

**COOPERATIVE RESEARCH REPORT**  
**RAPPORT DES RECHERCHES COLLECTIVES**  
**NO. 173**

**PART 1**

**REPORTS OF THE ICES ADVISORY COMMITTEE ON FISHERY MANAGEMENT, 1990**

Copenhagen, 15-23 May 1990  
Copenhagen, 31 October - 7 November 1990

Recommended format for purposes of citation:

ICES. 1991. Reports of the ICES Advisory Committee on Fishery Management, 1990, Part 1.

ICES Cooperative Research Report No. 173(1). pp. 360. <https://doi.org/10.17895/ices.pub.5310>

**International Council for the Exploration of the Sea**  
**Palægade 2-4, DK-1261, Copenhagen K, Denmark**

**March 1991**

**ISSN 2707-7144**

**ISBN 978-87-7482-481-7**



# PART 1

## TABLE OF CONTENTS

	<u>Page</u>
<b>PREFACE</b> .....	1
<b>MEMBERS OF THE ADVISORY COMMITTEE ON FISHERY MANAGEMENT 1989/1990</b> .....	2
<b>MEMBERS OF THE ADVISORY COMMITTEE ON FISHERY MANAGEMENT 1990/1991</b> .....	3
<b>REPORTS OF THE ADVISORY COMMITTEE ON FISHERY MANAGEMENT MAY AND NOVEMBER 1990</b> ...	4
Chart of ICES Fishing Areas .....	6
<b>REPORT TO THE NORTH-EAST ATLANTIC FISHERIES COMMISSION</b> .....	7
<b>1. INTRODUCTORY ITEMS</b> .....	7
1.1 Review of Nominal Catches in NEAFC Area .....	7
1.2 Review of ACFM Advice for 1990 .....	8
<b>2. STOCKS IN NEAFC REGION 1</b> .....	9
2.1 North-East Arctic Cod .....	9
2.1.1 Advice from the May 1990 ACFM meeting .....	9
2.1.2 Advice from the October/November 1990 ACFM meeting .....	10
2.2 North-East Arctic Haddock .....	12
2.3 North-East Arctic Saithe .....	13
2.4 Redfish in Sub-areas I and II .....	15
2.4.1 <u>Sebastes mentella</u> in Sub-areas I and II .....	15
2.4.2 <u>Sebastes marinus</u> in Sub-areas I and II .....	16
2.5 Greenland Halibut in Sub-areas I and II .....	17
2.6 Stocks off East Greenland .....	18
2.6.1 East Greenland cod (Sub-area XIV) .....	18
2.6.1.1 Advice from the May 1990 ACFM meeting .....	18
2.6.1.2 Advice from the October/November 1990 ACFM meeting .....	20
2.6.2 <u>Pandalus</u> in East Greenland waters (Denmark Strait, Divisions XIVb and Va) .....	22
2.7 Redfish in Sub-areas V, XIV, and XII .....	23
2.7.1 <u>Sebastes marinus</u> in Sub-areas V and XIV .....	24
2.7.2 <u>Sebastes mentella</u> "traditional fishery" in Sub-areas V and XIV ..	25
2.7.3 <u>Sebastes mentella</u> "oceanic type" in Sub-areas XII and XIV .....	26
2.8 Greenland Halibut in Sub-areas V and XIV .....	27
2.9 Icelandic Saithe (Division Va) .....	28

2.10 Demersal Stocks at the Faroe Islands .....	29
2.10.1 Faroe saithe (Division Vb) .....	29
2.10.2 Faroe Plateau cod (Sub-division Vb1) .....	30
2.10.3 Faroe Bank cod (Sub-division Vb2) .....	31
2.10.4 Faroe haddock (Division Vb) .....	32
2.11 Blue Ling, Ling and Tusk in Sub-areas V, VI and XIV .....	33
2.12 Atlanto-Scandian Herring .....	34
2.12.1 Iceland summer-spawning herring (Division Va) .....	34
2.12.2 Norwegian spring-spawning herring .....	35
2.12.2.1 Distribution in time and space of the Norwegian spring-spawning herring .....	36
2.13 Capelin .....	37
2.13.1 Barents Sea Capelin (Sub-areas I and II, excluding Division IIa west of 5°W) .....	37
2.13.2 Capelin in the Iceland-East Greenland-Jan Mayen area (Sub-areas V and XIV and Division IIa west of 5°W) .....	39
2.13.2.1 Advice from the May 1990 ACFM meeting .....	39
2.13.2.2 Advice from the October/November 1990 ACFM meeting .....	40
3. STOCKS IN NEAFC REGION 2 .....	41
3.1 Herring Stocks South of 62°N .....	41
3.1.1 Herring in Divisions IVa,b .....	41
3.1.2 Herring in Divisions IVc and VIId (Downs herring) .....	44
3.1.3 Herring in Sub-divisions 22-24 and Division IIIa .....	45
3.1.4 Celtic Sea and Division VIIj herring .....	48
3.1.5 Herring in Division VIa (North) .....	50
3.1.6 Clyde herring (Division VIa) .....	51
3.1.7 Herring in Divisions VIa (South) and VIIb,c .....	53
3.1.8 Irish Sea herring (Division VIIa) .....	55
3.2 Industrial Fisheries in the North Sea and Adjacent Waters .....	56
3.2.1 Definition of industrial fisheries .....	56
3.2.2 Data available .....	56
3.2.3 Trends in industrial landings .....	56
3.2.4 By-catches of protected species .....	56
3.2.5 Norway pout in Division IIIa .....	57
3.2.6 Norway pout in Sub-area IV .....	58
3.2.7 Norway pout in Division VIa .....	59
3.2.8 Sandeel in Division IIIa .....	59
3.2.9 Sandeel in the southern North Sea .....	60
3.2.10 Sandeel in the northern North Sea .....	61
3.2.11 Sandeel in the Shetland area .....	63
3.2.12 Sandeel in Division VIa .....	64
3.2.13 Sprat in Division IIIa .....	65
3.2.14 Sprat in Sub-area IV .....	66
3.2.15 Sprat in Division VIa .....	67
3.2.16 Sprat in Divisions VIId,e .....	67



3.3	Demersal Stocks in Division IIIa .....	68
3.3.1	Cod in the Kattegat .....	68
3.3.2	Cod in the Skagerrak .....	69
3.3.3	Haddock in Division IIIa .....	70
3.3.4	Whiting in Division IIIa .....	71
3.3.5	Plaice in the Kattegat .....	72
3.3.6	Plaice in the Skagerrak .....	74
3.3.7	Sole in Division IIIa .....	75
3.4	<u>Pandalus borealis</u> in Division IIIa and the North Sea .....	76
3.4.1	<u>Pandalus</u> stocks .....	76
3.4.2	Additional management measures .....	76
3.4.2.1	Mesh size evaluation .....	76
3.4.2.2	Weekend ban .....	77
3.4.3	<u>Pandalus borealis</u> in Division IIIa and Division IVa East (Norwegian Deeps) .....	78
3.4.3.1	Advice from the May 1990 ACFM meeting .....	78
3.4.3.2	Advice from the October/November 1990 ACFM meeting .....	79
3.4.4	<u>Pandalus borealis</u> in Division IVa - the Fladen Ground .....	81
3.5	Cod, Haddock, Whiting, and Saithe in the North Sea .....	82
3.5.1	Roundfish in Sub-area IV.....	82
3.5.1.1	Advice from the May 1990 ACFM meeting .....	82
3.5.1.2	Advice from the October/November 1990 ACFM meeting .....	82
3.5.1.3	Separate fisheries for cod, haddock, whiting, and saithe. ....	83
3.5.1.4	Short-term effects of changes in selectivity .....	84
3.5.1.5	Distribution of haddock, cod, and whiting .....	85
3.5.2	Cod in Sub-area IV (North Sea) .....	86
3.5.2.1	Effects of the cod box in the German Bight .....	88
3.5.3	Haddock in Sub-area IV (North Sea) .....	89
3.5.4	Whiting in Sub-area IV (North Sea) .....	91
3.5.5	Saithe in Sub-area IV and Division IIIa (North Sea) .....	93
3.6	Cod, Haddock, Whiting, and Saithe in Sub-areas VI and VII .....	94
3.6.1	Roundfish in Sub-areas VI and VII: Overview .....	94
3.6.2	Cod in Division VIa (West of Scotland) .....	96
3.6.3	Cod in Division VIb (Rockall) .....	96
3.6.4	Haddock in Division VIa (West of Scotland) .....	97
3.6.5	Haddock in Division VIb (Rockall) .....	98
3.6.6	Whiting in Division VIa (West of Scotland) .....	100
3.6.7	Whiting in Division VIb (Rockall) .....	100
3.6.8	Saithe in Sub-area VI (West of Scotland and Rockall) .....	101
3.6.9	Cod in Divisions VIId,e .....	102

3.6.10 Whiting in Divisions VIIId,e (English Channel) .....	103
3.6.10.1 Whiting in Division VIIId (Eastern English Channel) .....	103
3.6.10.2 Whiting in Division VIIe (Western English Channel) .....	103
3.6.11 Other stocks in Sub-area VII .....	104
3.6.12 Developments in methods used by Roundfish Working Group .....	104
3.7 Irish Sea/Bristol Channel and Celtic Sea Stocks .....	105
3.7.1 Irish Sea cod .....	106
3.7.2 Irish Sea whiting .....	108
3.7.3 Irish Sea plaice .....	109
3.7.4 Irish Sea sole .....	110
3.7.4.1 Advice from the May 1990 ACFM meeting .....	110
3.7.4.2 Advice from the October/November 1990 ACFM meeting .....	112
3.7.5 Celtic Sea cod (Divisions VIIIf and g) .....	114
3.7.6 Celtic Sea whiting (Divisions VIIIf and g) .....	116
3.7.7 Celtic Sea plaice (Divisions VIIIf and g) .....	117
3.7.8 Celtic Sea sole (Divisions VIIIf and g) .....	118
3.8 Sole and Plaice in the North Sea, English Channel and Bay of Biscay ....	119
3.8.1 North Sea sole .....	119
3.8.1.1 Advice from the May 1990 ACFM meeting .....	119
3.8.1.2 Advice from the October/November 1990 ACFM meeting .....	120
3.8.2 North Sea plaice .....	122
3.8.3 Sole in Division VIIId .....	124
3.8.4 Sole in Division VIIe .....	125
3.8.5 Plaice in Divisions VIIId,e .....	126
3.8.6 Sole in Divisions VIIIf,a,b (Bay of Biscay) .....	127
4. STOCKS IN NEAFC REGIONS 2 AND 3 .....	128
4.1 Hake in Sub-areas IV and VI-IX .....	128
4.1.1 Hake - Northern stock (Divisions IVa, Sub-areas VI and VII, and Divisions VIIIf,a,b) .....	128
4.1.2 Hake - Southern stock (Divisions VIIIf,c and IXa) .....	129
4.1.2.1 Advice from the May 1990 ACFM meeting .....	129
4.1.2.2 Advice from the October/November 1990 ACFM meeting .....	130
4.2 Megrin in Sub-areas VI-IX .....	131
4.2.1 Overview .....	131
4.2.2 Megrin - Sub-area VI .....	132
4.2.3 Megrin - Divisions VIIIf-k and VIIIf,a,b .....	133
4.2.4 Megrin - Divisions VIIIf,c and IXa .....	134

4.3	Anglerfish in Sub-areas VI-IX .....	135
4.3.1	Overview .....	135
4.3.2	Anglerfish - Sub-area VI .....	136
4.3.3	Anglerfish - Divisions VIIb-k and VIIId,b .....	137
4.3.4	Anglerfish - Divisions VIIId and Sub-area IX .....	138
4.4	Fisheries Units in Sub-areas VII and VIII .....	139
4.4.1	Introduction .....	139
4.4.2	Overview .....	139
4.4.3	Current state of the stocks and fisheries .....	140
4.4.4	Assessment of the effects of management measures .....	140
4.4.5	Recommendations and future activities .....	142
4.5	Horse Mackerel in Sub-areas II-IV and VI-IX .....	144
4.5.1	General comments .....	144
4.5.2	North Sea horse mackerel (Divisions IIIa, IVb-c, VIIId) .....	145
4.5.3	Western horse mackerel (Divisions IIa, IVa, VIa, VIIa-c, e-k, VIIId,b,d,e) .....	146
4.5.4	Southern horse mackerel (Divisions VIIId and IXa) .....	148
Tables 2.1.1 - 4.5.6	.....	149
Figures 2.1.2 - 4.5.3.2	.....	288



## PREFACE

This Cooperative Research Report (Parts 1 and 2) contains the reports of the Advisory Committee on Fishery Management in 1990.

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, March 1991  
Richard Grainger  
Secretary to ACFM

## MEMBERS OF THE ADVISORY COMMITTEE ON FISHERY MANAGEMENT

1989/1990

Mr. B. Vaske

Chairman

Mr J. Pope<sup>3</sup>  
 Prof. N. Daan  
 Mr E. Bakken  
 Dr W. Weber

Chairman, Consultative Committee  
 Chairman, Demersal Fish Committee  
 Chairman, Pelagic Fish Committee  
 Chairman, Baltic Fish Committee

Dr R. De Clerck, (Alternate: Dr F. Redant<sup>1</sup>)  
 Mr J.J. Maguire<sup>1</sup>, (Alternate: Mr J.S. Beckett<sup>1</sup>)  
 Mr N.A. Nielsen<sup>3</sup>, (Alternate: Mr E. Kirkegaard<sup>3</sup>)  
 Mr M. Hildén<sup>1</sup>, (Alternate: Mr R. Parmanne<sup>1</sup>)  
 Mr B. Mesnil<sup>1</sup>, (Alternate: Mr A. Forest<sup>2</sup>)  
 Dr O. Rechlin  
 Mr H.P. Cornus, (Alternate: Dr G. Rauck<sup>1</sup>)  
 Dr S.A. Schopka<sup>1</sup>, (Alternate: Mr O.K. Pálsson<sup>2</sup>)  
 Mr J. Browne, (Alternate: Mr J. Molloy<sup>1</sup>)  
 Dr R. Boddeke<sup>1</sup>, (Alternate: Mr A. Corten<sup>2</sup>)  
 Mr T. Jakobsen, (Alternate: Mr I. Røttingen<sup>1</sup>)  
 Dr J. Netzel, (Alternate: Dr J. Kleniewski<sup>1</sup>)  
 Prof. L. Saldanha<sup>1</sup>, (Alternate: Dr C. Sousa Reis<sup>2</sup>)  
 Mr J.A. Pereiro, (Alternate: Mr A. Astudillo<sup>1</sup>)  
 Mr B. Sjöstrand, (Alternate: Mr J. Modin<sup>1</sup>)  
 Dr R.S. Bailey, (Alternate: Dr J.G. Shepherd<sup>1</sup>)  
 Dr F.M. Serchuk, (Alternate: Mr R. Mayo<sup>1</sup>)  
 Dr Y. Efimov, (Alternate: Dr V.N. Shleinik<sup>1</sup>)

Belgium  
 Canada  
 Denmark  
 Finland  
 France  
 German Democratic Republic  
 Federal Republic of Germany  
 Iceland  
 Ireland  
 Netherlands  
 Norway  
 Poland  
 Portugal  
 Spain  
 Sweden  
 UK  
 USA  
 USSR

Mr M.J. Holden<sup>1</sup>, Mr W. Brugge<sup>2</sup>, Observer, Commission of the EC  
 Mr H. í Jakupsstovu<sup>3</sup>, Mr F. Riget<sup>3</sup>, Observer, Faroe Islands and Greenland.

Dr R. Grainger, ICES Statistician, Secretary to ACFM

<sup>1</sup> Did not attend May 1990 meeting.

<sup>2</sup> Attended May 1990 meeting in place of regular member.

<sup>3</sup> Attended only part of May 1990 meeting.

## MEMBERS OF THE ADVISORY COMMITTEE ON FISHERY MANAGEMENT

1990/1991

Dr. F. Serchuk		Chairman
Prof. N. Daan		Chairman, Demersal Fish Committee
Mr E. Bakken		Chairman, Pelagic Fish Committee
Dr W. Weber		Chairman, Baltic Fish Committee
Dr R. De Clerck	(Alternate: Dr F. Redant <sup>1</sup> )	Belgium
Mr J.J. Maguire	(Alternate: Mr J.S. Beckett <sup>1</sup> )	Canada
Mr E. Kirkegaard	(Alternate: Mr P. Degnbol <sup>1</sup> )	Denmark
Mr M. Hildén	(Alternate: Mr R. Parmanne <sup>1</sup> )	Finland
Mr B. Mesnil <sup>1</sup>	(Alternate: Mr A. Forest <sup>2</sup> )	France
Mr H.P. Cornus	(Alternate: Mr B. Vaske <sup>1</sup> )	Federal Republic of Germany
Dr S.A. Schopka	(Alternate: Mr O.K. Pálsson <sup>1</sup> )	Iceland
Mr J. Browne	(Alternate: Mr J. Molloy <sup>2</sup> )	Ireland
Dr R. Boddeke	(Alternate: Mr A. Corten <sup>1</sup> )	Netherlands
Mr T. Jakobsen	(Alternate: Mr I. Røttingen <sup>1</sup> )	Norway
Dr J. Netzel	(Alternate: Dr J. Kleniewski <sup>1</sup> )	Poland
Dr C. Sousa Reis	(Alternate: Dr M.J. Figueiredo <sup>1</sup> )	Portugal
Mr J.A. Pereiro	(Alternate: Mr F.J. Perçiro <sup>1</sup> )	Spain
Mr B. Sjöstrand <sup>1</sup>	(Alternate: Mr J. Modin <sup>2</sup> )	Sweden
Dr R.S. Bailey	(Alternate: Dr J.G. Shepherd <sup>1</sup> )	UK
Mr R. Mayo	(Alternate: Mr R. Conser <sup>1</sup> )	USA
Dr Y. Efimov <sup>3</sup>	(Alternate: Dr V.N. Shleinik <sup>3</sup> )	USSR

Mr A. Laurec<sup>3</sup>, Mr W. Brugge<sup>3</sup>, Observer, Commission of the EC  
 Mr H. i Jakupsstovu<sup>3</sup>, Mr F. Riget<sup>3</sup>, Observer, Faroe Islands and Greenland.

Dr R. Grainger, ICES Statistician, Secretary to ACFM

<sup>1</sup> Did not attend November 1990 meeting.

<sup>2</sup> Attended November 1990 meeting in place of regular member.

<sup>3</sup> Attended only part of November 1990 meeting.

## REPORTS OF THE ADVISORY COMMITTEE ON FISHERY MANAGEMENT

### MAY AND NOVEMBER 1990

#### Introduction

ACFM meets twice in the year, in mid-May and in late October/early November. The time table of the assessment working groups is arranged so that the advice on different stocks has been distributed between the two ACFM 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

For the last nine years, ACFM has generally used the same basic criteria on which to base 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 precautionary 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 at 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 as quickly as possible, or (in some cases) towards these points.

At the November 1990 meeting, however, ACFM did not make TAC recommendations or state TAC preferences for some Category 2 and 3 stocks. The reason for this is explained in Sections 3.5.1.2 and 3.6.1.



### Biological Reference Points

$F_{max}$  is the level of fishing mortality at which the maximum long-term average annual catch can be taken under the present exploitation pattern. It is based on the relationship between the yield per recruit and fishing mortality.

$F_{0.1}$  is the level of fishing mortality at which the slope of the yield-per-recruit curve is one tenth of its slope at the origin.  $F_{0.1}$  is always less than  $F_{max}$ ; the catch is only slightly less than at  $F_{max}$ , but the implied reduction in fishing mortality is much greater and so the catch per unit effort is higher with consequent economic benefits.  $F_{0.1}$  is, therefore, essentially an economic concept.

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, not 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 no 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.

$F_{low}$  corresponds to a level for which there is plenty of evidence that the stock is sustainable, subject to the same qualifications as for  $F_{med}$ .

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 guidance 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. INTRODUCTORY ITEMS

#### 1.1 Review of Nominal Catches in NEAFC Area

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.

In the assessments, the working groups try to estimate the total catch taken, including slipped catches, 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, slipped fish, 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 cases where there might be doubt, it has been indicated if discards, by-catches, and estimates of unreported landings are included in the assessments. 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, in general, 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.

ACFM in the past has noted the problems associated with discrepancies between the official landing figures reported to ICES by member countries and corresponding catch data used by assessment working groups. ACFM recognizes the need for a clear identification of the categories of the catch data used for assessments. It was decided to incorporate in the instructions to working groups a request for specification of the catch data used to estimate fishing mortalities. It is necessary that the working groups clearly identify factors contributing to the total fishing mortality in the various stocks, e.g.:

- recorded landings,
- discards at sea,
- slipping of unwanted catches,
- losses due to burst nets etc.,
- unreported landings,
- catch reported as other species,
- catch reported as taken in other areas,
- catch taken as by-catch in other fisheries.

It is recognized by ACFM that working groups should not be required to reveal the sources of the data. The groups, should, however, indicate whether the data originate from sampling programmes, field observations, interviews, etc., in order to allow ACFM and other interested parties to evaluate the quality of the data, and hence the basis for the assessment.

The overall responsibility of obtaining reliable and adequate fisheries statistics for publication in Bulletin Statistique does not rest with ACFM. It is the opinion of ACFM that national offices for fisheries statistics are responsible for providing the catch data needed for assessments and that catch statistics should be collected on a gear basis. Such offices should undertake to determine the species composition of landings in the case where landings are made unsorted by species.

#### 1.2 Review of ACFM Advice for 1990

ACFM wishes to stress that its definitive advice on each stock is based on all the data available to ICES, and that the timing of the advice on each stock is determined by the need for that advice to be as accurate as possible.

While new information can be used to redefine the advice, ACFM considers that mid-year revisions are in general unnecessary. The precision of stock size estimates is such that there would need to be quite major changes before any revision in advice was justified. Minor changes would simply serve to create instability in advice.

ACFM nevertheless recognizes that it has a responsibility to draw the attention of managers, as early as possible, to any necessary alteration in scientific advice and to the need for a change in management action.

## 2. STOCKS IN NEAFC REGION 1

### 2.1 North-East Arctic Cod

#### 2.1.1 Advice from the May 1990 ACFM meeting.

Source of information: Working paper.

At the request of Norway, ACFM reviewed the state of the stock of North-East Arctic cod.

The new information available was from the USSR survey in October-December 1989, and the Norwegian survey in January-March 1990.

The new survey indices were presented. ACFM decided that a revision of the assessment on the basis of the new survey indices should not be made for the following reasons:

- the new survey indices do not indicate large changes compared to the current assessment;
- to use the new survey indices to revise the assessment without taking into account revisions in the catch-at-age data would be inconsistent, and final figures for the latter are not yet available for 1989;
- it is the intention to revise the Norwegian time series of bottom trawl indices, based on new information about length selectivity of the sampling trawl. This series has the highest weighting in the VPA tuning, and it is not clear how this revision will affect the assessment.

The results of the Norwegian survey indicated that the growth in 1989 had been better than predicted. In the assessment, the mean of Norwegian and USSR weights at age in the surveys have been used as stock weights. The new stock weights estimated are from 6% to 23% higher than the predicted weights (Table 2.1.1). However, there are large differences between the Norwegian and the USSR weights. Although the weights for the Norwegian survey have normally been higher than those from the USSR survey, the difference between the last surveys is much higher than usual. A satisfactory explanation of this phenomenon was not given, which left some doubt about the reliability of the data. The stock weights used in the prediction are all in the range between the Norwegian and the USSR weights, and ACFM found that the evidence of increased growth was not strong enough to give a basis for a revision of the assessment.

ACFM stresses the need to clarify why Norwegian and USSR weights at age in the surveys are so different in general and, particularly, in 1989/1990.

Having considered all the new information, ACFM concludes that there is not sufficient basis for a revision of the advice for 1990.

### 2.1.2 North-East Arctic cod: Advice from the October/November 1990 ACFM meeting

Source of information: Report of the Arctic Fisheries Working Group, September 1990 (C.M. 1991/Assess:3).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC <sup>3</sup>	<380	150	170	<446	<645	530 <sup>4</sup>	300-370	172	-	-	-
Agreed TAC <sup>3</sup>	300	220	220	400	560	590 <sup>4</sup>	300	160	-	-	-
Nominal landings	328	315	336	454	552	449 <sup>5</sup>	343 <sup>5</sup>	-	-	-	-
Catch as used by WG <sup>3</sup>	290	278	308	430	523	435	333	-	1,343	278	691
Sp. stock biomass	326	281	287	241	261	153	151	259 <sup>1</sup>	1,526	151	521
Recruitment (age 3)	169	384	492	790	235	176	175	146 <sup>1</sup>	1,819	112	609
Mean F(5-10,u)	0.74	0.89	0.79	0.91	0.97	0.88	0.67	-	0.97	0.36	0.66

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1950-1989. <sup>3</sup> Norwegian coastal cod not included. <sup>4</sup> New advice May 1988: 325,000 - 363,000 t, agreed TAC reduced to 451,000 t. <sup>5</sup> Preliminary. Weights in '000 t, recruitment in millions.

Catches: After reaching the lowest level in 39 years in 1984, landings increased rapidly in response to improved recruitment (Tables 2.1.2 - 2.1.4). From 1988, more restrictive TACs have been introduced in response to a rapid decline in the stock. Landings in 1990 are expected to be 189,000 t, which is the lowest figure since 1945.

Data and assessment: Analytical assessment based on catch-at-age data, including estimates for 1990. VPA tuned using 6 time series of trawl and acoustic surveys and commercial CPUE data. Input Fs at age based on separable VPA. Recruitment estimated by combination of data from 16 index series.

Fishing mortality: Reached the highest level on record (0.97) in 1987, but decreased to 0.88 in 1988 and 0.67 in 1989 (Figure 2.1.2). A further decrease to 0.32 is expected in 1990. This is equal to  $F_{low}$  and the lowest level since 1947.

Recruitment: All year classes recruiting to the fishery after 1986 have been poor. The 0-group survey indicates that the 1990 year class is strong.

State of stock: Stock biomass decreased from about 1.5 million t in 1986 to 750,000 t in 1988, but improved growth and reduced catches have changed the trend, and the stock is estimated to be 960,000 t at the beginning of 1991. The spawning stock biomass estimates are considered to be more uncertain, but an increase from 150,000 t in 1988 to 260,000 t in 1990 is indicated, mostly due to maturation of the 1983 year class.

#### Forecast for 1991:

Assuming  $F(90) = 0.32$ , Basis: TAC/estimate, Catch(90) = Landings (90) = 189

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch (91)	Landgs(91)	SSB(92)	
A	$F_{max}$	0.25	342	173	173	438	SSB increasing.
B	$F_{low} = F(90)$	0.32		215	215	407	SSB increasing.
C	$F_{med}$	0.46		289	289	352	SSB stable.

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a gradual increase in spawning stock biomass and landings.

Recommendation: In 1990 severe restrictions have been imposed on the cod fisheries to achieve the recommended reduction in fishing mortality. Partly as a result of this and partly because of improved growth, the declining trend in stock biomass has been reversed. However, the stock is still at a low level and currently recruiting year classes are poor. A low fishing mortality is therefore needed to ensure continued growth of the stock. ACFM recommends that the fishing mortality in 1991 is kept at  $F_{low}$  corresponding to a TAC of 215,000 t. As in previous years, this TAC includes all cod except Norwegian coastal cod.

Special comments: The assessment confirms that recruitments from the 1984-1988 year classes are poor. There are indications that the 1990 year class is more abundant, but this will not have a significant impact on the catches before 1994. The growth rate of the cod from 1989 to 1990 has been higher than normal and is the main cause for the increase in the estimate of stock biomass at 1 January 1990.

There is some concern that the restrictions on the fishery, which to a large extent is regulated by single boat quotas, might have lead to increased discarding of small cod and to mis-reported or unreported landings. However, there is no evidence available to confirm that this has been the case.

The total stock biomass is still at a low level (about 1 million t). During the 20-year period 1957-1976, the average biomass was 2.5 - 3.0 million t.

## 2.2 North-East Arctic haddock

Source of information: Report of the Arctic Fisheries Working Group, September 1990 (C.M. 1991/Assess:3).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>1</sup>	Min <sup>1</sup>	Mean <sup>1</sup>
Recomm. TAC <sup>2</sup>	77	20	50	100	160	<240	<103	- <sup>3</sup>	-	-	-
Agreed TAC <sup>2</sup>	-	-	50	100	250	240	83	25	-	-	-
Nominal landings	25	21	45	101	155	95	59 <sup>4</sup>	-	-	-	-
Catch as used by WG <sup>2</sup>	22	17	41	97	151	92	55	-	320	18	130

<sup>1</sup>Over period 1950-1989. <sup>2</sup>Norwegian coastal haddock not included. <sup>3</sup>No directed fishery.

<sup>4</sup>Preliminary. Weights in '000 t, recruitment in millions.

Catches: Landings increased from 17,000 t, the lowest level on record, in 1984 to 151,000 t in 1987, but are now rapidly declining (Tables 2.2.1 and 2.2.2). In 1990, landings are expected to decrease to 25,000 t, and are to a large extent taken as by-catch in the cod fisheries.

Data and assessment: Analytical assessment based on catch-at-age data (including estimates for 1990) was not adopted by ACFM.

Fishing mortality: Has probably been decreasing in the most recent years, but a shift towards younger age groups is indicated in 1990.

Recruitment: After a series of poor year classes which recruited to the fishery in 1980-1984, recruitment was good in 1985-1987. The 1985-1989 year classes, recruiting in 1988-1992, are poor, but the 1990 year class may be above average.

State of stock: The stock is at a low level. Because of poor recruitment, no increase is expected in the short-term.

Forecast for 1991: Not available.

Recommendation: The haddock stock is at a low level, mainly due to poor recruitment in the most recent years, and there is no prospect of a recovery in the near future, even if fishing is stopped. ACFM recommends that no directed fishery for haddock be allowed in 1991.

Special comments: An analytical assessment was presented. However, the Working Group pointed out that the assessment was uncertain and inconsistencies were noted. The problems in the assessment were related mainly to the estimates of the two relatively abundant year classes 1982 and 1983 and to an apparent shift in the exploitation pattern towards younger fish in 1990. Because of the uncertainties and because the reasons for the inconsistencies could not be resolved, ACFM decided not to adopt the assessment. There is, however, no doubt that the stock is at a low level and that the year classes 1984-1989 are poor.

Even if no directed fishing is allowed, there will be unavoidable by-catches of haddock in the cod fisheries. In 1990, some directed fishing for haddock has been allowed and by-catches probably account for 15,000-20,000 t of the estimated total landings of 25,000 t. If the fishing mortality for cod in 1991 is kept at the same low level as in 1990, the by-catches of haddock can also be expected to be at the same level as in 1990.



### 2.3 North-East Arctic saithe

Source of information: Report of the Arctic Fisheries Working Group, September 1990 (C.M. 1991/Assess:3).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	130 <sup>3</sup>	103 <sup>3</sup>	85 <sup>3</sup>	74 <sup>3</sup>	<90	<83	120	93	-	-	-
Agreed TAC <sup>4</sup>	-	-	-	-	-	-	120	103	-	-	-
Nominal landings	157	159	107	70	92	114	122 <sup>5</sup>	-	-	-	-
Unallocated landings	-	-	-	-	-	1	-	-	-	-	-
Catch as used by WG	157	159	107	70	92	115	122	-	262	70	168
Sp. stock biomass	101	158	149	144	195	171	255	324 <sup>1</sup>	574	101	333
Recruitment (age 1)	196	424	327	123	100 <sup>1</sup>	100 <sup>1</sup>	200 <sup>1</sup>	200 <sup>1</sup>	466	123	291
Mean F(3-6,u) <sup>6</sup>	0.43	0.54	0.39	0.25	0.20	0.25	0.32	-	0.61	0.16	0.37

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period, 1960-1989. <sup>3</sup> Catch at  $F_{max}$ ; reduction to this level as quickly as possible was recommended. <sup>4</sup> Target set by Norwegian authorities. <sup>5</sup> Preliminary. <sup>6</sup> Changed from  $F_{(3-8,u)}$  used in last year's assessment. Weights in '000 t, recruitment in millions.

Catches: Landings declined sharply from 1984 to 1986 to the lowest level on record (Table 2.3), increased up to 1989, but will decrease again in 1990.

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: Decreased from 1984 to 1987, increased in 1988 and 1989, but is expected to decrease in 1990 (Figure 2.3). The level in 1989 (0.32) was close to  $F_{med}$  (0.34). The estimated level in 1990 is equal to  $F_{low}$  (0.23). The estimate is, however, uncertain due to poor effort data and little information on abundance of the recruiting year classes.

Recruitment: The 1983 year class is the strongest since 1978 and appears to be above average strength. Also the 1984 year class is relatively abundant, whereas the 1985 year class appears to be poor. Little is known about more recent year classes, but the indications are that the year classes 1986 and 1987 are poor.

State of stock: The stock biomass increased in 1989 and 1990 but is expected to decline in the future.

#### Forecast for 1991:

Assuming  $F(90) = 0.23$ , Basis: Estimate, Catch(90) = Landings (90) = 90

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs (91)	SSB(92)	
A	$F_{low} = F(90)$	0.23	303	90	90	281	SSB declining
B	$F_{max}$	0.28		109	109	265	SSB declining
C	$F_{med}$	0.34		128	128	249	SSB declining

Weights in '000 t.

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

Recommendation: Current (1990) fishing mortality is expected to be close to  $F_{low}$ . The spawning stock biomass will decline in 1992 for all options of fishing mortality in 1991. Observations from the purse seine fishery and results from post-larval surveys indicate that recruitment has been at a very low level since 1985. ACFM recommends that fishing mortality is kept at the  $F_{low}$  (1990) level, corresponding to a TAC of 90,000 t in 1991.

Special comments: Sampling of landings of spawning saithe, especially in the gill-net fishery, has been poor for many years and it has been assumed that older fish have been under-represented in the catch-at-age data. Improved sampling from this fishery in 1990 showed few fish older than 10 years, strongly indicating that these age groups are actually sparse in the population. It was therefore decided to reduce the number of age groups in this year's assessment and this accounts for some of the differences from last year's assessment.

After the Working Group meeting it became clear that the purse seiners would not be able to take much more than half their quota of 41,000 t. Reviewing the available information, the only plausible explanation seems to be low abundance of the age groups 3-5 (year classes 1985-1987). A revised assessment with lower estimates of the year classes 1986 and 1987 (the 1985 year class already being estimated as poor) was presented and was adopted by ACFM.

Estimates of year-class abundance are available from post-larval surveys since 1985. These data, together with the developments in the purse seine fishery, indicate that recent recruitment could be at a very low level.

## 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 35,000 t in 1987, but has increased in the most recent years (Tables 2.4.1-2.4.4). Landings in 1990 are expected to be 64,000 t.

The proportion of *Sebastes mentella* in the landings declined from 85% in 1983 to 30% in 1987, but increased to 38% in 1988 (Table 2.4.5). In 1989 and 1990, the proportion is close to 50%.

### 2.4.1 *Sebastes mentella* in Sub-areas I and II

Source of information: Report of the Arctic Fisheries Working Group, September 1990 (C.M. 1991/Assess:3).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	70	70	85	85	70 <sup>3</sup>	11	12	18	-	-	-
Agreed TAC	100	90	85	85	85	-	-	-	-	-	-
Catch as used by WG	105	73	63	23	11	16	23	32 <sup>4</sup>	269	5	67
Sp. stock biomass	149	95	66	54	47	50	53	52 <sup>1</sup>	323	47	170
Recruitment (age 6)	70	64	85	189 <sup>1</sup>	246 <sup>1</sup>	501 <sup>1</sup>	324 <sup>1</sup>	136 <sup>1</sup>	591	64	310
Mean F(10-15,u)	0.68	0.79	0.66	0.30	0.14	0.22	0.25	-	0.79	0.01	0.28

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1965-1989. <sup>3</sup> Precautionary TAC based on recent catches.

<sup>4</sup> Estimated. Weights in '000 t, recruitment in millions.

Catches: Landings have been declining from 1982 to 1987 (Table 2.4.5), but increased to 15,600 t in 1988 and 22,500 t in 1989. In 1990, a further increase to 32,000 t is expected.

Data and assessment: Analytical assessment based on catch-at-age data. VPA tuned with two series of CPUE data. Recruitment estimated from analysis of USSR survey indices.

Fishing mortality: Peaked in 1983-1985, decreased rapidly to 1987, but has increased in more recent years (Figure 2.4.1). The expected level in 1990 (0.58) is nearly twice the 1989 level and 30% above  $F_{high}$ .

Recruitment: The year classes recruiting to the fishery (at age 6) were about 500 million individuals in 1970-1977. In 1982-1985, the level was reduced to less than 100 million. Since then there appears to have been a gradual improvement with the 1982 year class, which is at the 1970-1977 level, as the most abundant.

State of stock: Total biomass and spawning stock biomass have been declining up to 1986 and 1987, respectively, and have remained at a low level compared to the 1970s.

Forecast for 1991: Precise figures are not available due to uncertainties related to the exploitation pattern. However, the 1991 catch level associated with a fishing mortality at the  $F_{med}$  (0.20) level is around 12,000 t.

Recommendation: The sudden increase in landings from 1989 to 1990 will increase fishing mortality to a very high level which may lead to stock collapse in the future. Although recruitment to the fishery improved in the latter half of the 1980s, a reduction in fishing mortality is still needed to ensure that these year classes will contribute to the spawning stock over a longer period. ACFM, therefore, recommends a reduction in fishing mortality to the  $F_{med}$  level corresponding to a TAC of 12,000 t in 1991.

Special comments: The increase in landings from 1989 to 1990 probably reflects a considerable increase in fishing mortality, suggesting that fishing mortality in 1990 will be at a very high level. The increase is probably caused by effort being diverted from cod to redfish because of the restrictions imposed on the cod fisheries. The trend may continue if the fishery for redfish is not more strictly controlled.

#### 2.4.2 *Sebastes marinus* in Sub-areas I and II

Source of information: Report of the Arctic Fisheries Working Group, September 1990 (C.M. 1991/Assess:3).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	15 <sup>3</sup>	15 <sup>3</sup>	15 <sup>3</sup>	15 <sup>3</sup>	- <sup>4</sup>	15	24	23	-	-	-
Agreed TAC	17	17	15	15	-	-	-	-	-	-	-
Unallocated landings	-	-	-	-	-	-	-	-	-	-	-
Catch as used by WG	19	28	29	30	24	26	22	-	49	13	26

<sup>1</sup>Predicted or assumed. <sup>2</sup>Over period 1969-1988. <sup>3</sup>Precautionary TAC. <sup>4</sup>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. In more recent years, landings have fluctuated between 19,300 t and 30,200 t (Table 2.4.5). Expected landings in 1990 are 32,000 t.

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

Fishing mortality: Unknown.

Recruitment: Unknown.

State of stock: Surveys indicate a stable situation, but Norwegian CPUE has been declining.

Forecast for 1991: Assuming Catch(90): 32,000 t. For continued fishing at the 1988/1989 level of exploitation, a catch of 24,000 t for 1991 is predicted.

Recommendation: The landings estimate for 1990 probably represents a substantial increase in fishing mortality which may lead to a decline in the stock. ACFM, therefore, recommends a precautionary TAC of 24,000 t in 1991.

Special comments: There are no indications of an increase in the stock and the increase in landings from 1989 to 1990, therefore, probably represents a substantial increase in the fishing mortality. The increase is probably caused by effort being diverted from cod to redfish because of the restrictions imposed on the cod fisheries. This trend may continue if the fishery for redfish is not more strictly controlled.

## 2.5 Greenland halibut in Sub-areas I and II

Source of information: Report of the Arctic Fisheries Working Group, September 1990 (C.M. 1991/Assess:3).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	17	17	20	20	- <sup>3</sup>	19	21	15	-	-	-
Agreed TAC	17	17	20	20	-	-	-	-	-	-	-
Nominal landings	22	22	20	23	19	20	20	-	-	-	-
Catch as used by WG	22	22	20	23	19	20	20	-	89	13	31
Sp. stock biomass	66	59	57	52	46	44	45	43	239	44	89
Recruitment (age 3)	26	25	29	38	15	25 <sup>1</sup>	25 <sup>1</sup>	25 <sup>1</sup>	43	15	28
Mean F(7-11,u)	0.33	0.40	0.40	0.47	0.49	0.74	0.49	-	0.74	0.18	0.41

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1970-1989. <sup>3</sup> Recommended that a precautionary TAC is set based on recent catches. Weights in '000 t, recruitment in millions.

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

Data and assessment: Analytical assessment based on catch-at-age data. VPA tuned using 2 time series of commercial CPUE data. Reliable recruitment indices are not available.

Fishing mortality: Increasing from 1981 to 1988, declining in 1989, but expected to increase in 1990 (Figure 2.5). The current level is above  $F_{high}$ .

Recruitment: Has generally varied little between years, but from 1986 (1983 year class) onwards, more variation is indicated. The 0-group survey has given very low indices of year-class abundance 1988-1990.

State of stock: Spawning stock biomass is at a low historical level (one sixth of the maximum value of 240,000 t). The continued stabilisation of SSB since 1989 is due primarily to a single year class (1983) in the spawning stock.

### Forecast for 1991:

Assuming  $F(90) = 0.54$ , Basis: Estimate,  $Catch(90) = Landings(90) = 22$

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	$F_{med}$	0.21	40	9	9	49	SSB increasing
B	$F_{high}$	0.40		16	16	43	SSB stable
C	$F(90)$	0.54		20	20	40	SSB stable

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a stable spawning stock biomass in the short term, but the stock cannot sustain fishing mortality at the estimated 1990 level.

Recommendation: Effort has increased in the most recent years and there are indications of a shift in the effort towards younger fish. Technical measures to improve the exploitation pattern should be considered. Recent landings are in excess of the level that can be sustained at the recent level of recruitment, and there are indications from 0-group surveys in the most recent years that recruitment could be failing. most recent years that recruitment could be failing. ACFM recommends as a first step that fishing mortality in 1991 be reduced to  $F_{med}$  corresponding to a TAC of 9,000 t, and further recommends that technical measures to improve the exploitation pattern be considered.

## 2.6 Stocks off East Greenland

### 2.6.1 East Greenland cod (Sub-area XIV)

#### 2.6.1.1 Advice from the May 1990 ACFM meeting

Source of information: Report of the Working Group on Cod Stocks off East Greenland, February 1990 (C.M.1990/Assess:12).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	6	6	4	4	5	5	5	-	6	4	5
Agreed TAC	11.5	11.5	11.5	11.5	11.5	11.5	11.5	15	11.5	11.5	11.5
Nominal landings	9	9	2	5	7	12	16	-	16	2	8
Unallocated landings	4	-1	-	-	-	-3	-1	-	-	-	-
Catch as used by WG	13	8	2	5	7	9	15	-	15	2	8
Sp. stock biomass	27	25	16	42	21	20	17	115 <sup>1</sup>	42	17	24
Mean F(5-10,u)	0.53	0.40	0.13	0.14	0.38	0.32	0.11	-	0.53	0.11	0.29

<sup>1</sup>Predicted or assumed. <sup>2</sup>Over period 1983-1989. Weights in '000 t.

Catches: More than 90% taken by trawlers in first and second quarters, 12,500 t by EC in accordance with Greenland-EC agreement (Table 2.6.1.1).

Data and assessment: Stock size determined by swept area abundance from Federal Republic of Germany survey in October 1989. Stock size is compared to similar estimate from 1988 survey and differences are explained by fishery and migration.

Fishing mortality: Low due to fixed quotas while stock increased by migration from West Greenland.

Recruitment: A large migration of cod from West Greenland to East Greenland, notably of the 1984 year class.

State of stock: SSB highest on record since start of groundfish survey (1980). Previous maximum 55,000 t (1981).

Forecast for 1990: (Figure 2.6.1.1).

Option	Basis	F(90)	Predicted			Consequences/implications
			SSB(90)	Catch(90)	SSB(91) <sup>2</sup>	
A	TAC = 15	0.09	158 <sup>1</sup>	15	171	] See Special Comment 1.
B	TAC = 30	0.20		30	154	
C	TAC = 45	0.31		45	137	

<sup>1</sup>21.2 million expected immigrants from West Greenland included. <sup>2</sup>Does not include immigrants from West Greenland in 1991. Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a further increase in SSB.

Special Comments:

1. Catch projections indicate that even a catch of 45,000 t, a figure which is three times the agreed TAC, will not reduce the spawning stock biomass below the level seen in recent years. However, ACFM is concerned about the long-term development. While both total and spawning stock biomasses will, due to the strong 1984 and 1985 year classes, be at the highest level on record in the next two to three years, the year classes of 1986-1989 are very poor in both East and West Greenland waters and the stock levels will decrease after 1993. Further, some proportions of these two year classes are expected to migrate to Icelandic waters at an increasing rate in the next few years. This will obviously adversely affect the fishery around Greenland.

2. The present distribution of cod in West Greenlandic waters is much more southerly than seen in previous decades to the point where this stock component meets the East Greenland cod and the distinction between cod stocks at East and West Greenland is rather arbitrary.

Assessment of East and West Greenland cod separately suffers from the high and probably variable migration between East and West Greenland. Therefore, ACFM recommends that in future the two stock components be assessed as one unit stock in order to improve advice.

The West Greenland cod stock is at present assessed by the NAFO Scientific Council, while ACFM processes the information for East Greenland cod. A combined East and West Greenland cod assessment processed through only one of these channels should be considered.

### 2.6.1.2 East Greenland cod (Sub-area XIV): Advice from October/November 1990 ACFM meeting

Source of information: Result of Federal Republic of Germany groundfish autumn surveys.

	1982	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>1</sup>	Min <sup>1</sup>	Mean <sup>1</sup>
Recomm. TAC	12	6	6	4	4	5	5	5	-	12	4	6
Agreed TAC	11.5	11.5	11.5	11.5	11.5	11.5	11.5	15	15	15	11.5	12
Actual landings	27	13	8	2	5	7	9	15	-	27	2	10.8

<sup>1</sup>Period 1982-1990. Weights in '000 t.

Results of Groundfish Survey: From the Federal Republic of Germany bottom trawl survey off East Greenland in the autumn of 1990 which ended in mid-October, provisional estimates of stock abundance and trawlable biomass are available. These are given in the text table below together with the corresponding figures from the 1980-1990 surveys:

Year	Season	Ship	Biomass		Abundance		Remarks
			Tonnes	% <sup>3</sup>	('000)	% <sup>3</sup>	
1980	Oct/Nov	FMS "Karlsburg"	62,944	33	15,425	34	
1981	Nov/Dec	FFS "Walther Herwig"	88,336	43	19,448	35	
1982	Sep/Oct	"	19,782	35	6,106	52	
1983	Sep/Oct	"	26,980	38	6,730	33	
1984	Oct	FFS "Anton Dohrn"	21,151	42	6,488	51	1
1985	Oct	FFS "Walther Herwig"	21,842	26	7,815	27	
1986	Oct	"	44,288	34	17,554	32	
1987	Sep/Oct	"	33,929	36	25,296	37	
1988	Sep/Oct	"	41,816	47	18,859	40	
1989	Sep/Oct	"	139,967	61	53,857	45	
1990	Sep/Oct	"	45,302	33	17,343	29	2

<sup>1</sup>Only 36 valid hauls.

<sup>2</sup>Preliminary.

<sup>3</sup>Confidence intervals are given at  $\pm$  95% significance level.

Survey results are evaluated using stratification by geographical areas and depth zones (Figure 2.6.1.2).

Fisheries: In Sub-area XIV, the agreed TAC for 1990 is 15,000 t. From June onwards, TACs for East and West Greenland were combined resulting in an overall TAC of 141,000 t for total Greenland area. The fishing effort partly shifted from West to East Greenland. During spawning time in spring 1990, ice covered the main spawning grounds altering the traditional fishing pattern. Highest catches in 1990 were taken in June. Catches until October 1990 sum to 25,000 t.

Data and Assessment: Age compositions for the 1990 surveyed stock are not yet available. Only a part of the catch samples have been worked up and, therefore, no age-based or length-based analysis could be carried out at present.

Recruitment: Survey results in 1990 show no indications of a good 1990 year class. Year classes 1986 to 1989 are still estimated to be very weak.



Migration: Survey results indicate a migration of a substantial part of the stock possibly to Iceland. However, it has not yet been possible to estimate the number of Greenlandic immigrants at Iceland as these fish have not yet been detected in the catches. Most migrants are expected to be of the 1984 year class.

State of the stock: The stock decreased substantially by a factor of 3 in terms of biomass and abundance due to fishing and emigration. A significant change of the distribution pattern was observed. The stock has shifted further to the north with the greatest part of the stock now in the middle part of the East Greenland shelf.

Special comments: The final advice for 1991 will be given in May 1991 when the report of the Working Group on Cod Stocks off East Greenland has been evaluated by ACFM.

## 2.6.2 Pandalus in East Greenland waters (Denmark Strait, Divisions XIVb and Va)

Source of information: NAFO Scientific Council, Provisional Report, June 1990 (SCS Doc. 90/23)

Year	1983	1984	1985	1986	1987 <sup>1</sup>	1988 <sup>1</sup>	1989 <sup>1</sup>	1990	Max <sup>5</sup>	Min <sup>5</sup>	Mean <sup>5</sup>
Advised TAC	4.2	4.2	5.0	-	-	-	10.0 <sup>2</sup>	10.0 <sup>2</sup>	-	-	-
Implemented TAC <sup>3</sup>	5.7	5.2	6.1	7.2 <sup>4</sup>	7.2 <sup>4</sup>	8.7 <sup>4</sup>	9.0 <sup>4</sup>	14.1	-	-	-
Actual Landings	4.2	6.7	8.1	11.0 <sup>4</sup>	12.2 <sup>4</sup>	12.5 <sup>4</sup>	10.1 <sup>4</sup>	-	12.5	1.3	7.7
Survey biomass			31.3	44.2	25.2	49.6	35.0	-			

<sup>1</sup>Provisional data. <sup>2</sup>Advised for a few years as a precautionary measure. <sup>3</sup>On western side of the Greenland-Iceland midline only. <sup>4</sup>Implemented TACs do not include Greenland fishery north of 66° 30' N but catches do. For the period 1979-1989. Weights in '000 t.

Catches: The fishery began in 1978 with catches of 400 t. Catches increased rapidly to 8,400 t in 1980, decreased to below 5,000 t in 1981-1983, increased towards 12,500 t in 1988. Catches decreased to 10,000 t in 1989.

Data and assessment: From 1986 to 1989, the total fishing effort doubled, while nominal catches remained at the same level. Evaluation of CPUE data is complicated by changes in gear, ice cover, and discards but in spite of these complications, the continued decrease in CPUE from 1986-1987 to 1989 may be cause for concern. Although there is no information to reliably estimate discards, it appears that they may have increased in recent years because of market demand for larger shrimp, the introduction of an effective grading machine and vessel quota limitations. Norwegian observer data from 1982 to 1989 indicate that fish by-catch was mostly small juvenile redfish and that the by-catches were substantially higher during 1987-1989. Research surveys have been conducted in the autumn by Norway but their usefulness as indicators of short-term changes in stock size was considered limited because of inconsistent coverage of the shrimp distribution. However, taken as a series the biomass has been relatively stable. A general production model was attempted but the results were not considered reliable.

Fishing mortality: No estimates available.

Recruitment: No estimates available.

State of stock: The surveys suggest that stock size has been relatively stable while commercial CPUE are steadily decreasing since 1986-1987.

Forecast for 1991: No basis to forecast catches for 1991.

Recommendation: Since 1986, the fishing effort exerted in the shrimp fishery has doubled, while catches have remained at the same level. There are indications that unreported discards may have increased in recent years and that catches and CPUE may be higher than recorded. There is, however, no basis to change the advice for a 10,000 t TAC in 1991.

Special comments: Discards should be estimated from direct observations in the shrimp fishery or from length frequencies of landings. Information on redfish by-catch should be made available to the ICES North-Western Working Group to assess the impact of these discards on redfish in Sub-areas XIV and V.

## 2.7 Redfish in Sub-areas V, XIV, and XII

The total landings from the Irminger Sea redfish stock complex reached its highest level on record in 1986 with some 228,000 t (Tables 2.7.1-2.7.8). Since then, landings have declined and in 1989 to the level of 144,000 t. The catches based on the oceanic type S. mentella reached their maximum in 1986 of 105,000 t (Table 2.7.8). Since then, the catches have declined to approximately 91,000 t in 1987 and 1988 and to the very low level of 37,000 t in 1989.

The North-Western Working Group was not able to assess either of the two traditional redfish stocks analytically, and ACFM accordingly can only recommend precautionary TACs for these. With regard to the oceanic type S. mentella stock, an analytical assessment was made and accepted by ACFM and advice based on this is given in Section 2.7.3.

ACFM, however, would like to point out some inherent problems in assessing redfish stocks and in advising TACs for these.

The catch is landed as redfish with no specification as to species. The necessary splitting of the landings into catches by species, therefore, has to be done based on sampling.

Age determination of redfish is a very difficult task for several reasons. The growth is very slow, the growth increments are indistinct both in scales and otoliths, and the fish recruit to the fishery at a late age. Furthermore, a validation of the ageing methods is badly needed.

In the attempt to assess the two traditional redfish complexes, the North-Western Working Group assumes for each species that all the fish from East Greenland, Iceland, and the Faroes belong to a unit stock. These assumptions have never been fully validated and may well be wrong.

If ACFM is to provide any advice other than for precautionary TACs in the future, several of the questions mentioned above have to be resolved.

TAC advice can be given by species, but as the fishery is managed for the two redfish stocks combined, management of the individual species would require continuous and increased sampling of the landings. In the future, ACFM will consider the possibility of giving area-based TAC advice for the species combined.

### 2.7.1 Sebastes marinus in Sub-areas V and XIV

Source of information: Report of the North-Western Working Group, May 1990 (C.M.1990/Assess: 20).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	60	80	104	104	83	84	77	76			
Agreed TAC	-	-	-	-	-	-	-	-			
Actual landings, total	106	96	78	77	76	91	63		112	63	85
Division Va	87	85	67	68	69	82	59		87	59	74
Division Vb	3	6	9	6	6	5	4		9	3	6
Sub-area XIV	16	5	2	3	1	4	-		16	1	5

<sup>1</sup>Predicted or assumed. <sup>2</sup>Over period 1983-1989. Weights in '000 t.

Catches: Total catches decreased continuously from 106,000 t in 1983 to 63,000 t in 1989, except in 1988, when catches reached 91,000 t. This was due to an increase in Division Va, where more than 90% of the catches were taken. Much more drastic is the decrease in Sub-area XIV.

Data and assessment: Survey data were available only for Sub-area XIV. No reliable assessment could be made.

Fishing mortality: The attempted assessment indicates very low fishing mortality.

Recruitment: Icelandic 0-group surveys since 1970 indicate good recruitment during the period 1972-1974. Between 1975 and 1989, the indices were below average. High values were found in 1985, 1987, and 1988, whereas in 1986 and 1989 the indices were slightly below average.

State of stock: Uncertain, but decreasing catches indicate a possible reduction in stock size.

Recommendation: ACFM recommends a precautionary TAC of 77,000 t corresponding to average catch for the period 1985-1989.

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

Source of information: Report of the North-Western Working Group, May 1990 (C.M.1990/Assess:20).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	12	25	25	25	-	-	40	40			
Agreed TAC	-	-	-	-	-	-	-	-			
Actual landings, total	58	42	45	46	38	32	44	-	67	27	44
Division Va	37	25	25	19	19	14	31		37	19	24
Division Vb	6	8	11	15	12	11	11		15	6	11
Sub-division XIV	15	9	9	12	7	7	2		15	2	9

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1983-1989. Weights in '000 t.

Catches: Catches increased in 1989 to 44,000 t, which is mainly due to increased catches in Division Va. A stable situation is seen for Division Vb, whereas a decline showed up in Sub-area XIV where catches were about 2,000 t in 1989.

Data and assessment: Survey data are available only for Sub-area XIV. No reliable assessment could be made.

Fishing mortality: No information, but seems to be very low as indicated by the attempted assessment.

Recruitment: See Section 2.7.1.

State of stock: Uncertain, seems to be stable in Divisions Va and Vb, but drastic decreased catch in Sub-area XIV indicates a possible reduction of stock size in that region.

Recommendation: ACFM recommends a precautionary TAC of 40,000 t corresponding to the average catch for the period 1985-1989.

Special comments: 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 were 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. ACFM reiterates its earlier advice and recommends that all fishing with bottom trawl should be prohibited in the area defined above.

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

Source of information: Report of the North-Western Working Group, May 1990 (C.M.1990/Assess: 20).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Catch as used by WG	60	65	72	105	91	91	37	-	105	37	74
Sp. stock biomass	284	342	317	334	314	327	336	364 <sup>1</sup>	336	284	322
Recruitment (age 9)	220	224	244	247	349	116	213	213 <sup>1</sup>	349 <sup>3</sup>	116 <sup>3</sup>	233 <sup>3</sup>
Mean F(13-17)u	.572	.618	.517	.809	.891	.846	.368	-	.891	.368	.660

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1983-1989. <sup>3</sup> Over period 1983-1988. Weights in '000 t.

Catches: The fishery started in 1982 and the catches increased from 60,495 t to 105,102 t in 1986. In 1987 and 1988 they stayed on a high level of about 91,000 t. But in 1989 there was a sharp decrease to 37,183 t. This was mainly caused by unfavourable hydrographic conditions so the refish did not concentrate in the Irminger Sea.

Data and assessment: Total catch in number at age were based on data from Bulgaria, the German Democratic Republic, and the USSR.

Fishing mortality: The fishing mortalities of the main age groups for the catch varied in accordance with the catch. F(13-17) was on a level of  $F = .8$  for the highest and  $F = .4$  for the lowest catch (Figure 2.7.3).

Recruitment: No indices of recruitment were available. Therefore, for prediction the mean stock size at age 9 for the period 1982 to 1987 of 213,000 was taken.

State of stock: The total stock biomass and the spawning stock biomass have remained at a rather constant level.

#### Forecast for 1991:

Assuming  $F(90) = .368$ . Basis:  $F(90) = F(89)$ . Catch(90) = 54.0.

Option	Basis	F(91)	Predicted			Consequences/implications
			SSB(91)	Catch(91)	SSB(92)	
A	F <sub>(89)</sub>	0.37	392	66	399	

Weights in '000 t.

Recommendation: ACFM recommends no increase in fishing mortality. This corresponds to a TAC of 66,000 t for 1991.

## 2.8 Greenland Halibut in Sub-areas V and XIV

Source of information: Report of the North-Western Working Group, May 1990 (C.M.1990/ Assess: 20).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	24	23	-	-	<28	<28	33	-	-	-	-
Agreed TAC	-	30	30	30	30	30	30	45	45	30	32
Nominal landings	31	34	32	33	47	51	62	-	62	31	43
Catch as used by WG	31	34	32	33	47	51	63	-	63	31	43
Sp. stock biomass	73	81	78	94	102	105	100	86 <sup>1</sup>	105	73	90
Recruitment (age 5)	24	27	44	66	58	32	32	32 <sup>1</sup>	66	24	39
Mean F(8-13,u)	0.39	0.47	0.38	0.36	0.44	0.53	0.79	0.56 <sup>1</sup>	0.79	0.36	0.49

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1983-1989. Weights in '000 t, recruitment in thousands.

Catches: Catches were stable at 30,000 - 34,000 t in 1983-1986 (Tables 2.8.1-2.8.4). They rose sharply to about 47,000 t in 1987, about 51,000 t in 1988 and about 63,000 t in 1989. Assumed to be about 50,000 t in 1990.

Data and assessment: VPA tuned with effort data estimated from the Icelandic trawler fleet. No recruitment indices available.

Fishing mortality: Fishing mortalities stable from 1983-1987 at a level of 0.40, corresponding to  $F_{max}$  (Figure 2.8). Have since increased to about  $2 \times F_{max}$  in 1989.

Recruitment: Shows an increase from about 24 millions in 1983 to about 66 millions in 1986, which is the highest on record. 1987 probably also higher than the average.

State of stock: Spawning stock biomass increased from 1983 to 1988, from 73,000 t to 105,000 t. Has been decreasing since.

Forecast for 1991:

Assuming  $F(90) = 0.56$ , Basis: Catch(90) = 50. Landings(90) = 50.

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	$F_{0.1}$	0.15	89	20	20	113	SSB increasing
B	$F_{max}$	0.40	-	39	39	95	SSB stable
C	$F_{(89)}$	0.79	-	67	67	74	SSB decreasing

Weights in '000 t.

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

Recommendation: ACFM recommends the fishing mortality be reduced to  $F_{max}$  in order to stabilize the SSB, corresponding to a catch of 40,000 t in 1991.

## 2.9 Icelandic Saithe (Division Va)

Source of information: Report of the North-Western Working Group, May 1990 (C.M.1990/Assess:20).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	66	70	60	60	64	64	80	80	80	60	66
Agreed TAC	-	70	70	70	70	80	80	90	90	70	76
Nominal landings	58	63	57	65	81	77	82		82	57	69
Catch as used by WG	58	63	57	66	81	77	82		82	57	69
Sp. stock biomass	214	211	174	190	179	135	132	174 <sup>1</sup>	434 <sup>3</sup>	108 <sup>3</sup>	241 <sup>3</sup>
Recruitment (age 3)	30	40	31	70	68	47 <sup>1</sup>	47 <sup>1</sup>	47 <sup>1</sup>	97 <sup>3</sup>	21 <sup>3</sup>	47 <sup>3</sup>
Mean F(4-9,u)	0.27	0.25	0.28	0.26	0.40	0.39	0.44	-	-	-	-

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1983-1989. Weights in '000 t, recruitment in millions.  
<sup>3</sup> Over period 1961-1985.

Catches: Landings increased from 57,000 t in 1985 to 82,000 t in 1989 (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 exploitation pattern was derived from separable VPA.

Fishing mortality: Due to an increase in effort and catches fishing mortality has increased from the level of 0.25-0.28 in 1983-1986 to a level of 0.39-0.44 in 1987-1989 (Figure 2.9).

Recruitment: The 1983 and 1984 year classes are estimated to be above average. Average recruitment has been assumed for the subsequent year classes.

State of stock: The spawning stock biomass declined in 1988 and 1989 but is expected to increase when the 1983 and 1984 year classes enter the stock.

Forecast for 1991:

Assuming  $F(90) = 0.39$ . Basis: TAC. Catch(90) = 90. Landings (90) = 90.

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	$F_{0.1}$	0.16	180	44	44	217	SSB increasing
B	$0.8 F_{(89)}$	0.35		85	85	181	SSB stable
C	$F_{max}$	0.36		87	87	180	SSB stable
D	$F_{(89)}$	0.44		101	101	166	SSB declining

Weights in '000 t.

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

Recommendation: ACFM recommends that fishing mortality is reduced to  $F_{max}$  corresponding to a catch of 87,000 t in 1991, which will stabilize the SSB.



## 2.10 Demersal Stocks at the Faroe Islands

### 2.10.1 Faroe Saithe (Division Vb)

Source of information: Report of the North-Western Working Group, May 1990 (C.M.1990/Assess:20).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	26	20-25	19	-	<32	<32	40				
Agreed TAC	-	-	-	-	-	-	-				
Nominal landings	39	55	45	42	40	41	43		55	40	25
Catch as used by WG	39	55	45	42	40	45	45		55	40	25
Sp. stock biomass	103	89	111	90	72	93	77	73 <sup>1</sup>	118	72	93
Recruitment (age 3)	40	25	20	50	27	27	22	22 <sup>1</sup>	50	12	27 <sup>3</sup>
Mean F(4-8,u)	0.44	0.46	0.38	0.60	0.51	0.65	0.58	-	0.63	0.22	0.46

<sup>1</sup>Predicted or assumed. <sup>2</sup>Over period 1980-1989. <sup>3</sup>Period 1980-1988. Weights in '000 t, recruitment in 10<sup>6</sup>.

Catches: The catches increased from 25,000 t in 1980 to 55,000 t in 1984 (Tables 2.10.1.1-2.10.1.2). Since 1985 the catches have been at the level of 40,000 - 45,000 t.

Data and assessment: VPA tuned with effort data from a group of pair trawlers >1,000 HP. No recruitment indices available.

Fishing mortality: Fishing mortality stable from 1983-1985 at a level of 0.40 (Figure 2.10.1). Has since increased to the level of 0.60.

Recruitment: The 1981-1985 year classes are at the long-term average level, except the 1983 which is well above the average. The assessment indicates that the 1986 year class is below the average level. However, in the prediction it is assumed to be of average size.

State of stock: The spawning stock biomass has shown a decreasing trend since 1983. The level in 1989 is the lowest on record.

#### Forecast for 1991:

Assuming  $F(90) = 0.58$ . Basis:  $F_{90} = F_{89}$ . Catch(90) = 39. Landings (90) = 39.

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	$F_{0.1}$	0.17	64	12	12	84	SSB increasing
B	$0.8F_{(89)}$	0.46	-	30	30	65	SSB decline halted
C	$F_{(89)}$	0.58	-	35	35	59	SSB decreasing

Weights in '000 t.

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

Recommendation: ACFM recommends that fishing mortality is reduced significantly and by at least 20% to the level of 0.46 corresponding to a catch of 30,000 t in 1991. This would halt the decline in the SSB.

### 2.10.2 Faroe Plateau cod (Sub-division Vb1)

Source of information: Report of the North-Western Working Group, May 1990 (C.M.1990/Assess:20).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	23	25	23	22	<31	<29	<19				
Agreed TAC	-	-	-	-	-	-	-	-			
Nominal landings	38	37	39	35	21	26	23		39	20	28
Catch as used by WG	38	37	39	35	23	25	23		39	20	28
Sp. stock biomass	57	62	60	75	64	48	38	29 <sup>1</sup>	75	38	56
Recruitment (age 2)	26	50	18	10	11	10	26	19 <sup>1</sup>	50	10	20 <sup>3</sup>
Mean F(3-7,u)	0.72	0.51	0.59	0.51	0.40	0.55	0.67	-	0.67	0.40	0.53

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1980-1989. <sup>3</sup> Over period 1980-1988. Weights in '000 t, recruitment in 10<sup>6</sup>.

Catches: Due to good recruitment in 1980-1982 the catches were at a high level in 1983-1986 but then decreased sharply (Table 2.10.2).

Data and assessment: VPA tuned with groundfish survey data. No recruitment indices available.

Fishing mortality: The fishing mortality has increased from a level of 0.43 in 1980 to 0.69 in 1989 (Figure 2.10.2).

Recruitment: The 1982 year class has been confirmed as being very strong. The 1984-1986 year classes are below the long-term average. The 1987 year class is assessed as above average.

State of stock: The spawning stock biomass has been at a low level during the last 10 years, although there was a slight increase between 1980 and 1986 due to the recruitment of the 1982 year class. The estimate of SSB in 1989 is at a very low level.

#### Forecast for 1991:

Assuming  $F(90) = 0.69$ . Basis:  $F_{90} = F_{89}$ . Catch(90) = 25. Landings (90) = 25.

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	F <sub>0.1</sub>	0.17	38	8	8	57	SSB increasing
B	F <sub>0.1</sub>	0.38	-	16	16	48	SSB increasing
C	F <sub>max</sub> 89	0.69	-	26	26	37	SSB decreasing

Weights in '000 t.

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

Recommendation: ACFM recommends that fishing mortality be reduced significantly by 45% to  $F_{max}$ , corresponding to a TAC of 16,000 t in 1991.

Special comments: In the prediction table, the recruitment of the 1987 year class is assumed to be above average. If average recruitment is assumed for the 1987 year class, the yield in 1990 and 1991 will be only 22,000 t and 23,000 t respectively with constant exploitation rates. In both cases the spawning stock biomass in the coming years will be on a very low level and should not be allowed to decrease further.

### 2.10.3 Faroe Bank cod (Sub-division Vb2)

Total landings of cod from the Faroe Bank ranged between 1,900 t and 3,000 t during the 1982-1987 period (Table 2.10.3). In 1988, landings decreased to 1,400 t and in 1989 dramatically declined to only 460 t. Although there are no data on which to base an assessment of the Faroe Bank cod stock, this rapid decline in landings is likely to be due to the increased effort on the Faroe Bank following the opening of the Bank to trawlers at the beginning of the 1980s. The similar decrease in landings of Faroe Bank haddock (from 1,500 t in 1985 to 200 t in 1989) suggests the same cause.

ACFM believes that both the cod and haddock stocks on the Faroe Bank are now in a depressed state. Rebuilding of these stocks may require significant protection of these resources, such as a limitation on access to the Bank for fishing.

#### 2.10.4 Faroe haddock (Division Vb)

Source of information: Report of the North-Western Working Group, May 1990 (C.M.1990/Assess:20).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	10	14	12	14	≤17	≤18	≤11				
Agreed TAC	-	-	-	-	-	-	-	-			
Nominal landings	13	12	15	14	14	12	14		14	10	13
Catch as used by WG	13	12	15	14	14	12	15		14	10	13
Sp. stock biomass	58	63	87	90	94	76	69	58 <sup>1</sup>			
Recruitment (age 1)	60	49	30	8	27	3	-	-	60	3	26 <sup>3</sup>
Mean F(4-8,u)	0.26	0.21	0.23	0.22	0.29	0.20	0.26	-	0.32	0.18	0.23

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1980-1989. <sup>3</sup> Over period 1980-1988. Weights in '000 t, recruitment in 10<sup>6</sup>.

Catches: The catches have been stable at a level of 14,000 t (Tables 2.10.4.1-2.10.4.2).

Data and assessment: VPA tuned with groundfish surveys data. No recruitment indices available.

Fishing mortality: Has been stable at a level of 0.25 (Figure 2.10.4).

Recruitment: Following the recruitment failure in 1977-1979, the 1982-1983, 1984 and 1986 year classes are assumed to be above or at the long-term average. The 1985 and 1987 year classes are assumed to be far below the average. However, the size of the 1987 year class has to be verified.

State of stock: Due to relatively good recruitment in 1982 and 1983 the spawning stock biomass increased in 1985 from a low level in the beginning of the 1980s. However, SSB has decreased in recent years.

Forecast for 1991:

Assuming  $F(90) = 0.26$ , Basis:  $F_{90} = F_{89}$ ,  $Catch(90) = 12$ , Landings (90) = 12.

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	F <sub>0.1</sub>	0.21	56	9	9	57	SSB decline halted.
B	F <sub>89</sub>	0.26	-	11	11	55	SSB decline halted.
C	F <sub>max</sub>	0.58	-	21	21	44	SSB decreasing.

Weights in '000 t.

Recommendation: ACFM recommends a continuation of the present level of fishing mortality corresponding to a catch of 11,000 t in 1991.

Special comments: See under Faroe Bank cod (Section 2.10.3).

## 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 - 2.11.10.

Some new data have been made available from surveys and the longline fisheries.

It is not yet possible to assess the state of these stocks. However, some of the data presented by the Working Group indicate the stocks of blue ling and ling to be heavily exploited at present.

## 2.12 Atlanto-Scandian Herring

### 2.12.1 Iceland summer-spawning herring (Division Va)

Source of information: Report of the Atlanto-Scandian Herring and Capelin Working Group, October 1990 (C.M.1991/Assess:6).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recommended TAC	50	50	50	65	70	100	90	-	-	-	-
Agreed TAC <sup>3</sup>	52.5	50	50	65	72.9	90	90	90	-	-	-
Actual landings	59	50	49	65	75	93	97	-	101	0.3	40
Discards/slipping	-	-	-	-	-	-	3.7	-	-	-	-
Catch as used by WG	59	50	49	65	75	93	101	-	101	0.3	40
Spawning stock biomass	233	249	270	288	426	496	457	510 <sup>1</sup>	496	10	196
Recruitment (age 1) <sup>4</sup>	220	547	1463	670	294	1086	440	600 <sup>1</sup>	1463	34	429
Mean F(4-14,w)	0.20	0.23	0.21	0.32	0.33	0.23	0.25	-	1.7	0.007	0.31

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1970-1989. <sup>3</sup> National quota. Weights in '000 t, recruitment in millions. <sup>4</sup> 1-ringers.

Catches: Stable up to 1985, increasing until 1988. In 1988 and 1989, the catches were higher than in any years since 1970 (Table 2.12.1).

Data and assessment: Analytical, based on catch-in-numbers data and acoustic surveys. The database is satisfactory and the estimates of target levels ( $F_{0.1}$ ) have been reliable.

Fishing mortality: Has fluctuated around  $F_{0.1} = 0.20$ , slightly higher in 1986-1989 (Figure 2.12.1).

Recruitment: Variable with a number of above-average year classes in recent years. The average in 1980-1989 is considerably higher than in the period 1970-1979.

State of stock: A continuing recovery from the low level in the early 1970s; now at the highest levels since 1947. The spawning stock biomass in 1989 is now estimated to be 19% higher than estimated last year.

Forecast for 1991: A more precise forecast will be possible when the results of the 1990 November/December acoustic survey are available. The forecast given below should be treated as provisional and is given only as a guide to expected catch levels.

Assuming  $F(90) = 0.19$ , Basis:  $F_{0.1} = 0.20$ , Catch(90) = 90, Landings (90) = 90.

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	$F_{0.1}$	0.17	510	80	80	510	SSB stable
B		0.19		90	90	505	SSB decreasing slightly
C		0.21		100	100	495	SSB decreasing

Weights in '000 t.

Recommendation: TAC for the 1990 season has been set at 90,000 t. ACFM will give advice on the TAC for the 1991 season at its May 1991 meeting when the results from the 1990 acoustic survey will be available.

### 2.12.2 Norwegian spring-spawning herring

Source of information: Report of the Atlanto-Scandian Herring and Capelin Working Group, October 1990 (C.M.1991/Assess:6).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recommended TAC	0	38	50	150	150	120-150	100	80	-	-	-
Agreed TAC <sup>3</sup>	21	38	60	126	115	120	100 <sup>4</sup>	80 <sup>5</sup>	-	-	-
Actual landings	18	49	71	127	113	125	94	-	127	0.4	36.3
Unallocated landings	-	-	-	-	-	-	-	-	-	-	-
Discards/slipping	5	5	99	98	14	10	10	-	-	-	-
Catch as used by WG	23	54	170	225	127	135	104	-	255	10.4	64.4
Spawning stock biomass	587	617	547	392	507	1368	1496	1554 <sup>1</sup>	1496	146	404
Recruitment (age 3)	106	81	182	9936	446	289	155	187 <sup>1</sup>	9936	48	982
Mean F(4-9,u)	0.03	0.10	0.38	0.55	0.22	0.19	0.05	-	0.55	0.02	0.12

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1975-1989. <sup>3</sup> National quotas. <sup>4</sup> Includes estimated 10,000 t slipping. Weights in '000 t, recruitment in millions. <sup>5</sup> Includes estimated 8,000 t slipping.

Catches: At a low level until 1984, increased in the period 1985-1988, but decreased in 1989 (Tables 2.12.2.1 and 2.12.2.2).

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

Fishing mortality: Kept at a low level except for 1985 and 1986, when unrecorded fishing mortality appears to have formed a considerable part of the total mortality (Figure 2.12.2.2).

Recruitment: Low except for the 1983 year class.

State of stock: Depleted, suffering from recruitment failure. The current spawning stock is about 60% of the lowest level (2.5 million t) known to have given good recruitment in the past.

Forecast for 1991:

Assuming  $F(90) = 0.04$ , Basis: Estimate, Catch(90) = 82, Landings (90) = 72.

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	No fishing	0.00	1411	0	0	1380	SSB decreasing
B	F(90)	0.04		73	63	1310	SSB decreasing
C	F(89)	0.05		91	81	1293	SSB decreasing

Weights in '000 t.

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

**Recommendation:** The current spawning stock is about 60% of the lowest level (2.5 million t) known to have given good recruitment in the past and is still very much below the historic level in the 1950s (about 7-10 million t) (Figure 2.12.2.1). The spawning stock biomass will decrease in the short term whether any fishery takes place or not. Therefore, from a biological point of view, no fishing should take place on this stock until a substantial increase in biomass is evident.

If the fishery is maintained and catches in 1991 are at the level of 90,000 t, which corresponds to fishing mortality in 1989, spawning stock biomass in 1992 will be about 6% lower than that resulting from no fishing in 1991.

#### 2.12.2.1 Distribution in time and space of the Norwegian spring-spawning herring

The account below gives additional information provided by the Atlanto-Scandian Herring and Capelin Working Group in 1990 (Doc. C.M. 1991/Assess:6):

1. The herring presently spawn along the Norwegian coast from Stadt northwards towards the Lofoten area in February to March. In 1990, as in 1989, some herring also spawned at Karmøy (approximately 59°N).
2. No information has been obtained in 1990 on changes in larval distribution.
3. At present, the adult herring have their feeding areas west of the Lofoten-Vesterålen area, mainly within 200 nautical miles off the coast. In June-July 1990, some herring were observed in the Norwegian Sea between 63°-71°N and 5°W - 5°E. A USSR survey in December 1989 and January-February 1990 on the traditional over-wintering areas east of Iceland and north of Faroes recorded no herring.

The distribution pattern for the period 1987-1990 is summarized in Figure 2.12.2.3.



## 2.13 Capelin

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

Source of information: Report of the Atlanto-Scandian Herring and Capelin Working Group, October 1990 (C.M.1991/Assess:6).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recommended TAC	2300	1100	1000	0	0	0	0	0	-	-	-
Agreed TAC	2300	1400	1100	120	0	0	0	0	-	-	-
Actual landings	2375	1481	868	123	0	0	0	0	2940	0	1295
Unallocated landings	-	-	-	-	-	-	-	-	-	-	-
Discards/slipping	-	-	-	-	-	-	-	-	-	-	-
Catch as used by WG	2375	1481	868	123	0	0	0	0	2940	0	1295
Sp.stock biom. (1 Oct) <sup>1</sup>	1328	1142	275	63	17	203	181	2620	3867	17	1508
Recruitm.(age 2, 1 Aug) <sup>1</sup>	257	224	68	3	2	29	19	178	636	2	236

<sup>1</sup>Year before spawning. <sup>2</sup>Over period 1973-1990. 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: Based on annual acoustic surveys.

Fishing mortality: Not estimated.

Recruitment: 1984-1988 year classes very poor. 1989 year class is much stronger, at the level of the mean for the year classes 1972-1983.

State of stock: The spawning stock is rapidly recovering and is dominated by the 1988 and 1989 year classes. An exceptionally high rate of growth was observed during 1990, and, as a consequence, a major part of the 1988 year class and a small part of the 1989 year class will spawn during the spring of 1991. The maturing stock was estimated at 2.6 million t on 1 October 1990.

Recommendation: ACFM recommends that the TAC for the winter and spring fishery in 1991 should not exceed 1,000,000 t.

Special comments: Due to uncertainties in the assessment of the spawning stock, caution must be exercised when setting a TAC for 1991. It is necessary to ensure that a minimum spawning stock of 500,000 t, as previously recommended for this stock, is left to spawn. To achieve this, a margin for the estimated stock of spawners should be allowed to account for uncertainties associated with the assessment of the size of the year classes, the rate of growth, the length at maturity, etc. In addition, a somewhat higher spawning stock may be required due to the indications of interaction between herring and capelin which suggest that survival of capelin larvae might be reduced by the relatively strong (compared with recent years) 1989 year class of herring. Allowance for a high natural mortality caused by predation by cod must also be made. Accounting for this predation, the following relationships between the spawning stock size (SSB) at the time of spawning in 1991 and catches taken during the season January-March 1991 have been estimated ('000 t):

SSB	Catch
500	1,365
600	1,245
700	1,135
800	1,020

For the reasons outlined, ACFM recommends that the lowest of these catch alternatives should be chosen.

An updated assessment of the Barents Sea capelin stock will be made by the Atlanto-Scandian Herring and Capelin Working Group at a scheduled meeting in April 1991, and ACFM will consider the stock situation and a TAC for the 1991 summer and autumn fishery at its meeting in May 1991.

### 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 1990 ACFM Meeting

Source of information: Report of the Atlanto-Scandian Herring and Capeling Working Group, October 1989 (ICES, C.M.1990:Assess 5) and Working Paper.

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC <sup>3</sup>	-	375	300	700	1100	500 <sup>4</sup>	915 <sup>4</sup>	900 <sup>4</sup>			
Agreed TAC <sup>3</sup>	-	640	920	1280	1290	1050	1065	900			
Nominal landings <sup>3</sup>	-	573	897	1307	1332	1112	1023	799	1332	0	816
Sp. stock biomass	260	440	460	450	420	400	446 <sup>1</sup>	115 <sup>5</sup>	460		
Recruitment (age 1)	145	134	220	102	107 <sup>1</sup>				220		

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1981-1988. <sup>3</sup> Refers to a fishing season ending in the year indicated, starting in July, and ending in March. <sup>4</sup> TAC for the period July-November. <sup>5</sup> See Special Comments. Weights in '000 t. Recruitment in billions.

Catches: Catches have varied according to agreed TAC recommendations and state of stock, and have been at a high level in recent years until 1990.

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

Fishing mortality: Not estimated.

State of stock: Generally variable due to the short life span, but stable in recent years until 1989/90 when the stock appears to have declined.

Forecast for December 1990/March 1991 season: Deferred until November 1990.

Recommendation: ACFM recommends that the TAC for the period July-November 1990 should not exceed 500,000 t. TAC recommendations for the period December 1990 - March 1991 are deferred until November 1990, at which time the results from the November 1990 capelin survey will be available.

Special comments: Due to adverse environmental conditions (sea ice, weather conditions) and unusual migratory pattern of the capelin stock, no reliable acoustic survey estimate of the fishable stock could be obtained during the 1989/90 season. Relatively minor catches were taken during the autumn season in 1989 (121,000 t) and the recommended TAC of 900,000 t for July-November was not reached.

The calculations for the 1989/1990 season, indicating a TAC of 1,025,000 t, therefore, overestimated the stock abundance considerably. However, in the two previous seasons the calculations considerably underestimated the stock abundance.

The size of the residual spawning stock, 115,000 t, is considered highly uncertain based on a survey in January 1990 and is probably an underestimate.

In view of the difficulties in predicting stock abundance in the last few years, the recruitment predictions and the calculations, on which the preliminary TAC is based, should be re-evaluated.

The calculations for the 1990/1991 season indicate a TAC of 973,000 t.

2.13.2.2 Capelin in the Iceland-East Greenland-Jan Mayen area (Sub-areas V and XIV and Division IIa west of 5° W): Advice from the October/November 1990 ACFM meeting

Source of information: Report of the Atlanto-Scandian Herring and Capelin Working Group, October 1990 (C.M.1991/Assess:6).

Year <sup>3</sup>	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recommended TAC	375	300	700	1100	500 <sup>4</sup>	900	900 <sup>4</sup>	500 <sup>4</sup>	-	-	-
Agreed TAC	640	920	1280	1290	1115	1065	900	600 <sup>4</sup>	-	-	-
Actual landings	573	897	1311	1333	1112	1022	799	-	1333	0	816
Unallocated landings	-	-	-	-	-	-	-	-	-	-	-
Discards/slipping	-	-	-	-	-	-	-	-	-	-	-
Catch as used by WG	573	897	1311	1333	1112	1022	799	-	1333	0	816
Spawning stock biomass	440	460	450	420	400	446	115 <sup>1</sup>	460	-	-	-
Recruitment (age 1)	147	252	100	142	143	-	- <sup>1</sup>	252	-	-	-

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1981-1989. <sup>3</sup> The figures in the table refer to a fishing season starting in July in the year indicated, and ending in March of the following year.

<sup>4</sup> Preliminary TAC for the period July-November. Weights in '000 t, recruitment in billions.

Catches: Catches have varied according to agreed TAC recommendations and the state of the stock, and have been at a high level in recent years until 1990 (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: Generally variable due to the short life span, but stable in recent years until 1989/1990 when the stock appears to have declined.

Recommendation: 1) ACFM at their May 1990 meeting recommended that the TAC for the period July-November 1990 should not exceed 500,000 t. 2) A TAC recommendation for the 1991 summer/autumn season will be given by ACFM at its May 1991 meeting.

Special comments: The TAC for the 1990 July-November season has been set at 600,000 t. This was based on a 1989 acoustic estimate of 1-group capelin, as no reliable acoustic survey estimate of the fishable stock could be obtained during the 1989/1990 season. The calculations for the whole 1990/1991 season indicate a TAC of 973,000 t.

As these calculations are based on a short-time series and are subject to uncertainties, a recommendation for the period December 1990-March 1991 was deferred until completion of an autumn 1990 survey when additional information was to have become available. As the survey will not take place until November 1990, ACFM is not at this time in a position to give advice for the remainder of the season.

Information about the 1991 summer/autumn season is currently solely based on the August 1990 1-group survey. The acoustic estimate would result in a TAC of 580,000 t. As considerable additional data may become available after the completion of acoustic surveys in November 1990 and January/February 1991, ACFM will give advice on a TAC for the 1991 summer/autumn season at its meeting in May 1991.

### 3. STOCKS IN NEAFC REGION 2

#### 3.1 Herring Stocks South of 62°N

##### 3.1.1 Herring in Divisions IVa,b

Source of information: Report of the Herring Assessment Working Group for the Area South of 62°N, March/April 1990 (C.M.1990/Assess:14).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
<u>Divisions IVa,b</u>											
Recomm. TAC	62	95	166	235	600	500	484	373/332	-	-	-
Agreed TAC	72	-	-	500	560	500	484	385	-	-	-
National landings <sup>3</sup>	80	209	414	494	543	644	638	-	-	-	-
Unallocated landings	164	65	52	2	37	2	-21	-	-	-	-
Discards/slipping	-----Not available-----						3	-	-	-	-
Catch as used by WG	244	274	466	496	580	646	620	-	646	10	295
<u>Total North Sea Sub-area IV and Division VIId</u>											
Total 2+ stock	480	822	902	939	1192	1348	1376	1365	1376	45	492
Sp. stock biomass	434	732	777	847	964	1102	1256	1262 <sup>1</sup>	1256	41	430
Recruitment (age 1-r)	14.8	13.5	13.6	22.7	26.4	15.5	13.7	10.7 <sup>1</sup>	26.4	0.8	9.8
Mean F(2-6,u)	0.32	0.41	0.58	0.49	0.49	0.47	0.47	-	1.52	0.06	0.63

<sup>1</sup> Predicted or assumed, catch not exceeding TAC in 1990. <sup>2</sup> Over period 1972 -1989. <sup>3</sup> Provided by Working Group members. Weights in '000 t, recruitment in billions.

Catches: The total catch (Divisions IVa + IVb) of 620,000 t considerably exceeded the TAC of 484,000 t. 0-ring catches were 33,200 t and 1-ring 82,800 t. Estimated discards amounted to 2,800 t. A considerable amount of Divisions IVc + VIId catches were misreported from Divisions IVa,b, which led to the negative unallocated figure of -21,000 t. Total North Sea catches are given in Table 3.1.1.

Data and assessment: Catch-at-age data considered adequate. Assessment of the total North Sea (Sub-area IV + Division VIId) involved tuning the VPA against a time series of relative SSB estimates based on acoustic, larvae and young fish surveys. Recruitment was estimated from IYFS indices of abundance. 19,870 t of the North Sea catch were identified as Division IIIa/SW Baltic spring spawners and thus transferred to that assessment.

Fishing mortality: High but relatively stable at about 0.48 over the years 1986-1989 (Figure 3.1.1).

Recruitment: Shows a decreasing trend. The 1986 year class recruiting to the adult stock in 1989 was not as strong as originally predicted, but remains a good one. Those of 1987 and 1988 are below the level of recent years. Early indications for that of 1989 are very poor.

State of stock: The SSB is now estimated to be at its highest level since recovery of the stock in the early 1980s. However, due to high fishing mortality since 1984 and the continuing high level of juvenile catches, its rate of increase has been significantly retarded, and it has not yet reached the original target level of 1.5 - 2.0 million t.

Forecast for 1991 for the total North Sea (Sub-area IV and Division VIId)A. Assuming  $F(90) = 0.33$ ,  $Catch(90) = TAC(90) = 415,000.t$ 

Option	Basis	F(91)	Predicted					Consequences/implications
			2+stock		Catch(91)	2+stock		
			SSB(91)	(91)		SSB(92)	(92)	
A	$F_{0.1}$	0.15	1,418	1,512	196	1,383	1,417	Small increase in SSB
B		0.30	1,280	1,370	372	1,075	1,109	Decline in SSB
C	$F_{91} = F_{89}$	0.47	1,144	1,226	540	815	843	Steep drop in SSB

Weights in '000 t.

B. Assuming  $F(90) = F(89) = 0.47$ ,  $Catch(90) = 580,000.t$ 

Option	Basis	F(91)	Predicted					Consequences/implications
			2+stock		Catch(91)	2+stock		
			SSB(91)	(91)		SSB(92)	(92)	
A	F <sub>0.1</sub>	0.15	1,242	1,330	172	1,226	1,260	Stable SSB
B		0.30	1,123	1,206	327	955	988	Decline in SSB
C	F <sub>91</sub> = F <sub>89</sub>	0.47	1,004	1,080	474	726	753	Steep drop in SSB

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a decrease in SSB to below the minimum safe level of 800,000 t by 1992.

Recommendation: ACFM recommends that  $F$  should be reduced to 0.30 in order to prevent a sharp decline in SSB in the next few years. The corresponding catch in 1991 depends on what is taken in 1990. If the TAC of 415,000 t is strictly enforced, then ACFM recommends a TAC of 372,000 t in 1991. If  $F$  in 1990 remains at the same level as in 1989, the TAC in 1991 corresponding to  $F = 0.30$  is 327,000 t. The TAC set for Divisions IVc and VIId should be subtracted from these figures to give the TAC for Divisions IVa,b.

The existing TAC of 415,000 t for 1990 corresponds to an  $F = 0.32$ . As this value is above the target level of  $F = 0.30$ , there is no justification for an upward revision of the 1990 TAC.

Existing regulations designed to protect juvenile North Sea herring (sprat box closures, 20 cm minimum landing size, by-catch regulations) should be maintained, and enforced more rigidly. The TAC for mixed clupeoids in Division IIIa should be reduced to zero as long as the catches taken under this TAC mainly consist of juvenile North Sea herring.

Spawning area closures in Division IVb should be maintained.

Special comments

1. Stock estimates given in last year's report have been revised upwards using the results of the 1989 acoustic and larvae surveys. Although the spawning stock size in 1989 is now estimated at a relatively high level (1.23 million t), the situation of this stock is far from optimal. Now that recruitment is expected to decline in the next few years, the stock will rapidly decline towards the minimal acceptable level of 800,000 t, unless fishing mortality is drastically reduced.
2. The discrepancy between agreed TACs and actual landings in 1988 and 1989 indicates a serious enforcement problem with national quotas. The success of future management of North Sea herring depends critically on an improvement of the present enforcement of quotas.

3. The high numbers of juvenile herring (0- and 1-group) taken in 1988 and 1989 show that existing regulations concerning the catches of juvenile herring (sprat box closure, 20 cm minimum landing size, by-catch regulations) are not adequately enforced.
4. Considering the expected drop in recruitment, it is important to allow as much as possible of the new year classes to contribute to the spawning stock. Until now, a large number of potential North Sea recruits are taken in the mixed clupeoid fishery in Division IIIa. From a biological point of view, there is no justification for a continuation of this fishery, unless the species composition of the catch shows a drastic change towards sprat.

### 3.1.2 Herring in Divisions IVc and VIId (Downs herring)

Source of information: Report of the Herring Assessment Working Group for the Area South of 62°N, March/April 1990 (C.M.1990/Assess:14).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	36 <sup>3</sup>	49	62	42	10	15	30	30			
Agreed TAC	73	55	90	70	40	30	30	30			
National landings <sup>4</sup>	47	44	48	32	23	21	30	-			
Unallocated landings	17	2	22	19	22	31	48	-			
Discards/slipping	-----Not available-----						1	-			
Catch as used by WG	64	46	70	51	45	52	79	-	79	1	37

Sp. stock biomass

Recruitment Included in Total North Sea

Mean F

<sup>1</sup>Predicted or assumed. <sup>2</sup>Over period 1972-1989. <sup>3</sup>For period October-March. <sup>4</sup>Provided by Working Group members. Weights in '000 t

Catches: The catch of 79,000 t in 1989 was more than double the TAC, and in recent years catches have consistently exceeded recommended TACs.

Data and assessment: Catch in numbers at age are provided and adequate, but a separate analytical assessment for this area is not possible due to unknown catches of this stock taken during the summer in other parts of the North Sea. Trends in stock levels provided by the larval surveys.

Fishing mortality: Not known for certain but probably high (0.6 - 1.0).

Recruitment: 1-ring fish from this stock cannot be reliably separated from other North Sea recruits on the IYFS, and a recruitment forecast cannot be made.

State of stock: Larval production estimates suggest a relatively stable level of SSB without a trend since 1981. The larval abundance index showed a sharp increase in 1989, indicating an increase in stock size. Fishermen have consistently reported an increased abundance of herring both in 1988 and 1989. Age compositions of catches show an increase in percentage of older fish, suggesting a reduction in F.

Forecast for 1991: Not available. See Total North Sea.

Recommendation: Although there have been signs of an increase in stock size in 1989, it is too early to relax the existing conservation measures for this component of North Sea herring. Larvae surveys should provide more firm evidence of a sustained growth of the stock before the precautionary TAC should be increased. It is recommended to maintain the TAC in 1990 and 1991 at the present level of 30,000 t. This TAC is part of the overall TAC calculated for the total North Sea stock.

Special comments: The large discrepancy between TACs and actual catches taken in recent years indicates a serious enforcement problem. Unless the enforcement of the area TAC is improved, additional conservation measures may have to be considered in future years.



### 3.1.3 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 1990 (C.M.1990/Assess:18). Report of the Herring Assessment Working Group for the Area South of 62°N, March/April 1990 (C.M.1990/Assess:14).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC 22-24	57	-	-	-	-	97	90	64			
Recomm. TAC IIIa <sup>3</sup>	40 <sup>4</sup>	40 <sup>4</sup>	80	132	112	99	84	67			
Agreed TAC IIIa	59	58	117	46	138	138	138	120			
Catch from assessed stock <sup>5</sup>	152	191	211	164	144	230	171	-			
Total catch 22-24	115	110	110	95	102	99	95	-			
Total catch IIIa <sup>6</sup>	198	233	244	217	234	334	172	-			
Catch in NE North Sea included in assessment		7	17	20	14	23	20	-			
Catch as used by WG <sup>7</sup>	224	261	247	186	173	246	206	-	261	95	-
Sp. stock biomass	190	229	267	226	176	202	224	207 <sup>1</sup>	267	79	167
Recruitment (age 2)	2590	3500	2860	1621	3307	5345	2209	2446 <sup>1</sup>	5345	916	2378
Mean F(2-6,u)	0.62	0.79	0.80	0.74	0.74	0.84	0.81	-	1.19	0.62	0.83

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1974-1989. <sup>3</sup> Adult herring fishery in Division IIIa only. <sup>4</sup> TAC for 1 Sep-31 Aug. <sup>5</sup> Includes Sub-divisions 22-24, 2-group and older from Division IIIa, and transferred amounts from the North Sea. <sup>6</sup> Includes landings of juvenile herring in mixed clupeoid fishery. Includes 0- and 1-ringers. Weights in '000 t, recruitment in millions.

