tag recoveries of 1SW and MSW salmon of USA origin in provinces of Quebec, Nova Scotia, and New Brunswick and MSW salmon in Newfoundland/Labrador

Additional information on the annual capture of 1SW and MSW Maine-origin salmon in the commercial fisheries of Quebec, New Brunswick, and Nova Scotia is provided for the period 1963-1987 in Tables 35 and 36. Similarly, new information was provided summarizing the annual capture of tagged MSW salmon of Maine origin in Newfoundland/Labrador fisheries (Table 37). Tag recovery information from these areas should be re-examined in the future in order to provide improved estimates of the impact of management measures.

ACFM notes that this is a recommendation of the Study Group on the North American Salmon Fishery in Appendix 4 of the Working Group report, which ACFM endorses.

6.3.3 Average percentage by number of USA fish in the total harvest of the Newfoundland/Labrador commercial fishery

The average percentage of Main-origin fish in the total harvest of the Newfoundland/Labrador commercial fishery during the years 1974-1986 (excluding 1979) is presented in Table 38.

6.4 Review of the Report of the Study Group on Acid Rain

6.4.1 Freshwater habitats of Atlantic salmon populations and their vulnerability to acidification

There are nearly 1,000 km^2 of accessible Atlantic salmon rearing habitat in Eastern North America, of which 50 km^2 were classed as vulnerable (on the previous criterion of <50 µeq/l mean alkalinity) (Anon., 1987a). Upon further examination, this estimate has now been increased from 50 to 108 km^2. The minimum standard for vulnerability has been revised to meet one of the following criteria: a) a mean value of 75 µeq/l or less (derived from at least 8 measurements which include seasonal changes and a realistic change of water flows; or b) when sampling has been or must be limited, a value of 150 µeq/l or less, derived from consistent measurements of low summer flows, preferably repeated over a 5-year period as an acceptable approximation of a) above.

The additional area of vulnerable habitat gained by applying new higher alkalinity criteria has not yet been estimated.

For Nova Scotia, the amount of habitat lost as a result of acidification has been revised from 10.3 km^2 to the more conservative value of 6.0 km^2.

The Study Group revised the production loss due to acidification in the Southern Upland of Nova Scotia (Watt, 1986). The Study Group was concerned about the robustness of the new estimate due to unexplained sensitivity of the estimate of production per unit habitat. The revised estimated loss of Atlantic salmon annual production due to acidification since 1980 has been conservatively estimated to be about 5,600 fish/year.

Following the 1987 advice of the North Atlantic Salmon Working Group (Anon., 1987a), an alternative method of estimating Atlantic salmon production loss was attempted, based on a relationship between pre-smolt production and pH. This method indicated a substantial decline in Atlantic salmon production, but was judged to be insufficiently developed at present.

6.4.2 Trends in acidification of habitat and in the fish populations

No new information on annual or seasonal trends in acidification was reported to the Study Group, and so the 1987 conclusions remain unchanged (Anon., 1987c).

The only historic water chemistry data available was from the Southern Upland region of Nova Scotia, and this revealed that, in at least four rivers during the period 1955-1981, acidity had increased.

Angling catch records for 22 rivers in the Southern Upland zone provide evidence that the Atlantic salmon harvest has declined from 1936 to the present.

6.4.3 Influence of acidification on growth and survival of Atlantic salmon

While the Working Group noted that low pH seems not to affect growth rates, increased acidity (lowered pH) can lead to mortality in several stages of the salmon's life cycle; alevins are particularly vulnerable at hatching and transition to first feeding, while the water-hardened egg is relatively resistent to low pH. Mortality can also occur in parr and smolts if the pH is rapidly reduced.

If pH falls to 4.7, juvenile production will tend to fall below the lower limit for maintenance of the population. Production stays below carrying capacity at more moderate pH levels up to about 5.6. It is also apparent that low pH levels will drastically limit reproductive success to the point where a stock may disappear before food supplies are themselves impoverished.

6.4.4 The effectiveness of mitigation measures

The only satisfactory permanent solution to the problem of acidification of Atlantic salmon habitat would be the elimination of the source of acidity.

Feasible short-term mitigation measures are liming, stocking, and the preservation of genetically diverse stocks. Liming has been used successfully in Europe and North America. Hatchery-reared stocks are most useful in situations where production declines are not yet severe. Preservation of the gene pool and selection of acid-resistant stocks require further research and development before implementation would be practical.

6.4.5 Recommendations

ACFM endorses the recommendations of the Study Group on Acid Rain (Appendix 4 of the Working Group report).

6 HOMEWATER FISHERIES

Section 7 of the Working Group report describes the various homewater fisheries.

The information from most countries allows a description of the fishery according to the various types of gear, contribution of fish from other countries, and status of stocks. Some countries were able to provide exploitation rates in some fisheries.

Effectiveness of management measures is commented on for most countries. For Canada, this is dealt with specifically in Section 6.2 above.

It is envisaged that the information in this section could be helpful in building a descriptive model of salmon in the North Atlantic.

8 GENERAL TASKS

8.1 Compilation of Tag Data

NASCO requested ICES to compile information on tagging carried out on Atlantic salmon.

8.1.1 Compilation of tag release data for 1987

About 1.2 million microtags and 0.4 million external tags were applied to Atlantic salmon in 1987 (Table 43). In addition, 1.3 million salmon were finclipped. Thus, more than 2.9 million fish were marked.

The Working Group prepared a separate report on salmon tagged or marked in 1987.

8.1.2 Tagging data base

ACFM notes the progress made by the Working Group in assembling tagging data, and endorses the Working Group's conclusion that there is no need for NASCO to develop a tagging data base as long as the Working Group can continue to provide this service.

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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