Catches: The catches (in tonnes) decreased considerably in 1989 compared with 1988, mainly due to reduced effort and smaller catches in the industrial mixed clupeoid fishery in Division IIIa (Tables 3.1.3.1-3.1.3.3).

Data and assessment: An analytical assessment using acoustic surveys for tuning.

Fishing mortality: Has remained relatively stable in recent years (Figure 3.1.3), but is far above  $F_{max}$  ( $F_{89} = 2 \times F_{max}$ ) and slightly above  $F_{med}$  (= 0.70).

Recruitment: 1989 year class slightly above average; recruitment in 1990 and 1991 taken as average 1974-1987.

State of stock: The stock is still at a high level compared with the level in the 1970s and is expected to be so in the next two years as well, although a decrease of approximately 10% is expected from 1990 to 1992.

Forecast for 1991:Assuming  $F(90) = 0.81$ . Catch(90) = 217, Landings (90) = 217

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	$F_{0.1}$	0.19	202	58	58	312	Sharp reduction in fishing mortality and rapid increase in SSB.
B	$F_{max}$	0.35	199	102	102	270	Marked decrease in catch and an increased SSB.
C	$F_{med}$	0.70	196	178	178	199	Stabilized SSB.
D	$F_{89}$	0.81	191	199	199	184	Decreasing catch and SSB.

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a small decrease in catch and a somewhat larger decrease in SSB.

Recommendation: ACFM recommends that the fishing mortality in 1991 should be reduced to the  $F_{med}$  level in order to stabilize the spawning stock size. This corresponds to a TAC of 178,000 t for the total area (87,000 t in Sub-divisions 22-24 and 91,000 t in the directed herring fisheries in Division IIIa).

ACFM recommends on biological grounds that the TAC for the mixed clupeoid fishery in Division IIIa is set to zero.

Special comments: The stock is fished in the North Sea, Division IIIa, and Sub-divisions 22-24.

The assessment was carried out on data from all areas and is based on catch data for all age groups, including 0- and 1-ring spring-spawning herring.

Racial investigations of the herring caught in the northeastern part of the North Sea showed that in a specified area between 25% and 38% of the 2-ringers and 42% and 73% of the older herring in the period May-September were of Skagerrak-Kattegat and Western Baltic stock origin. The total catch of Division IIIa/Western Baltic herring in the North Sea in 1989 is 19,867 t.

The total catch of herring in Division IIIa in 1989 is 172,043 t (Table 3.1.3.3), a reduction of 50% compared to 1988. Approximately 70% of the catch was taken in the human consumption fishery, and 30% (51,000 t) in the small-meshed mixed clupeoid fishery. 91,900 t of the Division IIIa catch is estimated to be Division IIIa/Western Baltic spring-spawning herring, and 80,000 t North Sea autumn spawners.

The landings in Sub-divisions 22-24 in 1989 (Tables 3.1.3.1 and 3.1.3.2) were 94,584 t, giving a total catch of Division IIIa/Western Baltic herring of 206,000 t.

The recommended TAC includes any catches of this stock that will be taken in the northeastern part of the North Sea, Division IIIa, and Sub-divisions 22-24. Because of the variable migration, however, it is not possible to quantify the likely level of the North Sea part of the catches.

With an unchanged exploitation pattern, 20,000 t of the recommended TAC is predicted to be juvenile spring-spawning herring in Sub-divisions 22-24, and 14,000 t in Division IIIa.

In Division IIIa, there will, when fishing a TAC of spring spawners, be unavoidable catches of juvenile North Sea herring. ACFM cannot predict these amounts. The amounts of juvenile herring by stock caught in recent years in Division IIIa, both in directed herring fishery and in the small clupeoid fishery, are given in the text table below.

Stock	AGE					
	0		1		2	
	SP	AU	SP	AU	SP	AU
1987	0	50	12	103	41	7
1988	0	22	0	161	116	17
1989	0	16	16	34	28	30

Catch in '000 t by stock (SP = spring spawners, AU = autumn spawners) taken in Division IIIa in 1987-1989.

The total catch of 0- and 1-group herring in Sub-divisions 22-24 was about 14,000 t compared with 20,000 t in 1988, and 6,000 t in 1987. A large part of this comes from the small-meshed fishery catching a mixture of sprat and herring. To improve the recruitment to the spawning stock and to increase the yield per recruit, the catch of juveniles should be reduced to about 6,000 t as it was when sprat was the target species in the small-meshed fishery.

### 3.1.4 Celtic Sea and Division VIIj herring

Source of information: Report of the Herring Assessment Working Group for the Area South of 62°N, March/April 1990 (C.M. 1990/Assess:14).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC <sup>3</sup>	6	13	13	17	18	13	20	15	-	-	-
Agreed TAC <sup>4</sup>	8 <sup>6</sup>	13	13	17	18	18	20	17.5	-	-	-
National landings <sup>5,7</sup>	12.0	8.6	11.6	13.3	17.8	16.8	17.8	-	17.8	7.2	12.0
Unallocated landings <sup>5</sup>	10.2	11.1	4.6	6.1	5.3	0	1.3	-	11.1	0	3.3
Discards/slipping <sup>5</sup>	4.0	3.6	3.1	3.9	4.2	2.4	3.5	-	4.2	0	1.9
Catch as used by WG <sup>5</sup>	26.2	23.3	19.3	23.3	27.3	19.2	22.6	-	27.3	7.2	17.8
Sp. stock biomass	70	63	63	64	65	67	71	71 <sup>1</sup>	92	26	53
Recruitment (age 1)	747	576	495	446	630	309	681	390 <sup>1</sup>	872	136	392
Mean F(1-7,u)	0.52	0.82	0.37	0.45	0.60	0.33	0.45	-	0.82	0.32	0.52

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1977-1989 for landings and catch; 1970-1989 for stock data. <sup>3</sup> VIIj, VIIg, and VIIa south of 52°30'N for 1 April-31 March. <sup>4</sup> VIIg-k and VIIa South of 52°30'N for calendar year. <sup>5</sup> Calendar year. <sup>6</sup> 1 October-31 March. <sup>7</sup> Provided by Working Group members. Weights in '000 t, recruitment in millions.

Catches: Landings in 1989 within TAC. Discards, estimated at 20% of the total landings by weight, have been included in assessment from 1983-1989 (Tables 3.1.4.1 and 3.1.4.2). Catches reasonably stable. Lack of markets and tighter management have prevented any increase in effort. Box B in Figure 3.1.4.1 was closed from 1-16 November as part of the rotational closures.

Data and assessment: Good catch-at-age data. Larvae surveys and acoustic surveys were carried out in 1989/1990 but neither was considered to provide a sufficiently reliable basis for the assessment. The assessment was carried out on the assumption that there has been no recent trend in F which is consistent with the recent stability in the fishery. The results, however, are not matched by the results of the larvae survey which indicated an increase in larvae production in 1989/1990 compared with the previous comparable surveys carried out in 1983/1984 and 1984/1985. The results of this assessment are, therefore, subject to considerable uncertainty.

Fishing mortality: Fishing mortality appears to have declined since 1987 (Figure 3.1.4.2).

Recruitment: Recruitment in recent years appears to have been at a high level compared with the level in the late 1970s.

State of stock: Appears to have been stable in recent years at about 60,000-70,000 t, but see section on data and assessment above.

#### Forecast for 1991:

Assuming  $F(90) = .34$ . Basis: TAC plus 20% discards.  $Catch(90) = 21.0$ .  $Landings(90) = 17.5$ .

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	F <sub>0.1</sub>	0.16	69	10	8.3	74	Small increase in SSB
B	F <sub>med</sub>	0.24	68	15	12.5	68	Stable SSB
C	F <sub>90</sub>	0.34	66	20	16.7	63	Small decline in SSB

Weights in '000 t.

Continued fishing at current levels of fishing mortality (i.e., the 1989 level) will lead to a decrease in spawning stock.

### Recommendation:

1. In order to prevent any decline in spawning stock, ACFM recommends that the fishing mortality in the 1991/1992 season (1 April 1991 - 31 March 1992) be set at the  $F_{med}$  level, with a corresponding catch including discards of 15,000 t. ACFM also recommends that the expected discards should be subtracted from this catch to give a TAC of 12,500 t.
2. In order to provide some protection to the spawning concentrations, ACFM recommends that the system of rotational closures of selected parts of the spawning area should be continued as described below and in Figure 3.1.4.1.

Season 1: Prohibit all herring fishing from 15-31 October in the area bounded by  $09^{\circ}00'$  west longitude,  $51^{\circ}15'$  north latitude,  $11^{\circ}00'$  west longitude,  $52^{\circ}30'$  north latitude, and by the Irish coast (Box A).

Season 2: Prohibit all herring fishing from 1-16 November in the area bounded by  $07^{\circ}30'$  west longitude,  $51^{\circ}15'$  north latitude,  $09^{\circ}00'$  west longitude, and by the Irish coast (Box B).

Season 3: Prohibit all herring fishing from 15-31 January in the area bounded by  $52^{\circ}30'$  north latitude,  $06^{\circ}00'$  west longitude,  $52^{\circ}00'$  north latitude, and by the Irish coast (Box C).

In the 1990/1991 fishing season, Box C should be closed from 15-31 January 1991 and in 1991/1992 Box A from 15-31 October 1991. To ensure the effectiveness of these closures, ACFM also recommends that all ports within the respective closed areas be closed to herring landings during the closure periods.

### Special comments:

1. To enable ACFM to evaluate the effectiveness of the system of rotational closures of selected spawning grounds, and to provide a firmed basis for assessment, it is recommended that herring larvae surveys and acoustic surveys be continued in this area.

### 3.1.5 Herring in Division VIa (North)

Source of information: Report of the Herring Assessment Working Group for the Area South of 62°N, March/April 1990 (C.M.1990/Assess:14).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	58	53	30	37-45	38-55	46	58	61	-	-	-
Agreed TAC	70.0	64.0	56.5	51.9	49.7	49.8	58	75	-	-	-
National landings <sup>4</sup>	67.6	58.6	43.3	43.9	45.0	42.2	49.3	-	-	-	-
Unallocated landings	-4.1	16.6	0.5	37.8	18.0	5.2	2.1	-	-	-	-
Discards/slipping	-	-	-	- <sup>3</sup>	- <sup>3</sup>	- <sup>3</sup>	1.6	-	-	-	-
Catch as used by WG	63.5	75.2	43.8	81.7	63.0	47.4	53.0	-	208.3	0.06	88.3
Sp. stock biomass	133	238	246	248	252	444	449	430 <sup>1</sup>	602	62	258
Recruitm. (age 2-rings)	352	1371	553	725	597	1952	572	586 <sup>1</sup>	3602	187	843
Mean F(3-6,u)	0.48	0.42	0.26	0.38	0.27	0.20	0.15	-	1.06	0.001	0.50

<sup>1</sup>Predicted or assumed. <sup>2</sup>Over period 1970-1989. <sup>3</sup>Included in landings. <sup>4</sup>Provided by Working Group members. Weights in '000 t, recruitment in millions.

Catches: The TAC has not been reached for the last two years, probably because more rigorous enforcement of regulations has reduced the amount of unallocated catches (Table 3.1.5).

Data and assessment: Sampling data provided by only two countries and estimates of discarding available for only one fleet. Assessment based on larvae abundance indices. No acoustic estimate available since 1987. This year's assessment indicates that last year's assessment probably overestimated stock size.

Fishing mortality: Currently just below  $F_{0.1}$ , with a decreasing trend as catches have stabilized while stock size has increased (Figure 3.1.5).

Recruitment: No independent estimates. Geometric mean (586 million) used for the prediction.

State of stock: Rapid increase in stock size over the last few years, but this needs confirmation by reliable fishery-independent methods.

#### Forecast for 1991:

Assuming  $F(90) = 0.22$ ; Basis: TAC; Catch (90) = 75.0; Landings (90) = 75.0.

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	$F_{91}=F_{89}$	0.15	423	50	50	422	Stability in SSB given average recruitment Large decrease in SSB
B	$F_{0.1}$	0.17	418	57	57	410	
C	$F_{med}$	0.39	363	118	118	303	

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to stability in SSB so long as recruitment remains at average levels.

Recommendation: As pointed out by ACFM last year, fishing at current levels of fishing mortality provides the opportunity to maintain the SSB at its recent level thereby gaining greater stability of catches. For this reason, ACFM recommends that fishing mortality should not be allowed to increase above the  $F_{0.1}$  level, corresponding to a TAC of 57,000 t in 1991.

### 3.1.6 Clyde herring (Division VIa)

Source of information: Report of the Herring Assessment Working Group for the Area South of 62°N, March/April 1990 (C.M.1990/Assess:14).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	2.5	2.5	-	3.07	3.5	3.2	2.9-3.4	2.6	-	-	-
Agreed TAC	2.5	3.0	3.0	3.4	3.5	3.2	3.2	2.6	-	-	-
Nominal landings	2.8	3.2	3.0	3.4	2.9	1.6	2.1	-	7.8 <sup>3</sup>	1.6 <sup>3</sup>	3.5 <sup>3</sup>
Unallocated landings	0.3	0.2	0.4	0.6	0.3	0.1	0.2	-	0.6 <sup>3</sup>	0.1 <sup>3</sup>	0.3 <sup>3</sup>
Discards/slipping	1.3	2.3	1.3	0.7	0.4	0.2	-	-	2.3 <sup>3</sup>	- <sup>3</sup>	0.9 <sup>3</sup>
Catch as used by WG	4.4	5.8	4.8	4.6	3.6	1.9	2.3	-	7.8	1.9	4.0
Sp. stock biomass	8.9	10.5	11.1	9.5	6.3	4.2	17.9	18.2 <sup>1</sup>	17.9	4.2	8.1
Recruitment (2-ringers)	38.9	39.0	24.0	19.7	13.3	129.4	21.8	23.0 <sup>1</sup>	129.4	9.2	28.2
Mean F(2-6,u)	0.29	0.34	0.49	0.51	0.71	0.55	0.16	-	0.71	0.16	0.43

<sup>1</sup>Predicted or assumed. <sup>2</sup>Over period 1970-1989. Weights in '000 t, recruitment in millions.  
<sup>3</sup>Over period 1981-1989.

Catches: Catch in 1989 increased slightly from its lowest level in 1988 (Table 3.1.6). Discarding in 1989 reported to be negligible and assumed to be zero in assessment. Landings once again failed to reach TAC.

Data and assessment: Sampling of landings at high level. Assessment based on CPUE data from 1974-1989 and acoustic survey from 1985-1989. While there are considerable uncertainties in estimates of fishing mortality and stock size in recent years, there is little doubt that the local spring spawning stock increased in 1989.

Fishing mortality: Increased up to 1987, decreased in 1988, and dropped sharply in 1989 (Figure 3.1.6). The decrease in 1989 may be due to the pattern of the fishery which concentrated on the exceptionally strong 1986 year class late in the year when older fish may have been absent.

Recruitment: After a long period of poor recruitment to the indigenous spring-spawning stock, the large 1986 year class recruited to the spawning stock in 1989. Subsequent year classes appear to be average or below average.

State of stock: While there have been a considerable recovery of the local spring-spawning stock, it is not yet clear whether further recovery can be expected.

#### Forecast for 1991:

Assuming  $F(90) = .14$ , Basis: TAC, Catch(90) = 2.6, Landings (90) = 2.6.

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	$F_{0.1}$	0.11	17.8	2.3	2.3	17.4	Maintenance of SSB
B	$F_{91} = F_{90}$	0.14	17.8	2.9	2.9	16.9	Gradual decrease in SSB
C	$F_{91} = F_{89}$	0.16	17.8	3.2	3.2	16.5	Gradual decrease in SSB

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a gradual decrease in the spawning stock until further good recruitment occurs.

Recommendation: To prevent a rapid reduction of the local spring-spawning stock, ACFM recommends that the fishing mortality should be kept at the level expected in 1990. The TAC corresponding to this level in 1991 is 2,900 t.

As an additional protection measure for the local spring-spawning stock, ACFM recommends that the closure of the directed herring fishery in the period 1 January - 15 April should be continued in 1991.



### 3.1.7 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, March/April 1990 (C.M.1990/Assess:14).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	12	12	14	17	18	11-18	15	27/25	-	-	-
Agreed TAC	12	12	14	17	17	14	20	27.5	-	-	-
National landings <sup>3</sup>	20.0	16.4	15.2	17.0	16.6	15.3	21.1	-	-	-	-
Unallocated landings	13.0	11.0	8.2	11.8	32.0	13.8	7.1	-	-	-	-
Discards/slipping	No estimates						1.0	-	-	-	-
Catch as used by WG	33.0	27.4	23.4	28.8	48.6	29.1	29.2	-	48.6	15.0	28.0
Sp. stock biomass	107	181	166	190	162	158	98	122 <sup>1</sup>	190	76	128
Recruitment (age 2)	231	799	270	379	297	417	69	319 <sup>1</sup>	799	69	273
Mean F(2-7,u)	.37	.20	.18	.20	.43	.31	.30	-	.44	.14	.28

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1970-1989. <sup>3</sup> Provided by Working Group members. Weights in '000 t, recruitment in millions.

Catches: Catches in 1989 at the same level as 1988 but considerably in excess of both recommended and agreed TAC levels in all recent years. Unallocated and misreported landings at a slightly lower level in 1989 (Table 3.1.7).

Data and assessment: Good catch-at-age data. No fishery independent surveys. Assessment based on assumption that stable catches in 1989 and 1990 may generate the same fishing mortality. Catch-at-age data suggest relatively light exploitation.

Fishing mortality: No reliable estimate available for 1989, but on above assumptions F is probably reasonably stable (Figure 3.1.7).

Recruitment: Two good year classes which recruited in 1984 and 1988 dominate present age composition. No estimates of recruitment. Catch-at-age data suggest 1986 year class which recruited in 1989 is very poor.

State of stock: Extremely uncertain but may be showing decreasing trend with a large drop in 1989 because of low recruitment and low mean weights of stock.

#### Forecast for 1991:

Assuming F(90) = .33. Basis: Catch = TAC. Catch(90) = 27.5. Landings (90) = 27.5.

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	F <sub>0.1</sub>	.15	139	14	14	157	Decreased catch; increased SSB. Maintenance of SSB at present level and slight decrease in catches.
B	F <sub>91</sub> = F <sub>89</sub>	.30	127	26	26	131	
C	F <sub>91</sub> = F <sub>90</sub>	.33	125	28	28	127	

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to slight increase in spawning stock if the assumption of average recruitment is correct.

Recommendation: In view of the expected low recruitment, and to take account of the uncertainty about the state of this stock, ACFM recommends that fishing mortality should be reduced below the 1989 level. The TAC for 1991 corresponding to this advice is less than 26,000 t.

Special comments: Without survey information for this stock, it is unlikely that ACFM will be in a position to improve the reliability of its advice. The provisional estimate of the 1986 year class, however, suggests that it may be considerably smaller than the poorest one previously recorded. Since the size of subsequent year classes has been assumed to be average for the prediction, the prognosis for this stock is very uncertain.

### 3.1.8 Irish Sea herring (Division VIIa)

Source of information: Report of the Herring Assessment Working Group for the Area South of 62°N, March/April 1990 (C.M.1990/Assess:14).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	3.0	4.0	5.0	6.3	4.3	10.5 <sup>3</sup>	5.5	5.7	-	-	-
Agreed TAC	3.0	4.0	5.0	6.3	4.5	10.5	6.0	7.0	-	-	-
National landings <sup>4</sup>	3.9	4.1	5.1	6.0	4.5	10.2	5.0	-	-	-	-
Unallocated landings	-	-	4.1	1.4	1.3	-	-	-	-	-	-
Discards/slipping	-	-	-	-	-	-	-	-	-	-	-
Catch as used by WG	3.9	4.1	9.2	7.4	5.8	10.2	5.0	-	38.6	3.9	13.3
Sp. stock biomass	18.9	24.2	18.7	19.4	20.3	21.1	20.4	18.1 <sup>1</sup>	32.3	5.6	17.5
Recruitment (age 1)	242	141	171	219	292	136	123	184 <sup>1</sup>	668	123	262
Mean F(2-7,u)	0.18	0.16	0.38	0.31	0.23	0.39	0.20	-	1.07	0.16	0.58

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1972-1989. <sup>3</sup> Revised in May 1988 to 5.6. <sup>4</sup> Provided by Working Group members. Weights in '000 t, recruitment in millions.

Catches: Reported catches (Table 3.1.8) were lower than the previous year and for the second year did not meet the TAC. This was probably due to a lack of markets rather than scarcity of fish. There are indications of unreported catches in this area but these cannot be quantified.

Data and assessment: Data for catch at age are good. An acoustic survey of the Manx spawning stock was carried out in 1989. There is still some uncertainty in the assessment because there are no independent recruitment data and only one acoustic estimate which covered only part of the total stock.

Fishing mortality: The value used for 1989 was chosen to be consistent with the acoustic survey (Figure 3.1.8).

Recruitment: The good 1985 year class entered the fishery as 2-ringers in 1988 and predominated in the catches in 1989. Geometric mean recruitment over the years 1984-1988 has been assumed in the prediction.

State of stock: The spawning stock biomass appears to have been relatively stable since 1985.

#### Forecast for 1991:

Assuming  $F(90) = 0.32$ . Basis: TAC. Catch(90) = 7.0. Landings (90) = 7.0.

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	$F_{0.1}$	0.17	20.1	3.9	3.9	22.2	Reduced catch, increased SSB
B	$F_{0.1} = F_{89}$	0.20	19.6	4.5	4.5	21.1	Reduced catch, stable SSB
C	$F_{0.26}^{low}$	0.26	18.6	5.6	5.6	19.3	Stable SSB
D	$F_{90}$	0.32	17.6	6.8	6.8	17.5	Stable TAC; SSB starting to decrease

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a fairly stable SSB so long as recruitment continues at recent levels.

Recommendation: To stabilize the spawning stock biomass, ACFM recommends that fishing mortality should be reduced by 20% from its expected 1990 level. The corresponding TAC in 1991 is 5,600 t. The spawning and nursery area closures should be maintained.

### 3.2 Industrial Fisheries in the North Sea and Adjacent Waters

#### 3.2.1 Definition of industrial fisheries

The usual definition of industrial fisheries is that these are fisheries with small-meshed gear directed at catching fish for reduction purposes, but in terms of the Industrial Fisheries Working Group "industrial landings" derive from industrial fisheries with small-meshed trawl only. Data on such landings do not include fish caught by small-meshed trawl but used for human consumption or fish caught for human consumption but used for industrial purposes due to market conditions.

Total catches are, however, used for the assessment of sprat, sandeel and Norway pout. Sandeel assessment areas are shown in Figure 3.2.9.

#### 3.2.2 Data available

Data on landings, fishing effort, species composition, age, length and weight are available from the major fisheries, but the number of samples from the Danish industrial fisheries decreased in 1989 compared to 1988.

#### 3.2.3 Trends in industrial landings

The total annual landings of sandeel, sprat and Norway pout together with by-catches of herring and blue whiting in Division IIIa during the period 1974-1989 have oscillated around a mean of 173,000 t without any particular trend (Table 3.2.3.1). Landings, however, decreased from 151,000 t in 1988 to 92,000 t in 1989, mainly because of reduced catches of young herring (see Section 3.1.3). About 51,000 t of herring were taken in the mixed clupeoid fishery.

Industrial landings from the North Sea (Table 3.2.3.2) over the same period have varied from 1.0 million t to 1.9 million t; they increased from 1985 to 1.3 million t in 1988 and further to 1.5 million t in 1989. The increase is mainly due to higher catches of sandeel which reached 1,035,000 t in 1989, the highest on record. The low level of sprat landings continued in 1989. Industrial landings of herring in the small-meshed trawl fishery were reduced from 179,000 t in 1988 to 132,000 t in 1989. The long-term decline in Norway pout landings terminated with a minimum of 102,000 t in 1988, increasing to 151,000 t in 1989.

Industrial landings from Division VIa are given in Table 3.2.3.3.

#### 3.2.4 By-catches of protected species

The annual landings of haddock, whiting and saithe taken in the industrial fisheries in the North Sea increased to 54,000 t in 1988, but decreased slightly in 1989 to 47,000 t, of which an estimated 43,000 t was whiting.

### 3.2.5 Norway pout in Division IIIa

Source of information: Report of the Industrial Fisheries Working Group, March 1990 (C.M. 1990/Assess:13).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>1</sup>	Min <sup>1</sup>	Mean <sup>1</sup>
Nominal landings	37	68	86	32	49	46	17 <sup>2</sup>	-	86	17	43
Catch as used by WG	30	46	9	6	3	8	6		46	3	21

<sup>1</sup>Over period 1979-1989. <sup>2</sup>Preliminary. Weights in '000 t.

Catches: See Tables 3.2.3.1 and 3.2.5.

Data and assessment: Not available.

## 3.2.6 Norway pout in Sub-area IV

Source of information: Report of the Industrial Fisheries Working Group, March 1990 (C.M. 1990/Assess:13).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	-	-	-	-	-	-	-	-			
Agreed TAC <sup>3</sup>	379.1	380.0	383.5	368.0	200.0	200.0	200.0	200.0			
Nominal landings	499.3	398.8	284.5	226.9	215.2	187.5	275.2 <sup>4</sup>	-	522.9	187.5	340.7
Catch as used by WG	422.9	354.9	196.5	174.4	147.2	101.6	150.6		471.1	101.6	266.8
Sp. stock biomass	639	535	262	188	234	148	153	377 <sup>1</sup>	639	148	369
Recruitment (age 1)	103	63	34	32	37	12	31	50 <sup>1</sup>			58
Mean F(1-2,u)	0.88	1.34	1.23	0.87	0.62	1.02	0.90	-	1.27	0.77	0.97

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1979-1989. <sup>3</sup> TACs for Sub-area IV (EC zone), Division IIa (EC Zone) and EC vessels IIIa. <sup>4</sup> Preliminary. Weights in '000 t, recruitment in thousand millions at 1 January.

Catches: The total landings increased from the lowest value since 1966 to a value in 1989 which is 44% below the mean (Tables 3.2.3.2 and 3.2.6). The increase took place in all quarters but the first.

Data and assessment: Quarterly catch at age, standardized effort and recruitment indices available. Assessment tuned to effort data from the fourth quarter.

Fishing mortality: Fishing mortality has increased in 1988 and 1989 from a somewhat lower level in 1986 and 1987.

Recruitment: Recruitment has been below average in the period 1985 to 1989. The 1989 year class is estimated to be slightly below average.

State of stock: The stock of Norway pout has declined in recent years, but may have partially recovered in 1990.

Forecast for 1990: Assuming fishing effort in 1990 remains at the same low level as in 1989, a catch of 187,000 t in 1990 is expected (SHOT estimate).

### 3.2.7 Norway pout in Division VIa

Source of information: Report of the Industrial Fisheries Working Group, March 1990 (C.M. 1990/Assess:13).

Catches: Nominal landings increased from 6,000 t in 1988 to 28,000 t in 1989 (Table 3.2.7).

Data and assessment: Not available.

### 3.2.8 Sandeel in Division IIIa

Source of information: Report of the Industrial Fisheries Working Group, March 1990 (C.M. 1990/Assess:13).

Catches: The landings show considerable variation without apparent trend. Nominal landings decreased from 22,000 t in 1988 to 17,000 t in 1989 (Table 3.2.8).

Data and assessment: Not available.

### 3.2.9 Sandeel in the Southern North Sea

Source of information: Report of the Industrial Fisheries Working Group, March 1990 (C.M. 1990/Assess:13).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	-	-	-	-	-	-	-	-			
Agreed TAC	-	-	-	-	-	-	-	-			
Catch as used by WG	419.0	532.8	513.5	457.4	402.8	487.6	525.0	-	532.8	355.9	450.3
Sp. stock biomass	1097	550	963	485	1994	1227	493	1716 <sup>1</sup>	1995	328	813
Recruitment (age 1)	62	338	113	555	73	39	476		555	39	218
Mean F(1-2,u)	0.45	0.32	0.88	0.28	0.28	0.66	0.46	-	0.88	0.28	0.54

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1979-1989. Weights in '000 t, recruitment in no x 10<sup>-9</sup>.

Catches: Have been stable since 1981 (Tables 3.2.9.1 and 3.2.9.2). In 1989, the catches were dominated by the 1988 year class.

Data and assessment: Effort, catch-at-age, and weight-at-age data available, except for second half of 1989 (3.5% of total catch). Fishing mortality in 1989 estimated by tuning on half-yearly data.

Fishing mortality: Fishing mortality has increased in 1988 and 1989 from a low level in 1986 and 1987.

Recruitment: Strong year classes entered the fishery as 0-groups in 1981, 1983, and 1985. The 1988 year class is estimated to be strong.

State of stock: The biomass has fluctuated in the 1980s without any trend. The spawning stock biomass decreased from approximately 2 million t in 1987 to 0.5 million t in 1989, and this is attributed to the strong 1985 year class followed by two poor year classes. The 1988 year class seems strong and may increase the spawning stock biomass again in 1990.



### 3.2.10 Sandeel in the Northern North Sea

Source of information: Report of the Industrial Fisheries Working Group, March 1990 (C.M. 1990/Assess:13).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	-	-	-	-	-	-	-	-			
Agreed TAC	-	-	-	-	-	-	-	-			
Catch as used by WG	78.2	91.8	79.7	375.1	395.9	384.8	489.7		489.7	74.4	235.9
Sp. stock biomass	101	135	157	99	294	682	161	194 <sup>1</sup>	682	97	219
Recruitment (age 1)	27	41	21	115	188	28	135	-	188	19	63
Mean F(1-2,u)	0.57	0.64	0.75	1.15	0.89	1.28	2.51	-	2.51	0.38	1.02

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1979-1989. Weights in '000 t, recruitment in no. x 10<sup>-9</sup>.

Catches: The catches increased by 27% in 1989 to the highest value on record (Tables 3.2.9.1 and 3.2.9.2). The catches were strongly dominated by the 1988 year class.

Data and assessment: Effort, catch at age, and weight-at-age data available. Fishing mortality in 1989 estimated by tuning on semi-annual data.

Fishing mortality: Fishing mortality has been increasing from a low value in 1982 to a high level in 1988 and 1989. The assumed increase in fishing mortality from 1988 to 1989 may partly be caused by an unrealistically high fishing mortality at age 2 in the second half of 1989.

Recruitment: The 1985 and 1986 year classes are very strong. The 1988 year class is estimated to be strong.

State of stock: The size of the spawning stock has fluctuated in the 1980s without any trend. It reached a historically high level in 1988 due to the strong 1985 and 1986 year classes.

Special comments:Effects of catches of 0-group sandeel upon the sandeel stock in the Northern North Sea

The effects were considered by ACFM in 1989 (1989 report, Section 3.2.9). A further study was carried out by the Working Group in March 1990.

With respect to the yield per recruit (Y/R), the conclusions reached at last year's meeting were confirmed. Implementing either a 10 cm minimum landing size or a total closure of the fishery in the second half of the year will produce only marginal changes in Y/R. This conclusion is, however, heavily dependent on the assumed weight at age and natural mortality of the 0-groups.

In terms of the spawning stock per recruit (SSB/R), both measures will lead to an increase. It is, however, difficult to determine a 'safe' level of SSB/R for sandeel. At present, there is no evidence to suggest that recruitment is dependent upon SSB within the region of historical experience, i.e., at a SSB above 100,000 t. It is furthermore uncertain to what extent recruitment in the Northern North Sea depends upon transport of larvae into this area from the Southern North Sea.

If needed, the most effective way of increasing the SSB/R is to decrease the fishing mortality on the juveniles. To achieve this a closure of the fishery in the second half of the year seems to be preferable to a minimum landing size accompanied by a regulation allowing a certain proportion of undersized fish. A closure seems easier to control and would provide a better protection of the 0-groups. The reason is that a regulation allowing some undersized fish tends to work in a counterintuitive way. If recruitment is high the regulation is difficult to adhere to (and less necessary), if recruitment is low it is not able to decrease the fishing mortality sufficiently.

### 3.2.11 Sandeel in the Shetland area

Source of information: Report of the Industrial Fisheries Working Group, March 1990 (C.M. 1990/Assess:13).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	-	-	-	-	-	-	-	-			-
Agreed TAC	-	-	-	-	-	-	-	-			-
Catch as used by WG	37.0	32.6	17.2	14.0	7.2	4.7	3.5 <sup>3</sup>	-	37.0	3.5	16.6
Sp. stock biomass	27.2	30.3	23.6	22.9	28.0	51.9	40.7	25.8 <sup>1</sup>	51.9	22.9	32.1
Recruitment (age 0)	33.2	27.1	29.6	49.0	2.3	1.3	-	- <sup>1</sup>	49.0	1.3	23.7
Mean F(1-3,u)	0.44	0.62	0.37	0.34	0.06	0.06	0.06	-	0.62	0.05	0.28

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1983-1989. <sup>3</sup> Preliminary. Weights in '000 t, recruitment in thousand millions (1 July).

Catches: Decreased to the lowest level since the fishery started in 1974 (Table 3.2.9.2). The fishery was closed in the second half of 1989.

Data and assessment: Catch-at-age and standardized effort data available. Very low catches. Poor convergence of VPA. Results driven by estimates of M but also very sensitive to input F at oldest age.

Fishing mortality: Effort in 1989 decreased by 47% compared to 1988. Fishing mortality has been very low since 1987.

Recruitment: Is estimated to have been very low in 1987 and 1988. Insufficient information on the 1989 year class.

State of stock: The 1986 year class is estimated to be the highest on record and the spawning stock is, therefore, presently at a high level. Due to the weak incoming year classes the stock is prone to decline.

Recommendation: In view of the recent poor recruitment, ACFM recommends that fishing effort be kept at a low level.

Special comments: The effort in the Shetland sandeel fishery has gradually been reduced since 1982. Annual standardized effort in 1989 was 47% less than in 1988. This was in part due to the closure of the fishery within the 6 n. miles UK limit in the second half of the year. The closure caused a change in exploitation pattern, reducing catches of 0-group sandeel.

3.2.12 Sandeel in Division VIa

Source of information: Report of the Industrial Fisheries Working Group, March 1990 (C.M. 1990/Assess:13).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	-	-	-	-	-	-	-	-			
Agreed TAC	-	-	-	-	-	-	-	-			
Nominal landings	13.1	14.2	18.6	24.5	14.5	24.5	17.6 <sup>3</sup>	-	24.5	13.1	18.1
Catch as used by WG	13.1	14.2	18.6	24.5	14.5	24.5	17.6	-	24.5	13.1	18.1
Sp. stock biomass	33.4	49.4	56.4	46.0	54.0	149.9	122.9	85.1 <sup>1</sup>	149.9	33.4	73.1
Recruitment (age 0)	36.2	19.3	61.0	133.5	24.4	8.7	20.0		133.5	8.7	43.3
Mean F(1-3,u)	0.10	0.17	0.17	0.24	0.07	0.12	0.11		0.24	0.07	0.14

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1983-1989. <sup>3</sup> Preliminary. Weights in '000 t, recruitment in thousand million (1 July).

Catches: Decreased by 28% from 1989 to 1990 (Table 3.2.12). Effort was reduced by 38%.

Data and assessment: Catch-at-age and effort data available. Poor convergence of VPA and high sensitivity to input F on oldest age.

Fishing mortality: Low and stable.

Recruitment: The very strong 1986 year class has been followed by three weak year classes.

State of stock: The spawning stock is at a high level but is expected to decline due to the poor 1987 and 1988 year classes.

### 3.2.13 Sprat in Division IIIa

Source of information: Report of the Industrial Fisheries Working Group, March 1990 (C.M. 1990/Assess:13).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>1</sup>	Min <sup>1</sup>	Mean <sup>1</sup>
Recomm. TAC	-	-	-	-	-	-	-	-			
Agreed TAC	-	-	-	80.0 <sup>2</sup>	80.0 <sup>2</sup>	80.0 <sup>2</sup>	80.0 <sup>2</sup>	65.0 <sup>2</sup>			
Nominal landings	71.3	48.5	66.9	61.8	67.5	63.4	74.5 <sup>3</sup>	-	104.8	48.5	74.9
Catch as used by WG	26.5	36.5	21.9	18.0	15.8	8.8	8.0		96.0	8.0	40.0
Recruitment (age 1) (IYFS index)	1173	4141	2077	684	1830	945	442	503	5339	442	2180

<sup>1</sup>Over period 1979-1989. <sup>2</sup>Mixed clupeoids TAC. <sup>3</sup>Preliminary. Weights in '000 t.

Catches: Have followed a declining trend since 1979 and were the lowest on record in 1989 (Table 3.2.13).

Data and assessment: Recruitment indices from IYFS. No analytical assessment.

Fishing mortality: No data.

Recruitment: Very poor year classes 1987, 1988, and 1989.

State of stock: Adult stock at very low level and poor recruitment.

Forecast for 1990: Assuming fishing effort in 1990 remains at the same level as in 1989, a catch of 7,600 t in 1990 is expected (SHOT forecast).

Recommendation: To allow a rebuilding of the sprat stock, ACFM recommends the catch of sprat for 1990 to be kept at the lowest possible level.

Special comment: In this area, sprat are caught in both a directed fishery for human consumption and in the industrial fishery for mixed clupeoids.

Further management considerations are given in relation to herring in Division IIIa and Sub-divisions 22-24 in Section 3.1.3.

3.2.14 Sprat in Sub-area IV

Source of information: Report of the Industrial Fisheries Working Group, March 1990 (C.M. 1990/Assess:13).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	-	-	-	0	0	0	-	-			
Agreed TAC <sup>1</sup>	330	205	153	100	57	57	59	59			
Nominal landings	197.8	132.7	60.6	53.9	78.1	92.6	58.0 <sup>5</sup>		407.6	53.9	169.4
Catch as used by WG	88.2	77.2	50.2	16.4	33.1	92.0	65.5	-	323.4	16.4	110.8
Recruitment (age 1) (IYFS index)	512	347	659	73	807	145	4246	1751	4246	73	926

<sup>1</sup>Predicted or assumed. <sup>2</sup>Over period 1980-1989. <sup>3</sup>Division IIa (EC zone), Sub-area IV (EC zone). <sup>4</sup>1-group Division IVb. <sup>5</sup>Preliminary. Weights in '000 t.

Catches: Total landings decreased from 92,000 t in 1988 to 65,500 t in 1989 (Table 3.2.14). Catch in 1989 dominated by 1- and 2-year-old fish.

Data and assessment: Catch-at-age data available for 1989. No effort data available. Recruitment indices available from IYFS; for 1990, 1-group Division IVb only. Insufficient data for assessment or catch prediction.

Fishing mortality: No information.

Recruitment: The IYFS index indicated a very strong 1988 year class which, however, did not turn up in the catch in 1989. 1989 year class appears to be low.

State of stock: The stock is at a low level compared to the early 1980s.

### 3.2.15 Sprat in Division VIa

Source of information: Report of the Industrial Fisheries Working Group, March 1990 (C.M. 1990/Assess:13).

Catches: Landings for 1980-1989 given in (Table 3.2.15).

### 3.2.16 Sprat in Divisions VII d,e

Source of information: Report of the Industrial Fisheries Working Group, March 1990 (C.M. 1990/Assess:13).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>1</sup>	Min <sup>1</sup>	Mean <sup>1</sup>
Recomm. TAC	-	-	-	-	-	-	-	-			
Agreed TAC	20	20	20	5	5	5	12	12			
Nominal landings	6.9	4.5	3.8	1.2	2.7	5.5	3.4 <sup>2</sup>	-	17.7	1.2	6.6

<sup>1</sup>Over period 1980 -1989. <sup>2</sup>Preliminary. Weights in '000 t.

Catches: Total landings have decreased in 1989 (Table 3.2.16).

Data and assessment: Catch-at-age data available for the UK fishery in the Lyme Bay area. No data available for the offshore fishery. Recruitment data not available. No assessment possible.

### 3.3 Demersal Stocks in Division IIIa

#### 3.3.1 Cod in the Kattegat

Source of information: Report of the Division IIIa Demersal Stocks Working Group, February/March 1990 (C.M.1990/Assess:10).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	15.0	12.0	12.0	- <sup>3</sup>	<13	<15	10.0	7.0	-	-	-
Agreed TAC	16.4	16.0	16.0	17.0	15.5	15.0	12.5	8.5	-	-	-
Catch as used by WG	12.8	11.9	12.7	9.1	11.5	5.5	8.5	-	12.8	5.5	10.3
Sp. stock biomass	15.7	16.4	16.4	12.5	9.1	7.9	8.3	6.7 <sup>1</sup>	16.4	7.9	12.4
Recruitment (age 1)	20.6	11.3	8.8	17.4	5.5	10.0	6.3	14.6 <sup>1</sup>	20.6	5.5	12.1
Mean F(2-6,u)	1.08	1.15	1.21	1.21	1.35	0.87	1.29	-	1.35	0.87	1.16

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1983-1989. <sup>3</sup> Precautionary TAC based on recent catch levels. Weights in '000 t, recruitment in millions.

Catches: Landings have shown a decreasing trend since the late 1970s (Table 3.3.1). In the 1970s landings varied between 15,000 and 20,000 t; however, in the 1980s they declined to a minimum level of 5,500 t in 1988. Landings in 1989 increased to 8,500 t.

Data and assessment: Catch-at-age data are available from Denmark. CPUE and effort series are available from the Danish and Swedish fisheries. Recruitment indices are available from IYFS surveys. An analytical assessment was made using CPUE data from Danish and Swedish fleets and IYFS data. The assessment gives reliable results of the overall trends in stock size and level of exploitation. However, due to imprecise estimates of recruitment and terminal Fs, the assessment should be interpreted with some caution.

Fishing mortality: Fishing mortality has increased by about 50% from the 1970s to the 1980s (Figure 3.3.1). Fishing mortality has remained stable at a high level in the 1980s.

Recruitment: Recruitment figures were available from IYFS and the index for the 1989 year class was high. The estimate of the 1989 year class in the prognosis is based on information from the IYFS and on estimates from the assessment (VPA). For year classes 1990 and 1991, a value of 10 million has been assumed, this being the average of year classes 1983-1988. This short recent time period has been selected because the assessment shows a declining trend in recruitment.

State of stock: The spawning stock biomass has decreased since the late 1970s. The SSB levels in 1988 and 1989 are the two lowest on record.

#### Forecast for 1991:

Assuming  $F(90) = 1.29$ , Basis:  $F_{90} = F_{89}$ ,  $Catch(90) = 6.5$ ,  $Landings(90) = 6.5$

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	$F_{91} = 0.6 \times F_{89}$	0.77	5.0	5.1	5.1	10.5	SSB increases SSB at historically low level
B	$F_{91} = 0.8 \times F_{89}$	1.03		6.3	6.3	9.0	
C	$F_{91} = F_{89}$	1.29		7.3	7.3	7.8	

Weights in '000 t.

Continued fishing at current levels of fishing mortality will maintain SSB at a low level.

Recommendation: ACFM recommends that fishing mortality be reduced in 1991. In order to increase the spawning stock, ACFM recommends a TAC of not more than 6,300 t in 1991.



### 3.3.2 Cod in the Skagerrak

Source of information: Report of the Division IIIa Demersal Stocks Working Group, February/March 1990 (C.M.1990/Assess:10).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC <sup>3</sup>	16.0	20.0	20.0	- <sup>4</sup>	<21	- <sup>4</sup>	<23	21.0	-	-	-
Agreed TAC <sup>3</sup>	25.0	28.0	29.0	29.0	22.5	21.5	20.5	21.0	-	-	-
Catch as used by WG <sup>3</sup>	21.8	19.9	16.6	20.1	19.9	16.9	18.6	-	21.8	16.6	19.1
Sp. stock biomass	23.9	20.7	21.5	19.6	13.5	21.9	18.6	16.0 <sup>1</sup>	23.9	13.5	20.0
Recruitment (age 1)	19.9	14.6	11.9	32.5	10.8	15.9	15.0	16.7 <sup>1</sup>	32.5	10.8	18.1
Mean F(2-6,u)	1.06	0.88	0.90	1.31	1.05	0.85	1.14	-	1.3	0.8	1.0

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1983-1989. <sup>3</sup> Not including Norwegian fjords. <sup>4</sup> Precautionary TAC based on recent catch levels. Weights in '000 t, recruitment in millions.

Catches: A slight increase in landings was seen from 1988 to 1989 (Table 3.3.2). The landings have fluctuated without an apparent trend in the 1980s.

Data and assessment: Catch-at-age data are available from the Danish fisheries. CPUE series are available from Swedish demersal and Nephrops trawlers and Danish seiners, and from three size categories of Danish trawlers. Due to imprecise estimates of recruitment and difficulties in determining input Fs, the assessment should be interpreted with some caution.

Fishing mortality: Fishing mortality has been stable at a high level during the whole period for which data are available (Figure 3.3.2).

Recruitment: Recruitment shows no apparent trend in the period for which data have been available. The 1985 year class was strong whereas recruiting year classes since then have been of average strength. In last year's assessment, the 1987 year class was estimated to be strong but is now assumed to be about average.

State of stock: Spawning stock size has been relatively low in recent years and is expected in 1990 to be at the same low level as in 1987, the lowest in the period for which data are available.

#### Forecast for 1991:

Assuming  $F(90) = 1.14$ , Basis:  $F_{89}$ , Catch(90) = 18.0, Landings (90) = 18.0.

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	$F_{91}=0.6 \times F_{89}$	0.69	14	12	12	21	
B	$F_{91}=0.8 \times F_{89}$	0.92		15	15	18	
C	$F_{91} = F_{89}$	1.14		17	17	15	

Weights in '000 t.

Continued fishing at current levels of fishing mortality will maintain the SSB at a low level.

Recommendation: 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.

For the Skagerrak area, ACFM recommends that fishing mortality be reduced in 1991. In order to allow the spawning stock to increase from its expected low level in 1991, ACFM recommends that the TAC for 1991 is set no higher than 15,000 t.

### 3.3.3 Haddock in Division IIIa

Source of information: Report of the Division IIIa Demersal Stocks Working Group, February/March 1990 (C.M.1990/Assess:10).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	7.0	7.0	- <sup>3</sup>	- <sup>3</sup>	- <sup>3</sup>	- <sup>3</sup>	- <sup>3</sup>	- <sup>3</sup>	-	-	-
Agreed TAC	9.5	10.5	11.5	11.5	11.5	10.0	10.0	10.0	-	-	-
Nominal landings	10.3	8.7	8.4	4.5	3.9	2.9 <sup>1</sup>	4.0 <sup>1</sup>	-	-	-	-
Unallocated landings	-	-	-0.1	-	1.4	1.5	0.2	-	-	-	-
Discards/slipping	-	-	-	-	-	-	-	-	-	-	-
Catch as used by WG	10.3	8.7	8.3	4.5	5.3	4.4	4.2	-	12.1	4.4	7.5

<sup>1</sup> Preliminary. <sup>2</sup> Over period 1975-1989. <sup>3</sup> Precautionary TAC based on recent catch levels. Weights '000 t.

Catches: The total landing figures include industrial catches (Table 3.3.3.1). The decrease in the total landings seen from 1983 to 1989 is caused by a decrease in the industrial catches. The landings for 1983-1989 were composed of landings for consumption and industrial purposes (Table 3.3.3.2). From 1987, it is further possible to split the landings according to area (Table 3.3.3.3-3.3.3.4).

50% of the Danish landings from the Kattegat for consumption is taken by trawlers (20-59 grt) in the fourth quarter in a directed fishery (more than 40% haddock in the landings) and 50% as by-catch in other mixed human consumption trawl fisheries.

The Danish landings from the Skagerrak during 1987-1989 split into landings for human consumption and industrial purposes are given in Table 3.3.3.4, together with the Norwegian and Swedish landings, which are exclusively for consumption.

About 60% of the Danish landings for consumption is taken in a directed trawl fishery (more than 40% of haddock in the landings), the rest is taken as by-catch in other non-industrial trawl fisheries and by seiners.

Data and assessment: Catch-at-age data from the Danish human consumption landings are available and IYFS survey index. No assessment could be made.

Fishing mortality: No information.

Recruitment: IYFS surveys data were available. Year classes 1986 and 1987 were above average. The 1989 year class was very low, the second lowest on record.

State of stock: Recruit indices indicate that the stock is at a very low level.

Forecast for 1991: Not available.

Recommendation: ACFM recommends a precautionary TAC for this stock. Because of the low recruitment in recent years, the TAC should be set to average catches over the most recent years. ACFM, therefore, recommends a precautionary TAC of 4,600 t corresponding to the average landing for the years 1986-1989.

### 3.3.4 Whiting in Division IIIa

Source of information: Report of the Division IIIa Demersal Stocks Working Group, February/March 1990 (C.M.1990/Assess:10).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	22.0	22.0	- <sup>3</sup>	- <sup>3</sup>	- <sup>3</sup>	- <sup>3</sup>	- <sup>3</sup>	- <sup>3</sup>	-	-	-
Agreed TAC	22.15	22.15	22.15	22.15	17.0	17.0	17.0	17.0	-	-	-
Nominal landings	12.6	14.0	3.6	1.2	1.1	0.9	1.5 <sup>1</sup>	-	-	-	-
Unallocated landings	13.3	0.4	9.6	11.8	15.6	10.9	11.7	-	-	-	-
Catch as used by WG	25.9	14.4	13.2	13.0	16.7	11.8	13.2	-	41.7	11.8	19.9
Recruitment (age 1) <sup>4</sup>	262	500	940	1379	2178	2978	478	2255	2978	262	1263

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1980-1989. <sup>3</sup> Precautionary TAC based on recent catch levels. <sup>4</sup> IYFS data. Weights in '000 t.

Catches: The total landings were revised by the Working Group and now include industrial landings (Table 3.3.4.1). The decrease in catches is caused by a decline in the industrial catch.

The Danish landings for the period 1981-1989 are composed of landings for consumption and landings for industrial purposes (Table 3.3.4.2). The landings for consumption constitute 4-7% of the total landings and are taken as a by-catch in non-industrial trawl fisheries and by Danish seiners.

The Norwegian landings in the Skagerrak are taken mainly as by-catch in the trawl fishery. The Swedish landings in Division IIIa are taken mainly as a by-catch in other trawl fisheries.

Data and assessment: No information.

Fishing mortality: No information.

Recruitment: IYFS indices are available and indicate that the 1989 year class is the second highest index in the period 1974-1989. The level of the recruitment has been very high in the period 1985-1989.

State of stock: No information.

Forecast for 1991: Not available.

Recommendation: ACFM has no basis to recommend a change in the current TAC level.

### 3.3.5 Plaice in the Kattegat

Source of information: Report of the Division IIIa Demersal Stocks Working Group, February/March 1990 (C.M.1990/Assess:10).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	4.0	1.5	4.0	- <sup>3</sup>	- <sup>3</sup>	<3.7	<2.9	1.3	-	-	-
Agreed TAC	6.1	5.0	5.5	5.5	4.75	4.75	4.0	2.0	-	-	-
Catch as used by WG	3.6	3.6	3.4	2.7	3.2	2.0	1.7	-	-	-	-
Sp. stock biomass	7.9	7.8	8.0	7.7	7.7	4.7	4.3	3.3 <sup>1</sup>	8.0	4.3	6.9
Recruitment (age 1)	16.4	14.4	9.3	5.2	6.3	1.8	4.0	11.4 <sup>1</sup>	16.4	1.8	8.2
Mean F(3-9,u)	0.55	0.80	0.39	0.49	0.56	0.62	0.46	-	0.62	0.39	0.55

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1983-1989. <sup>3</sup> Precautionary TAC based on recent catch levels. Weights in '000 t, recruitment in millions.

Catches: Landings dropped to a level around 3,000 t in the 1980s compared to annual landings about 12,000 t in the 1970s (Table 3.3.5). In recent years, landings have decreased further and reached 1,700 t in 1989, the lowest on record. Because of the low catch rate of plaice there is little directed fishery for plaice.

Data and assessment: Catch-at-age data were available from Denmark and CPUE data from the Danish and Swedish fisheries. Analytical assessment using tuning based on CPUE data for Danish seiners, Swedish Nephrops trawlers and Swedish cod trawlers.

Fishing mortality: Fishing mortality has shown a slight decrease from around 0.6 in the 1970s to about 0.5 in the 1980s (Figure 3.3.5).

Recruitment: The index from the young fish survey predicts recruitment at a very low level. The estimated recruitment level in 1985 to 1989 was less than one fifth what it was in the 1970s.

State of stock: Because of the low level of recruitment, the SSB is at the lowest level on record (3,300 t). There are no prospects of a significant increase in SSB in the near future.

#### Forecast for 1991:

Assuming  $F(90) = 0.46$ , Basis:  $F_{90} = F_{89}$ , Catch(90) = 1.4, Landings (90) = 1.4.

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	$F_{91} = 0.8 \times F_{89}$	0.37	2.9	1.1	1.1	4.5	) SSB slightly increased ) above the lowest on record ) (3,300 t)
B	$F_{91} = F_{89}$	0.46		1.4	1.4	4.3	

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a small increase in SSB.

Recommendation: Fishing mortality should be reduced in order to allow more fish to contribute to the SSB. ACFM recommends a TAC of 1,100 t for 1991, corresponding to a reduction in fishing mortality of 20%.

Special comments: The low landings in 1988 may be due to the poor environmental conditions in the southern part of the Kattegat (lack of oxygen). The low SSB is caused by the very low level in recruitment in the 1980s, and there is no indication that recruitment and SSB will increase in the future.

Most of the spawning has stopped in the southern part of the Kattegat and in Sub-division 22 because of adverse environmental conditions.

### 3.3.6 Plaice in the Skagerrak

Source of information: Report of the Division IIIa Demersal Stocks Working Group, February/March 1990 (C.M.1990/Assess:10).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	7.0	7.0	9.0	- <sup>3</sup>	- <sup>3</sup>	- <sup>3</sup>	- <sup>3</sup>	10.0	-	-	-
Agreed TAC	10.0	10.0	12.0	14.5	14.5	15.0	15.0	11.0	-	-	-
Catch as used by WG	7.7	9.5	12.3	15.4	14.7	12.9	6.0 <sup>1</sup>	-	15.4	6.0 <sup>1</sup>	11.1

<sup>1</sup> Underestimate as catch data not available from all countries. <sup>2</sup> Over period 1983-1989.

<sup>3</sup> Precautionary TAC based on recent catch levels. Weights in '000 t, recruitment in millions.

Catches: Landings have decreased since 1985 (Table 3.3.6). The landings in 1989 are about half the 1988 landings, however the landing data from Division IIIa for 1989 are incomplete. The catch statistics for the Skagerrak have been uncertain for years.

Data and assessment: A tentative VPA was tuned using CPUE data from Danish seiners, Swedish Nephrops trawlers and Swedish cod trawlers.

Fishing mortality: The tentative assessment does not allow conclusions to be drawn on the actual fishing mortality level.

Recruitment: No recruitment indices are available.

State of stock: No reliable assessment is available.

Forecast for 1991: Not available.

Recommendation: As reported in earlier reports from ACFM, the catch data for this area are imprecise and no reliable assessment can be made. This year, the catch data are incomplete and ACFM can only refer to its advice from May 1989. ACFM, therefore, advises that the TAC for 1991 should not exceed 10,000 t.

### 3.3.7 Sole in Division IIIa

Source of information: Report of the Division IIIa Demersal Stocks Working Group, February/March 1990 (C.M.1990/Assess:10).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	-	-	-	-	-	-	<800	-	-	-	-
Agreed TAC	600	600	600	600	850	950	800	500	-	-	-
Nominal landings	319	406	548	783	830	705 <sup>1</sup>	814 <sup>1</sup>	-	-	-	-
Unallocated landings	-	-	-	-	116	53	-	-	-	-	-
Catch as used by WG	319	406	548	783	714	652	814 <sup>1</sup>	-	814	295	510

<sup>1</sup> Underestimate as catch data not available from all countries. <sup>2</sup> Over period 1980-1989. <sup>3</sup> TAC set only by the EC. Weights in t.

Catches: Recent landings of sole have been at a high level, around 750 t in 1986-1988 (Table 3.3.7). Landings in 1989 are not reported from all countries but are above 814 t. Landings at this high level were also observed in 1976-1978 but in other years landings have been between 300 and 500 t. The landings have increased since 1982.

Data and assessment: Catch-at-age data were available from Denmark for the period 1984-1989. Recruitment indices are available, as are CPUE data for 1988 and 1989. No analytical assessment was made because the time series of catch-at-age data is too short.

Fishing mortality: No analytical assessment is available but catch curve analyses indicate a fishing mortality of around 0.4. Effort in the trawl fishery is reported to have increased considerably in the second half of the 1980s, and consequently fishing mortality would have increased.

Recruitment: Recruitment indices indicate that the recruitment level has increased in the 1980s as compared to the 1960s. The 1988 year class was above average (1984-1988).

State of stock: The recruitment surveys and catch-at-age data show that recruitment has been good in recent years. Fishing effort has increased in the fishery and in the absence of an analytical assessment, ACFM cannot identify to what extent the high landings in recent years are caused by good recruitment and/or increased fishing.

Forecast for 1991: Not available.

Recommendation: At its November 1989 meeting, ACFM decided to provide final advice for 1990 at its May 1990 meeting. On this basis, ACFM recommends a precautionary TAC for this area. A status quo exploitation would give an estimated catch of around 750 t in 1990. Since effort has increased above full exploitation, ACFM recommends that the exploitation is reduced by 20%. This would correspond to a catch of 600 t in 1990. ACFM, therefore, recommends a precautionary TAC of 600 t for 1990 and a TAC of 600 t as a precautionary advice for 1991.

### 3.4 Pandalus borealis in Division IIIa and the North Sea

#### 3.4.1 Pandalus stocks

Within the North Sea and Division IIIa, shrimp fisheries are conducted in four areas:

- Skagerrak/Kattegat (Division IIIa)
- Norwegian Deeps (Division IVa, East)
- Fladen Ground (Division IVa)
- Farn Deeps (Division IVb)

The shrimp on the Fladen Ground and in the Farn Deeps are considered separate stocks on the basis of geographical separation and hydrographical considerations. There is a continuous distribution of Pandalus from the Norwegian Deeps into the Skagerrak which suggests that shrimp in the two areas may comprise a single stock. Working Group analyses [in 1989 and 1990] of length frequency data collected from the Norwegian Deeps and the Skagerrak indicate that differences in length frequency distributions exist, but are probably caused by movements of shrimp between the two areas. It is believed that larvae and small shrimp drift from the Norwegian Deeps into the Skagerrak, and that adult shrimp migrate in the opposite direction. The instrument for transport of the juvenile shrimp is the Tampen current which, during a large part of the year, moves sub-surface Atlantic water into the Skagerrak following the western and southern slope of the trench along the west and south coasts of Norway. Hence, shrimp in the Skagerrak and Norwegian Deeps should be regarded as a single stock.

Apart from issues of stock separation, problems with misallocation of landings between the Skagerrak and Norwegian Deeps areas prior to 1988 are such that only a combined assessment of the shrimp in these two regions is really meaningful.

Henceforth, ACFM analyses and advice will be given on three Pandalus stock/management units:

1. Skagerrak and Norwegian Deeps (Divisions IIIa and IVa East)
2. Fladen Ground (Division IVa)
3. Farn Deeps (Division IVb)

#### 3.4.2 Additional management measures

At the consultations between Sweden, Norway, and the EEC on the regulation of fisheries in the Skagerrak/Kattegat area in 1990, the parties decided to submit to ICES the results of experimental fisheries carried out by each party, with mesh sizes between 40 and 45 mm, to evaluate the advice given by ICES in recommending an increase in mesh size.

It was also agreed at the consultations that Norway and Sweden should submit their proposal of introducing a weekend ban in the shrimp fishery to ICES for scientific evaluation.

##### 3.4.2.1 Mesh size evaluation

ACFM reviewed two reports (one from Sweden and one from Denmark) on mesh size experiments conducted in the shrimp fishery using different mesh sizes (35 mm, 40 mm, and 45 mm) in the codend. The experimental findings indicated no difference in size composition of Pandalus taken with 35 and 40 mm codend meshes, and only marginal differences in size composition of shrimp taken with 35 and 45 mm meshes. ACFM believes that increasing the mesh size in the codend from 35 mm to 45 mm will have only little effect on the selection of Pandalus because the long tow time (7-10 hours) practiced in the commercial fishery reduces selection in the trawls drastically, at least when ordinary diamond-shaped meshes are used.

ACFM was informed that Norwegian experiments with both square meshes and separator trawls have shown improved selection of Pandalus compared to standard gear.



#### 3.4.2.2 Weekend ban

ACFM had no information to quantify the effects of a weekend ban on the Pandalus stock. If, however, such a ban leads to a reduction in fishing time that is not compensated for by larger trawls or other ways of increasing fishing power, effort will be reduced.

### 3.4.3 Pandalus borealis in Division IIIa and Division IVa East (Norwegian Deeps)

#### 3.4.3.1 Advice from the May 1990 ACFM meeting

Source of information: Report of the Working Group on the Assessment of Pandalus Stocks, February 1990 (C.M.1990/Assess:9).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	-	-	-	-	-	-	-	10.0	-	-	-
Agreed TAC	-	-	-	-	-	-	3.1 <sup>3</sup>	2.75 <sup>3</sup>	-	-	-
Discards/slipping	----- Discarding occurs, but no data are available -----										
Catch as used by WG	8.1	7.6	12.0	12.8	14.3	12.0	11.0	-	14.3	5.2	8.2
Sp. stock biomass	-	-	17.4	11.6	15.4	10.4	14.2	16.0 <sup>1</sup>	-	-	-
Recruitment (age 1)	-	-	11.3	7.1	6.2	6.0	8.6 <sup>1</sup>	-	-	-	-
Mean F(1-3,u)	-	-	0.51	0.41	0.49	0.60	0.49	-	-	-	-

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1970-1989. <sup>3</sup> Division IIIa (Skagerrak) only; EEC only. Weights in '000 t, recruitment in billions.

Catches: Annual landings since 1985 have been the highest on record, reaching a peak of 14,300 t in 1987. Catches declined in both 1988 and 1989 (Tables 3.4.3.1.1 and 3.4.3.1.2).

Data and assessment: Age-based VPA. Data on age compositions derived by transforming quarterly length frequency distributions (1984-1989) into age groups, and performing VPA on an annual basis. VPA tuned with effort data from Danish, Norwegian, and Swedish fleets.

Fishing mortality: Fishing mortality has been relatively stable, varying between 0.4 and 0.6 during the 5-year period covered in the assessment.

Recruitment: The 1989 year class appears to be very strong. The 0-group abundance index in the 1989 Norwegian trawl survey was the highest value ever observed. Based on relating the trawl survey indices with VPA results, the size of the 1989 year class as 1-group may be more than twice as large as the largest year class previously observed. However, the absolute strength of the 1989 year class is still uncertain.

State of the stock: The strong recruitment of the 1989 year class will increase spawning stock biomass in 1991 to a record-high level.

Forecast for 1991: Forecast will be provided at November 1990 ACFM meeting.

Recommendation: Due to uncertainties concerning the absolute size of the 1989 year class and the magnitude of the 1990 catch level, ACFM postpones advice on this stock until the November 1990 ACFM meeting. By that time, more complete information will be available on the 1990 catch, as will further data on the strength of the 1989 year class from the October 1990 Norwegian trawl survey.

Special comments: The 1989 year class will comprise the major portion of the landings in 1990-1992 (~50-70%, by weight). Hence, TAC advice for 1991 will depend critically on the estimated abundance (and catch) of this cohort in 1990.

### 3.4.3.2 Pandalus borealis in Division IIIa and Division IVa East (Norwegian Deeps): Advice from the October/November 1990 ACFM meeting

Source of information: Report of the Working Group on the Assessment of Pandalus Stocks, February 1990 (C.M.1990/Assess:9) and Working Document.

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	-	-	-	-	-	-	-	10.0	-	-	-
Agreed TAC	-	-	-	-	-	-	3.1 <sup>3</sup>	2.75 <sup>3</sup>	-	-	-
Discards/slipping	-----Discarding occurs, but no data are available-----										
Catch as used by WG	8.1	7.6	12.0	12.8	14.3	12.0	11.0	-	14.3	5.2	8.2
Sp. stock biomass	-	-	17.4	11.6	15.4	10.4	14.2	16.0 <sup>1</sup>	-	-	-
Recruitment (age 1)	-	-	11.3	7.1	6.2	6.0	8.6	8.0 <sup>1</sup>	-	-	-
Mean F(1-3,u)	-	-	0.51	0.41	0.49	0.60	0.49	-	-	-	-

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1970-1989. <sup>3</sup> Division IIIa (Skagerrak); EEC only. Weights in '000 t, recruitment in billions.

Catches: Annual landings since 1985 have been the highest on record, reaching a peak of 14,300 t in 1987. Catches declined in both 1988 and 1989 (Tables 3.4.3.1.1 and 3.4.3.1.2).

Data and assessment: Age-based VPAs. Data on age compositions derived by transforming quarterly length frequency distributions (1984-1989) into age groups, and performing VPA on an annual basis. VPA tuned with effort data from Danish, Norwegian, and Swedish fleets.

Fishing mortality: Fishing mortality has been relatively stable, varying between 0.4 and 0.6 during the 5-year period covered in the assessment.

Recruitment: Based on abundance of 1-group Pandalus in the 1990 Norwegian trawl survey and in the catches of the first half of 1990, the 1989 year class is estimated to be of average strength (see Special comments).

State of stock: The spawning stock biomass has fluctuated between 10,000 and 17,000 t without any general trend.

#### Forecast for 1991:

Assuming status quo  $F(90) = F(89)$ ,  $Catch(90) = 12$

Option	Basis	F(91)	Predicted			Consequences/implications
			SSB(91)	Catch(91)	SSB(92)	
A	0.8 F(89)	0.39	17	10	18	SSB increases
B	1.0 F(89)	0.49		12	16	SSB stable
C	1.2 F(89)	0.59		14	14	SSB declines

Weights in '000 t.

Recommendation: All information indicates a relatively stable stock, and continued fishing at current levels of fishing mortality is estimated to give no change in SSB in 1992. Based on this, ACFM prefers that fishing mortality should not be allowed to increase, corresponding to a TAC in 1991 of no more than 12,000 t.

Special comments: The 1989 year class appeared to be very strong based on the 0-group index in the 1989 Norwegian trawl survey. However, as 1-group in the 1990 survey and in the catches taken in the first half of 1990, the year class appeared to be about average.

The difference in the estimated strength of the 1989 year class between the 1989 and 1990 surveys may be explained by the relatively high temperature in 1989. High temperatures may have led to faster growth and earlier settlement of the 0-group, resulting in an increase in catchability in the 1989 survey compared to previous years.

The relatively high natural mortality on shrimps, which is assumed to be caused by predation, may vary from year to year. This suggests that changes in the stock may be more sensitive to changes in natural mortality than to changes in the fishery. It is, therefore, possible that the reduction in the estimated strength of the 1989 year class between 1989 and 1990 may be due to natural mortality.

### 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 1990 (C.M.1990/Assess:9).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>1</sup>	Min <sup>1</sup>	Mean <sup>1</sup>
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	-	-	-	-	-	-	-	-	-	-	-
Nominal landings	-	-	-	-	-	-	-	-	-	-	-
Unallocated landings	-	-	-	-	-	-	-	-	-	-	-
Discards/slipping	----- Discarding occurs, but no data are available -----										
Catch as used by WG	7.6	4.6	5.0	3.7	8.0	1.2	3.0	-	8.0	0.3	2.9

<sup>1</sup>Over period 1970-1989. Weights in '000 t.

Catches: Landings increased to a record level in 1987, declined sharply in 1988, and increased to the long-term mean in 1989 (Table 3.4.4).

Data and assessment: Length distributions have been transformed into age compositions by quarter. Sampling of the 1989 catch was incomplete (only first two quarters and only for one country). CPUE data are available on a quarterly basis from 1984 onwards. Provisional VPAs for 1984-1989 performed on both a quarterly and annual basis, calibrated with effort data. VPA results are not entirely reliable due to wide fluctuations in effort (which make VPA calibration difficult), and the short life span of Fladen shrimp (3 years) due to a very high natural mortality rate.

Fishing mortality: Fishing mortality estimates are uncertain but suggest that fishing mortality peaked in 1987, markedly declined in 1988, and has subsequently increased. Apart from 1987, fishing mortality has generally been very much lower than natural mortality.

Recruitment: No adequate recruitment indices are available.

State of the stock: CPUE data indicate an increase in stock abundance in 1989 compared to 1988.

Forecast for 1991: Not available.

Special comments: Lack of adequate recruitment indices precludes any short-term predictions for this stock. Without such data, and given the short-life span of Fladen shrimp, annual assessments of this stock will continue to be imprecise and unreliable.

### 3.4.5 Pandalus borealis in Division IVb - the Farn Deep

Landings from this stock have fluctuated widely during the last decade (Table 3.4.5). In 1985, 8 t were reported and in 1988 catches increased to a record-high of 500 t. In 1989, landings declined by 50% to 248 t.

Little fishery data are available for this stock, and no assessment has been attempted.

### 3.5 Cod, Haddock, Whiting, and Saithe in the North Sea

#### 3.5.1 Roundfish in Sub-area IV

##### 3.5.1.1 Advice from the May 1990 ACFM meeting

Denmark and Norway requested ACFM at its meeting in May 1990 to evaluate the impact of alternative sizes of the whiting stock in the North Sea on the yield of other stocks in the area, and among these herring.

Research on biological interactions shows that whiting is a very important predator in the North Sea, and that a decrease in the whiting stock will almost certainly have a positive effect on the yield and spawning stock size of other stocks, particularly herring and haddock.

With the information available, ACFM is, however, not in the position to quantify the effect of large changes in the whiting stock size and hence to calculate the impact on the yield of other stocks.

A possible management system aimed at increasing yield from other fisheries by reducing the size of the whiting stock requires that whiting can be fished in such a way that no adverse conservation effects are created on other species. At present, it is not possible to determine areas, times, or a gear which would allow such a fishery.

ACFM recommends research be carried out to investigate the possibility of fishing whiting without an undesirable by-catch of other species.

##### 3.5.1.2 Roundfish in Sub-area IV - Overview: Advice from the October/November 1990 ACFM meeting

ACFM has stated repeatedly in previous reports that the levels of exploitation on the North Sea stocks of cod, haddock and whiting are very high. Most of the catch consists of 1- and 2-year-old fish which are largely immature. Fewer than one third of the fish present at the start of a year survive to the end of the year. For cod, for example, less than 10% of a year class survives from age 1 (when they are almost all immature) to age 3 (when they begin to mature). This exploitation level results in yields which are far below the potential and the catch in each year depends almost entirely on the highly variable abundance of the recruiting year class. The low survival rate of fish to ages at which they become mature results, on average, in low spawning stock biomass with consequent concern about the production of sufficient recruits to maintain stock biomass. Furthermore, given the current state of the stocks, the prediction of near-future stock sizes and associated catches, requires precise estimation of both current stock size and recent recruitments which is very difficult.

In addition to these problems, the quality of the data base required to carry out assessments and predictions is being eroded. Almost no sampling was carried out on the large industrial by-catch of whiting in 1989. A proportion of the 1989 landings of haddock were either not reported or were misreported as coming from Division VIa (West of Scotland). It is believed that misreporting and/or non-reporting of landings of roundfish, especially cod, has been prevalent in some countries for many years. Roundfish Working Group members have made every effort to compensate for these inaccuracies but, by the very nature of the problem, their efforts cannot be guaranteed to have been successful. Problems of this type appear to have persisted or become more severe in 1990.

Despite their reduced quality, the assessments carried out this year confirm the depleted state of the North Sea stocks of cod and haddock. The stock size of whiting has increased in recent years, despite high fishing intensity, due to recent good recruitment. The situation with saithe is less clear but it appears that spawning biomass remains at a relatively low level. Reference should be made to the appropriate Special Comments sections for more detailed discussion of the current and future state of the stocks.

In recent years, ACFM has recommended TACs which, if adhered to, should have resulted in reductions in fishing mortality. Management bodies have, in general, agreed with and implemented these recommendations and landings, as officially reported, have been in line with the agreed TACs. These TACs were designed to reduce fishing mortality and, therefore, they were set at levels considerably below the current catching capacity of the fleets so as to reduce the proportion of the stock taken from the sea. However, because the fleets did not reduce their effort in accordance with the reduced fishing opportunities implicit in the TACs, they caught quantities of fish greater than the TACs. Fish caught in excess of a TAC constraint may be officially reported, in which case the TAC is exceeded. More usually, however, the excess catches are discarded, not reported, reported as coming from some other area or are reported as some other species. The net effect of these practices is that there is no reduction in the proportion of the stock taken from the sea, i.e., there is no reduction in fishing mortality even though officially reported catches correspond well with the relevant TACs.

Given this state of affairs, ACFM feels that any TAC which it recommends would not, of itself, produce the required reduction in fishing mortality. ACFM has, therefore, refrained from making any proposals for North Sea roundfish stocks on TACs intended to reduce fishing mortality, although option tables are presented to allow management bodies to assess the consequences and implications of different TAC levels assuming that these TACs will be effective. ACFM stresses that unless fishing effort is also controlled in an appropriate manner, it is extremely unlikely that fishing mortality will be reduced.

As a first step in the appropriate direction, fishing effort in the directed fisheries on North Sea roundfish stocks, except saithe, in 1991 should be limited to 70% of the 1989 fishing effort. One way of achieving this would be to constrain the number of days fished in 1991 by each vessel exploiting North Sea roundfish in the directed fisheries to 70% of the days fished in 1989. This should reduce fishing mortality by a significant amount. The precise amount by which fishing mortality would be reduced is not certain but it should be of the order of 20-30% as advocated repeatedly by ACFM and management bodies in recent years. The reduction in fishing mortality implicit in the recommendation is not based on any specific biological reference point, nor is it such that spawning stock biomass of cod or haddock will be restored in 1991 to their respective lowest desirable levels. Given the current state of knowledge about the mechanism of multispecies effects, ACFM feels that it is unwise to advocate measures leading to a larger reduction in fishing mortality in 1991.

To move away from the critical situation for North Sea cod and haddock and to reduce the risk of such a situation arising in North Sea whiting, a permanent reduction in fishing effort is urgently required. ACFM recognises that such an effort reduction will inevitably affect fishing for other demersal species due to the mixed character of North Sea demersal fisheries but, in general, the stocks concerned will also benefit from a reduction in fishing effort.

ACFM recommends that the fishing effort in the directed fisheries on North Sea roundfish stocks, except saithe, in 1991 should be limited to 70% of the 1989 fishing effort.

#### 3.5.1.3 Separate fisheries for cod, haddock, whiting and saithe

ACFM was asked for an evaluation by season and area of which fisheries for cod, haddock, whiting and saithe should be considered as separate fisheries and was also requested to consider how it would be possible to maximise the sustainable take of whiting in the North Sea while improving technical measures to conserve cod and haddock.

Reference to the sustainable take of whiting implies investigation of various multispecies effects which the Roundfish Working Group was not equipped to carry out and ACFM is unable to comment on this aspect. Otherwise, these requests amount to identifying combinations of seasons, areas and fleets where one species predominates in the catch. To this end, The Roundfish Working Group has provided ACFM with a computer-based system for mapping or filtering of data on landings by species, fleet, statistical rectangle and quarter. Scanning of

data of this type should reveal the presence or absence of separate fisheries as defined by the user of the system. (It should be noted that the data available at present, although voluminous, are by no means comprehensive.)

An example of the type of output available from the filtering procedure is shown in Table 3.5.1.3 where all occurrences in the present data set of landings consisting of 50% or more of whiting and 10% or less of cod + haddock + saithe are recorded. Figure 3.5.1.3 shows landings and percent of total landings of saithe by French large trawlers. Rectangles in which percent of total catch exceeded 75% are indicated.

The only examples emerging from the existing data set of fisheries targetting clearly on a single roundfish species are the saithe fisheries conducted by French fleets. It is also known, but is not included in the current data set, that Norwegian fisheries also target on saithe. Some other fisheries also target mainly on one species. Examples are the Danish gillnet fishery for cod and the French fishery for whiting in the Southern Bight.

In general, it appears from examination of the current data set that most existing fisheries do not target on only one species and that the possibilities for conducting a fishery targetted on only one species are limited.

#### 3.5.1.4 Short-term effects of changes in selectivity

ACFM was requested to "assess the short-term effects of an increase in the minimum mesh size to 100, 110 and 120 mm in the North Sea roundfish fishery, taking into account all available information on the 1990 year classes".

The range of options considered was widened considerably from those originally requested to give a comprehensive review of this topic in the light of recent scientific work and of recent proposals from the Commission of the EC and others for improving selectivity.

Recent scientific work indicates that mesh size is not the only feature of gear design which affects selectivity. It is now known that selectivity is also affected by the number of meshes around the mouth of the codend and by the length of the extension piece between the main panels of the net and the codend. It was, therefore, decided to consider the effects of changes in both mesh size and number of meshes around the mouth of the codend. No investigation of the effect of changing extension length was carried out since this is the least important aspect of gear design.

The effects of all possible combinations of 5 mesh sizes (90, 100, 110, 120 and 130 mm) and 3 numbers of meshes around the mouth of the codend (120, 100, 75) were estimated. Three of the options for mesh size are those requested by the Commission of the EC. The 90 mm mesh option is required to calculate "baseline" estimates. The 130 mm option was included to simulate the effects of the recent proposal by the Commission of the EC to introduce 120 mm minimum mesh size with square-mesh netting in the top half of the codend. The options on numbers of meshes were chosen because 120 is the most usual number currently in use (required for "baseline" calculations), 100 meshes has been suggested as a possibility by UK and 75 has been proposed by the EC in conjunction with 120 mm minimum mesh size and a square-mesh top half of the codend.

In addition, because recent EC proposals for improvement of selectivity would also apply to Division VIa north of 56°N, it was decided to also estimate the effects of changing selectivity in this area.

The effect of each change in selectivity was measured by comparing predictions of catches in future years (subdivided where possible into landings for human consumption, discards and industrial by-catches) assuming no change in selectivity (the baseline estimates) with corresponding predictions incorporating selectivity changes.

Estimates of the effects of changes in gear design were made for cod, haddock and whiting. No attempt was made to estimate the effects on saithe since data on selectivity of this species are insufficient. It was assumed that the changes in gear design would occur on 1



January 1991. The starting point for the calculations was the age composition of the stock at the start of 1990. This age composition incorporates current knowledge of the abundance of the 1990 year class for each species and area investigated. Reference should be made to this year's Roundfish Working Group report (C.M. 1991/Assess:4) for a more detailed description of computational methods and assumptions.

## Results

The full results of the exercise are very voluminous (ca 350 pages) and it is not possible to present this much material in this report. A copy of the outputs was made available on floppy disk to ICES.

A summary of the results is given in Tables 3.5.1.4 to 3.5.1.9 which show, for each species and area considered, the percentage change from the baseline for the total international fleet in 1991 of human consumption landings and, where possible, discards and industrial by-catch. Also shown are the percentage changes expected in spawning stock biomass at the start of 1992.

It should be noted that the highly aggregated summary provided in this report obscures the fact that in the simulations some fleets experience larger short-term losses than those for the total international fleet, while other fleets experience lower losses. Where no change occurs in selectivity for some fleets (e.g. industrial fleets and Scottish Nephrops trawlers), these fleets increase their landings in 1991 (and further into the future) since the other fleets have left young, small fish in the sea as a result of their increase in selectivity.

It should be specifically pointed out that the estimated short-term loss of haddock landed for human consumption in the North Sea in 1991 is either zero or very low except for simulations incorporating large changes in selectivity. This is because at present that part of the stock of sizes big enough to be landed consists almost entirely of the survivors of the 1986 year class. These fish will be 5 years old in 1991 and will all be big enough to be retained by gears exhibiting increased selectivities.

### 3.5.1.5 Distribution of haddock, cod and whiting

The Commission of the EC requested a description of the seasonal distribution of 0- and 1-group haddock in the North Sea during recent years. Since this may result in a proposal for closed areas, ACFM requested the Roundfish Working Group to also consider other age groups of haddock as well as cod and whiting in the analysis to find out to what extent a closed area for young haddock might influence the fisheries for older haddock and other gadoid species.

The data used for the analysis were survey results for the years 1986 up to, and including, 1990. Data were available from which "winter" and "summer" distributions could be determined.

Figures 3.5.1.5 to 3.5.1.13 indicate the areas in which the highest concentrations of the various species and age groups occur (IYFS maps represent winter distributions and EGFS or SGFS maps represent summer distributions). 0-group haddock are widely distributed over the northwestern North Sea but are more concentrated at ages 1 and 2 and as 3+ in winter. In the summer the 3+ group can again be found over a wider area. The distribution of 1-group haddock overlaps to a great extent with the distribution of 2-group haddock and older fish. Cod is at all ages more widely distributed over the whole North Sea than haddock but only from age 2 onwards is there an overlap with the main distribution area of haddock. The main distribution area of older whiting is to the northeast of Scotland, off the northeast coast of England and in the Southern Bight. The area with the highest concentrations overlaps to a great extent the area of distribution of the haddock.

The EC also requested information on the expected distribution of 1-group haddock in 1991. Since the distribution of 1-group haddock varies considerably from year to year, it is not possible to provide this information.

### 3.5.2 Cod in Sub-area IV (North Sea)

Source of information: Report of the Roundfish Working Group, October 1990 (C.M.1991/Assess:4).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recommended TAC	<220	<215	<259	<130	125-200	148	124	113	-	-	-
Agreed TAC	240	215	250	170	175	160	124	105	-	-	-
Nominal landings <sup>3</sup>	237	197	187	157	167	n/a <sup>4</sup>	113	-	-	-	-
Unallocated landings	-3	8	6	6	8	-	6	-	-	-	-
Catch as used by WG	234	205	193	163	175	150	119	-	301	119	208
Spawning stock biomass	135	116	107	97	89	84	85	87 <sup>1</sup>	173	84	121
Recruitment (age 1)	269	534	108	581	257	201	324	161 <sup>1</sup>	800	108	390
Mean F(2-8,u)	0.89	0.85	0.82	0.86	0.86	0.83	0.86	-	0.90	0.77	0.84

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1980-1989. <sup>3</sup> Not including some cod caught as industrial by-catch. <sup>4</sup> Figures are not available from one country. Weights in '000 t, recruitment in millions.

Catches: Landings in 1989 were the lowest since 1964 and have declined continuously since 1981 (Table 3.5.2).

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

Fishing mortality: Peaked in 1982 and is still very high (Figure 3.5.2.1).

Recruitment: The 1985 year class was the last one above average. The last five year classes are below average.

State of stock: Spawning stock biomass is estimated to have reached the record low level of 84,000 t in 1988 and has remained low since then.

Forecast for 1991: (Figure 3.5.2.2)

Assuming  $F(90) = 0.86$ , Basis:  $F(89)$ ,  $Catch(90) = 142$ ,  $Landings(90) = 142$ .

Option	Basis	F(91)	SSB(91)	Predicted			Disc SSB (91) (92)	Consequences/Implications
				Landings(91)				
				Total	HC	Ind		
A	0.0 F(89)	0.00	78	0	0	0	163	SSB above target level.
B	0.4 F(89)	0.34		59	59	0	116	SSB increases from current low level
C	0.6 F(89)	0.52		82	82	0	98	
D	0.8 F(89)	0.69		102	102	0	83	SSB at low level
E	1.0 F(89)	0.86		119	119	0	71	SSB decreases further.

Continued fishing at current levels of fishing mortality will lead to a further decrease in spawning stock biomass.

Recommendation: ACFM recommends that the fishing effort in the directed fisheries on North Sea roundfish stocks, except saithe, in 1991 should be limited to 70% of the 1989 fishing effort (see Section 3.5.1.2).

Special comments: The latest assessment agrees closely with that adopted by ACFM in November 1989. Fishing mortality reached record high values in the early 1980s and has remained close to these levels. The last five year classes are all of below average abundance. If current fishing mortality is maintained, the size of the stock and the catches taken from it will remain low unless recruitment returns to the higher levels of the 1970s for a protracted period.

Detailed data for North Sea cod exist from 1963 onwards. Spawning stock biomass was low (somewhat less than 150,000 t) between 1977 and 1979 but recovered briefly in the period 1980-1982. Since then spawning stock biomass has declined to the historically low levels (ca. 85,000 t) of the last 3 years. Having observed a recovery of spawning stock biomass from levels slightly less than 150,000 t, ACFM advises this level as the "lowest desirable".

A danger of the present situation is that the low egg production associated with the current very low spawning stock biomass will require high survival of the eggs to produce even an average year class. The unbroken sequence of poor year classes in the last 5 years gives reason for great concern in this respect.

### 3.5.2.1 Effects of the Cod Box in the German Bight

Further attempts were made by the Roundfish Working Group to assess the effects of the cod box in the German Bight but, due to the lack of appropriate data and computational methods, little progress was made.

The cod box will have had much less effect than that originally intended since the original scientific recommendation to implement a minimum legal mesh size within the box was not adopted in regulations. The current legal minimum mesh size within the box is 100 mm and this will have little conservation effect on young cod. Inspection of the latest results on recent years' fishing mortality rates on 1-year-old cod reveals no effects which could be conclusively attributed to the existence of the box.

The percentage by number of the total international catch of 1- and 2-year old cod caught within the cod box is very variable from year to year and in some years, such as 1990, is very low. There is some evidence that 1-year-old cod have become less abundant in the cod box in recent years.

The overall conclusion is that the cod box will only have a significant effect when there is an abundant year class of which a significant proportion is distributed within the box, and if a mesh size of at least 120 mm is enforced within the box. There have been no abundant year classes of cod since that of 1985.

However, ACFM believes that even if the effects of the cod box are at present undetectable, they can only be positive in terms of conservation of the stock. Given the current depleted state of the North Sea cod stock, any such measures are welcome. In particular, ACFM restates its comment of last year that the presence of a box results in lower fishing intensity in this area than would otherwise be the case, i.e., if the box is removed, fishing mortality on 1-year-cod could increase further from its already high level.

ACFM notes with interest the work of the STCF Sub-group on estimation of the effects of technical measures. It is hoped that this group will soon establish a data base and computational methods to allow estimation of the effects of the cod box.

ACFM recommends that the cod box should be maintained and that the associated legal minimum mesh size should be increased to 120 mm.

### 3.5.3 Haddock in Sub-area IV (North Sea)

Source of information: Report of the Roundfish Working Group, October 1990 (C.M. 1991/Assess:4).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recommended TAC	170	172	209	239	120	185	68	50	-	-	-
Agreed TAC	181	170	207	230	140	185	68	50	-	-	-
Nominal landings <sup>3</sup>	165	134	168	167	109	104	64	-	-	-	-
Unallocated landings	7	4	-3	2	3	5	14	-	-	-	-
Landings as used by WG <sup>4</sup>	172	138	165	169	112	109	78	-	185	78	140
Industrial by-catch	13	10	6	3	4	4	2	-	22	2	10
Discards	66	75	86	52	59	62	26	-	95	26	62
Catch as used by WG	238	213	251	221	171	171	104	-	251	104	202
Spawning stock biomass	241	190	231	213	150	149	122	86 <sup>1</sup>	285	122	195
Recruitment (age 0)	63.5	16.1	22.7	45.3	5.7	10.5	12.8	53.9 <sup>1</sup>	63.5	5.7	24.1
Mean F(2-6,u)	0.94	0.99	0.93	1.05	1.00	1.05	0.95	-	1.05	0.62	0.91

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1980-1989. <sup>3</sup> Not including some haddock caught as industrial by-catch. <sup>4</sup> Includes industrial by-catch. Weights in '000 t, recruitment in thousand millions.

Catches: 1989 landings are lowest since 1962 (Table 3.5.3).

Data and assessment: Problems with misreported catches. Analytical assessment using catch, effort and survey data

Fishing mortality: Remains at a high level. Mean F in excess of  $F_{med}$  (Figure 3.5.3.1).

Recruitment: 1990 year class possibly strong but confirmation needed. Since 1983, all year classes except 1986 and 1990 are below average.

State of stock: Continues to cause concern. 1990 year class may ease pressure on the stock if it is confirmed to be above average.

Forecast for 1991: (Figure 3.5.3.2)

Assuming  $F(90) = 0.95$ , Basis: Status quo, Catch(90) = 88, Landings (90) = 63.

Option	Basis	F(91)	SSB(91)	Predicted			Disc (91)	SSB (92)	Consequences/implications
				Landings(91)					
				Total	HC	Ind.			
A	0.6 F(89)	0.57	81	44	37	7	40	174	SSB recovers to levels greater than the minimum desirable
B	0.8 F(89)	0.76		53	46	6	52	161	
C	F(89)	0.95		61	54	6	64	150	

Continued fishing at current levels of fishing mortality will lead to apparent recovery of SSB, but this is contingent on estimates of 1990 year class strength.

Recommendation: ACFM recommends that the fishing effort in the directed fisheries on North Sea roundfish stocks, except saithe, in 1991 should be limited to 70% of the 1989 fishing effort (see Section 3.5.1.2).

Special comments: The latest assessment agrees closely with that adopted by ACFM in November 1989.

According to officially reported statistics, landings in 1989 were 66,000 t (64,000 for human consumption and 2,000 as industrial by-catch). This is slightly less than the TAC for 1989 of 68,000 t. However, it is estimated that the actual landings were 78,000 t and it is on this basis that the assessment of the current state of the stock and associated predictions were carried out. The estimated total weight of the catch (human consumption landings + discards + industrial by-catch) in 1989 is 104,000 t which is by far the lowest value since 1960. Fishing mortality in 1989 remains high.

The year classes of 1985, 1987, 1988 and 1989 are all of below average abundance while that of 1986 is only of average abundance (average for period 1970-1989). There are indications that the 1990 year class is strong. This estimate has been included in predictions of catches and biomasses for 1991 and 1992. However, the estimate of abundance of the 1990 year class is based largely on the results of only one survey and needs to be confirmed by further surveys to be carried out in 1991.

The succession of poor recruitments has led to a decline in spawning biomass from 150,000 t in 1987 to 86,000 t at the start of 1990. This is well below the "lowest desirable" level of 100,000 tonnes advised by ACFM. The 1990 year class will be largely immature in 1991 and hence no increase in spawning stock biomass can be expected in that year. In 1991, the 1990 year class will become large enough to be retained by fishing gears but not to be legally landed. Thus it is expected that large quantities of 1-year-haddock will be discarded and human consumption landings will remain low in 1991. If the 1990 year class is abundant, as currently estimated, spawning biomass at the start of 1992 will be considerably greater than that estimated for 1990.

An abundant year class will improve the North Sea haddock stock in the medium term, but it must be emphasised that this stock remains very heavily exploited. The prospective dependence of the spawning stock biomass on a single year class (1990) makes the stock very vulnerable to future recruitment variability and the possibility of another sudden decline. A permanent reduction in fishing mortality will reduce this vulnerability.

### 3.5.4 Whiting in Sub-area IV (North Sea)

Source of information: Report of the Roundfish Working Group, October 1990 (C.M.1991/Assess:4).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recommended TAC	125	102	118	135	127	134	115	130	-	-	-
Agreed TAC	170	149	160	135	135	120	115	125	-	-	-
Nominal landings	99	99	72	67	65	61	40	-	109	40	81
Unallocated landings	4	-3	-3	9	13	39	44	-	50	-3	19
Landings as used by WG <sup>3</sup>	103	96	69	76	78	100	84	-	146	69	99
Industrial by-catch	24	19	15	18	16	49	43	-	67	15	33
Discards/slipping	48	39	28	78	53	28	35	-	78	26	45
Catch as used by WG	151	135	97	154	132	127	119	-	212	97	144
Spawning stock biomass	303	247	242	266	278	283	365	474 <sup>1</sup>	474	242	324
Recruitment (age 0)	32409	23861	47608	39166	50113	72010	48155	49756 <sup>1</sup>	72010	20635	37829
Mean F(2-6,u)	0.706	0.871	0.816	0.878	1.067	0.783	0.691	-	1.07	0.59	0.80

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1980-1989. <sup>3</sup> Includes industrial by-catch. Weights in '000 t, recruitment in millions.

Catches: Decreasing trend in catch and landings (Table 3.5.4). Slight decrease of industrial by-catch compared to 1988, but it was at a higher level than human consumption landings. Discards are at a fairly low level.

Data and assessment: Analytical assessment of catch-at-age data using CPUE and recruit survey indices. Discard data available are incomplete.

Fishing mortality: Has decreased and is currently at its lowest level since 1982 (Figure 3.5.4.1). No trend in human consumption landings F. Industrial F at its highest level since 1981.

Recruitment: The 1988 year class was the strongest one since 1974. The 1989 year class is at an average level (average for the period 1970-1989).

State of stock: SSB at its highest level since 1981. Current F below  $F_{med}$ .

Forecast for 1991: (Figure 3.5.4.2)

Assuming  $F(90) = 0.69$ , Basis:  $F(90) = F(89)$ , Catch(90) = 204, Landings (90) = 150.

Option	Basis	F(91)	SSB(91)	Predicted			Disc (91)	SSB (92)	Consequences/implications
				Landings(91)					
				Total	HC	Ind			
A	$F_{91}=0.6F_{89}$	0.41	444	128	55	73	32	458	In all cases decline in SSB from 1990 level
B	$F_{91}=0.8F_{89}$	0.55		141	69	71	41	436	
C	$F_{91}=F_{89}$	0.69		152	83	70	50	416	

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a sharp increase in the landings but the SSB will decline somewhat.

Recommendation: ACFM recommends that the fishing effort in the directed fisheries on North Sea roundfish stocks, except saithe, in 1991 should be limited to 70% of the 1989 fishing effort (see Section 3.5.1.2).

Special comments: Following recent good recruitment, the stock of whiting in the North Sea has increased from the rather low levels of the mid-1980s.

It should be noted that prediction of industrial by-catch, human consumption landings and discards presented in the options table are carried out simultaneously by the computer program used for this purpose. It is assumed in every option that the fishing mortality rate generated by the industrial fishing fleet will remain unchanged from that in the last data year (in this case, 1989). The various options assume that the fishing mortality rate generated by the fleet fishing for human consumption will change in accordance with the multiplying factors indicated in the options table. It is not the case that total catch is first calculated and then subdivided to arrive at predicted landings, discards and industrial by-catch.

In the summary table for this stock there are high values for "unallocated landings". These are the differences between official catch figures and corresponding values used by Working Groups.

There is in principle no requirement at present to reduce fishing mortality on North Sea whiting. However, if fishing mortality of cod and haddock are to be reduced, it is an inevitable consequence that fishing mortality of whiting will also decline since the three species are caught in a mixed fishery. The ACFM recommendation to reduce fishing effort must, therefore, also be applied to whiting.



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

Source of information: Report of the Roundfish Working Group, October 1990 (C.M.1991/Assess:4):

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recommended TAC	131	160	195	195	<198	156	170	120	-	-	-
Agreed TAC	158	180	200	240	173	165	170	120	-	-	-
Nominal landings <sup>3</sup>	159	182	194	167	154	112	92	-	-	-	-
Unallocated landings	10	16	6	-3	-5	-7	-	-	-	-	-
Industrial by-catch	1	6	8	1	4	1	2	-	-	-	-
Catch as used by WG	169	198	200	164	149	105	92	-	200	92	145
Spawning stock biomass	171	136	104	99	107	125	122	166 <sup>1</sup>	204	99	147
Recruitment (age 1)	466	428	163	230	245	235	230	232 <sup>1</sup>	466	163	268
Mean F(3-6,u)	0.61	0.76	0.83	0.89	0.62	0.51	0.39	-	0.89	0.31	0.57

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1979-1989. <sup>3</sup> Includes industrial by-catch. Weights in '000 t, recruitment in millions.

Catches: Since 1986, the catches have been 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. Interpretation of data difficult and uncertain.

Fishing mortality: Has increased up to 1986 with a shift towards heavy exploitation of fairly young fish. Fishing mortality has decreased since 1986 (Figure 3.5.5.1).

Recruitment: No fishery independent estimates of recruitment are available.

State of stock: The stock has been declining, but it now seems to be recovering. The assessment is, however, uncertain.

Forecast for 1991: (Figure 3.5.5.2).

Assuming  $F(90) = 0.40$ , Basis:  $F(89)$ ,  $Catch(90) = 116$ ,  $Landings(90) = 116$ .

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	0.6 F(89)	0.24	206	82	82	274	] SSB increases
B	0.8 F(89)	0.32		104	104	253	
C	F(89)	0.40		125	125	233	

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to further recovery of SSB.

Recommendation: ACFM prefers that fishing mortality should not be allowed to increase, corresponding to a TAC for 1991 of 125,000 t.

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

#### 3.6.1 Roundfish in Sub-areas VI and VII: Overview

##### Roundfish in Sub-area VI

The assessment of the state of the roundfish stocks in Division VIa is less certain than that for the North Sea. Levels of biological sampling of landings and discards are too low in certain countries and some of the catch statistics are inadequate. In addition, fishery-independent indices of recruitment from research vessel surveys are only just becoming available from Scotland. No other nation conducts appropriate surveys in this area. It is therefore difficult to estimate the abundance of recently-recruited year classes.

The poor state of roundfish stocks in the North Sea is described in Section 3.5.1.2 of this report. Fundamentally, the same problems exist in the roundfish stocks to the west of Scotland. Fishing mortality rates on the roundfish stocks in this area are similar to those in the North Sea. In addition, current spawning stock biomass of haddock, whiting and saithe are all at low levels compared to historical estimates, and that of cod has recovered recently only because of the presence of the abundant 1986 year class. The biomasses of the fishable stocks and the catches associated with them are all very dependent on the abundance of recruiting year classes.

There is no indication that the TACs agreed for this area have resulted in a reduction in fishing mortality and associated improvement in the state of the stocks. The most likely reason for this is the same as that explained more fully in Section 3.5.1.2, i.e., TACs have not restricted fishing effort and hence do not restrict catches - at best, they only restrict landings.

In the light of this, ACFM has decided not to recommend TACs for 1991 for these stocks. Management bodies are presented with option tables from which the consequences of TACs can be assessed assuming that the TAC would be effective. However, ACFM is of the opinion that fishing mortality rates can only be reduced on these stocks by direct control of fishing effort.

As in the North Sea, a permanent reduction in fishing effort is urgently required in Sub-area VI.

ACFM, therefore, recommends that fishing effort on the roundfish stocks in Division VIa, except saithe, in 1991 should be limited to 70% of the 1989 fishing effort. The consequences of this recommendation and the reasons for its specification are the same as those for the North Sea stocks of roundfish (see Section 3.5.1.2).

The stock of haddock at Rockall (Division VIb) is an exception to the considerations given above. The biomass of this stock appears to have always varied widely from year to year being high following the occasional good recruitment but generally being low. The only other roundfish species which occurs in this area in significant quantities is saithe which is (largely) exploited separately from haddock. In such a case management of the stock by implementation of a TAC is appropriate.

##### Roundfish Sub-area VII

Data required to carry out analytical assessments of cod and haddock in Sub-area VII except for Divisions VIIf,g and VIIa (which are dealt with by the Irish Sea and Bristol Channel Working Group) are either of very poor quality or are non-existent. In principle, data exist which would allow analytical assessment cod and whiting only for Division VIId. Of these data sets, the Roundfish Working Group has indicated that the one for cod is so poor that it should not be used. An analytical assessment was presented for whiting in VIId and accepted by ACFM even though it is obviously of very poor quality.

### Stock Unit Definitions

The relationships between stocks of cod and whiting in Divisions VIId and VIIe and stocks of the same species in the North Sea were investigated by the Roundfish Working Group. This problem has been addressed previously and few new data are available.

The evidence suggests that cod and whiting in the western Channel (Division VIIe) have little or no relationship with those in the southern North Sea (Division IVc). However, the evidence is conflicting with regard to the relationships between the eastern Channel (Division VIId) and the southern North Sea. There are undoubtedly links between cod in these two areas, as shown by the CPUE data and the tagging data. However, for whiting the recruitment at age 1 is uncorrelated in the two areas, although the reliability of the whiting assessment for Division VIId is less than that for the North Sea. The relationships between cod and whiting in the eastern and western Channel are also unclear. ACFM, therefore, has no basis at present for proposing stock units different from those currently used for assessment purposes.

The present management unit covers all stocks in Divisions VIIb-k, which includes several assessment units, and areas for which precautionary TACs are in place. This has led to problems in management in the recent past, and a more satisfactory arrangement would be desirable. However, it is now apparent that the state of the available data and the lack of biological information for this area make it impossible, at present, to propose a solution.

ACFM notes the existence of a study group set up by France and England to study the fish and fisheries in the Channel. As part of its work in 1991, this Group will be investigating the question of stock units, and ACFM will ask the Group for advice.

### 3.6.2 Cod in Division VIa (West of Scotland)

Source of information: Report of the Roundfish Working Group, October 1990 (C.M.1991/Assess:4).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recommended TAC	25.8	23.0	27.0	25.0	22.0	16.0	16.0	15.0	-	-	-
Agreed TAC <sup>3</sup>	27.0	25.0	25.0	25.0	22.0	18.4	18.4	16.0	-	-	-
Nominal landings	21	21	19	12	19	19	14	-	-	-	-
Unallocated landings	-	-	-	-	-	1	3	-	-	-	-
Catch as used by WG	21	21	19	12	19	20	17	-	-	-	-
Spawning stock biomass	33	31	24	19	21	29	30	30 <sup>1</sup>	39	19	29
Recruitment (age 1)	9	15	6	13	31	7	15	11 <sup>1</sup>	21	6	14
Mean F(2-5,u)	0.80	0.91	1.00	0.80	0.87	0.75	0.70	-	1.0	0.70	0.82

<sup>1</sup>Predicted or assumed. <sup>2</sup>Over period 1980-1989. <sup>3</sup>TAC is for the whole of Sub-area VI. Weights in '000 t, recruitment in millions.

Catches: Landings in 1989 have decreased to the second lowest level during the past decade (Table 3.6.2).

Data and assessment: Analytical assessment based on catch-at-age data, CPUE data and research-vessel data. Recruitment indices from CPUE data and survey data in Division VIa.

Fishing mortality: Increased to reach a peak in 1985, but appears to have declined slightly. Current F is slightly above F<sub>med</sub> (Figure 3.6.2.1).

Recruitment: After a strong 1986 year class the three following year classes are close to average.

State of stock: The spawning stock has recovered from the low level of 1986.

Forecast for 1991: (Figure 3.6.2.2)

Assuming F(90) = 0.70, Basis: F(89), Catch(90) = 19, Landings (90) = 19.

Option	Basis	Predicted					Consequences/implications
		F(91)	SSB(91)	Catch(91)	Landings(91)	SSB(92)	
A	0.4 F(89)	0.28	30	8	8	42	SSB increase
B	0.6 F(89)	0.42		12	12	37	
C	0.8 F(89)	0.56		15	15	33	
D	1.0 F(89)	0.70		18	18	29	SSB stable

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to stable spawning stock biomass.

Recommendation: ACFM recommends that fishing effort on the roundfish stocks in Division VIa, except saithe, in 1991 should be limited to 70% of the 1989 fishing effort (see Section 3.6.1).

### 3.6.3 Cod in Division VIb (Rockall)

Landings are small but have increased somewhat in recent years (Table 3.6.3). 1,000 t could be added to the TAC for Division VIa to provide a TAC for the whole of Sub-area VI.

### 3.6.4 Haddock in Division VIa (West of Scotland)

Source of information: Report of the Roundfish Working Group, October 1990 (C.M.1991/Assess:4).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recommended TAC	<14.4	<27.0	<25.0	-	<23.0	25.0	15.0	14.0	-	-	-
Agreed TAC <sup>3</sup>	45.0	40.0	36.0	34.5	32.0	35.0	35.0	24.0	-	-	-
Nominal landings	31	28	25	20	27	21	22	-	31.3	13.9	23.6
Unallocated landings	-2	2	-1	-	-	-2	-5	-	30	13	22.7
Landings as used by WG	29	30	24	20	27	19	17	-	-	-	-
Discards/slipping	7	16	17	7	16	9	3	-	17	3	10.5
Catch as used by WG	36	46	42	27	43	28	20	-	46	17	33.2
Spawning stock biomass	90	66	71	64	54	45	39	25 <sup>1</sup>	105	31	64
Recruitment (age 0)	463	87	66	307	31	44	61	305 <sup>1</sup>	463	44	126
Mean F(2-6,u)	0.49	0.72	0.65	0.43	0.85	0.65	0.73	-	0.73	0.38	0.59

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1980-1989. <sup>3</sup> TAC is set for Divisions VIa and VIb combined. Weights in '000 t, recruitment in millions.

Catches: Continue to decline and are currently at a low level (Table 3.6.4).

Data and assessment: Some uncertainty due to misreporting of catches. Catch, effort and research vessel data used in analytical assessment.

Fishing mortality: Remains at a high level and is considerably in excess of  $F_{med}$  (Figure 3.6.4.1).

Recruitment: 1990 year class is provisionally estimated to be strong but this is dependent on the Scottish GFS 0-group index for 1990 in the North Sea. Year classes 1984-1989 have been poor except for 1986 year class.

State of stock: Spawning stock biomass is currently very low.

Forecast for 1991: (Figure 3.6.4.2)

Assuming  $F(90) = 0.73$ , Basis:  $F(89)$ ,  $Catch(90) = 16$ ,  $Landings(90) = 12$ .

Option	Basis	F(91)	Predicted					Consequences/implications
			SSB (91)	Catch (91)	Landings(91)	Disc (91)	SSB (92)	
A	0.6 F(89)	0.44	18	15	7	8	39	SSB increases to 1989 level
B	0.8 F(89)	0.58		19	8	11	35	SSB increases to near 1989 level
C	F(89)	0.73		23	10	13	31	SSB increases above 1990 level

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to SSB at start of 1992 greater than values for 1990 and 1991, but still at low level.

Recommendation: ACFM recommends that fishing effort on the roundfish stocks in Division VIa, except saithe, in 1991 should be limited to 70% of the 1989 fishing effort (see Section 3.6.1).

### 3.6.5 Haddock in Division VIb (Rockall)

Source of information: Report of the Roundfish Working Group, October 1990 (C.M.1991/Assess:4).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recommended TAC	30.0	20.0	8.0	5.0	10.0	10.0	18.0	5.5	30	5	13.3
Agreed TAC	Included in Sub-area VI combined TAC										
Nominal landings	0.4	2.6	9.3	4.8	8.0	7.6	6.3	-	9.3	0.4	4.84
Unallocated landings	Not known										
Discards/slipping											
Catch as used by WG	0.4	2.6	9.3	4.8	8.0	7.3	6.3	-	9.3	0.4	4.84
Spawning stock biomass	-	-	17.6	8.4	20.2	15.2	12.4	12.4 <sup>1</sup>	20.2 <sup>3</sup>	8.4 <sup>3</sup>	14.76 <sup>3</sup>
Recruitment (age 1)	-	-	77.0	9.8	23.8	24.3	18.9	27.5 <sup>1</sup>	-	-	-
Mean F(1-10,u)	-	-	0.43	0.81	0.92	0.78	0.74	-	0.92	0.43	0.74

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1983-1989. Weights in '000 t, recruitment in millions.  
<sup>3</sup> Over period 1985-1989.

Catches: Recent catches about 6,000 - 8,000 t (Table 3.6.5). Viability of Rockall fishery depends on state of North Sea fishery and recruitment at Rockall.

Data and assessment: Analytical assessment based on catch-at-age data, effort data and research vessel survey data.

Fishing mortality: Difficult to judge the trend given short-time series. Appears to be high and increasing as suggested by effort data.

Recruitment: Fluctuates considerably. Recent recruitment appears to be fairly stable near the long-term geometric mean.

State of stock: Little historical data to make a judgement. SSB appears to be fairly stable in view of recruitment (see above).

#### Forecast for 1991:

Assuming  $F(90) = 0.74$ , Basis:  $F(90) = F(89)$ ,  $Catch(90) = 5.84$ ,  $Landings(90) = 5.84$ .

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	$F(91)=F(89)$	0.74	11.3	5.35	5.35	12.8	Little change in SSB.

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to no change in SSB in the short term. Stock heavily dependent on recruitment.

Recommendation: A precautionary TAC of 5,500 t for 1991 would allow continuation of fishing at the present intensity on this very variable stock.

Special comments: Two assessments of Rockall haddock were carried out by the Roundfish Working Group, one based on a separable model and the other based on conventional VPA. Neither of these assessments and the associated predictions were thought to be entirely acceptable. However, they both produced status quo predictions of catch of approximately the same value as a recent-years' mean landings value. It therefore makes little difference whether the Rockall haddock TAC is based on analytical results or is precautionary.

ACFM recognizes the attempts made by management bodies to ensure that TACs recommended for Rockall haddock are not taken from Division VIa.

### 3.6.6 Whiting in Division VIa (West of Scotland)

Source of information: Report of the Roundfish Working Group, October 1990 (C.M.1991/Assess:4).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recommended TAC	8.2	6.4	12.0	13.0	15.0	15.0	13.0	11.0	-	-	-
Agreed TAC <sup>3</sup>	16.0	16.4	16.4	16.4	16.4	16.4	16.4	11.0	-	-	-
Nominal landings	17	17	13	8	12	12	8	-	-	-	-
Unallocated landings	-1	-1	-	-	-	-1	-	-	-	-	-
Catch as used by WG	16	16	13	8	12	11	8	-	16	8	12
Spawning stock biomass	37	28	23	21	23	22	17	15 <sup>1</sup>	52	17	30
Recruitment (age 1)	43	68	65	51	64	41	49	54 <sup>1</sup>	192	36	65
Mean F(2-4,u)	0.53	0.77	0.91	0.67	0.75	0.88	1.04	-	1.04	0.36	0.67

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1980-1989. <sup>3</sup> TAC is set for Divisions VIa and VIb combined. Weights in '000 t, recruitment in millions.

Catches: Landings remain at a low level (Table 3.6.6). The 1989 landings are much less than both the predicted level and the TAC, and at their lowest level on record.

Data and assessment: Analytical assessment of catch-at-age data, excluding discards. CPUE data used.

Fishing mortality: Fluctuating with an upward trend. The current level is well above the mean (Figure 3.6.6.1).

Recruitment: The 1987 and 1988 year classes are far below average.

State of stock: The spawning stock biomass remains far below the average and is at its lowest level of the last 20 years.

Forecast for 1991: (Figure 3.6.6.2)

Assuming  $F(90) = 1.04$ , Basis:  $F(90) = F(89)$ ,  $Catch(90) = 10$ ,  $Landings(90) = 10$ .

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	$F(91)=0.6F(89)$	0.63	16	7	7	21	Increase in SSB
B	$F(91)=0.8F(89)$	0.83		8	8	20	Increase in SSB
C	$F(91)=F(89)$	1.04		10	10	18	SSB stable at low level

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to landings and SSB remaining at their current low levels.

Recommendation: ACFM recommends that fishing effort on the roundfish stocks in Division VIa, except saithe, in 1991 should be limited to 70% of the 1989 fishing effort (see Section 3.6.1).

### 3.6.7 Whiting in Division VIb (Rockall)

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: Report of the Roundfish Working Group, October 1990 (C.M.1991/Assess:4).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recommended TAC	23	27	26	20	23	35	20	24	-	-	-
Agreed TAC	23.0	27.0	27.8	27.8	27.8	35.0	30.0	29	-	-	-
Nominal landings	26	27	26	35	33	33	23	-	-	-	-
Unallocated landings	3	-5	1	5	-2	1	3	-	-	-	-
Catch as used by WG	29	22	27	40	31	34	26	-	40	22	27
Spawning stock biomass	57	51	61	55	51	44	28	31 <sup>1</sup>	63	28	53
Recruitment (age 1)	39	44	24	38	45	29 <sup>1</sup>	29 <sup>1</sup>	30 <sup>1</sup>	45	23	34
Mean F(3-6,u)	0.32	0.24	0.29	0.60	0.51	0.53	0.53	-	0.60	0.24	0.39

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1979-1989. Weights in '000 t, recruitment in millions.

Catches: Estimated landings have in recent years been on the level of recommended TAC except for the years 1986, 1987 and 1989 (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.

Fishing mortality: Increased sharply in 1986 and has remained at that level since then (Figure 3.6.8.1).

Recruitment: No independent estimates are available.

State of stock: The spawning stock biomass has declined since 1974 and is predicted to stay at a historically low level.

Forecast for 1991: (Figure 3.6.8.2).

Assuming  $F(90) = 0.53$ , Basis:  $F(89)$ ,  $Catch(90) = 27$ ,  $Landings(90) = 27$ .

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	0.6 F(89)	0.32	33	17	17	37	Slight recovery of SSB
B	0.8 F(89)	0.42		21	21	33	SSB stable at low level
C	F(89)	0.53		25	25	29	SSB at historically low level

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a slight increase in SSB in 1991, but in 1992 the SSB will drop to a historically low level again.

Recommendation: ACFM recommends that the fishing mortality in 1991 should be reduced by 20% to prevent any further decline in spawning stock biomass and the 1991 TAC corresponding to this objective is 21,000 t.

### 3.6.9 Cod in Divisions VIId,e

The Roundfish Working Group decided at this year's meeting that the data on cod in Division VIId were too poor to use in an analytical assessment. Since no relevant data exist for cod in Division VIId, the TAC for this area must be set on a precautionary basis. Landings are given in Tables 3.6.9.1 and 3.6.9.2.

Recommendation: ACFM recommends a precautionary TAC in 1991 in the region of of 12,000 t which reflects recent landings in this area and the apparently declining trend in landings in the last two years (1987, 1988) for which complete official data are available.

### 3.6.10 Whiting in Divisions VII d,e (English Channel)

#### 3.6.10.1 Whiting in Division VII d (Eastern English Channel)

Source of information: Report of the Roundfish Working Group, October 1990 (C.M.1991/Assess:4).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recommended TAC	-	-	-	-	-	-	-	8.0	-	-	-
Agreed TAC	Precautionary TAC for Sub-area VII excluding Division VIIa										
Nominal landings	5.3	7.1	7.8	4.8	7.2	7.8	n/a <sup>3</sup>	-	-	-	-
Unallocated landings	1.6	0.3	-0.5	0.7	-2.5	-3.4	-	-	-	-	-
Catch as used by WG	6.9	7.4	7.3	5.5	4.7	4.4	4.1	-	9.2	4.1	6.6
Spawning stock biomass	10	11	11	8	5	5	6	7 <sup>1</sup>	17	5	10
Recruitment (age 1)	61	59	9	18	35	26	35	35 <sup>1</sup>	61	9	38
Mean F(2-4,u)	0.88	0.90	0.79	1.31	1.22	1.26	0.93	-	1.31	0.66	0.98

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1980-1989. Weights in '000 t, recruitment in millions.

<sup>3</sup> No report for one country.

Catches: Decreased and are now at their lowest level (Table 3.6.10.1).

Data and assessment: Analytical assessment based on separable VPA. No recruit indices. Data of poor quality. No discard data.

Fishing mortality: Decreased since 1986 but remains still at a high level (Figure 3.6.10.1).

Recruitment: Highly variable.

State of stock: SSB is at its lowest level, but the state of stock is not clear due to poor data.

Forecast for 1991: (Figure 3.6.10.2).

Assuming  $F(90) = 0.93$ , Basis:  $F_{90} = F_{89}$ , Catch(90) = 4.5, Landings (90) = 4.5.

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	$F_{91} = 0.6F_{89}$	0.56	7.3	3.5	3.5	9.2	) Increase of SSB
B	$F_{91} = 0.8F_{89}$	0.74		4.3	4.3	8.4	
C	$F_{91} = F_{89}$	0.93		5.1	5.1	7.6	

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to increase both landings and SSB.

Recommendation: ACFM recommends a TAC for 1991 of 5,100 t which will allow continuation of fishing at current intensity.

#### 3.6.10.2 Whiting in Division VII e (Western English Channel)

No data exist on which to carry out an analytical assessment. Landings are given in Table 3.6.10.2.

Recommendation: ACFM recommends a precautionary TAC in 1991 in the region of 3,000 t which reflects landings in recent years from this area.

### 3.6.11 Other stocks in Sub-area VII

For roundfish in the following areas, insufficient data exist to allow analytical assessments. Nominal catch data are given in the tables listed below.

Species	Area	Table
Cod	VIIb,c,h-k	3.6.11.1
Haddock	VIIb,c	3.6.11.2
Haddock	VIIId,e	3.6.11.3
Haddock	VIIg-k	3.6.11.4
Whiting	VIIb,c,h-k	3.6.11.5
Saithe	VII (all Divisions)	3.6.11.6

### 3.6.12 Developments in Methods Used by Roundfish Working Group

ACFM noted with interest and approval three methods introduced this year into the Roundfish Working Group procedures. These are:

- 1) A more objective method to determine critical spawning stock biomass (Figure 3.6.12.1). Following the philosophy of estimation of  $F_{high}$  and  $F_{med}$ , "high" and "moderate" levels of recruitment and survival were plotted on the SSB/Recruitment scatter diagram. The critical SSB was determined at the point of intersection of levels of "high" recruitment and "high" survival, resulting in a critical SSB of 150,000 t which corresponds with the empirically-assumed critical SSB.
- 2) Presentation of risk curves for use by management. Figure 3.6.12.2 shows the risk, for various values of fishing effort, that the North Sea cod spawning stock biomass will fall below 100,000 t.
- 3) Use of sensitivity analysis to identify the most important parameter values incorporated in catch and biomass prediction (Figure 3.6.12.3).

### 3.7 Irish Sea/Bristol Channel and Celtic Sea Stocks

#### Assessment and management areas

The species assessed by the Irish Sea and Bristol Channel Working Group (cod, whiting, plaice, and sole) are caught in mixed fisheries in the Irish Sea, Celtic Sea, and Bristol Channel. ACFM reiterates its opinion that the management areas should be consistent for all four species and that the management areas should be:

- 1) the Irish Sea (Division VIIa), and
- 2) the Celtic Sea and Bristol Channel (Divisions VIIf and g).

While the management areas for plaice and sole correspond to these areas, the cod and whiting stocks in Divisions VIIf and g are managed as part of a much larger unit (the whole of Sub-areas VII and VIII except for Division VIIa). Since the cod and whiting stocks in other parts of Sub-areas VII and VIII are either assessed separately or not subject to analytical assessments, ACFM advises that separate TACs should be set for Divisions VIIf and g as a unit. Further comments on the assessment units for cod and whiting in Divisions VIId and are given in Sections 3.7.5 and 3.7.6.

## 3.7.1 Irish Sea cod

Source of information: Report of the Irish Sea and Bristol Channel Working Group, September 1990 (C.M.1991/Assess:1).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	10.0	10.4	8.8	10.7	10.3	10.1	13.4	15.3	-	-	-
Agreed TAC	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.3	-	-	-
Nominal landings	10.3	8.6	11.1	10.1	13.2	15.8	N/A	-	-	-	-
Unallocated landings	-0.3	-0.3	-0.6	-0.2	-0.3	-1.7	N/A	-	-	-	-
Discards/slipping	none recorded										
Catch as used by WG	10.0	8.4	10.5	9.9	12.9	14.2	12.1	-	14.9	6.3	10.1
Sp. stock biomass	8.3	6.3	6.1	5.8	6.1	5.7	6.1	4.8 <sup>1</sup>	10.3	5.7	7.4
Recruitment (age 1)	4.3	6.4	6.5	5.2	15.1	6.7	3.1 <sup>1</sup>	4.9 <sup>1</sup>	15.1	2.7	6.8 <sup>3</sup>
Mean F(2-6,u)	0.84	0.81	0.88	0.91	0.97	1.05	1.14	-	1.14	0.53	0.80

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1968-1989. <sup>3</sup> Over period 1968-1988. Weights in '000 t, recruitment in millions.

Catches: Recently high due to the 1986 year class (Table 3.7.1), and are now due to decrease. Did not reach the TAC in 1989.

Data and assessment: Analytical age-based assessment tuned with two fleets (Northern Ireland and England/Wales); recruitments estimated from recruit surveys. CPUE data conflicting, so the assessment is rather uncertain.

Fishing mortality: At a record high level in 1989 (see Special comments) (Figure 3.7.1).

Recruitment: The 1988 and 1989 year classes are estimated to be below average and it should be noted that a significant percentage of the predicted catch in 1991 is contributed by them.

State of stock: See Special comments that express concern about the predicted very low levels of SSB and high fishing mortality. It should be noted that at recent exploitation levels, the record 1986 year class has given no long-term benefit to the stock.

Forecast for 1991:

Assuming F(90) = 1.14 Basis: F(89), Catch(90) = 9.5, Landings (90) = 9.5

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	0.54F(89)	0.62	4.2	5.2	5.2	5.8	Restoration of SSB by 1992 to previous minimum of 5,800 t.
B	0.66F(89)	0.75	3.9	6.0	6.0	4.8	Prevention of further decline in SSB
C	0.8F(89)	0.92	3.6	6.9	6.9	3.9	SSB reduced to 70% of previous minimum
D	1.0F(89)	1.14	3.2	8.0	8.0	2.9	SSB reduced to half its previous minimum

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to reduction in catches and historically low SSBs.

Recommendation: ACFM recommends that SSB should not be allowed to decline below its present level of 4,800 t and, therefore, recommends a TAC for 1991 of 6,000 t. This implies a reduction in F of 35% compared with 1989.

Special comments: The assessment carried out this year is very different from that given in last year's ACFM report, in which it was predicted that fishing mortality would drop in 1989 to its lowest recorded level. In the new assessment fishing mortality in 1989 is estimated to have been the highest on record and almost double that predicted. This change in perception of the state of the stock can be explained by the fact that the catch rates in 1989 for one of the fleets (Northern Ireland) were simply much lower than expected. ACFM is not in a position to explain why this has occurred but notes that the two series of catch per unit effort data on which the assessment is based conflict. This means that the validity of the assessment is rather uncertain, but ACFM emphasizes that the assessment makes the best resolution between the conflicting data sets. ACFM, therefore, considers that it would be imprudent to discount the results of the assessment simply because it is so different from last year's.

The expected catch in 1990 as estimated in the current assessment is 9,465 t. Northern Ireland catches in the first six months, prorated to the total annual international catch, predict a catch of about 10,000 t. This was considered supportive of the current assessment.

The effect of continuing fishing at the high fishing mortality level of 1989, aggravated by two predicted below-average year classes of 1988 and 1989, is predicted to result in SSBs of 4,800 t in 1990, 3,200 t in 1991, and 2,900 t in 1992. These are well below any previously experienced SSBs in the past 20 years.

ACFM is concerned that if the artificially high TAC set for cod in the Irish Sea in recent years attracts new effort, because of restrictions elsewhere, the extra fishing mortality will drive the SSB even lower.

In the past, ACFM has advised that effects on the stock of Nephrops should be considered when giving advice on cod. The current stock sizes of cod, however, are much lower than previously, and the mortalities are much higher. ACFM is, therefore, not in a position to determine whether considerations for the Nephrops stock are required given the low level of the cod stock.

## 3.7.2 Irish Sea whiting

Source of information: Report of the Irish Sea and Bristol Channel Working Group, September 1990 (C.M.1991/Assess:1).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	12.0	10.0	13.4	16.0	16.0	12.0	11.0	8.3 <sup>3</sup>	-	-	-
Agreed TAC	18.2	18.2	18.2	18.2	18.2	18.2	18.2	15.0	-	-	-
Nominal landings	10.8	12.5	16.8	10.0	11.7	11.5	N/A	-	-	-	-
Unallocated landings	-0.3	-1.0	-0.8	+	-1.0	-1.5	N/A	-	-	-	-
Discards from <u>Nephrops</u> fishery	1.8	3.7	2.3	2.3	4.4	2.1	2.0	-	-	-	-
Catch as used by WG	12.3	15.2	18.2	12.4	15.1	12.1	13.1	-	20.6	12.1	15.3
Sp. stock biomass	9.1	8.2	10.6	7.3	7.7	9.5	6.4	5.0 <sup>1</sup>	17.4	6.4	10.4
Recruitment (age 0)	184	133	112	189	99	130 <sup>1</sup>	142 <sup>1</sup>	127 <sup>1</sup>	189	68	121 <sup>4</sup>
Mean F(2-6,u)	1.08	1.14	1.21	1.22	0.96	1.06	1.42	-	1.42	0.83	1.10

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1980-1989. <sup>3</sup> Not including discards from the Nephrops fishery. <sup>4</sup> Over period 1980-1987. Weights in '000 t, recruitment in millions. + less than 50 t.

Catches: Fairly stable in recent years, apart from 1985 (Table 3.7.2).

Data and assessment: Age-based. Assessment uncertain. CPUE series available for two fleets but the resulting assessment was rejected due to unrealistic results. The assessment was redone matching fishing mortality to the international effort index. Recruitment estimated from recruit surveys.

Fishing mortality: Fishing mortality is estimated to be extremely high and at its highest recorded level (Figure 3.7.2).

Recruitment: Incoming recruitments appear average. 1987 year class confirmed to be below average.

State of stock: A historically low SSB is forecast for 1990 and 1991 assuming the estimate of the present fishing mortality to be correct.

Forecast for 1991:

Assuming  $F(90) = 1.39$ , Basis:  $= F(89)$ , Catch(90) = catch including discards not calculated, Landings (90) = 9.5

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	0.63 x F(89)	0.87	5.4	Not calculated	6.4	6.4	Recovery of SSB by 1992
B	0.8 x F(89)	1.11	5.1	Not calculated	7.6	5.3	Historically low SSB, but SSB decline halts
C	1.0 x F(89)	1.39	4.7	"	8.9	4.3	Continuing decrease in SSB to a level below recorded minimum

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to historically low SSB of 4,300 t in 1992.

Recommendation: As SSB is expected to decrease even further at the present fishing mortality rate, ACFM recommends a TAC in 1991 of 6,400 t to allow the stock to rebuild to its 1989 level.



### 3.7.3 Irish Sea plaice

Source of information: Report of the Irish Sea and Bristol Channel Working Group, September 1990 (C.M.1991/Assess:1).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	3.5	3.1	4.0	5.0	5.0	4.8	5.8	5.1			
Agreed TAC	4.5	4.5	5.0	5.0	5.0	5.0	5.8	5.1			
Nominal landings	3.6	4.2	6.1	4.6	5.6	4.4	N/A	-			
Unallocated landings	+	+	-1.0	+	0.4	0.4	N/A				
Discards	-	-	-	0.3	0.3	0.2	0				
Catch as used by WG	3.6	4.2	5.1	4.8	6.2	5.0	4.4		6.2	2.9	4.2
Sp. stock biomass	4.7	5.5	6.5	6.9	6.3	4.8	4.5	4.4 <sup>1</sup>	10.6	3.2	6.8
Recruitment (age 1)	21.3	21.9	15.6	18.2	19.1	21.8 <sup>1</sup>	14.3 <sup>1</sup>	14.7 <sup>1</sup>	34.1	8.5	17.6
Mean F(3-8,u)	0.55	0.46	0.52	0.55	0.70	0.74	0.70	-	0.74	0.26	0.52

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1964-1989. Weights in '000 t, recruitment in millions. + less than 50 t.

Catches: Currently near average, following the highest catch record of 6,200 t in 1987 (Table 3.7.3). Misreporting of landings, and under-reporting in 1987 and 1988 cast considerable doubt about the validity of the figures used in the assessment.

Data and assessment: Analytical age-based assessment tuned on one fleet, with recruit survey information.

Fishing mortality: Currently near record high levels (Figure 3.7.3).

Recruitment: 1987 year class above average, 1988 and 1989 below average.

State of stock: SSB has decreased since 1986 and is only 65% of the long-term average.

Forecast for 1991:

Assuming  $F(90) = 0.70$ , Basis: =  $F(89)$ , Catch(90) = 4.8, Landings (90) = 4.8

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	0.72 x F(89)	0.49	4.2	3.3	3.3	4.4	Maintain SSB at 1990 level
B	1.0 x F(89)	0.70	4.0	4.2	4.2	3.6	SSB declining to near long-term minimum

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to near record low levels of SSB.

Recommendation: To rebuild SSB to the low 1990 level, ACFM recommends a TAC for 1991 of 3,300 t.

## 3.7.4 Irish Sea sole

## 3.7.4.1 Advice from the May 1990 ACFM meeting

Source of information: Working document from Irish Sea and Bristol Channel ad hoc Working Group, Lowestoft, March 1990.

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	0.7	1.0	1.1	1.65	1.9	1.6	<1.48	1.05 <sup>4</sup>	-	-	-
Agreed TAC	1.4	1.25	1.25	1.9	2.1	1.75	1.48	1.05	-	-	-
Nominal landings	1.3	1.0	1.7	1.9	2.0	1.8 <sup>1</sup>	1.8 <sup>1</sup>		-	-	-
Unallocated landings	-0.1 <sup>3</sup>	+	-0.5 <sup>3</sup>	0.1	0.8	0.2	0.03		-	-	-
Catch as used by WG	1.2	1.1	1.1	2.0	2.8	2.0	1.8		2.8	1.1	1.6
Sp. stock biomass	3.7	3.4	5.0	6.7	8.9	7.8	7.0		8.9	3.4	5.7
Recruitment (age 2)	6.0	16.9	18.1	28.2	4.3	6.2	9.1		28.2	2.4	7.7
Mean F(3-8,u)	0.34	0.30	0.30	0.42	0.64	0.41	0.33		0.64	0.30	0.36

<sup>1</sup>Preliminary. <sup>2</sup>Over period 1970-1988. <sup>3</sup>Overreporting. <sup>4</sup>Provisional. Weights in '000 t, recruitment in millions. +Less than 100 t.

Catches: Relatively stable around 1,500 t with two peaks, one in 1980 (1,900 t) and one in 1987 (2,800 t).

Data and assessment: Analytical, age-based assessment using two series of CPUE data. Survey indices used for recruitment estimation.

Fishing mortality: Was very stable, increased sharply in 1987, but decreased again to average levels in 1989.

Recruitment: Strong 1982-1984 year classes recruited in 1984-1986. Surveys predict below-average recruitment in 1987-1988 and above average recruitment in 1989.

State of stock: SSB increased in 1986-1987 as a result of good recruitment, and remained well above average afterwards.

Forecast for 1990: At its meeting in November 1989, ACFM stated that it would reconsider its advice for 1990 in May 1990.

Option	Basis	F(90)	Predicted			Consequences/implications
			SSB(90)	Catch(90)	SSB(91)	
A Prov. TAC		0.20	6,670	1,050	6,770	Stable SSB
B $F_{90} = .90F_{89}$		0.30		1,500	6,150	SSB declining but still above average
C $F_{90} = F_{89}$		0.33		1,650	6,010	

Weights in 000't.

Continued fishing at current levels of fishing mortality will lead to no significant change in SSB.

Recommendation: Having considered all the new biological information, ACFM noted that the current level of fishing mortality has become equal to the historical levels and that this level may be considered as appropriate for this stock. ACFM, therefore, accepted that there was enough reason to revise the 1990 provisional TAC. However, in the light of the major revision of the 1989 assessment, some caution should be exercised by using a slight reduction in the current fishing mortality in the forecast. ACFM recommends a TAC of 1,500 t for 1990, which corresponds to the objective of a reduction of 10% in the fishing mortality from the 1989 level.

Special Comments: The ad hoc meeting of the Irish Sea and Bristol Channel Working Group in 1990 considered the new information available on the 1989 catch data and recruitment indices. While no revision has been made to the 1988 catch data, the new assessment implies a considerable downward revision of  $F$  compared with the assessment carried out in 1989. Since it is not possible to reconcile this difference it is appropriate to consider the new assessment with some caution. From the results of this meeting there are sufficient reasons to revise the provisional 1990 TAC. The estimated fishing mortality is only a little higher than that giving the maximum yield per recruit and is at a similar level to that experienced for many years before the recent increase. The estimated SSB in 1990 lies within the range of that experienced by this stock.

### 3.7.4.2 Irish Sea sole: Advice from the October/November 1990 ACFM meeting

Source of information: Report of the Irish Sea and Bristol Channnel Working Group, September 1990 (C.M.1991/Assess:1).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	0.7	1.0	1.1	1.65	1.9	1.6	<1.48	1.5			
Agreed TAC	1.4	1.25	1.25	1.9	2.1	1.75	1.48	1.5			
Nominal landings	1.3	1.0	1.7	1.9	2.0	1.9	N/A	-			
Unallocated landings	-0.1	+	-0.5	0.1	0.8	0.1	-				
Catch as used by WG	1.2	1.1	1.1	2.0	2.8	2.0	1.8		2.8	1.1	1.6
Sp. stock biomass	3.7	3.4	5.2	7.1	9.4	8.0 <sup>1</sup>	7.3 <sup>1</sup>	6.3 <sup>1</sup>	9.4	3.4	5.7 <sup>3</sup>
Recruitment (age 2)	6.0	16.9	18.1	28.2	4.3 <sup>1</sup>	6.2 <sup>1</sup>	7.7	4.9 <sup>1</sup>	28.2	2.4	9.3 <sup>3</sup>
Mean F(3-9,u)	0.34	0.30	0.30	0.42	0.67	0.43	0.34	-	0.67	0.30	0.33 <sup>3</sup>

<sup>1</sup>Predicted or assumed. <sup>2</sup>Over period 1970-1989. <sup>3</sup>Over period 1970-1987. Weights in '000 t, recruitment in millions. + less than 50 t.

Catches: Relatively stable around 1,500 t with two peaks, one in 1980 (1,900 t) and one in 1987 (2,800 t) (Table 3.7.4.2). Catches for the last 3 years exceeded the TACs.

Data and assessment: Analytical age-based assessments, tuned with two fleets and estimates of recruitments assisted by recruit surveys. Two techniques were used, the results of the conventional assessment are presented (see Special comments).

Fishing mortality: Fishing mortalities are near to  $F_{max}$ . Apart from 1987, the fishing mortalities appear to have been relatively stable (Figure 3.7.4.2).

Recruitment: The 1982-1984 year classes were outstanding. The 1985 and 1986 year classes appear from surveys to be below average and the 1987 year class is predicted as average.

State of stock: The analysis indicates that SSB in 1990 will lie within the range experienced by the stock since 1970.

#### Forecast for 1991:

Assuming  $F(90) = 0.33$ , Basis: TAC, Catch(90)= 1.5, Landings (90) = 1.5

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	0.9F(89)	0.31	5.7	1.30	1.30	5.4	SSB declines 26% from 1990 level
B	1.0F(89)	0.34	5.6	1.42	1.42	5.2	SSB declines 29% from 1990 level

Weights in '000 t.

Continued fishing at current levels of fishing mortality ( $F_{max}$ ) will lead to declines in SSB to below the historical average.

Recommendation: ACFM noted that the current level of fishing mortality is now close to  $F_{max}$  and that this level may be considered as appropriate for this stock. However, in the light of some uncertainties in the assessment (see Special comments), some caution should be exercised by adopting an option lower than the status quo option. ACFM, therefore, recommends a TAC of 1,300 t for 1991, which corresponds to a fishing mortality 10% lower than the 1989 level.

Special comments: Two assessments were done for the Irish Sea sole, one using the conventional Laurec-Shepherd method and one using the Extended Survivor Analysis (XSA). The XSA assessment shows lower stock sizes and recruitment in recent years as well as a different pattern of spawning stock biomass over the years. ACFM was not able to decide which assessment best represented the status of the Irish Sea sole. However, with the aim of providing advice using consistent methodology and until the question of which assessment technique provides the best reflection of stock status is resolved, ACFM is presenting the results of the conventional assessment.

The major sole fleet in the Irish Sea, the beam trawl fleet, only takes about 26% of the international plaice catch (C.M.1989/Assess:2). As a consequence of this small percentage, the advice provided for Irish Sea plaice is consistent with the advice provided for the Irish Sea sole stock.

### 3.7.5 Celtic Sea cod (Divisions VIIf and g)

Source of information: Report of the Irish Sea and Bristol Channel Working Group, September 1990 (C.M.1991/Assess:1).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	3.5	<3.7	<7.0	5-6	<6.4	7.0	8.6	9.2			
Agreed TAC	TAC covers sub-areas VII (except Division VIIa) and VIII										
Catch as used by WG	5.3	5.6	6.2	8.0	7.9	12.0	14.9	-	14.9	2.1	5.7
Sp. stock biomass	6.5	4.1	7.1	7.7	5.7	4.9	13.8	10.7 <sup>1</sup>	13.8	3.3	5.8
Recruitment (age 1)	3.5	3.6	2.5	1.9	13.2	5.4	1.3 <sup>1</sup>	2.0 <sup>1</sup>	13.2	0.5	2.9
Mean F(2-7,u)	0.68	0.60	0.57	0.90	0.92	0.81	0.95	-	0.95	0.34	0.64

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1971-1989. Weights in '000 t, recruitment in millions.

Catches: Catches in 1988-1989 were high because of the very strong 1986 year class (Table 3.7.5).

Data and assessment: Analytical age-based assessment, tuned with one fleet. Recruit indices are from Division VIIa surveys.

Fishing mortality: Fishing mortality in 1989 was at a record high level, and very much higher than assumed in last year's prediction (Figure 3.7.5).

Recruitment: The exceptional 1986 year class has been predominant in the catches. The 1987 year class is estimated to be above average, while the 1988 and 1989 year classes are estimated from surveys to be well below average.

State of stock: In 1989, the spawning stock was at its highest recorded level because of the 1986 year class, but has already decreased in 1990.

#### Forecast for 1991:

Assuming  $F(90) = 0.95$ , Basis:  $F(89)$ ,  $Catch(90) = 9.2$ ,  $Landings(90) = 9.2$

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	0.68xF(89)	0.65	6.2	4.5	4.5	5.8	SSB at long-term average
B	0.8xF(89)	0.76	6.1	5.1	5.1	5.1	Decrease in SSB
C	1.0xF(89)	0.95	5.8	5.9	5.9	4.1	Rapid decrease in SSB

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a sharp decrease in spawning stock biomass as the 1986 year class is fished out.

Recommendation: With the disappearance from the catches of the 1986 year class, the spawning stock is almost certain to decline in the short term. To prevent a continuation of this decline, however, ACFM recommends a TAC in 1991 of 4,500 t so that SSB in 1992 will not fall below its long-term average of 5,800 t.

A precautionary TAC based on recent catch levels should be set for other parts of Sub-areas VII and VIII, except Divisions VIIa,d, and e.

Special comments: ACFM reiterates its advice that TACs should be set for the region corresponding to the assessment area.

The yield-per-recruit curve shown in Figure 3.7.5 indicates that the yield per recruit obtained at the present high level of fishing mortality is very much lower than that obtained by fishing at  $F_{\max}$ .

The other consequence of the high fishing mortality is that the exceptional 1986 year class contributed to an increase in catch for only two years and has made no lasting contribution to the spawning stock.

### 3.7.6 Celtic Sea whiting (Divisions VII<sub>f</sub> and g)

Source of information: Report of the Irish Sea and Bristol Channel Working Group, September 1990 (C.M.1991/Assess:1).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	6.5	-	-	8-10	7.1	7.0	7.9	8.4			
Agreed TAC	TAC covers Sub-areas VII (except Division VII <sub>a</sub> ) and VIII										
Catch as used by WG	8.5	7.2	7.3	6.8	8.7	9.7	12.4	-	12.4	6.8	8.5
Indicative of trends only											
Sp. stock biomass	7.8	8.5	8.9	9.2	9.6	15.1	11.4	5.8 <sup>1</sup>	15.1	7.8	10.1
Recruitment (age 1)	28.7	22.8	24.5	32.2	54.0	24.5	16.4	24.3 <sup>1</sup>	54.0	16.0	27.4
Mean F(2-7,u)	1.5	1.3	1.3	1.2	1.5	1.3	1.9	-	1.9	1.1	1.4

<sup>1</sup>Predicted or assumed. <sup>2</sup>Over period 1980-1989. Weights in '000 t, recruitment in millions.

Catches: Record catches in 1989 due to the strong 1986 year class (Table 3.7.6).

Data and assessment: Analytical age-based assessment tuned with CPUE from one fleet, but results are difficult to interpret. The values of SSB, recruitment, and fishing mortality in the table above should be treated as indicative of trends only. No survey indices.

Fishing mortality: Appears to have been stable up to 1988 with a sharp increase in 1989 (see Special comments) (Figure 3.7.6).

Recruitment: The 1986 year class was a strong one, but the first estimate of the 1988 year class from its contribution to the catches indicates that it may be a poor one.

State of stock: The spawning stock biomass appears to have increased in 1988 but subsequently seems to have fallen to a low level.

Recommendation: As the spawning stock biomass appears to have decreased recently, ACFM recommends a precautionary TAC in 1991 of 8,000 t, corresponding to the mean level of catches from 1983-1988.

ACFM reiterates its advice that TACs should be set for the region corresponding to the assessment area.

Special comments: The estimated values of fishing mortality on this stock are very high, and ACFM considers that they may be unrealistic. For this reason, ACFM decided to use this assessment only as a guide in formulating its advice.



### 3.7.7 Celtic Sea plaice (Division VII f and g)

Source of information: Report of the Irish Sea and Bristol Channel Working Group, September 1990 (C.M.1991/Assess:1).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	1.0	1.2	1.3	1.6	-	-	-	~1.9			
Agreed TAC	1.2	1.2	1.8	1.8	1.8	2.5	2.5	1.9			
Nominal landings <sup>3</sup>	1.2	1.3	1.4	1.5	1.9	2.1	2.1	-			
Unallocated landings	-	+	0.4	0.2	-	-	-				
Catch as used by WG	1.2	1.2	1.8	1.7	1.9	2.1	2.1		2.1	0.8	1.4
Sp. stock biomass	1.9	1.9	2.3	3.1	4.2	4.6	5.6	5.1 <sup>1</sup>	5.6	1.3	2.6
Recruitment (age 1)	8.8	9.7	11.1	12.0	9.3	6.4 <sup>1</sup>	6.4 <sup>1</sup>	6.4 <sup>1</sup>	12.0	2.1	6.9
Mean F(3-8,u)	0.47	0.56	0.44	0.39	0.45	0.45	0.39	-	0.58	0.39	0.47

<sup>1</sup>Predicted or assumed. <sup>2</sup>Over period 1977-1989. <sup>3</sup>Figures submitted to the EC by member states. Weights in '000 t, recruitment in millions. + less than 50 t.

Catches: Increasing over recent years. The 1988 and 1989 catches were the highest in the time series (Table 3.7.7).

Data and assessment: Age-based analytical assessment tuned with one fleet. No survey indices available. Due to shortcomings in the data, the assessment is uncertain.

Fishing mortality: Fishing mortality has been relatively stable (Figure 3.7.7).

Recruitment: The 1982-1986 year classes are all above average. Average recruitment has been assumed for the subsequent year classes.

State of stock: SSB in 1989 reached a record high level as a result of good recruitment.

#### Forecast for 1991:

Assuming F(90) = 0.39, Basis: F(89), Catch(90) = 2.0, Landings (90) = 2.0

Option	Basis	F(91)	Predicted				Consequences and implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	0.8 F(89) = F <sub>max</sub>	0.32	4.8	1.5	1.5	5.0	SSB stable at recent high level
B	1 x F(89)	0.39	4.7	1.7	1.7	4.6	SSB at high level

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a slight decline in SSB, but SSB remains at a high level.

Recommendation: Since no reduction in F is recommended for sole in Divisions VII f, g, fishing at the 1989 level implies a catch of about 1,700 t in 1991.

Special comments: Plaice are taken in a mixed fishery but also as a by-catch in the sole fishery. In the forecast it is assumed that F will be at the status quo level in 1990.

### 3.7.8 Celtic Sea sole (Divisions VII f and g)

Source of information: Report of the Irish Sea and Bristol Channel Working Group, September 1990 (C.M.1991/Assess:1).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	0.7	1.1	≤1.2	-	-	0.9	1.0	1.2			
Agreed TAC	1.4	1.2	1.2	1.5	1.6	1.1	1.0	1.2			
Catch as used by WG	1.37	1.27	1.33	1.55	1.22	1.15	1.0	-	1.9	0.8	1.2
Sp. stock biomass	3.2	3.4	3.7	3.8	3.5	3.5	3.3	3.6 <sup>1</sup>	6.8	3.2	4.4
Recruitment (age 2)	4.8	6.7	4.9	6.2	3.9	5.7 <sup>1</sup>	5.7 <sup>1</sup>	4.7 <sup>1</sup>	9.2	2.7	5.0
Mean F(3-9,u)	0.35	0.30	0.33	0.40	0.38	0.33	0.29	-	0.40	0.16	0.27

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1971-1989. Weights in '000 t, recruitment in millions.

Catches: Relatively stable for 15 years with a small peak in 1986 and a small decrease in 1989 (Table 3.7.8).

Data and assessment: Age-based analytical assessment, using catch-at-age data from Belgium and the UK. Tuned using Belgian beam trawl CPUE data. No survey indices available.

Fishing mortality: Increased up to 1986 and declined thereafter (Figure 3.7.8).

Recruitment: In the absence of survey indices, the 1986 and 1987 year classes are assumed to be about 15% above the average based on commercial CPUE data.

State of stock: SSB has been relatively stable in the 1980s at a below-average level.

Forecast for 1991:

Assuming F(90) = 0.29, Basis: F(89), Catch(90) = 1.06, Landings (90) = 1.06

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	0.8F(89) = (F <sub>max</sub> )	0.24	3.7	0.90	0.90	4.0	Small increase in SSB
B	1 x F(89)	0.29	3.7	1.09	1.09	3.7	Stabilised SSB

Weights in '000 t.

Continued fishing at current levels of fishing mortality (which is close to F<sub>max</sub>) will lead to the maintenance of a relatively stable stock.

Recommendation: To maintain the stability of the spawning stock, ACFM recommends that fishing mortality should not be increased above the current level, corresponding to a TAC in 1991 of 1,100 t in Divisions VII f and g.

Special comments: Recent information on the expected catches in 1990 was available at the ACFM meeting, which indicated that only about 80% of the Belgian quota will be taken due to improved catch rates in 1990 in the North Sea sole fishery. The option of status quo in 1990 was, therefore, considered to be more realistic than assuming that the 1990 TAC will be taken.

### 3.8 Sole and Plaice in the North Sea, English Channel, and Bay of Biscay

#### 3.8.1 North Sea sole

##### 3.8.1.1 Advice from the May 1990 ACFM meeting

The Danish landings of sole from the North Sea as well as the catch rates have shown a significant increase in 1990 compared to 1989. The observed increases in CPUE for different boat categories have been between 30% and 100%.

ACFM was requested by Denmark to comment on whether these increases in catch per unit effort are in line with the forecast made by ACFM in 1989.

ACFM has predicted an increase in spawning stock size from 27,100 t in 1989 to 51,000 t in 1990 (an 88% increase), mainly because of the recruitment of the strong 1987 year class to the spawning population.

The Danish fishery is mainly a gill net fishery on the spawning stock in the second quarter, and the observed increase in catch rate is in agreement with the predicted increase in the spawning stock size.

The new information does not give any reason to change the advice given by ACFM at its November 1989 meeting. In November, ACFM recommended a TAC for 1990 of 25,000 t. Although the recommended TAC is considerably higher than that recommended for 1989, it is important to recognize that the recommended reduction in fishing mortality implies a real reduction in fishing effort, i.e., in the amount of time spent fishing.

### 3.8.1.2 North Sea sole: Advice from the October/November 1990 ACFM meeting

Source of information: Report of the North Sea Flatfish Working Group, October 1990 (C.M.1991/Assess:5)

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recommended TAC	15.0	14.0	15.0	12.0	11.0	11.0	14.0	25.0	-	-	-
Agreed TAC	20.0	20.0	22.0	20.0	14.0	14.0	14.0	25.0	-	-	-
Nominal landings	20.0	18.9	19.9	12.9	13.8	13.2	14.5	-	20.0 <sup>4</sup>	12.9 <sup>4</sup>	16.0 <sup>4</sup>
Unallocated landings	4.9	7.7	4.3	5.3	3.6	8.3	7.2	-	7.2 <sup>4</sup>	3.6 <sup>4</sup>	5.8 <sup>4</sup>
Catch as used by WG	24.9	26.6	24.2 <sup>3</sup>	18.2	17.4	21.6	21.7	-	26.6	15.4	20.4
Spawning stock biomass	41.5	44.4	41.3	33.9	28.8	37.8	29.8	69.9 <sup>1</sup>	62.8	24.5	40.6
Recruitment (age 1)	141	69	78	14	48	450 <sup>1</sup>	106 <sup>1</sup>	99 <sup>1</sup>	450	12	117
Mean F(2-8,u)	.48	.58	.55	.55	.48	.58	.53	-	.58	.35	.47

<sup>1</sup>Predicted or assumed. <sup>2</sup>Over period 1970-1989. <sup>3</sup>Minimum estimate. <sup>4</sup>Over period 1983-1989. Weights in '000 t, recruitment in millions.

Catches: Catches have fluctuated considerably in the last 10 years and depend on variations in recruitment (Table 3.8.1.2).

Data and assessment: Uncertainties in the level of landings because of unreported catches. Crude effort series, biological sampling satisfactory. Analytical age-based assessment. Fishery independent information available from egg surveys and beam trawl surveys.

Fishing mortality: VPA indicates that F fluctuated at a high level with no trend during the last six years (Figure 3.8.1.2).

Recruitment: Year class 1987 is exceptionally strong. Year classes 1988 and 1989 seem to be around average. Year class 1990 appears very poor.

State of stock: SSB in 1990 has doubled and is now the largest since 1969 due to recruitment of the large 1987 year class. SSB is expected to decrease rapidly at the present level of exploitation.

#### Forecast for 1991:

Assuming  $F(90) = 0.53$ , Basis:  $F(89)$ ,  $Catch(90) = 38$ ,  $Landings(90) = 38$ .

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	$F_{91} = 0.8 \times F_{89}$	0.43	58	27	27	52	SSB declines but remains above minimum biologically acceptable level
B	$F_{91} = F_{89}$	0.53		31	31	46	SSB declines below minimum biologically acceptable level

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to decline in SSB.

Recommendation: The TAC should be set at a level which ensures that SSB in 1992 will be at or above the minimum biologically acceptable SSB of 50,000 t. ACFM, therefore, recommends a TAC for 1991 of 27,000 t. This implies a reduction in fishing mortality in 1991 of 20%.

In former years, the agreed TAC has not resulted in the intended reduction in fishing mortality. Therefore, ACFM stresses the need for a real reduction in fishing effort, i.e., in the amount of time spent fishing.

### 3.8.2 North Sea plaice

Source of information: Report of the North Sea Flatfish Working Group, October 1990 (C.M.1991/Assess:5)

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recommended TAC	164	150	130	<160	120	150	<175	171	-	-	-
Agreed TAC	164	182	200	180	150	175	185	180	-	-	-
Nominal landings	103	116	148	128	131	142	153	-	153 <sup>4</sup>	103 <sup>4</sup>	132 <sup>4</sup>
Unallocated landings	41	40	12	37	22	31	17	-	41 <sup>4</sup>	12 <sup>4</sup>	29 <sup>4</sup>
Catch as used by WG	144	156	160 <sup>3</sup>	165	153	173	170	-	173	109	138
Spawning stock biomass	310	307	336	330	364	348	382	377 <sup>1</sup>	398	289	331
Recruitment (age 1)	572	595	505	1317	548 <sup>1</sup>	628 <sup>1</sup>	574 <sup>1</sup>	584 <sup>1</sup>	1317	233	533
Mean F(2-10,u)	.45	.43	.43	.52	.48	.60	.55	-	.60	.32	.42

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1970-1989. <sup>3</sup> Minimum estimate. <sup>4</sup> Over period 1983-1989. Weights in '000 t, recruitment in millions.

Catches: Recent catches at a record high level of above 150,000 t, compared to about 70,000 t in the 1950s (Table 3.8.2). Actual levels in recent years uncertain due to unreported catches.

Data and assessment: Quality of the data base has deteriorated due to uncertainties about catch levels, age compositions and effort. Results of VPA should be treated with caution. Fishery-independent data from egg surveys and beam trawl surveys.

Fishing mortality: VPA indicated that fishing mortality has been at a historically high level since 1986 (Figure 3.8.2).

Recruitment: Recruitment is well above average with exceptionally strong year classes in 1981 and 1985.

State of stock: VPA indicated that SSB is rather stable at a level above the minimum biologically acceptable level of 300,000 t.

#### Forecast for 1991:

Assuming  $F(90) = 0.55$ , Basis:  $F(89)$ ,  $Catch(90) = 189$ ,  $Landings(90) = 189$ .

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	0.8 $F_{90}$	0.44	345	142	142	353	Reduced catch and slightly reduced SSB compared to 1990.
B	1.0 $F_{90}$	0.55		169	169	326	Stable catch and slight decrease in SSB.

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a spawning stock biomass in 1992 that is slightly lower than in recent years.

Recommendation: Although the SSB is well above the minimum biologically acceptable level of 300,000 t, the level of fishing mortality is at a historic high. Therefore, ACFM prefers that the TAC in 1991 should not exceed 169,000 t, corresponding to the status quo forecast.

Given the mixed character of part of the fishery for flatfish in the North Sea, the advised reduction in fishing mortality on sole necessitates a similar reduction for plaice in the area where both stocks occur together, e.g., south of 56°N. ACFM, therefore, recommends that the fishing effort in the mixed plaice and sole fishery south of 56°N be reduced by 20%. This could be achieved by reducing the time spent fishing in this area by 20%.

### 3.8.3 Sole in Division VIId

Source of information: Report of the North Sea Flatfish Working Group, October 1990 (C.M.1991/Assess:5)

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recommended TAC	2.1	1.4	2.3	2.6	3.1	3.4	3.8	3.7	-	-	-
Agreed TAC	2.1	2.5	2.7	3.2	3.85	3.85	3.85	3.85	-	-	-
Nominal landings	2.0	2.4	3.6	2.9	3.8	3.3	3.0	-	3.8	2.0	3.0
Unallocated landings	1.2	0.9	0.3	1.0	1.1	0.6	0.8	-	1.2	0.3	0.8
Catch as used by WG	3.2	3.3	3.9	3.9	4.9	3.9	3.8	-	4.9	3.2	3.8
Spawning stock biomass	9.5	9.1	10.1	10.9	9.9	9.1	8.3	7.9 <sup>1</sup>	10.9	8.3	9.6
Recruitment (age 1)	21.3	22.3	14.7	28.6	11.3	19.4 <sup>1</sup>	14.6 <sup>1</sup>	21.0 <sup>1</sup>	28.6	11.3	18.9
Mean F(3-8,u)	.46	.41	.32	.39	.58	.40	.47	-	.58	.32	.43

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1983-1989. Weights in '000 t, recruitment in millions.

Catches: Catches at a high level since 1984 with a peak in 1987 (Table 3.8.3). Some uncertainty about catch level.

Data and assessment: Analytical age-based assessment. Data base of poor quality before 1983 but has improved since then. Fishery-independent information from beam trawl survey.

Fishing mortality: VPA indicates that fishing mortality varies substantially from year to year (Figure 3.8.3).

Recruitment: Recruitment surveys indicate that year class 1989 will be above average.

State of stock: SSB decreased slightly in recent years but is not much lower than in 1983.

Forecast for 1991:

Assuming F(90) = 0.47, Basis: F(89), Catch(90) = 3.6, Landings (90) = 3.6.

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	0.8 F <sub>89</sub>	0.38	7.2	2.8	2.8	8.0	Stabilised SSB
B	1.0 F <sub>89</sub>	0.47		3.4	3.4	7.4	Decrease in SSB
C	1.2 F <sub>89</sub>	0.57		3.9	3.9	6.9	SSB declines to record low levels

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a further decrease in SSB.

Recommendation: The SSB has fallen in recent years, but is still at about 80% of the recent average level. Fishing mortality has been relatively stable since 1983. ACFM, therefore, sees no immediate danger in continuing the current level of fishing and prefers that the 1991 TAC not exceed 3,400 t, corresponding to status quo fishing mortality.



### 3.8.4 Sole in Division VIIe

Source of information: Report of the North Sea Flatfish Working Group, October 1990 (C.M.1991/Assess:5).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recommended TAC	0.4	0.9	1.3	1.3	1.3	1.3	1.0	0.9	-	-	-
Agreed TAC	1.1	1.35	1.4	1.3	1.15	1.3	1.0	0.9	-	-	-
Nominal landings	1.5	1.4	1.1	1.4	1.1	0.9	0.8	-	-	-	-
Unallocated landings	-	-	0.3	-	0.1	0.4	0.4	-	-	-	-
Catch as used by WG	1.5	1.4	1.4	1.4	1.2	1.4	1.2	-	1.5	0.4	0.9
Spawning stock biomass	4.23	3.83	3.46	3.54	2.88	2.82	2.20	1.76 <sup>1</sup>	5.48	2.04	3.39
Recruitment (age 1)	5.79	6.36	3.10	4.62	3.16	3.75	3.36	4.90 <sup>1</sup>	8.15	1.16	4.13
Mean F(3-8,u)	.44	.40	.47	.47	.44	.55	.69	-	.69	.16	.31

<sup>1</sup>Predicted or assumed. <sup>2</sup>Over period 1969-1989. Weights in '000 t, recruitment in millions.

Catches: Reached a peak in the mid-1980s, now falling (Table 3.8.4).

Data and assessment: Analytical age-based assessment: tuned on three fleets. Reasonable data series, sampling satisfactory. Fishery independent data from trawl survey since 1984.

Fishing mortality: Higher in the 1980s, currently very high (Figure 3.8.4).

Recruitment: 1982 and 1983 year classes good, 1986-1988 thought to be below average.

State of stock: SSB in 1990 is the lowest for the series, and it is predicted to fall further in 1991.

Forecast for 1991:

Assuming  $F(90) = 0.59$ , Basis: TAC, Catch(90) = 0.90, Landings (90) = 0.90.

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	$F_{91} = F_{high} = 0.5 \times F_{89}$	0.34	1.54	0.54	0.54	1.94	SSB increases, catch 40% reduction.
B	$F_{91} = 0.8 \times F_{89}$	0.55		0.80	0.80	1.68	SSB held, catch 10% reduction.
C	$F_{91} = F_{89}$	0.69		0.94	0.94	1.53	SSB declining further.

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to further depletion of the stock which is already at a historically low level.

Recommendation: Given the historically high level of fishing mortality and the historically low SSB, ACFM recommends that fishing mortality be at least reduced to  $F_{high}$ . ACFM, therefore, recommends a TAC for 1991 of 540 t.

## 3.8.5 Plaice in Divisions VIIId,e

Source of information: Report of the North Sea Flatfish Working Group, October 1990 (C.M. 1991/Assess:5).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>1</sup>	Min <sup>1</sup>	Mean <sup>1</sup>
Recommended TAC	3.5	3.5	5.4	6.2	6.8	6.9	11.7	10.7	-	-	-
Agreed TAC	6.5	6.0	6.5	6.9	8.3	9.96	11.7	10.7	-	-	-
Nominal landings	6.3	5.9	7.3	7.5	9.8	11.4	8.9	-	-	-	-
Unallocated landings	0.2	0.7	0.2	1.1	0.5	1.5	1.7	-	-	-	-
Catch as used by WG	6.5	6.6	7.5	8.6	10.3	12.9	10.6	-	12.9	2.6	6.6

<sup>1</sup>Over period 1976-1989. Weights in '000 t.

Catches: Have increased steadily since the late 1970s (Tables 3.8.5.1 and 3.8.5.2).

Data and assessment: Analytical, aged-based assessment with one tuning fleet for Division VIIe; trial age-based assessment (some data queries) and SHOT forecast for Division VIIId.

Fishing mortality: No information for the combined Divisions VIIId,e stocks.

Recruitment: No information for the combined Divisions VIIId,e stocks.

State of stock: CPUE series for Division VIIId are currently high. SSB in Division VIIe (given by VPA) is high.

Forecast for 1991:

Basis:  $F(90) = F(89)$ ,  $Catch(90) = VIIe\ 2.1, VIIId\ 8.0$  Landings (90) = VIIe 2.1, VIIId 8.0

Basis	F(91)	Predicted	
		Catch(91)	Landgs(91)
VIIe	$F_{91} = F_{89}$	1.7	1.7
	$F_{91} = 0.5 \times F_{89}$	1.0	1.0
VIIId	SHOT <u>status quo</u>	7.8	7.8

Weights in '000 t.

Recommendation: Plaice in Divisions VIIId,e is taken mainly as a by-catch in mixed demersal fisheries although some directed fishery occurs. Given the recommended reduction of 50% in fishing mortality in Division VIIe sole, the TAC for plaice should be set at a level that takes this into account. Therefore, ACFM recommends a TAC for 1991 of 8,800 t for Divisions VIIId,e.

### 3.8.6 Sole in Divisions VIIIA,b (Bay of Biscay)

Source of information: Report of the North Sea Flatfish Working Group, October 1990 (C.M.1991/Assess:5).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recommended TAC	-	-	-	-	-	3.7	4.5	5.1	-	-	-
Agreed TAC	3.1 <sup>3</sup>	3.1 <sup>3</sup>	3.3 <sup>3</sup>	3.3 <sup>3</sup>	4.4	4.0	4.8	5.2	-	-	-
Nominal landings	2.7	3.2	3.9	4.6	4.4	4.6	5.8	-	5.8	2.7	4.2
Unallocated landings	0.9	0.8	0.3	0.2	0.7	0.8	0.0	-	0.9	0.0	0.53
Catch as used by WG	3.6	4.0	4.3	4.8	5.1	5.4	5.8	-	5.8	3.6	4.7

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1983-1989. <sup>3</sup> Sub-area VIII (EC zone). Weights in '000 t, recruitment in millions.

Catches: Catches have increased to a record level in 1989 (Table 3.8.6).

Data and assessment: Data base quality improved since 1983, but results of age-based analytical assessment not accepted due to uncertainties about age determination. No fishery-independent information available.

Fishing mortality: From the constant CPUE and the increasing landings, it is concluded that effort has increased.

Recruitment: No reliable estimates available.

State of stock: Uncertain but appears stable based on near-constant CPUE.

#### Forecast for 1991:

Assuming  $F(90) =$  Basis: status quo,  $Catch(90) = 5.5$ ,  $Landings(90) = 5.5$ .

Option	F(91)	Predicted	
		Catch(91)	Landgs(91)
SHOT forecast	$=F_{89}$	5.3	5.3

Weights in '000 t.

Recommendation: Fishing effort should not be allowed to increase. ACFM, therefore, recommends a precautionary TAC for 1991 of 4,700 t, corresponding to the mean catch over the period 1983-1989.

#### 4. STOCKS IN NEAFC REGIONS 2 AND 3

##### 4.1 Hake in Sub-areas IV and VI-IX

##### 4.1.1 Hake - Northern stock (Division IVa, Sub-areas VI and VII, and Divisions VIIa,b)

Source of information: Report of the Working Group on the Assessment of the Stocks of Hake, May 1990 (C.M.1990/Assess:22).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>1</sup>	Min <sup>1</sup>	Mean <sup>1</sup>
Recommended TAC	30	30	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	54	54	59	-	-	-
Agreed TAC <sup>3</sup>	-	-	-	47.36	62.36	64.86	58.37	63.80	-	-	-
Landings used by WG	57.7	63.2	65.7	59.9	63.4	64.8	66.5	-	66.5	50.6	59.1
Discards/slipping	2.6	1.9	4.7	2.8	2.0	2.0	2.3	-	4.7	1.9	2.7
Catch as used by WG	60.3	65.1	70.4	62.7	65.3	66.8	68.8	-	70.4	52.9	61.7

<sup>1</sup>Over period 1978-1989. <sup>2</sup>Based on recent landings. <sup>3</sup>Sum of area TACs corresponding to Northern stock plus Division IIa and Sub-area IV (EC zone only). Weights in '000 t.

Catches: Catches have been relatively stable since 1983, but landings include substantial numbers of undersized fish (Table 4.1.1). In addition, large numbers of undersized fish are caught and discarded at sea.

Data and assessment: Length composition data for landings and discards, 1978-1989. A preliminary age-structured VPA was attempted (using length-to-age conversion techniques based on growth parameters) but results should be treated with caution.

Fishing mortality: Fishing mortality appears relatively low ( $F = 0.17$ ) and slightly above  $F_{max}$  ( $F = 0.16$ ) (Figure 4.1.1). However,  $F$  is high on young fish resulting in an unsatisfactory exploitation pattern.

Recruitment: Estimates of recruitment from VPA not considered reliable. Survey indices indicate the 1985 year class is abundant, the 1986 year class is poor, and other year classes are average.

State of stock: Appears relatively stable. Yield per recruit could be increased by reducing the capture of young fish.

Forecast for 1991: Not available.

Recommendation: ACFM recommends that current technical measures (minimum trawl mesh sizes, minimum landing size) be enforced to improve the exploitation pattern in this stock.

ACFM also recommends a precautionary TAC for 1991 of 59,000 t, based on the average landings during the period 1978-1989.

Special Comments: In this year's assessment, a VPA was attempted using catch-at-age data derived from catch length frequencies. The age-based VPA should be regarded as a preliminary attempt at an age-based assessment and the results should be treated with caution.

The long-term effect of strict enforcement of the current legal minimum mesh size is discussed in Section 4.4.5

#### 4.1.2 Hake - Southern stock (Divisions VIIIc and IXa)

##### 4.1.2.1 Advice from the May 1990 ACFM meeting

Following an EC request, ACFM dealt with new proposals concerning areas closed to the bottom-trawl fishery off Spain and Portugal.

As a result of the revision of the series of recruitment surveys carried out by Spain and Portugal off their respective coasts, the 1990 Hake Working Group proposed the following closures:

##### Spain:

- To maintain the existing closure between Cabo Villano and Cabo Prior in depths less than 200 m, to the bottom-trawl fishery.
- To substitute the existing closure between Cabo Silleiro and Cabo Corrubedo by a closure between Cabo Corrubedo and Cabo Finisterre, in depths less than 200 m, to the bottom-trawl fishery.

These closures should be enforced from 1 October to 31 March.

##### Portugal:

To close the areas defined by the parallels:

39°05'N to 38°20'N  
and 37°00'N to 37°50'N

in depths less than 200 m, to bottom-trawl fishery, from 1 October to 31 March.

During the ACFM meeting, some doubt was expressed about the most appropriate areas to be closed off the Portuguese coast. ACFM discussed this point and concluded that it would not be possible to solve it until new information and the 1990 Hake Working Group report were available.

ACFM, therefore, recommends that:

The areas defined by the latitudes:

42°34.7'N (Cabo Corrubedo) to 43°00'N (Cabo Finisterre)  
and 9°13'W (Cabo Villano) to 8°20'W (Cabo Prior)

in depths less than 200 m be closed to bottom-trawl fishery from 1 October to 31 March, both dates inclusive (Figure 4.1.2.1).

Any recommendation on seasonal closures of the main hake nursery grounds off the Portuguese coast must be delayed until the new information on the location of main hake nursery grounds will be available.

#### 4.1.2.2 Hake - Southern stock (Divisions VIIIC and IXa): Advice from the October/November 1990 ACFM meeting

Source of information: Report of the Working Group on the Assessment of the Stocks of Hake, May 1990 (C.M.1990/Assess:22).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>1</sup>	Min <sup>1</sup>	Mean <sup>1</sup>
Recommended TAC	8.5	8.5	8.5	15.0	15.0	15.0	15.0	15.0	-	-	-
Agreed TAC	-	-	-	-	25.0	25.0	20.0	20.0	-	-	-
Landings used by WG	24.7	21.0	18.1	16.2	15.2	15.3	12.5	-	34.8	12.5	20.2
Discards/slipping	No information available for two of the major fleets								-	-	-
Catch as used by WG	24.7	21.0	18.1	16.2	15.2	15.3	12.5	-	34.8	12.5	20.2

<sup>1</sup> Over period 1972-1989. Weights in '000 t.

Catches: Have progressively declined from 24,700 t since 1983 to a record-low 12,500 t in 1989 (Table 4.1.2.2). During the past five years, small, undersized fish (<25 cm) have comprised 43% of the landings, by number.

Data and assessment: Length composition data for landings during 1978-1989. Sampling problems exist and the quantity of small hake has probably been under-estimated in recent years. A preliminary age-structured VPA was attempted (using length-to-age conversion techniques based on growth parameters).

Fishing mortality: Estimates of fishing mortality during 1983-1989 range between 0.2 and 0.3 ( $F_{max} = 0.25$ ) (Figure 4.1.2.2).  $F$  is high on young fish resulting in an unsatisfactory exploitation pattern.

Recruitment: Recruitment indices (hake <17 cm per trawl hour) are available from Portuguese and Spanish surveys but are inconsistent with one another. The 1989 Portuguese survey index was the second-lowest in the 1981-1989 time series, whereas the 1989 Spanish survey index was about average.

State of stock: Commercial CPUE indices in 1989 reached record-low levels, declining by about 50% from 1983. Although landings in 1989 were a record low (and well below the agreed TAC of 20,000 t), bottom trawl fishing effort was the highest since 1982. These factors, in conjunction with an unsatisfactory exploitation pattern on small hake, suggest that the spawning stock is presently at a very low level.

Forecast for 1991: Not available.

Recommendation: There has been a decreasing trend in landings. There are indications of a decline in the stock. In order to prevent any further increase in the exploitation of this stock, ACFM recommends that a precautionary TAC for 1991 is set at 10,000 t.

To discourage fishing on undersize fish, ACFM also recommends vigorous enforcement of the existing regulations concerning the minimum legal mesh-size, nursery ground area closures, and the minimum legal landing size for hake.

Special comments: In this year's assessment, a VPA was attempted using catch-at-age data derived from catch length frequencies. The age-based VPA should be regarded as a preliminary attempt at an age-based assessment and the results treated with caution.

Sampling of landings and discards should be improved. Better coordination between the Spanish and Portuguese surveys is necessary to obtain indices of recruitment and abundance for the entire stock. Additional surveys directed to obtaining indices on the relative abundance of the adult component of the stock would also help to improve the assessment.

## 4.2 Megrim in Sub-areas VI-IX

### 4.2.1 Overview

There are two species of megrim in the management areas considered by ACFM. Lepidorhombus whiffiagonis is predominant in the landings overall, although L. bosci is more important in the southernmost parts of the area, forming over 90% of the landings in Division IXa. In the assessments, the two species are combined except in Divisions VIIIc and IXa where they are kept separate.

ACFM recognises three assessment and management areas for megrim:

- a) Sub-area VI which is an existing management area;
- b) Divisions VIIb-k and VIIla,b;
- c) Divisions VIIIc and IXa.

Sampling programmes for megrim have been initiated, but it is likely that these will need to continue for several years before proper assessments can be made. Full analytical assessments are, therefore, not at present available for any of the management units considered, although an indication of the relative state of exploitation has been provided by length cohort analysis which assumes that the populations are in a state of equilibrium. Because of uncertainties in the input parameters, these assessments should be treated as provisional. With this proviso, they indicate that fishing mortality rates are at a level giving maximum yield per recruit (Y/R). This implies that no long-term gains in Y/R can be expected from an increase in effort in the fisheries that take megrim.

Megrim are taken as one component of mixed fisheries for demersal species. As shown in the report of the Working Group on Fisheries Units in Sub-areas VII and VIII, landings of megrim form an important component of the landings by some fleet units, both in terms of weight and value. ACFM is not at present able to determine to what extent megrim can be considered as a target species in different fisheries, but considers that the multispecies nature of these fisheries should be taken into account in formulating management measures that affect these stocks.

In view of the uncertainties in the growth and mortality rates used in the assessments, and in view of the mixed nature of the fisheries that exploit megrim, ACFM is not in a position to provide meaningful advice for any of the stock units. If the management bodies need to set TACs for megrim, then ACFM can only suggest that these be set on a precautionary basis.

Nominal landings are given in Tables 4.2.1 - 4.2.5.

#### 4.2.2 Megrin - Sub-area VI

Source of information: Report of the Working Group on the Assessment of the Stocks of Hake, May 1990 (C.M.1990/Assess:22).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>1</sup>	Min <sup>1</sup>	Mean <sup>1</sup>
Recommended TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	-	-	-	3.9	4.4	4.84	4.84	4.84	-	-	-
Catch as used by WG	3.5	3.9	3.8	2.8	3.9	n/a	n/a	-	3.9	2.7	3.3

<sup>1</sup>Over period 1980-1987. n/a = Not available. Weights in '000 t.

Catches: Catches are comprised of two species (*Lepidorhombus whiffiagonis* and *L. boscii*), but *L. whiffiagonis* predominates. Landings have been relatively stable in the last decade; however, catch data from 1988 onward are incomplete (Table 4.2.1). Megrin has traditionally been a by-catch species in the directed fishery for mixed gadoids including cod, haddock, whiting, and saithe.

Data and assessment: Limited commercial length frequency data are available for 1989-1990. Research vessel survey length frequency distributions are available from Scottish groundfish surveys conducted during 1981-1989. A length cohort analysis was performed on steady-state length compositions derived from both the commercial and research vessel samples. The results of this assessment, however, must be regarded as very preliminary.

Fishing mortality: Fishing mortality on the main length groups is about 0.15, which is above  $F_{max}$  (Figure 4.2.2).

Recruitment: No information available.

State of stock: Not known due to insufficient data to evaluate changes in stock abundance and recruitment.

Forecast for 1991: Not available.

Special comments: More data are required before the assessment of this stock can be improved. Although sampling programs for megrim have begun, it will take several years of data collection before reliable assessment results are likely to be achieved.

Recent landings of megrim in Sub-area VI by some fleets have been constrained by existing TAC and quota regulations. This may have led to misreporting so that the true level of catch is not known. In addition to the reasons given in the overview (Section 4.2.1), the lack of reliable catch data will provide a further reason why meaningful advice cannot be given for this area.



#### 4.2.3 Megrin - Divisions VIIb-k and VIIa,b

Source of information: Report of the Working Group on the Assessment of the Stocks of Hake, May 1990 (C.M.1990/Assess:22).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>1</sup>	Min <sup>1</sup>	Mean <sup>1</sup>
Recommended TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC <sup>2</sup>	-	-	-	-	16.46	18.1	18.1	18.1	-	-	-
Catch as used by WG <sup>3</sup>	-	18.8	13.0	9.2	19.4	19.7	19.5	-	19.7	9.2	16.6

<sup>1</sup>Over period 1984-1989. <sup>2</sup>Includes Division VIIa. <sup>3</sup>Includes estimates of discards. Weights in '000 t.

Catches: Catches are comprised of two species (*L. whiffiagonis* and *L. boscii*), but *L. whiffiagonis* is believed to account for over 90% of the megrim caught. Apart from 1985-1986, landings have been relatively stable at about 19,000 t (Tables 4.2.3 - 4.2.4). Megrin is exploited in the Celtic Sea-Bay of Biscay area in several different trawl fisheries that take a mixture of demersal species including hake, anglerfish, megrim, and *Nephrops*.

Data and assessment: Commercial catch length frequency data are available for 1984-1989, but not for all countries in all years. Discard length frequencies are also available, but only for some countries in some years. A preliminary age-based VPA was attempted but the results were not accepted.

Fishing mortality: Fishing mortality estimates from the VPA were very low and were considered to be unrealistic. Estimates of F from a length cohort analysis conducted in 1989 ranged between 0.25 and 0.35; these values are believed to be more reliable than those from the VPA.

Recruitment: No information available.

State of stock: Not known due to insufficient data, although constant catch levels since 1987 suggest that the stock is relatively stable.

Forecast for 1991: Not available.

Special comments: More data are required before the assessment of this stock can be improved. Further information is required on ageing, sex ratio of the catches, and recruitment patterns.

#### 4.2.4 Megrin - Divisions VIIIC and IXa

Source of information: Report of the Working Group on the Assessment of the Stocks of Hake, May 1990 (C.M.1990/Assess:22).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>1</sup>	Min <sup>1</sup>	Mean <sup>1</sup>
Recommended TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	-	-	-	-	13.0	13.0	13.0	13.0	-	-	-
Catch as used by WG	-	-	-	1.96	2.42	2.72	3.24	-	3.24	1.96	2.58

<sup>1</sup> Over period 1986-1989. Weights in '000 t.

Catches: Catches are comprised of two species (Lepidorhombus whiffiagonis and L. boscii). L. boscii predominates the catch in Division IXa (>90%) but catches of the two species are nearly equal in Division VIIIC (60% L. boscii; 40% L. whiffiagonis). Total catches of megrim increased by more than 50% between 1986 and 1989 but have been far below agreed TACs (Tables 4.2.4 and 4.2.5). Megrin is one component of a fishery for mixed demersal species.

Data and assessment: Only limited data available. For L. boscii, catch length compositions 1986-1989 are available by sex, for only one fleet. L. whiffiagonis, catch length frequencies exist for 1986-1989 but with sexes combined and only for one fleet. Provisional length cohort analyses were performed for both species (L. boscii, by sex; L. whiffiagonis, with sexes combined). However, the assessment cannot be considered reliable.

Fishing mortality: Not reliably known.

Recruitment: No information available.

State of stock: Not known due to insufficient data.

Forecast for 1991: Not available.

Special comments: Basic life history data are required before the assessment of these species can be improved. For both species, information is needed on growth, length-weight relationships and natural mortality. In addition, length compositions of the catches, by species and sex, are needed for all fleets.

### 4.3 Anglerfish in Sub-areas VI-IX

#### 4.3.1 Overview

There are two species of anglerfish in the management areas considered by ACFM. Lophius piscatorius is predominant in the landings overall, although Lophius budegassa forms about a third of the landings in Sub-areas VII-IX combined. In the assessments, the species are treated separately, but for management advice they are combined. ACFM recognizes three management areas:

- a) Sub-area VI corresponding to an existing management area;
- b) Divisions VIIb-k and VIIIa,b;
- c) Division VIIIC and Sub-area IX.

Sampling programmes for anglerfish have been initiated but it is likely that these will need to continue for several years before proper assessments can be made. Full analytical assessments are, therefore, not at present available for any of the management units considered, although an indication of the relative state of exploitation has been provided by length cohort analysis which assumes that the populations are in a state of equilibrium. Because of uncertainties in the input parameters, these assessments should be treated as provisional. With this proviso, they indicate that fishing mortality rates are in excess of the biological reference point  $F_{max}$  for Lophius piscatorius, and at about the  $F_{max}$  level for L. budegassa. The implication of this is that no long-term gains in yield per recruit can be expected from an increase in effort in the fisheries that take anglerfish.

Traditionally, anglerfish have been taken as one component of a mixed fishery. As shown in the report of the Working Group on Fisheries Units in Sub-areas VII and VIII, landings of anglerfish form an important component of the landings by some fleet units, both in terms of weight and value. ACFM is not at present able to determine for each area and fleet unit whether anglerfish are target or by-catch species, but considers that the multispecies nature of these fisheries should be taken into account in formulating management measures that affect these stocks.

Anglerfish down to a very small size are retained by current minimum mesh sizes in trawls. However, there is little scope for improving the exploitation pattern of either species of anglerfish by technical regulations such as mesh size, since a very large mesh size would be required to reduce the capture of small anglerfish. A mesh size appropriate for anglerfish would not be satisfactory for other species in mixed fisheries.

In view of the uncertainties in the growth and mortality rates used in the assessments, and in view of the mixed nature of the fisheries that exploit anglerfish, ACFM is not in a position to provide meaningful advice for any of the stock units. If the management bodies need to set TACs for anglerfish, then, ACFM can only suggest that these be set on a precautionary basis.

Nominal landings are given in Tables 4.3.1 - 4.3.5

#### 4.3.2 Anglerfish - Sub-area VI

Source of information: Report of the Working Group on the Assessment of the Stocks of Hake, May 1990 (C.M.1990/Assess:22)

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>1</sup>	Min <sup>1</sup>	Mean <sup>1</sup>
Recommended TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	-	-	-	7.5	7.8	8.6	8.6	8.6	-	-	-
Catch as used by WG	3.9	4.6	5.1	4.4	5.2	n/a	n/a	-	5.2	1.7	3.9

<sup>1</sup> Over period 1980-1987. n/a = not available. Weights in '000 t.

Catches: Catches are comprised of two species (Lophius piscatorius and L. budegassa, but L. piscatorius predominates. Total landings have been relatively stable since 1984 at about 5,000 t; however, catch data from 1988 onwards are incomplete (Table 4.3.1). Anglerfish has traditionally been a by-catch species in the directed fishery for mixed gadoids including, cod, haddock, whiting, and saithe.

Data and assessment: Limited commercial length frequency data are available for 1989-1990. Research vessel survey length frequency distributions are available from Scottish groundfish surveys conducted during 1981-1989. A length cohort analysis was performed on steady-state length compositions derived from both the commercial and research vessel samples. The results of this assessment, however, must be regarded as very preliminary.

Fishing mortality: Tentative fishing mortality values estimated from length cohort analysis indicate that current  $F$  is above  $F_{max}$  (Figure 4.3.2). The  $F$  estimates in the most heavily exploited length groups are similar to those in the cod and haddock fisheries in which the anglerfish is a by-catch species.

Recruitment: No information available.

State of stock: Not clear due to insufficient data.

Forecast for 1991: Not available.

Special comments: More data are required before the assessment of these species can be improved. Although sampling programmes for anglerfish have begun, it will take several years of data collection before reliable assessment results are likely to be achieved.

Recent landings of anglerfish in Sub-area VI by some fleets have been constrained by existing TAC and quota regulations. This may have led to misreporting so that the true level of catch is not known. In addition to the reasons given in the overview (Section 4.3.1), the lack of reliable catch data will provide a further reason why meaningful advice cannot be given for this area.

#### 4.3.3 Anglerfish - Divisions VIIb-k and VIIIa,b

Source of information: Report of the Working Group on the Assessment of the Stocks of Hake, May 1990 (C.M.1990/Assess:22).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>1</sup>	Min <sup>1</sup>	Mean <sup>1</sup>
Recommended TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC <sup>2</sup>	-	-	-	-	39.08	42.99	42.99	42.99	-	-	-
Catch as used by WG	-	-	29.4	30.2	27.0	27.3	27.2	-	30.2	27.0	28.2

<sup>1</sup>Over period 1985-1989. <sup>2</sup>Includes Division VIIa. Weights in '000 t.

Catches: Catches are comprised of two species (Lophius piscatorius and L. budegassa), but L. piscatorius predominates accounting for 69% of the anglerfish landings during 1985-1989. Catches have been relatively stable over the past five years, ranging between 27,000 and 30,000 t but far below the agreed TACs in these years (Tables 4.3.3 - 4.3.4). Anglerfish is exploited in the Celtic Sea-Bay of Biscay area in several different trawl fisheries that take a mixture of demersal species including hake, anglerfish, megrim, and Nephrops.

Data and assessment: Length compositions of the landings are available for 1986-1989, by species. Length cohort analyses were performed separately for each species. An age-based VPA was attempted for L. piscatorius but the results are not considered reliable.

Fishing mortality: Fishing mortality values estimated from length cohort analyses appeared relatively low for both species. However, yield-per-recruit results suggest that the current level of fishing mortality on L. piscatorius is well in excess of  $F_{max}$ . For L. budegassa,  $F$  is close to  $F_{max}$ .

Recruitment: No information available.

State of stock: Stable landings seem to indicate stable stock size.

Forecast for 1991: No information available.

Special comments: Better assessments of these species could be accomplished if additional information is available to tune the VPA (i.e., CPUE indices, etc.). Recruitment indices, however, would be needed to perform reliable catch predictions. Length composition of the catches should be extended as far back in time as possible since length to age conversions appear potentially useful for these species. In addition, growth studies of the two species should continue so that the quality of the data used in the assessments can be improved.

#### 4.3.4 Anglerfish - Division VIIIC and Sub-area IX

Source of information: Report of the Working Group on the Assessment of the Stocks of Hake, May 1990 (C.M.1990/Assess:22).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>1</sup>	Min <sup>1</sup>	Mean <sup>1</sup>
Recommended TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	-	-	-	-	12.0	12.0	12.0	12.0	-	-	-
Catch as used by WG	-	-	5.9	8.5	8.6	9.6	7.1	-	9.6	5.9	7.9

<sup>1</sup>Over period 1985-1989. Weights in '000 t.

Catches: Catches are comprised of two species (Lophius piscatorius and Lophius budegassa), but L. piscatorius predominates accounting for 73% of the anglerfish landings during 1985-1989. Catches increased between 1985 and 1988 (5,900 to 9,600 t) but declined to 7,100 t in 1989 (Tables 4.3.4 - 4.3.5). Anglerfish is only one component in the bottom trawl and gill net mixed species fisheries in the region that exploit a variety of demersal species including hake, anglerfish, megrim, and Nephrops.

Data and assessment: Length compositions of the landings, by species and gear, are available for the period 1986-1989. Length cohort analyses were performed, by species, on the length compositions of the landings averaged over 1986-1989.

Fishing mortality: Fishing mortality values estimated from length cohort analyses were relatively low for both species. Results from a provisional yield-per-recruit analysis suggest that fishing mortality is well in excess of  $F_{max}$  for L. piscatorius, but close to  $F_{max}$  for L. budegassa.

Recruitment: No information available.

State of stock: Not clear due to insufficient information.

Forecast for 1991: Not available.

Special comments: More data are required before the assessment of these species can be improved. Due to lack of information, several of the parameters used in the Divisions VIIIC and IXa assessments (i.e., growth parameters, natural mortality rates; length-weight relationships) were assumed to be the same as those used in the assessments of anglerfish in the northern area (Divisions VIIb-k and VIIa,b). Clearly, information on growth and natural mortality for anglerfish in the southern area is needed before the assessments can be considered very reliable.

#### 4.4 Fisheries Units in Sub-areas VII and VIII

Source of information: Report of the Working Group on Fisheries Units in Sub-areas VII and VIII, 13-20 June 1990 (Doc. C.M.1990/Assess:23).

##### 4.4.1 Introduction

The fisheries system considered involves 10 stocks (hake, Nephrops in Divisions VIIg,h and VIIIfa,b, anglerfish L. piscatorius and L. budegassa, megrim, Celtic Sea cod and whiting, and sole in Divisions VIIe-g and VIIIfa,b) and 16 fishery units (Table 4.4.1): eight operate in the Celtic Sea part of Sub-area VII, six in Sub-area VIII, one is for fishing activities which cannot be attributed precisely to any of the other units, and the last one accounts for fishing mortalities generated on the fraction of the stocks above extending outside the management area considered.

##### 4.4.2 Overview

During its 1990 meeting, the Working Group attempted to provide answers to the requests and suggestions made by ACFM and the EC, and continued its efforts to improve the relevance of its advice.

The description of the national fleets by fishery unit was updated and significant progress was made in the monitoring of the different fleets in the area of competence of the Group. However, it became clearly apparent during the meeting, and particularly when the Group tried to define simulation regimes including the shift of fishing effort from one fishery to another, that there is a serious paucity of data on fisheries in terms of trends in numbers of vessels, fishing effort and seasonal activities.

For a number of years, the Working Group has been using length-based methodology which has proved very useful in various respects, notably in the comprehension of the fundamental aspects of interactions between fishery and stock units in the area and the evaluation of the effects and implications of implementing technical measures. Of particular interest for managers, formal demonstration has been given of three key issues:

- the need for consistency between legal mesh and landing sizes;
- the lack of conservation effect of landing size regulations when implemented in isolation, because discards generally have little chance of surviving;
- because compliance with a management measure is likely to be achieved only if there is a perception that the burden is equitably shared among the components of the fishery, effort reductions on individual fishery units do not result in long-term gains even though the stocks are overfished.

Nevertheless, the length-based approach used has a limitation in that only the immediate and long-term equilibrium effects of management regimes can be assessed, but not the interim effects, although these are considered to be a critical component of the evaluation. ACFM, therefore, considered that there was no point repeating the long-term analyses performed and confirmed year after year using this methodology. This year, only the hybrid age- and length-based forecast method (introduced for the first time last year) was used. There has been no major revision to the method and software, except that the possibility for discards surviving as happens in the fisheries for Nephrops has been added.

In addition to the terms of reference for the Working Group in 1990, ACFM indicated that the Working Group should obtain from the Commission of EC precise sets of management scenarios. Proposals received from the Commission included enforcement of current regulations on mesh size in Sub-areas VII and VIII combined with a change of legal landing size for megrim in Sub-area VIII, transfer of fishing effort from trawl fleets to fixed gear fleets and effects of the use of selective gear in Nephrops fisheries in the Bay of Biscay.

In order to respond to these requests, simulations were carried out under the following assumptions:

- In Sub-area VII, fleets comply with the mesh size regulation and, in some cases (Nephrops fishery), the current mesh size (80 mm) is above the legal minimum (70 mm). Therefore, no change of mesh size was considered in this Sub-area. In Divisions VIIa,b, the same mesh sizes as last year were assumed to be in use. In most fisheries units in the Bay of Biscay, the legal mesh sizes are not strictly enforced, although an increase seems to have taken place in at least some of the fleets.
- Even though fleet descriptions have been improved this year, available data did not allow a full description of the different fishery units to be made. This point was critical when the effects of a shift in fishing effort from trawl fisheries to fixed gear fisheries were evaluated. Due to the lack of data on standardized fishing effort, these transfers were made only in terms of number of fishing boats, assuming that these vessels would adopt the new activity on a full-time basis.
- Landings predictions in weight and values under the different regimes were carried out over an 11-year period, assuming that recruitments of each species in each prediction year were equal to the average initial numbers provided by the pseudo-cohort analyses. Effects of these regimes were compared with the status quo situation.
- Predicted landings are computed under average stock conditions and, therefore, should not be used to derive TAC figures for any year.

#### 4.4.3 Current state of the stocks and fisheries

Average catches for the period 1986-1989 and landings values recorded in 1989 have been used in the assessment and are given in Tables 4.4.2a and b for each fishery unit. Total landings amount to 159,000 t corresponding to 740 million ECUs. Hake is by far the dominant species in the landings (39% in weight, 52% in value), and is followed by megrim and Lophius piscatorius which each account for about 13% in weight and 9% in value.

When all species are combined, fishery unit 4 (offshore trawling in the Celtic Sea) is the most important in weight (23% of the landings), but only ranks second in value (18%). Indeed, longliners in Celtic Sea (fishery unit 1) land only hake and this unit contributed 25% of the total landings in value (9% in weight).

For most of the species included in the data base, it is generally considered that exploitation patterns are not satisfactory and that the regulations intended to improve them are not effectively enforced.

Futhermore, as demonstrated last year, the current fishing effort is beyond the  $F_{max}$  level for most stocks, and a significant reduction of this effort would be required to achieve maximum sustainable yield unless exploitation patterns are improved (Tables 4.4.3 - 4.4.4).

#### 4.4.4 Assessment of the effects of management measures

Four different management regimes suggested by the Commission of EC were simulated this year:

- Regime 1: enforcement of legal mesh sizes in Sub-areas VII and VIII as defined by EC regulations and a decrease of the minimum landing size for megrim in Sub-area VII from 24 to 20 cm.
- Regime 2: transfer of 10% of fishing effort from non-Nephrops trawling (unit 4) to long-lining (unit 1) and transfer of a further 10% from unit 4 to gillnetting (unit 3).



Regime 3: a transfer of 10% of fishing effort from the deep water trawl fishery (unit 14) to the longline fishery (unit 12), and an additional transfer of 10% of fishing effort from the shallow water trawl fishery (unit 10) to the gillnet fishery (unit 13).

In addition to these requests, the Commission of the EC also requested the assessment of the effects of use by Nephrops trawlers in the Bay of Biscay (fishery unit 9) of a selective gear.

#### Regime 1

The results of regime 1 show a slight immediate reduction in the landings of all species combined followed by a gradual increase to a stable maximum after 9 years (Figure 4.4.1a). These gains represent increases of 6% in weight and 8% in value compared with the status quo situation. The gains are mainly accounted for by gains in hake, Biscay sole and Biscay Nephrops.

For hake (Figure 4.4.1b), the projected landings show a similar trend to those of all species and units combined, emphasising the crucial role of hake to the fisheries in this area.

The overall effect for Biscay sole and Biscay Nephrops is similar, with an immediate reduction in landed weight, followed by an increase to a stable maximum after some years (Figures 4.4.1c and d).

The effects of this regime on the overall landings by fishing units are shown in Figures 4.4.1e-i. Unit 1 (long line in medium to deep water in Sub-area VII) shows the greatest gains (approximately 10%), and for the others units, predicted gains vary between 0 and 5%.

Under this regime, there are no long-term losses in weight or value in any fishery unit, if landings for all species are considered.

#### Regime 2

Results of the effects of regime 2 are shown in Figures 4.4.1j-n.

Unit 4 experiences an immediate decrease in both landed weight and value. Although landings then increase slightly, after 5 years they stabilize below the status quo situation (Figure 4.4.1j).

In this regime, transfers of fishing effort correspond to a 30% increase in effort of unit 1 (long line in Sub-area VII) and a 20% increase in the effort of unit 3 (gillnet in Sub-area VII). Therefore, units 1 and 3 show an immediate increase in both landed weight and value which then remain approximately steady over the period considered (Figures 4.4.1j and k).

When all species and all units combined are considered, landed weight shows a slight immediate decrease (2%) but an opposite trend is observed in landed value (2% increase). After the first year, both weight and value increase until they stabilize slightly higher than the status quo situation.

Results in terms of landed weight of the main target species are shown in Figure 4.4.1n. For hake, after an immediate increase (3% in weight, 10% in value), landings stabilize at a level which is 3% greater in weight and 9% greater in value than the level existing before the change in regime.

Landings of anglerfish and megrim show a small immediate decrease. Later, landed weight and value are slightly higher (anglerfish) or equal (megrim) to the status quo situation.

### Regime 3

In regime 3, fishing effort in fishery units 12 and 13 increases by 10% and 30%, respectively, corresponding to a 10% decrease in fishery units 14 and 10.

As shown in Figures 4.4.10-r, changes predicted by this simulation are very small and no significant losses or gains are observed.

### Regime 4

Regime 4 is a combination of regimes 2 and 3 and implies transfer of effort from trawling to longlining or gillnetting. Therefore, to a large extent, the results are a repetition of those shown for regimes 2 and 3. The effects for the whole fishery are insignificant (Figure 4.4.1s).

The objective of this regime is to improve exploitation patterns on hake. The effects on this species are immediate and long-term increases of 4% and 5%, respectively. The main beneficiaries are fishery units 1, 12 and 13. For each of these units, there is an immediate increase in value of about 20%, and landed value remains stable over the years.

For anglerfish and megrim, immediate losses in weight of approximately 10% are compensated for in 2 to 3 years (Figure 4.4.1t).

When all species combined are considered, fishery units in which effort has been reduced show losses in value and none of these units attains its reference landings in the time period considered in the simulation (Figures 4.4.1u-v).

### Effects of use of selective trawl in the Nephrops fishery

Only two vessels are using a selective trawl at present in this area, and the only data available from selective trawls are experimental.

Furthermore, the analysis programs currently available do not allow simulation of the use of selective trawls. However, an attempt to solve the problem for the particular case of hake in fishery unit 9 (Nephrops trawling in Bay of Biscay) was made.

Experiments on board commercial vessels using a two codend selective trawl with mesh sizes of 50 mm in the lower codend and 65 mm in the upper one indicated that 96% of the catch of hake in weight was taken in the upper codend and 97% of the catch of Nephrops in weight was in the lower codend. However, small hake up to 19 cm were distributed almost equally between the two codends. A new selectivity ogive has been calculated combining the partition of hake between upper and lower codends taking account of selectivity of the lower codend (50 mm) and upper codend (65 mm).

These new selection parameters were used in a mesh assessment carried out for hake alone.

Results (Figures 4.4.2a and b) show a long-term gain of approximately 7% for all units combined. In fishery unit 9 catches of hake consist mainly of small fish, and the immediate and long-term effects of using a selective gear are losses of 16% and 5% respectively.

Due to the lack of relevant data, this attempt has to be considered as a very provisional assessment of the effect of use of such gear.

### 4.4.5 Recommendations and future activities

ACFM repeats its former advice that the legal mesh sizes in Sub-area VII and, particularly Sub-area VIII should be strictly enforced, since this would be beneficial to all fishery units. Similarly, benefits would accrue to all fishery units if the mesh exemption in the Nephrops fishery were cancelled and a uniform 65 mm regulation were set in Sub-area VIII, but this would generate sizeable short-term losses.

For several stocks, the current overall fishing intensity is above the  $F_{max}$  level given the current exploitation patterns in each fishery unit. The available assessment models and data are appropriate for investigating the interactions between fishery units and species, but provide no basis for recommending TACs, especially if these are to be made compatible amongst species and areas. Noting that relative gains in equilibrium yield when fishing at the  $F_{max}$  level would be small, ACFM recommends that effort should not be allowed to increase.

As pointed out in previous reports of the Working Group, deficiencies exist in the available data set. There is a serious paucity of data on fleet activities, and it remains very difficult to identify possible trends over a range of years for the different fishing units in terms of fishing activities. In some cases, a revision of biological parameters would be necessary, and could be obtained, for each species, from the relevant working group reports. For most of the stocks in the area, there is a serious shortage of data on gear selectivity. Accurate estimates of selectivity parameters are of paramount importance when technical interactions are analysed, and new research on this topic is required.

#### 4.5 Horse Mackerel in Sub-areas II-IV and VI-IX

##### 4.5.1 General comments

##### Total landings

Landings of horse mackerel as officially reported to ICES decreased from 375,000 t in 1976 to about 100,000 t in 1982. Since then, they have gradually increased to 372,000 t in 1989 (Tables 4.5.1 - 4.5.7). The level of catches is uncertain, because discarding of this fish is likely to take place in some fisheries.

##### Stock units

Three stock units are assumed to exist within the ICES area. Catches in Divisions IIa, IVa, VIa, VIIa-c,e-k, and VIIIa,b,d,e were allocated to the Western "stock", catches in Divisions IIIa, IVb,c, and VIId to the North Sea "stock", and the catches from Divisions VIIc and IXa to the Southern "stock".

Horse mackerel have at present a similar pattern of distribution as mackerel. Changes in distribution and migration have been observed in later years, and ACFM considers the allocation of catches in the different Divisions to "stocks" as a temporary approach.

#### 4.5.2 North Sea horse mackerel (Divisions IIIa, IVb-c, VIId)

Source of information: Report of the Working Group on the Assessment of Stocks of Sardine, Horse Mackerel, and Anchovy, June 1990 (C.M.1990/Assess:24).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	-	-	-	-	-	-	-	-	-	-	-
Agreed TAC	125 <sup>3</sup>	181 <sup>3</sup>	18.5 <sup>4</sup>	30 <sup>4</sup>	30 <sup>4</sup>	50 <sup>4</sup>	45 <sup>4</sup>	40 <sup>4</sup>	-	-	-
Catch as used by WG	8	29	27	25	11	26	50	-	50	4	23
Sp. stock biomass <sup>5</sup>						110	217	255			

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1982-1989. <sup>3</sup> Division IIa and Sub-areas IV, VI-VII (EC waters only). <sup>4</sup> Division IIa and Sub-area IV (EC waters only). <sup>5</sup> Egg survey estimates. Weights in '000 t.

Catches: North Sea horse mackerel are caught in Divisions IIIa, IVb,c, and VIId. Catches were below 10,000 t before 1984. In 1984-1988, the catches have been between 25,000 t and 30,000 t, except for 1987. In 1989, the catches were 50,000 t, the highest on record. The fishery in Division VIId is targeted at horse mackerel, while the catches in Divisions IVb and c are taken as by-catches in the small mesh fishery.

Data and assessment: Length compositions available from Dutch groundfish surveys (1980-1989) and Danish acoustic surveys (1985-1989). Age compositions available from Dutch commercial and research vessel catches (1987-1989). SSB is estimated from egg surveys conducted in 1988, 1989, and 1990.

Fishing mortality: No information.

Recruitment: The 1982 year class is strong. Age compositions from commercial catches indicate relatively strong 1985 and 1986 year classes. No information on the 1989 year class.

State of stock: SSB estimated to be 255,000 t in 1990, compared to 217,000 t in 1989 and 110,000 t in 1988. No information on historical state of the stock.

Forecast for 1991: Not available.

Special comments: If a TAC is set for North Sea horse mackerel, it should only apply to the areas where the stock is fished (Divisions IIIa, IVb,c and VIId).

#### 4.5.3 Western horse mackerel (Divisions IIa, IVa, VIa, VIIa-c,e-k, VIIId,a,b,d,e)

Source of information: Report of the Working Group on the Assessment of the Stocks of Sardine, Horse Mackerel and Anchovy, June 1990 (C.M.1990/Assess:24).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	-	-	-	-	-	-	100	~200	-	-	-
Agreed TAC	125 <sup>3</sup>	181 <sup>3</sup>	145 <sup>4</sup>	123 <sup>5</sup>	155 <sup>5</sup>	169 <sup>5</sup>	153 <sup>5</sup>	203 <sup>5</sup>	-	-	-
Nominal landings )	65	74	73	97	157	182	248	-			
Unallocated landings)											
Discards/slipping	-	+	8	9	-	4	1	-			
Catch as used by WG	65	74	81	106	157	186	249	- <sup>1</sup>	249	42	120
Sp. stock biomass	483	-	-	645	-	-	2134	1931 <sup>1</sup>	2134	483	-
Recruitment (age 1)	37078	384	94	722	4870	1250	1250	1250 <sup>1</sup>	37078	94	-
Mean F(3 -11,w)	0.06	0.10	0.02	0.03	0.05	0.07	0.10	-	0.10	0.02	0.06

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1982-1989. <sup>3</sup> Division IIa and Sub-areas IV, VI-VIII (EC waters only). <sup>4</sup> Division Vb (EC waters only) and Sub-areas VI-VIII. <sup>5</sup> Division Vb (EC waters only), Sub-areas VI and VII, and VIIId,a,b,d,e. Weights in '000 t, recruitment in millions.

Catches: In the 1980s, the catches have increased from about 50,000 t to 250,000 t in 1989. The catches in Divisions IIa and IVa increased from less than 1,000 t in 1986 to 50,000 t in 1988 and 79,000 t in 1989.

Data and assessment: The assessment is based on international egg surveys (1983, 1986, and 1989) and VPA. The VPA is considered uncertain due to difficulties with catch-in-numbers-at-age data and uncertainties concerning the maturity ogive. Catch at age only available from the Netherlands.

Fishing mortality: Due to the increase in catches, particularly in Divisions IIa and IVb, the fishing mortality has increased over the last three years (Figure 4.5.3.1).

Recruitment: The recruitment has been very poor except for the extremely strong 1982 year class. No recruitment data from surveys are available. The 1987 year class was believed to be strong, but it did not turn up in the catches in 1989.

State of stock: SSB is at a high level due to the 1982 year class, which contributed 90% of the spawning stock biomass in 1989.

#### Forecast for 1991:

Assuming  $F(90) = 0.12$ , Basis: Agreed TAC plus Norwegian fishery at 1989 level; Catch(90) = 291, Landings (90) = 280.

Option	Basis	F(91)	Predicted				Consequences/implications
			SSB(91)	Catch(91)	Landgs(91)	SSB(92)	
A	No fishery	0	1,788	0	0	1,823	Stable SSB
B	Status quo	0.10	1,691	217	210	1,535 )	Reduction in SSB
C	F <sub>0.1</sub>	0.15	1,638	329	320	1,395 )	

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to a reduction of the spawning stock in 1991 by 20% and in 1992 by 28% compared to the 1989 level.

Recommendation: Before the recruitment of the 1982 year class to the spawning stock, the spawning stock biomass was in the order of 500,000 t. As long as the spawning stock is above 500,000 t, ACFM considers the stock to be within safe biological limits.

As the 1982 year class dominates the stock, and this year class has reached an age where growth is very slow, the spawning stock biomass will decline if no significant recruitment appears. Assuming constant catches of 100,000, 200,000 and 300,000 t from 1991 and onwards, the expected decline in biomass is illustrated in Figure 4.5.3.2.

If a TAC is set, it should apply to the areas where Western horse mackerel are fished, i.e., Divisions IIa, IVa, VIa, VIIa-c,e-k, VIIIa,b,d,e.

Special comments: The catches given for horse mackerel in the western areas are of Trachurus trachurus. In 1989, the catches of Trachurus mediterraneus in these areas were negligible (about 20-30 t).

#### 4.5.4 Southern horse mackerel (Divisions VIIIC and IXa)

Source of information: Report on the Working Group on the Assessment of the Stocks of Sardine, Horse Mackerel and Anchovy, June 1990 (C.M.1990/Assess:24).

Year	1983	1984	1985	1986	1987	1988	1989	1990	Max <sup>2</sup>	Min <sup>2</sup>	Mean <sup>2</sup>
Recomm. TAC	-	-	-	-	-	-	-	38			
Agreed TAC	-	-	-	72.5 <sup>3</sup>	72.5 <sup>3</sup>	82.0 <sup>3</sup>	73.0 <sup>3</sup>	55.0 <sup>4</sup>	82.0	72.5	75.0
Catch as used by WG	74	46	44	61	63	63	70	-	72	44	61

<sup>1</sup> Predicted or assumed. <sup>2</sup> Over period 1981-1989. <sup>3</sup> Division VIIIC, Sub-areas IX and X, and CECAF Division 34.1.1 (EC waters only). <sup>4</sup> Division VIIIC and Sub-area IX. Weights in '000 t, recruitment in millions.

Catches: Total catches in 1989 increased by 11% relative to 1988. This increase is due to the purse-seine fishery in Divisions VIIIC and IXa (Galicia + Cantabria).

Data and assessment: Uncertainty about stock identity. Catch in numbers at age uncertain up to 1987 due to problems with ageing. CPUE data available. Recruitment estimated from trawl survey. An analytical assessment was attempted, but the results are very uncertain and should be treated with caution.

Fishing mortality: Fishing mortality appears relatively stable but seems to be high on very young fish.

Recruitment: After the strong 1982 and 1986 year classes, all other year classes appear to be of average size except for the weak 1988 year class.

State of stock: The spawning stock biomass appears to be relatively stable.

Forecast for 1991: Not available due to uncertainties about the assessment.

Recommendation: In view of increasing uncertainty about the assessment (see Data and assessment above) ACFM did not accept the results.

ACFM recommends a precautionary TAC for 1991 based on the average 1981-1989 level of catches, i.e., 61,000 t.

Special comments: If there is a stock-recruitment relationship, the high catches of immature horse mackerel may have a negative effect on the state of the stock.



Table 2.1.1 Weights at age (kg) in the Norwegian (February 1990) and USSR (Oct-Dec 1989) surveys and their mean compared to the values predicted by the Arctic Fisheries Working Group 1989.

Year class	Age (1990)	Norway	USSR	Mean	Predicted
1987	3	0.570	0.220	0.395	0.350
1986	4	1.030	0.401	0.716	0.650
1985	5	1.460	0.928	1.194	0.970
1984	6	1.930	1.427	1.679	1.470
1983	7	2.890	2.200	2.545	2.300
1982	8	4.370	3.133	3.752	3.550
1981	9	8.980	4.649	6.815	6.270
1980	10	10.900	6.800	8.850	8.090

Age 3 from USSR estimated from numbers and biomass.

Table 2.1.2 North-East Arctic COD.  
Total nominal catch (t) by fishing areas. (Data  
provided by Working Group members.)

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	157,631	202,688	69,794	430,113
1987	146,106	245,387	131,578	523,071
1988	166,649	209,930	58,360	434,939
1989 <sup>1</sup>	163,849	150,074	19,240	333,163

<sup>1</sup> Provisional figures.

Table 2.1.3 Coastal COD.  
Total nominal catch  
('000 t) by Norway  
in Division IIa.  
(Data provided by  
Working Group members.)

Year	Division IIa
1980	40
1981	49
1982	42
1983	38
1984	33
1985	28
1986	26
1987	31
1988	22
1989 <sup>1</sup>	16

<sup>1</sup> Provisional figure.

Table 2.1.4 North-East Arctic COD.

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

Year	Faroe Islands	France	German Dem.Rep.	Germany, Fed.Rep.	Norway	Poland	United Kingdom	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
<u>Spain</u>										
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	18,667	591	1,543	10,092	232,096	5,497	7,581	150,541	3,505	430,113
1987	15,036	1	986	7,035	268,004	16,223	10,957	202,314	2,515	523,071
1988	15,329	2,551	605	2,803	223,412	10,905	8,107	169,365	1,862	434,939
1989 <sup>1</sup>	15,685	1,853	326	3,290	159,939	7,802	8,666	134,329	1,273	333,163

<sup>1</sup>Provisional figures.

Table 2.2.1 North-East Arctic HADDOCK.

Total nominal catch (t) by fishing areas. (Data provided by Working Group members.)

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	69,865	26,006	714	96,585
1987	109,429	38,182	3,048	150,659
1988	43,990	47,086	668	91,744
1989 <sup>1</sup>	31,505	23,655	366	55,496

<sup>1</sup> Provisional figures.

Table 2.2.2 North-East Arctic HADDOCK.

Nominal catch (t) by countries (Sub-area I and Divisions IIa+b combined).  
(Data provided by Working Group members.)

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	893	33	75	1,079	48,314	22	431	45,738	-	96,585
1987	464	26	83	3,106	69,333	99	563	76,980	-	150,654
1988	1,113	116	78	1,324	57,273	72	435	31,293	41	91,745
1989 <sup>1</sup>	1,218	125	26	171	32,199	1	853	20,903	-	55,496

<sup>1</sup> 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	1980	1981	1982	1983	1984
Denmark	-	-	-	-	-
Faroe Islands	532	236	339	539	503
France	1,016	218	82	418	431
German Dem.Rep.	-	-	-	-	6
Germany, Fed.Rep.	12,511	8,413	7,224	4,933	4,532
Norway	128,878	166,139	159,643	149,556	152,818
Spain	780	-	-	33	-
UK (Engl. & Wales)	794	395	731	1,251	335
UK (Scotland)	-	-	1	-	-
USSR	43	121	14	206	161
Total	144,554	175,522	168,034	156,936	158,786

Country	1985	1986	1987	1988 <sup>1</sup>	1989 <sup>1</sup>
Denmark	-	-	1	-	-
Faroe Islands	490	426	712	167	514
France	657	308	576	404	460
German Dem.Rep.	11	-	-	1	-
Germany, Fed.Rep.	1,837	3,470	4,909	4,559	605
Norway	103,899	63,090	85,710	108,805	119,372
Spain	-	-	-	-	-
UK (Engl. & Wales)	202	54	54	436	724
UK (Scotland)	+	21	3	6	18
USSR	51	27	426	130	506
Total	107,147	67,396	92,391	114,508	122,199

<sup>1</sup> Provisional figures.

Table 2.4.1 REDFISH in Sub-areas I and II.  
Nominal catch (t) by countries in Sub-area I, Divisions IIa and IIb combined as officially reported to ICES.

Country	1980	1981	1982	1983	1984
Denmark	-	-	-	-	-
Faroe Islands	-	206	-	-	-
France	1,297	537	841	798	2,970
German Dem.Rep.	8,448	4,614	4,463	3,394	4,168
Germany, Fed.Rep.	7,992	4,688	3,182	3,395	3,289
Norway	8,472	9,249	10,045	11,083	18,650
Poland	87	26	-	-	-
Portugal	271	-	-	-	1,806
Spain	1,965	930	72	222	25
UK (England & Wales)	1,307	470	336	182	716
UK (Scotland)	-	-	-	-	-
USSR	72,802	81,652	112,810	105,459	69,689
Total	102,765 <sup>2</sup>	102,372	131,749	124,533	101,313

Country	1985	1986	1987	1988	1989 <sup>1</sup>
Denmark	-	-	+	-	-
Faroe Islands	-	29	450 <sup>3</sup>	973	372 <sup>3</sup>
France	3,326	2,719	1,611	3,369	350 <sup>3</sup>
German Dem.Rep.	3,260	1,323	417	994	1,979
Germany, Fed.Rep.	3,306	3,561	5,412	1,361	2,249
Norway	20,456	23,251	18,052	24,665	24,583
Poland	-	-	-	-	-
Portugal	2,056	1,591	1,175	500	340
Spain	38	-	25	26	5
UK (England & Wales)	167	129	230	468	272
UK (Scotland)	-	14	9	2	13
USSR	59,943	20,694	7,215	9,139	14,344
Total	92,552	53,311	34,596	41,497	44,507

<sup>1</sup> Provisional figures.

<sup>2</sup> The total figure used by the Working Group for assessments (including catches by non-members).

<sup>3</sup> As reported to Norwegian authorities.

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	1980	1981	1982	1983	1984
Faroe Islands	-	-	-	-	-
France	1	16	-	-	-
Germany, Fed.Rep.	-	7	10	-	1
Norway	736	543	732	580	1,472
Portugal	170	-	-	-	-
UK (England & Wales)	295	61	77	48	22
UK (Scotland)	-	-	-	-	-
USSR	33	1,220	1,750	4,023	532
Total	1,235	1,847	2,569	4,651	2,027

Country	1985	1986	1987	1988	1989 <sup>1</sup>
Faroe Islands	-	-	-	1	10
France	-	-	-	-	-
Germany, Fed.Rep.	143	50	10	6	+
Norway	2,378	4,245 <sup>2</sup>	2,331	1,979 <sup>2</sup>	1,772
Portugal	-	-	-	-	-
UK (England & Wales)	43	32	14	20	14
UK (Scotland)	-	3	-	-	2
USSR	368	1,066	769	199	594
Total	2,932	5,396	3,124	2,205	2,392

<sup>1</sup> Provisional figures.

<sup>2</sup> Working Group figure.



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	1980	1981	1982	1983	1984
Faroe Islands	-	206	-	-	-
France	1,296	521	841	798	2,970
German Dem.Rep.	7,460	2,205	2,760	2,500	2,570
Germany, Fed.Rep.	7,992	4,681	3,172	3,395	3,288
Norway	7,734	8,704	9,140	10,500	17,111
Poland	78	26	-	-	-
Portugal	89	-	-	-	1,134
Spain	1,500	620	-	-	-
UK (England & Wales)	967	409	259	134	672
UK (Scotland)	-	-	-	-	-
USSR	46,762	56,130	63,125	82,836	63,342
<b>Total</b>	<b>73,878</b>	<b>73,502</b>	<b>79,297</b>	<b>100,163</b>	<b>91,087</b>

Country	1985	1986	1987	1988	1989 <sup>1</sup>
Faroe Islands	-	29	450 <sup>2</sup>	970	355
France	3,326	2,719	1,611	3,349	320 <sup>2</sup>
German Dem.Rep.	2,800	1,252	375	879	1,468
Germany, Fed.Rep.	2,972	3,319	3,562	1,320	2,125
Norway	18,062	18,704	15,410	22,544 <sup>3</sup>	22,747
Poland	-	-	-	-	-
Portugal	1,327	1,273	1,156	467	251
Spain	-	-	-	-	-
UK (England & Wales)	120	94	205	412	249
UK (Scotland)	-	11	8	2	9
USSR	59,047	19,099	4,953	7,598	10,661
<b>Total</b>	<b>87,654</b>	<b>46,500</b>	<b>27,730</b>	<b>37,541</b>	<b>38,185</b>

<sup>1</sup> Provisional figures.

<sup>2</sup> As reported to Norwegian authorities.

<sup>3</sup> Working Group figure.

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	1980	1981	1982	1983	1984
Denmark	-	-	-	-	-
Faroe Islands	-	-	-	-	-
France	-	-	-	-	-
German Dem. Rep.	988	2,409	1,703	894	1,598
Germany, Fed. Rep.	-	-	-	-	-
Norway	2	2	173	3	67
Poland	9	-	-	-	-
Portugal	12	-	-	-	672
Spain	465	310	72	222	25
UK (England & Wales)	45	+	+	-	22
UK (Scotland)	-	-	-	-	-
USSR	26,007	24,302	47,935	18,600	5,815
Non-members	124 <sup>2</sup>	-	-	-	-
Total	27,652	27,023	49,883	19,719	8,199

Country	1985	1986	1987	1988	1989 <sup>1</sup>
Denmark	-	-	+	-	-
Faroe Islands	-	-	-	2	7
France	-	-	-	20 <sup>2</sup>	30 <sup>2</sup>
German Dem. Rep.	460	71	42	115	511
Germany, Fed. Rep.	190	192	1,840	35	124
Norway	16	302	311	142	64
Poland	-	-	-	-	-
Portugal	729	318	19	33	89
Spain	38	-	25 <sup>3</sup>	26 <sup>3</sup>	5
UK (England & Wales)	4	3	11	36	9
UK (Scotland)	-	+	1	-	2
USSR	528	529	1,493	1,342	3,089
Total	1,965	1,415	3,742	1,751	3,930

<sup>1</sup> Provisional figures.

<sup>2</sup> As reported to Norwegian authorities.

<sup>3</sup> Working Group figure.

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, as used by the Working Group.

Species	1980	1981	1982	1983	1984
<u>S. marinus</u>	23,411	20,826	16,366	19,260	28,379
<u>S. mentella</u>	79,354	81,546	115,383	105,273	72,934
Total	102,765	102,372	131,749	124,533	101,313

Species	1985	1986	1987	1988	1989 <sup>1</sup>
<u>S. marinus</u>	29,484	30,199	24,078	25,911	21,994
<u>S. mentella</u>	63,068	23,112	10,518	15,586	22,513
Total	92,552	53,311	34,596	41,497	44,507

<sup>1</sup> 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	1980	1981	1982	1983	1984
Denmark	-	-	-	-	-
Faroe Islands	-	8	-	-	-
France	-	-	8	67	138
German Dem.Rep.	2,080	1,358	1,153	1,913	2,089
Germany, Fed.Rep.	303	128	18	130	76
Norway	3,157	4,201	3,206	4,883	4,376
UK (Engl.& Wales)	26	9	10	2	23
UK (Scotland)	-	-	-	-	-
USSR	7,670	9,276	12,394	15,152	15,181
Others	48	38	-	-	-
<b>Total</b>	<b>13,284</b>	<b>15,018</b>	<b>16,789</b>	<b>22,147</b>	<b>21,883</b>

Country	1985	1986	1987	1988	1989 <sup>1</sup>
Denmark	-	-	+	-	-
Faroe Islands	-	42	7 <sup>2</sup>	186	78
France	239	13	13	67	40 <sup>2</sup>
German Dem.Rep.	3,807	2,659	1,855	712	589
Germany, Fed.Rep.	193	59	169	32	11
Norway	5,464	7,891	7,262	9,079 <sup>3</sup>	10,872
UK (Engl.& Wales)	5	10	61	82	6
UK (Scotland)	-	2	20	2	-
USSR	10,237	12,200	9,733	9,430	8,812
Others	-	-	-	-	-
<b>Total</b>	<b>19,945</b>	<b>22,876</b>	<b>19,120</b>	<b>19,590</b>	<b>20,408</b>

<sup>1</sup> Provisional figures.

<sup>2</sup> As reported to Norwegian Authorities.

<sup>3</sup> Working Group figure.

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	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Faroe Islands	-	-	-	-	-	-	-	-	9	-
Germany, Fed.Rep.	-	19	-	-	-	-	1	2	4 <sup>2</sup>	-
Norway	490	641	505	490	593	602	557	984	517 <sup>2</sup>	330
UK (Engl.& Wales)	12	5	8	1	17	1	5	10	7	+
UK (Scotland)	-	-	-	-	-	-	1	+	-	-
USSR	100	564	200	196	81	122	615	259	420	482
Others	-	1	-	-	-	-	-	-	-	-
Total	602	1,230	713	687	691	725	1,179	1,255	957	812

<sup>1</sup> Provisional figures.<sup>2</sup> Working Group figure.

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	1980	1981	1982	1983	1984
Faroe Islands	-	8	-	-	-
France	-	-	8	67	138
German Dem.Rep.	570	18	73	14	189
Germany, Fed.Rep.	303	109	18	130	76
Norway	2,529	3,077	2,487	4,257	3,703
UK (Engl.& Wales)	9	4	2	1	1
UK (Scotland)	-	-	-	-	-
USSR	2,014	2,031	2,459	5,031	5,459
Others	48	37	-	-	-
Total	5,473	5,284	5,047	9,500	9,566

Country	1985	1986	1987	1988	1989 <sup>1</sup>
Faroe Islands	-	6	-	177	78
France	239	13	13	67	40 <sup>2</sup>
German Dem.Rep.	82	55	12	130	94
Germany, Fed.Rep.	172	42	63	20	10
Norway	4,791	6,389	5,706	8,125 <sup>3</sup>	7,096
UK (Engl.& Wales)	2	5	44	56	6
UK (Scotland)	-	1	10	2	-
USSR	6,894	5,553	4,739	4,002	4,964
Others	-	-	-	-	-
Total	12,180	12,064	10,587	12,579	12,288

<sup>1</sup> Provisional figures.<sup>2</sup> As reported to Norwegian authorities.<sup>3</sup> Working Group figure.

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	1980	1981	1982	1983	1984
Denmark	-	-	-	-	-
Faroe Islands	-	-	-	-	-
France	-	-	-	-	-
German Dem.Rep.	1,510	1,340	1,080	1,899	1,900
Germany, Fed.Rep.	-	-	-	-	-
Norway	138	483	214	136	80
UK (Engl.& Wales)	5	-	+	+	5
UK (Scotland)	-	-	-	-	-
USSR	5,556	6,681	9,735	9,925	9,641
Total	7,209	8,504	11,029	11,960	11,626

Country	1985	1986	1987	1988	1989 <sup>1</sup>
Denmark	-	-	+	-	-
Faroe Islands	-	36	7 <sup>2</sup>	-	-
France	-	-	-	-	-
German Dem.Rep.	3,725	2,604	1,843	582	495
Germany, Fed.Rep.	21	16	104	8	1
Norway	71	945	572	437 <sup>3</sup>	3,446
UK (Engl.& Wales)	2	+	7	19	-
UK (Scotland)	-	-	10	+	-
USSR	3,221	6,032	4,735	5,008	3,366
Total	7,040	9,633	7,278	6,054	7,308

<sup>1</sup> Provisional figures.

<sup>2</sup> As reported to Norwegian authorities.

<sup>3</sup> Working Group figure.

Table 2.6.1.1 Nominal catches (in tonnes) of cod in ICES Sub-area XIV, 1980-1989. (Data for 1980-1987 broken down by countries are from Bulletin Statistique.)

Country	1980	1981	1982	1983	1984
Faroe Islands	-	292	-	368	-
Germany, Fed. Rep.	3,193	7,367	8,940	8,238	7,035
Greenland	1,778	890	898	438	1,051
Iceland	19	1	-	-	-
Norway	-	-	-	-	794
USSR	-	-	-	-	-
Total	4,990	8,550	9,838	9,044	8,880
Working Group estimate	12,000	16,000	27,000	13,377	8,068

Country	1985	1986	1987	1988 <sup>1</sup>	1989 <sup>1</sup>
Faroe Islands	-	86	-	-	2
Germany, Fed. Rep.	2,006	4,063	5,358	11,702	10,700
Greenland	106	606	1,476	380	3,790
Iceland	-	-	1	-	-
USSR	-	-	-	65	-
UK	-	-	-	-	1,860
Japan	-	-	-	-	94
Total	2,112	4,755	6,835	12,147	16,446
Working Group estimate	2,112	4,668	6,658	9,147 <sup>2</sup>	15,151 <sup>3</sup>

<sup>1</sup> Preliminary.

<sup>2</sup> Excluding 3,000 t assumed to be from NAFO Division 1F.

<sup>3</sup> Excluding 2,741 t assumed to be from NAFO Division 1F and including 1,500 t reported from other areas assumed to be from Sub-area XIV.

**Table 2.7.1** Nominal catch of REDFISH (in tonnes) by countries in Division Va (Iceland) as reported officially to ICES.

Country	1978	1979	1980	1981	1982	1983
Belgium	1,549	1,385	1,381	924	283	389
Faroe Islands	242	629	1,055	1,212	1,046	1,357
Germany, Fed.Rep.	-	-	-	-	-	-
Iceland	33,318	62,253	69,780	93,349	115,051	122,749
Norway	93	43	33	32	11	32
UK	-	-	-	-	-	-
<b>Total</b>	<b>35,202</b>	<b>64,310</b>	<b>72,249</b>	<b>95,517</b>	<b>116,391</b>	<b>124,527</b>

Country	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Belgium	291	400	423	398	372	190
Faroe Islands	686	291	253	332	372 <sup>2</sup>	374
Germany, Fed.Rep.	-	-	-	-	-	-
Iceland	108,270	91,381	85,992	87,768	93,995	88,778
Norway	12	8	2	7	7	1
UK	-	-	-	-	-	-
<b>Total</b>	<b>109,259</b>	<b>92,080</b>	<b>86,670</b>	<b>88,505</b>	<b>94,746</b>	<b>89,363</b>

<sup>1</sup> Provisional data.

<sup>2</sup> Working Group figure.



**Table 2.7.2** Nominal catch of REDFISH (in tonnes) by countries in Division Vb (Faroe Islands) as reported officially to ICES.

Country	1978	1979	1980	1981	1982	1983
Denmark	-	-	-	-	-	-
Faroe Islands	1,525	5,693	5,509	3,232	3,999	4,642
France	448	862	627	59	204	439
Germany, Fed.Rep.	7,767	6,108	3,891	3,841	5,230 <sup>2</sup>	4,300
Iceland	-	-	-	-	1	-
Netherlands	+	-	-	-	-	-
Norway	9	11	12	13	7	3
UK	57	+	-	-	-	-
USSR	-	-	-	-	-	-
<b>Total</b>	<b>9,806</b>	<b>12,674</b>	<b>10,039</b>	<b>7,145</b>	<b>9,441</b>	<b>9,384</b>

Country	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Denmark	-	-	36	176	8	-
Faroe Islands	8,770	12,634	15,224	13,478	13,318	12,728 <sup>3</sup>
France	559	1,157	752	819	582	928 <sup>3</sup>
Germany, Fed.Rep.	4,460	5,091	5,142	3,060	1,595	1,191
Iceland	-	-	-	-	-	-
Netherlands	-	-	-	-	-	-
Norway	1	4	2	5	5	20
UK	-	-	-	-	-	-
USSR	142	868	320 <sup>3</sup>	-	-	-
<b>Total</b>	<b>13,932</b>	<b>19,754</b>	<b>21,476</b>	<b>17,538</b>	<b>15,508</b>	<b>14,867</b>

<sup>1</sup> Provisional data.

<sup>2</sup> Including 570 t from Sub-area VI.

<sup>3</sup> 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	1978	1979	1980	1981	1982	1983
Bulgaria	-	-	-	-	-	-
Greenland	3	-	-	1	+	1
Faroe Islands	-	-	-	18	-	27
France	-	490	-	-	-	-
German Dem. Rep.	-	-	-	-	-	155 <sup>3</sup>
Germany, Fed. Rep.	20,711 <sup>2</sup>	20,428 <sup>2</sup>	32,520 <sup>2</sup>	42,980 <sup>2</sup>	42,815 <sup>2</sup>	30,815 <sup>2</sup>
Iceland	151	-	89	-	17 <sup>3</sup>	-
Norway	2	-	-	-	-	-
Poland	-	-	-	-	581 <sup>3</sup>	-
UK	13	-	-	-	-	-
USSR	-	-	-	-	20,217 <sup>3</sup>	-
<b>Total</b>	<b>20,880</b>	<b>20,918</b>	<b>32,609</b>	<b>42,999</b>	<b>63,630</b>	<b>31,036</b>
<b>Total used in the Assessment<sup>6</sup></b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>42,815</b>	<b>30,853</b>

Country	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Bulgaria	2,961 <sup>3</sup>	5,825 <sup>3</sup>	11,385 <sup>3</sup>	12,270 <sup>3</sup>	8,455 <sup>3</sup>	4,546 <sup>3</sup>
Greenland	10	5,519 <sup>4</sup>	9,542 <sup>4</sup>	2,912 <sup>4</sup>	3,751 <sup>4</sup>	285 <sup>4</sup>
Faroe Islands	-	-	5	382	1,634 <sup>5</sup>	41
France	-	-	-	-	-	-
German Dem. Rep.	989 <sup>3</sup>	5,438 <sup>3</sup>	8,574 <sup>3</sup>	7,023 <sup>3</sup>	16,848 <sup>3</sup>	6,444 <sup>3</sup>
Germany, Fed. Rep.	14,141	5,974	5,584	4,691	5,734	2,372 <sup>3</sup>
Iceland	-	+	-	-	-	2,722 <sup>3</sup>
Japan	-	-	-	-	-	307 <sup>3</sup>
Norway	15	-	-	-	-	-
Poland	239 <sup>3</sup>	135 <sup>3</sup>	149 <sup>3</sup>	25 <sup>3</sup>	-	-
UK	-	-	-	-	-	4 <sup>3</sup>
USSR	-	42,973 <sup>3</sup>	60,863 <sup>3</sup>	68,521 <sup>3</sup>	55,254 <sup>3</sup>	7,200 <sup>3</sup>
<b>Total</b>	<b>18,355</b>	<b>65,864</b>	<b>96,102</b>	<b>95,824</b>	<b>91,676</b>	<b>23,921</b>
<b>Total used in the Assessment<sup>6</sup></b>	<b>14,166</b>	<b>11,493</b>	<b>15,131</b>	<b>7,985</b>	<b>10,029</b>	<b>2,702</b>

<sup>1</sup> Provisional data.

<sup>2</sup> Catches updated for Sub-area XII included.

<sup>3</sup> Catches from the oceanic stock not included in the assessments.

<sup>4</sup> Fished mainly by the Japanese fleet.

<sup>5</sup> 1,090 t from the oceanic stock not included.

<sup>6</sup> Excluding oceanic stock of *S. mentella*.

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	1988	1989 <sup>1</sup>
German								
Dem. Rep.	-	-	-	-	-	-	-	352
Poland	-	-	-	-	-	-	-	112
USSR	39,783	60,079	60,643	17,300	24,131	2,948	9,772	15,500
Total	39,783	60,079	60,643	17,300	24,131	2,948	9,772	15,964

<sup>1</sup> Provisional.

**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
1978	Total	1.5	0.2	-	-	33.3	0.1	-	-	35.1
	<u>S.mar.</u>	1.5	0.2			29.4	0.1			31.2
	<u>S.ment.</u>	-	-			3.9	-			3.9
1979	Total	1.4	0.6	-	-	62.3	0.1	-	-	64.4
	<u>S.mar.</u>	1.4	0.6			54.6	0.1			56.7
	<u>S.ment.</u>	-	-			7.7	-			7.7
1980	Total	1.4	1.1	-	-	69.8	+	-	-	72.3
	<u>S.mar.</u>	1.4	1.1			59.6				62.1
	<u>S.ment.</u>	-	-			10.2				10.2
1981	Total	0.9	1.2	-	-	93.4	+	-	-	95.5
	<u>S.mar.</u>	0.9	1.2			73.7				75.8
	<u>S.ment.</u>	-	-			19.7				19.7
1982	Total	0.3	1.0	-	-	115.1	+	-	-	116.4
	<u>S.mar.</u>	0.3	1.0			96.6	+			97.9
	<u>S.ment.</u>	-	-			18.5	-			18.5
1983	Total	0.4	1.4	-	-	122.7	+	-	-	124.5
	<u>S.mar.</u>	0.4	1.4			85.6				87.4
	<u>S.ment.</u>	-	-			37.1				37.1
1984	Total	0.3	0.7	-	-	108.3	+	-	-	109.3
	<u>S.mar.</u>	0.3	0.7			83.8	+			84.8
	<u>S.ment.</u>	-	-			24.5	-			24.5
1985	Total	0.4	0.3	-	-	91.4	+	-	-	92.2
	<u>S.mar.</u>	0.4	0.3			66.7	+			67.4
	<u>S.ment.</u>	-	-			24.8	-			24.8
1986	Total	0.4	0.3	-	-	86.0	+	-	-	86.7
	<u>S.mar.</u>	0.4	0.3			67.1	+			67.8
	<u>S.ment.</u>	-	-			18.9	-			18.9
1987	Total	0.4	0.3	-	-	87.8	+	-	-	88.5
	<u>S.mar.</u>	0.4	0.3			68.5				69.2
	<u>S.ment.</u>	-	-			19.3				19.3
1988	Total	0.4	0.4	-	-	94.0	+	-	-	94.8
	<u>S.mar.</u>	0.4	0.4			79.8	+			81.6
	<u>S.ment.</u>	-	-			14.2	-			14.2
1989 <sup>1</sup>	Total	0.2	0.3	-	-	88.8	+	-	-	89.3
	<u>S.mar.</u>	0.2	0.3			57.6	+			58.1
	<u>S.ment.</u>	-	-			31.2	-			31.2

<sup>1</sup> 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.	Nether- lands	Norway	UK	USSR	Total
1978	Total	-	1.5	0.4	-	7.8	-	+	0.1	-	9.8
	<u>S.mar.</u>		1.5	0.4		-			0.1		2.0
	<u>S.ment.</u>		-	-		7.8			-		6.7
1979	Total	-	5.7	0.9	-	6.1	-	+	-	-	12.7
	<u>S.mar.</u>		4.8	-		-					4.8
	<u>S.ment.</u>		0.9	0.9		6.1					7.9
1980	Total	-	5.5	0.6	-	3.9	-	+	-	-	10.0
	<u>S.mar.</u>		4.9	-		-		+			4.9
	<u>S.ment.</u>		0.6	0.6		3.9		-			5.1
1981	Total	-	3.2	+	-	3.9	-	+	-	-	7.1
	<u>S.mar.</u>		2.5	-		-		+			2.5
	<u>S.ment.</u>		0.7	+		3.9		-			4.6
1982	Total	-	4.0	0.2	-	5.2	-	+	-	-	9.4
	<u>S.mar.</u>		1.7	0.1		-		+			1.8
	<u>S.ment.</u>		2.3	+		5.2		-			7.5
1983	Total	-	4.7	0.4	-	4.3	-	-	-	-	9.4
	<u>S.mar.</u>		3.1	0.3		-					3.4
	<u>S.ment.</u>		1.6	0.1		4.3					6.0
1984	Total	-	8.8	0.5	-	4.5	-	+	-	0.1	13.9
	<u>S.mar.</u>		5.8	0.4		-				-	6.2
	<u>S.ment.</u>		3.0	0.1		4.5				0.1	7.7
1985	Total	-	12.6	1.2	-	5.1	-	+	-	0.9	19.8
	<u>S.mar.</u>		8.3	0.9		-				-	9.2
	<u>S.ment.</u>		4.3	0.3		5.1				0.9	10.6
1986	Total	+	15.4	0.8	-	5.1	-	+		0.3	21.6
	<u>S.mar.</u>	-	5.7	0.6		0.1		-		-	6.4
	<u>S.ment.</u>	+	9.7	0.2		5.0		+		0.3	15.2
1987	Total	0.2	13.5	0.8	-	3.1	-	+		0.1	17.6
	<u>S.mar.</u>	-	5.0	0.5		0.6		-		-	6.1
	<u>S.ment.</u>	0.2	8.9	0.1		2.4		+		0.1	11.8
1988	Total	-	13.3	0.6	-	1.6	-	+	-	-	15.5
	<u>S.mar.</u>		5.0	-		-		+		-	5.0
	<u>S.ment.</u>		8.3	0.6		1.6		-		-	10.5
1989 <sup>1</sup>	Total	-	12.7	0.9	-	1.2	-	+	-	-	14.8
	<u>S.mar.</u>		4.1	-		-		+		-	4.1
	<u>S.ment.</u>		8.6	0.9		1.2		-		-	10.7

<sup>1</sup> 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		Bul- garia	Canada	Denmark (G)	Faroe Isl.	German Dem.Rep.	Germany, Fed.Rep.	Ice- land	Norway	Poland	UK	USSR	Green- land	Total
1978	Total	-	-	+	-	-	20.7	0.2	+	-	+	-	-	20.9
	<u>S.mar.</u>	-	-	-	-	-	15.3	0.2	-	-	-	-	-	15.5
	<u>S.ment.</u>	-	-	-	-	-	5.4	-	-	-	-	-	-	5.4
1979	Total	-	-	-	+	-	21.1	-	-	-	-	-	-	21.1
	<u>S.mar.</u>	-	-	-	-	-	15.8	-	-	-	-	-	-	15.8
	<u>S.ment.</u>	-	-	-	-	-	5.3	-	-	-	-	-	-	5.3
1980	Total	-	-	-	-	-	32.5	0.1	-	-	-	-	-	32.6
	<u>S.mar.</u>	-	-	-	-	-	22.1	0.1	-	-	-	-	-	22.2
	<u>S.ment.</u>	-	-	-	-	-	10.4	-	-	-	-	-	-	10.4
1981	Total	-	-	-	+	-	43.0	-	-	-	-	-	-	43.0
	<u>S.mar.</u>	-	-	-	-	-	23.6	-	-	-	-	-	-	23.6
	<u>S.ment.</u>	-	-	-	-	-	19.4	-	-	-	-	-	-	19.4
1982	Total	-	-	+	-	-	42.8	+	-	0.6 <sup>2</sup>	-	20.2 <sup>2</sup>	-	63.6 <sup>2</sup>
	<u>S.mar.</u>	-	-	-	-	-	23.5	-	-	-	-	-	-	23.5
	<u>S.ment.</u>	-	-	-	-	-	19.3	-	-	0.6	-	20.2 <sup>2</sup>	-	40.1 <sup>2</sup>
1983	Total	-	-	-	+	0.1 <sup>2</sup>	30.8	-	-	-	-	- <sup>2</sup>	-	30.9 <sup>2</sup>
	<u>S.mar.</u>	-	-	-	-	-	15.6	-	-	-	-	- <sup>2</sup>	-	15.7 <sup>2</sup>
	<u>S.ment.</u>	-	-	-	-	0.1	15.2	-	-	-	-	- <sup>2</sup>	-	15.2 <sup>2</sup>
1984	Total	3.0 <sup>2</sup>	-	-	-	1.0 <sup>2</sup>	14.1	+	-	0.2 <sup>2</sup>	-	- <sup>2</sup>	+	18.3 <sup>2</sup>
	<u>S.mar.</u>	-	-	-	-	-	5.0	-	-	-	-	-	-	5.0
	<u>S.ment.</u>	3.0 <sup>2</sup>	-	-	-	1.0	9.1	-	-	0.2	-	-	-	13.3 <sup>2</sup>
1985	Total	5.8 <sup>2</sup>	-	-	+	5.4 <sup>2</sup>	5.9	+	-	0.1 <sup>2</sup>	-	43.0 <sup>2</sup>	5.5	65.7 <sup>2</sup>
	<u>S.mar.</u>	-	-	-	-	-	1.1	-	-	-	-	-	1.0	2.1 <sup>2</sup>
	<u>S.ment.</u>	5.8 <sup>2</sup>	-	-	-	5.4	4.8	-	-	0.1	-	43.0	4.5	63.6 <sup>2</sup>
1986	Total	11.4 <sup>2</sup>	-	-	+	8.6 <sup>2</sup>	5.6	-	-	0.1 <sup>2</sup>	-	60.9 <sup>2</sup>	9.6	96.2 <sup>2</sup>
	<u>S.mar.</u>	-	-	-	+	-	1.1	-	-	-	-	-	1.9	3.0 <sup>2</sup>
	<u>S.ment.</u>	11.4 <sup>2</sup>	-	-	+	8.6	4.5	-	-	0.1	-	60.9	7.7	93.2 <sup>2</sup>
1987	Total	12.3 <sup>2</sup>	-	-	0.4	7.0 <sup>2</sup>	4.7	-	+	+ <sup>2</sup>	-	68.5 <sup>2</sup>	2.9	95.9 <sup>2</sup>
	<u>S.mar.</u>	-	-	-	0.1	-	0.7	-	-	-	-	-	0.4	1.2
	<u>S.ment.</u>	12.3 <sup>2</sup>	-	-	0.3	7.0 <sup>2</sup>	4.0	-	+	-	-	68.5 <sup>2</sup>	2.5	94.7
1988	Total	8.5 <sup>2</sup>	-	-	1.6 <sup>2</sup>	16.8 <sup>2</sup>	5.7	-	-	-	-	55.2 <sup>2</sup>	3.8	91.6 <sup>2</sup>
	<u>S.mar.</u>	-	-	-	-	-	0.8	-	-	-	-	-	3.2	4.0
	<u>S.ment.</u>	8.5 <sup>2</sup>	-	-	1.6 <sup>2</sup>	16.8 <sup>2</sup>	4.9	-	-	-	-	55.2 <sup>2</sup>	0.6	87.6
1989 <sup>1</sup>	Total	4.5 <sup>2</sup>	-	-	+	6.4 <sup>2</sup>	2.4	2.7 <sup>2</sup>	-	-	+	7.2 <sup>2</sup>	0.3	23.8 <sup>2,3</sup>
	<u>S.mar.</u>	-	-	-	-	-	0.4	-	-	-	-	-	0.3	0.7
	<u>S.ment.</u>	4.5 <sup>2</sup>	-	-	-	6.4 <sup>2</sup>	2.0	2.7 <sup>2</sup>	-	-	-	7.2 <sup>2</sup>	+	22.8

<sup>1</sup> Preliminary. <sup>2</sup> Catches of the oceanic stock included. <sup>3</sup> Includes 300 t for Japan.

Table 2.7.8      Nominal catches of oceanic Sebastes mentella in Sub-areas XII and XIV by countries.

Country	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Bulgaria	-	-	2,961	5,825	11,385	12,270	8,455	4,546
Faroe Islands	-	-	-	-	-	-	1,090	-
German Dem.Rep.	-	155	989	5,438	8,574	7,023	16,848	6,796
Iceland	-	-	-	-	-	-	-	2,722
Japan	-	-	-	-	-	-	-	307
Poland	581	-	239	135	149	25	-	112
USSR	59,914	60,079	60,643	60,273	84,994	71,469	65,026	22,700
Total	60,495	60,234	64,832	71,671	105,102	90,787	91,419	37,183

<sup>1</sup> Provisional data.

**Table 2.8.1 GREENLAND HALIBUT.** Nominal catches (tonnes) in Sub-areas V and XIV, 1980-1989, as reported to ICES.

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Denmark	-	-	-	-	-	-	-	6	+	-
Faroe Islands	1,042	767	1,532	1,146	2,502	1,052	857	1,096	1,469	2,249
France	51	8	27	236	489	845	52	19	25	17
Germany, Fed.Rep.	2,318	3,007	2,581	1,142	936	863	859	566	637 <sup>1</sup>	488
Greenland	-	+	1	5	15	81	177	154	37	13
Iceland	27,838	15,455	28,300	28,360	30,080	29,231	31,044	44,780	49,040	59,450
Norway	3	2	+	2	2	3	2	2	1	3
<b>Total</b>	<b>31,252</b>	<b>19,239</b>	<b>32,441</b>	<b>30,888</b>	<b>34,024</b>	<b>32,075</b>	<b>32,991</b>	<b>46,623</b>	<b>51,209</b>	<b>62,220</b>

<sup>1</sup> Preliminary.

Working Group total 62,834 in 1989.

**Table 2.8.2 GREENLAND HALIBUT.** Nominal catches (tonnes) in Division Vb, 1980-1989, as reported to ICES.

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Denmark	-	-	-	-	-	-	-	6	+	-
Faroe Islands	951	442	863	1,112	2,456	1,052	779	1,007	1,055	1,515
France	51	8	27	236	489	845	52	19	25	17
Germany, Fed.Rep.	172	114	142	86	118	227	114	10	42	75
Norway	3	2	+	2	2	2	2	2	1	3
<b>Total</b>	<b>1,177</b>	<b>566</b>	<b>1,032</b>	<b>1,436</b>	<b>3,065</b>	<b>2,126</b>	<b>947</b>	<b>1,044</b>	<b>1,123</b>	<b>1,610</b>

<sup>1</sup> Preliminary data.

Working Group total 1,610 in 1989.



**Table 2.8.3 GREENLAND HALIBUT.** Nominal catches (tonnes) in Division Va, 1980-1989, as reported officially to ICES.

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Faroe Islands	91	325	669	33	46	-	-	15	379	719
Iceland	27,836	15,455	28,300	28,359	30,078	29,195	31,027	44,644	49,000	59,450
Norway	-	+	-	+	+	1	-	-	-	-
<b>Total</b>	<b>27,927</b>	<b>15,780</b>	<b>28,969</b>	<b>28,392</b>	<b>30,124</b>	<b>29,196</b>	<b>31,027</b>	<b>44,659</b>	<b>49,379</b>	<b>60,169</b>

<sup>1</sup> Preliminary data.

Working Group total - 60,719 in 1989.

**Table 2.8.4 GREENLAND HALIBUT.** Nominal catches (tonnes) in Sub-area XIV, 1980-1989, as reported to ICES.

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Faroe Islands	-	-	-	-	-	-	78	74	35	15
France	-	-	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	2,146	2,893	2,439	1,054	818	636	745	456	595 <sup>1</sup>	413
Greenland	-	+	1	5	15	81	177	154	37	13
Iceland	2	-	-	1	2	36	17	136	40	-
Norway	-	-	-	-	+	-	-	-	-	-
UK (Engl. & Wales)	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>2,148</b>	<b>2,893</b>	<b>2,440</b>	<b>1,060</b>	<b>835</b>	<b>753</b>	<b>1,017</b>	<b>820</b>	<b>707</b>	<b>441</b>

<sup>1</sup> Preliminary data.

Working Group total 505 in 1989.

**Table 2.9** Nominal catch (tonnes) of SAITHE in Division Va, 1978-1989, as reported to ICES.

Country	1978	1979	1980	1981	1982	1983
Belgium	1,092	980	980	532	203	224
Faroe Islands	4,250	5,457	4,930	3,545	3,582	2,138
France	-	-	-	-	23	-
Germany, Fed.Rep.	-	-	-	-	-	-
Iceland	44,327	57,066	52,436	54,921	65,124	55,904
Norway	3	1	1	3	1	+
UK (Engl.& Wales)	-	-	-	-	-	-
UK (Scotland)	-	-	-	-	-	-
<b>Total</b>	<b>49,672</b>	<b>63,504</b>	<b>58,347</b>	<b>59,001</b>	<b>68,933</b>	<b>58,266</b>

Country	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Belgium	269	158	218	217	268	369
Faroe Islands	2,044	1,778 <sup>2</sup>	2,291	2,139	2,596	2,246
France	-	-	-	-	-	-
Germany, Fed.Rep.	-	-	-	-	-	-
Iceland	60,406	55,135	63,867	78,175	74,383	79,446
Norway	-	1	-	-	-	-
UK (Engl.& Wales)	-	29	-	-	-	-
UK (Scotland)	-	-	-	-	-	-
<b>Total</b>	<b>62,719</b>	<b>57,101</b>	<b>66,376</b>	<b>80,531</b>	<b>77,247</b>	<b>82,061</b>

<sup>1</sup> Preliminary.

<sup>2</sup> Working Group estimate.

Table 2.10.1.1 Catches of saithe, cod, and haddock in Division Vb (Faroes area) in 1981-1989 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		
	Saithe	Cod	Haddock	Saithe	Cod	Haddock	Saithe	Cod	Haddock
Open boats	75	75	235	94	5,960	944	110	3,203	93
Longliners (< 100 GRT)	27	6,884	3,579	22	8,351	4,771	62	5,113	6,170
Longliners (>100 GRT)	19	2,825	1,406	44	2,562	1,547	14	1,778	1,667
Trawlers (4-1000 HP)	9,820	4,908	906	3,186	2,838	678	1,211	2,150	350
Trawlers (>1000 HP)	17,759	4,392	886	13,963	4,300	904	10,717	2,798	526
Pair trawlers (4-1000 HP)	8,556	4,454	1,917	11,203	4,754	1,927	11,112	9,634	2,428
Pair trawlers (>1000 HP)	11,259	2,131	637	11,015	1,994	686	13,791	4,595	1,264
Others	6,829	11,085	2,777	4,664	10,250	4,359	3,396	5,255	2,808
Total	54,344	36,914	12,343	44,191	41,009	15,816	40,413	34,526	15,306

Category	1987			1988			1989		
	Saithe	Cod	Haddock	Saithe	Cod	Haddock	Saithe	Cod	Haddock
Open boats	235	2,345	1,665	29	2,745	74	533	1,903	898
Longliners (< 100 GRT)	46	3,434	5,932	-	2,745	4,598	38	6,047	7,696
Longliners (>100 GRT)	31	2,359	1,611	-	3,080	2,018	52	3,887	2,301
Trawlers (4-1000 HP)	1,536	1,580	627	2,958	1,764	466	2,392	1,277	436
Trawlers (>1000 HP)	7,763	1,879	284	9,118	1,558	268	7,737	1,218	208
Pair trawlers (4-1000 HP)	9,371	6,359	2,243	9,680	6,475	1,259	10,021	2,285	837
Pair trawlers (>1000 HP)	16,689	3,334	1,264	18,172	3,674	983	18,298	1,901	821
Others	1,723	3,052	1,756	4,765	5,545	2,486	5,406	4,471	1,104
Total	37,394	24,342	15,382	44,722	25,075	12,152	44,477	22,989	14,301

Table 2.10.1.2 Nominal catch (t) of SAITHE in Division Vb, 1979-1989, as reported to ICES.

Country	1979	1980	1981	1982	1983	1984
Denmark	-	-	-	-	-	-
Faroe Islands	22,003	23,810	29,682	30,808	38,963	54,344
France	2,974	1,110	258	130	180	243
German Dem.Rep.	-	-	-	-	-	-
Germany, Fed.Rep.	581	197	20	19	28	73
Norway	1,137	62	134	15	5	5
UK (England & Wales)	190	13	-	-	-	-
UK (Scotland)	361	38	9	1	-	-
USSR	-	-	-	-	-	-
Total	27,246	25,230	30,103	30,973	39,176	54,665

Country	1985	1986	1987	1988	1989 <sup>1</sup>
Denmark	-	21	255	94	-
Faroe Islands	42,874	40,139	39,301	43,000 <sup>1</sup>	42,500
France	839	87	153	313	-
German Dem.Rep.	31	-	-	-	9
Germany, Fed.Rep.	227	105	49	74	22
Norway	-	24	14	52 <sup>1</sup>	49
UK (England & Wales)	4	-	108	-	20
UK (Scotland)	630	1,340	140	92	-
USSR	-	-	-	-	-
Total	44,605	41,716	40,020	43,625	42,600

<sup>1</sup> Preliminary.

Working Group figures (t):

1987 ..... 39,931  
 1988 ..... 45,347  
 1989 ..... 45,050

**Table 2.10.2** Faroe Plateau COD. Nominal catches (t) by countries, 1974-1988, as reported to ICES.

Year	Faroe Islands	France	Germany, Fed. Rep.	Norway	Poland	UK England	UK Scotland	Denmark	Others	Total
1974	12,541	567 <sup>1</sup>	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 <sup>1</sup>	71 <sup>3</sup>	245	-	518	1,460	-	2	26,585
1979	21,774	117 <sup>1</sup>	23 <sup>3</sup>	274	-	263	661	-	-	23,112
1980	19,966	40 <sup>1</sup>	- <sup>3</sup>	127	-	13	367	-	-	20,513
1981	22,616	47	- <sup>3</sup>	240	-	-	60	-	-	22,963
1982	21,387	10	-	90	-	-	2	-	-	21,489
1983	37,916	13	128	76	-	-	- <sup>4</sup>	-	-	38,133
1984	36,914	34	9	22	-	-	- <sup>4</sup>	-	-	36,979
1985	39,422	29	5	28	-	-	- <sup>4</sup>	-	-	39,484
1986	34,492	4	8	83	-	-	- <sup>4</sup>	8	-	34,595
1987	21,303	17	12	21	-	8	- <sup>4</sup>	30	-	21,391
1988	25,500 <sup>1,2</sup>	17	5	163	-	-	- <sup>4</sup>	10	-	25,695
1989 <sup>2</sup>	23,000 <sup>1</sup>	-	7	410 <sup>1</sup>	-	-	- <sup>4</sup>	-	-	23,417

<sup>1</sup> Sub-division Vb<sub>2</sub> included.

<sup>2</sup> Preliminary.

<sup>3</sup> Working Group Data.

<sup>4</sup> Included in Sub-division Vb<sub>2</sub>.

**Working Group figures (t):**

1987	22,712
1988	25,274
1989	23,418

**Table 2.10.3** Faroe Bank COD. Nominal catches (t) by countries, 1974-1988, as reported to ICES.

Year	Faroe Islands	France	Germany, Fed.Rep.	Norway	UK England	UK Scotland	Denmark	Others	Total
1974	696	- <sup>1</sup>	-	-	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	- <sup>1</sup>	-	183	2	1,071	-	-	5,450
1979	1,273	- <sup>1</sup>	-	33	-	677	-	-	1,983
1980	724	- <sup>1</sup>	-	54	85	340	-	-	1,203
1981	975	-	-	120	-	134	-	-	1,229
1982	2,184	-	-	16	-	152	-	-	2,352
1983	2,284	-	-	17	-	66 <sup>3</sup>	-	-	2,367
1984	2,189	-	-	11	-	16 <sup>3</sup>	-	-	2,216
1985	2,913	-	-	23	-	25 <sup>3</sup>	-	-	2,961
1986	1,836	-	-	6	-	63 <sup>3</sup>	-	-	1,905
1987	3,409	-	-	23	-	47 <sup>3</sup>	-	-	3,479
1988	- <sup>1</sup>	-	-	94	-	37 <sup>3</sup>	-	-	131
1989 <sup>2</sup>	- <sup>1</sup>	-	-	- <sup>1</sup>	-	12 <sup>3</sup>	-	-	12

<sup>1</sup> Catches included in Sub-division Vb<sub>1</sub>.

<sup>2</sup> Preliminary.

<sup>3</sup> Catches including Sub-division Vb<sub>1</sub>.

Working Group figures (t):

1987	1,931
1988	1,369
1989	461

Table 2.10.4.1 Faroe Plateau HADDOCK. Nominal catches (t) by countries, 1974-1989, 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 <sup>1</sup>	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 <sup>1</sup>	8	91	-	48	367	-	-	16,124
1979	11,259	50 <sup>1</sup>	2	39	-	35	212	-	-	11,597
1980	13,633	31 <sup>1</sup>	4	9	-	6	434	-	6	14,123
1981	10,891	113	+	20	-	-	85	-	-	11,109
1982	10,319	2	1	12	-	-	1 <sup>3</sup>	-	-	10,335
1983	11,898	2	+	12	-	-	3 <sup>3</sup>	-	-	11,912
1984	11,418	20	+	10	-	-	3 <sup>3</sup>	-	-	11,448
1985	13,597	23	+	21	-	-	3 <sup>3</sup>	-	-	13,641
1986	13,359	8	1	22	-	-	3 <sup>3</sup>	1	-	13,391
1987	13,954	22	1	13	-	2	3 <sup>3</sup>	8	-	14,000
1988	11,500 <sup>1,2</sup>	14	-	54 <sup>1</sup>	-	-	3 <sup>3</sup>	4	-	11,572
1989 <sup>2</sup>	14,000 <sup>1</sup>	-	-	125 <sup>1</sup>	-	-	3 <sup>3</sup>	-	-	14,125

<sup>1</sup> Catches including Sub-division Vb<sub>2</sub>.

<sup>2</sup> Preliminary.

<sup>3</sup> Catches included in Sub-division Vb<sub>2</sub>.

<sup>4</sup> Catches as reported to the Faroese Coastal Guard Service.

Working Group figures (t):

1987	.....	13,891
1988	.....	11,759
1989	.....	14,768

**Table 2.10.4.2** Faroe Bank HADDOCK. Nominal catches (t) by countries, 1974-1989, as reported to ICES.

Year	Faroe Islands	France	Germany, Fed.Rep.	Norway	UK England	UK Scotland	Denmark	Others	Total
1974	273	- <sup>1</sup>	-	-	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	- <sup>1</sup>	-	39	-	394	-	-	3,076
1979	716	- <sup>1</sup>	-	-	-	105	-	-	821
1980	690	- <sup>1</sup>	-	8	152	43	-	-	893
1981	1,103	-	-	7	-	14	-	-	1,124
1982	1,553	-	-	1	-	48	-	-	1,602
1983	967	-	-	2	-	13 <sup>3</sup>	-	-	982
1984	925	-	-	5	-	+ <sup>3</sup>	-	-	930
1985	1,474	-	-	3	-	25 <sup>3</sup>	-	-	1,502
1986	1,050	-	-	10	-	26 <sup>3</sup>	-	-	1,086
1987	832	-	-	5	-	45 <sup>3</sup>	-	-	832
1988 <sup>2</sup>	- <sup>1</sup>	-	-	43 <sup>1</sup>	-	15 <sup>3</sup>	-	-	58
1989 <sup>2</sup>	- <sup>1</sup>	-	-	- <sup>1</sup>	-	26 <sup>3</sup>	-	-	26

<sup>1</sup> Catches included in Sub-division Vb<sub>1</sub>.

<sup>2</sup> Preliminary.

<sup>3</sup> Catches including Sub-division Vb<sub>1</sub>.

**Working Group figures (t):**

1987	969
1988	527
1989	204



Table 2.11.1 Nominal catch (tonnes) of Blue Ling in Division Va, 1979-1989, as reported to ICES.

BLUE LING Va											
Country	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Faroe Islands	85	183	220	224	1,195	353	59	69	75	403 <sup>1</sup>	403
Iceland	2,019	8,133	7,952	5,945	5,117	3,122	1,407	1,774	1,693	1,093	2,587
Norway	98	229	64	402	402	31	7	8	8	7	5
Total	2,202	8,399	8,401	6,233	6,714	3,506	1,473	1,851	1,776	1,371	2,995

<sup>1</sup> Preliminary.

Table 2.11.2 Nominal catch (tonnes) of Blue Ling in Division Vb, 1979-1989, as reported to ICES.

BLUE LING Vb <sub>1</sub>											
Country	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Faroe Islands	1,072	1,187	1,481	2,761	3,933	6,453	4,038	4,799	2,872 <sup>1</sup>	4,131 <sup>1</sup>	3,002
France	2,683 <sup>2</sup>	2,427 <sup>2</sup>	371	843	668	515	1,193	2,578	3,246	3,036	1,671
Germany, Fed.Rep.	691	5,905	2,867	2,538	222	214	217	197	142 <sup>1</sup>	49	51
Norway	331	304	167	121	256	105	140	85	81	94	227
Total	4,777	9,824	4,886	6,263	5,079	7,287	5,588	7,659	6,341	7,310	4,951

<sup>1</sup> Preliminary.

<sup>2</sup> Includes Sub-division Vb<sub>2</sub>.

BLUE LING Vb <sub>2</sub>											
Country	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Faroe Islands	14	36	48	128	463	757	396	81	197 <sup>1</sup>	2,220 <sup>1</sup>	1,046
Germany, Fed.Rep.	-	-	-	-	1	-	+	-	-	-	-
Norway	87	159	93	66	182	50	70	41	90	72	95
Total	101	196	141	194	646	807	466	122	287	2,292	1,141

<sup>1</sup> Preliminary.

Table 2.11.3 Nominal catch (tonnes) of Blue Ling in Sub-area VI, 1979-1989, as reported to ICES.

## BLUE LING VIa

Country	1979	1980	1981	1982	1983	1984	1985	1986	1987 <sup>1</sup>	1988	1989 <sup>1</sup>
Faroe Islands	-	-	-	-	-	-	56	-	-	10 <sup>1</sup>	3
France	3,064	2,124	3,338	3,430	5,233	3,653	5,670	7,628	9,389	6,605 <sup>1</sup>	7,383
Germany, Fed.Rep.	993	773	335	79	11	183	5	7	44	2	2
Norway	2	10	11	16	118	45	75	50	51	29	142
UK (Engl. & Wales)	279	-	-	99	13	5	2	2	13	2	-
UK (Scotland)	-	-	1	+	-	-	-	1	+	1	-
Total	4,338	2,907	3,685	3,624	5,375	3,886	5,808	7,688	9,497	6,649	7,530

<sup>1</sup> Preliminary.

## BLUE LING VIb

Country	1979	1980	1981	1982	1983	1984	1985	1986	1987 <sup>1</sup>	1988	1989 <sup>1</sup>
Faroe Islands	4	-	-	-	-	133	11	1,845	-	1,462 <sup>1</sup>	739
France	652	3,827	534	263	243	3,281	7,263	2,141	10	499	-
Germany, Fed.Rep.	187	5,526	3,944	554	38	-	31	39	356 <sup>1</sup>	38 <sup>1</sup>	22
Norway	28	8	5	13	50	43	38	66	76	42	217
UK (Engl. & Wales)	-	-	-	-	-	-	+	7	62	9	-
UK (Scotland)	-	+	-	1	2	-	-	1	10	14	-
Total	871	9,361	4,483	831	333	3,457	7,343	4,099	514	2,064	978

<sup>1</sup> Preliminary.<sup>2</sup> Includes Division VIa.

Table 2.11.4 Nominal catch (tonnes) of Blue Ling in Sub-area XIV, 1979-1989, as reported to ICES.

## BLUE LING XIVb

Country	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Faroe Islands							-	-		4	3
Germany, Fed.Rep. <sup>2</sup>	1,026 <sup>2</sup>	746 <sup>2</sup>	1,206 <sup>2</sup>	1,946 <sup>2</sup>	621 <sup>2</sup>	537	314	150	199	219	57
Greenland <sup>2</sup>							-	-	-	3	-
Total	1,026	746	1,206	1,946	621	537	314	150	199	226	60

<sup>1</sup> Preliminary.<sup>2</sup> Includes Division XIVa.

Table 2.11.5 Nominal catch (tonnes) of Ling in Division Va, 1979-1989, as reported to ICES.

## LING Va

Country	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Belgium	508	445	196	116	128	103	59	88	157	134	-
Faroe Islands	536	607	489	524	644	450	384	556	675 <sup>1</sup>	619 <sup>1</sup>	614
Iceland	3,759	3,149	3,348	3,733	4,256	3,304	2,980	2,946	4,161	5,098	5,187
Norway	399	423	415	612	115	21	17	4	6	10	5
UK (Engl. & Wales)	-	-	-	-	-	+	+	-	-	-	-
Total	5,202	4,624	4,448	4,985	5,143	3,878	3,440	3,594	4,999	5,861	5,806

<sup>1</sup> Preliminary.

Table 2.11.6 Nominal catch (tonnes) of Ling in Division Vb, 1979-1989, as reported to ICES.

LING Vb<sub>1</sub>

Country	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Denmark	-	-	-	-	-	-	-	4	16	4 <sup>2</sup>	-
Faroe Islands	1,919	1,734	1,274	2,099	2,365	2,666	2,911	2,406	2,598	2,045 <sup>1</sup>	1,974
France	304 <sup>2</sup>	49	13	16	155	11	40	123	384	53	-
Germany, Fed. Rep.	18	12	1	3	5	6	3	6	8	4	-
Norway	2,716	1,538	1,135	2,495	1,580	935	1,317	1,604	1,051	884	1,414
UK (Engl. & Wales)	23	1	-	-	- <sup>3</sup>	- <sup>3</sup>	-	-	1	1	-
UK (Scotland)	279 <sup>2</sup>	90	4	-	-	-	-	-	-	-	-
Total	5,259	3,424	2,427	4,613	4,105	3,618	4,271	4,143	4,058	2,991	3,388

LING Vb<sub>2</sub>

Country	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Faroe Islands	205	87	126	271	140	155	279	177	343 <sup>1</sup>	175 <sup>1</sup>	59
Norway	734 <sub>2</sub>	873	1,641	1,119	1,166 <sub>3</sub>	631 <sub>3</sub>	638	636	948	1,284	1,328
UK (Scotland)	- <sub>2</sub>	121	24	94	48 <sub>3</sub>	4 <sub>3</sub>	2	1	1	5	-
Total	939	1,086	1,791	1,484	1,354	790	919	814	1,306	1,464	1,387

<sup>1</sup> Preliminary.<sup>2</sup> Included in Sub-division Vb<sub>1</sub>.<sup>3</sup> Includes Sub-division Vb<sub>1</sub>.

Table 2.11.7 Nominal catch (tonnes) of Ling in Sub-area VI, 1979-1989, as reported to ICES.

## LING VIa

Country	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988 <sup>1</sup>	1989 <sup>1</sup>
Belgium	-	-	-	4	-	1	4	-	4	4	-
Denmark	-	44 <sup>2</sup>	-	1	-	-	-	-	1	+	-
Faroe Islands	4	-	-	20	-	-	-	-	-	-	-
France	2,990	3,092	3,820	5,049	5,362	5,757	6,061	4,620	4,338	5,118	-
Germany, Fed.Rep.	5	1	-	-	-	14	8	6	2	6	-
Ireland	40	34	44	34	62	49	81	255	287	-	-
Norway	2,778	2,932	2,150	4,499	5,943	4,667	4,779	5,426	3,842	3,392	3,722
Spain	566	-	-	461	604	720	388	620	975	-	-
UK (Engl. & Wales)	73	85	123	201	78	101	130	151	507	1,075	-
UK (N.Ireland)	-	-	-	-	+	+	-	+	6	53	-
UK (Scotland)	234	207	379	188	236	341	510	284	574	874	4
Total	6,690	6,398	6,516	10,460	12,285	11,650	11,961	11,362	10,536	10,522	3,726

<sup>1</sup> Preliminary.<sup>2</sup> Includes Division VIb.

## LING VIb

Country	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988 <sup>1</sup>	1989 <sup>1</sup>
Faroe Islands	368	236	4	123	204	153	24	6	-	144 <sup>1</sup>	13
France	7	3	5	13	8	34	140	24	4	8	-
Germany, Fed.Rep.	-	-	+	-	-	-	-	-	2	-	-
Norway	1,776	1,096	1,083	1,711	2,315	2,345	1,973	2,157	1,933	1,253	3,542
Spain	- <sup>2</sup>	620	590	1,911	1,889	986	2,381	2,762	4,036	-	-
UK (Engl. & Wales)	39	+	8	4	26	28	75	109	151	94	-
UK (Scotland)	203	235	184	80	4	29	127	127	164	223	-
Total	2,393	2,190	1,874	3,842	4,446	3,575	4,720	5,185	6,290	1,722	3,555

Table 2.11.8 Nominal catch (tonnes) of Tusk (Cusk) in Division Va, 1979-1989, as reported to ICES.

TUSK Va											
Country	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Faroe Islands	2,050	2,873	2,624	2,410	4,046	2,008	1,885	2,811	2,638	3,757 <sup>1</sup>	3,908
Iceland	3,558	3,089	2,827	2,804	3,469	3,430	3,068	2,549	2,984	3,078	2,376
Norway	845	928	1,025	666	772	254	111	21	19	20	10
UK (Engl. & Wales)	-	-	-	-	-	-	+	-	-	-	-
Total	6,453	6,890	6,476	5,880	8,287	5,692	5,064	5,381	5,641	6,855	6,294

<sup>1</sup> Preliminary.

Table 2.11.9 Nominal catch (tonnes) of Tusk (Cusk) in Division Vb, 1979-1989, as reported to ICES.

TUSK Vb <sub>1</sub>											
Country	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Denmark	-	-	-	-	-	-	-	+	2	+	-
Faroe Islands	3,652	4,629	2,028	4,056	3,416	4,355	4,994	3,531	3,771 <sup>1</sup>	3,253	3,060
France	34	24	14	14	15	25	34	24	54	81	-
Germany, Fed. Rep.	36	23	7	12	11	16	10	15	13	8	-
Norway	1,943	1,713	1,472	1,432	1,074	897	1,200	966	942	1,143	1,827
UK (Scotland)	252 <sup>2</sup>	145	-	-	-	-	-	-	-	-	-
Total	5,918	6,534	3,521	5,514	4,516	5,293	6,238	4,536	4,782	4,485	4,887

<sup>1</sup> Preliminary.

<sup>2</sup> Includes Sub-division Vb<sub>2</sub>.

<sup>3</sup> Included in Sub-division Vb<sub>2</sub>.

TUSK Vb <sub>2</sub>											
Country	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Faroe Islands	225	88	38	92	34	39	294	94	411 <sup>1</sup>	201 <sup>1</sup>	82
Germany, Fed. Rep.	-	-	-	-	-	-	+	-	-	-	-
Norway	422	975	1,276	660	861	640	775	590	1,256	1,061	1,237
UK (Scotland)	-	213	15	125	73 <sup>3</sup>	2 <sup>3</sup>	+	+	+	+	-
Total	647	1,276	1,329	877	968	681	1,069	684	1,667	1,262	1,319

<sup>1</sup> Preliminary.

<sup>2</sup> Included in Sub-division Vb<sub>1</sub>.

<sup>3</sup> Includes Sub-division Vb<sub>1</sub>.

Table 2.11.10 Nominal catch (tonnes) of Tusk (Cusk) in Sub-area VI, 1979-1989, as reported to ICES.

## TUSK VIa

Country	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Faroe Islands	3	-	-	-	-	-	-	-	-	-	4
France	296	241	322	355	418	514	767	608	627	724	-
Germany, Fed. Rep.	3	4	1	-	-	1	1	+	+	1	-
Ireland							-	-	1	-	-
Norway	460	652	802	1,052	1,733	1,305	1,609	1,873	1,238	1,310	1,456
UK (Engl. & Wales)	4	+	1	7	1	5	1	2	9	30	-
UK (Scotland)	8	14	94	+	2	1	1	4	7	13	-
Total	774	912	1,220	1,830	2,404	1,826	2,379	2,487	1,882	2,078	1,460

<sup>1</sup> Preliminary.

<sup>2</sup> Includes Division VIb.

## TUSK VIb

Country	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Faroe Islands	282	196	1	159	188	53	48	106	-	159 <sup>1</sup>	31
France	5	-	1	3	3	4	3	9	2	4	-
Norway	680	503	568	468	1,080	960	944	952	1,385	601	1,537
UK (Engl. & Wales)	30	-	+	-	3	+	6	8	6	8	-
UK (Scotland)	178	214	181	101	22	+	14	16	15	34	-
Total	1,175	913	752	2,829	3,198	1,017	1,015	1,091	1,408	806	1,568

<sup>1</sup> Preliminary.

<sup>2</sup> Included in Division VIa.

Table 2.12.1 Catch in numbers, millions and total catch in weight, '000 tonnes. Icelandic summer spawners. Age in years is number of rings + 1.

Rings	1970	1971	1972	1973	1974	1975	1976
1	2.003	8.774	0.147	0.001	0.001	1.518	0.614
2	22.344	13.071	0.322	0.159	3.760	2.049	9.848
3	33.965	5.439	0.131	0.678	0.832	31.975	3.908
4	4.500	13.688	0.163	0.104	0.993	6.493	34.144
5	2.734	3.040	0.264	0.017	0.092	7.905	7.009
6	4.419	1.563	0.047	0.013	0.046	0.863	5.481
7	1.145	3.276	0.028	0.006	0.002	0.442	1.045
8	0.531	0.748	0.024	0.006	0.001	0.345	0.438
9	0.604	0.250	0.013	0.003	0.001	0.114	0.296
10	0.195	0.103	0.009	0.003	0.001	0.004	0.134
11	0.103	0.120	0.003	0.001	0.001	0.001	0.092
12	0.076	0.001	0.001	0.001	0.001	0.001	0.001
13	0.061	0.001	0.003	0.001	0.001	0.001	0.001
14	0.051	0.001	0.001	0.001	0.001	0.001	0.001
Total	15.779	10.975	0.310	0.255	1.274	13.280	17.168

Rings	1977	1978	1979	1980	1981	1982	1983
1	0.705	2.634	0.929	3.147	2.283	0.454	1.470
2	18.853	22.551	15.098	14.347	4.629	19.187	22.422
3	24.152	50.995	47.561	20.761	16.771	28.109	151.198
4	10.404	13.846	69.735	60.728	12.126	38.280	30.181
5	46.357	8.738	16.451	65.329	36.871	16.623	21.525
6	6.735	39.492	8.003	11.541	41.917	38.308	8.637
7	5.421	7.253	26.040	9.285	7.299	43.770	14.017
8	1.395	6.354	3.050	19.442	4.863	6.813	13.666
9	0.524	1.616	1.869	1.796	13.416	6.633	3.715
10	0.362	0.926	0.494	1.464	1.032	10.457	2.373
11	0.027	0.400	0.439	0.698	0.884	2.354	3.424
12	0.128	0.017	0.032	0.001	0.760	0.594	0.552
13	0.001	0.025	0.054	0.110	0.101	0.075	0.100
14	0.001	0.051	0.006	0.079	0.062	0.211	0.003
Total	28.924	37.333	45.072	53.269	39.544	56.528	58.665

Rings	1984	1985	1986	1987	1988	1989
1	0.421	0.111	0.100	0.029	0.869	3.963
2	18.011	12.800	8.161	3.144	4.702	22.568
3	32.237	24.521	33.893	44.590	40.855	26.578
4	141.324	21.535	23.421	60.285	98.222	77.618
5	17.039	84.733	20.654	20.622	68.533	188.155
6	7.111	11.836	77.526	19.751	22.691	43.000
7	3.915	5.708	18.228	46.240	19.899	8.095
8	4.112	2.323	10.971	15.232	31.830	5.881
9	4.516	4.339	8.583	13.963	12.207	7.273
10	1.828	4.030	9.662	10.179	10.132	4.767
11	0.202	2.758	7.174	13.216	7.293	3.440
12	0.255	0.970	3.677	6.224	7.200	1.406
13	0.260	0.477	2.914	4.723	4.752	0.842
14	0.003	0.578	1.786	2.280	1.935	0.347
Total	50.293	49.092	65.413	75.439	91.760	100.733

Table 2.12.2.1 Catches of Norwegian spring-spawning herring (tonnes) since 1972 as used by the Working Group.

Year	A	B <sup>1</sup>	C	D	Total	Total catch as used by the Working Group
1972	-	9,895	3,266 <sup>2</sup>	-	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	-	8,557	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	169,872 <sup>3</sup>
1986	71,122 <sup>4</sup>	55,507	156	-	126,785	225,256 <sup>3</sup>
1987	62,910	49,798	181	-	112,899	127,306 <sup>3</sup>
1988	78,592	46,582	127	-	125,301	135,301
1989	52,003	41,770	57	-	93,830	103,830
1990 <sup>5</sup>	46,467					

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)

<sup>1</sup> Includes also by-catches of adult herring in other fisheries.

<sup>2</sup> In 1972, there was also a directed herring 0-group fishery.

<sup>3</sup> Includes mortality caused by fishing operations in addition to unreported catches.

<sup>4</sup> Includes 26,000 tonnes of immature herring (1983 year class) fished by USSR in the Barents Sea.

<sup>5</sup> Preliminary catch pr 1 July 1990.



Table 2.12.2.2 Total catch (as used by the Working Group) of Norwegian spring-spawning herring (tonnes) since 1972.

Year	Norway	USSR	Total
1972	13,161	-	13,161
1973	7,017	-	7,017
1974	7,619	-	7,619
1975	13,713	-	13,713
1976	10,436	-	10,436
1977	22,706	-	22,706
1978	19,824	-	19,824
1979	12,864	-	12,864
1980	18,577	-	18,577
1981	13,736	-	13,736
1982	16,655	-	16,655
1983	23,054	-	23,054
1984	53,532	-	53,532
1985	167,272	2,600	169,872
1986	199,256	26,000	225,256
1987	108,417	18,889	127,306
1988	115,076	20,225	135,301
1989	88,707 <sup>1</sup>	15,123	103,830
1990	34,660 <sup>1</sup>	11,807	

<sup>1</sup> Preliminary up to 1 July.

Table 2.13.1 International catch of Barents Sea Capelin ('000 tonnes) in the years 1965-1989 as used by the Working Group.

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	-	-	-	-
1989	-	-	-	-
1990	-	-	-	-

Table 2.13.2 The total annual and seasonal catch of capelin in the  
Iceland-Greenland-Jan Mayen area since 1964 (in /000 tonnes).

year	Winter season		Summer and autumn season				Total
	Iceland	Far/Nor	Iceland	Norway	Faroes	EEC	
1964	8.6						8.6
1965	49.7						49.7
1966	124.5						124.5
1967	97.2						97.2
1968	78.1						78.1
1969	170.6						170.6
1970	190.8						190.8
1971	182.9						182.9
1972	276.5						276.5
1973	440.9						440.9
1974	461.9						461.9
1975	457.1		3.1				460.2
1976	338.7		114.4				453.1
1977	549.2	24.3	259.7				833.2
1978	468.4	36.2	497.5	154.1	3.4		1.159.6
1979	521.7	18.2	442.0	124.0	22.0		1.127.9
1980	392.0		367.4	118.7	24.2	17.3	919.6
1981	156.0		484.6	91.4	16.2	20.8	769.0
1982	13.2						13.2
1983			133.4				133.4
1984	439.6		425.2	104.6	10.2	8.5	988.1
1985	348.5		644.8	193.0	65.9	16.0	1.268.3
1986	341.8	50.0	552.5	149.7	65.4	5.3	1.164.7
1987	500.6	59.9	311.3	82.1	65.2		1.019.1
1988	600.6	53.2	311.4	15.5	34.8		1.015.5
1989	609.1	52.0	53.9	52.7	14.4		782.1
1990	611.5	66.2					

**Table 3.1.1 HERRING.** Catch in tonnes, 1979-1989, 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	1979	1980	1981	1982	1983	1984
Belgium	-	-	-	9,700	5,969	5,080
Denmark	10,546	4,431	21,146	67,851	10,467	38,777
Faroe Islands	10	-	-	-	-	-
France	2,560	5,527	15,099	15,310	16,353	20,320
Germany, Fed.Rep.	10	147	2,300	349	1,837	11,609
Netherlands	-	509	7,700	22,300	40,045	44,308
Norway	2,367	2,165	-	-	32,512	98,706
Sweden	-	-	-	-	284	886
UK (England)	2,253	77	303	3,703	111	1,689
UK (Scotland)	-	610	45	1,780	17,260	31,393
USSR	162	-	-	-	-	-
Unallocated landings	-	47,528	94,309	114,252	181,116	64,487
Total landings	17,908	60,994	140,902	235,245	305,954	317,255
Discards <sup>3</sup>	-	-	-	-	-	-
Total catch	17,908	60,994	140,902	235,245	305,954	317,255
Catches of Div.IIIa spring spawners (included above)	-	-	-	-	-	6,958

Country	1985	1986	1987	1988	1989 <sup>1</sup>
Belgium	3,482	414	39	4	434
Denmark	129,305	121,631	138,596	263,006	210,315 <sup>2</sup>
Faroe Islands	-	623	2,228	810	1,916
France	14,400	9,729	7,266	8,384	29,085
Germany, Fed.Rep.	8,930	3,934	5,552	13,824	38,707
Netherlands	79,335	85,998	91,478	82,267	84,178
Norway	159,947	223,058	241,765	222,719	221,891 <sup>2</sup>
Sweden	2,442	1,872	1,725	1,819	5,586
UK (England)	5,564	1,404	873	8,097	7,980
UK (Scotland)	55,795	77,459	76,413	64,108	68,106
USSR	-	-	-	-	-
Unallocated landings	74,220	21,089	58,972	33,411	26,749 <sup>2</sup>
Total landings	533,420	547,191	624,907	698,449	698,947 <sup>2</sup>
Discards <sup>3</sup>	-	-	-	-	4,000 <sup>3</sup>
Total catch	533,420	547,191	624,907	698,449	698,947 <sup>2</sup>
Catches of Div.IIIa spring spawners (included above)	17,386	19,654	14,207	23,306	19,869 <sup>2</sup>

<sup>1</sup> Preliminary.

<sup>2</sup> Working Group estimates (only applicable to 1989).

<sup>3</sup> In previous years any discard estimates were included in unallocated landings.

<sup>4</sup> Catches of Atlanto-Scandian spring spawners removed (taken under a separate TAC).

Table 3.1.3.1 HERRING, catch in tonnes in Sub-divisions 22 and 24, as reported to the Working Group.

Country	1978	1979	1980	1981	1982	1983
Denmark	12,383	9,659	7,221	8,098	4,583	4,583
German Democratic Republic	40,678	46,749	58,501	54,501	50,739	50,739
Germany, Fed. Rep.	6,849	6,672	9,323	8,300	8,300	8,300
Poland	6,335	10,276	13,605	13,366	16,868	16,868
Sweden	6,550	10,151	12,010	7,660	6,536	6,536
Total	72,795	85,543	100,337	90,159	107,519	108,103

Country	1984	1985	1986	1987	1988	1989
Denmark	23,762	15,942	14,046	32,462	33,075	21,730
German Democratic Republic	49,022	46,749	51,180	47,267	49,488	51,207
Germany, Fed. Rep.	7,085	7,888	8,850	5,806	5,188	5,166
Poland	14,250	16,721	12,344	7,997	6,590	8,524
Sweden	7,689	11,373	5,946	7,814	4,586	6,327
Total	101,808	101,870	92,066	101,346	98,927	92,954

Table 3.1.3.2 HERRING, catch in tonnes in Sub-division 23, as reported to the Working Group.

Country	1978	1979	1980	1981	1982	1983
Denmark	4,090	8,817	6,313	8,098	7,139	4,583
Sweden	1,000	1,860	2,400	2,000	2,460	2,416
Total	5,091	10,677	8,713	10,098	9,599	6,999

Country	1984	1985	1986	1987	1988	1989
Denmark	6,935	6,849	1,490	754	102	1,528
Sweden	800	1,113	1,365	172	117	102
Total	7,735	7,962	2,855	926	219	1,630

Table 3.1.3.3 HERRING in Division IIIa.  
Landings in tonnes, 1980-1989. (Data provided by Working Group members 1989.)

Country	1980	1981	1982	1983	1984
<u>Skagerrak</u>					
Denmark	22,811	45,525	43,328	54,102	64,621
Faroe Islands	526	900	715	1,980	891
Germany, Fed.Rep.	-	199	43	40	-
Norway (Open sea)	1,350	6,330	10,140	500	-
Norway (Fjords)	2,795	900	1,560	2,834	1,494
Sweden	10,701	30,274	24,859	35,176	59,195
Total	38,183	83,768	80,645	94,632	126,201
<u>Kattegat</u>					
Denmark	25,380	48,922	38,609	62,901	71,359
Sweden	18,260	38,871	38,892	40,463	35,027
Total	43,640	87,833	77,501	103,364	106,386
Div. IIIa total	81,823	171,601	158,146	197,996	232,587
Country	1985	1986	1987	1988	1989 <sup>1</sup>
<u>Skagerrak</u>					
Denmark	88,192	94,014	105,017	144,421	47,393
Faroe Islands	455	520	-	-	-
Germany, Fed.Rep.	-	11	-	-	-
Norway (Open sea)	2,752	677	-	2,982	] 1,605
Norway (Fjords)	1,673	860	1,209	2,692	
Sweden	40,349	42,996	51,184	57,159	39,756
Total	133,421	139,078	157,410	207,254	88,754
<u>Kattegat</u>					
Denmark	69,235	37,419	46,603	76,175	57,130
Sweden	39,829	35,852	29,844	49,653	26,159
Total	109,064	73,271	76,447	125,828	83,289
Div. IIIa total	242,485	212,349	233,931	333,082	172,043

<sup>1</sup> Preliminary.

Table 3.1.4.1 Celtic Sea and Division VIIj HERRING landings by calendar year (t), 1977-1989. (Data provided by by Working Group members.)

Year	France	Germany, Fed.Rep.	Ireland	Netherlands	Unallocated	Discards	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	4,000	26,187
1984	680	-	7,000	890	11,148	3,600	23,318
1985	622	-	11,000	-	4,601	3,100	19,323
1986	-	-	13,338	+	6,098	3,900	23,236
1987	820	-	15,500	1,453	5,310	4,200	27,283
1988	-	-	16,766	-	-	2,400	19,166
1989 <sup>1</sup>	10	-	15,880	1,942	1,258	3,500	22,590

<sup>1</sup> Provisional.

Table 3.1.4.2 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	Discards	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	-	-
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	3,800	24,981
1984/1985	680	-	7,000	890	14,009	4,200	26,779
1985/1986	622	-	11,995	-	4,509	3,300	20,426
1986/1987	-	-	14,725	1	6,098	4,200	25,024
1987/1988	820	-	15,500	1,453	4,444	4,000	26,217
1988/1989	-	-	17,047	-	-	3,400	20,447
1989/1990 <sup>1</sup>	10	-	15,000	1,942	2,602	3,600	23,254

<sup>1</sup> Provisional.

Table 3.1.5 Nominal catch (t), Division VIa (North) HERRING,  
1980-1989, as reported to the Working Group.

Country	1980	1981	1982	1983	1984
Denmark	-	1,580	-	-	96
Faroes	-	-	74	834	954
France	-	1,243	2,069	1,313	-
German Dem. Rep.	2	-	-	-	-
Germany, Fed. Rep.	-	3,029	8,453	6,283	5,564
Iceland	256	-	-	-	-
Ireland	-	-	-	-	-
Netherlands	-	5,602	11,317	20,200	7,729
Norway	-	3,850	13,018	7,336	6,669
UK (England)	-	1,094	90	-	-
UK (Scotland)	33	30,389	38,381	31,616	37,554
USSR	15	-	-	-	-
Unallocated	-	4,633	18,958	-4,059	16,588
Total	306	51,420	92,360	63,523	75,154

Country	1985	1986	1987	1988	1989 <sup>1</sup>
Denmark	-	-	-	-	-
Faroes	104	400	-	-	-
France	20	18	136	44	1,342
German Dem. Rep.	-	-	-	-	-
Germany, Fed. Rep.	5,937	2,188	1,711	1,860	4,290
Iceland	-	-	-	-	-
Ireland	-	6,000	6,800	6,740	8,000
Netherlands	5,500	5,160 <sup>2</sup>	5,212 <sup>2</sup>	6,131	5,860 <sup>3</sup>
Norway	4,690	4,799	4,300	456	-
UK (England)	-	-	-	1,892	1,977
UK (Scotland)	28,065	25,294	26,810	25,002	27,897
USSR	-	-	-	-	-
Unallocated	502	37,840 <sup>2</sup>	18,038 <sup>2</sup>	5,229 <sup>2</sup>	2,123
Discards	-	-	-	-	1,550
Total	43,814	81,699	63,007	47,354	53,039

<sup>1</sup> Preliminary.

<sup>2</sup> Including discards.

<sup>3</sup> Working Group estimate.



Table 3.1.6 Catches (t) of HERRING from the Firth of Clyde.

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Reported landings:										
UK (Scotland)	2,081	2,135	2,506	2,530	2,991	3,001	3,395	2,895	1,568	2,135
UK (N.Ireland and Isle of Man)	-	-	-	273	247	22	-	-	-	-
Additional landings <sup>1</sup>	-	274	262	293	224	433	576	278	110	208
Discards	- <sup>5</sup>	- <sup>5</sup>	1,253	1,265	2,308 <sup>3</sup>	1,344 <sup>3</sup>	679 <sup>3</sup>	439 <sup>4</sup>	245 <sup>4</sup>	- <sup>2</sup>
Catch used by Working Group	2,081	2,409	4,021	4,361	5,770	4,800	4,650	3,612	1,923	2,343

<sup>1</sup> Calculated from estimates of weight per box and, in some years, estimated by-catch in sprat fishery.

<sup>2</sup> Reported to be at a low level; assumed to be zero.

<sup>3</sup> Based on sampling.

<sup>4</sup> Estimated assuming same discarding rate as in 1986.

<sup>5</sup> No estimates available.

Table 3.1.7 Estimated HERRING catches in tonnes in Divisions VIa (South) and VIIb,c, 1980-1989, as estimated by the Working Group.

Country	1980	1981	1982	1983	1984
France	-	-	353	19	-
Germany, Fed. Rep.	-	2,687	265	-	-
Ireland	27,499	19,443	16,856	15,000	10,000
Netherlands	1,514	2,790	1,735	5,000	6,400
UK (N. Ireland)	1	2	-	-	-
UK (England + Wales)	-	-	-	-	-
Unallocated	1,110	-	-	13,000	11,000
Total landings	30,124	24,922	19,209	33,019	27,400
Discards	-	-	-	-	-
Total catch	30,124	24,922	19,209	33,019	27,400

Country	1985	1986	1987	1988	1989 <sup>1</sup>
France	-	-	-	-	-
Germany, Fed. Rep.	-	-	-	-	-
Ireland	13,900	15,450	15,000	15,000	18,200
Netherlands	1,270	1,550	1,550	300	2,900
UK (N. Ireland)	-	-	5	-	-
UK (England + Wales)	-	-	51	-	-
UK (Scotland)	-	-	-	-	+
Unallocated	8,204	11,785	31,994	13,800	7,100
Total landings	23,374	28,785	48,600	29,100	28,200
Discards	-	-	-	-	1,000
Total catch	23,374	28,785	48,600	29,100	29,200

<sup>1</sup> Provisional.

Table 3.1.8

## HERRING.

Total catches (t) in North Irish Sea  
(Division VIIa), 1979-1989 as reported to  
the Working Group.

Country	1979	1980	1981	1982	1983	1984
France	455	1	-	-	48	-
Ireland	1,805	1,340	283	300	860	1,084
Netherlands	-	-	-	-	-	-
UK	10,078	9,272	4,094	3,375	3,025	2,982
Unallocated	-	-	-	1,180	-	-
Total	12,338	10,613	4,377	4,855	3,933	4,066

Country	1985	1986	1987	1988	1989
France	-	-	-	-	-
Ireland	1,000	1,640	1,200	2,579	1,430
Netherlands	-	-	-	-	-
UK	4,077	4,376	3,290	7,593	3,532
Unallocated	4,110	1,424	1,333	-	-
Total	9,187	7,440	5,823	10,172	4,962

Table 3.2.3.1 Industrial landings<sup>1</sup> from the fisheries for SANDEEL, SPRAT, and NORWAY POUT in Division IIIa ('000 t), 1974-1989.-

Year	Major fisheries					Total
	Sandeel	Clupeoids		Gadoid species		
		Sprat <sup>2</sup>	Herring <sup>3</sup>	Norway pout	Blue whiting	
1974	8	71	76	13	-	168
1975	17	101	57	19	-	194
1976	22	59	38	42	-	161
1977	7	67	32	21	-	127
1978	23	78	16	25	-	142
1979	34	96	13	25	6	174
1980	39	84	25	26	14	188
1981	59	76	63	30	+	228
1982	18	45	54	44	5	166
1983	28	27	89	30	16	190
1984	19	37	112	46	15	229
1985	14	22	116	9	19	180
1986	80	18	65	6	9	178
1987 <sup>4</sup>	4	16	72	3	25	120
1988	22	9	97	8	15	151
1989 <sup>4</sup>	17	8	52	6	9	92
Mean 1974-1988	26	54	62	23	12 <sup>5</sup>	173

<sup>1</sup> Data 1974-1984 from Anon. (1986), 1985-1989 provided by Working Group members.

<sup>2</sup> Landings for human consumption included.

<sup>3</sup> For years 1974-1985, human consumption landings used for reduction are included in these data.

<sup>4</sup> Preliminary.

<sup>5</sup> Mean 1979-1988.

**Table 3.2.3.2** Industrial landings from the fisheries for SANDEEL, SPRAT and NORWAY POUT in the North Sea ('000 t), 1974-1989.  
(Data provided by Working Group members.)

Year	Major fisheries					By-catch protected species <sup>1</sup>	Total
	Clupeoids			Gadoid species			
	Sandeel	Sprat <sup>3</sup>	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	69	1,612
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	611	153	153	360	118	57	1,452
1983	537	88	155	423	118	38	1,359
1984	669	77	35	355	79	35	1,250
1985	622	50	63	197	73	29	1,033
1986	848	16	40	174	37	22	1,140
1987	825	33	47	147	30	24	1,106
1988	893	92	179	102	28	54	1,349
1989 <sup>2</sup>	1,035	66	132	151	52	47	1,483
1st Quarter	88.0	17.1 <sup>4</sup>	10.0	15.3	0.7	4.8	135.9
2nd Quarter	869.2	0.5 <sup>4</sup>	5.3	13.9	2.1	5.9	896.9
3rd Quarter	77.5	44.1 <sup>4</sup>	90.6	34.0	38.4	20.2	304.8
4th Quarter	0.1	1.2 <sup>4</sup>	26.0	87.4	10.8	16.0	141.5
Mean							
1974-1988	660	245	54	345	64	83	1,452

<sup>1</sup> Haddock, whiting and saithe summarized from Table 3.1 of the Working Group report.

<sup>2</sup> Preliminary.

<sup>3</sup> Includes human consumption landings.

<sup>4</sup> From Table 11.1.2 of the Working Group report.

Table 3.2.3.3 Industrial landings ('000 t) from the fisheries for SANDEEL, SPRAT and NORWAY POUT in Division VIa.  
(Data officially reported to ICES.)

Year	Sandeel	Sprat	Norway pout	Total
1974	+	7,026	6,721	13,747
1975	+	9,053	8,655	17,708
1976	17	8,042	19,933	27,992
1977	67	4,844	5,206	10,117
1978	+	12,401	23,250	35,651
1979	-	1,321	20,502	21,823
1980	211	5,202	17,870	23,283
1981	5,972	3,414	7,757	17,143
1982	10,873	3,524	4,911	19,308
1983	13,051	3,834	8,325	25,210
1984	14,166	2,648	7,794	24,608
1985	18,586	3,554	9,697	31,837
1986	24,469	870	5,832	31,171
1987	14,479	850	38,267	53,596
1988	24,465	4,208	6,366	35,039
1989 <sup>1</sup>	17,619	1,146	28,185	46,950
Mean 1974-1988	8,424	4,719	12,739	25,882

<sup>1</sup> Preliminary.

**Table 3.2.5** NORWAY POUT. Annual landings (tonnes) in Division IIIa. (Data as officially reported to ICES.)

Country	1976	1977	1978	1979	1980	1981	1982
Denmark	40,144	20,694	23,922	23,951	26,235	29,273	51,317
Norway	50 <sup>2</sup>	104	362	1,182	141	752	1,265
Sweden	2,255	318	591 <sup>3</sup>	32	39	60	60
Total	42,449	21,116	24,875	25,165	26,415	30,085	52,685

Country	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Denmark	36,124	67,007	85,082	32,056	47,527	45,034	16,904
Norway	990	947	831	400	1,680	843	-
Sweden	52	+	-	+	-	-	-
Total	37,166	67,954	85,913	32,456	49,207	45,877	16,904

<sup>1</sup> Preliminary.

<sup>2</sup> Including by-catch.

<sup>3</sup> Includes North Sea.

**Table 3.2.6** NORWAY POUT annual landings ('000 tonnes) in Sub-area IV by countries, North Sea, 1957-1989. (Data provided by Working Group members.)

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	97.3	-	+	-	422.9
1984	251.9	19.1 <sup>1</sup>	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
1988	79.0	1.5	21.1	-	-	-	101.6
1989	95.6	0.6	54.4	-	0.1	-	150.6

<sup>1</sup> Including by-catch.



**Table 3.2.7** NORWAY POUT. Annual landings (tonnes) in Division VIa.  
(Data officially reported to ICES.)

Country	1974	1975	1976	1977	1978	1979	1980	1981
Denmark	-	193	-	-	4,443	15,609	13,070	2,877
Faroes	1,581	1,524	6,203	2,177	18,484	4,772	3,530	3,540
Germany, Fed.Rep.	179	-	8	-	-	-	-	-
Netherlands	-	322	147	230	21	98	68	182
Norway	144 <sup>3</sup>	-	82 <sup>3</sup>	-	-	-	-	-
Poland	75	-	-	-	-	-	-	-
UK (Scotland) <sup>2</sup>	4,702	6,614	6,346	2,799	302	23	1,202	1,158
USSR	40	2	7,147	-	-	-	-	-
<b>Total</b>	<b>6,721</b>	<b>8,655</b>	<b>19,933</b>	<b>5,206</b>	<b>23,250</b>	<b>20,502</b>	<b>17,870</b>	<b>7,757</b>

Country	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Denmark	751	530	4,301	8,547 <sup>4</sup>	5,832	37,714	5,849	28,180
Faroes	3,026	6,261	3,400	998	-	-	-	-
Germany, Fed.Rep.	-	-	70	-	-	-	-	-
Netherlands	548	1,534	-	139	-	-	-	-
Norway	-	-	-	-	-	-	-	-
Poland	-	-	-	-	-	-	-	-
UK(Scotland) <sup>2</sup>	586	-	23	13	-	553	517	5
USSR	-	-	-	-	-	-	-	-
<b>Total</b>	<b>4,911</b>	<b>8,325</b>	<b>7,794</b>	<b>9,697</b>	<b>5,832</b>	<b>38,267</b>	<b>6,366</b>	<b>28,185</b>

<sup>1</sup> Preliminary.

<sup>2</sup> Amended using national data.

<sup>3</sup> Including by-catch.

<sup>4</sup> Includes Division VIb.

Table 3.2.8 SANDEEL, Division IIIa.  
Landings in tonnes as officially reported  
to ICES except where indicated.

Country	1982	1983	1984	1985
Denmark	21,540	34,286 <sup>1</sup>	27,679 <sup>1</sup>	14,058
Norway	-	178	-	-
Sweden	5	31	-	-

Country	1986	1987	1988	1989 <sup>2</sup>
Denmark	80,171	3,817	22,365	17,236
Norway	-	-	-	-
Sweden	2	-	-	-

<sup>1</sup> Estimate provided by Working Group members.

<sup>2</sup> Preliminary.

**Table 3.2.9.1** Landings of SANDEEL from the North Sea, 1952-1989  
('000 t). (Data provided by Working Group members.)

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	-	3.9	-	13.1	-	17.2	621.8
1986	752.5	-	1.2	-	82.1	-	12.0	847.8
1987	605.4	-	18.6	-	193.4	-	7.2	824.6
1988	686.4	-	15.5	-	185.1	-	5.8	892.8
1989 <sup>1</sup>	824.4	-	16.6	-	186.8	-	6.9	1034.7

<sup>1</sup> Preliminary.

+ = less than half unit.

- = no information or no catch.

**Table 3.2.9.2** Annual landings ('000 t) of SANDEELS by area (see Figure 3.2.9) of the North Sea [Denmark, Norway, and UK (Scotland)]. (Data provided by Working Group members.)

Year	Area										Assessment areas <sup>1</sup>		
	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	275.1	63.6	1.1	53.5	325.2	0.4	5.6	21.4	7.7	45.1	7.2	395.9	402.8
1988	291.1	58.4	2.0	47.0	256.5	0.3	37.6	35.3	12.0	102.2	4.7	384.8	487.6
1989	227.1	31.0	0.5	167.8	331.4	1.5	125.3	30.5	4.5	95.1	3.5	489.7	525.0

<sup>1</sup> Assessment areas: Northern - Areas 1B, 1C, 2B, 2C, 3.  
Southern - Areas 1A, 2A, 4, 5, 6.

**Table 3.2.12** SANDEEL, Division VIa.  
Landings in tonnes, 1983-1989, as officially reported to ICES.

Country	1983	1984	1985	1986	1987	1988	1989
UK (Scotland)	13,051	14,166	18,586	24,469	14,479	24,465	17,619

**Table 3.2.13** Landings of SPRAT in Division IIIa (tonnes  $10^{-3}$ ).  
(Data provided by Working Group members.)

Year	Skagerrak				Kattegat			Div. IIIa 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
1975	15.0	2.1	1.9	19.0	60.7	20.9	81.6	100.6
1976	12.8	2.6	2.0	17.4	27.9	13.5	41.4	58.8
1977	7.1	2.2	1.2	10.5	47.1	9.8	56.9	67.4
1978	26.6	2.2	2.7	31.5	37.0	9.4	46.4	77.9
1979	33.5	8.1	1.8	43.4	45.8	6.4	52.2	95.6
1980	31.7	4.0	3.4	39.1	35.8	9.0	44.8	83.9
1981	26.4	6.3	4.6	37.3	23.0	16.0	39.0	76.3
1982	10.5	6.7	1.8	19.0	21.4	4.8	26.2	45.2
1983	3.4	6.4	1.9	11.7	9.1	5.7	14.8	26.5
1984	13.2	5.4	1.8	20.4	10.9	5.2	16.1	36.5
1985	1.3	8.1 <sup>2</sup>	2.5	11.9	4.6	5.4	10.0	21.9
1986	0.4	6.6	1.1	8.1	0.9	9.0	9.9	18.0
1987 <sup>1</sup>	1.4	7.1	0.4	8.9	1.4	5.5	6.9	15.8
1988 <sup>1</sup>	1.7	2.4	0.3	4.4	1.3	3.1	4.4	8.8
1989 <sup>1</sup>	0.9	2.9	1.2	4.0	3.0	1.0	4.0	8.0

<sup>1</sup> Preliminary figures.

<sup>2</sup> 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 3.2.14** SPRAT catches in the North Sea ('000 tonnes), 1980-1989.  
(Data provided by Working Group members except where indicated.)

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
<u>Division IVa West</u>										
Denmark	-	2.8	-	-	-	0.9	0.6	0.2	0.1	+
Germany, Fed.Rep.	0.1	-	-	-	-	-	-	-	-	-
Netherlands	-	-	-	-	-	6.7	-	-	-	-
UK (Scotland)	3.8	1.0	+	-	+	-	+	+	-	-
Total	3.9	3.8	+	-	+	7.6	0.6	0.2	0.1	+
<u>Division IVa East (North Sea) stock</u>										
Denmark	-	-	+	-	-	+	0.2	+	+	+
Norway	0.4	-	-	3.0	-	-	-	-	4.9 <sup>4</sup>	2.2 <sup>4</sup>
Total	0.4	-	+	3.0	-	+	0.2	+	4.9	+
<u>Division IVb West</u>										
Denmark	76.7	53.6	23.1	32.6	5.6	1.8	0.4	3.4	1.4	2.0
Faroe Islands	2.8 <sup>2</sup>	-	-	-	-	-	-	-	-	-
Norway	18.3	0.2	8.6	-	-	-	-	-	4.2	0.1
UK (England)	2.4	-	-	-	+	-	-	-	-	-
UK (Scotland)	2.5	0.7	0.2	+	+	-	-	0.1	-	-
Total	102.7	54.5	31.9	32.6	5.6	1.8	0.4	3.5	5.6	2.1

<sup>1</sup> Preliminary.

<sup>2</sup> Includes Division IVb East.

<sup>3</sup> Includes Division IVb West.

<sup>4</sup> Norwegian Fjords.

+ = less than 0.1.

- = magnitude known to be nil.

(cont'd)

Table 3.2.14 (cont'd)

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
<u>Division IVb East</u>										
Denmark	149.0	127.5	91.2	39.2	62.1	36.6	10.3	28.0	80.7	59.2
Germany, Fed.Rep.	6.1	4.8	1.5	-	0.6	0.6	0.6 <sup>3</sup>	-	-	-
Norway	33.7	0.2	7.2	12.0	3.9	-	-	-	-	-
Sweden	0.6	-	-	-	-	-	-	-	-	-
Total	189.4	132.5	99.9	51.2	66.6	37.2	10.9	28.0	80.7	59.2
<u>Division IVc</u>										
Belgium	-	-	-	-	-	+	+	+	-	+ <sup>2</sup>
Denmark	6.5	4.3	2.4	1.0	0.5	+	0.1	+	0.1	0.5
France	-	-	-	-	-	-	+	-	-	+ <sup>2</sup>
Netherlands	-	-	-	-	0.1	-	-	-	-	0.4 <sup>23</sup>
Norway	16.2	-	3.7	-	3.5	-	-	-	-	-
UK (England)	4.3	14.0	14.9	3.6	0.9	3.4	4.1	0.7	0.6	0.9
Total	27.0	18.3	21.0	4.6	5.0	3.4	4.3	0.7	0.7	1.8
<u>Total North Sea</u>										
Belgium	-	-	-	-	-	+	+	+	-	+
Denmark	232.2	188.2	116.6	72.6	68.1	39.5	11.7	31.7	82.3	61.9
Faroe Islands	2.8	-	-	-	-	-	-	-	-	-
France	-	-	-	-	-	-	+	-	-	+
Germany, Fed.Rep.	6.2	4.8	1.5	-	0.6	-	0.6	-	-	-
Netherlands	-	-	-	-	0.1	0.6	-	0.5	-	0.4
Norway	68.6	0.4	19.5	12.0	7.4	6.7	-	-	9.1	2.3
Sweden	0.6	-	-	-	-	-	-	-	-	-
UK (England)	6.7	14.0	14.9	3.6	0.9	3.4	4.1	0.7	0.6	0.9
UK (Scotland)	6.3	1.7	0.2	+	+	-	+	0.2	-	-
Total	323.4	209.1	152.7	88.2	77.2	50.2	16.4	33.1	92.0	65.5

<sup>1</sup> Preliminary.<sup>2</sup> Official statistics (applies to 1989).<sup>3</sup> Includes Divisions IVa-e.

+ = less than 0.1.

- = magnitude known to be nil.

**Table 3.2.15** SPRAT in Division VIa.  
Landings in tonnes as officially reported to ICES.

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Denmark	-	242	-	-	-	-	-	268 <sup>2</sup>	364	-
Germany, Fed.Rep.	-	2	-	-	-	-	-	-	-	-
Ireland	1,787	790	287	-	192	51	348	-	-	-
Netherlands	428	892	2,156	1,863	-	-	-	-	-	-
Norway	-	-	24	-	-	557	-	-	-	-
UK (Engl. & Wales)	-	-	-	-	-	-	2	-	-	-
UK (Scotland) <sup>3</sup>	2,987	1,488	1,057	1,971	2,456	2,946	520	582	3,844	1,146
Total	5,202	3,414	3,524	3,834	2,648	3,554	870	850	4,208	1,146

<sup>1</sup> Preliminary figures.

<sup>2</sup> Includes Division VIb.

<sup>3</sup> Amended from national data.

**Table 3.2.16** Nominal catch of SPRAT in Divisions VIIId,e, 1980-1989.

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Belgium	-	-	-	3	-	-	-	-	-	-
Denmark	7,483	-	286	638	1,417	-	15	250	2,529	2,092
France	1,867	146	44	60	47	14	-	23	2	10
Germany, Fed.Rep.	52	1	-	-	-	-	-	-	-	-
Netherlands	1,401	1,015	1,533	1,454	589	-	-	-	-	-
Norway	65	-	-	-	-	-	-	-	-	-
UK (Engl. + Wales)	6,864	10,183	4,749	4,756	2,402	3,771	1,163	2,454	2,944	1,314
Total	17,732	13,890	6,612	6,911	4,455	3,785	1,178	2,714	5,475	3,416

<sup>1</sup> Preliminary.



**Table 3.3.1** Cod landings from the Kattegat as estimated by the Working Group, 1971-1989 (t).

Year	Denmark	Sweden	Fed.Rep. of Germany <sup>1</sup>	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	9,396	2,006	89	11,491
1988	4,054	1,359	114	5,527
1989 <sup>2</sup>	6,979	1,431	51	8,461

<sup>1</sup> Landing statistics incompletely split on the Kattegat and the Skagerrak. The figures are estimated by the Working Group.

<sup>2</sup> Preliminary.

**Table 3.3.2** Cod landings from the Skagerrak as estimated by the Working Group, 1971-1989 (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	17,824	1,924	152	-	19,900	838
1988	14,806	1,648	392	106	16,952	769
1989 <sup>1</sup>	16,663	1,778	91	30	18,562	814

<sup>1</sup> Preliminary.

Table 3.3.3.1 Nominal landings (tonnes) of HADDOCK from Division IIIa as supplied by Working Group members.

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 <sup>2</sup>	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	8,297
1986	4,092	226	151	5	4,474
1987	5,033	148	71	36	5,288
1988 <sup>1</sup>	4,023	245	64	48	4,380
1989 <sup>1</sup>	4,078	78	60	-	4,216

<sup>1</sup> Preliminary.

<sup>2</sup> Includes Divisions IVa and IVb.

Table 3.3.3.2 Landings of haddock in Division IIIa in tonnes as supplied by Working Group members.

Year	Denmark		Total	Norway	Sweden	Others	Total	Total
	Consumption	Industrial					Consump.	Indust.& Consump.
1983	1,445	2,225	8,670	756	608	221	2,809	10,255
1984	5,130	2,707	7,837	321	499	30	5,950	8,687
1985	6,698	954	7,652	279	351	15	7,348	8,297
1986	2,410	1,682	4,092	226	151	5	2,792	4,474
1987	3,584	1,449	5,033	148	71	36	3,803	5,288
1988	2,543	1,480	4,023	245	64	48	2,852	4,380
1989	3,718	360	4,078	78	60	-	3,856	4,216

Table 3.3.3.3 Landings of haddock in the Kattegat (in tonnes) as supplied by Working Group members.

Year	Denmark		Sweden		Total
	Consumption	Industrial	Consumption	Total Consump.	
1987	469	338	-	469 <sup>1</sup>	806 <sup>1</sup>
1988	29	158	15	44	202
1989	111	63	-	111 <sup>1</sup>	174 <sup>1</sup>

<sup>1</sup> Swedish landings not split according to area.

Table 3.3.3.4 Landings of Haddock in the Skagerrak (in tonnes) as supplied by Working Group members.

Year	Denmark		Norway/Sweden		Total
	Consumption	Industrial	Consumption	Total Consump.	
1987	3,117	1,111	148	3,265 <sup>1</sup>	4,376 <sup>1</sup>
1988	2,514	1,322	245	2,808	4,130
1989	3,707	297	78	3,785 <sup>1</sup>	4,082 <sup>1</sup>

<sup>1</sup> Swedish landings not split according to area.

Table 3.3.4.1 Nominal landings (tonnes) of WHITING from Division IIIa as supplied by Working Group members.

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	24,942 <sup>2</sup>	70	1,054	7	26,073 <sup>2</sup>
1982	40,941 <sup>2</sup>	40	670	13	41,664 <sup>2</sup>
1983	24,816 <sup>2</sup>	48	1,061	8	25,933 <sup>2</sup>
1984	13,138 <sup>2</sup>	51	1,168	60	14,417 <sup>2</sup>
1985	12,524 <sup>2</sup>	45	654	2	13,225 <sup>2</sup>
1986	12,463 <sup>2</sup>	64	477	1	13,005 <sup>2</sup>
1987	16,323 <sup>2</sup>	29	262	43	16,657 <sup>2</sup>
1988	11,262 <sup>2</sup>	42	435	24	11,764 <sup>2</sup>
1989 <sup>1</sup>	12,516 <sup>2</sup>	26	663	-	13,205 <sup>2</sup>

<sup>1</sup> Preliminary.

<sup>2</sup> Data revised by the Working Group.

Table 3.3.4.2 Danish landings of WHITING in Skagerrak and Kattegat 1981-1989 as supplied by Working Group members.

Year	Kattegat		Skagerrak		Division IIIa		Total
	Consump.	Indust.	Consump.	Indust.	Total consump.	Total indust.	
1981	189	14,010	838	9,905	1,027	23,915	24,942
1982	234	18,917	949	20,841	1,183	39,758	40,941
1983	202	12,285	1,109	11,220	1,311	23,505	24,816
1984	114	7,678	922	4,424	1,036	12,102	13,138
1985	113	5,734	444	6,333	557	11,967	12,524
1986	130	3,755	354	8,284	484	11,979	12,463
1987	184	6,338	259	9,542	443	15,880	16,323
1988	123	2,492	268	8,380	391	10,872	11,263
1989	144	3,954	710	7,708	854	11,662	12,516

Table 3.3.5 PLAICE landings from the Kattegat (tonnes) as supplied by Working Group members.

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	2,859	283	104	3,246
1988	1,818	210	2.8	2,031
1989 <sup>1</sup>	1,571	126	4.0	1,701

<sup>1</sup> Preliminary.

Table 3.3.6 PLAICE landings from the Skagerrak (tonnes) as supplied by Working Group members.

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	11,370	222	2,209	907	25	14,728
1988	9,781	281	2,087	716	41	12,906
1989 <sup>1</sup>	5,414	311	-	200	33	5,958

<sup>1</sup> Preliminary.

Table 3.3.7 Catches (tonnes) of SOLE from Division IIIa. Data from Bulletin Statistique.

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	645 <sup>2</sup>	26 <sup>2</sup>	1	109	2	-	783 <sup>2</sup>
1987	623 <sup>2</sup>	19 <sup>2</sup>	-	70	2	-	714 <sup>2</sup>
1988	678	24	-	78 <sup>2</sup>	-	-	652 <sup>2</sup>
1989 <sup>1</sup>	793	21	-	-	-	-	814

<sup>1</sup> Preliminary.

<sup>2</sup> Working Group estimate.



Table 3.4.3.1.1 Nominal landings (tonnes) of Pandalus borealis in ICES Division IIIa and Sub-area IV as officially reported to ICES.

Year	Division IIIa				Sub-area IV					
	Denmark	Norway	Sweden	Total	Denmark	Norway	Sweden	UK(Engl) <sup>1</sup>	UK(Scotl) <sup>2</sup>	Total
1970	757	982	2,740 <sup>3</sup>	4,479	3,460	1,107	...	14	100	4,681
1971	834	1,392	2,906 <sup>3</sup>	5,132	3,572	1,265	...	-	438	5,275
1972	773	1,123	2,524 <sup>3</sup>	4,420	2,448	1,216	...	692	187	4,543
1973	716	1,415	2,130 <sup>3</sup>	4,261	196	931	...	1,021	163	2,311
1974	475	1,186	2,003 <sup>3</sup>	3,664	337	767	..	50	432	1,586
1975	743	1,463	1,740	3,946	1,392	604	261	-	525	2,782
1976	865	2,541	2,212	5,618	1,861	1,051	136	186	2,006	5,240
1977	763	2,167	1,895	4,825	782	960	124	265	1,723	3,854
1978	757	1,841	1,529	4,127	1,592	692	78	98	2,044	4,504
1979	973	2,489	1,752	5,214	962	594	34	238	309	2,137
1980	1,679	3,498	2,121	7,298	1,273	1,140	38	203	406	3,060
1981	2,593	3,753	2,210	8,556	719	1,435	31	1	341	2,527
1982	2,920	3,877	1,421	8,218	1,069	1,545	92	-	354	3,060
1983	1,571	3,722	988	6,281	5,725	1,657	112	65	1,836	9,395
1984	1,717	3,509	933	6,159	4,638	1,274	120	277	25	6,334
1985	4,105	4,772	1,474	10,351	4,582	1,785	128	415	1,347	8,257
1986	4,686	4,811	1,357	10,854	3,896	1,681	157	458	358	6,550
1987	4,140	5,199	1,085	10,424	9,223	3,144	252	526	774	13,919
1988	2,278	3,048 <sup>4</sup>	1,075	6,401	2,647	4,613 <sup>4</sup>	220	489	109	8,078
1989 <sup>5</sup>	2,451	3,149	1,303	6,903	3,223	3,262	129	181	573	7,368

<sup>1</sup> Includes other Pandalid shrimp.

<sup>2</sup> Includes small amounts of other Pandalid shrimp.

<sup>3</sup> Includes Sub-area IV.

<sup>4</sup> Working Group figure.

<sup>5</sup> Preliminary.

Table 3.4.3.1.2 *Pandalus borealis* landings from Divisions  
 IIIa (Skagerrak) and IVa (eastern part)  
 (Norwegian Deeps) (tonnes) as estimated by  
 the Working Group.

Year	Denmark	Norway	Sweden	Total
1970	1,102	1,729	2,742	5,573
1971	1,190	2,486	2,906	6,582
1972	1,017	2,477	2,524	6,018
1973	755	2,333	2,130	5,218
1974	530	1,809	2,003	4,342
1975	817	2,339	2,003	5,159
1976	1,204	3,348	2,529	7,081
1977	1,120	3,004	2,019	6,143
1978	1,459	2,440	1,609	5,508
1979	1,062	3,040	1,787	5,889
1980	1,678	4,562	2,159	8,399
1981	2,593	5,183	2,241	10,017
1982	3,766	5,042	1,450	10,258
1983	1,567	5,361	1,136	8,064
1984	1,747	4,783	1,022	7,552
1985	3,827	6,646	1,571	12,044
1986	4,834	6,490	1,463	12,787
1987	4,599	8,343	1,321	14,263
1988	3,068	7,661	1,278	12,007
1989	3,150	6,411	1,433	10,994

**Table 3.4.5** Landings (t) of *Pandalus borealis* from Division IVb, the Farn Deeps as estimated by the Working Group.

Year	UK (England)	UK (Scotland)	Denmark	Total	CPUE kg/hr (Scotland)
1977	227	-	No data	-	-
1978	91	2	-	-	No data
1979	235	34	-	-	No data
1980	203	17	-	-	60
1981	1	-	-	-	-
1982	-	-	-	-	-
1983	65	-	-	-	-
1984	30	-	-	-	-
1985	2	6	-	-	70
1986	137	57	106	300	127
1987	212	86	92	390	101
1988	91	25	384	500	67
1989	168	8	72	248	44

**Table 3.4.4** Landings (t) of Pandalus borealis from the Fladen Ground (Division IVa) as estimated by the Working Group.

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	3,489
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
1988	1,077	-	-	84	1,161
1989	2,438	-	-	547	2,985

Table 3.5.1.3 Occurrences of whiting constituting more than 50% of total demersal landing while the by-catch of other roundfish species constitute less than 10%. Minimum whiting catch : 10 t.

RECT	FLEET	Q	CCOD	PCOD	CHAD	PHAD	CWHI	PWHI	CSAI	PSAI	CCHS	PCHS
44E9	DKTR60	4	.5	4.2	.1	.6	11.3	89.6	.0	.0	.6	4.9
40E8	FRATRB	3	.6	3.1	.8	4.1	19.2	92.4	.0	.0	1.5	7.2
37F0	FRATRB	4	1.1	1.2	7.1	7.7	81.4	88.7	.0	.0	8.3	9.0
35F3	FRATRM	1	1.4	7.7	.0	.0	16.9	90.3	.0	.0	1.4	7.7
33F2	FRATRM	1	1.5	6.4	.0	.0	20.5	88.8	.0	.0	1.5	6.4
33F3	FRATRM	1	1.3	3.4	.0	.1	36.3	92.8	.0	.0	1.4	3.5
34F2	FRATRC	1	1.0	8.4	.0	.1	11.1	88.9	.0	.0	1.1	8.5
34F3	FRATRC	2	.3	1.5	.0	.0	22.1	92.2	.0	.0	.3	1.5
33F2	FRATRC	1	1.1	3.0	.0	.0	36.1	95.2	.0	.0	1.1	3.0
33F3	FRATRC	1	1.3	6.2	.0	.0	20.0	91.7	.0	.0	1.3	6.2
41E3	SCOLTR	3	.8	2.1	2.5	6.2	27.6	68.2	.0	.0	3.4	8.3

Table 3.5.1.4 Percentage Changes compared to Baseline for Total International Fleet, 1991, Cod in area IV

COD IV Landings for Human Consumption

No. Meshes	Mesh Size				
	90	100	110	120	130
120	0	-1	-5	-12	-20
100	-1	-3	-8	-16	-25
75	-2	-5	-13	-22	-31

COD IV Spawning Biomass (1992)

No. Meshes	Mesh Size				
	90	100	110	120	130
120	0	0	2	5	10
100	0	1	3	7	14
75	1	2	5	12	21

Table 3.5.1.5 Percentage Changes compared to Baseline for Total International Fleet, 1991, Cod in area VIA

COD VIA Landings for Human Consumption

No. Meshes	Mesh Size				
	90	100	110	120	130
120	0	-1	-3	-7	-13
100	0	-1	-4	-10	-17
75	-1	-3	-7	-15	-23

COD VIA Spawning Biomass (1992)

No. Meshes	Mesh Size				
	90	100	110	120	130
120	0	1	3	7	14
100	0	1	4	10	19
75	1	3	8	16	27

Table 3.5.1.6: Percentage Changes compared to Baseline for Total International Fleet, 1991, Haddock in area IV

HAD IV Landings for Human Consumption

No. Meshes	Mesh Size				
	90	100	110	120	130
120	0	0	0	-2	-9
100	0	0	-2	-10	-24
75	0	-3	-12	-29	-47

HAD IV Discards

No. Meshes	Mesh Size				
	90	100	110	120	130
120	0	-15	-40	-65	-81
100	-14	-39	-65	-82	-91
75	-39	-67	-84	-91	-94

HAD IV Industrial By-Catch

No. Meshes	Mesh Size				
	90	100	110	120	130
120	0	5	2	4	5
100	1	2	4	5	7
75	0	4	6	8	9

HAD IV Spawning Biomass (1992)

No. Meshes	Mesh Size				
	90	100	110	120	130
120	0	2	6	11	17
100	2	6	11	18	24
75	6	12	19	26	32

Table 3.5.1.7 Percentage Changes compared to Baseline for Total International Fleet, 1991, Haddock in area VIA

HAD VIA Landings for Human Consumption

	Mesh Size				
	90	100	110	120	130
No. Meshes					
120	0	0	0	-2	-9
100	0	0	-3	-10	-22
75	0	-3	-13	-26	-40

HAD VIA Discards

	Mesh Size				
	90	100	110	120	130
No. Meshes					
120	0	-16	-41	-65	-80
100	-14	-41	-66	-82	-89
75	-41	-69	-84	-90	-92

HAD VIA Spawning Biomass (1992)

	Mesh Size				
	90	100	110	120	130
No. Meshes					
120	0	6	15	25	33
100	5	15	26	35	41
75	15	27	36	43	48



Table 3.5.1.8 Percentage Changes compared to Baseline for Total International Fleet, 1991, Whiting in area IV

WHI IV Landings for Human Consumption

No. Meshes	Mesh Size				
	90	100	110	120	130
120	0	-8	-25	-44	-60
100	-5	-20	-40	-58	-71
75	-16	-40	-58	-71	-80

WHI IV Discards

No. Meshes	Mesh Size				
	90	100	110	120	130
120	0	-32	-56	-70	-77
100	-22	-50	-67	-76	-80
75	-45	-65	-76	-80	-82

WHI IV Industrial By-Catch

No. Meshes	Mesh Size				
	90	100	110	120	130
120	0	3	7	10	13
100	2	6	10	12	14
75	5	9	12	14	15

WHI IV Spawning Biomass (1992)

No. Meshes	Mesh Size				
	90	100	110	120	130
120	0	7	15	21	26
100	5	13	20	26	29
75	11	19	25	29	32

Table 3.5.1.9 Percentage Changes compared to Baseline for Total International Fleet, 1991, Whiting in area VIA

WHI VIA Landings for Human Consumption

No. Meshes	Mesh Size				
	90	100	110	120	130
120	0	-13	-33	-53	-69
100	-8	-27	-50	-67	-79
75	-23	-47	-67	-79	-85

WHI VIA Spawning Biomass (1992)

No. Meshes	Mesh Size				
	90	100	110	120	130
120	0	7	17	27	34
100	4	14	25	34	39
75	11	23	33	39	42

**Table 3.5.2** Nominal catch (tonnes) of COD in Sub-area IV, 1980-1989, as officially reported to ICES.

Country	1980	1981	1982	1983	1984
Belgium	9,630	8,744	6,604	6,704	5,804
Denmark	56,404	64,968	61,454	48,828	46,751
Faroe Islands	150	38	65	361	-
France	10,910	11,369	8,399	7,159	8,129
German Dem. Rep.	63	-	-	-	-
Germany, Fed. Rep.	26,343	29,741	18,525	20,333	13,453
Netherlands	45,400	51,281	36,490	34,111	25,460
Norway <sup>2</sup>	4,506	6,766	12,163	6,625	7,005
Poland	28	7	62	75	7
Sweden	293	321	453	422	575
UK (England & Wales)	49,951	59,856	54,277	53,860	35,605
UK (Isle of Man)	-	-	-	-	-
UK (N. Ireland)	-	-	-	-	-
UK (Scotland)	45,044	53,921	57,308	58,581	54,359
USSR	-	-	-	-	-
<b>Total</b>	<b>248,722</b>	<b>287,012</b>	<b>255,800</b>	<b>237,059</b>	<b>197,148</b>

Country	1985	1986	1987	1988	1989
Belgium	4,815	6,604	6,693	5,508	3,398
Denmark	42,547	32,892	36,948	34,905	25,782
Faroe Islands	71	15	57	46	25 <sup>1</sup>
France	4,834	8,402	8,199	8,323	2,578 <sup>1,3</sup>
German Dem. Rep.	-	-	-	-	-
Germany, Fed. Rep.	7,675	7,667	8,230	7,707	13,154 <sup>1</sup>
Netherlands	30,844	25,082	21,347	n/a	12,028
Norway <sup>2</sup>	5,766	4,864	5,000	3,585	5,166 <sup>1</sup>
Poland	-	10	13	19	24
Sweden	748	839	688	367	501
UK (England & Wales)	29,692	25,361	29,960	23,496	18,250
UK (Isle of Man)	-	-	-	-	1
UK (N. Ireland)	-	-	-	-	124
UK (Scotland)	60,931	45,748	49,671	41,382	31,480
<b>Total</b>	<b>187,923</b>	<b>157,484</b>	<b>166,806</b>	<b>125,338</b>	<b>112,511</b>

<sup>1</sup> Preliminary.

<sup>2</sup> Figures do not include cod caught as industrial by-catch.

<sup>3</sup> Includes Division IIa.

n/a = Not available.

**Table 3.5.3** Nominal catch (tonnes) of HADDOCK in Sub-area IV, 1980-1989, as officially reported to ICES.

Country	1980	1981	1982	1983	1984
Belgium	1,414	1,217	966	985	494
Denmark	12,928	13,198	22,704	25,653	16,368
Faroe Islands	27	46	6	51	-
France	7,407	11,966	15,988	11,250	8,103
German Dem. Rep.	36	-	-	-	-
Germany, Fed. Rep.	2,354	3,387	4,510	3,654	2,571
Netherlands	1,557	2,279	1,021	1,722	1,052
Norway <sup>2</sup>	1,191	2,283	2,888	3,862	3,959
Poland	59	31	317	150	17
Sweden	1,165	1,301	1,874	1,360	1,518
UK (England and Wales)	12,195	14,570	16,403	15,476	12,340
UK (N. Ireland)	-	-	-	-	-
UK (Scotland)	64,058	82,798	107,773	100,390	87,479
<b>Total</b>	<b>104,391</b>	<b>133,076</b>	<b>174,450</b>	<b>164,553</b>	<b>133,901</b>

Country	1985	1986	1987	1988	1989
Belgium	719	317	165	220	145
Denmark	23,821	16,397	7,767	9,174	2,789
Faroe Islands	5	4	23	35	10 <sup>1</sup>
France	5,389	4,802	3,889	2,193	1,702 <sup>1,3</sup>
German Dem. Rep.	-	-	-	-	-
Germany, Fed. Rep.	2,796	1,984	1,231	802	500 <sup>1</sup>
Netherlands	3,875	1,627	1,093	n/a	328
Norway <sup>2</sup>	3,498	5,190	2,610	1,590	1,664 <sup>1</sup>
Poland	-	1	-	-	-
Sweden	1,942	1,550	937	614	1,051
UK (England & Wales)	13,614	8,137	7,491	5,537	2,704
UK (N. Ireland)	-	-	-	-	137
UK (Scotland)	112,549	126,650	84,063	84,104	53,252
<b>Total</b>	<b>168,208</b>	<b>166,659</b>	<b>109,269</b>	<b>104,269</b>	<b>64,282</b>

<sup>1</sup> Preliminary.

<sup>2</sup> Figures do not include haddock caught as industrial by-catch.

<sup>3</sup> Includes Division IIa.

n/a = Not available.

**Table 3.5.4** Nominal catch (tonnes) of WHITING in Sub-area IV, 1980-1989, as officially reported to ICES.

Country	1980	1981	1982	1983	1984
Belgium	3,153	2,623	2,272	2,864	2,798
Denmark	17,916	16,430	27,043	18,054	19,771
Faroe Islands	21	12	57	18	-
France	23,626	24,744	23,780	21,263	19,209
Germany, Fed. Rep.	1,267	601	223	317	286
Netherlands	14,389	14,600	12,218	10,935	8,767
Norway	27	27	17	39	88
Poland	1	-	-	1	2
Sweden	16	9	11	44	53
UK (England and Wales)	6,778	5,964	4,743	4,366	5,017
UK (N. Ireland)	-	-	-	-	-
UK (Scotland)	42,218	31,399	29,640	41,248	42,967
<b>Total</b>	<b>109,412</b>	<b>96,409</b>	<b>100,004</b>	<b>99,149</b>	<b>98,958</b>

Country	1985	1986	1987	1988	1989
Belgium	2,177	2,275	1,404	1,984	1,271
Denmark	16,152	9,076	2,047	12,112	803
Faroe Islands	6	-	12	222	1 <sup>1</sup>
France	10,853	8,250	10,493	10,569	5,277 <sup>1,2</sup>
Germany, Fed. Rep.	226	313	274	454	686 <sup>1</sup>
Netherlands	6,973	13,741	8,542	n/a	3,860 <sup>1</sup>
Norway	103	103	74	52	34 <sup>1</sup>
Poland	-	-	-	-	-
Sweden	22	33	17	5	17
UK (England & Wales)	5,024	3,805	4,485	4,007	1,896
UK (N. Ireland)	-	-	-	1	61
UK (Scotland)	30,398	29,113	37,630	31,804	26,491
<b>Total</b>	<b>71,934</b>	<b>66,709</b>	<b>64,978</b>	<b>61,210</b>	<b>40,397</b>

<sup>1</sup> Preliminary.

<sup>2</sup> Includes Division IIa.

n/a = Not available.

**Table 3.5.5** Nominal catch (tonnes) of SAITHE in Sub-area IV and Division IIIa, 1980-1989, as officially reported to ICES.

Country	1980	1981	1982	1983	1984
Belgium	13	12	4	7	32
Denmark	10,370	6,454	10,114	10,530	8,526
Faroe Islands	1,020	614	746	806	-
France	37,306	42,649	47,064	38,782	43,592
German Dem. Rep.	925	-	-	-	-
Germany, Fed. Rep.	11,095	8,246	13,517	13,649	25,262
Netherlands	245	123	36	89	181
Norway	47,959	55,882	72,669	81,330	88,420
Poland	2,404	698	793	415	413
Sweden	342	156	372	548	522
UK (England and Wales)	4,879	4,309	5,627	6,845	8,183
UK (N. Ireland)	-	-	-	-	-
UK (Scotland)	6,525	6,529	8,136	6,321	6,970

Country	1985	1986	1987	1988	1989
Belgium	31	16	4	60	13
Denmark	9,033	10,343	7,928	6,868	6,550 <sup>1</sup>
Faroe Islands	895	224	691	276	392 <sup>1</sup>
France	42,200	43,958	38,356	28,913	30,761 <sup>1,2</sup>
German Dem. Rep.	-	-	-	-	-
Germany, Fed. Rep.	22,551	22,277	22,400	18,528	13,095 <sup>1</sup>
Netherlands	233	134	334	n/a	257
Norway	101,808	67,341	66,400	40,021	25,941 <sup>1</sup>
Poland	-	495	832	1,016	809
Sweden	1,764	1,987	1,732	2,064	797
UK (England & Wales)	5,455	4,480	3,233	3,790	4,441
UK (N. Ireland)	-	-	-	-	24
UK (Scotland)	9,932	15,520	11,911	10,850	8,726
<b>Total</b>	<b>193,902</b>	<b>166,775</b>	<b>153,821</b>	<b>112,386</b>	<b>91,806</b>

<sup>1</sup> Preliminary.

<sup>2</sup> Includes Divisions IIa, and IIIa,d(EC).

n/a = Not available.

**Table 3.6.2** Nominal catch (tonnes) of COD in Division VIa, 1980-1989, as officially reported to ICES.

Country	1980	1981	1982	1983	1984
Belgium	57	30	35	21	22
Denmark	27 <sup>2</sup>	-	3	-	-
Faroe Islands	3	-	2	-	-
France	5,495	7,601	7,160	8,140	7,637
Germany, Fed. Rep.	1	21	8	205	75
Ireland	2,331	2,725	3,527	2,695	2,316
Netherlands	1	-	-	-	-
Norway	48	40	238	267	231
Spain	-	-	41	52	64
Sweden	-	-	1	-	-
UK (England and Wales)	2,302	3,187 <sup>3</sup>	2,948	1,141	692
UK (Isle of Man)	-	-	-	-	-
UK (N. Ireland)	2	7	33	37	32
UK (Scotland)	7,603	10,339	7,969	8,933	9,483
Total	17,870	23,950	21,965	21,491	20,552

Country	1985	1986	1987	1988	1989
Belgium	48	88	33	44	28
Denmark	-	-	4	1	3
Faroe Islands	-	-	-	11	16 <sup>1</sup>
France	7,411	5,096	5,044	7,669	3,640 <sup>1,4</sup>
Germany, Fed. Rep.	66	53	12	25	546 <sup>1,2</sup>
Ireland	2,564	1,704	2,442	2,335	n/a
Netherlands	1	-	-	n/a	-
Norway	204	174	77	186	200 <sup>1</sup>
Spain	28	-	-	-	n/a
Sweden	-	-	-	-	-
UK (England & Wales)	243	106	306	184	439
UK (Isle of Man)	-	-	-	-	3
UK (N. Ireland)	17	54	138	46	129
UK (Scotland)	8,032	4,251	11,143	8,465	8,942
Total	18,614	11,526	19,199	18,966	13,946

<sup>1</sup> Preliminary.

<sup>2</sup> Includes Division VIb.

<sup>3</sup> Including 37 tonnes caught in Sub-area VI.

<sup>4</sup> Includes Divisions Vb and VIb.

n/a = Not available.

**Table 3.6.3** Nominal catch (tonnes) of COD in Division VIb, 1980-1989, as officially reported to ICES.

Country	1980	1981	1982	1983	1984
Faroe Islands	75	2	77	112	18
France	1	4	27	97	9
Germany, Fed. Rep.	136	443	+	195	-
Norway	80	134	51	462	373
Spain	-	70	58	42	241
UK (England and Wales)	1	67	3	163	161
UK (Isle of Man)	-	-	-	-	-
UK (N.Ireland)	-	-	-	-	-
UK (Scotland)	370	143	157	35	221
<b>Total</b>	<b>696</b>	<b>863</b>	<b>373</b>	<b>1,106</b>	<b>1,023</b>

Country	1985	1986	1987	1988	1989
Faroe Islands	-	1	-	31	2 <sup>1</sup>
France	17	5	7	2	1,2
Germany, Fed. Rep.	3	-	-	3	1,2
Norway	202	95	130	195	148 <sup>1</sup>
Spain	1,200	1,219	808	1,345	n/a
UK (England & Wales)	114	93	69	56	130
UK (Isle of Man)	-	-	-	-	1
UK (N. Ireland)	-	1	-	-	3
UK (Scotland)	437	187	284	254	262
<b>Total</b>	<b>1,973</b>	<b>1,601</b>	<b>1,298</b>	<b>1,886</b>	<b>546</b>

<sup>1</sup> Preliminary.

<sup>2</sup> Included in Division VIa.

n/a = Not available.



**Table 3.6.4** Nominal catch (tonnes) of HADDOCK in Division VIa, 1980-1989, as officially reported to ICES.

Country	1980	1981	1982	1983	1984
Belgium	3	1	2	1	6
Denmark	-	-	+	-	-
Faroe Islands	-	-	-	-	-
France	2,808	3,403	3,760	4,520	4,240
Germany, Fed. Rep.	3	7	71	65	83
Ireland	726	1,891	4,402	3,450	3,932
Netherlands	2	3	391	25	-
Norway	16	29	37	68	33
Spain	-	-	97	201	129
UK (England and Wales)	1,279	1,052	2,035	1,376	1,042
UK (Isle of Man)	-	-	-	-	-
UK (N. Ireland)	+	-	1	4	5
UK (Scotland)	8,198	12,051	19,249	21,593	18,472
<b>Total</b>	<b>13,935</b>	<b>18,437</b>	<b>30,045</b>	<b>31,303</b>	<b>27,942</b>

Country	1985	1986	1987	1988	1989
Belgium	7	-	29	8	9
Denmark	-	-	4	+	+
Faroe Islands	-	1	-	-	8 <sup>1</sup>
France	5,930	4,956	5,456	3,001	1,335 <sup>1,2</sup>
Germany, Fed. Rep.	38	25	21	4	10 <sup>1,3</sup>
Ireland	3,512	2,026	2,628	2,731	n/a
Netherlands	-	-	-	n/a	-
Norway	76	45	13	54	74 <sup>1</sup>
Spain	166	-	-	-	n/a
UK (England and Wales)	348	222	425	114	476
UK (Isle of Man)	-	-	-	-	4
UK (N. Ireland)	1	155	1	35	73
UK (Scotland)	15,036	12,955	18,503	15,151	19,651
<b>Total</b>	<b>25,114</b>	<b>20,385</b>	<b>27,080</b>	<b>21,098</b>	<b>21,636</b>

<sup>1</sup> Preliminary.

<sup>2</sup> Includes Divisions Vb and VIb.

<sup>3</sup> Includes Division VIb.

n/a = Not available.

**Table 3.6.5** Nominal catch (tonnes) of HADDOCK in Division VIb, 1980-1989, as officially reported to ICES.

Country	1980	1981	1982	1983	1984
Faroe Islands	5	1	21	3	3
France	1	10	32	48	12
Germany, Fed. Rep.	17	-	4	1	-
Norway	2	10	3	20	45
Spain	6	88	121	79	128
UK England & Wales)	6,261	9,005	3,736	113	788
UK (Isle of Man)	-	-	-	-	-
UK (N. Ireland)	-	-	-	-	-
UK (Scotland)	1,051	27	5	136	1,654
<b>Total</b>	<b>7,343</b>	<b>9,141</b>	<b>3,992</b>	<b>400</b>	<b>2,630</b>

Country	1985	1986	1987	1988	1989
Faroe Islands	1	-	-	5	- <sup>1</sup>
France	116	103	99	5	1,2
Germany, Fed. Rep.	4	-	-	4	1,2
Norway	31	83	33	20	47 <sup>1</sup>
Spain	892	756	371	245	n/a
UK (England & Wales)	1,876	703	1,271	753	1,007
UK (Isle of Man)	-	-	-	-	+
UK (N. Ireland)	-	157	-	-	8
UK (Scotland)	6,397	2,961	6,221	6,542	5,210
<b>Total</b>	<b>9,317</b>	<b>4,763</b>	<b>7,995</b>	<b>7,574</b>	<b>6,272</b>

<sup>1</sup> Preliminary.

<sup>2</sup> Included in Division VIa.

n/a = Not available.

**Table 3.6.6** Nominal catch (tonnes) of WHITING in Division VIa, 1980-1989, as officially reported to ICES.

Country	1980	1981	1982	1983	1984
Belgium	+	-	2	-	-
Denmark	32	-	+	-	-
France	2,609	1,637	1,798	2,029	1,887
Germany, Fed. Rep.	1	49	53	43	6
Ireland	4,407	8,148	3,406	3,578	3,454
Netherlands	2	6	285	811	-
Spain	-	-	99	76	40
UK (England & Wales)	227	145	166	157	162
UK (Isle of Man)	-	-	-	-	-
UK (N. Ireland)	-	-	-	52	40
UK (Scotland)	7,386	8,519	8,419	10,019	11,270
<b>Total</b>	<b>14,664</b>	<b>18,504</b>	<b>14,235</b>	<b>16,765</b>	<b>16,859</b>

Country	1985	1986	1987	1988	1989
Belgium	3	-	4	3	1
Denmark	-	-	5	-	1
France	1,502	829	1,644	1,249	199 <sup>1,2</sup>
Germany, Fed. Rep.	9	1	+	4	4 <sup>1</sup>
Ireland	1,917	1,683	2,868	2,640	n/a <sub>1</sub>
Netherlands	14	-	-	n/a	-
Spain	61	-	-	-	n/a
UK (England & Wales)	63	26	62	30	83
UK (Isle of Man)	-	-	-	-	2
UK (N. Ireland)	17	5	13	89	18
UK (Scotland)	9,051	5,848	7,803	7,864	6,047
<b>Total</b>	<b>12,637</b>	<b>8,392</b>	<b>12,399</b>	<b>11,879</b>	<b>6,355</b>

<sup>1</sup> Preliminary.

<sup>2</sup> Includes Divisions Vb and VIb.

n/a = Not available.

**Table 3.6.7** Nominal catch (tonnes) of WHITING in Division VIb, 1980-1989, as officially reported to ICES.

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Denmark	...	<sup>2</sup>	-	-	-	-	-	-	-	-
France	3	-	-	-	3	2	-	-	-	...
Spain	-	196	112	88	16	123	-	-	-	<sup>1,2</sup>
UK(Engl. & Wales)	+	-	-	+	2	+	5	4	-	n/a
UK (N. Ireland)	-	-	-	-	-	-	-	-	-	2
UK(Scotland)	59	+	-	5	25	6	13	108	23	15
Total	62	196	112	93	46	131	18	112	23	35

<sup>1</sup> Provisional.

<sup>2</sup> Included in Division VIa.

n/a = Not available.

**Table 3.6.8** Nominal catch (tonnes) of SAITHE in Sub-area VI, 1980-1989, as officially reported to ICES.

Country	1980	1981	1982	1983	1984
Belgium	2	2	-	-	-
Denmark	-	-	4	-	-
Faroe Islands	4	3	5	-	-
France	15,427	16,654	17,102	13,470	19,706
Germany, Fed. Rep.	49	581	441	179	713
Ireland	295	250	322	698	599
Netherlands	91	-	-	32	-
Norway	62	25	19	55	66
Spain	-	120	243	330	882
UK (England and Wales)	1,594	1,364	1,966	2,760	1,800
UK (Isle of Man)	-	-	-	-	-
UK (N. Ireland)	9	10	7	12	49
UK (Scotland)	2,902	3,117	2,141	2,642	3,170
<b>Total</b>	<b>20,435</b>	<b>22,126</b>	<b>22,250</b>	<b>26,178</b>	<b>26,985</b>

Country	1985	1986	1987	1988	1989
Belgium	2	-	12	14	15
Denmark	-	-	7	+	2 <sup>1</sup>
Faroe Islands	-	-	-	8	-
France	19,120	26,521	24,581	24,656	17,106 <sup>1,2</sup>
Germany, Fed. Rep.	838	2,345	1,486	1,584	1,988
Ireland	670	660	704	544	n/a
Netherlands	-	-	-	n/a	-
Norway	51	72	38	50	72 <sup>1</sup>
Spain	624	824	533	857	n/a
UK (England and Wales)	1,349	1,259	1,708	1,193	555
UK (Isle of Man)	-	-	-	-	+
UK (N. Ireland)	15	21	26	13	21
UK (Scotland)	3,118	3,697	3,442	3,925	2,851
<b>Total</b>	<b>25,787</b>	<b>35,399</b>	<b>32,537</b>	<b>32,844</b>	<b>22,610</b>

<sup>1</sup> Preliminary.

<sup>2</sup> Includes Division Vb.

n/a = Not available.

Table 3.6.9.1 Nominal catch (tonnes) of COD in Division VIId, 1980-1989, as officially reported to ICES.

Country	1980	1981	1982	1983	1984
Belgium	151 <sub>1</sub>	329	251	368	331
Denmark	...	-	-	-	-
France	3,203	3,707	2,696	2,802	2,492
Netherlands	-	4	1	4	-
UK (England and Wales)	160	206	306	358	282
Total	3,514	4,246	3,254	3,532	3,105
WG Estimate	5,020	5,336	3,981	3,841	3,524

Country	1985	1986	1987	1988	1989
Belgium	501	650	815	486	173
Denmark	-	4	-	+	+
France	2,589 <sub>1</sub>	9,938 <sub>1</sub>	7,541	8,795	n/a
Netherlands	...	...	-	n/a	1
UK (England and Wales)	326	830	1,044	867	562
Total	3,416	11,422	9,400	10,148	736
WG Estimate	3,331	12,814	14,220	9,359	5,504

<sup>1</sup>Included in Division VIIe.

n/a = Not available.

Table 3.6.9.2 Nominal catch (tonnes) of COD in Division VIIe, 1980-1989, as officially reported to ICES.

Country	1980	1981	1982	1983	1984
Belgium	12	34	42	21	15
Denmark	660 <sup>1</sup>	-	-	-	-
France	798	779	653	567	390
Netherlands	-	-	-	-	-
UK (England and Wales)	205	222	262	292	236
UK (Scotland)	-	-	-	-	-
Total	1,675	1,035	957	880	641
WG Estimate	1,774	1,170	956	906	805

Country	1985	1986	1987	1988	1989
Belgium	12	8	10	12	19
Denmark	-	-	+	+	+
France	359	1,305	1,122	1,758	n/a
Netherlands	1 <sup>1</sup>	66 <sup>1</sup>	-	n/a	-
UK (England and Wales)	243	406	524	840	734
UK (Scotland)	-	-	-	-	2
Total	615	1,785	1,656	2,610	755
WG Estimate	733	1,028	2,699	2,387	1,679

<sup>1</sup> Includes Division VIId.  
n/a = Not available.

**Table 3.6.10.1** Nominal catch (t) of WHITING in Division VIId, 1980-1989, as officially reported to ICES.

Country	1980	1981	1982	1983	1984
Belgium	52	88	93	84	79
Denmark	-	2	-	-	-
France	7,110	8,145	7,012	5,057	6,914
Netherlands	-	1	2	1	-
UK(England and Wales)	122	120	170	198	88
<b>Total</b>	<b>7,284</b>	<b>8,356</b>	<b>7,277</b>	<b>5,340</b>	<b>7,081</b>
<b>WG Estimate</b>	<b>9,167</b>	<b>8,932</b>	<b>7,911</b>	<b>6,936</b>	<b>7,373</b>

Country	1985	1986	1987	1988	1989
Belgium	82	65	136	69	38
Denmark	-	-	-	-	-
France	7,563	4,551 <sup>1</sup>	6,730	7,501	n/a
Netherlands	-	...	-	n/a	-
UK(England and Wales)	186	180	287	251	231
<b>Total</b>	<b>7,831</b>	<b>4,796</b>	<b>7,153</b>	<b>7,821</b>	<b>269</b>
<b>WG Estimate</b>	<b>7,339</b>	<b>5,678</b>	<b>5,518</b>	<b>5,203</b>	<b>4,148</b>

<sup>1</sup> Included in Division VIIe.  
n/a = Not available.



Table 3.6.10.2 Nominal catch (t) of WHITING in Division VIIe, 1980-1989, as officially reported to ICES.

Country	1980	1981	1982	1983	1984
Belgium	33	14	8	10	4
Denmark	6	-	-	-	-
France	580	697	1,039	651	325
Netherlands	2	1	68	398	-
UK(England and Wales)	717	1,016	1,052	1,012	723
UK (Scotland)	-	-	-	-	-
Total	1,338	1,728	2,167	2,071	1,052
WG Estimate	1,487	1,681	1,649	2,075	1,369

Country	1985	1986	1987	1988	1989
Belgium	2	2	2	4	3
Denmark	-	-	-	-	-
France	544	788 <sup>1</sup>	1,486	1,439	n/a
Netherlands	-	124 <sup>1</sup>	-	n/a	-
UK(England and Wales)	418	629	753	1,183	917
UK (Scotland)	-	-	-	-	5
Total	964	1,543	2,241	2,626	925
WG Estimate	1,942	1,282	1,921	2,294	1,541

<sup>1</sup> Includes Division VIId.

n/a = Not available.

Table 3.6.11.1 Nominal catch (t) of COD in Divisions VIIb,c,h-k, 1980-1989, based on officially reported figures (where available) and Working Group estimates.

Country	1980	1981	1982	1983	1984
Belgium	-	-	-	-	-
Denmark	-	-	-	-	-
France	983	1,465	587	636	946
Germany, Fed. Rep.	7	-	-	-	-
Ireland	782	1,434	1,764	1,192	1,211
Netherlands	5	-	+	80	325
Norway	-	-	-	4	1
Spain	17	37	29	28	56
UK (England and Wales)	1	171	304	41	408
UK (Scotland)	12	+	-	-	45
Total	1,807	3,107	2,684	1,981	2,991

Country	1985	1986	1987	1988	1989
Belgium	13	3	-	-	-
Denmark	-	-	+ <sup>2</sup>	+ <sup>2</sup>	-
France	1,115	1,599	1,214	2,551	n/a <sub>1</sub>
Germany, Fed. Rep.	-	-	-	-	-
Ireland	1,176	1,283	1,301	1,256	n/a
Netherlands	208	1	-	n/a	-
Norway	22	106	1	2	22 <sup>1,2</sup>
Spain	26	-	-	-	n/a
UK (England and Wales)	546	455	275	127	137
UK (Scotland)	+	17	19	7	33
Total	3,106	3,464	2,810	3,943	192

<sup>1</sup> Preliminary.

<sup>2</sup> Includes Division VIIg.

n/a = Not available.

**Table 3.6.11.2** Nominal landings (tonnes) of HADDOCK in Divisions VIIb,c, 1980-1989, as officially reported to ICES.

Country	1980	1981	1982	1983	1984
France	523	658	750	1,443	1,840
Ireland	150	335	464	450	277
Netherlands	-	-	1	-	-
Norway	-	-	-	54	17
Spain	5	85	129	58	240
UK (England & Wales)	1	-	3	-	275
UK (N. Ireland)	-	-	-	-	-
UK (Scotland)	56	-	-	-	63
<b>Total</b>	<b>735</b>	<b>1,078</b>	<b>1,347</b>	<b>2,005</b>	<b>2,712</b>

Country	1985	1986	1987	1988	1989
France	1,183	1,243	1,079	487	n/a
Ireland	388	202	156	101	n/a
Netherlands	-	-	-	-	-
Norway	4	77	-	+	26 <sup>1</sup>
Spain	291	-	-	-	n/a
UK (England & Wales)	35	58	30	33	3
UK (N. Ireland)	-	-	-	+	-
UK (Scotland)	7	51	79	3	17
<b>Total</b>	<b>1,908</b>	<b>1,631</b>	<b>1,344</b>	<b>624</b>	<b>46</b>

<sup>1</sup> Preliminary.

<sup>2</sup> Included in Divisions VIIg-k.

n/a = Not available.

Table 3.6.11.3 Nominal landings (t) of HADDOCK in Divisions VIIId,e, 1980-1989, as officially reported to ICES.

Country	1980	1981	1982	1983	1984
Belgium	+	2	1	1	-
Denmark	15	-	-	-	-
France	298	421	344	232	273
Ireland	+	-	-	-	-
Netherlands	-	-	94	1	-
UK (England & Wales)	59	119	60	41	26
UK (Scotland)	-	-	-	-	-
Total	372	542	499	275	299

Country	1985	1986	1987	1988	1989
Belgium	2	1	+	1	1
Denmark	-	-	-	-	-
France	138	249	268	411	n/a
Ireland	-	-	-	-	n/a
Netherlands	-	-	-	n/a	-
UK (England & Wales)	27	21	43	102	70
UK (Scotland)	-	-	-	-	1
Total	167	271	311	514	72

n/a = Not available.

**Table 3.6.11.4** Nominal landings (t) of HADDOCK in Divisions VIIg-k, 1980-1989, as officially reported to ICES.

Country	1980	1981	1982	1983	1984
Belgium	2	3	3	1	-
France	1,696	1,913	1,255	1,145	1,161
Ireland	124	344	440	491	369
Netherlands	-	-	6	-	-
Norway	-	-	-	3	-
Spain	-	192	119	109	292
UK (England & Wales)	49	92	179	23	34
UK (N. Ireland)	-	-	-	-	-
UK (Scotland)	-	4	-	-	-
<b>Total</b>	<b>1,871</b>	<b>2,548</b>	<b>2,002</b>	<b>1,772</b>	<b>1,856</b>

Country	1985	1986	1987	1988	1989
Belgium	2	-	8	11	18
France	1,075	824	928	1,960	n/a
Ireland	406	115	158	174	n/a
Netherlands	-	-	-	n/a	-
Norway	-	9	-	-	1 <sup>1</sup>
Spain	270	-	-	-	n/a
UK (England & Wales)	100	100	98	184	100
UK (N. Ireland)	-	-	-	+	1
UK (Scotland)	-	6	-	1	-
<b>Total</b>	<b>1,853</b>	<b>1,054</b>	<b>1,192</b>	<b>2,330</b>	<b>120</b>

<sup>1</sup> Preliminary.

n/a = Not available.

**Table 3.6.11.5** Nominal catch (tonnes) of WHITING in Divisions VIIb,c,h-k, 1980-1989, based on officially reported figures (where available) and Working Group estimates.

Country	1980	1981	1982	1983	1984
Belgium	-	-	-	-	-
France	656	516	204	356	398
Germany, Fed. Rep.	+	-	-	-	-
Ireland	3,499	3,550	4,011	2,590	1,872
Netherlands	1	21	78	363	169
Spain	-	-	85	91	57
UK (England and Wales)	-	67	49	18	58
UK (Scotland)	80	1	-	-	4
<b>Total</b>	<b>4,236</b>	<b>4,155</b>	<b>4,427</b>	<b>3,418</b>	<b>2,558</b>

Country	1985	1986	1987	1988	1989
Belgium	75 <sup>2</sup>	33 <sup>2</sup>	29 <sup>2</sup>	19 <sup>2</sup>	39 <sup>2</sup>
France	583	614	487	890	n/a <sup>1</sup>
Germany, Fed. Rep.	-	-	-	+	1
Ireland	2,719	2,165	2,421	2,693	n/a
Netherlands	90	7	-	n/a	-
Spain	76	-	-	-	n/a
UK (England and Wales)	165	168	95	121	117
UK (Scotland)	-	-	7	1	32
<b>Total</b>	<b>3,708</b>	<b>2,987</b>	<b>3,039</b>	<b>3,724</b>	<b>189</b>

<sup>1</sup> Preliminary.

<sup>2</sup> Includes Division VIIg.

n/a = Not available.

**Table 3.6.11.6** Nominal catch (tonnes) of SAITHE in Sub-area VII, 1980-1989, as officially reported to ICES.

Country	1980	1981	1982	1983	1984
Belgium	19	12	13	6	10
Denmark	6	-	-	-	-
France	2,317	4,563	4,061	4,760	3,697
Germany, Fed. Rep.	46	-	-	11	5
Ireland	2,220	2,197	2,367	2,383	2,374
Netherlands	84	100	22	7	-
Norway	-	-	-	3	-
Spain	-	266	179	70	118
UK (England and Wales)	109	236	526	235	974
UK (Isle of Man)	19	36	34	16	27
UK (N. Ireland)	301	577	872	668	411
UK (Scotland)	56	94	119	138	140
<b>Total</b>	<b>5,177</b>	<b>8,081</b>	<b>8,193</b>	<b>8,297</b>	<b>7,756</b>

Country	1985	1986	1987	1988	1989
Belgium	31	25	20	23	15
Denmark	-	-	-	+	-
France	6,101	8,256	6,210	6,185	8,278 <sup>1,2</sup>
Germany, Fed. Rep.	-	-	-	124	29 <sup>1</sup>
Ireland	2,177	1,739	1,624	1,400	n/a
Netherlands	-	-	-	n/a	-
Norway	3	40	2	1	16 <sup>1</sup>
Spain	118	-	-	-	n/a
UK (England and Wales)	722	648	375	762	699
UK (Isle of Man)	9	6	3	4	2
UK (N. Ireland)	665	635	571	491	524
UK (Scotland)	477	488	1,064	142	66
<b>Total</b>	<b>10,303</b>	<b>11,837</b>	<b>9,869</b>	<b>9,132</b>	<b>9,629</b>

<sup>1</sup> Preliminary.

<sup>2</sup> Includes Division Vb.

n/a = Not available.

Table 3.7.1 Nominal catch (t) of COD in Division VIIa, 1980-1989 as reported to ICES.

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Belgium	246	395	269	139	135	185	222	344	269	467
Denmark	-	-	6	-	-	-	-	-	-	-
France	1,009	1,178	1,066	815	912	1,782	1,480	1,717	2,406	352
Germany, Fed. Rep. of	-	-	-	-	-	-	-	-	-	5
Ireland	4,421	6,552	4,758	4,032	2,885	4,121	3,991	5,017	5,821	N/A
Netherlands	36	94	48	34	38	104	-	-	-	-
UK (England & Wales)	1,918	2,712	2,544	1,405	1,253	1,200	847	1,922	2,667	2,554
UK (Isle of Man)	232	221	161	103	98	119	80	44	118	4
UK (N. Ireland)	2,591	3,360	3,852	3,463	2,658	2,541	2,992	3,565	4,080	3,864
UK (Scotland)	286	376	583	336	669	1,038	446	574	472	351
Total	10,739	14,894	13,281	10,327	8,648	11,090	10,058	13,183	15,833	7,597
Unallocated	37	13	-	-312 <sup>2</sup>	-265 <sup>2</sup>	-607 <sup>2</sup>	-206 <sup>2</sup>	-289 <sup>2</sup>	-1,665 <sup>2</sup>	4,507 <sup>2</sup>
Total figures used by Working Group for stock assessment	10,776	14,907	13,381	10,015	8,383	10,483	9,852	12,894	14,168	12,104

<sup>1</sup> Preliminary.<sup>2</sup> Overreporting.



Table 3.7.2 Nominal catch (tonnes) of WHITING in Division VIIa, 1980-1989, as officially reported to ICES and Working Group estimates of human consumption and discards.

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Belgium	45	85	45	78	99	100	70	109	90	92
France	1,616	1,254	1,375	1,021	930	956	770	826	1,063	533
Ireland	5,546	5,362	4,204	3,047	4,276	5,521	3,101	4,067	4,394	N/A
Netherlands	10	12	14	18	10 <sup>1</sup>	30	-	-	-	-
UK (Engl.+ Wales)	1,000	816	1,195	1,200	1,224	1,379	1,004	1,529	1,202	949
UK (N. Ireland)	3,954	9,052	9,927	5,218	5,660	8,382	4,940	4,858	4,621	5,651
UK (Scotland)	251	102	189	120	275	368	129	281	107	184
UK (Isle of Man)	243	346	268	127	68	57	25	14	15	7
Total human consumption	12,665	17,029	16,989	10,829	12,542	16,793	10,039	11,684	11,492	-
Unallocated	-	-	230	-321 <sup>2</sup>	-981 <sup>2</sup>	-841 <sup>2</sup>	47	-987 <sup>2</sup>	-1,5372	-
Total human consumption figures used by the Working Group for stock assessment	12,665	17,029	17,219	10,508	11,561	15,952	10,086	10,697	9,955 <sup>3</sup>	11,139
Estimated discards from Nephrops fishery	3,302	3,577	893	1,837	3,674	2,284	2,329	4,413	2,097 <sup>3</sup>	1,962

<sup>1</sup> Preliminary.

<sup>2</sup> Over-reporting.

<sup>3</sup> Revised.

N/A= not available.

Table 3.7.3 Nominal landings (t) of PLAICE in Division VIIa, 1980-1989 (as officially reported to ICES).

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Belgium	214	231	130	195	118	285	384	403	243	265
France	104	51	60	99	38	110	165	87	58	11
Ireland	1,086	1,243	923	1,384	1,420	2,000	1,858	2,132	2,009	n/a
Netherlands	60	40	29	73 <sup>2</sup>	30 <sup>2</sup>	1,091 <sup>2</sup>	0	0	0	0
UK (England & Wales)	2,139	2,117	1,868	1,666	2,301	2,295	1,774	2,366	1,630	2,017
UK (Isle of Man)	20	27	12	11	11	26	12	9	12	5
UK (N. Ireland)	139	132	159	183	203	198	272	332	286	370
UK (Scotland)	141	64	47	42	86	118	119	243	127	94
Others	0	1	0	0	0	0	0	0	0	0
Total	3,903	3,906	3,228	3,653	4,207	6,123	4,584	5,572	4,365	n/a
Discards <sup>3</sup>	-	-	-	-	-	-	250	270	220	0
Unallocated	0	0	9	-14 <sup>4</sup>	34	-1,048 <sup>4</sup>	-28 <sup>4</sup>	378	420	0
Total figures used by Working Group for stock assessment	3,903	3,906	3,237	3,639	4,241	5,075	4,806	6,220	5,005	4,363

<sup>1</sup> Preliminary.

<sup>2</sup> EC figures.

<sup>3</sup> Estimated discards as a result of UK (England & Wales) by-catch restrictions.

<sup>4</sup> Over-reporting.

n/a Not available.

Table 3.7.4.2 Irish Sea SOLE.

Nominal catches (tonnes) 1980-1989 as officially reported to ICES.

Country	Year									
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Belgium	1,002	884	669	544	425	589	930	987	915	1,010
Denmark	-	15	-	-	-	-	-	-	-	-
France	41	13	9	3	10	9	17	5	11	5
Ireland	229	167	161	203	187	180	235	312	366	
Netherlands	169	186	138	224	113	546	-	-	-	0
UK (England & Wales)	367	311	277	219	230	266	637	599	507	527
UK (Isle of Man)	18	7	10	10	6	12	1	3	1	
UK (N. Ireland)	44	41	31	33	38	36	50	72	47	83
UK (Scotland)	68	45	44	29	17	28	46	63	38	40
Total	1,938	1,669	1,339	1,265	1,026	1,666	1,916	2,041	1,885	
Unallocated	3	3	1	-96 <sup>2</sup>	32	-520 <sup>2</sup>	79	767 <sup>3</sup>	103	0
Total figures used by Working Group for stock assessment	1,941	1,667	1,338	1,169	1,058	1,146	1,995	2,808	1,988	1,838

<sup>1</sup> Preliminary.

<sup>2</sup> Over-reporting.

<sup>3</sup> Excess catches.

Table 3.7.5 Nominal catches of COD in Divisions VIIIf and VIIg as used by WG in 1989.

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Belgium	172	285	172	244	229	451	372	216	542	888
France	5,036	7,473	5,984	4,602	4,900	5,237	7,050	6,998	10,535	12,638
Ireland	246	108	142	274	204	198	226	380	612	1,003
UK (England & Wales)	199	299	302	188	287	307	302	355	351	379
Others	7	-	-	-	-	-	-	-	-	-
Total	5,660	8,165	6,600	5,308	5,620	6,193	7,950	7,949	12,040	14,908

<sup>1</sup>Provisional.

Table 3.7.6 Nominal catches of WHITING in Divisions VIIIf and VIIg as used by the Working Group in 1989.

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Belgium	72	102	70	120	154	164	104	109	155	293
France	7,933	7,993	7,172	8,080	6,552	6,798	6,149	8,123	9,013	10,491
Ireland	211	62	62	124	299	138	138	198	189	1,334
UK (England & Wales)	201	309	187	162	224	175	117	258	322	285
Total	8,420	8,466	7,491	8,486	7,229	7,275	6,845	8,688	9,679	12,403

<sup>1</sup>Preliminary.

Table 3.7.7 Nominal landings (t) of PLAICE in Divisions VII f,g, 1980-1989.

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Belgium	372	365	341	314	283	357	544	576	635	835
France	706	697	568	532	558	493	598	708	687	642
Ireland	61	64	198	48	72	91	59	122	164	195
UK (Engl.+ Wales)	227	251	196	279	366	466	324	495	630	472
UK (others)	7	0	0	0	0	0	21	0	0	0
Total	1,373	1,377	1,303	1,173	1,279	1,407	1,546	1,901	2,116	2,144
Total figures used by Working Group for stock assessment	1,373	1,377	1,303	1,146	1,210	1,752	1,691	1,901	2,116	2,144

<sup>1</sup> Provisional.

NB: ICES receives statistics from some countries only for Divisions VII g-k combined and not for each division separately. The figures up to 1982 and 1987 onwards are provided by members of the Working Group; from 1983-1986, they are figures submitted to the EC by member states.

Table 3.7.8 Celtic Sea SOLE. Divisions VII f and VII g. Nominal landings (tonnes), 1980-1989. Data used by the Working Group.

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Belgium	981	938	819	871	786	786	1,092	704	725	660
France	141	91	100	124	115	126	92	72	89	94
Ireland	14	8	3	48	4	13	12	9	15	32
UK (Engl.& Wales)	178	175	206	330	361	403	404	437	317	203
Total	1,314	1,212	1,128	1,373	1,266	1,328	1,550	1,222	1,146	989

<sup>1</sup> Preliminary.

Table 3.8.1.2 Nominal catch (tonnes) of sole in Sub-area IV and landings as estimated by the Working Group, 1980-1989

Country	1980	1981	1982	1983	1984
Belgium	1,378	1,363	1,927	1,740	1,771
Denmark	710 <sup>1</sup>	720	522	730	818
France	232 <sup>1</sup>	193	686	332	400
Germany, Fed.Rep.	338 <sup>1</sup>	346	290	619	1,034
Netherlands	12,695 <sup>1</sup>	12,400	17,749	16,101	14,330
UK (Engl.& Wales)	452 <sup>1</sup>	381	403	435	586
Other countries	2	-	-	+	1
Total reported	15,807	15,403	21,579	19,957	18,940
Unreported landings	-	-	-	4,982	7,666
Grand total	15,807	15,403	21,579	24,939	26,606

Country	1985 <sup>2</sup>	1986 <sup>2</sup>	1987 <sup>2</sup>	1988 <sup>2</sup>	1989 <sup>2,3</sup>
Belgium	2,390	1,833	1,644	1,199	1,596
Denmark	692	443	342	616	1,020
France	875	296	318	487	313
Germany, Fed.Rep.	303	155	210	452	888
Netherlands	14,897	9,558	10,635	9,725	9,620
UK (Engl.& Wales)	774	647	676	740	966
Other countries	3	2	4	28	65
Total reported	19,934	12,934	13,829	13,247	14,468
Unreported landings	4,310 <sup>4</sup>	5,266 <sup>4</sup>	3,538 <sup>4</sup>	8,343 <sup>4</sup>	7,236
Grand total	24,244	18,200	17,367	21,590	21,704

<sup>1</sup> Figure revised by ad hoc Flatfish Working Group 1982.

<sup>2</sup> Reported to ICES.

<sup>3</sup> Provisional.

<sup>4</sup> Working Group estimate.

**Table 3.8.2** North Sea PLAICE.  
Nominal catch (tonnes) in Sub-area IV and landings as estimated  
by the Working Group, 1980-1989.

Country	1980	1981	1982	1983	1984
Belgium	7,005 <sup>1</sup>	6,346 <sup>1</sup>	6,755 <sup>1</sup>	8,916	10,220
Denmark	27,057	22,026	24,532	19,114	33,361
France	711 <sup>1</sup>	586 <sup>1</sup>	1,046	1,185	1,143
Federal Republic of Germany	4,319 <sup>1</sup>	3,449 <sup>1</sup>	3,626	2,397	2,485
Netherlands	39,782	40,049	41,208	53,608	61,478
Norway	15	18	17	17	17
Sweden	7	3	6	22	14
UK (England & Wales)	18,687 <sup>1</sup>	17,129 <sup>1</sup>	16,385	13,248	12,988
UK (Scotland)	4,345	4,390	4,355	4,159	4,195
UK (Northern Ireland)	-	-	-	-	-
<b>Total</b>	<b>101,928</b>	<b>93,996</b>	<b>97,930</b>	<b>102,666</b>	<b>115,903</b>
Unreported landings	38,023	45,751	56,619	41,369	40,244
<b>Grand total</b>	<b>139,951</b>	<b>139,747</b>	<b>154,549</b>	<b>144,035</b>	<b>156,147</b>

Country	1985 <sup>2</sup>	1986 <sup>2</sup>	1987 <sup>2</sup>	1988 <sup>2</sup>	1989 <sup>2</sup>
Belgium	9,965	7,232	8,554	11,527	10,939
Denmark	28,236	26,332	21,597	20,258	23,481
France	1,010	751	1,580	1,799	2,037 <sup>3</sup>
Federal Republic of Germany	2,197	1,809	1,794	4,517	5,908 <sup>3</sup>
Netherlands	90,950	74,447	76,612	79,504	84,173 <sup>3</sup>
Norway	23	21	12	15	321 <sup>3</sup>
Sweden	18	16	7	2	12
UK (England & Wales)	11,335	12,428	14,890	17,613	19,735
UK (Scotland)	4,577	4,866	5,747	6,884	5,516
UK (Northern Ireland)					530
<b>Total reported</b>	<b>148,311</b>	<b>127,902</b>	<b>130,794</b>	<b>142,119</b>	<b>152,652</b>
Unreported landings	11,526 <sup>4</sup>	37,445 <sup>4</sup>	22,639 <sup>4</sup>	30,496 <sup>4</sup>	16,989 <sup>4</sup>
<b>Grand total</b>	<b>159,837<sup>3</sup></b>	<b>165,347</b>	<b>153,433</b>	<b>172,615</b>	<b>169,641</b>

<sup>1</sup> Figure revised by ad hoc Flatfish Working Group 1982.

<sup>2</sup> Reported to ICES.

<sup>3</sup> Provisional.

<sup>4</sup> Working Group estimates.

**Table 3.8.3** English Channel SOLE - Division VIIId. Nominal catch (tonnes) and landings as estimated by the Working Group, 1974-1989.

Year	Belgium	France	Netherlands	United Kingdom	Total	Unreported	Grand total
1974	159	706 <sup>1</sup>	3	309	940 <sup>2</sup>	-	940 <sup>2</sup>
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	2,545	-	513	3,625	245	3,870
1986	882	1,528	-	540	2,950	978	3,928
1987	1,100	2,086	-	659	3,841	1,021	4,867
1988	686	2,057	-	578	3,321	625	3,946
1989	651	1,610	-	636	2,947	815	3,762

<sup>1</sup> Divisions VIIId, e.

<sup>2</sup> Estimated.

**Table 3.8.4** Division VIIe SOLE.  
Nominal catches, 1972-1989 (tonnes).

Year	Belgium	France	UK (Engl. + Wales) <sup>3</sup>	Un- reported	Other	Total
1972	6	230 <sup>1</sup>	201	-	-	437
1973	2	263 <sup>1</sup>	194	-	-	459
1974	6	237 <sup>1</sup>	181	-	3	427
1975	3	271	216	-	1	491
1976	4	352	260	-	-	616
1977	3	331	272	-	-	606
1978	4	384	453	-	20	861
1979	1	515	665	-	-	1,181
1980	45	447	764	-	13	1,269
1981	16	415	784	-	-	1,215
1982	97	321	1,028	-	-	1,446
1983	50	405	1,043	-	-	1,498
1984	48	421	901	-	-	1,370
1985	59	130	910	310	-	1,409
1986	63	467	838	-	-	1,368
1987	49	432	634	44	-	1,159
1988	69	98	785	398	-	1,350
1989 <sup>2</sup>	67	112	615	364	-	1,158

<sup>1</sup> Estimated from Divisions VIIId,e total.

<sup>2</sup> Provisional data.

<sup>3</sup> Includes landings in the Channel Islands.



Table 3.8.5.1 English Channel plaice.  
Nominal catch (tonnes) in Division VIId 1976-1989, as used by the Working Group.

Year	Belgium	Denmark	France	UK <sup>2</sup> (E+W)	Unreported	Total
1976	147	1 <sup>3</sup>	1439	376	-	1963
1977	149	81 <sup>3</sup>	1714	302	-	2246
1978	161	156 <sup>3</sup>	1810	349	-	2476
1979	217	28 <sup>3</sup>	2094	278	-	2617
1980	435	-	2346	517	-	3298
1981	850	-	3430	489	-	4769
1982	819	-	3505	541	-	4865
1983	1033	-	3119	548	343	5043
1984	998	-	2844	491	679	5012
1985	1076	-	3943	855	137	6011
1986	1190	-	4337	760	476	6763
1987	1892	-	4768	1246	402	8308
1988	2226	-	5689	1231	1254	10400
1989 <sup>1</sup>	2034	-	3265	1373	1611	8283

<sup>1</sup> Provisional

<sup>2</sup> Includes landings into the Channel Islands.

<sup>3</sup> Includes Division VIIe.

**Table 3.8.5.2 English Channel plaice.**  
 Nominal catch (tonnes) in Division VIIe, 1976-1989, as used by the Working Group.

Year	Belgium	Denmark	France	UK <sup>2</sup> (E+W)	Unreported	Total
1976	5	- <sup>1</sup>	323	312	-	640
1977	3	- <sup>1</sup>	336	363	-	702
1978	3	- <sup>1</sup>	314	467	-	784
1979	2	- <sup>1</sup>	458	517	-	977
1980	22	-	440	617	-	1079
1981	- <sup>1</sup>	-	538	963	-	1501
1982	- <sup>1</sup>	-	363	1114	211	1688
1983	- <sup>1</sup>	-	289	1206	-	1495
1984	- <sup>1</sup>	-	278	1152	117	1547
1985	- <sup>1</sup>	-	197	1119	125	1441
1986	27	-	276	1384	123	1810
1987	70	-	435	1416	37	1958
1988	92	-	583	1654	129	2458
1989 <sup>3</sup>	89	-	448	1713	107	2357

<sup>1</sup>Included in Division VIId.

<sup>2</sup>Includes landings in the Channel Islands.

<sup>3</sup>Provisional.

**Table 3.8.6** Bay of Biscay SOLE. Nominal catch (tonnes) and catches as estimated by the Working Group in Divisions VIIIA,b.

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Belgium	33	4	19	9	-	25	52	124	135	311
Denmark	-	-	-	-	-	-	-	-	-	-
France	2,549	2,581	1,618	2,590	2,968	3,425	4,228	4,010	4,309 <sup>2</sup>	5,471 <sup>1</sup>
Netherlands	-	13	52	32	175	169	213	145	-	-
Portugal	-	-	-	-	-	-	-	3	7	8
Spain	107	96	57	38	40	308	75	101	+	NA
UK (Engl.& Wales)	-	+	+	-	-	-	-	-	-	-
<b>Total</b>	<b>2,689</b>	<b>2,694</b>	<b>1,746</b>	<b>2,669</b>	<b>3,183</b>	<b>3,927</b>	<b>4,568</b>	<b>4,383</b>	<b>4,451</b>	<b>5,790</b>
Unreported catches	297	242	2,067	959	855	324	237	703	931	-
<b>Total</b>	<b>2,986</b>	<b>2,936</b>	<b>3,813</b>	<b>3,628</b>	<b>4,038</b>	<b>4,251</b>	<b>4,805</b>	<b>5,086</b>	<b>5,382</b>	<b>5,790<sup>1</sup></b>

<sup>1</sup> Provisional.

NA: Not available.

Table 4.1.1 Revised estimates of landings ('000 t) for the Northern HAKE stocks (ICES Division, IVa, Sub-areas VI and VII, and Divisions VIIa,b) by country and area as determined by the Hake Working Group, 1961-1989.

Year	Total	France			Spain <sup>1</sup>			UK			Others				
		IVa+VI		VII	VIIIa,b		Total	IVa+VI		VII	Total		IVa+VI		VII
		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	65.7	25.9	6.3	4.7	15.0	32.5	0.4	19.3	12.8	5.5	1.7	3.8	1.9	0.5	1.4
1986	59.9	22.5	2.6	4.4	15.5	27.6	0.3	16.6	10.7	6.6	1.9	4.7	3.2	0.6	2.6
1987	63.4	18.5	1.8	4.7	12.0	32.2	0.3	19.2	12.7	9.7	3.0	6.7	3.0	0.7	2.3
1988 <sup>2</sup>	64.8	21.6	1.8	4.5	15.3	32.9	1.7	19.9	11.3	8.3	3.1	5.2	1.9	0.6	1.3
1989 <sup>2</sup>	66.5	22.9	1.0	3.7	18.2	33.9	1.3	16.6	16.0	6.6	2.0	4.6	3.0	1.0	2.0

<sup>1</sup> Data for 1961-1972 not revised; revised figures for Sub-area VIII for 1973-1978 include data for Divisions VIIa,b only.

<sup>2</sup> Data for 1979-1981 are revised based on French surveillance data and supplemental catch information (see text). Preliminary.

Table 4.1.2.2 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, 1972-1989.

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 <sup>1</sup>	1.0 <sup>1</sup>	2.2 <sup>1</sup>	5.8	8.3	14.1	5.1	3.5	8.6	0.1	22.8
1975	3.5 <sup>1</sup>	1.3 <sup>1</sup>	3.0 <sup>1</sup>	7.8	11.2	19.0	6.1	4.3	10.4	0.1	29.5
1976	3.1 <sup>1</sup>	1.2 <sup>1</sup>	2.6 <sup>1</sup>	6.9	10.0	16.9	6.0	3.1	9.1	0.1	26.1
1977	1.5 <sup>1</sup>	0.6 <sup>1</sup>	1.3 <sup>1</sup>	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	0.0	16.2
1987	2.0	0.5	4.4	6.9	3.5	10.4	3.5	1.3	4.8	0.0	15.2
1988	2.0	0.7	3.0	5.7	3.7	9.4	4.3	1.6	5.9	0.0	15.3
1989	1.9	0.6	1.9	4.4	3.9	8.3	2.7	1.5	4.2	0.0	12.5

<sup>1</sup> Estimated.

**Table 4.2.1** MEGRIM in Sub-area VI. Nominal landings (tonnes)  
as officially reported to ICES, 1980-1989.

A. Division VIa					
Country	1980	1981	1982	1983	1984
Belgium	1	-	1	-	-
France	1,781	1,373	1,337	1,530	1,398
Germany, Fed. Rep.	-	-	-	-	1
Ireland	58	73	112	113	134
Spain	-	-	510	601	310
UK (England & Wales)	94	78	28	9	14
UK (N. Ireland)	-	-	-	+	-
UK (Scotland)	485	694	436	424	862
Total	2,419	2,218	2,424	2,677	2,719
	1985	1986	1987	1988	1989*
Belgium	-	-	1	1	1
France	1,411	777	997	1,295	457 <sup>1</sup>
Germany, Fed. Rep.	+	-	-	2	n/a
Ireland	151	243	403	n/a	n/a
Spain	422	137	102	n/a	n/a
UK (England & Wales)	84	55	369	284	109
UK (N. Ireland)	-	+	11	70	1
UK (Scotland)	919	660	991	1,068	1,072
Total	2,987	1,872	2,874		
B. Division VIb					
Country	1980	1981	1982	1983	1984
France	1	-	9	2	9
Spain	433	491	816	784	640
UK (England & Wales)	+	+	-	6	6
UK (N. Ireland)	-	-	-	-	-
UK (Scotland)	1	+	-	-	10
Total	435	491	825	792	665
	1985	1986	1987	1988	1989*
France	6	11	2	1	...
Spain	646	730	583	n/a	n/a
UK (England & Wales)	32	88	261	77	16
UK (N. Ireland)	-	-	-	-	1
UK (Scotland)	82	79	174	185	162
Total	766	908	1,020		
C. Total for Sub-area VI					
	1980	1981	1982	1983	1984
Total	2,854	2,709	3,249	3,469	3,884
	1985	1986	1987	1988	1989
Total	3,753	2,780	3,894		

\*Preliminary. <sup>1</sup> Includes Divisions Vb and VIb.

<sup>2</sup> Included in Division VIa. n/a = Not available.

**Table 4.2.2** MEGRIM in Division VIIa.  
Nominal landings (tonnes) as officially  
reported to ICES, 1980-1989.

Country	1980	1981	1982	1983	1984
Belgium	2	10	8	39	11
France	20	18	20	11	20
Ireland	189	100	111	214	188
UK (England & Wales)	3	3	2	2	2
UK (Isle of Man)	-	+	-	-	-
UK (N. Ireland)	5	6	5	20	9
UK (Scotland)	+	-	+	-	1
<b>Total</b>	<b>219</b>	<b>137</b>	<b>146</b>	<b>286</b>	<b>231</b>

Country	1985	1986	1987	1988	1989 <sup>*</sup>
Belgium	28	22	25	11	13 <sup>1</sup>
France	33	40	32	39	...
Ireland	236	255	167	n/a	n/a
UK (England & Wales)	2	3	20	53	25
UK (Isle of Man)	-	-	-	n/a	n/a
UK (N. Ireland)	24	14	42	27	2
UK (Scotland)	1	1	3	3	88
<b>Total</b>	<b>324</b>	<b>335</b>	<b>289</b>		

\* Preliminary.

<sup>1</sup> Included in Divisions VIIg-k.

n/a = Not available.

**Table 4.2.3** MEGRIM in Divisions VIIb-k. Nominal landings  
(t) as officially reported to ICES, 1980-1989.

**A. Divisions VIIb,c**

Country	1980	1981	1982	1983	1984
France	346	357	155	116	177
Germany, Fed. Rep.	-	-	-	-	-
Ireland	15	607	277	44	42
Spain	654	651	762	804	954
UK (England & Wales)	+	25	35	-	2
UK (N. Ireland)	-	-	-	-	-
UK (Scotland)	+	-	-	-	+
<b>Total</b>	<b>1,015</b>	<b>1,640</b>	<b>1,229</b>	<b>964</b>	<b>1,175</b>

Country	1985	1986	1987	1988	1989*
France	155	119	132	111	1
Germany, Fed. Rep.	-	-	-	+	n/a
Ireland	123	86	321	n/a	n/a
Spain	846	910	917	n/a	n/a
UK (England & Wales)	173	163	199	183	24
UK (N. Ireland)	-	-	+	2	-
UK (Scotland)	+	1	+	6	35
<b>Total</b>	<b>1,297</b>	<b>1,279</b>	<b>1,569</b>		

**B. Division VIId**

Country	1980	1981	1982	1983	1984
Belgium	1	3	-	-	2
France	+	1	-	+	1
UK (England & Wales)	-	-	+	+	2
<b>Total</b>	<b>1</b>	<b>4</b>	<b>+</b>	<b>+</b>	<b>5</b>

Country	1985	1986	1987	1988	1989*
Belgium	1	2	1	1	8 <sub>1</sub>
France	-	1	1	-	1
UK (England & Wales)	1	1	2	2	11
<b>Total</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>19</b>

**C. Division VIIe**

Country	1980	1981	1982	1983	1984
Belgium	8	9	18	3	4
France	322	494	654	289	266
UK (England & Wales)	165	232	212	341	266
<b>Total</b>	<b>495</b>	<b>735</b>	<b>884</b>	<b>633</b>	<b>536</b>

Country	1985	1986	1987	1988	1989*
Belgium	4	2	8	7	12 <sub>1</sub>
France	302	195	242	303	285
UK (England & Wales)	322	205	262	371	285
<b>Total</b>	<b>628</b>	<b>402</b>	<b>512</b>	<b>681</b>	<b>297</b>

(cont'd)



Table 4.2.3 (cont'd)

## D. Division VIIIf

Country	1980	1981	1982	1983	1984
Belgium	47	46	48	59	46
France	175	201	143	144	101
UK (England & Wales)	43	48	41	70	43
Total	265	295	232	273	190

Country	1985	1986	1987	1988	1989*
Belgium	76	85	76	92	108 <sup>1</sup>
France	79	120	85	104	...
UK (England & Wales)	86	66	156	83	106
Total	241	271	317	279	214

## E. Divisions VIIg-k

Country	1980	1981	1982	1983	1984
Belgium	165	181	143	85	136
France	3,749	4,156	3,510	3,556	3,047
Ireland	1,409	1,025	1,348	1,790	1,581
Netherlands	-	-	-	-	-
Spain	2,475	1,496	1,696	1,798	980
UK (England & Wales)	349	1,103	1,304	316	980
UK (N. Ireland)	-	-	-	-	-
UK (Scotland)	-	3	-	-	-
Total	8,147	7,964	8,001	7,545	6,724

Country	1985	1986	1987	1988	1989*
Belgium	133	90	42	71	148 <sup>2</sup>
France	3,986	3,424	3,154	3,498	4,705 <sup>2</sup>
Ireland	1,395	1,659	1,512	n/a	n/a
Netherlands	-	-	2	n/a	n/a
Spain	1,438	1,337	1,570	n/a	n/a
UK (England & Wales)	1,669	1,636	1,003	1,329	1,032
UK (N. Ireland)	-	-	-	2	-
UK (Scotland)	-	-	-	5	-
Total	8,621	8,146	7,283		

## F. Total for Divisions VIIb-k

	1980	1981	1982	1983	1984
Total	9,923	10,638	10,346	9,415	8,630

	1985	1986	1987	1988	1989
Total	10,789	10,102	9,685		

\* Preliminary.

<sup>1</sup> Included in Divisions VIIg-k.<sup>2</sup> Includes Divisions VIIa-f. n/a = Not available.

**Table 4.2.4** MEGRIM in Sub-area VIII. Nominal landings (t)  
as officially reported to ICES, 1980-1989.

Country	1980	1981	1982	1983	1984
Belgium	1	3	-	-	-
France	829	573	610	914	868
Portugal	-	-	-	-	-
Spain	9,207	9,291	7,624	6,428	7,570
UK (England & Wales)	-	14	+	-	2
Total	10,037	9,881	8,234	7,342	8,440

Country	1985	1986	1987	1988	1989 <sup>*</sup>
Belgium	1	1	+	3	32 <sup>†</sup>
France	1,049	1,036	1,295	1,178	1,108 <sup>†</sup>
Portugal	-	-	1	2	n/a
Spain	6,464	6,075	6,505	n/a	n/a
UK (England & Wales)	10	-	1	-	-
Total	7,524	7,112	7,802		

\* Preliminary.

<sup>†</sup> Excluding Division VIIIC.

n/a = Not available.

**Table 4.2.5** MEGRIM in Sub-area IX. Nominal landings (t)  
officially reported to ICES, 1980-1989.

Country	1980	1981	1982	1983	1984
Portugal	-	-	-	-	-
Spain	8,135	8,184	8,107	7,187	5,958
Total	8,135	8,184	8,107	7,187	5,958

Country	1985	1986	1987	1988	1989*
Portugal	-	361	386	306	412
Spain	5,183	4,605	5,283	n/a	n/a
Total	5,183	4,966	5,669		

\* Preliminary.

n/a = Not available.

**Table 4.3.1** Anglerfish in Sub-area VI.  
Nominal landings (tonnes) as officially reported to ICES,  
1980-1989.

**A. Division VIa**

Country	1980	1981	1982	1983	1984
Belgium	-	-	-	-	-
Denmark	-	-	+	-	-
Faroe Islands	3	-	-	-	-
France	1,236	13	1,421	1,543	1,723
Germany, Fed. Rep.	9	2	5	+	4
Ireland	22	62	113	110	172
Netherlands	1	-	-	-	-
Norway	6	4	6	9	6
Spain	-	-	358	405	355
UK (England & Wales)	97	93	74	36	56
UK (N. Ireland)	-	-	-	2	2
UK (Scotland)	1,260	1,213	1,177	1,312	1,617
<b>Total</b>	<b>2,634</b>	<b>1,387</b>	<b>3,154</b>	<b>3,417</b>	<b>3,935</b>

Country	1985	1986	1987	1988	1989 <sup>*</sup>
Belgium	4	2	15	2	8
Denmark	-	-	4	+	34
Faroe Islands	-	-	-	n/a	n/a
France	2,036	1,505	1,601	2,329	1,901 <sup>1</sup>
Germany, Fed. Rep.	24	3	4	9	n/a
Ireland	119	295	187	n/a	n/a
Netherlands	-	-	-	n/a	n/a
Norway	5	6	3	8	19
Spain	281	142	130		n/a
UK (England & Wales)	52	36	241	403	128
UK (N. Ireland)	-	2	2	30	7
UK (Scotland)	1,522	1,099	1,768	2,629	2,340
<b>Total</b>	<b>4,043</b>	<b>3,090</b>	<b>3,955</b>		

(cont'd)

Table 4.3.1 (cont'd)

B. Division VIb					
Country	1980	1981	1982	1983	1984
Faroe Islands	3	1	3	-	5
France	9	7	24	24	35
Germany, Fed. Rep.	-	1	1	-	-
Norway	4	2	1	8	14
Spain	176	315	423	377	598
UK (England & Wales)	+	2	-	22	20
UK (N. Ireland)	-	-	-	-	-
UK (Scotland)	8	3	2	2	35
Total	200	331	454	433	707

Country	1985	1986	1987	1988	1989 <sup>*</sup>
Faroe Islands	4	-	-	n/a	n/a <sub>2</sub>
France	13	19	4	4	...
Germany, Fed. Rep.	-	-	-	-	n/a
Norway	7	9	11	7	13
Spain	642	990	730	n/a	n/a
UK (England & Wales)	85	112	253	123	15
UK (N. Ireland)	-	-	-	-	2
UK (Scotland)	262	196	296	250	156
Total	1,013	1,326	1,294		

C. Total for Sub-area VI					
	1980	1981	1982	1983	1984
Total	2,834	1,717	3,608	3,851	4,642
	1985	1986	1987	1988	1989
Total	5,056	4,416	5,249		

\* Preliminary.

<sup>1</sup> Includes Divisions Vb and VIb.

<sup>2</sup> Included in Division VIa.

n/a = Not available.

**Table 4.3.2 Anglerfish in Division VIIa.**  
 Nominal landings (tonnes) as officially reported to ICES,  
 1980-1989.

Country	1980	1981	1982	1983	1984
Belgium	71	102	197	379	153
France	91	142	99	66	135
Ireland	143	223	291	668	837
Netherlands	9	6	8	2	69
UK (England & Wales)	90	131	168	128	125
UK (Isle of Man)	21	24	35	27	50
UK (N. Ireland)	227	288	409	368	373
UK (Scotland)	25	17	31	15	30
<b>Total</b>	<b>677</b>	<b>933</b>	<b>1,238</b>	<b>1,653</b>	<b>1,772</b>

Country	1985	1986	1987	1988	1989 <sup>*</sup>
Belgium	149	140	111	52	130 <sub>1</sub>
France	167	200	134	134	...
Ireland	791	579	522	n/a	n/a
Netherlands	-	-	-	n/a	n/a
UK (England & Wales)	109	80	104	209	267
UK (Isle of Man)	21	16	22	9	n/a
UK (N. Ireland)	265	264	244	356	603
UK (Scotland)	34	36	45	42	308
<b>Total</b>	<b>1,536</b>	<b>1,315</b>	<b>1,182</b>		

<sup>\*</sup> Preliminary.

<sup>1</sup> Included in Divisions VIIg-k.

n/a = Not available.

**Table 4.3.3** Anglerfish in Divisions VIIb-k.  
Nominal landings (tonnes) as officially reported to ICES,  
1980-1989.

A. Divisions VIIb,c					
Country	1980	1981	1982	1983	1984
France	363	467	207	217	283
Ireland	4	266	160	46	65
Norway	-	-	-	1	-
Spain	554	708	906	905	1,200
UK (England & Wales)	+	41	29	-	3
UK (N. Ireland)	-	-	-	-	-
UK (Scotland)	+	-	-	-	1
Total	921	1,482	1,302	1,169	1,552

Country	1985	1986	1987	1988	1989 <sup>*</sup>
France	244	215	264	308	...
Ireland	77	70	231	n/a	n/a
Norway	1	5	-	-	1
Spain	1,282	588	568	n/a	n/
UK (England & Wales)	238	357	256	331	46
UK (N. Ireland)	-	-	+	1	-
UK (Scotland)	1	3	3	13	96
Total	1,843	1,238	1,322		

B. Division VIIId					
Country	1980	1981	1982	1983	1984
Belgium	127	122	131	170	288
France	130	146	123	107	92
UK (England & Wales)	15	17	-	40	97
Total	272	285	254	317	477

Country	1985	1986	1987	1988	1989 <sup>*</sup>
Belgium	136	125	113	102	119
France	77	79	115	63	...
UK (England & Wales)	73	60	62	49	119
Total	286	264	290	214	

(cont'd)

Table 4.3.3 (cont'd)

C. Division VIIe					
Country	1980	1981	1982	1983	1984
Belgium	60	37	210	114	252
France	3,191	3,366	3,927	3,361	3,148
Ireland	9	-	-	-	-
Netherlands	-	+	-	1	-
UK (England & Wales)	931	863	881	3,502	3,368
Total	4,191	4,266	5,018	6,978	6,768

Country	1985	1986	1987	1988	1989 <sup>*</sup>
Belgium	172	83	61	133	190 <sup>1</sup>
France	2,443	1,754	2,152	1,879	...
Ireland	-	-	-	n/a	n/a
Netherlands	-	-	-	n/a	n/a
UK (England & Wales)	2,120	1,203	1,250	1,785	2,095
Total	4,735	3,040	3,463		

D. Division VIIf					
Country	1980	1981	1982	1983	1984
Belgium	181	186	376	554	343
Denmark	-	-	-	-	-
France	397	487	377	408	248
UK (England & Wales)	118	119	172	389	386
Total	696	792	925	1,351	977

Country	1985	1986	1987	1988	1989 <sup>*</sup>
Belgium	429	319	187	130	270
Denmark	-	-	-	1	1 <sup>1</sup>
France	216	218	189	183	...
UK (England & Wales)	307	410	732	461	454
Total	952	1,010	1,108	775	725



Table 4.3.3 (cont'd)

E. Divisions VIIg-k					
Country	1980	1981	1982	1983	1984
Belgium	198	378	553	649	678
Denmark	-	-	-	-	-
France	9,342	10,657	8,958	9,619	8,896
Ireland	649	459	650	1,006	1,168
Netherlands	-	-	-	-	-
Norway	-	-	-	+	-
Spain	1,396	1,446	1,347	1,420	1,316
UK (England & Wales)	235	682	675	416	1,537
UK (Scotland)	-	8	-	-	-
Total	11,820	13,630	12,183	13,110	13,595

Country	1985	1986	1987	1988	1989*
Belgium	535	284	101	86	345
Denmark	-	-	8	15	8
France	10,649	8,288	6,275	6,791	11,445 <sup>2</sup>
Ireland	974	1,005	700	n/a	n/a
Netherlands	-	-	8	n/a	n/a
Norway	-	+	-	-	2
Spain	1,148	487	849	n/a	n/a
UK (England & Wales)	2,126	2,157	1,655	2,038	1,596
UK (Scotland)	-	-	-	-	-
Total	15,432	12,221	9,596		

F. Total for Divisions VIIb-k					
	1980	1981	1982	1983	1984
Total	17,900	20,455	19,682	22,925	23,369
	1985	1986	1987	1988	1989
Total	23,248	17,773	15,779		

\*Preliminary.

<sup>1</sup>Included in Divisions VIIg-k.<sup>2</sup>Includes Division VIIa.

n/a = Not available.

**Table 4.3.4 Anglerfish in Sub-area VIII.**  
 Nominal landings (tonnes) as officially reported to ICES,  
 1980-1989.

Country	1980	1981	1982	1983	1984
Belgium	10	5	8	-	-
Denmark	-	-	-	-	-
France	7,783	6,407	5,657	7,144	7,584
Netherlands	-	7	21	30	-
Portugal	-	-	-	-	-
Spain	12,415	6,588	12,358	11,307	8,505
UK (England & Wales)	-	11	+	-	3
<b>Total</b>	<b>20,208</b>	<b>13,018</b>	<b>18,044</b>	<b>18,481</b>	<b>16,092</b>

Country	1985	1986	1987	1988	1989 <sup>*</sup>
Belgium	-	10	20	12	125
Denmark	-	-	1	-	-
France	6,626	5,564	7,063	6,274	5,439 <sup>1</sup>
Netherlands	-	-	-	n/a	n/a
Portugal	-	-	1	2	n/a
Spain	8,984	6,813	6,989	n/a	n/a
UK (England & Wales)	13	-	1	2	2
<b>Total</b>	<b>15,623</b>	<b>12,387</b>	<b>14,075</b>		

<sup>\*</sup> Preliminary.

<sup>1</sup> Excluding Divisions VIIIC,e.

n/a = Not available.

**Table 4.3.5** Anglerfish in Sub-area IX.  
Nominal landings (tonnes) as officially reported to  
ICES, 1980-1989.

Country	1980	1981	1982	1983	1984
Portugal	660	716	614	944	1,336
Spain	4,422	1,927	3,428	2,778	3,846
<b>Total</b>	<b>5,082</b>	<b>2,643</b>	<b>4,042</b>	<b>3,722</b>	<b>5,182</b>

Country	1985	1986	1987	1988	1989*
Portugal	1,814	2,002	2,093	1,920	1,675
Spain	3,626	4,804	3,988	n/a	n/a
<b>Total</b>	<b>5,440</b>	<b>6,806</b>	<b>6,081</b>		

\* Preliminary.

n/a = Not available.

Fishery unit	Country	Number of boats	KW	GRT	Target species	By-catch
<b>"Western Approaches"</b>						
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	41	560	202	hake	Monk, ling
	UK (1)	30	537	201	hake, link, cod	whiting
2. "Long line in shallow water"	FRANCE	11	184	42	pollack, ling dogfish	skate
	UK	12	118	24	gadoids, skates spurdog	
3. Gill net	FRANCE	30	190	33	hake	pollack
	UK	110	107	19	hake, monk, cod pollack	spurdog
4. Non-Nephrops trawling in medium to deep water	FRANCE	121	442	96	monk, megrim	hake, skates gadoids
	IRELAND	13	760	240	hake, megrim monk	cod, witch
	SPAIN	127	596	208	hake, megrim,	cod, Nephrops
	UK (1)	30	831	202	hake, monk	megrim
5. Non-Nephrops trawling in shallow water	FRANCE	98	468	128	gadoids	monk, skates dogfish
	IRELAND	< 130	230	65 (50-175)	gadoids	megrim, monk, rays plaice, sole
	UK	221	143	33	monk, gadoids	skates, flatfish
6. Beam trawling in shallow water (B/T)	BELGIUM	15	740	-	sole	plaice, rays
	UK	91	431	56	monk, sole	megrim
7. Nephrops trawling in deep water	FRANCE				Nephrops	
	SPAIN	8	422	296	Nephrops	Hake, monk, megrim,
	FRANCE	60	324	52	Nephrops	hake, gadoids, monk, megrim
	IRELAND	< 25	330	≈ 70	Nephrops	whiting, hake, monk, megrim
8. Nephrops trawling in medium depth		< 17	400	≈ 110	Nephrops	unknown
		< 20	330	≈ 60	Nephrops	hake, monk, whiting, megrim
					Nephrops	
<b>"Bay of Biscay"</b>						
9. Nephrops trawling in shallow to medium depth	FRANCE	330	208	26	Nephrops	hake, monk
10. Trawling in shallow to medium depth	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 in deep and medium depth (DL)	SPAIN	81	380	134	hake	scad
13. Gill nets in medium to shallow depth (NS)	FRANCE	55	250	50	hake	pollack
14. Trawling in deep to medium depth (DS)	FRANCE	67	308	51	monk	skates, hake, megrim
	SPAIN	76	615	212	hake	scad, bib, monk, cephalopods

**Table 4.4.1** Summary of the characteristics of each of the demersal fishery units.  
(1) These vessels fishes only in the 1st quarter of 1989.

Table 4.4.2.a Reference landings in weight ('000 t) by species and fisheries unit.

SPECIES UNIT	Hake	Nephrops Celtic	Nephrops Biscay	Monk pisc.	Monk bude.	Megrim	Cod Celtic	Whiting Celtic	Sole Biscay	Sole Celtic	TOTAL
1 LINE DEEP7	13.68	0	0	0	0	0	0	0	0	0	13.68
2 LINE SHAL7	.04	0	0	0	0	0	0	0	0	0	.04
3 GILL SHAL7	1.24	0	0	0	0	0	.4	0	0	0	1.65
4 NONEP DEEP	1.86	1.2	0	11.12	6.37	14.08	1.5	0	0	0	36.12
5 NONEP SHAL	4.12	0	0	1.49	.57	2.59	8.58	11.9	0	.53	29.78
6 BEAM SHAL7	.09	0	0	1.79	1.1	1.02	.37	.29	0	2.11	6.77
7 NEPH DEEP7	.29	.49	0	.26	.04	0	0	0	0	0	1.09
8 NEPH MED7	.59	3.33	0	1.48	.78	1.01	1.49	1.08	0	0	9.75
9 TRAWL MED8	2.87	0	5.67	1.37	.77	.56	0	0	0	0	11.25
10 TRAWL SHA8	7.51	0	0	.6	.16	0	0	0	2.52	0	10.8
11 BEAM SHAL8	0	0	0	0	0	0	0	0	.33	0	.33
12 LINE DEEP8	7.26	0	0	0	0	0	0	.13	0	0	7.38
13 GILL MED8	4.16	0	0	0	0	0	0	0	0	0	4.16
14 TRAWL DEEP	7.67	0	0	2.12	1.54	1.26	.02	.19	0	0	12.81
15 MISCELL	2.61	0	0	0	0	0	.04	.31	3.02	0	5.97
16 OUTSIDERS	7.64	0	0	0	0	0	0	0	0	0	7.64
TOTAL	61.63	5.03	5.67	20.24	11.33	20.52	12.4	13.89	5.86	2.64	159.2

Table 4.4.2.b Reference landings in value (M ECU) by species and fisheries unit.

SPECIES UNIT	Hake	Nephrops Celtic	Nephrops Biscay	Monk pisc.	Monk bude.	Megrim	Cod Celtic	Whiting Celtic	Sole Biscay	Sole Celtic	TOTAL
1 LINE DEEP7	181.34	0	0	0	0	0	0	0	0	0	181.34
2 LINE SHAL7	.16	0	0	0	0	0	0	0	0	0	.16
3 GILL SHAL7	4.91	0	0	0	0	0	.69	0	0	0	5.6
4 NONEP DEEP	5.91	17.88	0	35.45	18.26	55.35	2.43	0	0	0	135.28
5 NONEP SHAL	18.35	0	0	3.32	1.33	6.24	12.19	18.54	0	4.58	64.55
6 BEAM SHAL7	.22	0	0	3.81	1.92	2.94	.63	.26	0	17.82	27.6
7 NEPH DEEP7	.99	7.41	0	.84	.09	0	0	0	0	0	9.32
8 NEPH MED7	2.27	21.54	0	5.25	2.78	3.12	2.39	1.78	0	0	39.14
9 TRAWL MED8	8.45	0	30.56	4.6	2.43	1.71	0	0	0	0	47.74
10 TRAWL SHA8	26.12	0	0	1.96	.51	0	0	0	19.62	0	48.21
11 BEAM SHAL8	0	0	0	0	0	0	0	0	2.67	0	2.66
12 LINE DEEP8	33.73	0	0	0	0	0	0	.13	0	0	33.86
13 GILL MED8	20.49	0	0	0	0	0	0	0	0	0	20.49
14 TRAWL DEEP	43.14	0	0	8.22	6.36	4.34	.04	.33	0	0	62.44
15 MISCELL	7.64	0	0	0	0	0	.07	.5	23.26	0	31.46
16 OUTSIDERS	31.76	0	0	0	0	0	0	0	0	0	31.76
TOTAL	385.47	46.83	30.56	63.45	33.69	73.71	18.45	21.54	45.53	22.39	741.62

EFFORT FACTOR	0,0	0,1	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1,0	1,1	1,2	1,3	1,4	1,5	1,6	1,7	1,8	1,9
HAKE	0,00	27,38	44,42	54,80	60,81	63,94	65,14	65,06	64,13	62,65	60,82	58,79	56,64	54,45	52,26	50,10	48,01	45,97	44,02	42,15
NEPH CEL	0,00	1,10	1,97	2,67	3,22	3,68	4,03	4,33	4,56	4,76	4,90	5,02	5,11	5,18	5,23	5,27	5,29	5,29	5,30	5,29
NEPH BIS	0,00	2,86	4,35	5,11	5,47	5,59	5,57	5,48	5,34	5,17	4,98	4,81	4,62	4,44	4,26	4,09	3,93	3,76	3,62	3,48
MONK PISC	0,00	12,19	17,99	20,64	21,68	21,85	21,56	21,02	20,36	19,64	18,91	18,19	17,50	16,83	16,19	15,59	15,02	14,48	13,98	13,50
MONK BUDE	0,00	3,61	5,99	7,55	8,55	9,18	9,55	9,74	9,80	9,77	9,68	9,55	9,40	9,22	9,03	8,84	8,65	8,45	8,26	8,07
MEGRIM	0,00	6,67	10,95	13,76	15,61	16,83	17,61	18,11	18,40	18,53	18,57	18,54	18,46	18,33	18,19	18,02	17,85	17,67	17,48	17,30
COD CELT	0,00	12,95	17,84	19,39	19,46	18,88	18,03	17,10	16,17	15,28	14,46	13,71	13,03	12,41	11,84	11,33	10,87	10,45	10,07	9,72
WHI CELT	0,00	10,36	14,26	15,61	15,89	15,72	15,37	14,95	14,53	14,13	13,76	13,41	13,10	12,82	12,56	12,32	12,10	11,90	11,72	11,55
SOLE BIS	0,00	2,35	3,76	4,62	5,14	5,42	5,56	5,59	5,56	5,47	5,36	5,32	5,07	4,91	4,76	4,60	4,44	4,28	4,13	3,98
SOLE CEL	0,00	1,09	1,68	2,01	2,20	2,33	2,39	2,43	2,45	2,46	2,45	2,44	2,42	2,41	2,39	2,37	2,35	2,33	2,31	2,29
ALL SPP	0,00	80,56	123,21	146,16	158,03	163,42	164,81	163,81	161,30	157,86	153,89	149,68	145,35	141,00	136,76	132,53	128,51	124,58	120,89	117,33

Table 4.4.3 Long-term equilibrium yield in '000 tonnes.

EFFORT FACTOR	0,0	0,1	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1,0	1,1	1,2	1,3	1,4	1,5	1,6	1,7	1,8	1,9
HAKE	0,00	192,12	286,10	341,83	367,60	374,70	370,40	359,20	344,20	327,20	309,34	291,50	274,11	257,45	241,67	226,90	213,00	200,10	188,20	177,10
NEPH CEL	0,00	10,57	18,78	24,83	30,17	34,07	37,11	39,46	41,25	42,60	43,60	44,31	44,78	45,07	45,19	45,19	45,08	44,88	44,62	44,29
NEPH BIS	0,00	18,36	27,08	30,89	32,08	31,87	30,91	29,58	28,08	26,54	25,02	23,56	22,18	20,89	19,69	18,56	17,52	16,56	15,67	14,85
MONK PISC	0,00	38,21	56,14	64,16	67,09	67,33	66,16	64,25	61,99	59,60	57,19	54,83	52,57	50,42	48,38	46,46	44,66	42,96	41,36	39,86
MONK BUDE	0,00	11,75	19,42	24,39	27,54	29,46	30,52	31,00	31,06	30,85	30,45	29,92	29,31	28,64	27,95	27,25	26,55	25,86	25,18	24,52
MEGRIM	0,00	22,11	36,11	45,08	50,81	54,45	56,68	57,98	58,64	58,86	58,78	58,52	58,12	57,64	57,10	56,54	55,97	55,40	54,83	54,28
COD CELT	0,00	20,20	27,60	29,73	29,56	28,40	26,85	25,20	23,58	22,06	20,66	19,39	18,24	17,20	16,27	15,43	14,67	13,98	13,36	12,80
WHI CELT	0,00	15,53	20,99	22,56	22,53	21,84	20,91	19,92	18,96	18,05	17,21	16,44	15,73	15,09	14,50	13,96	13,46	13,00	12,58	12,19
SOLE BIS	0,00	15,50	24,70	30,16	33,30	34,95	35,61	35,61	35,19	34,47	33,57	32,55	31,45	30,34	29,20	28,08	26,97	25,90	24,85	23,84
SOLE CEL	0,00	9,66	14,73	17,53	19,10	19,95	20,37	20,51	20,49	20,34	20,13	19,87	19,60	19,30	18,99	18,68	18,38	18,09	17,80	17,52
ALL SPP	0,00	344,01	531,65	631,16	679,70	697,00	695,50	682,70	663,40	640,50	615,95	590,90	566,09	542,04	518,94	497,00	476,30	456,80	438,40	421,20

Table 4.4.4 Long-term equilibrium value in million ECU.

Table 4.5.1 Landings (tonnes) of HORSE MACKEREL by Sub-area. (Data as estimated by the Working Group)

Sub-area	1978	1979	1980	1981	1982	1983
II	50	2	-	-	-	412
IV	4,920	1,412	2,151	7,245	2,788	4,420
VI	408	7,791	8,724	11,134	5,036	24,881
VII	26,060	43,525	45,697	34,749	33,478	40,526
VIII	84,823	47,155	37,495	40,073	22,683	28,223
IX	45,371	37,619	36,903	35,873	39,726	48,733
Total	161,632	137,504	130,970	129,074	103,711	147,195
Sub-area	1984	1985	1986	1987	1988	1989 <sup>1</sup>
II	23	79	214	3,331	6,818	4,809
IV	25,987	24,238	20,746	20,895	62,892	112,047
VI	31,716	32,995	20,455	35,157	45,842	33,054
VII	42,952	39,034	77,628	100,734	90,253	137,712
VIII	25,629	27,740	36,061	37,703	34,177	45,918
IX	23,178	20,237	31,159	34,243	37,888	38,259
Total	149,485	144,323	186,263	232,063	277,870	371,799

<sup>1</sup> Preliminary.

Table 4.5.2 Landings (tonnes) of HORSE MACKEREL in Sub-area II by country (Data as estimated by the Working Group).

Country	1978	1979	1980	1981	1982	1983
Denmark	-	-	-	-	-	-
France	-	+	-	-	-	-
Germany, Fed. Rep.	2	2	-	+	-	-
Norway	48	-	-	-	-	412
USSR	-	-	-	-	-	-
Total	50	2	-	+	-	412
Country	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Denmark	-	-	- <sup>2</sup>	39 <sup>2</sup>	- <sup>2</sup>	-
France	1	1	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	-
Germany, Fed. Rep.	-	-	-	-	64	12
Norway	22	78	214	3,272	6,285	4,770
USSR	-	-	-	-	469	27
Total	23	79	214	3,311	6,818	4,809

<sup>1</sup> Preliminary.

<sup>2</sup> Included in Sub-area IV.

Table 4.5.3 Landings (tonnes) of HORSE MACKEREL in Sub-area IV by country (Data as estimated by the Working Group).

Country	1978	1979	1980	1981	1982	1983
Belgium	15	9	8	34	7	55
Denmark	1,543	496	199	3,576	1,612	1,590
Faroe Islands	3	-	260	-	-	-
France	182	221	292	421	567	366
Germany, Fed. Rep.	1,993	376	+	139	30	52
Ireland	-	-	1,161	412	-	-
Netherlands	106	88	101	355	559	2,029 <sup>4</sup>
Norway	1,037	199	119	2,292	7	322
Poland	-	-	-	-	-	2
Sweden	-	+	-	-	-	-
UK (Engl. & Wales)	36	23	11	15	6	4
UK (Scotland)	5	+	-	-	-	-
USSR	-	-	-	-	-	-
Total	4,920	1,412	2,151	7,245	2,788	4,420
Country	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Belgium	20	13	13	9	10	10
Denmark	23,730	22,495	18,652 <sup>2</sup>	7,290 <sup>2</sup>	20,323 <sup>2</sup>	23,329 <sup>2</sup>
Faroe Islands	-	-	-	-	-	-
France	827	298	231 <sup>3</sup>	189 <sup>3</sup>	784 <sup>3</sup>	248
Germany, Fed. Rep.	+	+	-	3	153	506
Ireland	-	-	-	-	-	-
Netherlands	824 <sup>4</sup>	160 <sup>4</sup>	600 <sup>4</sup>	850 <sup>4</sup>	1,060 <sup>4</sup>	14,172
Norway	94	203	776	11,728 <sup>5</sup>	34,425 <sup>5</sup>	84,161
Poland	-	-	-	-	-	-
Sweden	-	-	2 <sup>2</sup>	-	-	-
UK (Engl. & Wales)	3	71	3	339	373	10
UK (Scotland)	489	998	531	487	5,749	2,093
USSR	-	-	-	-	-	-
Unallocated+discards	-	-	-	-	-	-12,482 <sup>5</sup>
Total	25,987	24,238	20,746	20,895	62,892	112,047

<sup>1</sup> Preliminary.

<sup>2</sup> Includes Division IIIa.

<sup>3</sup> Includes Division IIa.

<sup>4</sup> Estimated from biological sampling.

<sup>5</sup> Assumed to be misreported.



Table 4.5.4 Landings (tonnes) of HORSE MACKEREL in Sub-area VI by country (Data as estimated by the Working Group).

Country	1978	1979	1980	1981	1982	1983
Denmark	-	443	734	341	2,785	7
Faroe Islands	-	-	-	-	1,248	-
France	91	151	45	454	4	10
Ireland	59	-	-	-	-	15,086
Germany, Fed. Rep.	-	155	5,550	10,212 <sup>2</sup>	2,113	4,146 <sup>2</sup>
Netherlands	114	6,910	2,385 <sup>2</sup>	100 <sup>2</sup>	50	5,500 <sup>2</sup>
Norway	-	-	-	5	-	94
Spain	91	20	-	-	-	-
UK (Engl. & Wales)	44	73	9	5	+	-
UK (Scotland)	9	39	1	17	83	38
USSR	-	-	-	-	-	-
Total	408	7,791	8,724	11,134	6,283	24,881
Country	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Denmark	-	-	-	769	1,655	973
Faroe Islands	-	4,014	1,992 <sup>2</sup>	4,450 <sup>4</sup>	4,000 <sup>4</sup>	3,059
France	14	13	12	20	10	2
Ireland	13,858	27,102	28,125	29,743	27,872	17,677
Germany, Fed. Rep.	130	191	354	174	615	1,162
Netherlands	17,500 <sup>2</sup>	18,450 <sup>2</sup>	3,450 <sup>2</sup>	5,750 <sup>2</sup>	3,340 <sup>2</sup>	1,907
Norway	-	-	83 <sub>3</sub>	75 <sub>3</sub>	41 <sub>3</sub>	- <sub>3</sub>
Spain	-	-	-	-	-	-
UK (Engl. & Wales)	+	996	198	404	475	44
UK (Scotland)	214	1,427	138	1,027	7,834	1,737
USSR	-	-	-	-	-	-
Unallocated+discards	-	-19,168	-13,897	-7,255	-	6,493
Total	31,716	33,025	20,455	35,157	45,842	33,054

<sup>1</sup> Preliminary.

<sup>2</sup> Estimated from biological sampling.

<sup>3</sup> Included in Sub-area VII.

<sup>4</sup> Includes Divisions IIIa, IVa,b and VIb.

Table 4.5.5 Landings (tonnes) of HORSE MACKEREL in Sub-area VII by country. (Data as estimated by the Working Group.)

Country	1978	1979	1980	1981	1982	1983
Belgium	1	3	-	1	1	-
Denmark	2,104	4,287	5,045	3,099	877	993
France	3,564	4,407	1,983	2,800	2,314	1,834
German Dem. Rep.	-	-	-	-	-	-
Germany, Fed. Rep.	2,923	5,333	2,289	1,079	12	1,977
Ireland	3,388	-	-	16	-	-
Netherlands	10,556	25,174	23,002	25,000 <sup>2</sup>	27,500 <sup>2</sup>	34,350 <sup>2</sup>
Norway	29	959	394	-	-	-
Poland	61	-	-	-	-	-
Spain	516	676	50	234	104	142
UK (Engl. & Wales)	2,918	2,686	12,933	2,520	2,670	1,230
UK (Scotland)	-	-	1	-	-	-
USSR	-	-	-	-	-	-
Total	28,855	26,060	43,525	45,697	34,749	33,478
Country	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Belgium	-	+	+	2	-	-
Denmark	732	1,477 <sup>3</sup>	30,408 <sup>3</sup>	27,368	33,202	37,474
France	2,387	1,881	3,801	2,197	1,523	4,576
German Dem. Rep.	-	-	-	-	-	-
Germany, Fed. Rep.	228	-	5	374	4,705	7,743
Ireland	65	100	703	15	481	11,467
Netherlands	38,700 <sup>2</sup>	33,550 <sup>2</sup>	40,750 <sup>2</sup>	69,400 <sup>2</sup>	43,560 <sup>2</sup>	43,582
Norway	-	-	-	-	-	-
Poland	-	-	-	-	-	-
Spain	560	275	137 <sup>3</sup>	148 <sup>3</sup>	150	14
UK (Engl. & Wales)	279	1,630	1,824	1,228	3,759	4,488
UK (Scotland)	1	1	+	2	2,873	+
USSR	-	120	-	-	-	-
Unallocated+discards	-	-	-	-	-	28,368
Total	42,952	39,034	77,628	100,734	90,253	137,712

<sup>1</sup> Provisional.

<sup>2</sup> Estimated from biological sampling.

<sup>3</sup> Includes Sub-area VI.

Table 4.5.6 Landings (tonnes) of HORSE MACKEREL in Sub-area VIII by country. (Data as estimated by the Working Group.)

Country	1978	1979	1980	1981	1982	1983
Denmark	-	127	-	-	-	-
France	4,662	4,240	3,361	3,711	3,073	2,643
German Dem. Rep	-	-	-	-	-	-
Netherlands	19	-	-	-	-	-
Spain	80,139	42,766	34,134	36,362	19,610	25,580
UK (Engl. & Wales)	-	22	-	+	1	-
USSR	3	-	-	-	-	-
<b>Total</b>	<b>84,823</b>	<b>47,155</b>	<b>37,495</b>	<b>40,073</b>	<b>22,683</b>	<b>28,223</b>
Country	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Denmark	-	-	446	3,283	2,793	6,729
France	2,489	4,305	3,534	3,983 <sub>2</sub>	4,502	4,719
German Dem. Rep	- <sub>2</sub>	- <sub>2</sub>	- <sub>2</sub>	-	-	-
Netherlands	-	-	-	-	-	-
Spain	23,119 <sup>3</sup>	23,292 <sup>3</sup>	31,033	30,098	26,629	34,402
UK (Engl. & Wales)	1	143	392	339	253	68
USSR	20	-	656	-	-	-
Unallocated+discards	-	-	-	-	-	-
<b>Total</b>	<b>25,629</b>	<b>27,740</b>	<b>36,061</b>	<b>37,703</b>	<b>34,177</b>	<b>45,918</b>

<sup>1</sup> Preliminary.

<sup>2</sup> Included in Sub-area VII.

<sup>3</sup> Data provided by the Working Group members.

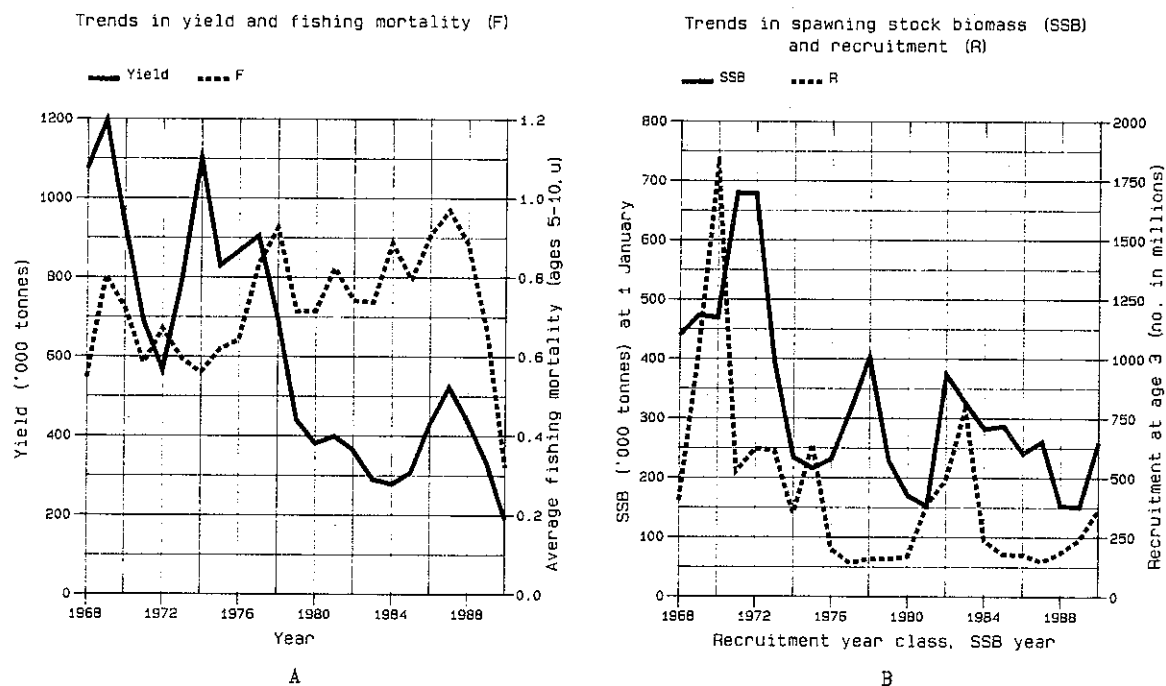
Table 4.5.7 Landings (tonnes) of HORSE MACKEREL in Sub-area IX by country. (Data as estimated by the Working Group.)

Country	1978	1979	1980	1981	1982	1983
Portugal	30,203	24,489	25,224	23,753	30,886	30,951 <sup>2</sup>
Spain	14,787	12,880	11,679	12,120	8,840	17,782 <sup>2</sup>
USSR	381	250	-	-	-	-
<b>Total</b>	<b>45,371</b>	<b>37,619</b>	<b>36,903</b>	<b>35,873</b>	<b>39,726</b>	<b>48,733<sup>2</sup></b>
Country	1984	1985	1986	1987	1988	1989 <sup>1</sup>
Portugal	17,307 <sup>2</sup>	9,420 <sup>2</sup>	17,682 <sup>2</sup>	21,444 <sup>2</sup>	25,629	25,231 <sup>2</sup>
Spain	5,871 <sup>2</sup>	10,817 <sup>2</sup>	13,477 <sup>2</sup>	12,799 <sup>2</sup>	12,259	13,028
USSR	-	-	-	-	-	-
Unallocated+discards	-	-	-	-	-	-
<b>Total</b>	<b>23,178<sup>2</sup></b>	<b>20,237<sup>2</sup></b>	<b>31,159<sup>2</sup></b>	<b>34,243<sup>2</sup></b>	<b>37,888</b>	<b>38,259</b>

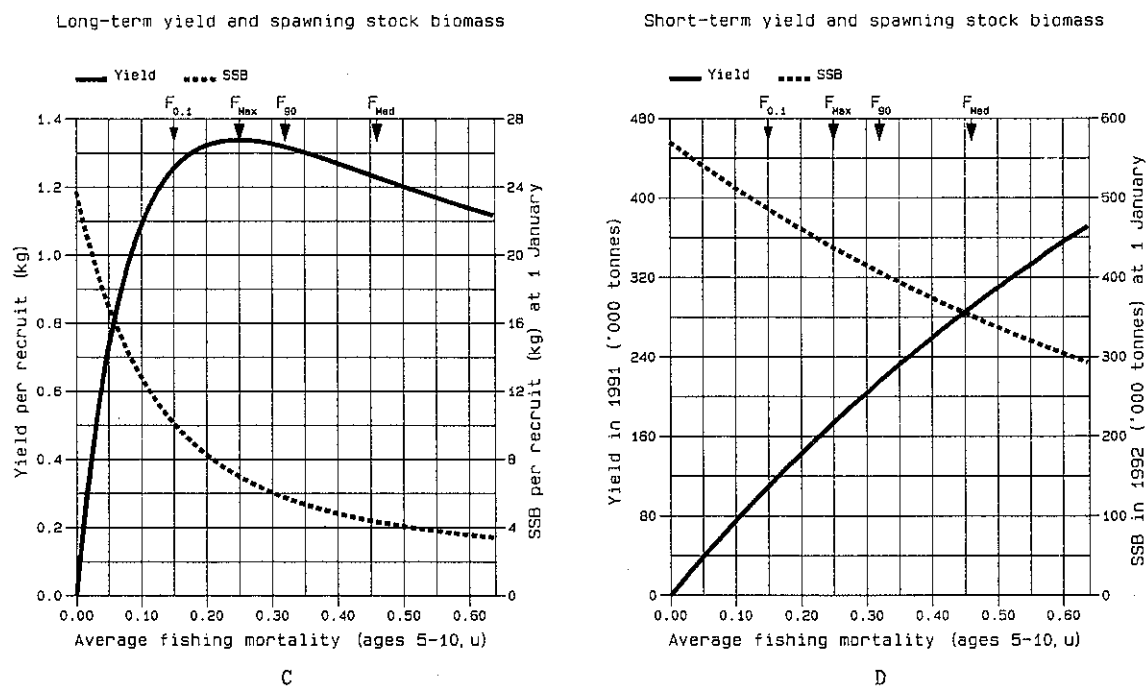
<sup>1</sup> Preliminary

<sup>2</sup> Data provided by the Working Group members.

Figure 2.1.2  
FISH STOCK SUMMARY  
STOCK: North-East Arctic Cod  
17.10.1990



FISH STOCK SUMMARY  
STOCK: North-East Arctic Cod  
17.10.1990

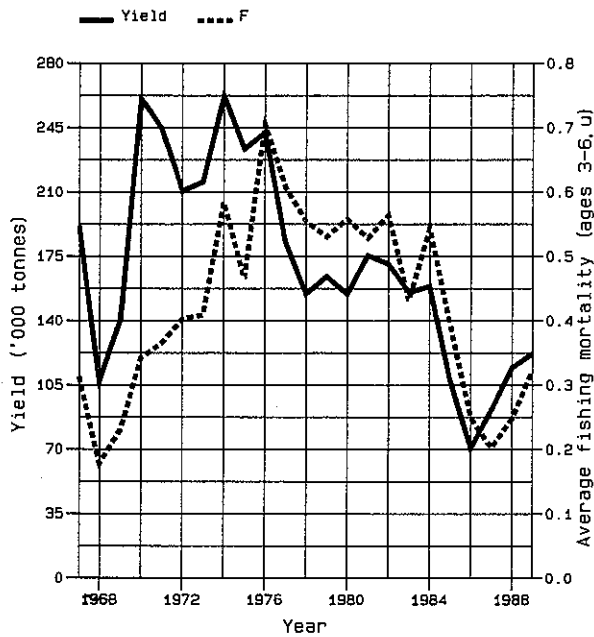


FISH STOCK SUMMARY  
STOCK: North-East Arctic Saithe  
09.11.1990

289

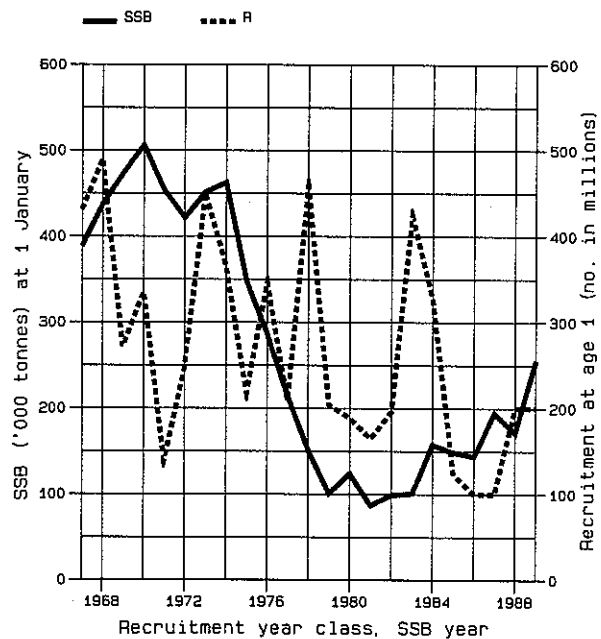
Figure 2.3

Trends in yield and fishing mortality (F)



A

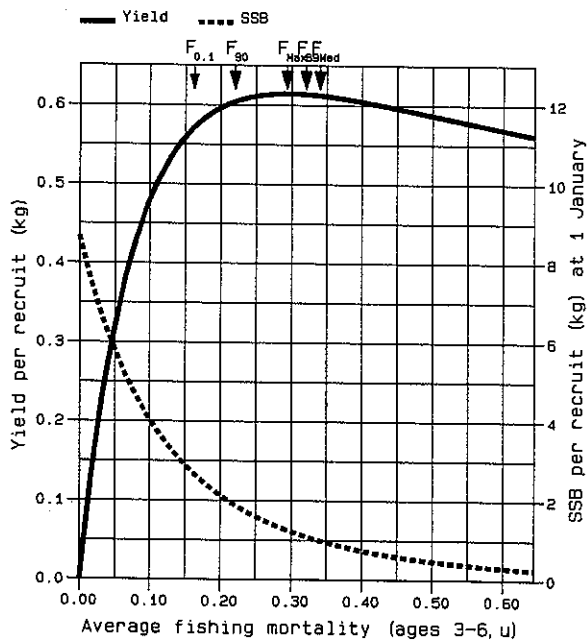
Trends in spawning stock biomass (SSB) and recruitment (R)



B

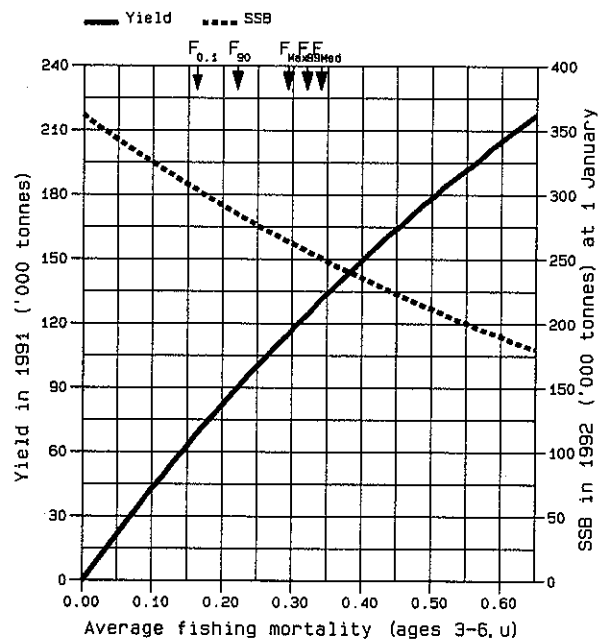
FISH STOCK SUMMARY  
STOCK: North-East Arctic Saithe  
09.11.1990

Long-term yield and spawning stock biomass



C

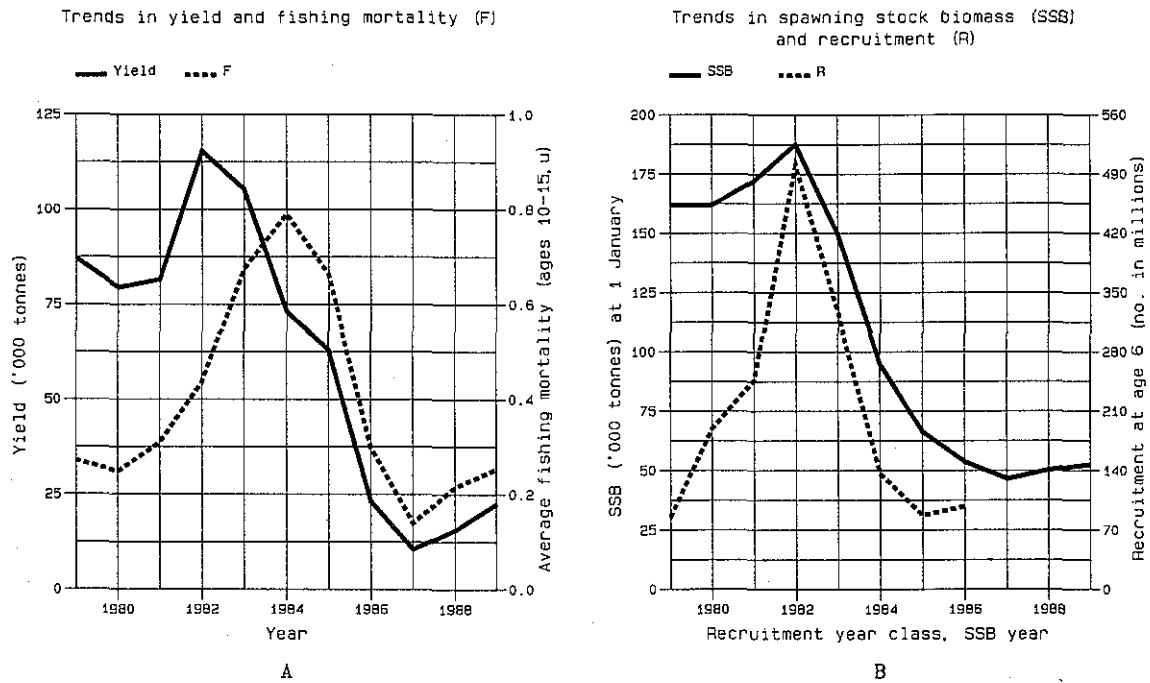
Short-term yield and spawning stock biomass



D

## FISH STOCK SUMMARY

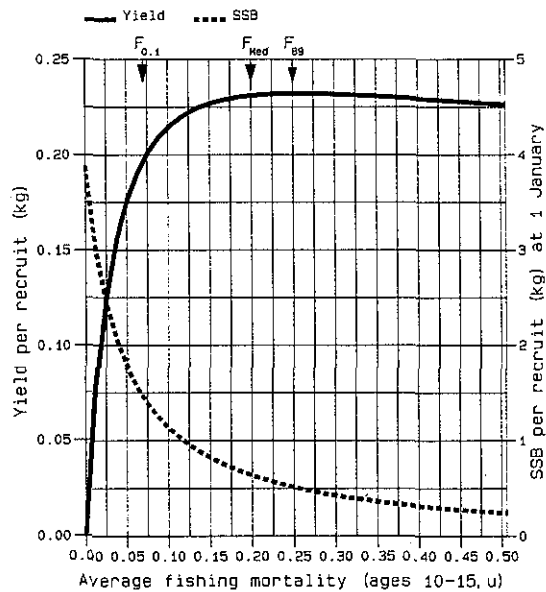
Figure 2.4.1 STOCK: *Sebastes Mentella* in Sub-areas I and II  
18.10.1990



## FISH STOCK SUMMARY

STOCK: *Sebastes Mentella* in Sub-areas I and II  
22.10.1990

Long-term yield and spawning stock biomass



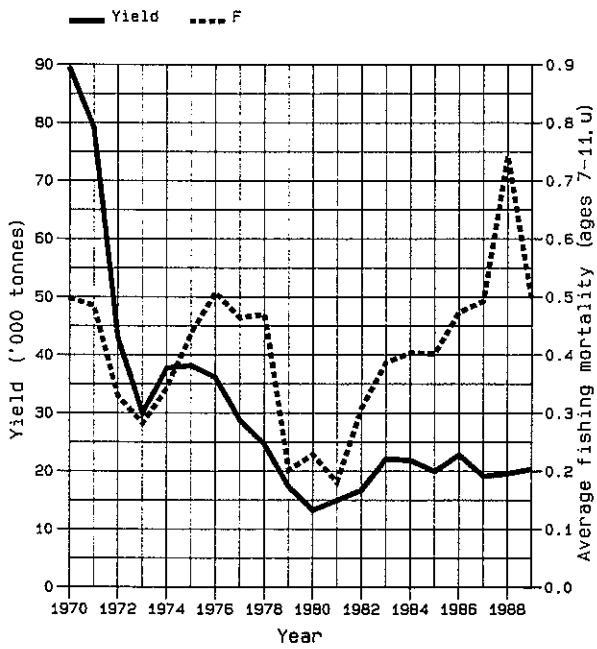
# FISH STOCK SUMMARY

STOCK: Greenland Halibut in Sub-areas I and II  
19.10.1990

291

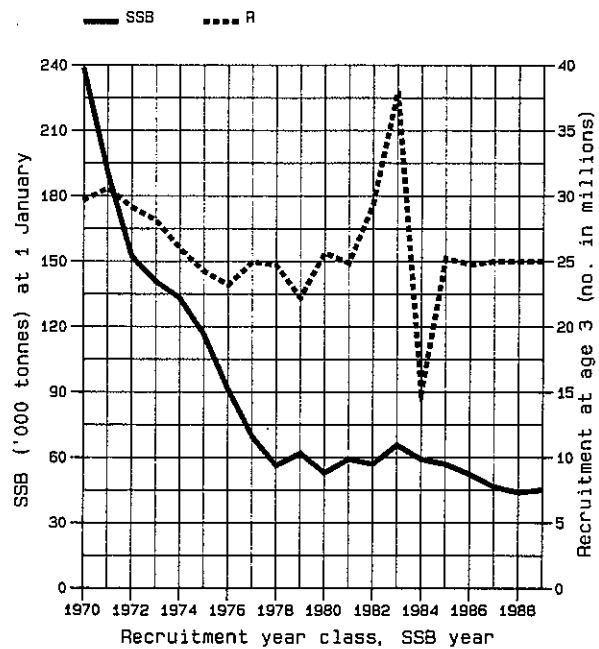
Figure 2.5

Trends in yield and fishing mortality (F)



A

Trends in spawning stock biomass (SSB) and recruitment (R)

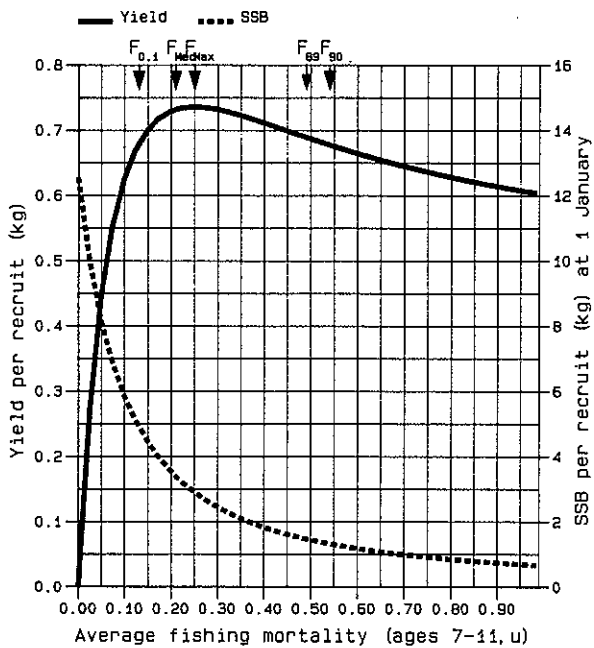


B

# FISH STOCK SUMMARY

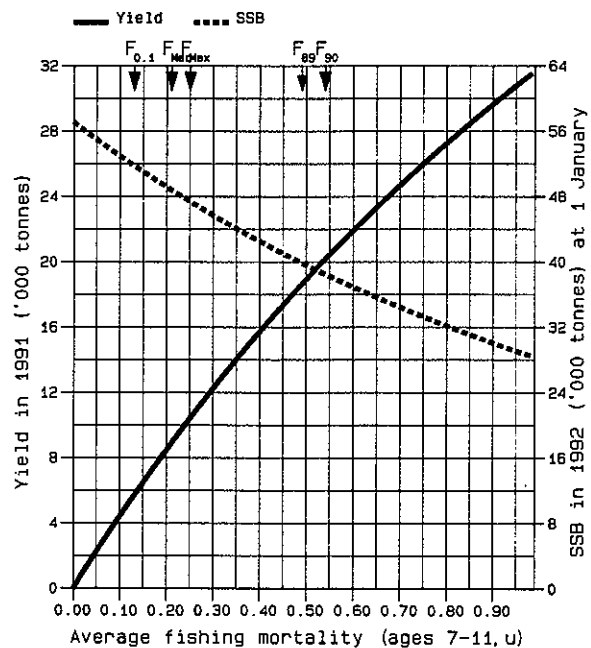
STOCK: Greenland Halibut in Sub-areas I and II  
19.10.1990

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass

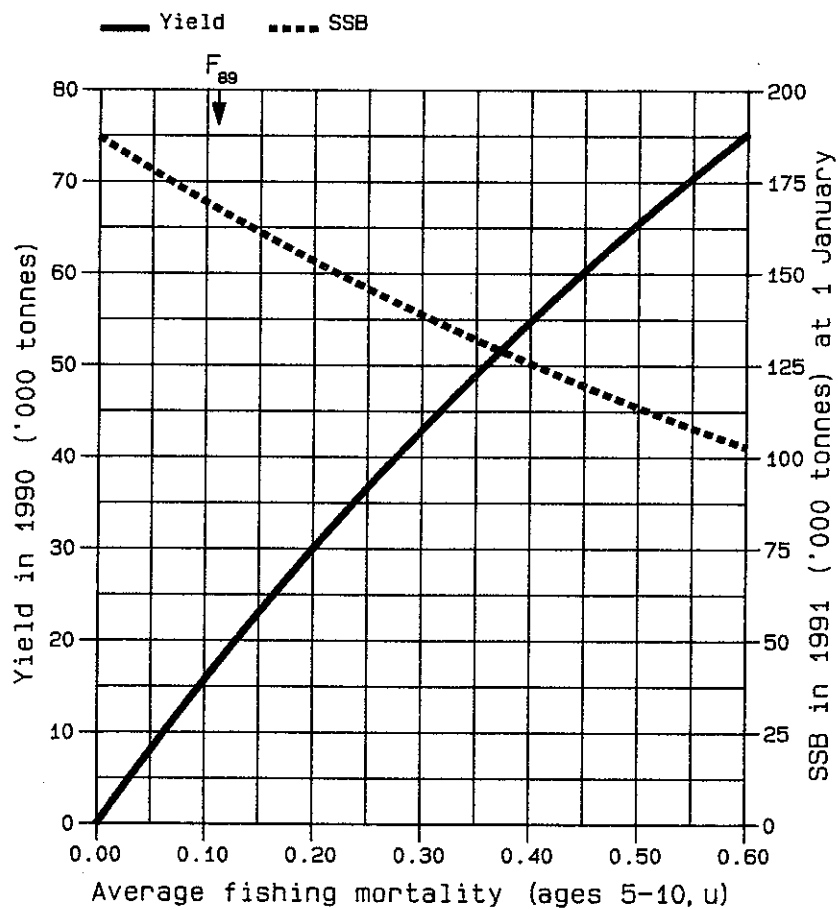


D

Figure 2.6.1.1

FISH STOCK SUMMARY  
STOCK: East Greenland Cod  
30-03-1990

Short-term yield and spawning stock biomass





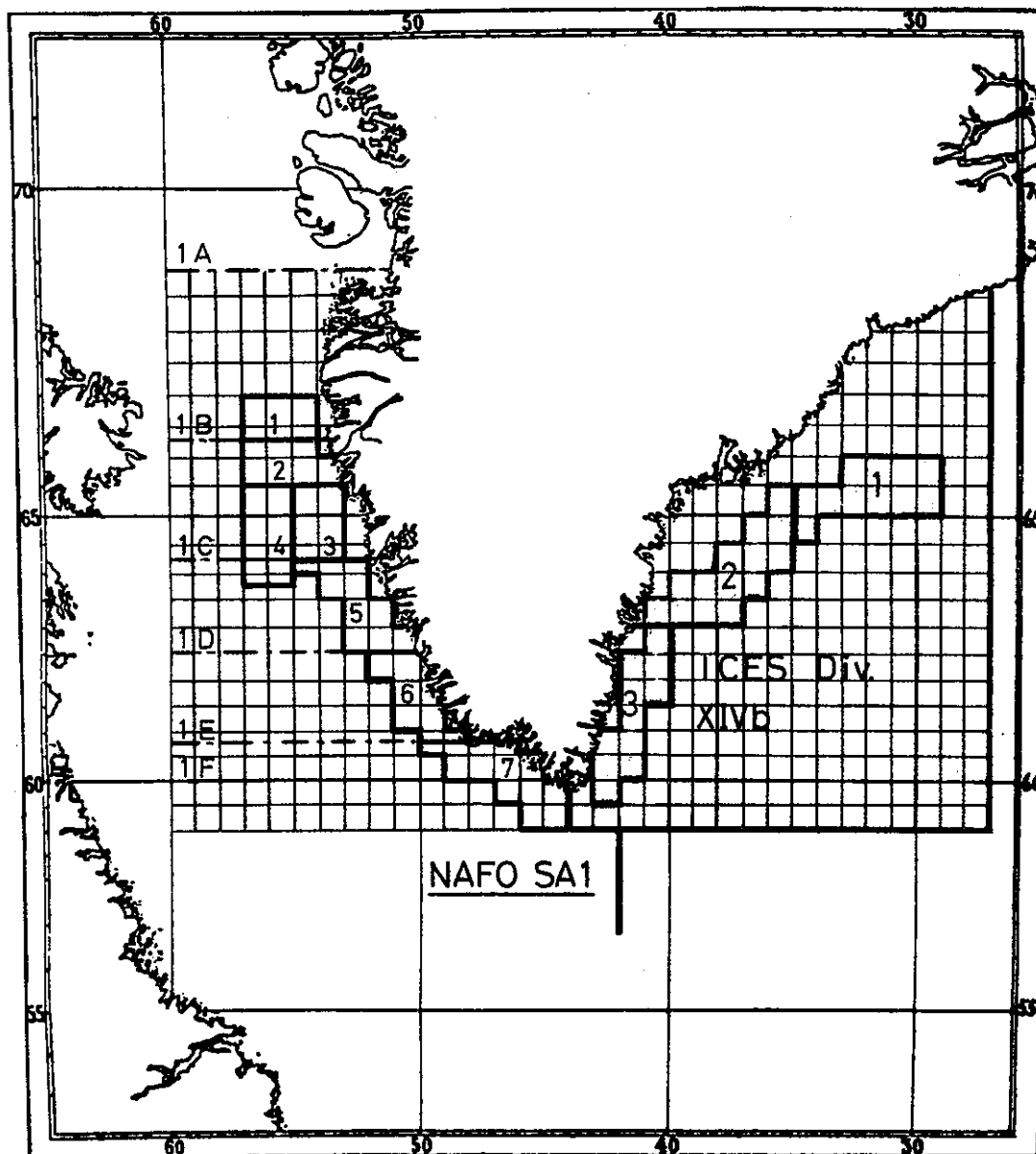


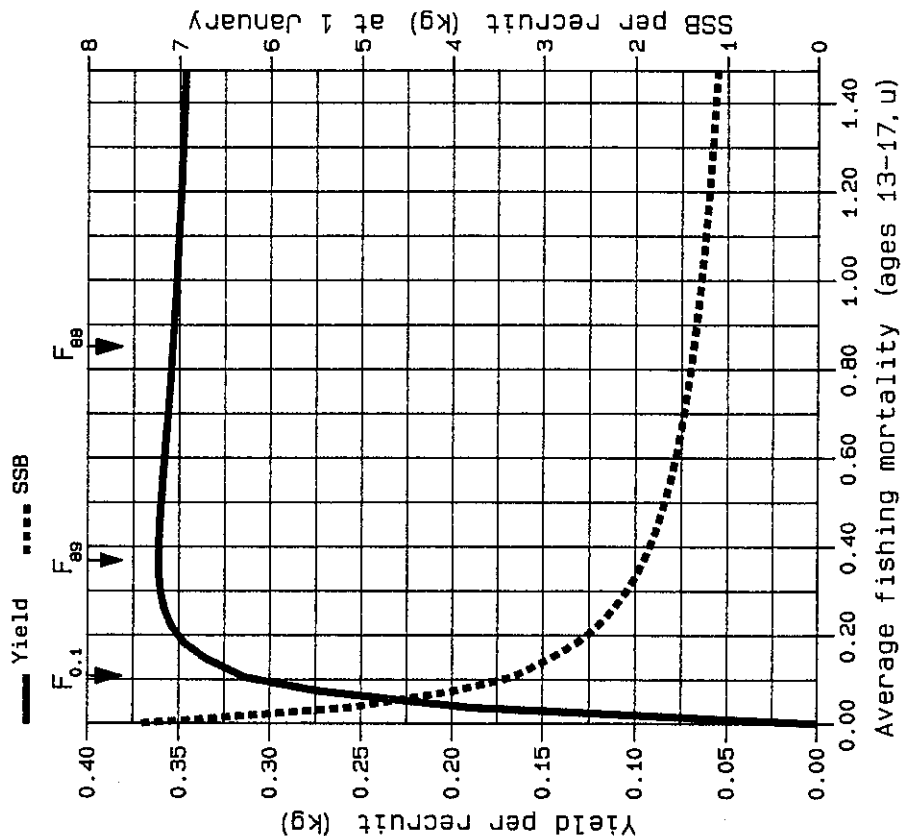
Figure 2.6.1.2 Survey areas and stratification off East and West Greenland.



# FISH STOCK SUMMARY STOCK: *Sebastes mentella*, Oceanic Type 16-05-1990

Figure 2.7.3 (cont'd)

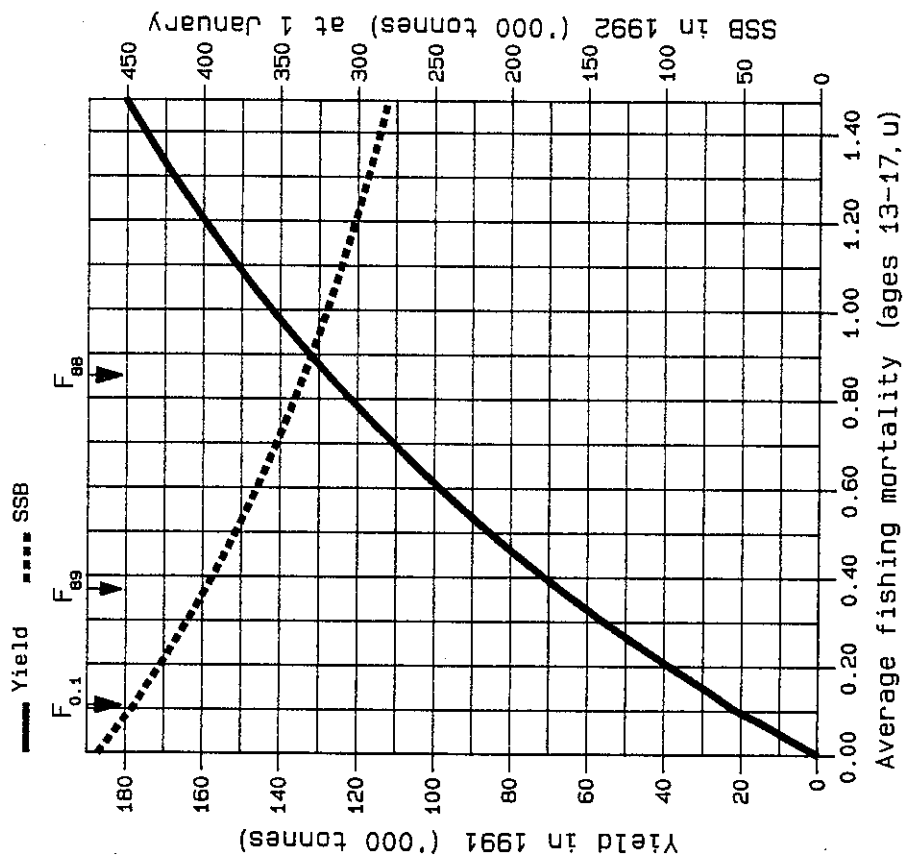
Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass

Assumes  $F_{90} = F_{89}$

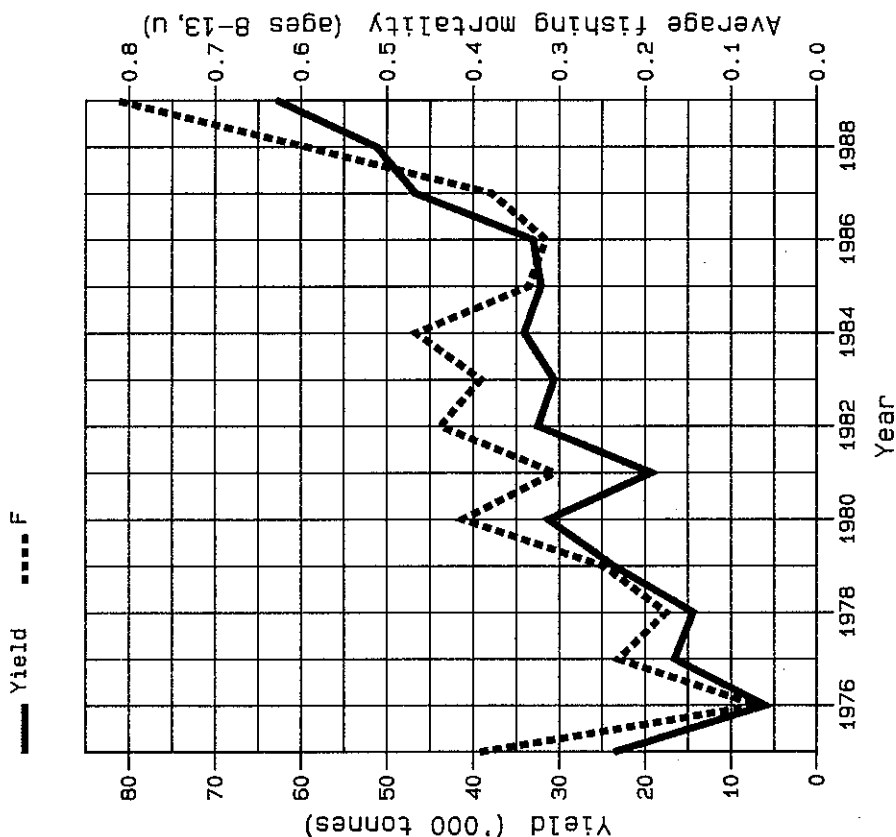


D

# FISH STOCK SUMMARY STOCK: Greenland Halibut in Areas V and XIV 01-06-1990

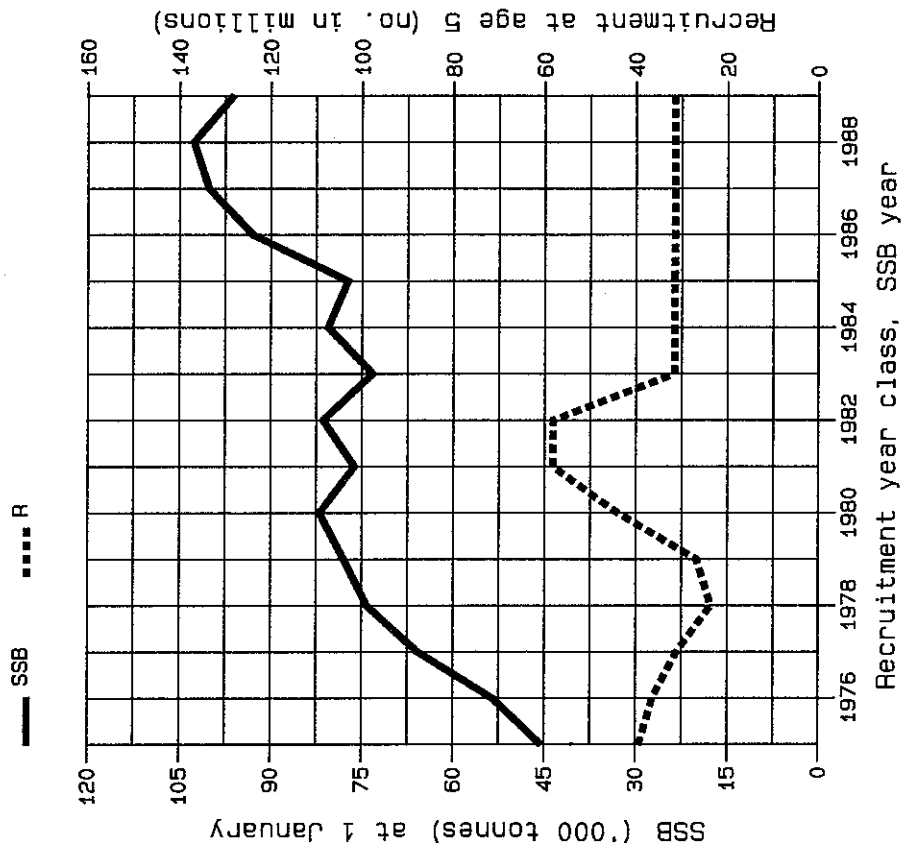
Figure 2.8

Trends in yield and fishing mortality (F)



A

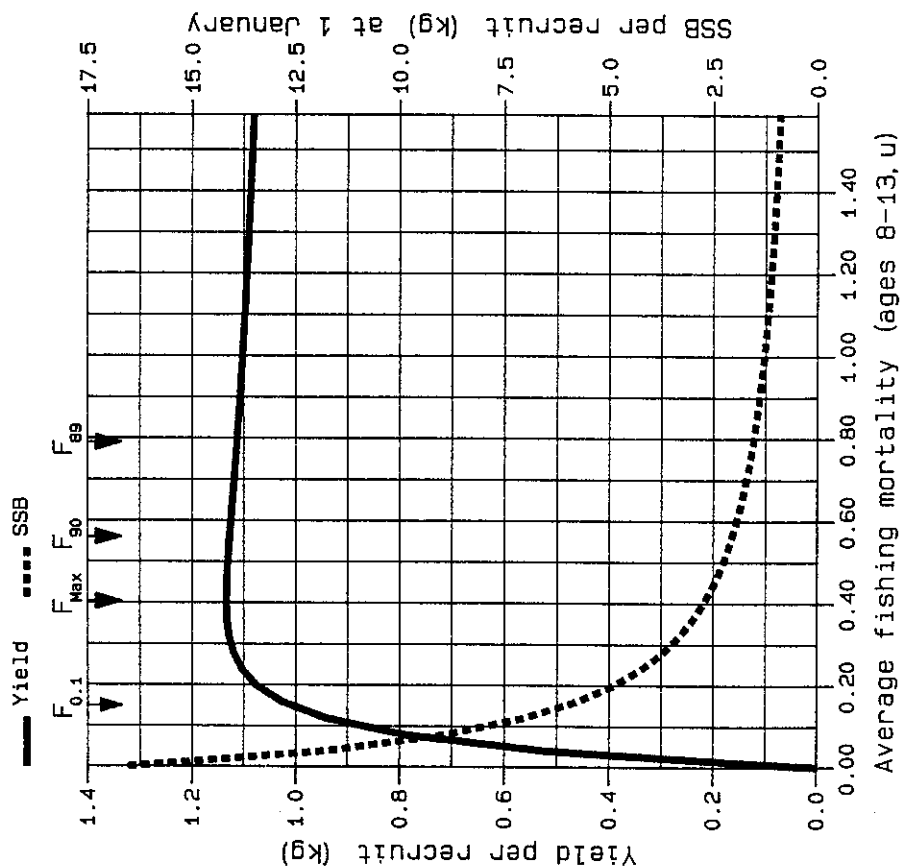
Trends in spawning stock biomass (SSB) and recruitment (R)



B (cont'd)

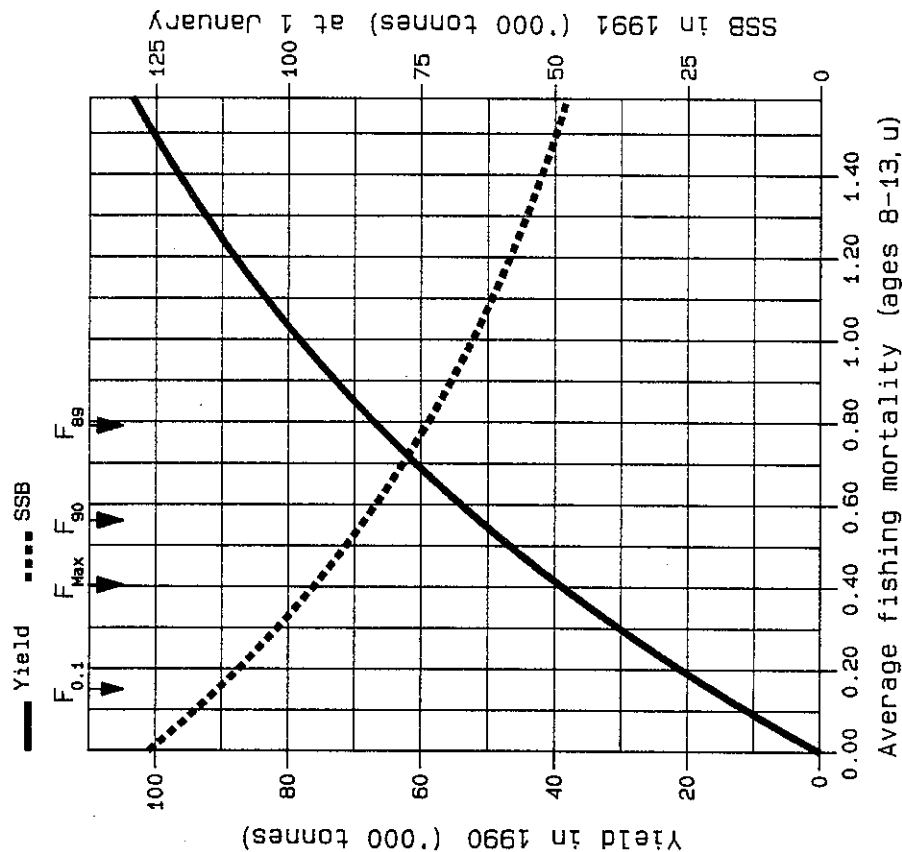
FISH STOCK SUMMARY  
 STOCK: Greenland Halibut in Areas V and XIV  
 14-05-1990

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass

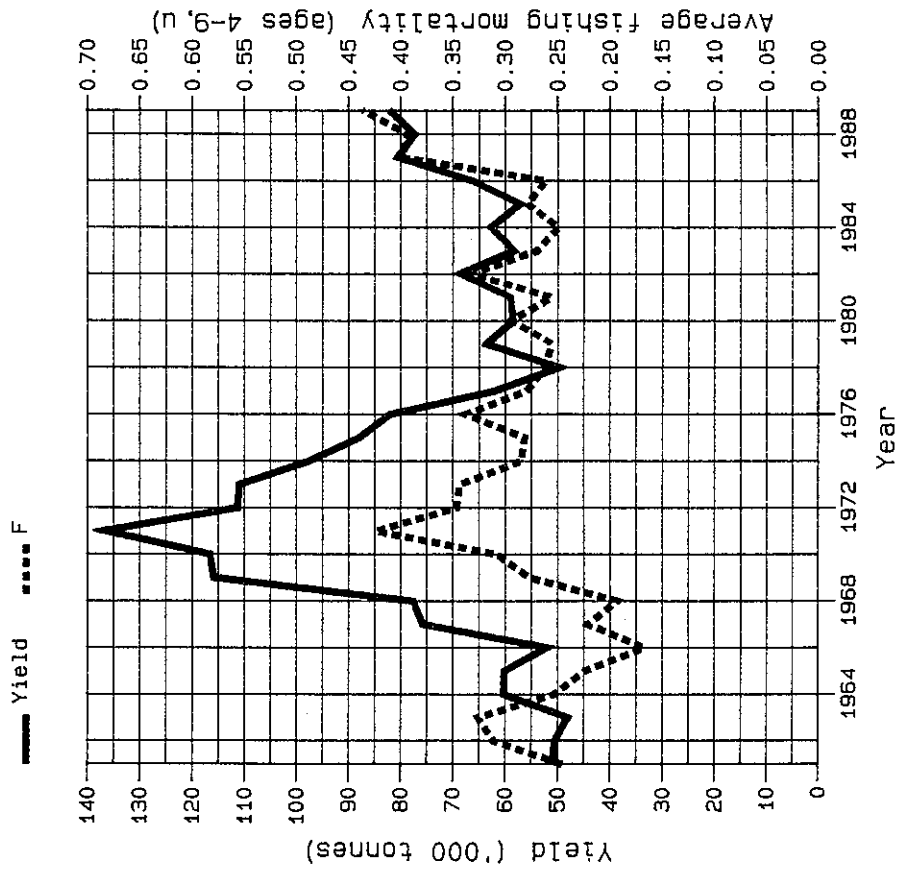


D

FISH STOCK SUMMARY  
STOCK: Icelandic Saithe  
15-05-1990

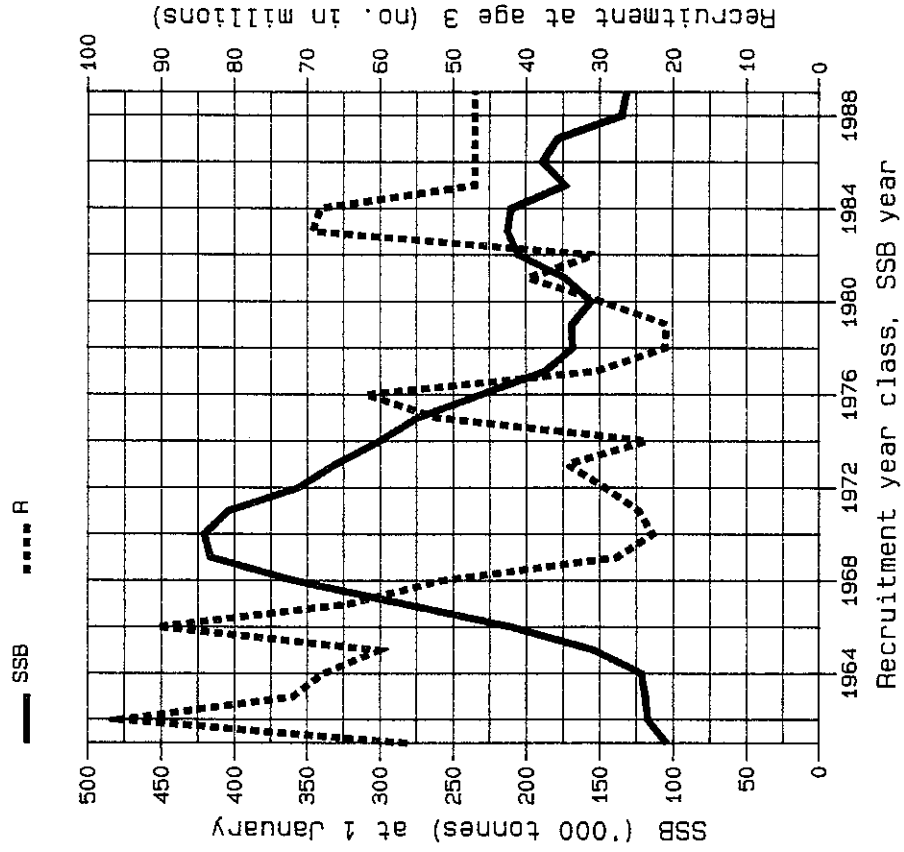
Figure 2.9

Trends in yield and fishing mortality (F)



A

Trends in spawning stock biomass (SSB) and recruitment (R)



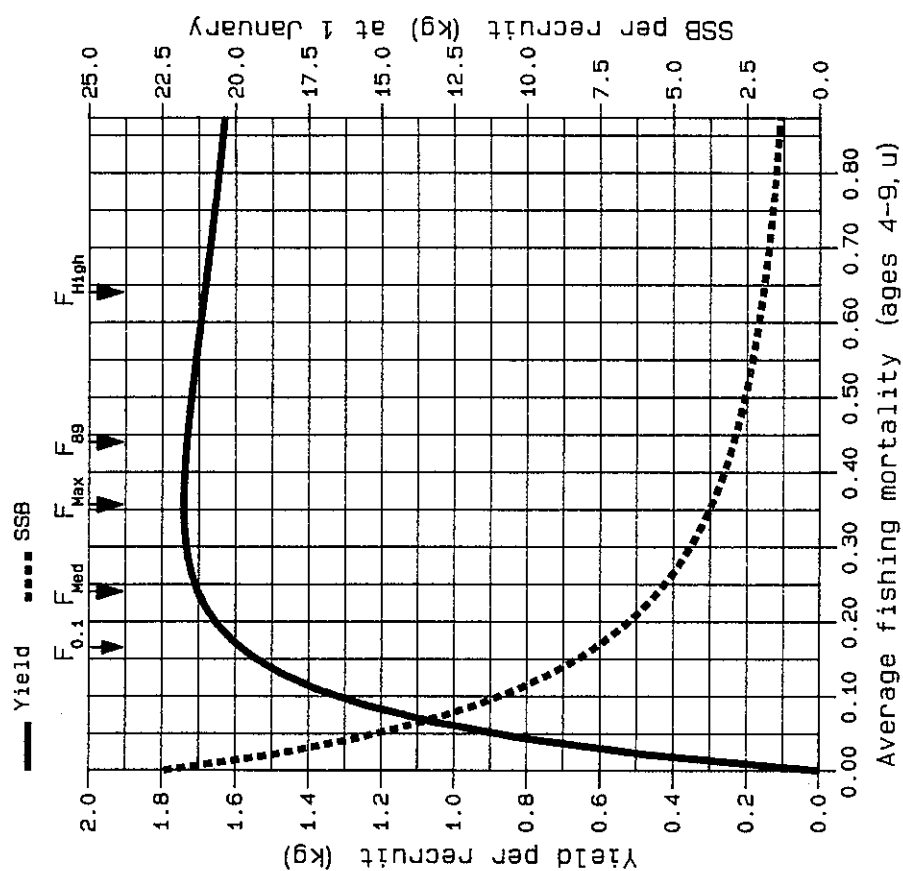
B

(cont'd)

**FISH STOCK SUMMARY**  
**STOCK: Icelandic Saithe**  
**15-05-1990**

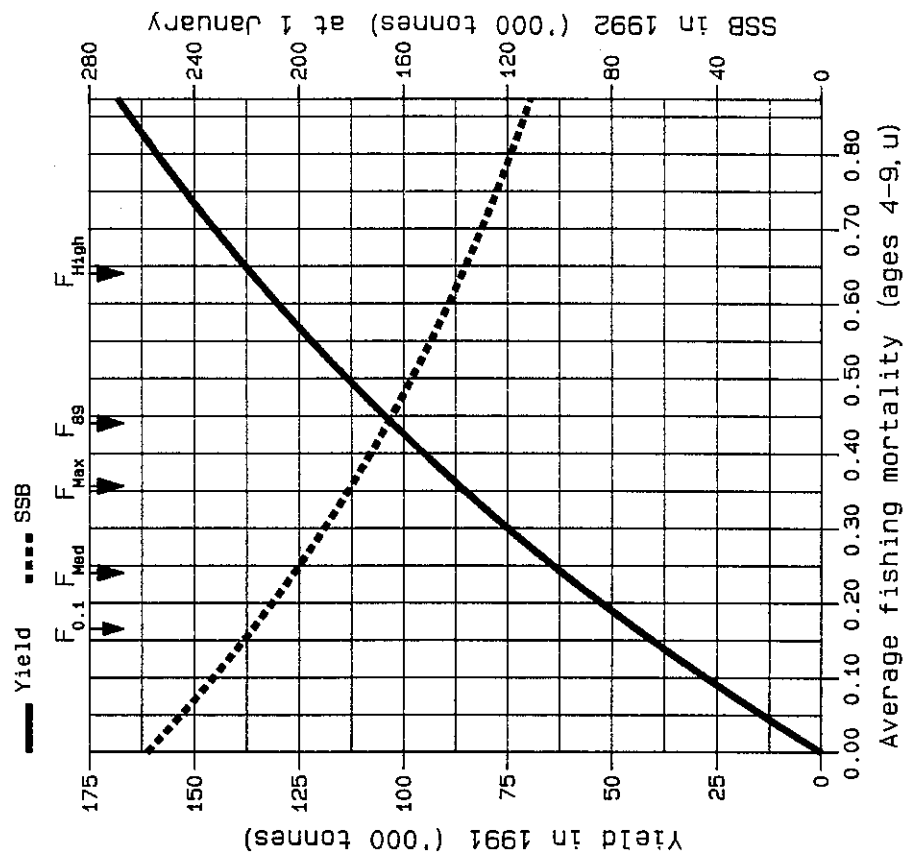
**Figure 2.9 (cont'd)**

Long-term yield and spawning stock biomass



**C**

Short-term yield and spawning stock biomass

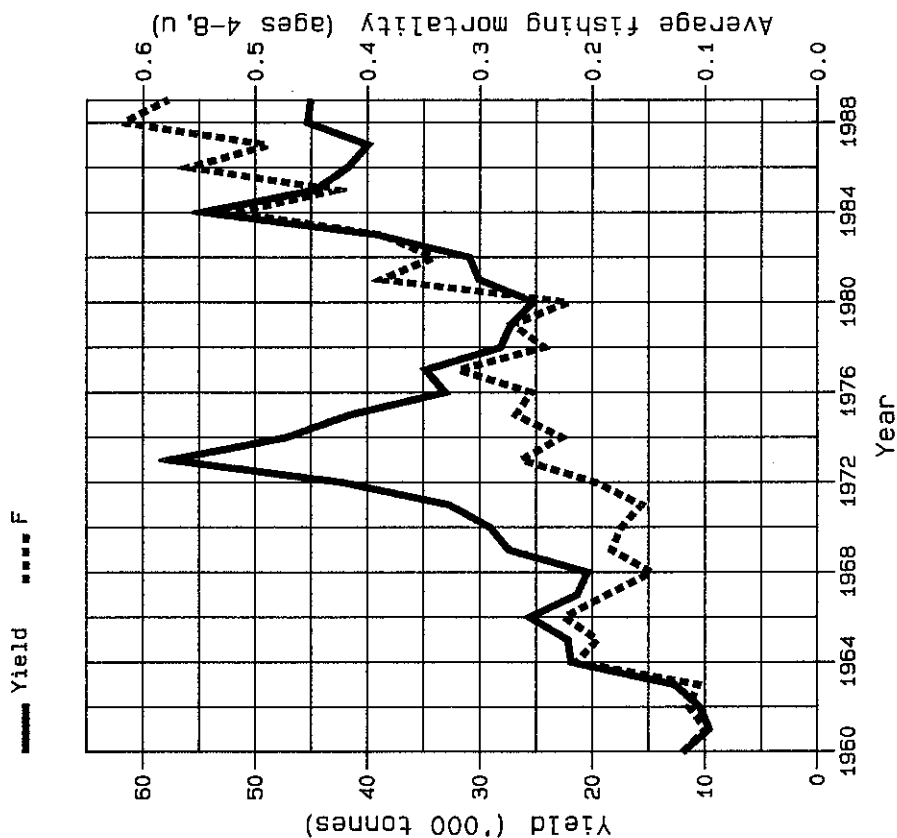


**D**

# FISH STOCK SUMMARY STOCK: Faroe Saithe 01-06-1990

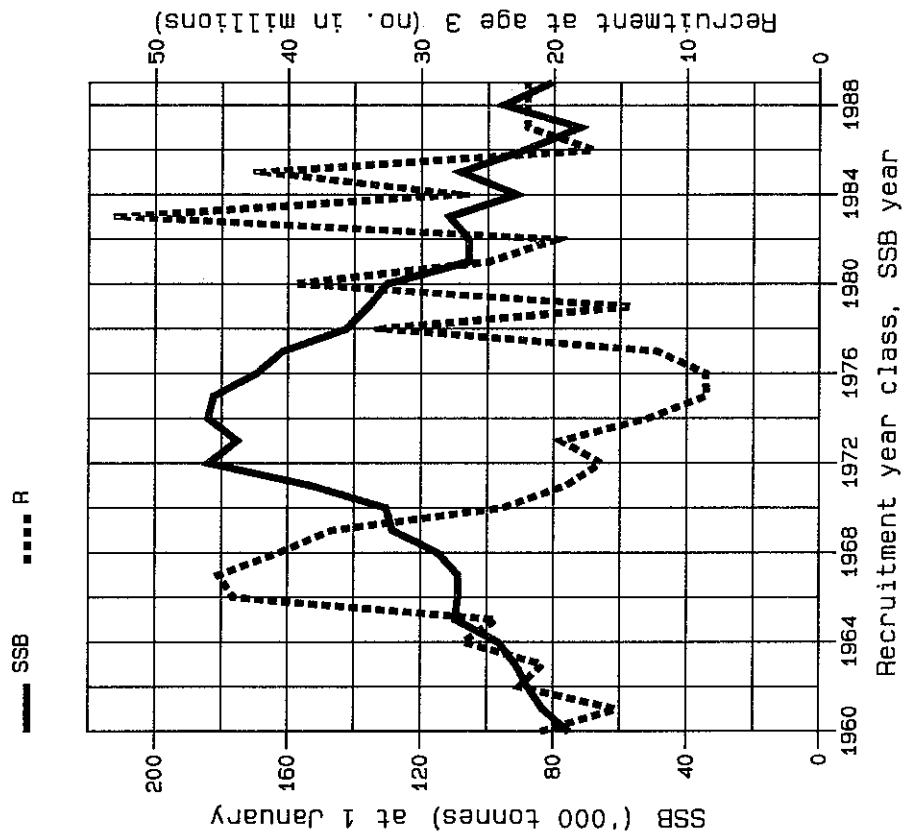
Figure 2.10.1

Trends in yield and fishing mortality (F)



A

Trends in spawning stock biomass (SSB) and recruitment (R)



B

cont'd

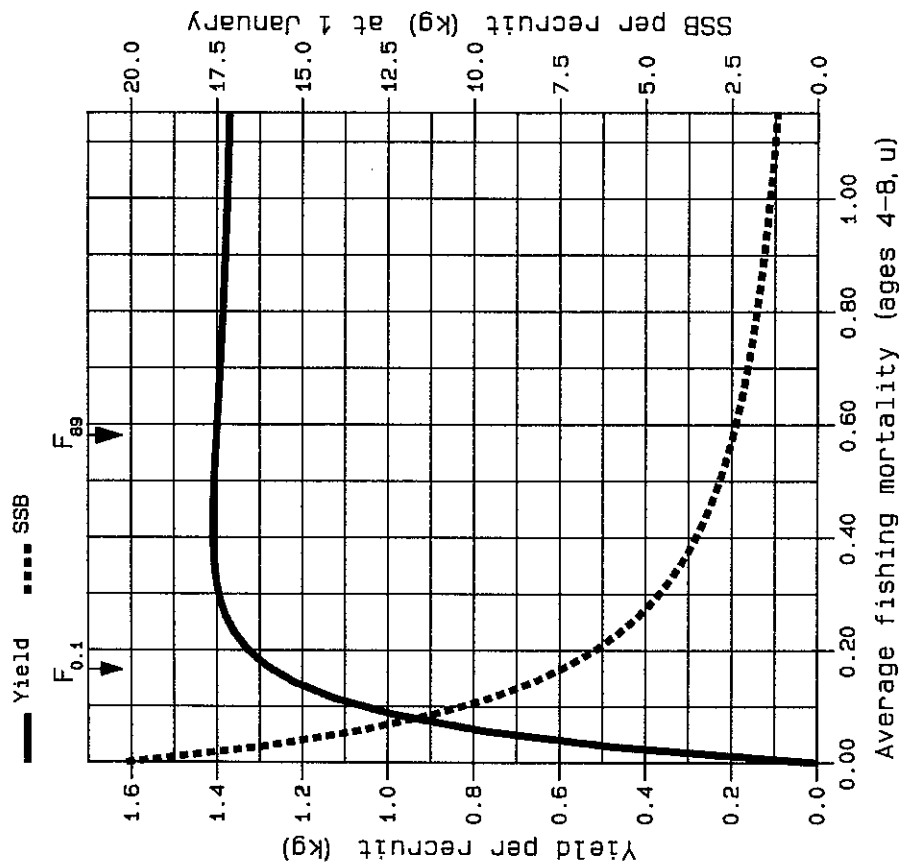


# FISH STOCK SUMMARY STOCK: Faroe Saithe

01-06-1990

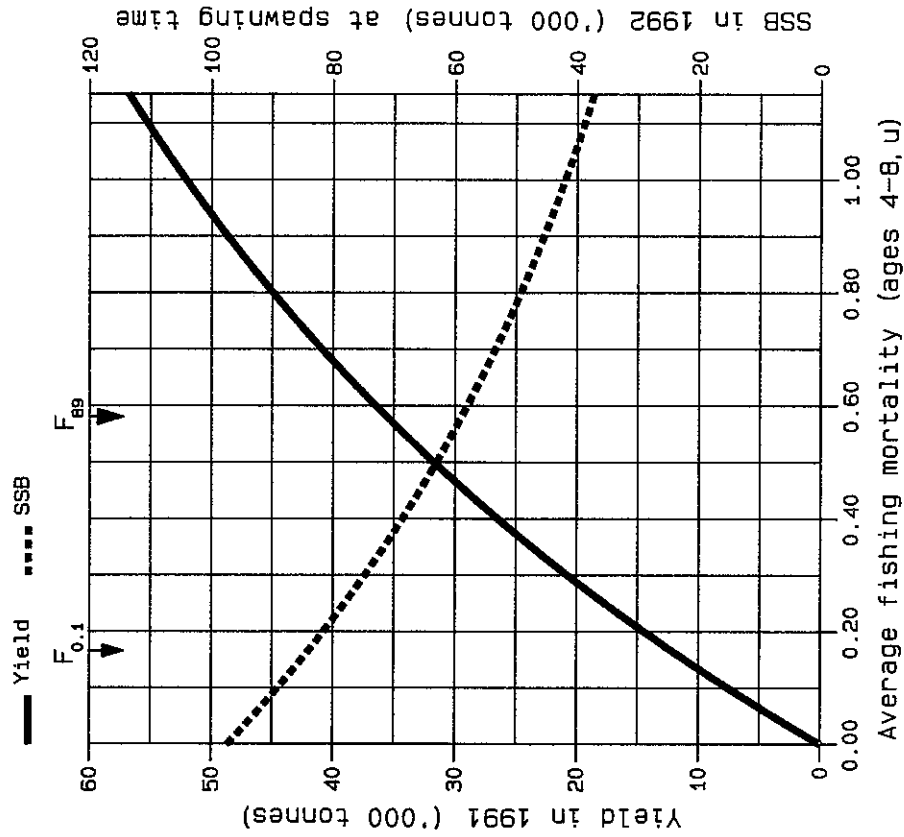
Figure 2.10.1 (cont'd)

Long-term yield and spawning stock biomass



C

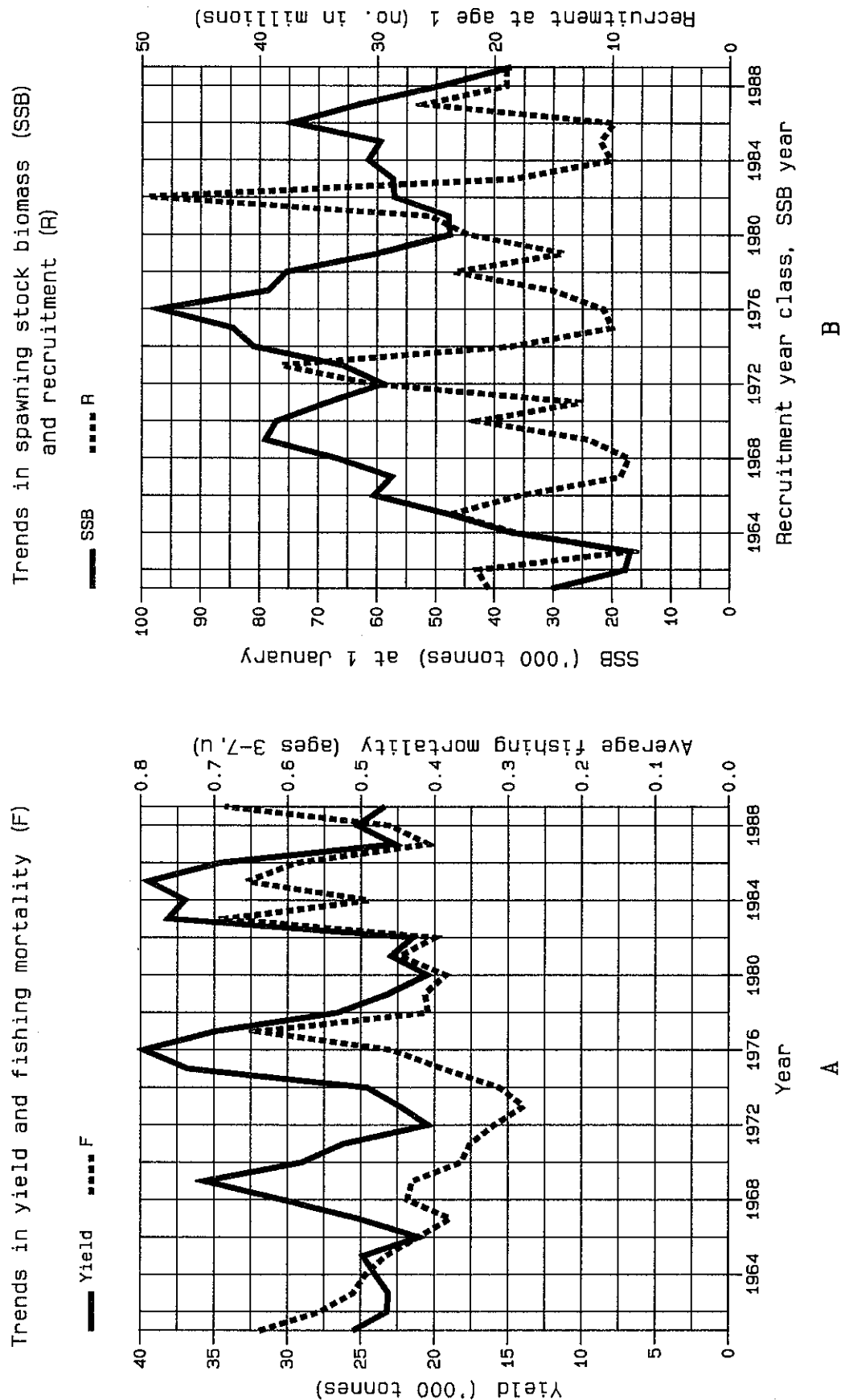
Short-term yield and spawning stock biomass



D

**FISH STOCK SUMMARY**  
**STOCK: Cod in the Faroe Plateau**  
**01-06-1990**

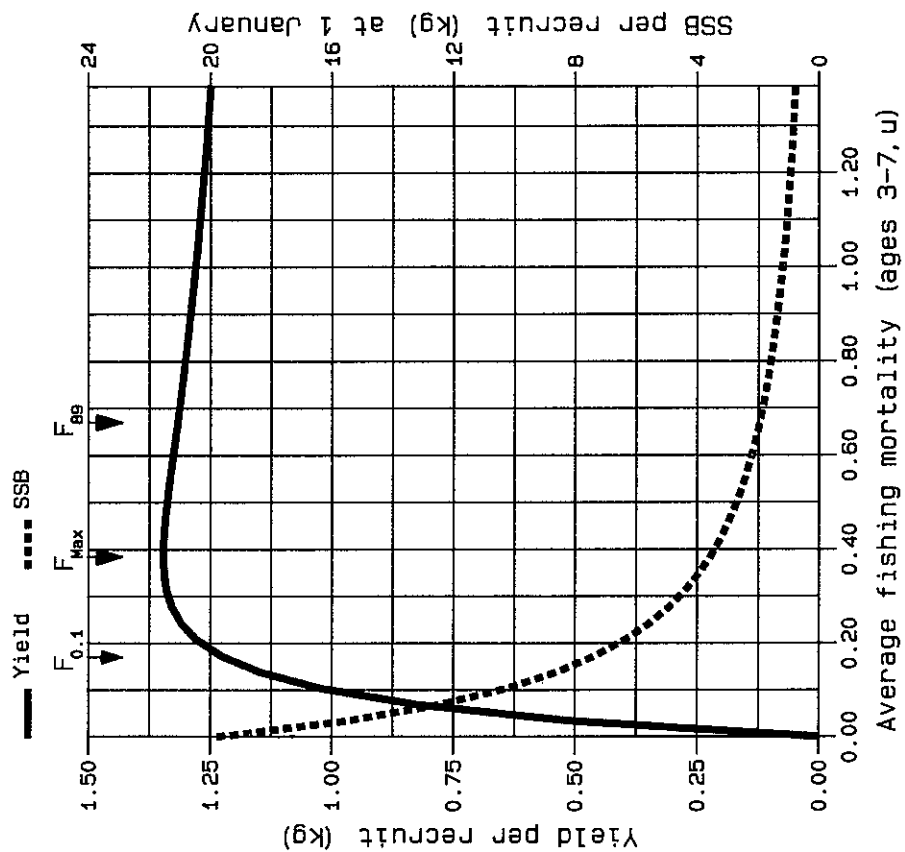
Figure 2.10.2



# FISH STOCK SUMMARY STOCK: Cod in the Faroe Plateau 01-06-1990

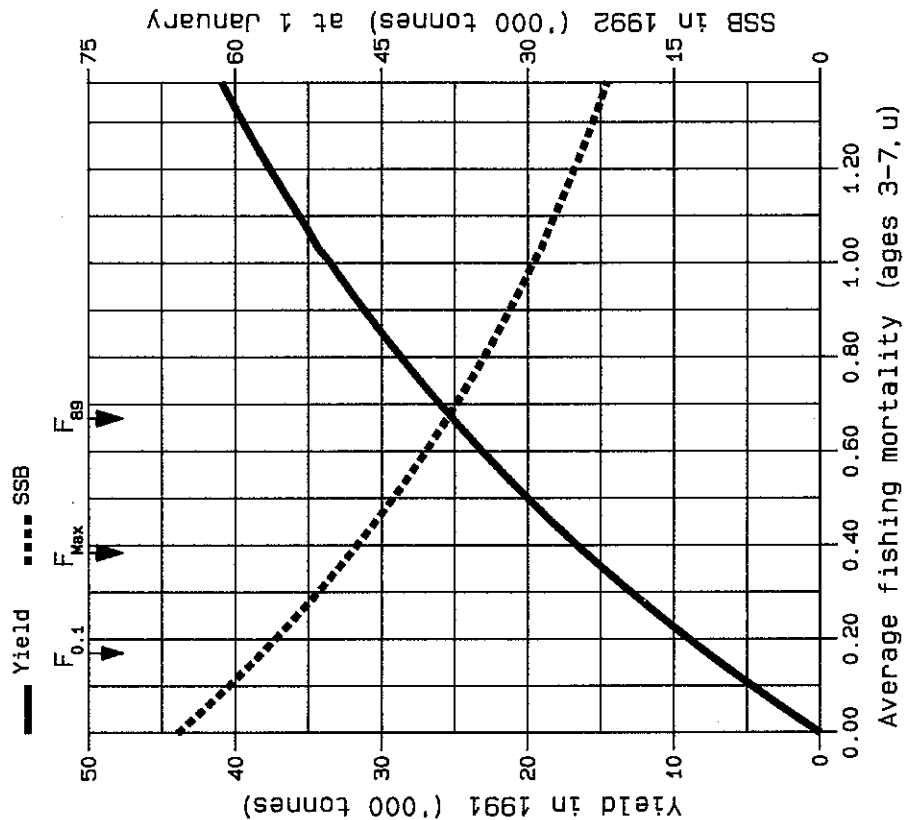
Figure 2.10.2 (cont'd)

Long-term yield and spawning stock biomass



C

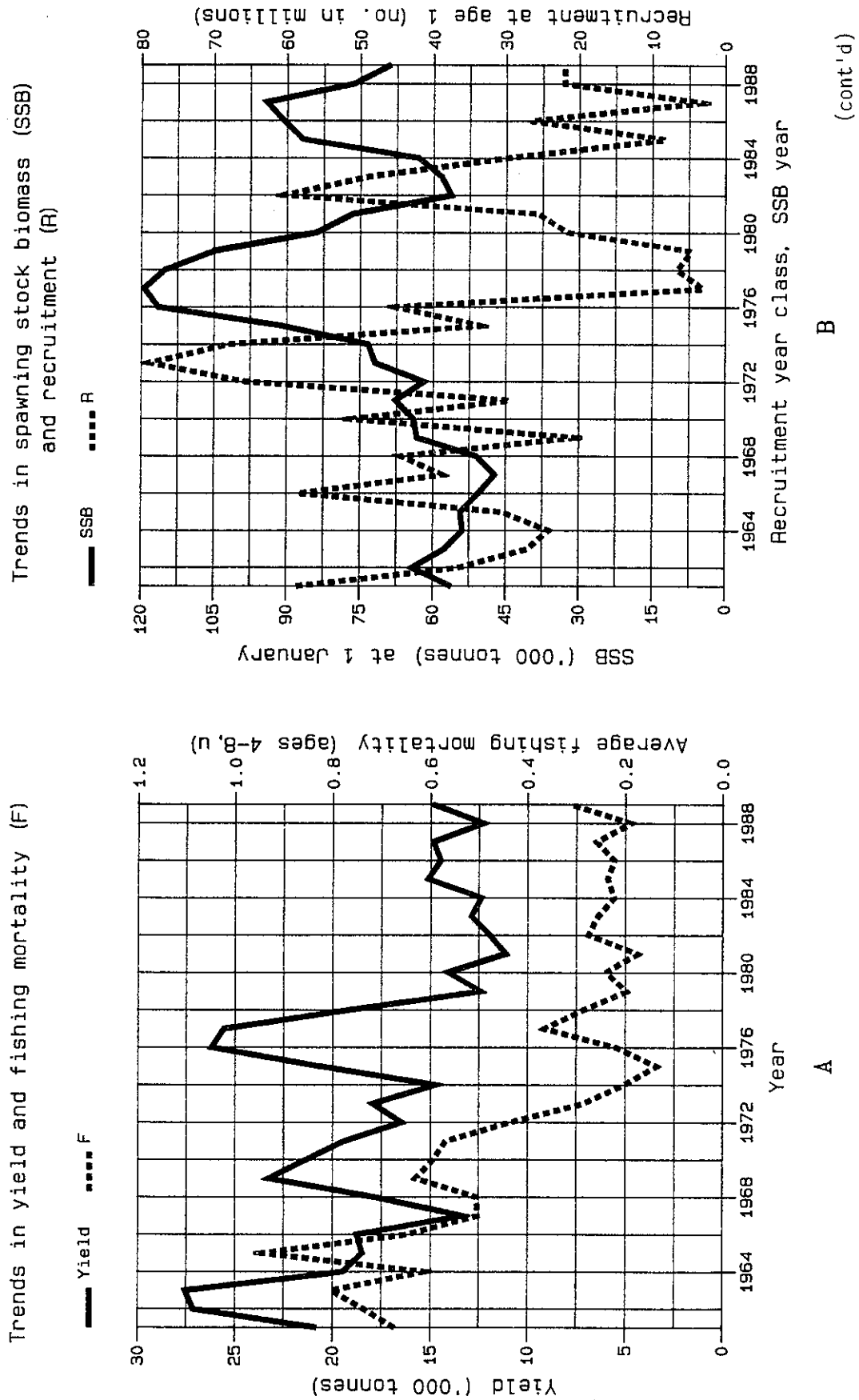
Short-term yield and spawning stock biomass



D

**FISH STOCK SUMMARY**  
**STOCK: Haddock in the Faroe Region**  
**16-05-1990**

Figure 2.10.4



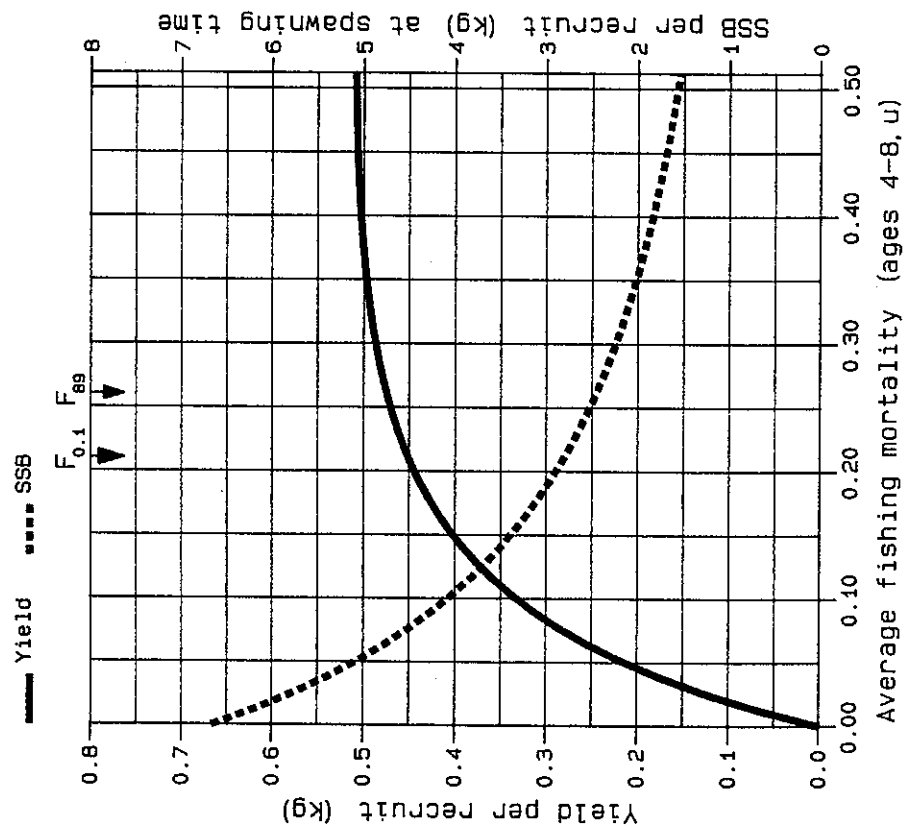
# FISH STOCK SUMMARY STOCK: Haddock in the Faroe Region

Figure 2.10.4 (cont'd)

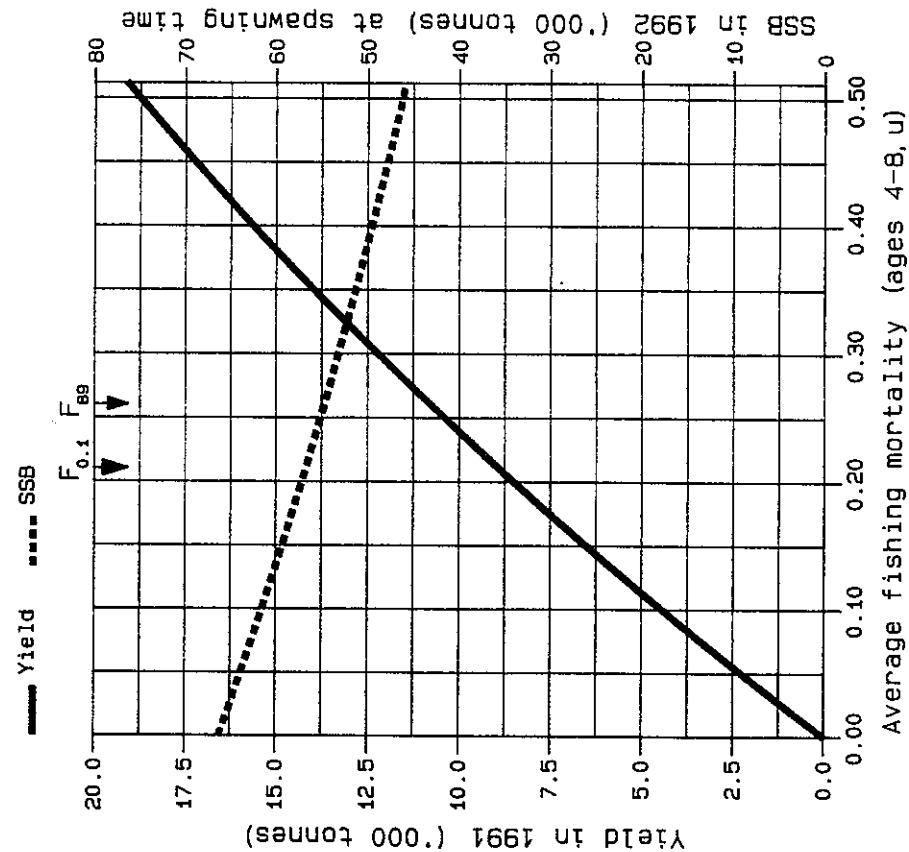
16-05-1990

Long-term yield and spawning stock biomass

Short-term yield and spawning stock biomass



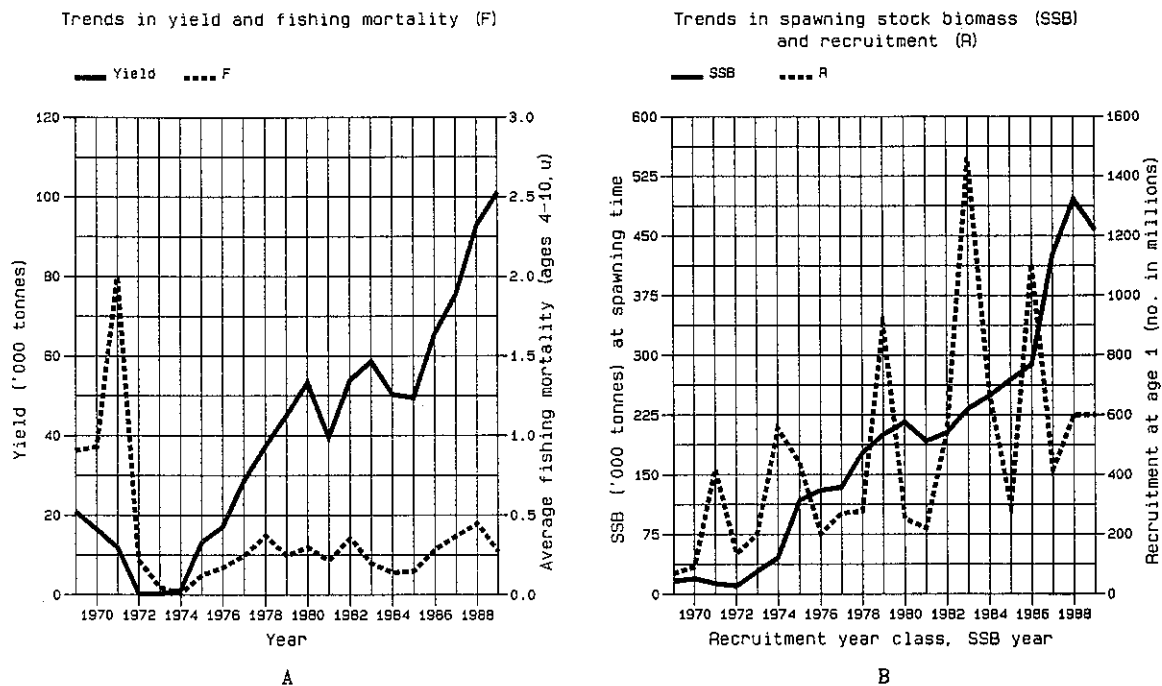
C



D

Figure 2.12.1

FISH STOCK SUMMARY  
STOCK: Herring - Va (Summer)  
19.10.1990



FISH STOCK SUMMARY  
STOCK: Herring - Va (Summer)  
19.10.1990

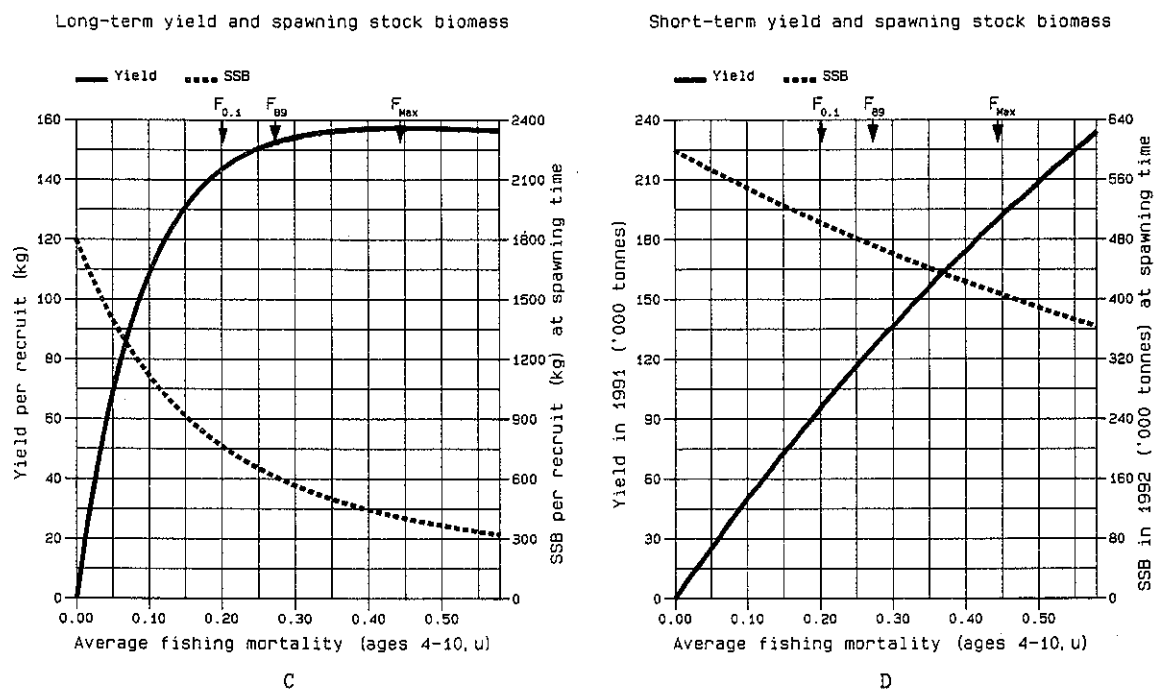


Figure 2.12.2.1 Norwegian spring spawning herring. Spawning stock size in weight for the years 1950-1988.

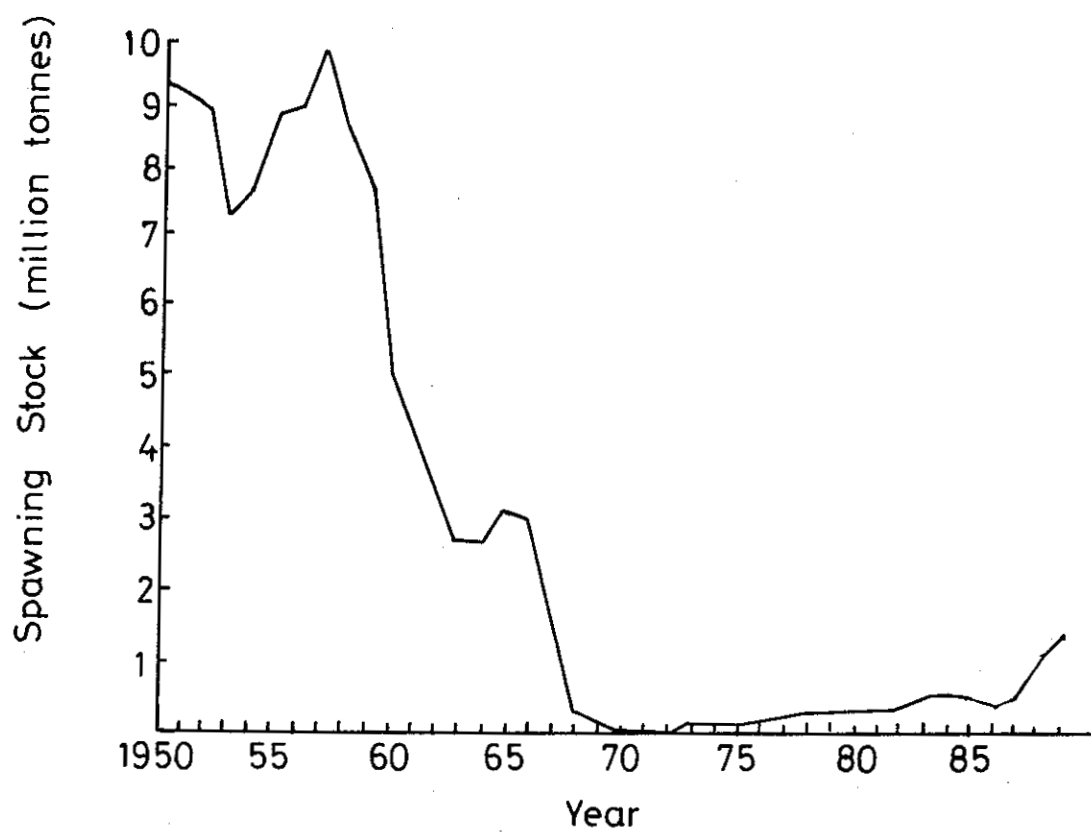
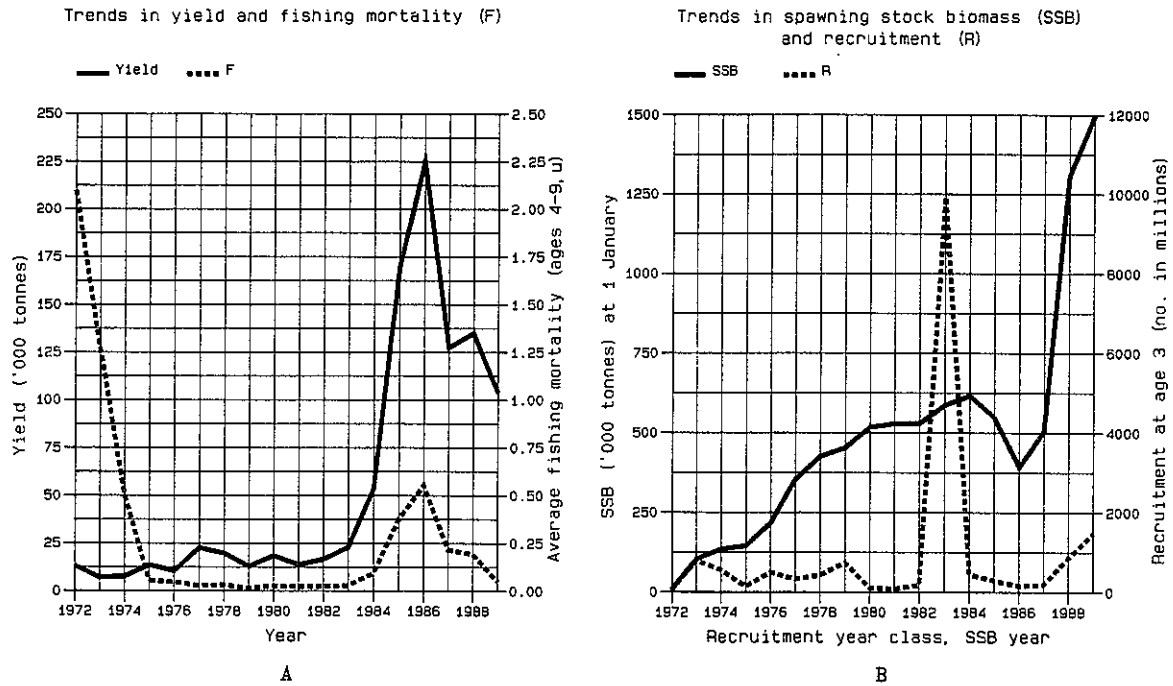
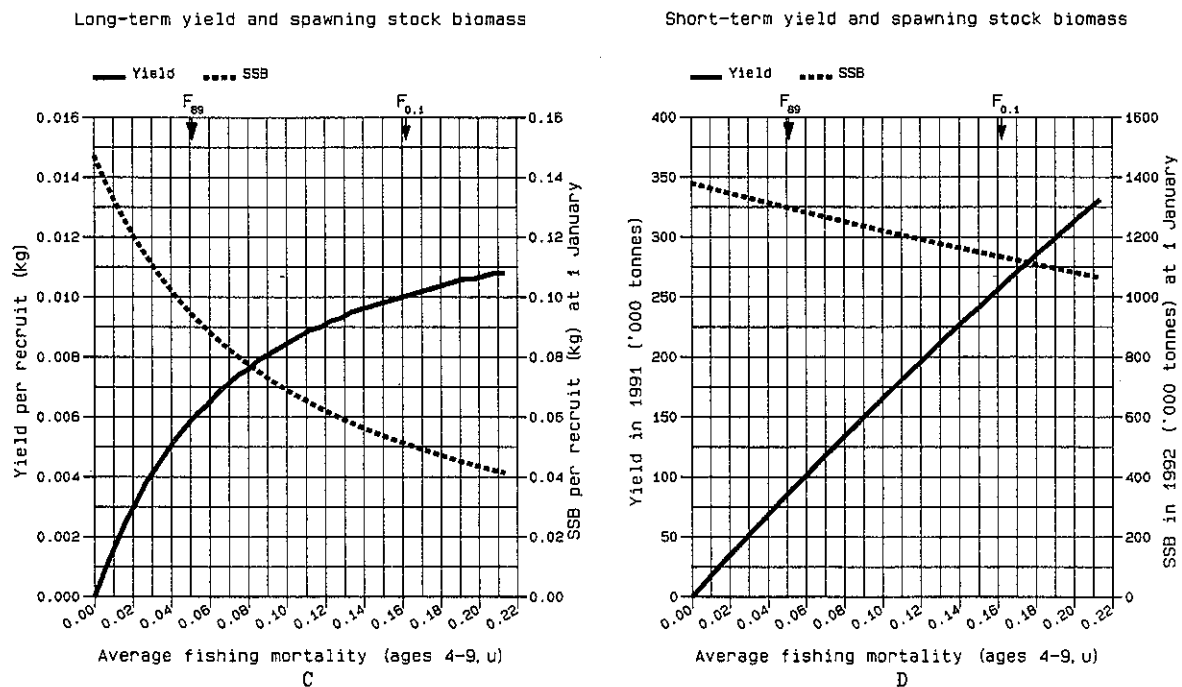


Figure 2.12.2.2.

**FISH STOCK SUMMARY**  
**STOCK: Norwegian Spring Spawning Herring**  
**19.10.1990**



**FISH STOCK SUMMARY**  
**STOCK: Norwegian Spring Spawning Herring**  
**19.10.1990**





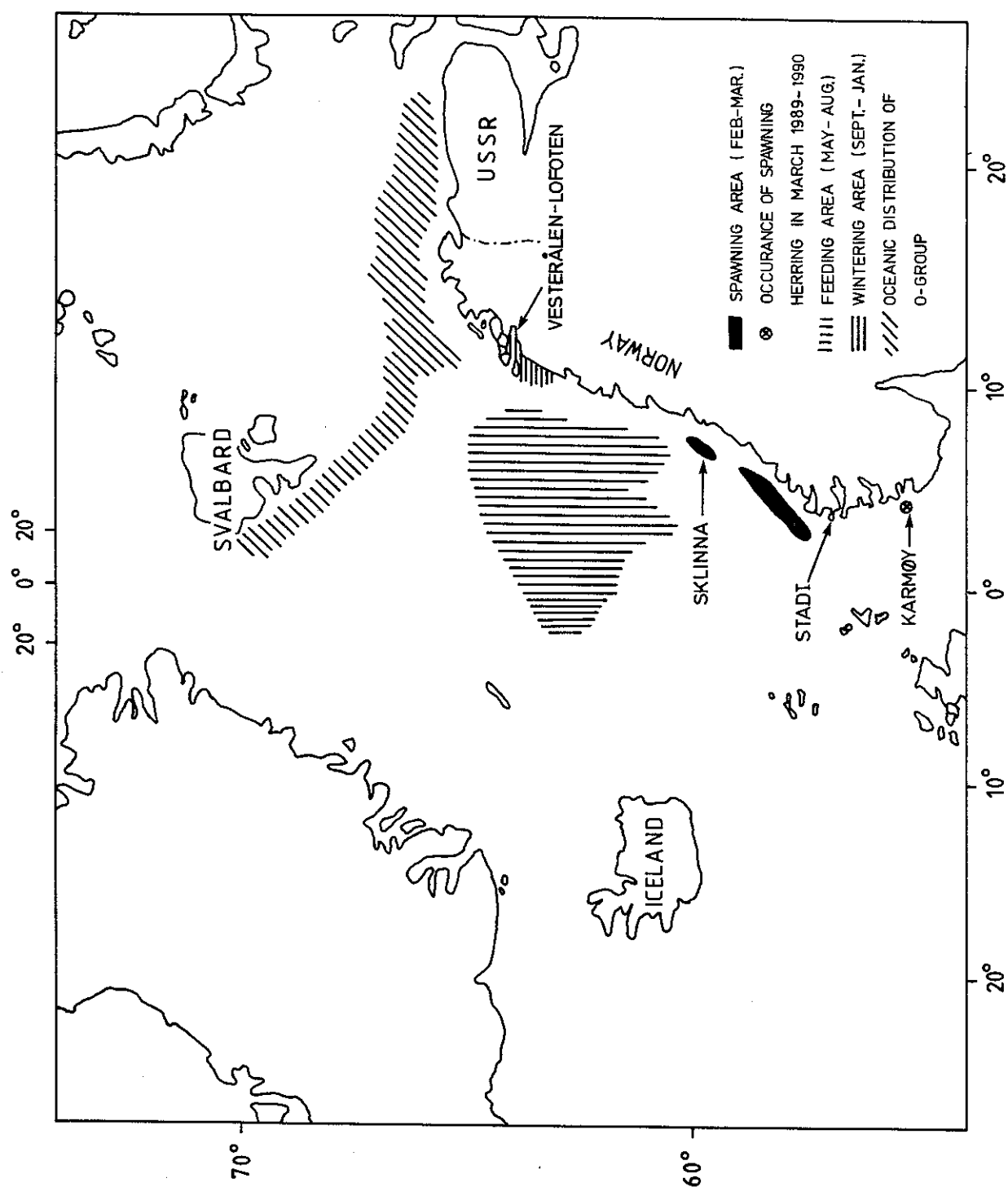
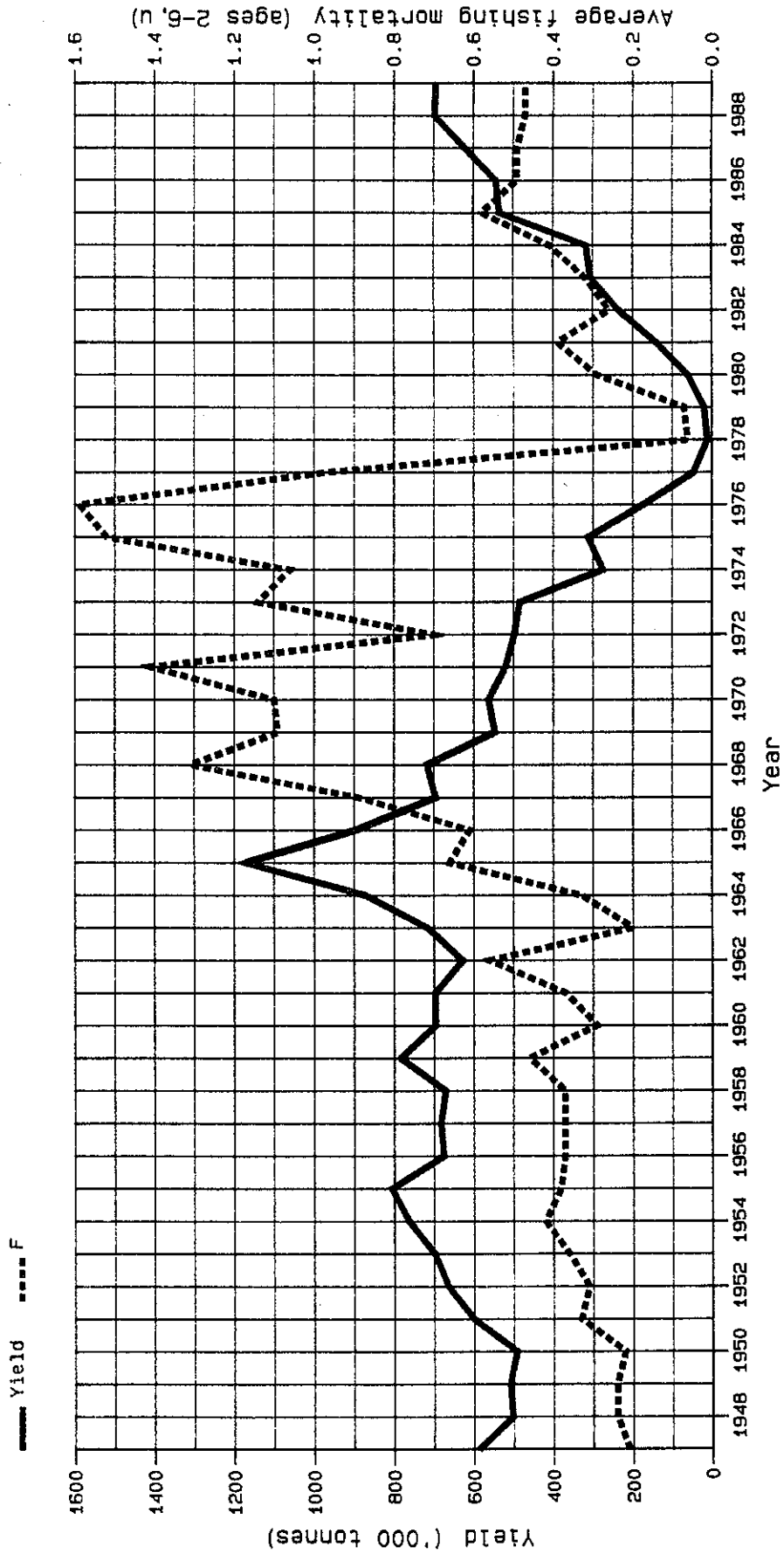


Figure 2.12.2.3 Distribution of Norwegian spring-spawning herring, 1987-1990.

FISH STOCK SUMMARY  
 STOCK: Herring - Total North Sea  
 03-05-1990

Figure 3.1.1.1

Trends in yield and fishing mortality (F)



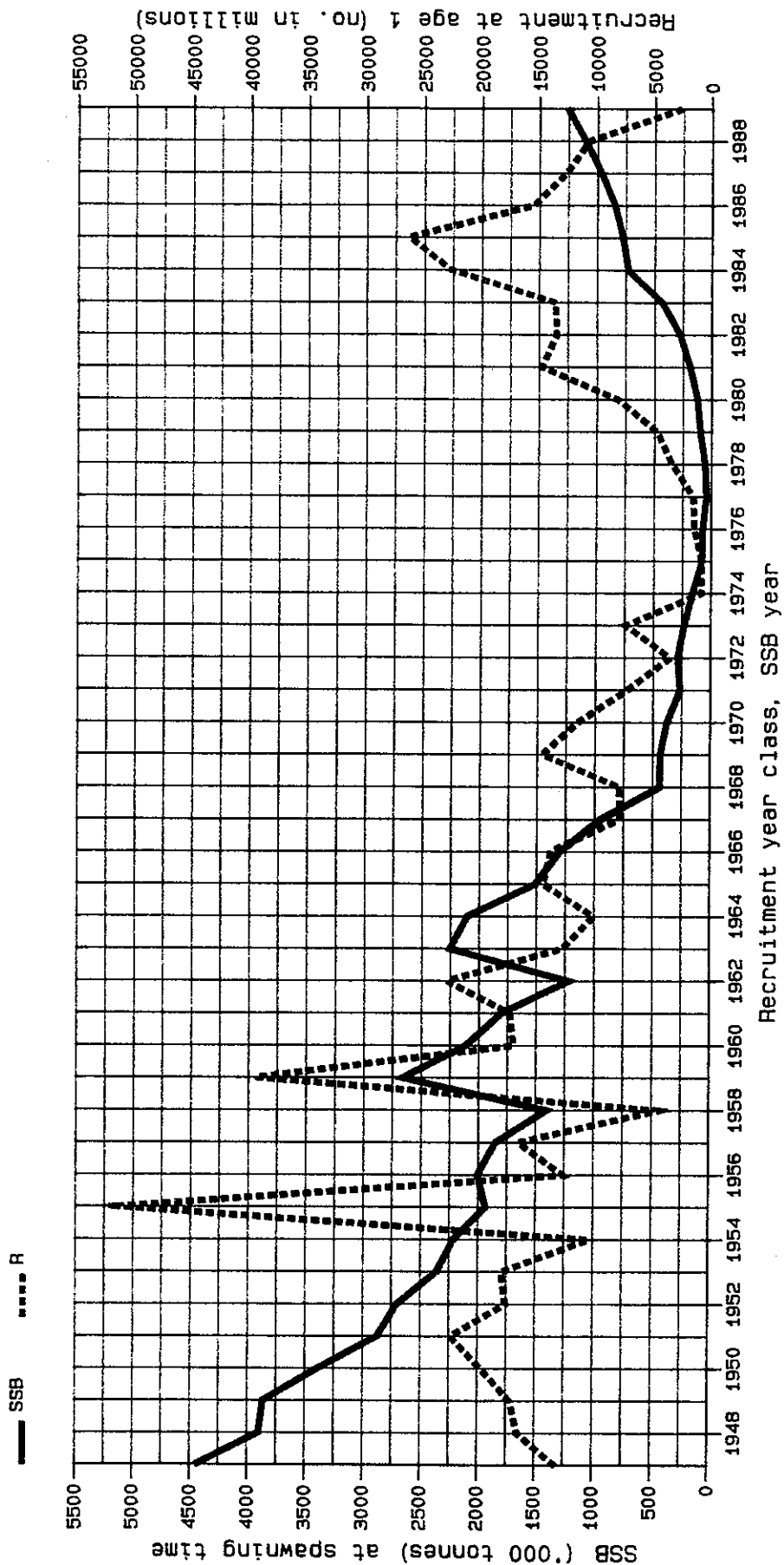
cont'd.

A

# FISH STOCK SUMMARY STOCK: Herring - Total North Sea 03-05-1990

Figure 3.1.1.1 cont'd.

Trends in spawning stock biomass (SSB)  
 and recruitment (R)



B

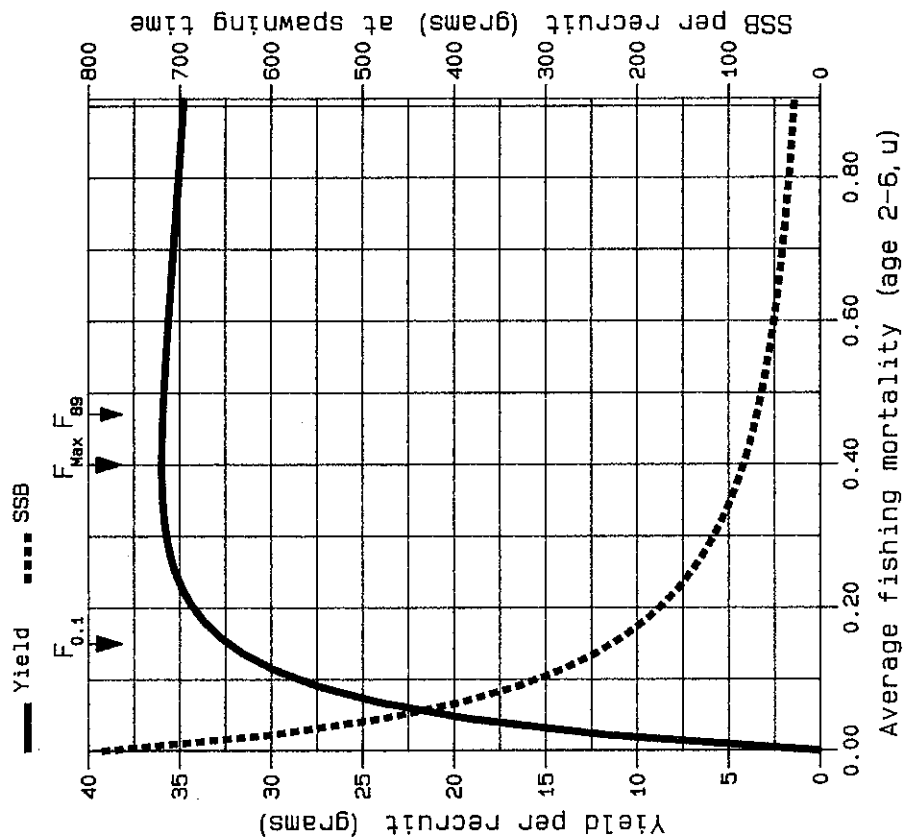
cont'd.

Figure 3.1.1.1 cont'd.

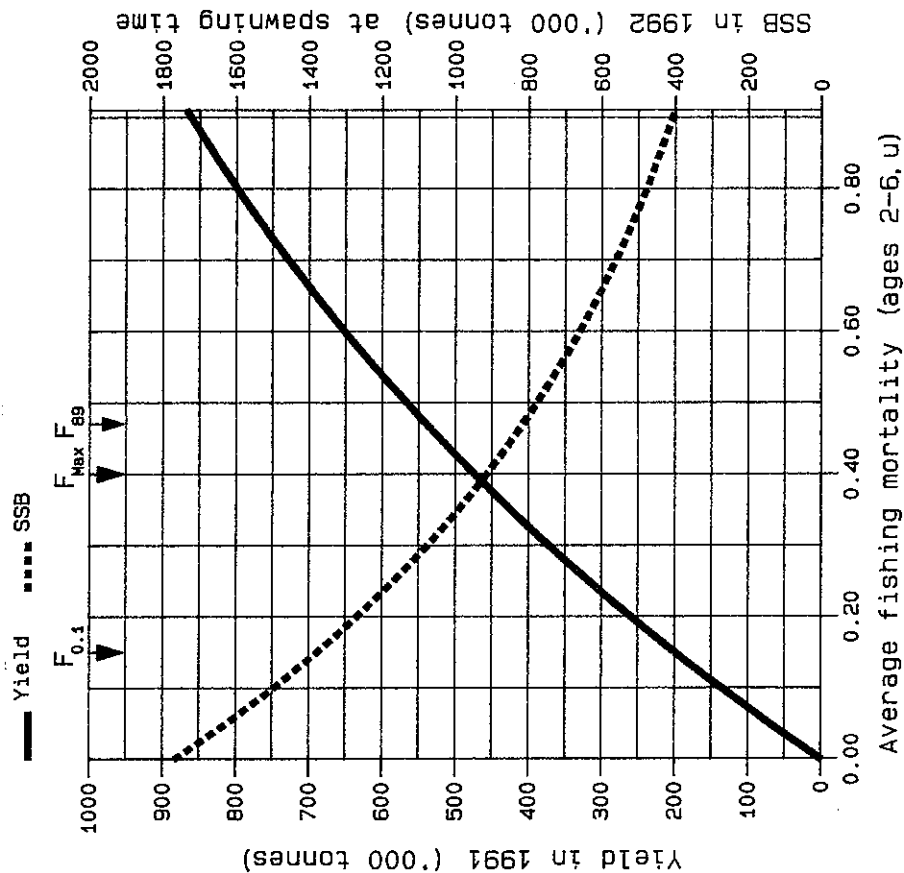
FISH STOCK SUMMARY  
STOCK: Herring - Total North Sea  
29-05-1990

Long-term yield and spawning stock biomass

Short-term yield and spawning stock biomass  
Assumes TAC in 1990



C



cont'd.

D

Figure 3.1.1.1 cont'd.

# FISH STOCK SUMMARY STOCK: Herring - Total North Sea 29-05-1990

Short-term yield and spawning stock biomass  
 Assumes 1990 catch = 580,000 t.

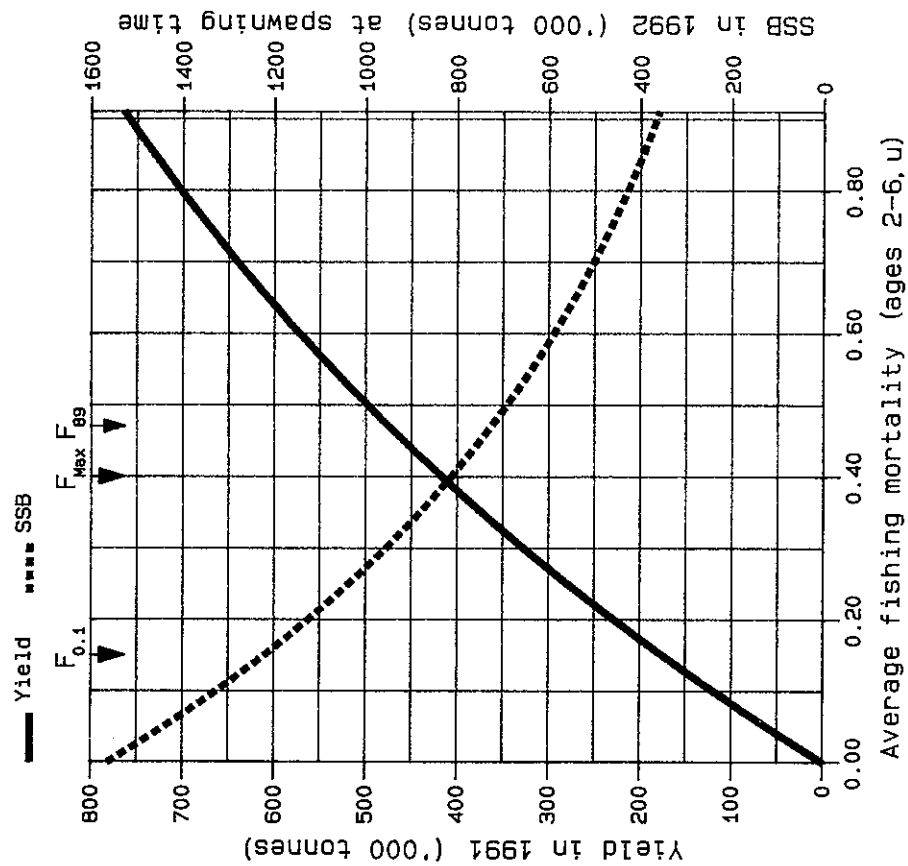
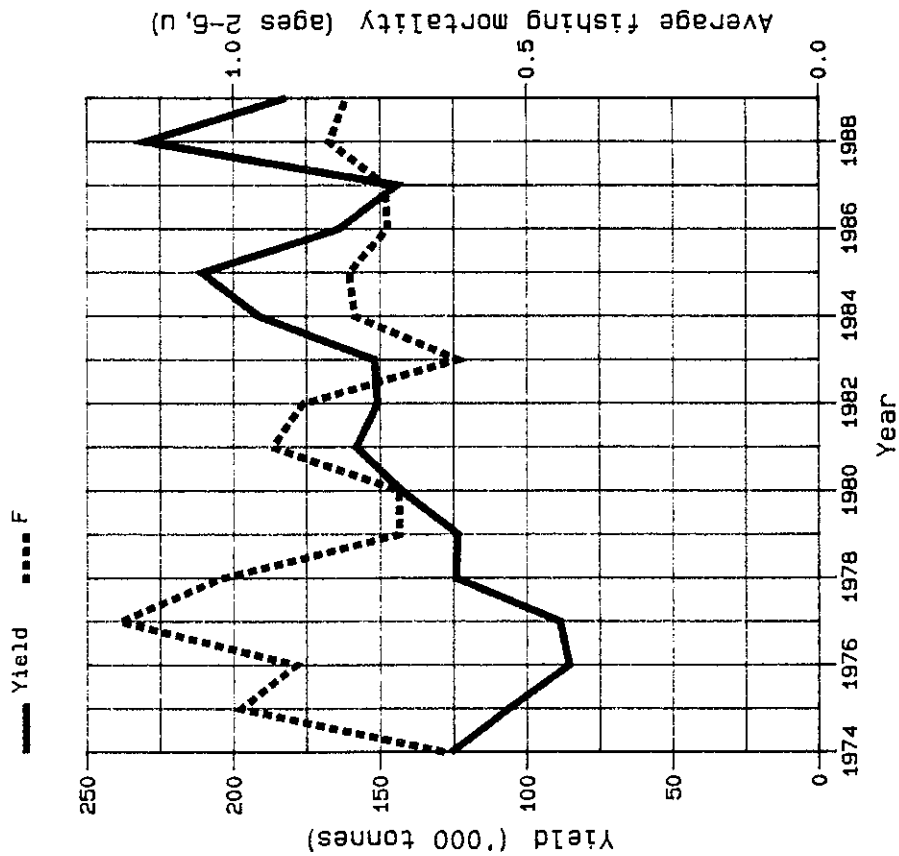


Figure 3.1.3

# FISH STOCK SUMMARY STOCK: Herring in the Western Baltic and Kattegat

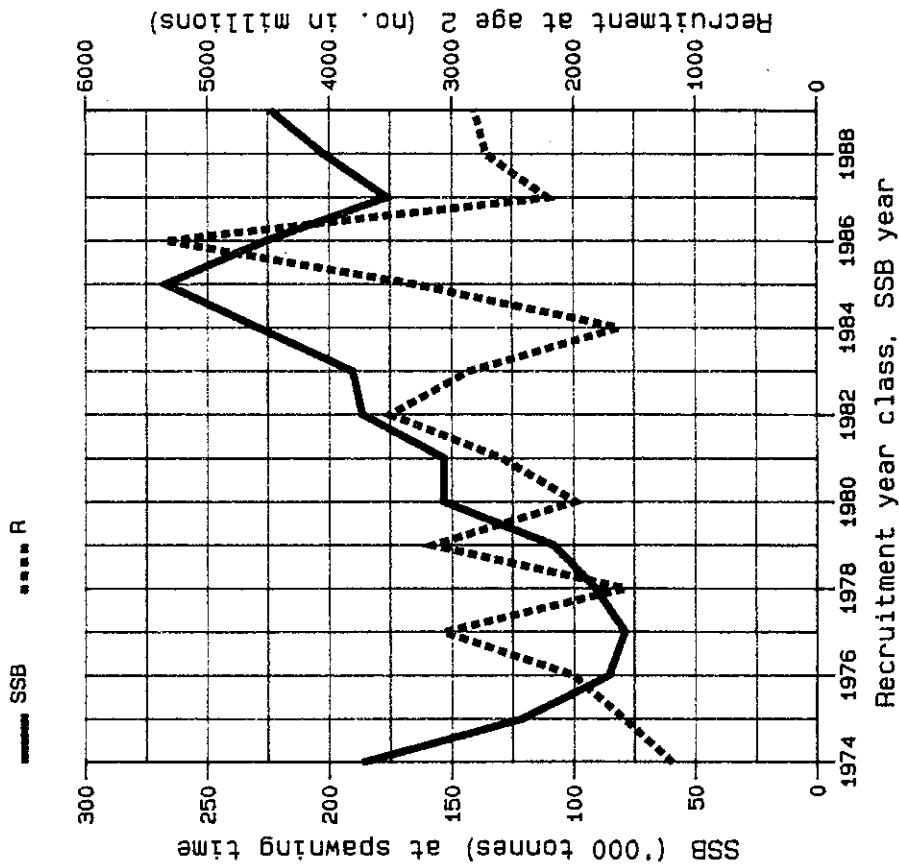
07-05-1990

Trends in yield and fishing mortality (F)



A

Trends in spawning stock biomass (SSB) and recruitment (R)



B cont'd.

Figure 3.1.3 cont'd.

# FISH STOCK SUMMARY

STOCK: Herring in the Western Baltic and Kattegat

07-05-1990

Long-term yield and spawning stock biomass

Short-term yield and spawning stock biomass

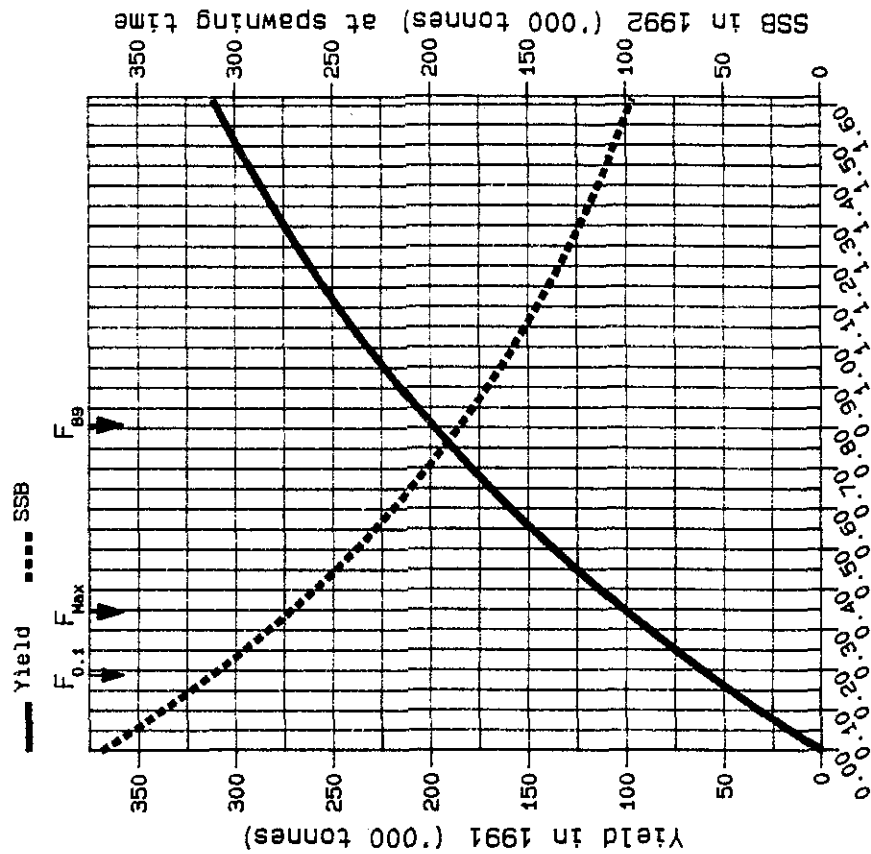
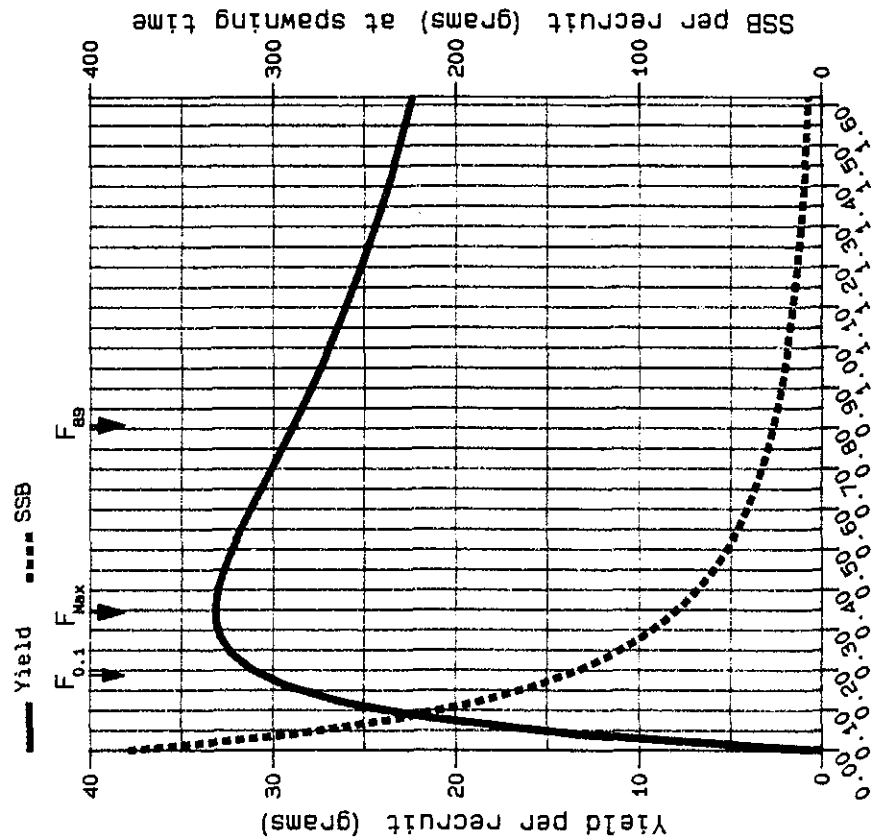


Figure 3.1.4.1 Recommended seasonal closures of herring spawning grounds in the Celtic Sea and Division VIIj herring stock.

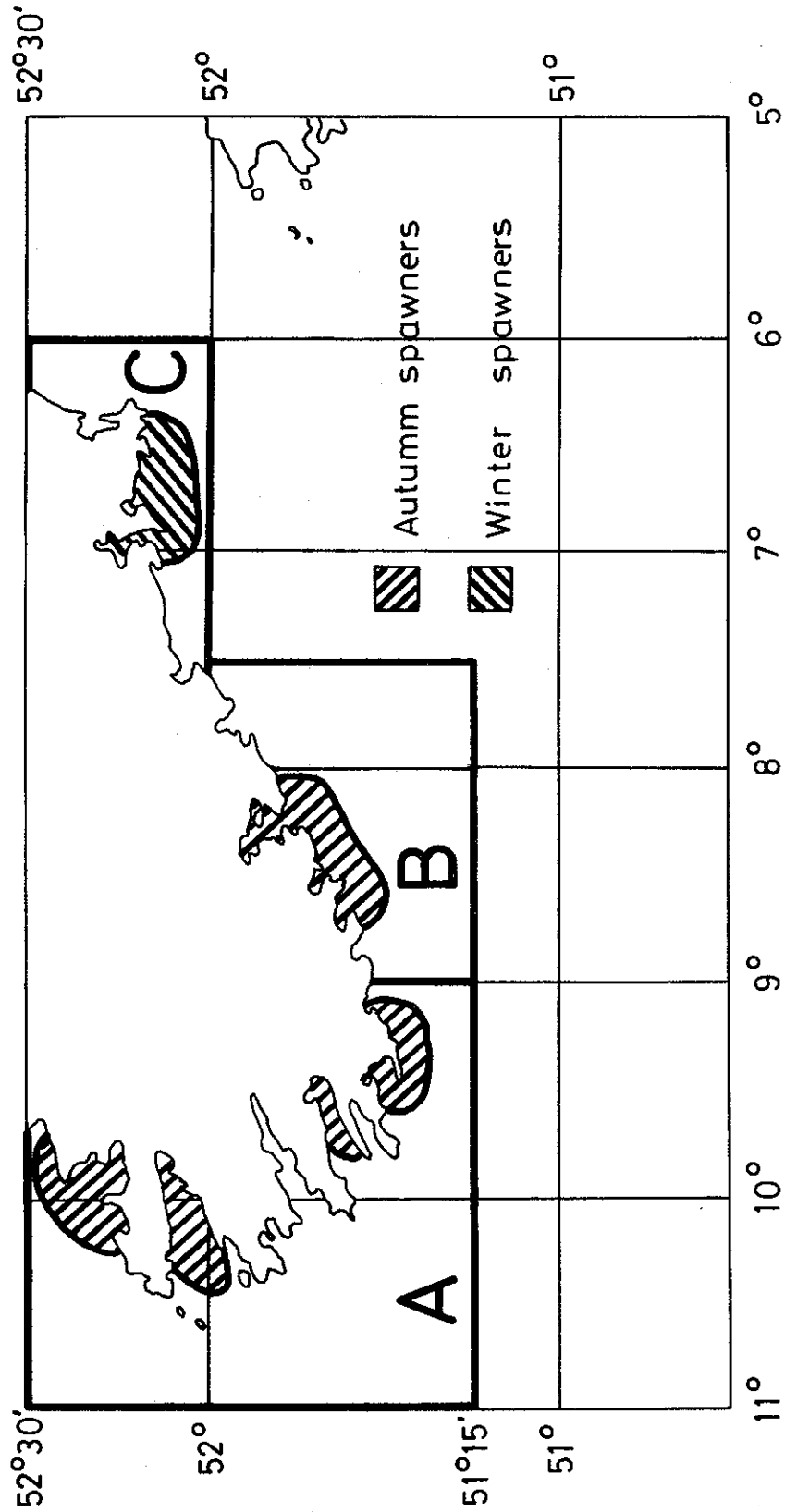
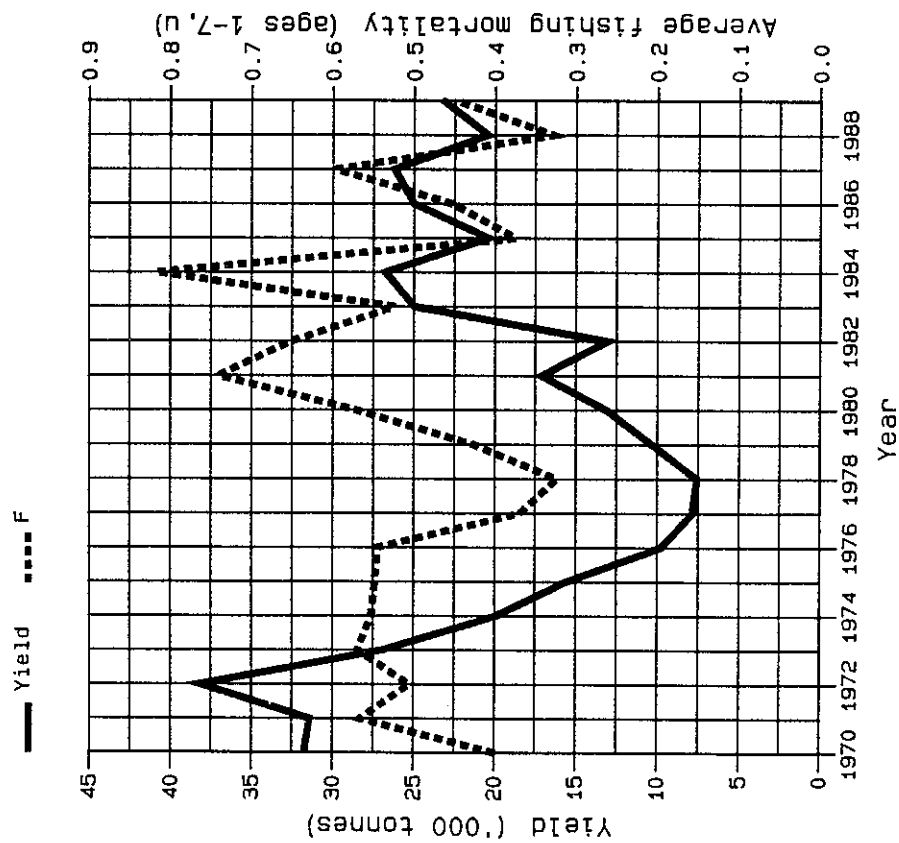




Figure 3.1.4.2

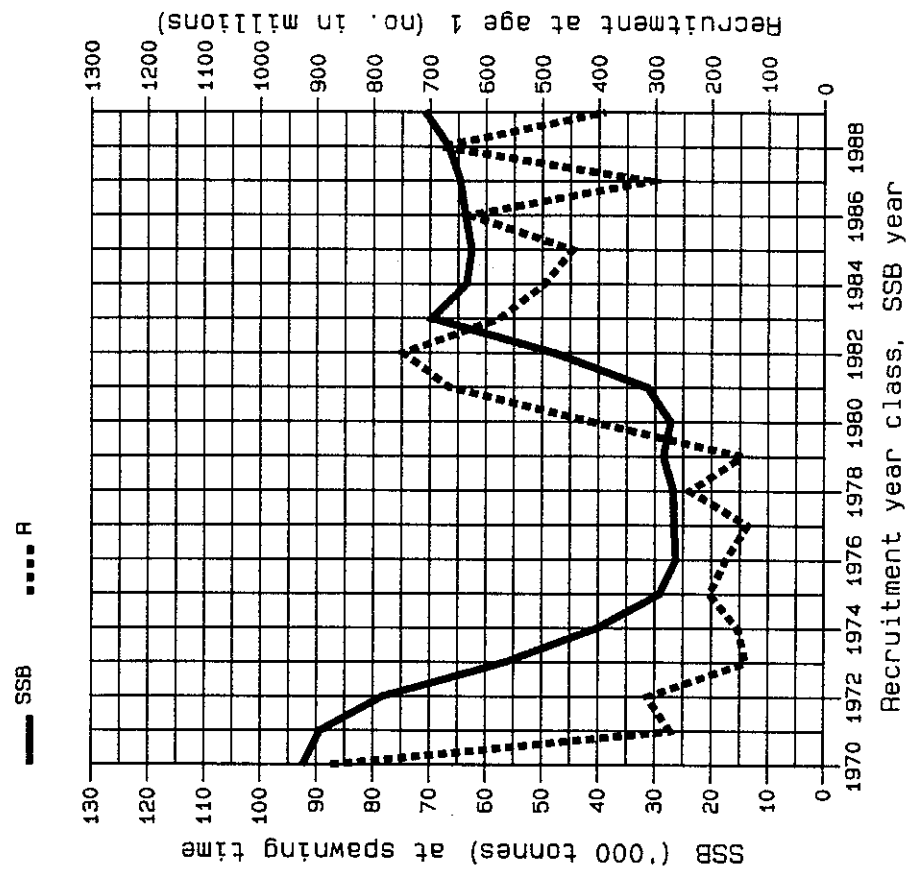
# FISH STOCK SUMMARY STOCK: Herring - South and South West of Ireland 26-04-1990

Trends in yield and fishing mortality (F)



A

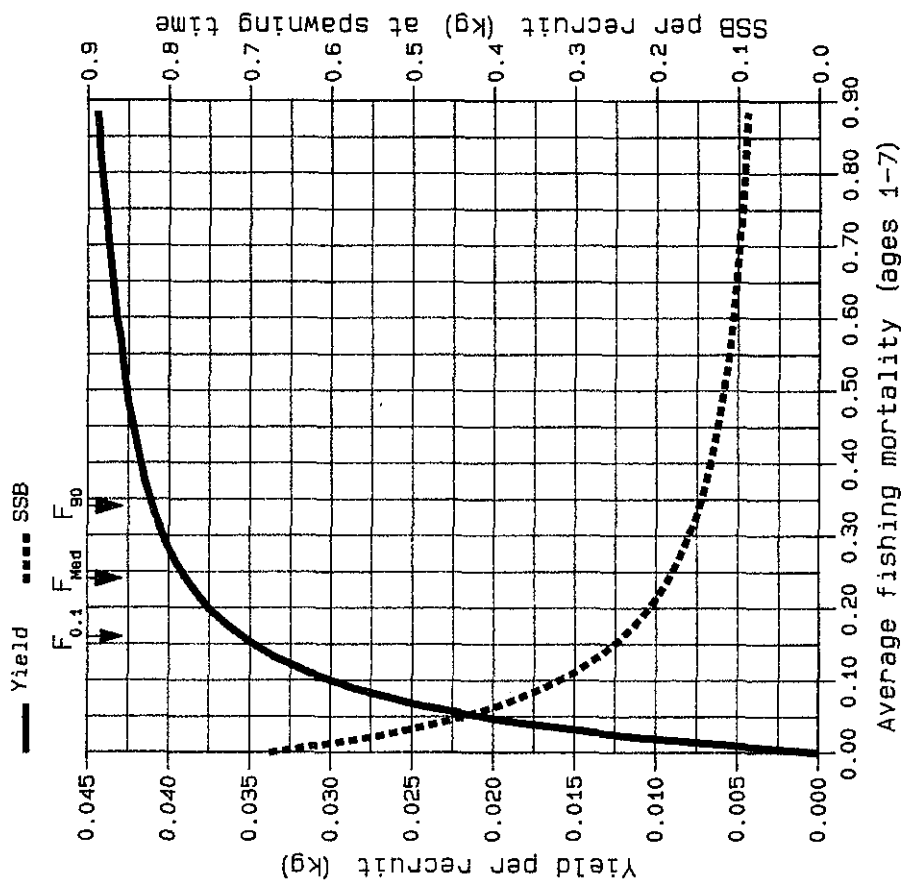
Trends in spawning stock biomass (SSB) and recruitment (R)



B    cont'd.

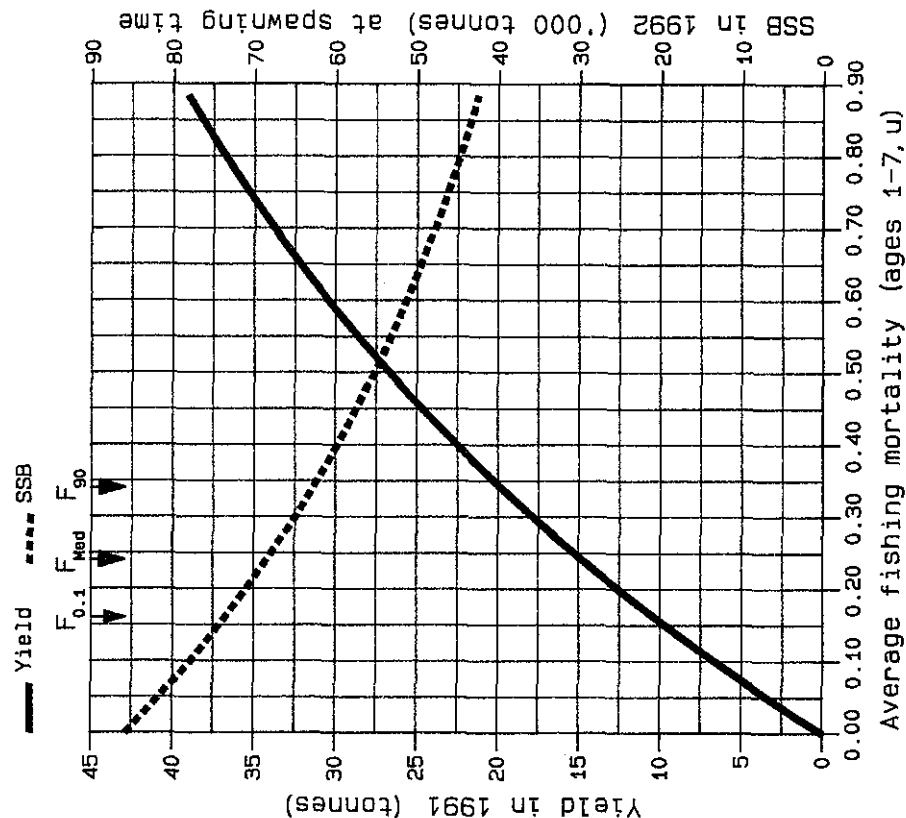
Figure 3.1.1.4.2 cont'd.  
 FISH STOCK SUMMARY  
 STOCK: Herring - South and South West of Ireland  
 30-05-1990

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass

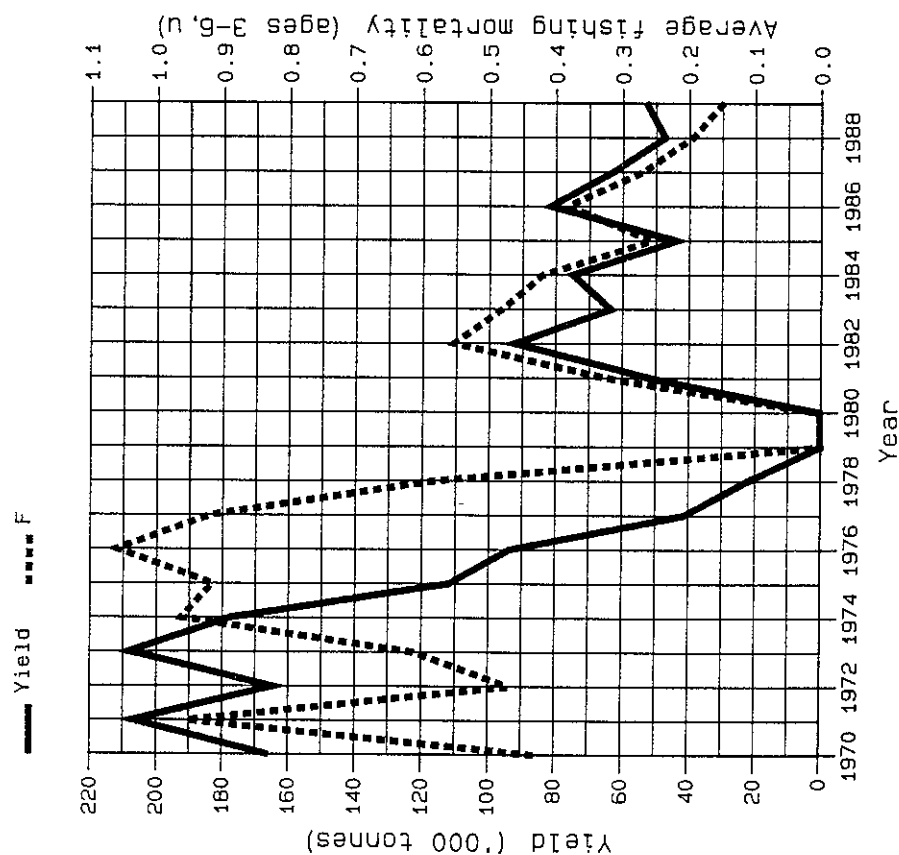


D

Figure 3.1.5

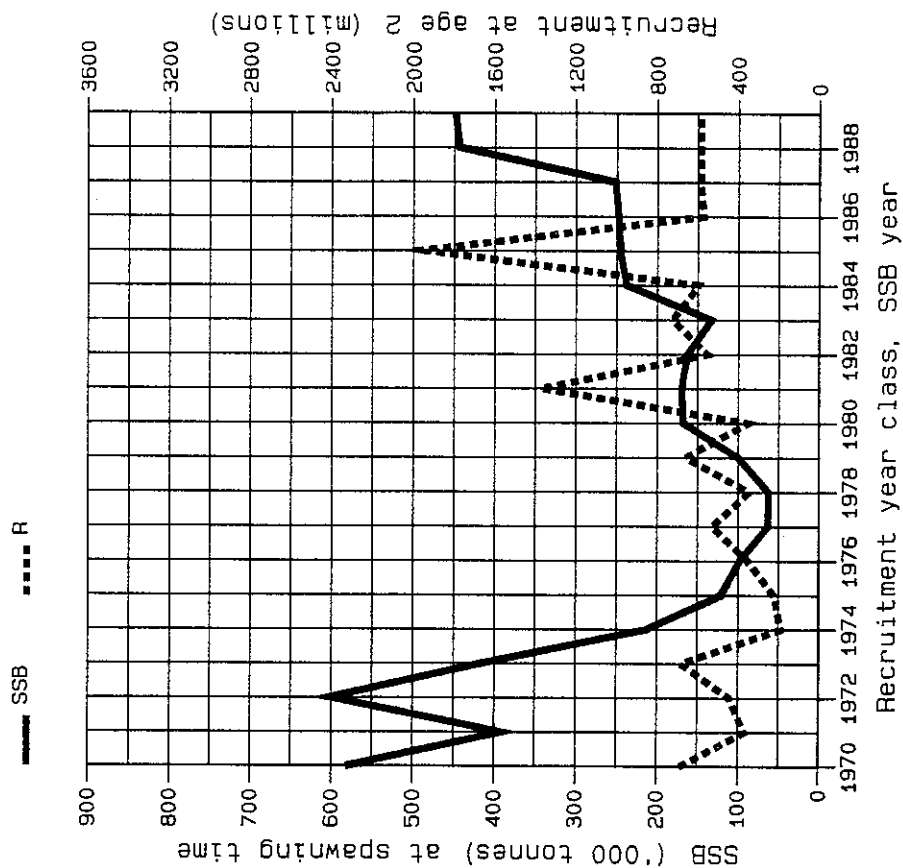
FISH STOCK SUMMARY  
STOCK: Herring - VIa North  
30-04-1990

Trends in yield and fishing mortality (F)



A

Trends in spawning stock biomass (SSB) and recruitment (R)

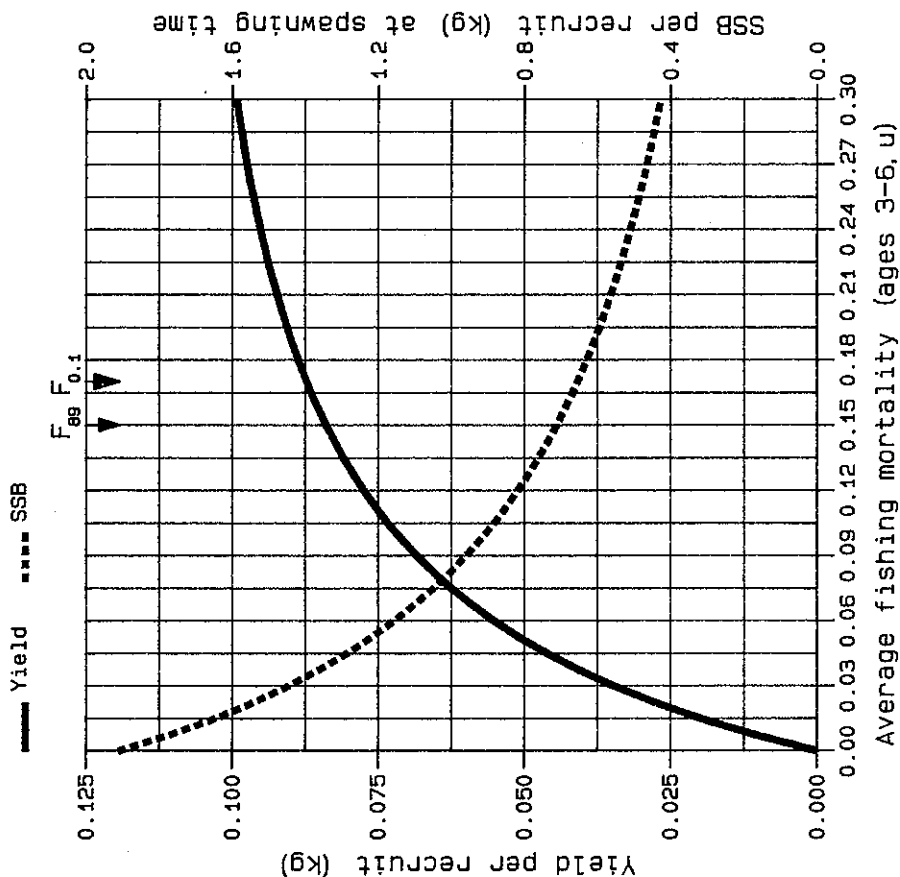


B cont'd.

# FISH STOCK SUMMARY STOCK: Herring - Via North 30-05-1990

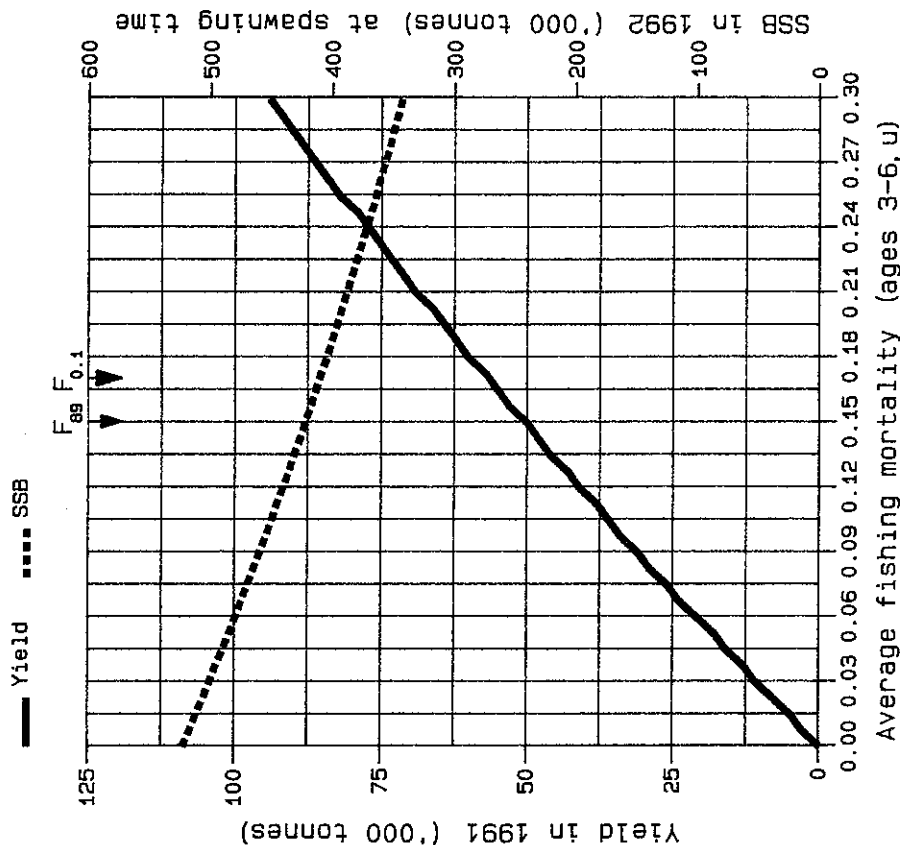
Figure 3.1.5 cont'd.

Long-term yield and spawning stock biomass



C

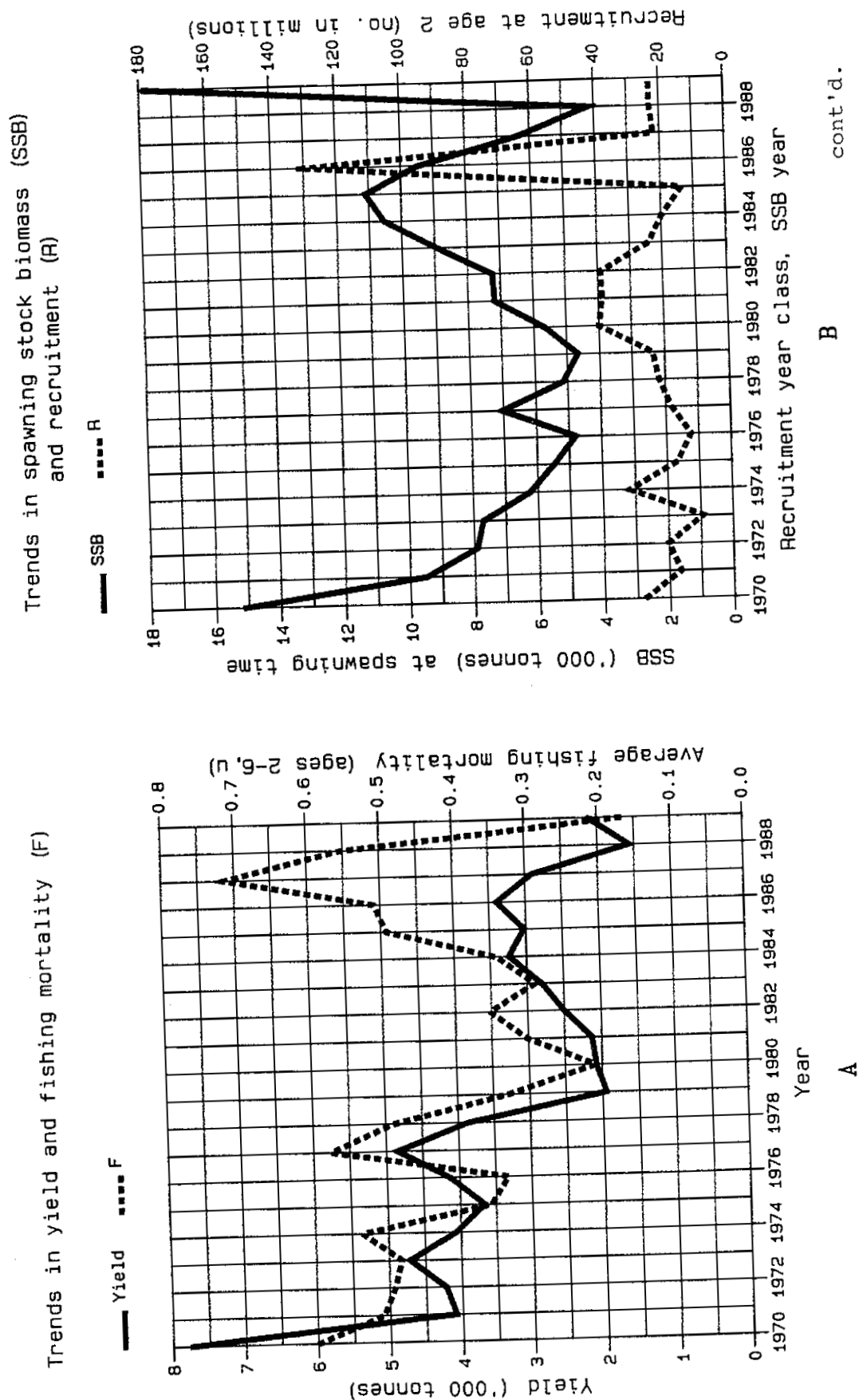
Short-term yield and spawning stock biomass



D

# FISH STOCK SUMMARY STOCK: Clyde Herring 30-04-1990

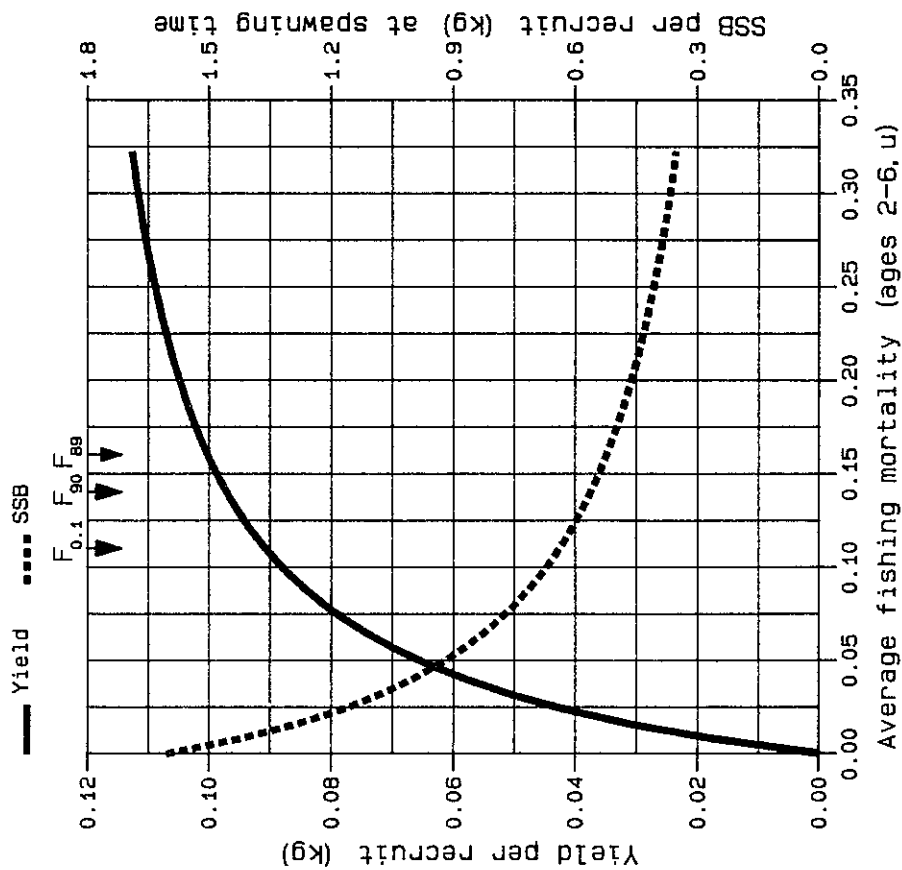
Figure 3.1.6



FISH STOCK SUMMARY  
STOCK: Clyde Herring  
30.04.1990

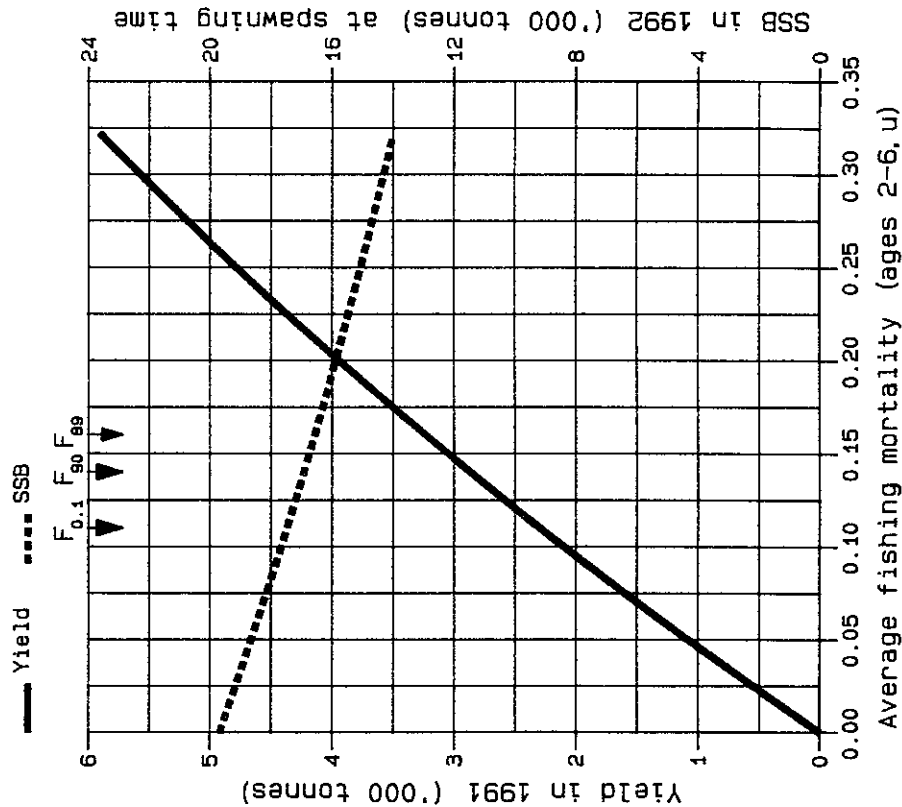
Figure 3.1.6 cont'd.

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass



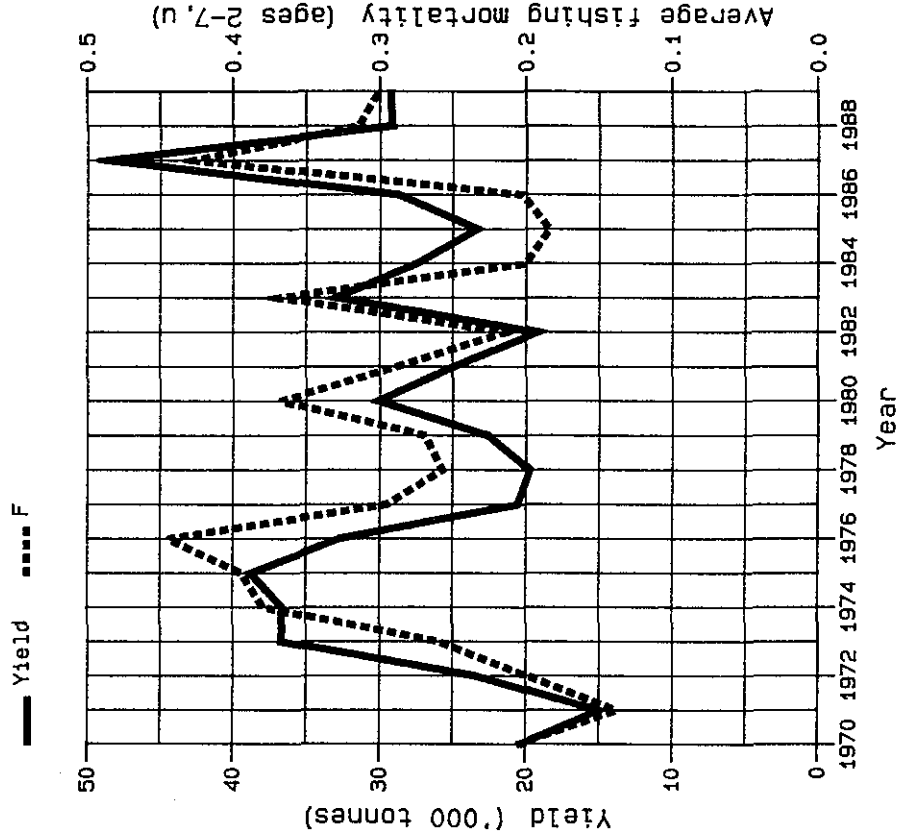
D

Figure 3.1.7

FISH STOCK SUMMARY  
STOCK: Herring - VIa (South) and VIIb,c

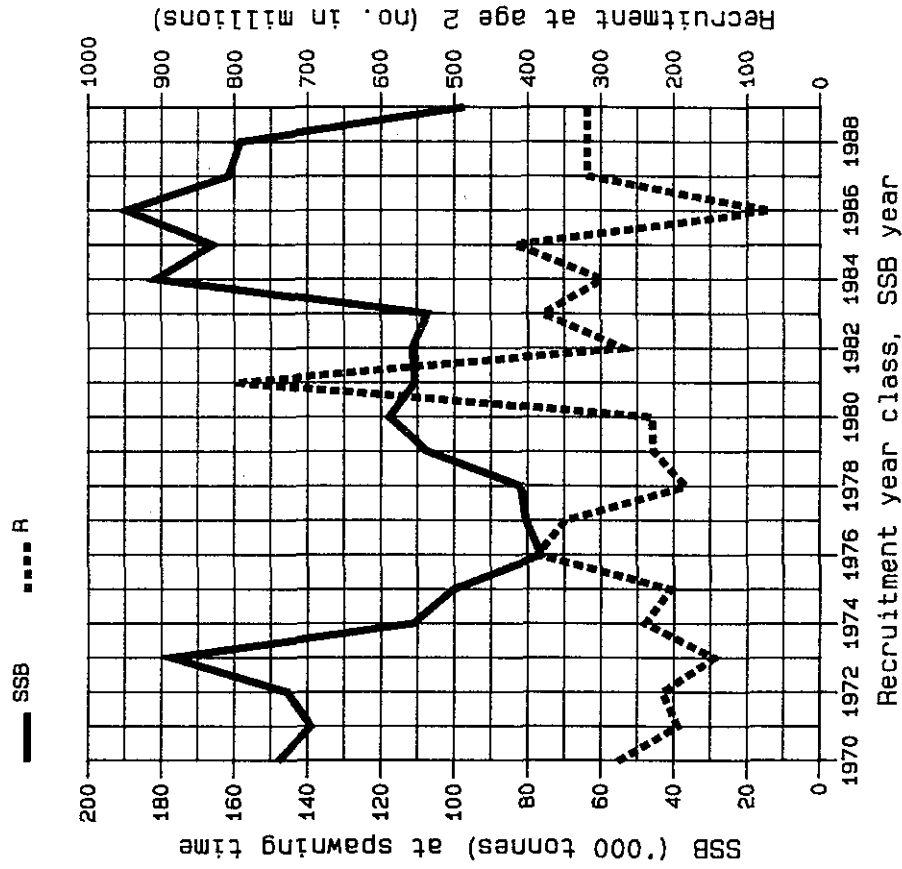
01.05.1990

Trends in yield and fishing mortality (F)



A

Trends in spawning stock biomass (SSB) and recruitment (R)



cont'd.

B

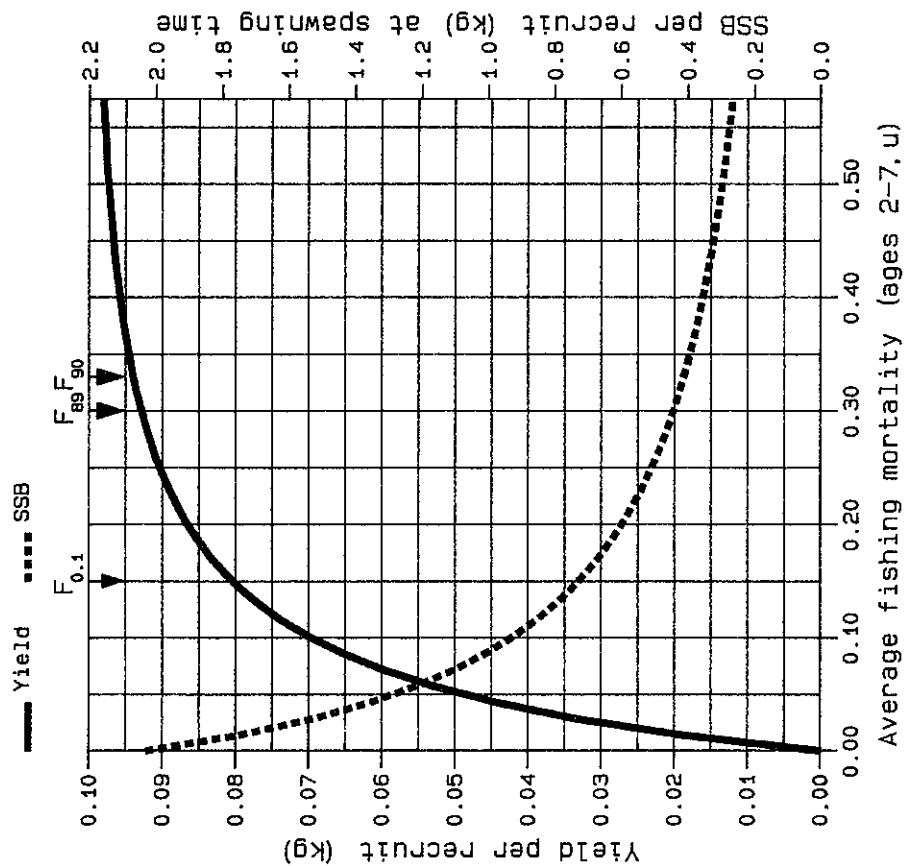
Figure 3.1.7 cont'd.

# FISH STOCK SUMMARY

STOCK: Herring - VIa (South) and VIIb,c

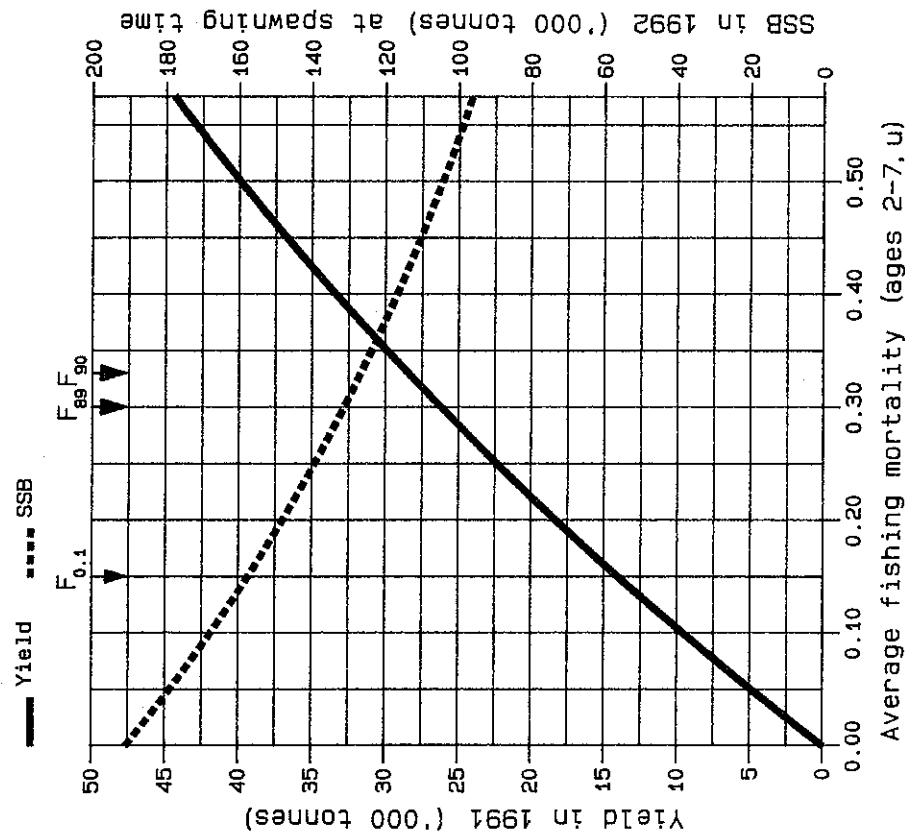
30-05-1990

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass



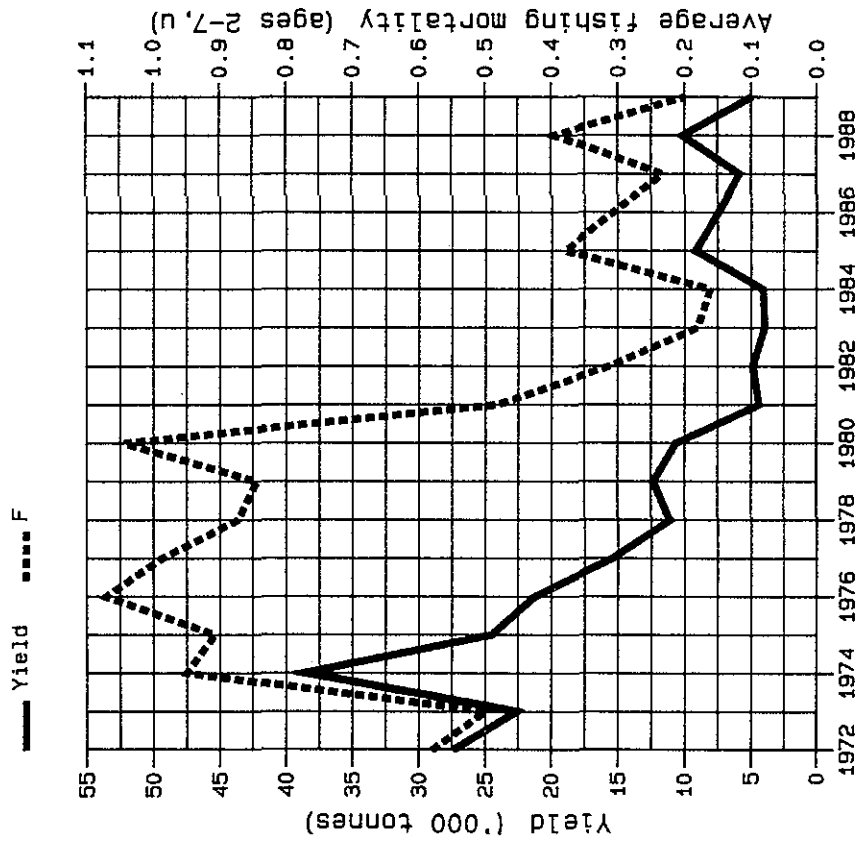
D



# FISH STOCK SUMMARY STOCK: Herring - Northern Irish Sea 30.04.1990

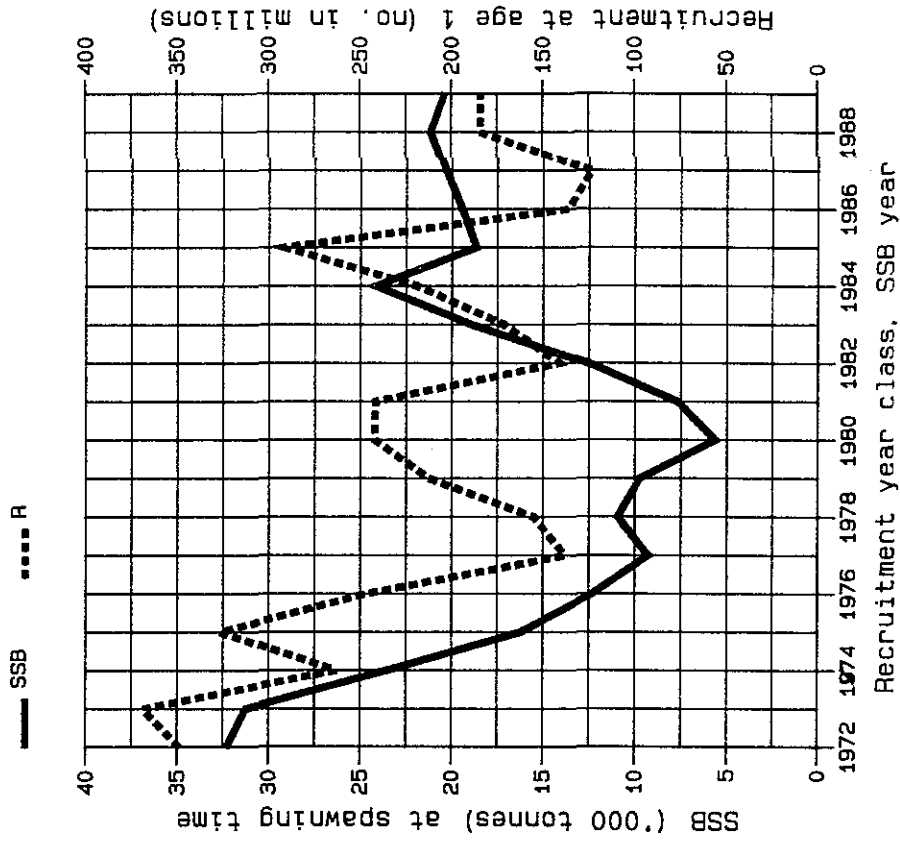
Figure 3.1.8

Trends in yield and fishing mortality (F)



A

Trends in spawning stock biomass (SSB) and recruitment (R)



B

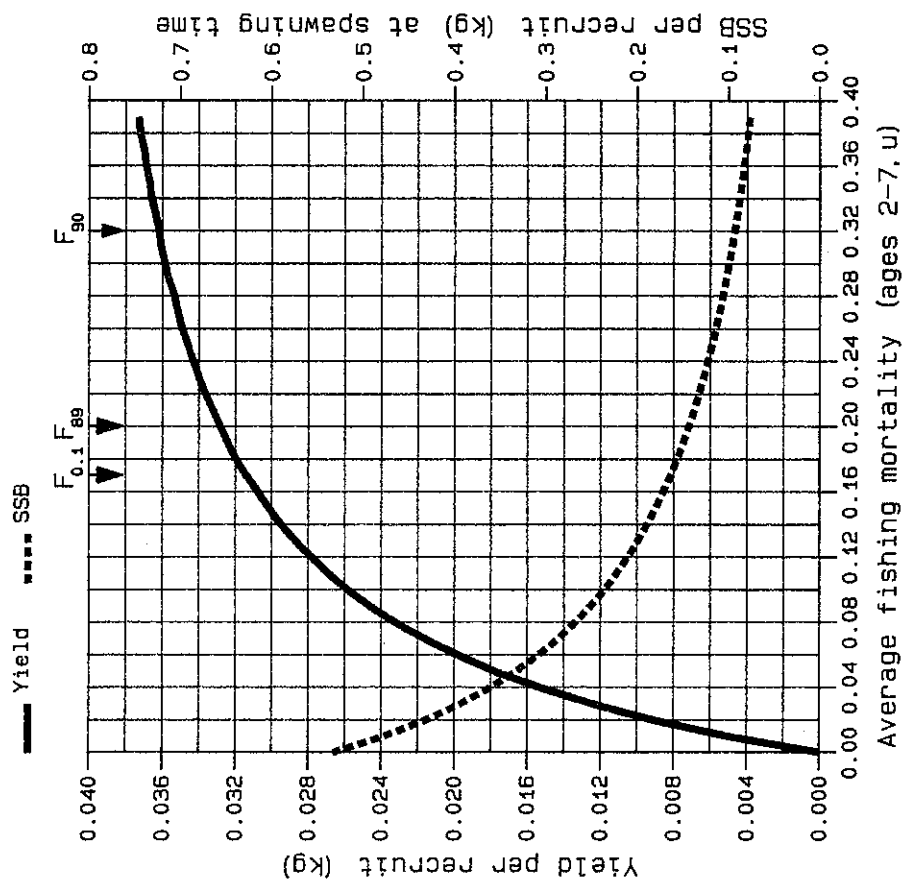
cont'd.

Figure 3.1.8 cont'd.

# FISH STOCK SUMMARY STOCK: Herring - Northern Irish Sea 30.05.1990

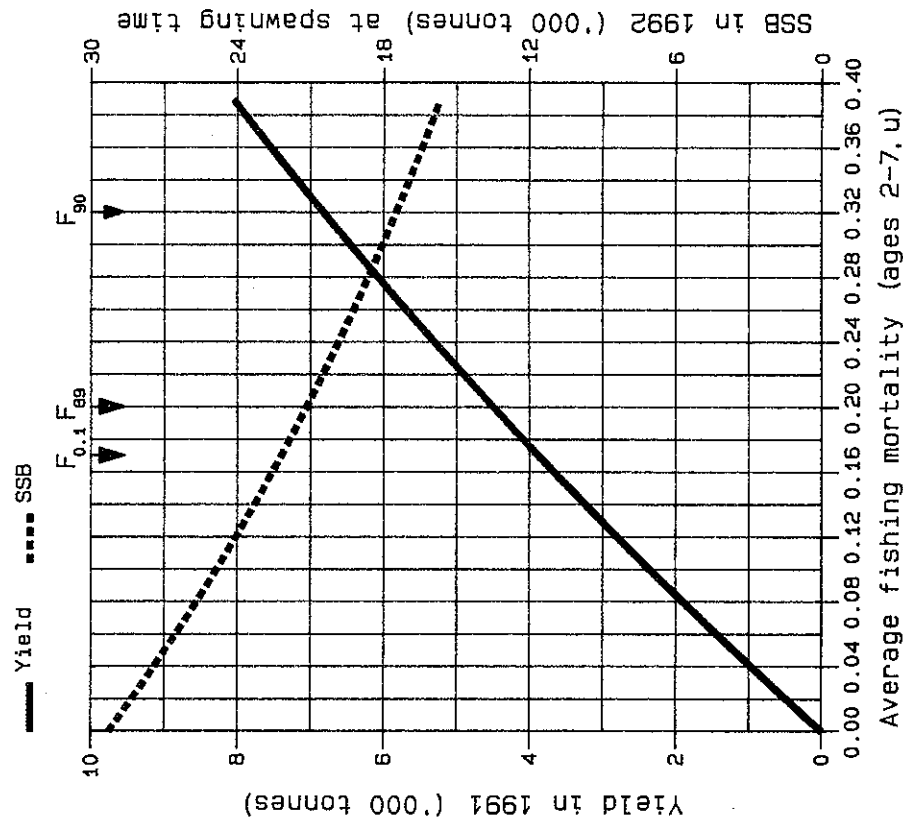
326

Long-term yield and spawning stock biomass



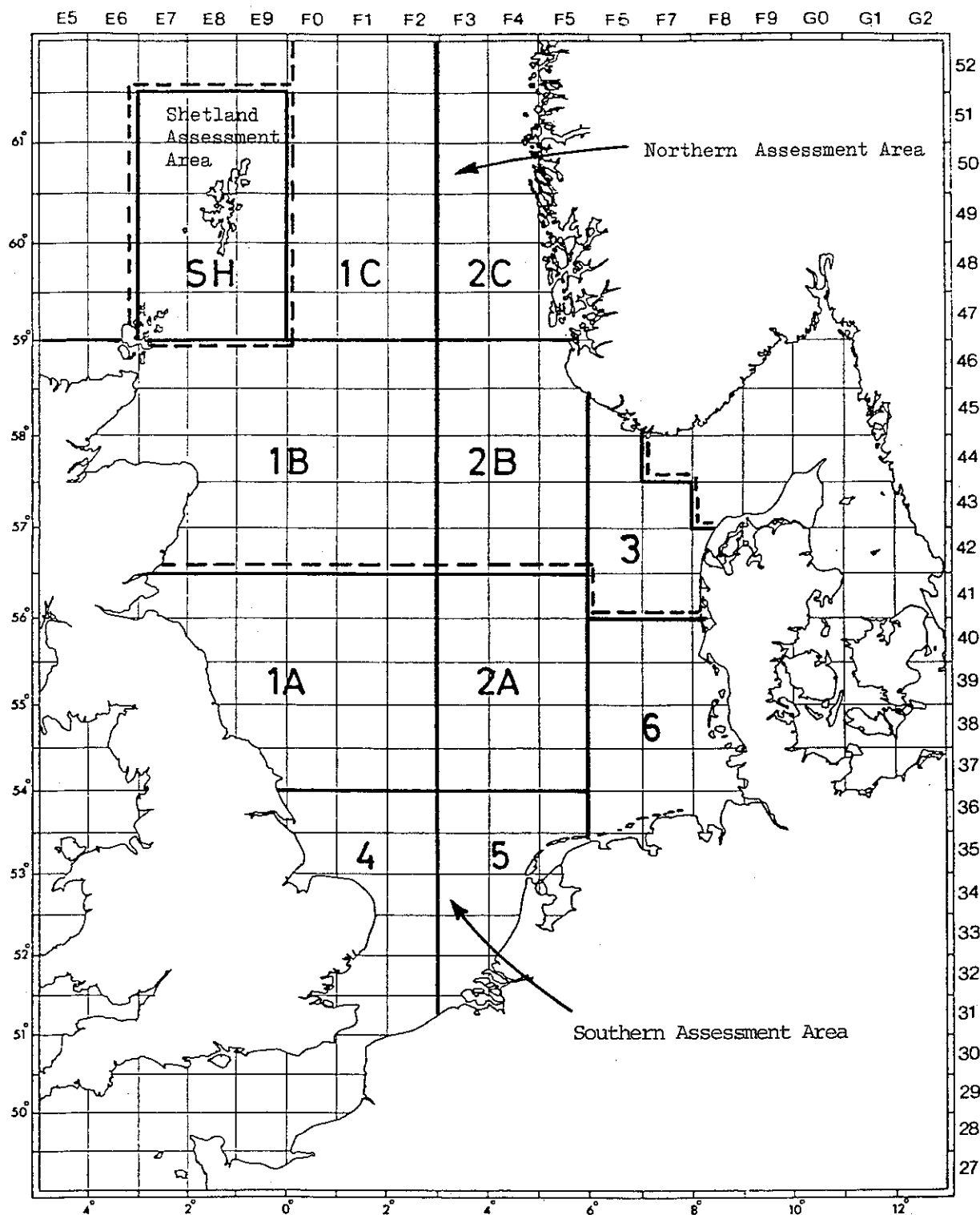
C

Short-term yield and spawning stock biomass



D

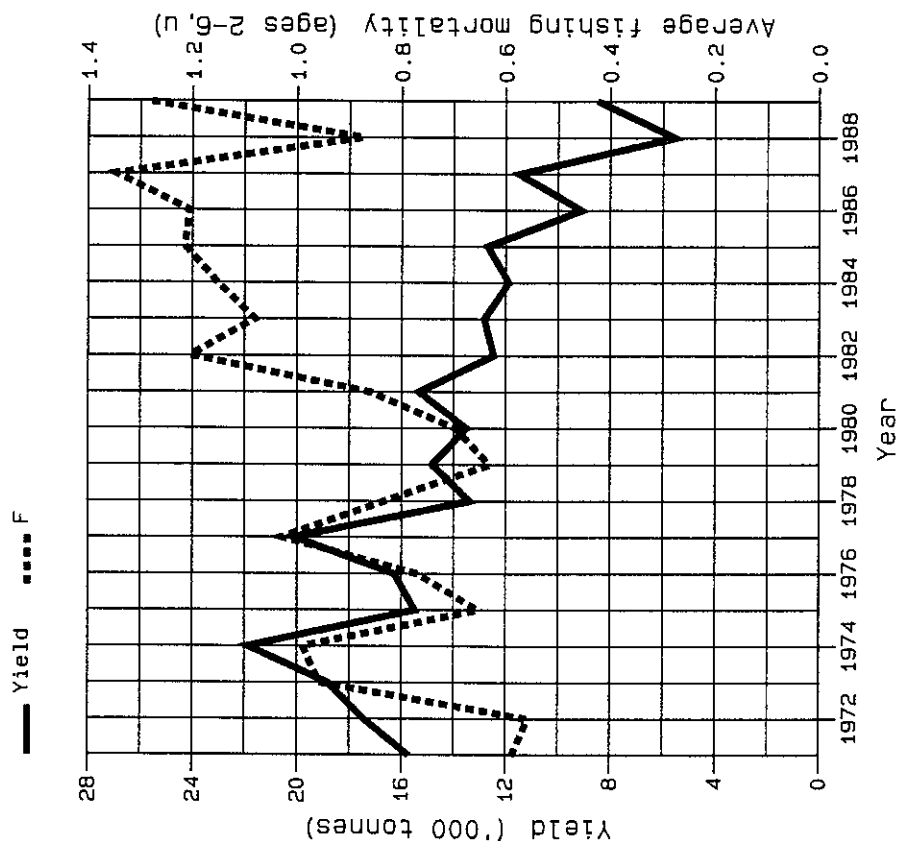
Figure 3.2.9 Danish SANDEEL areas and assessment areas used by the Working Group.



**FISH STOCK SUMMARY**  
**STOCK: Cod in the Kattegat**  
**02-04-1990**

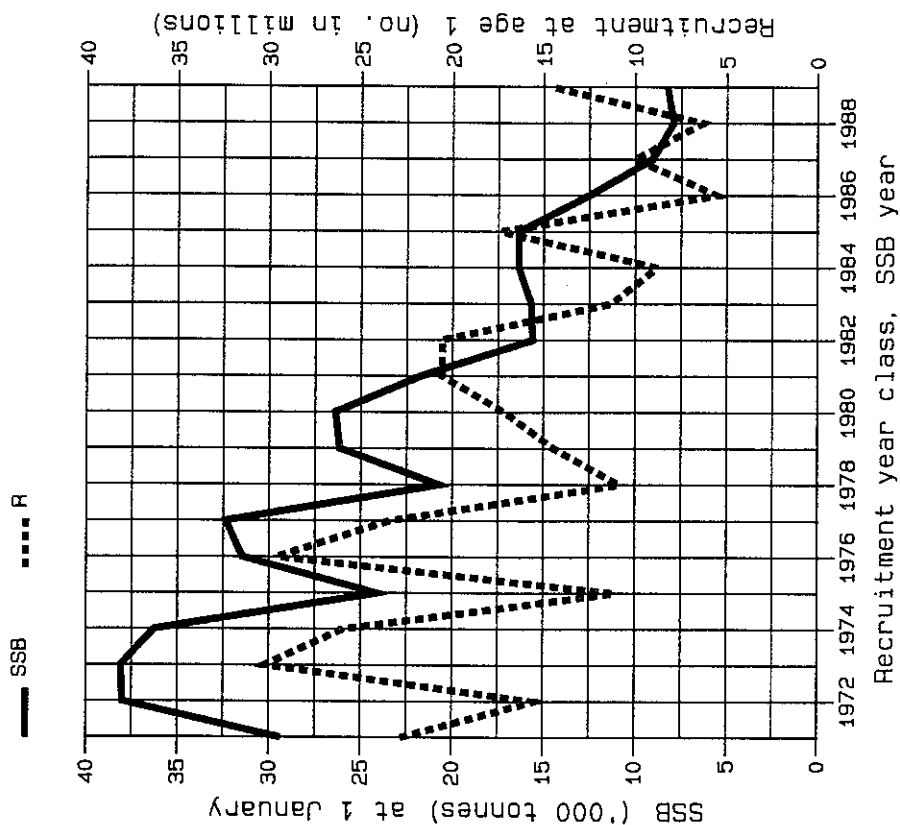
Figure 3.3.1

Trends in yield and fishing mortality (F)



A

Trends in spawning stock biomass (SSB) and recruitment (R)



B      cont'd.

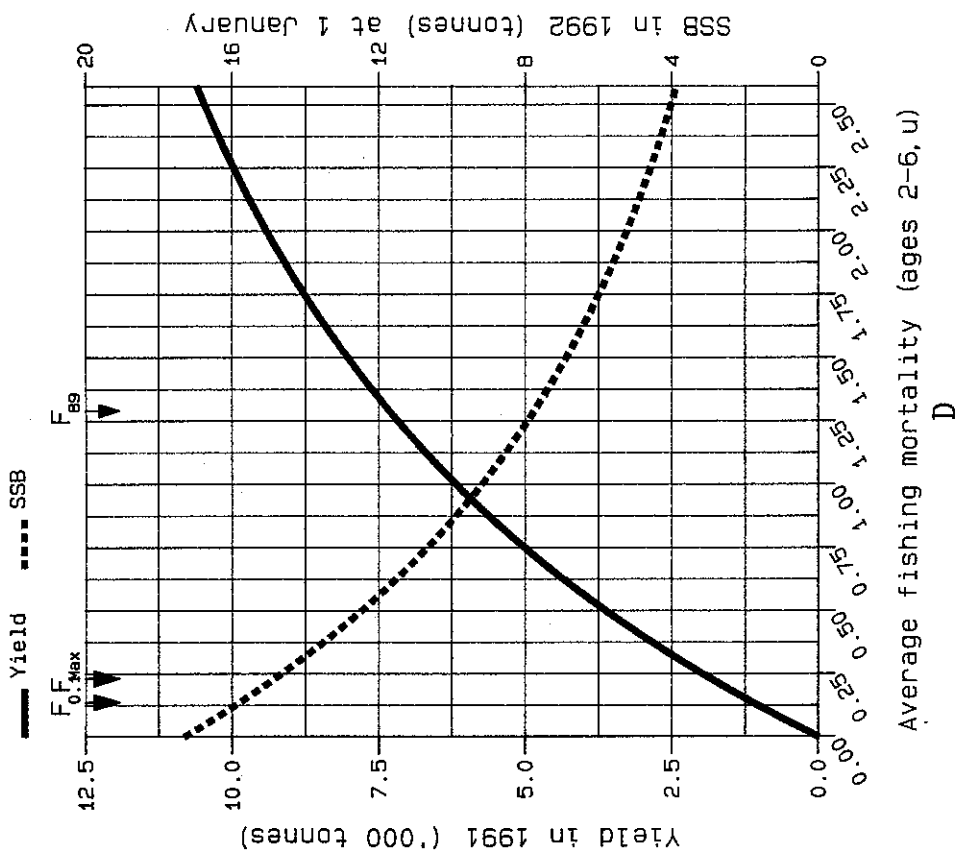
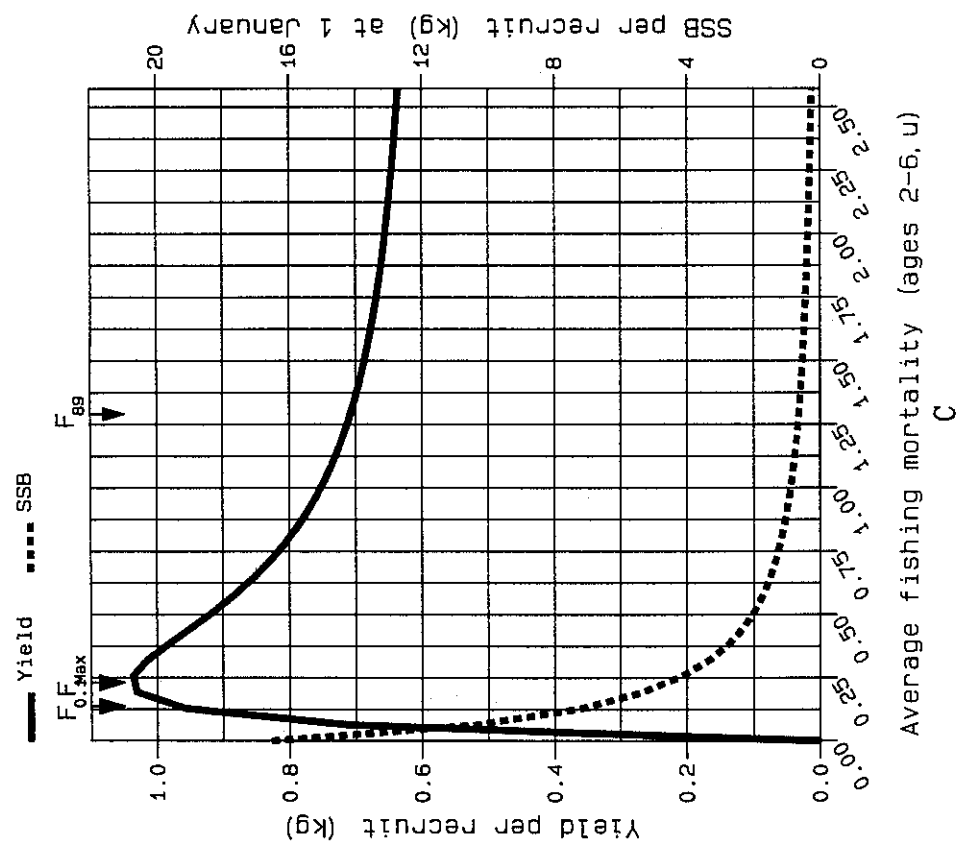
# FISH STOCK SUMMARY STOCK: Cod in the Kattegat

23-05-1990

Figure 3.3.1 (cont'd)

Long-term yield and spawning stock biomass

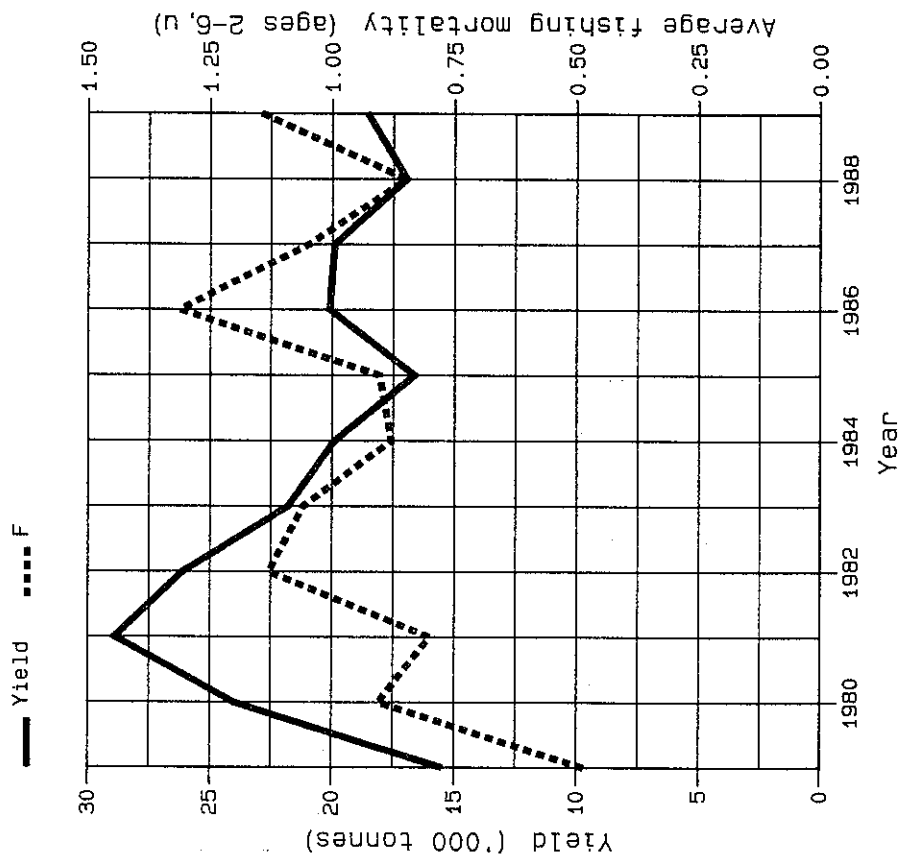
Short-term yield and spawning stock biomass



FISH STOCK SUMMARY  
STOCK: Cod in the Skagerrak  
02-04-1990

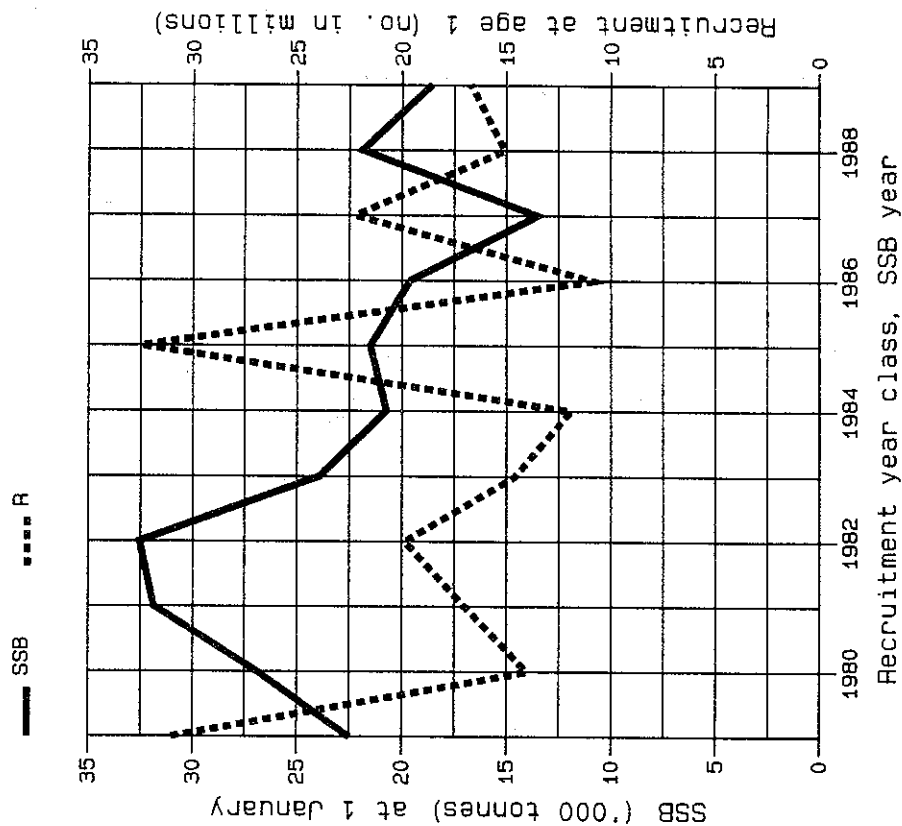
Figure 3.3.2

Trends in yield and fishing mortality (F)



A

Trends in spawning stock biomass (SSB) and recruitment (R)



B

cont'd.

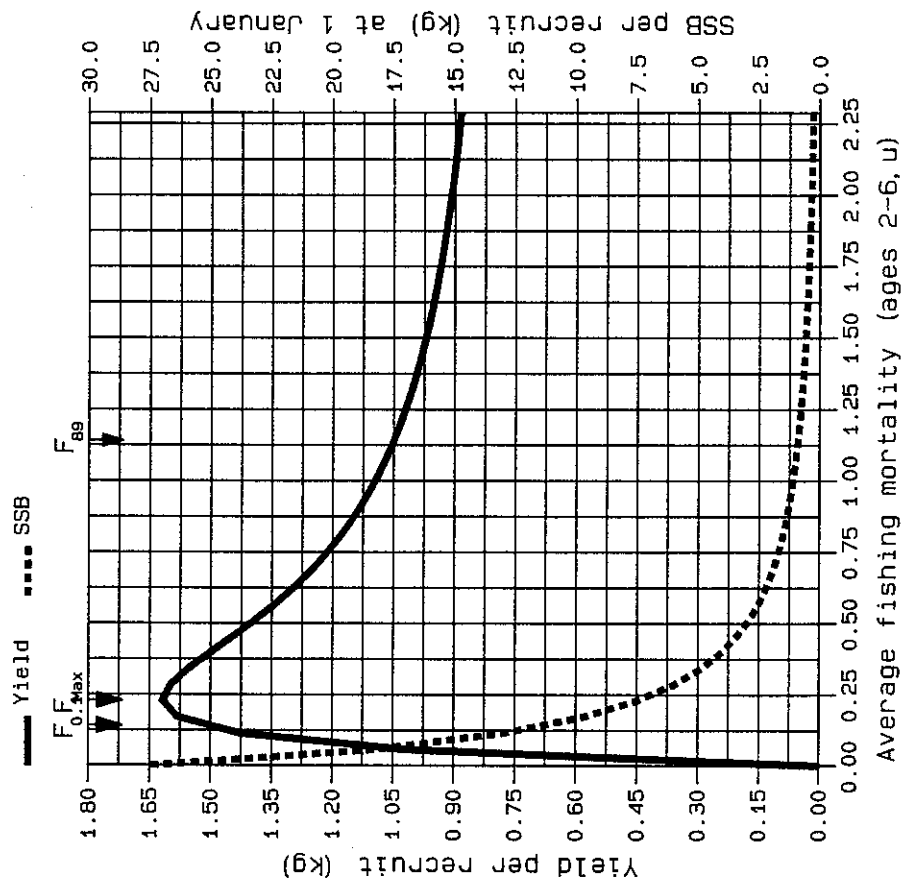
# FISH STOCK SUMMARY STOCK: Cod in the Skagerrak

23-05-1990

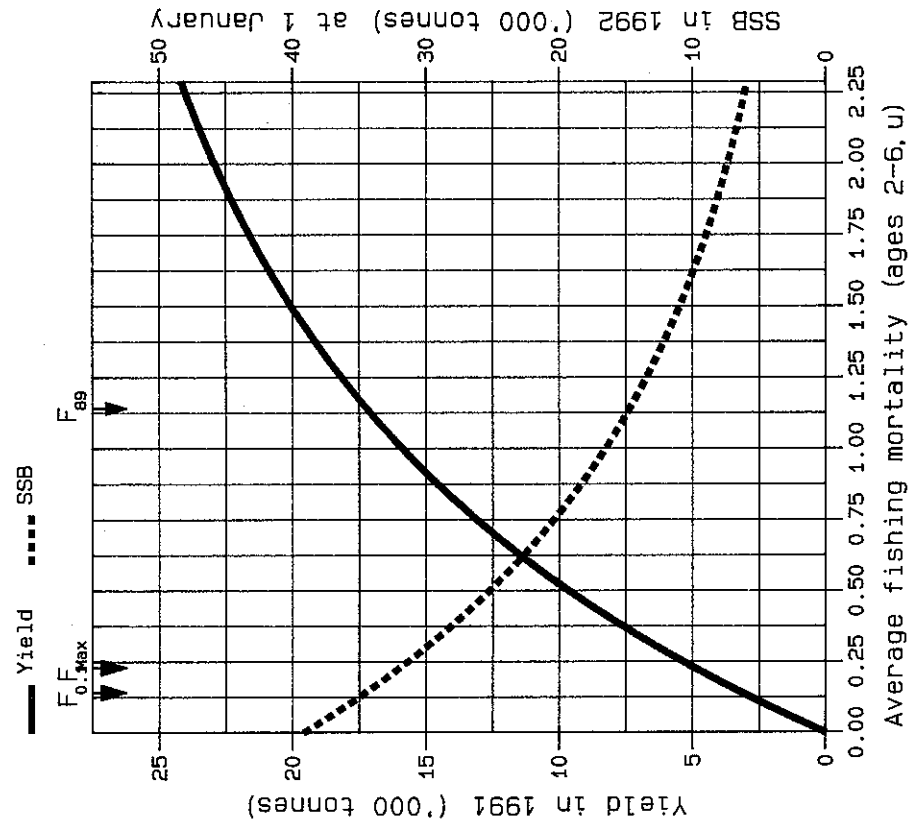
Figure 3.3.2 (cont'd)

Long-term yield and spawning stock biomass

Short-term yield and spawning stock biomass



C



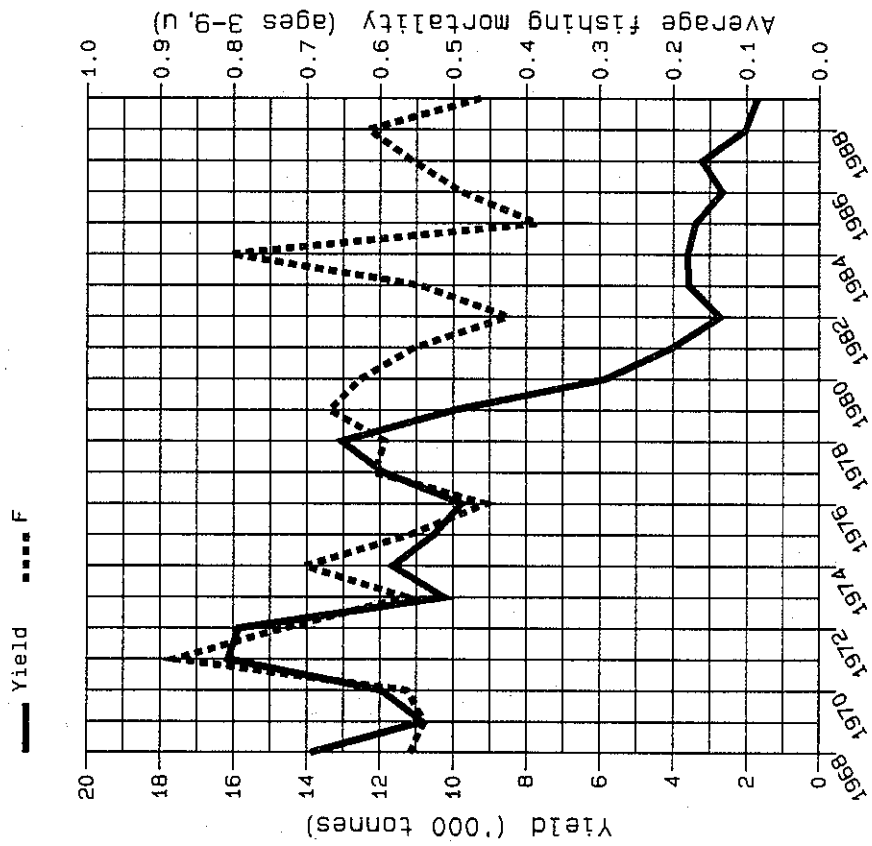
D

# FISH STOCK SUMMARY STOCK: Plaice in the Kattegat

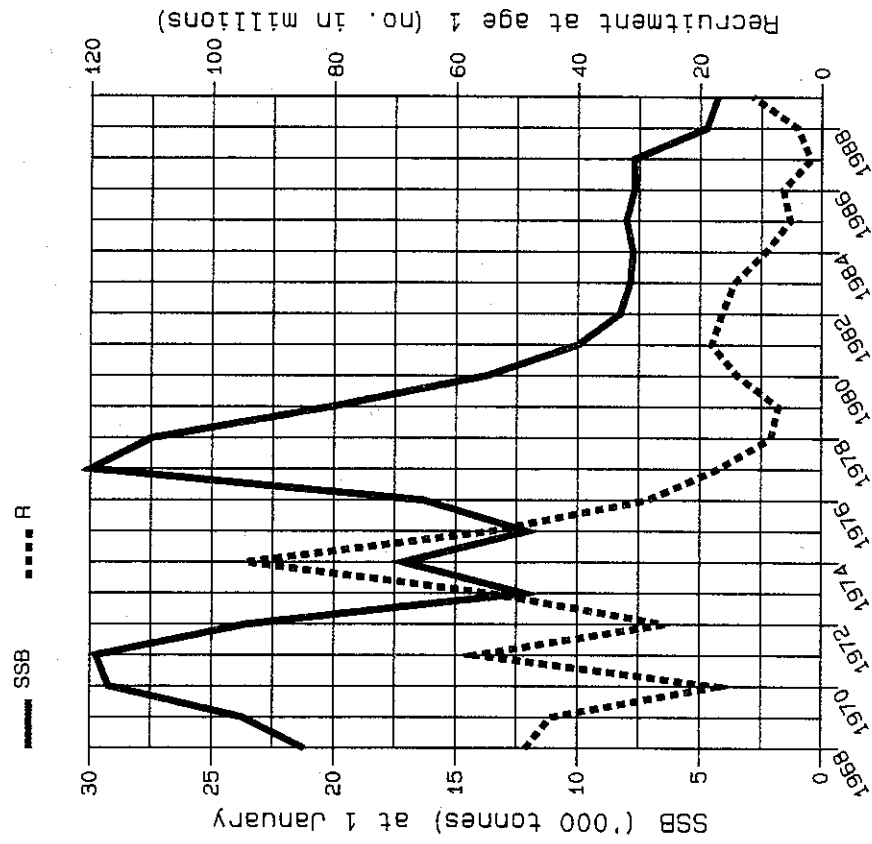
Figure 3.3.5

02-04-1990

Trends in yield and fishing mortality (F)



Trends in spawning stock biomass (SSB) and recruitment (R)



cont'd.



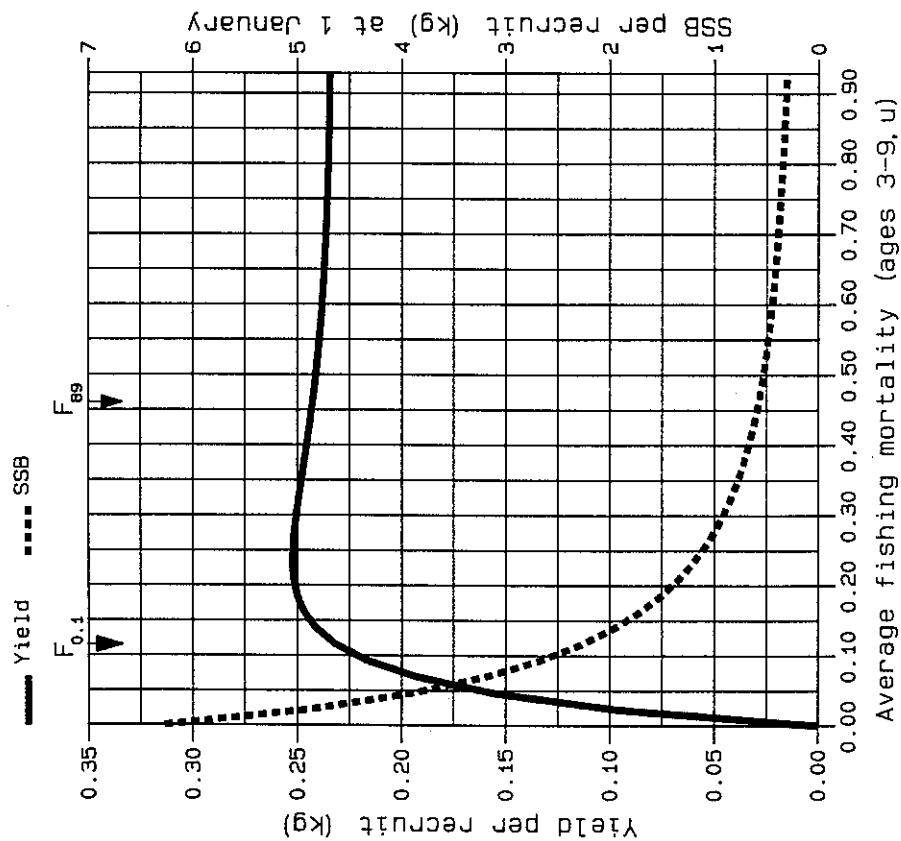
# FISH STOCK SUMMARY STOCK: Plaice in the Kattegat

02-04-1990

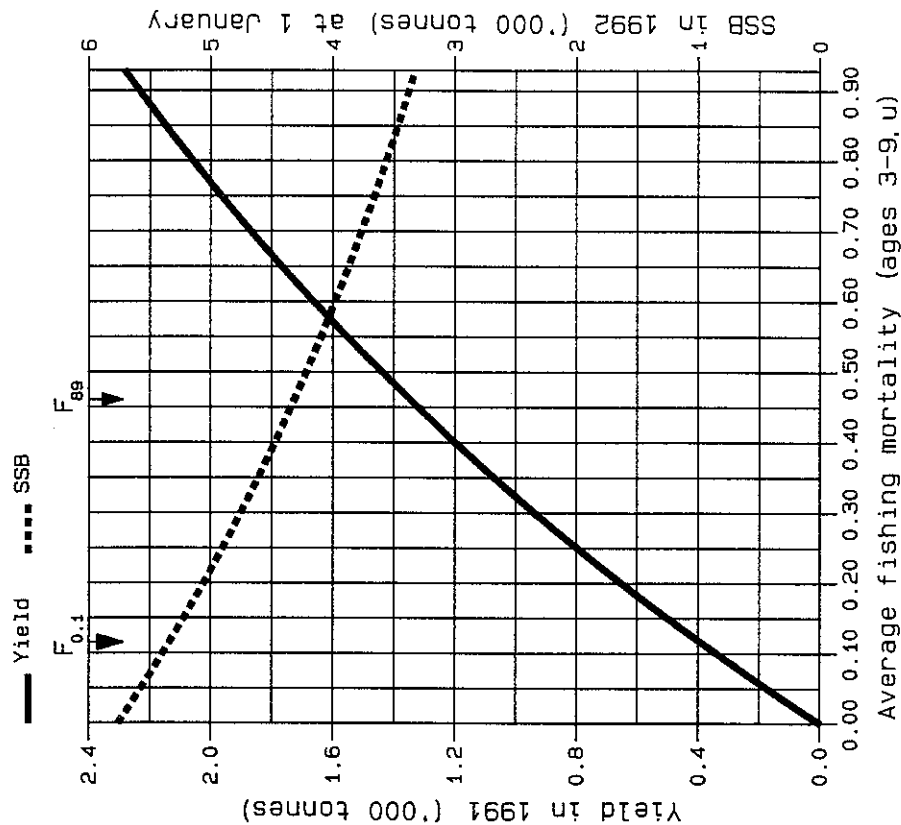
Figure 3.3.5 (cont'd)

Long-term yield and spawning stock biomass

Short-term yield and spawning stock biomass

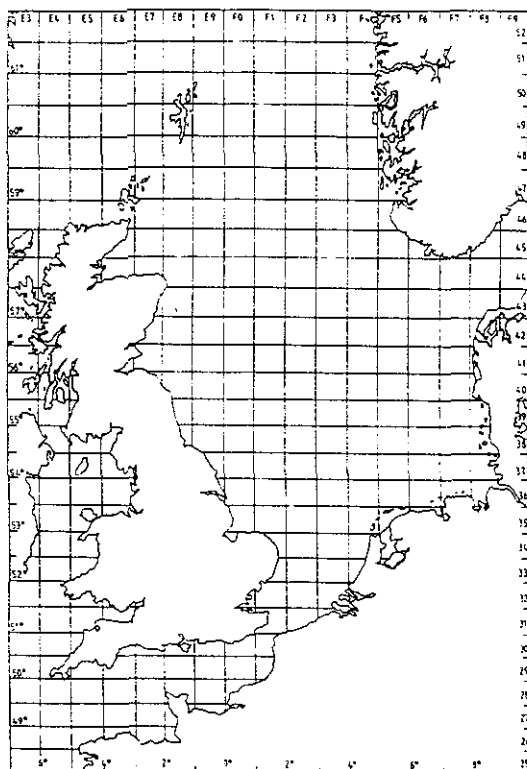


C



D





Cod 0-group 1986-1990.

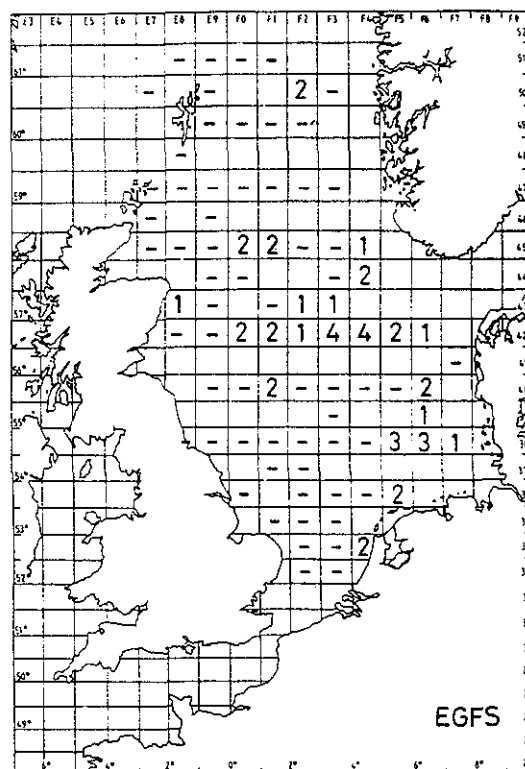
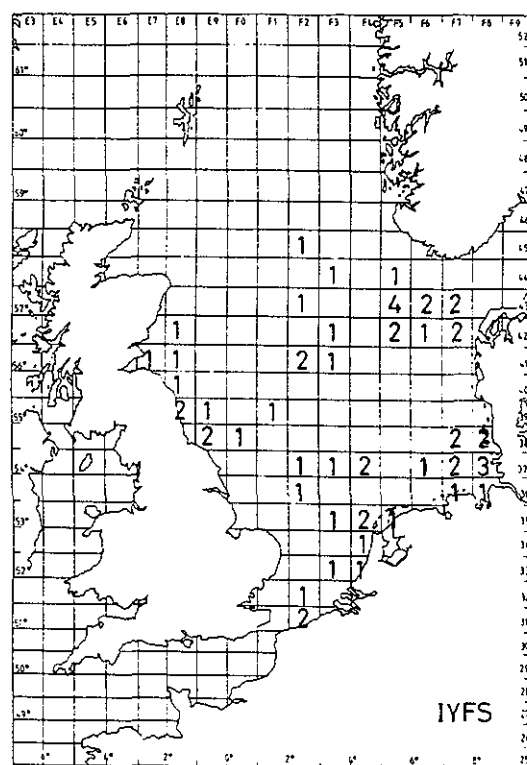
- rectangle fished but no catch  $\geq 2\%$ .

Figure 3.5.1.5 Number of years in which the catch in a certain rectangle comprised 2% or more of the total catch of that age group.



Cod 1-group 1986-1990.

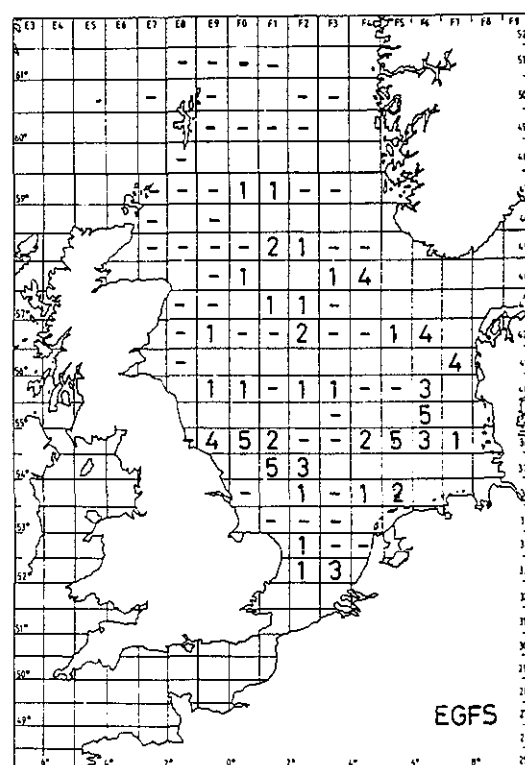
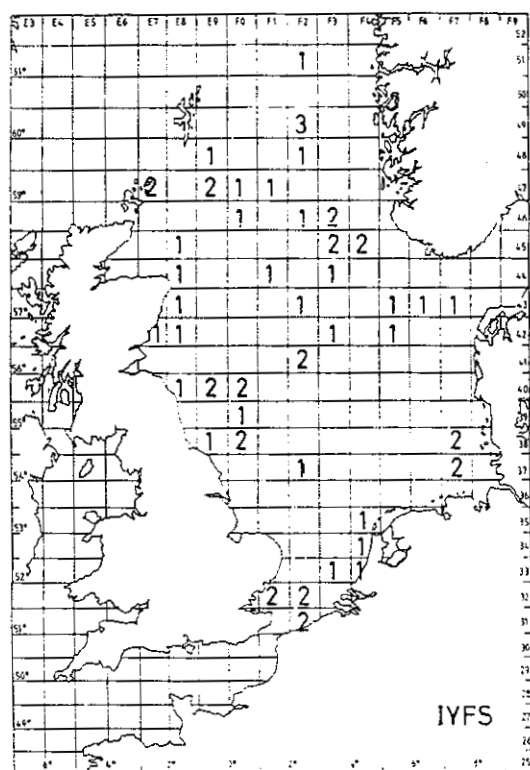


Figure 3.5.1.6 Number of years in which the catch in a certain rectangle comprised 2% or more of the total catch of that age group.



Cod 2-group 1986-1990.

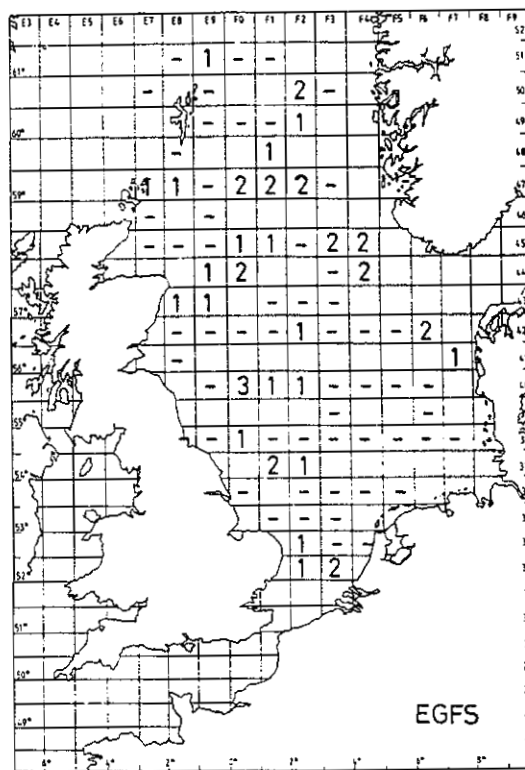


Figure 3.5.1.7 Number of years in which the catch in a certain rectangle comprised 2% or more of the total catch of that age group.

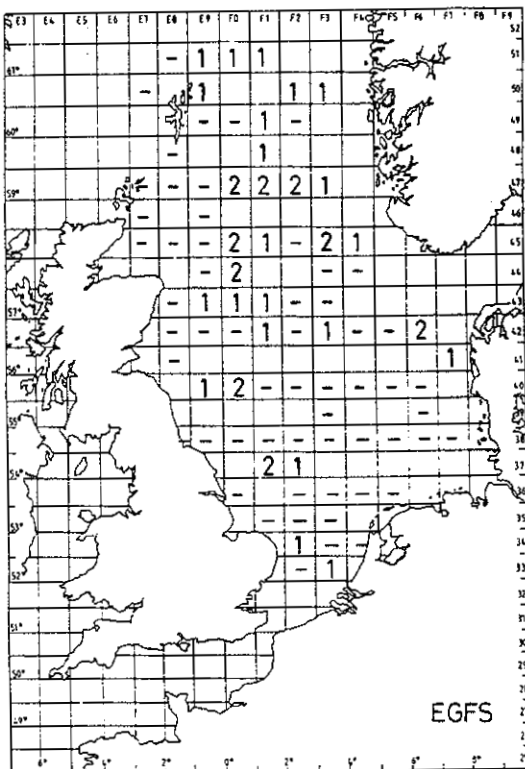
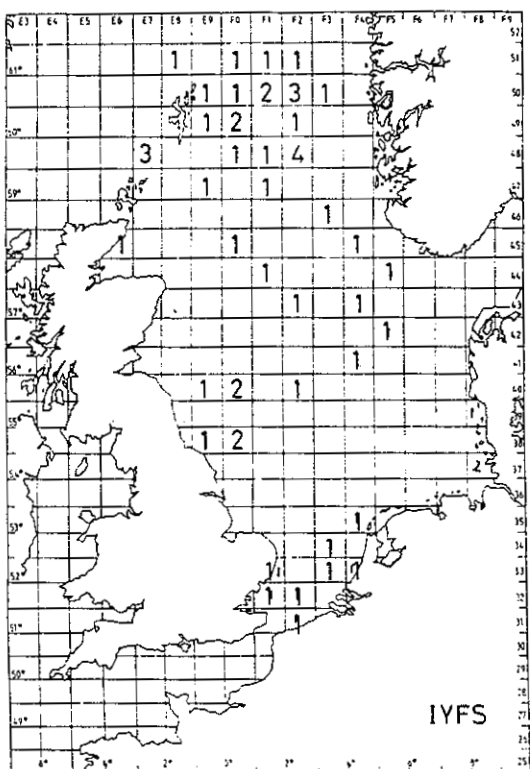
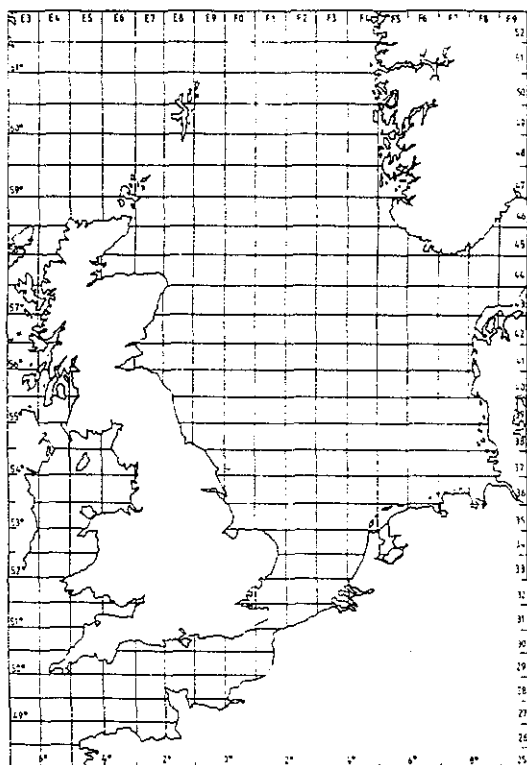
Cod 3<sup>+</sup>-group IYFS and 3-group EGFS 1986-1990.

Figure 3.5.1.8 Number of years in which the catch in a certain rectangle comprised 2% or more of the total catch of that age group.



Haddock 0-group 1986-1990.

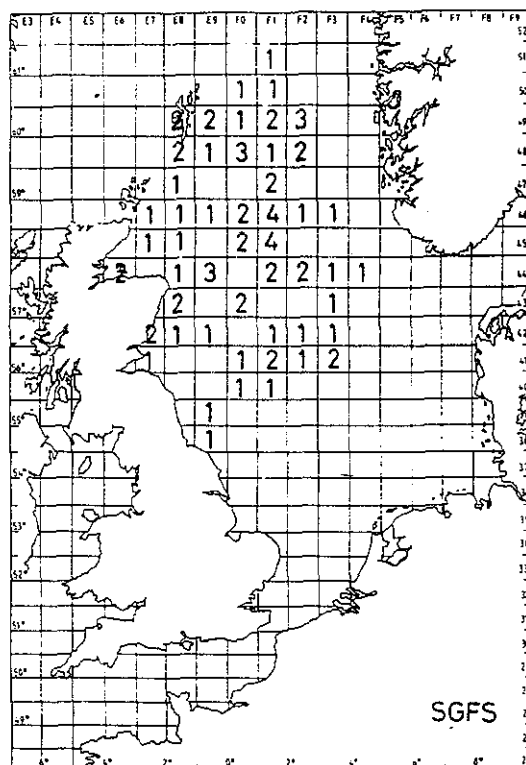
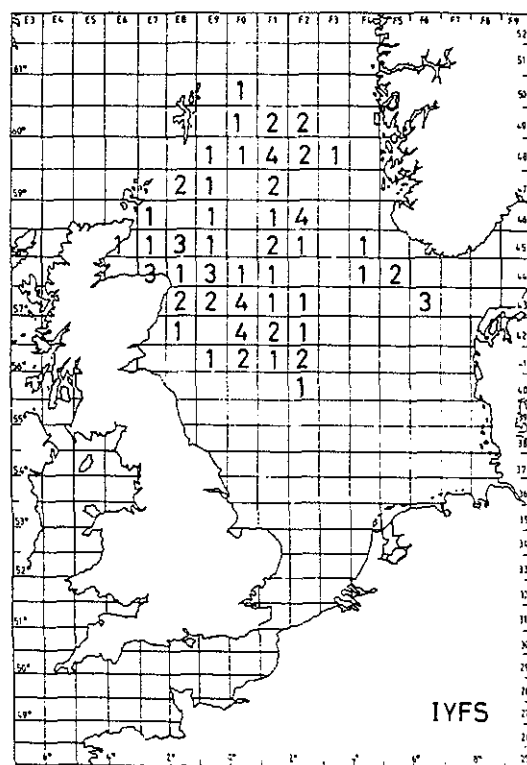


Figure 3.5.1.9 Number of years in which the catch in a certain rectangle comprised 2% or more of the total catch of that age group.



Haddock 1-group 1986-1990.

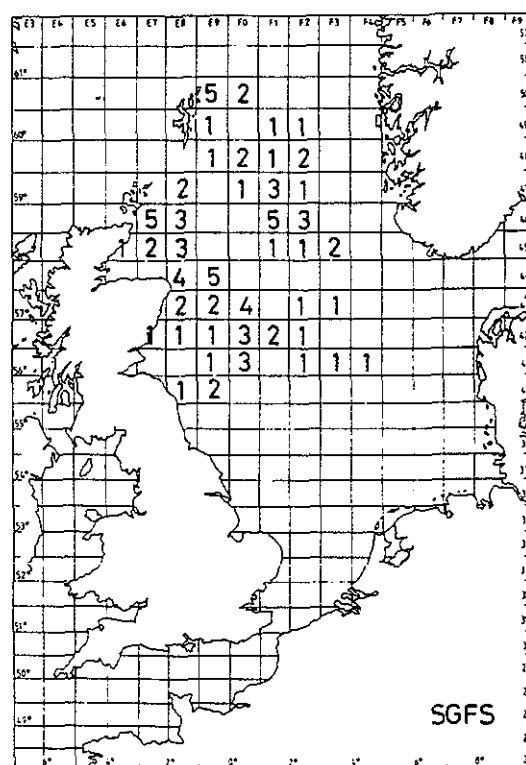
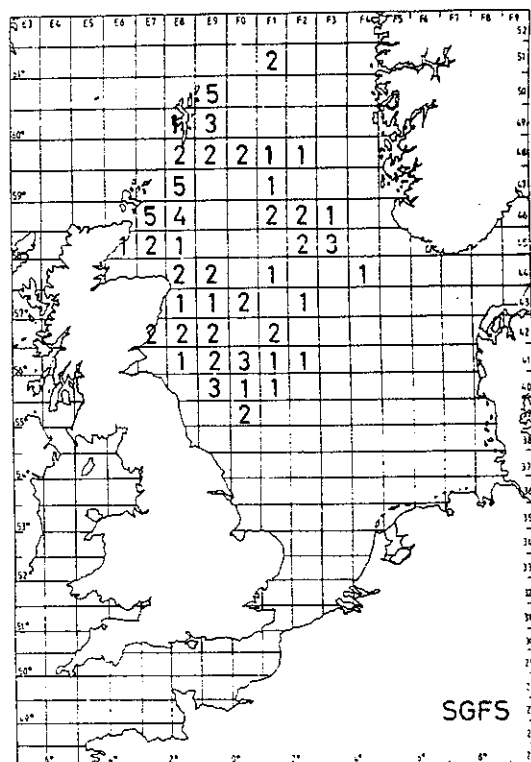
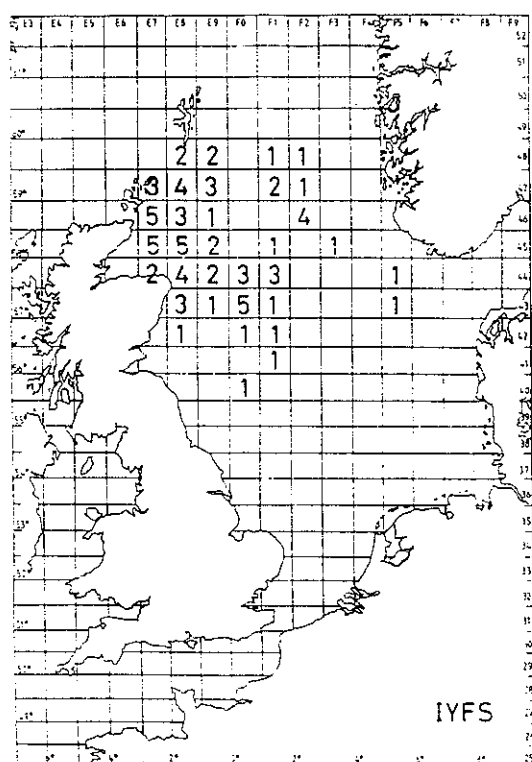
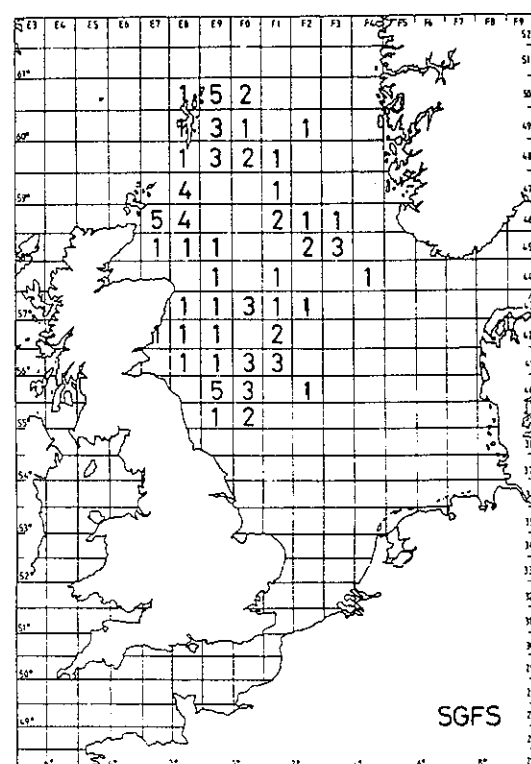
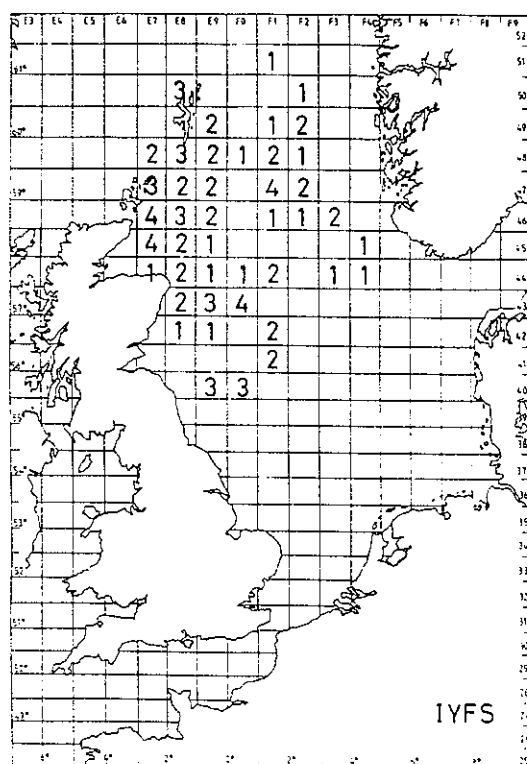


Figure 3.5.1.10 Number of years in which the catch in a certain rectangle comprised 2% or more of the total catch of that age group.



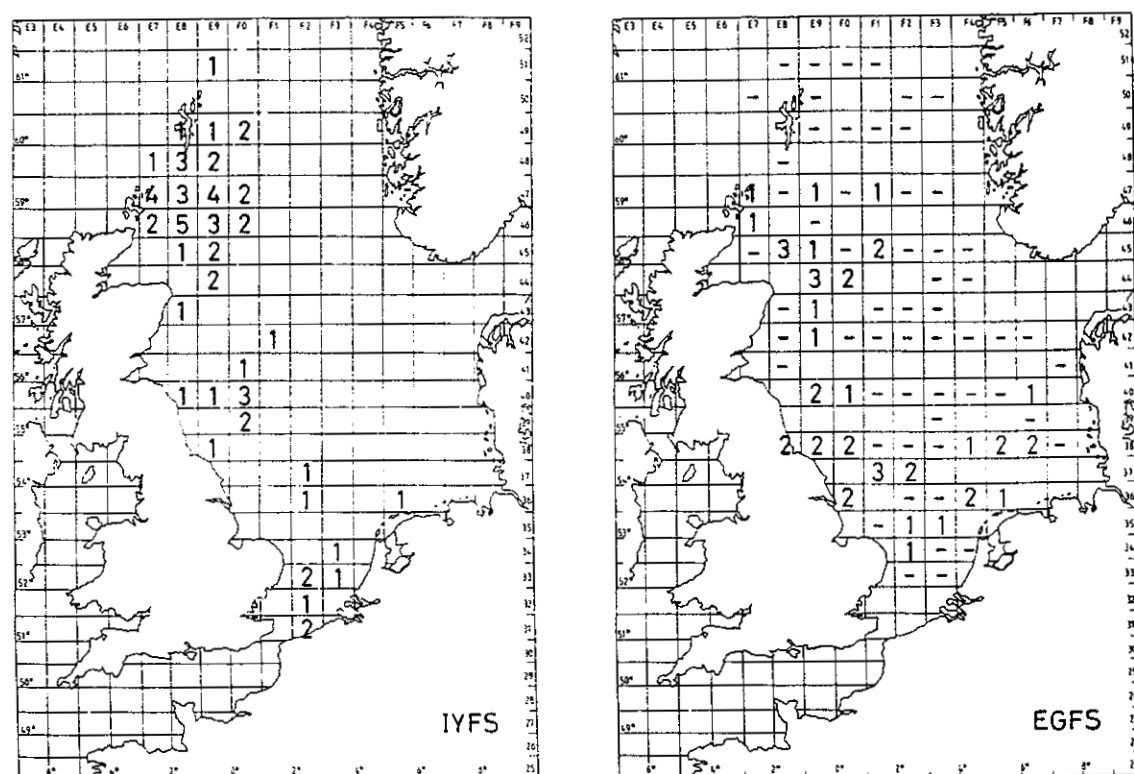
Haddock 2-group 1986-1990.

Figure 3.5.1.11 Number of years in which the catch in a certain rectangle comprised 2% or more of the total catch of that age group.



Haddock 3<sup>+</sup>-group 1986-1990.

Figure 3.5.1.12 Number of years in which the catch in a certain rectangle comprised 2% or more of the total catch of that age group.

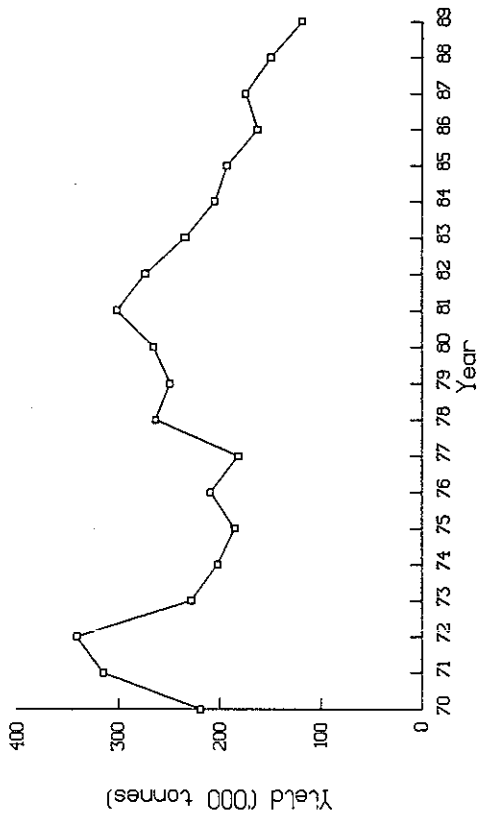


Whiting 3<sup>+</sup>-group IYFS and 3-group EGFS.

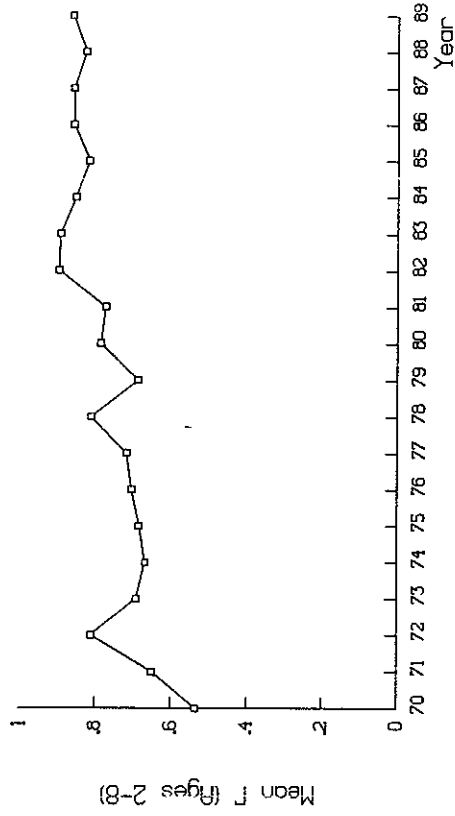
Figure 3.5.1.13 Number of years in which the catch in a certain rectangle comprised 2% or more of the total catch of that age group.

Figure 3.5.2.1

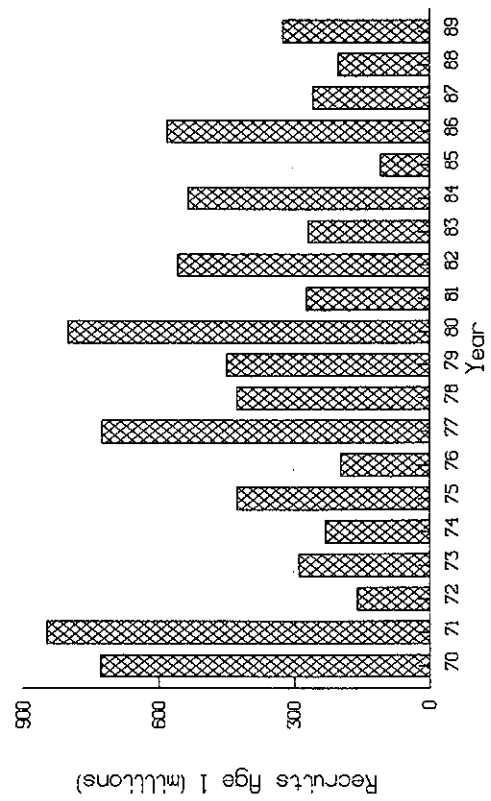
North Sea Cod  
Yield



North Sea Cod  
Mean Fishing Mortality



North Sea Cod  
Recruitment



North Sea Cod  
Biomass

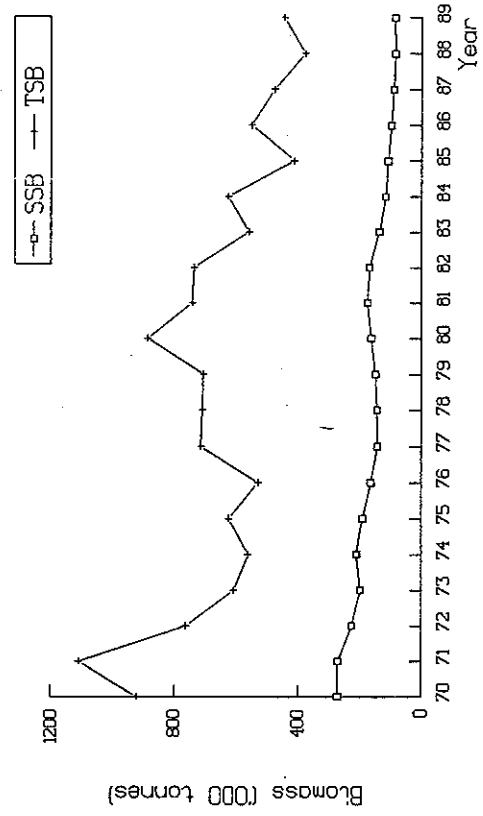
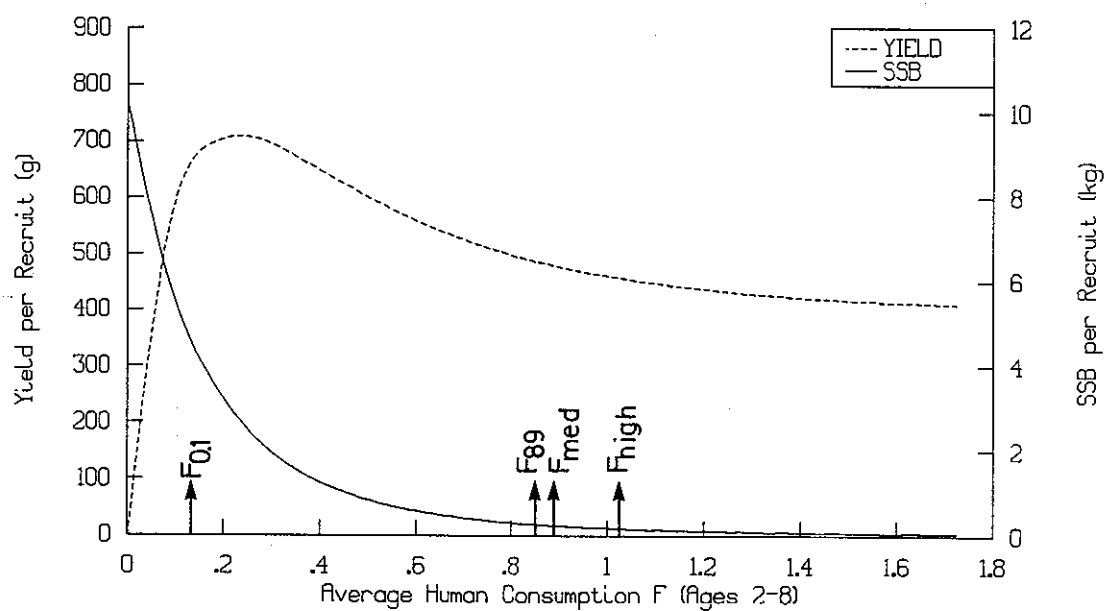




Figure 3.5.2.2

NORTH SEA COD.

a) Long Term Total Landings and Spawning Biomass



b) Short Term Total Landings and Spawning Biomass

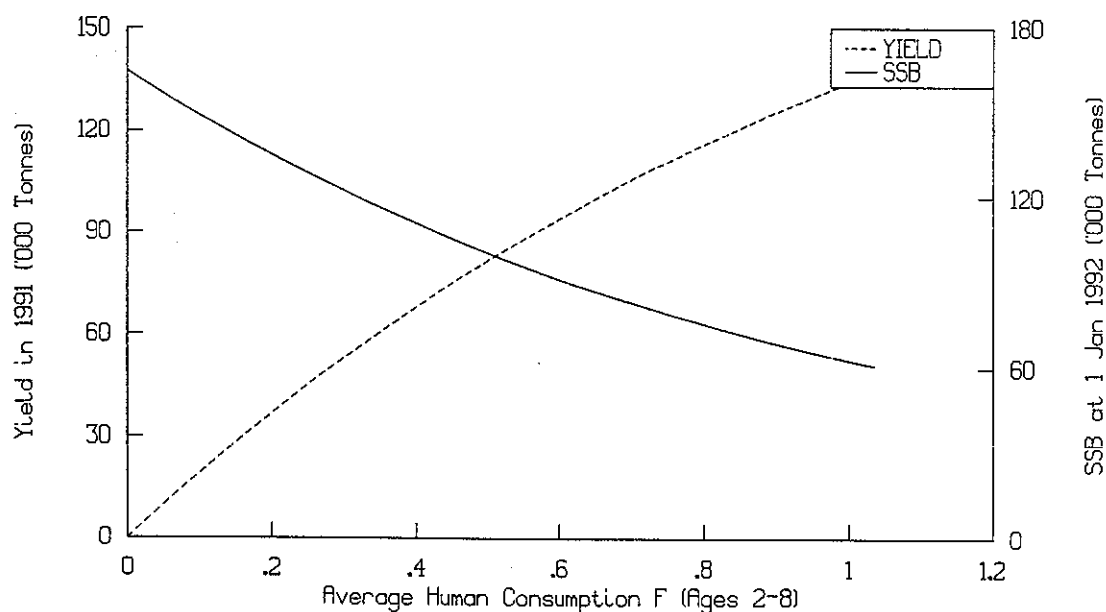
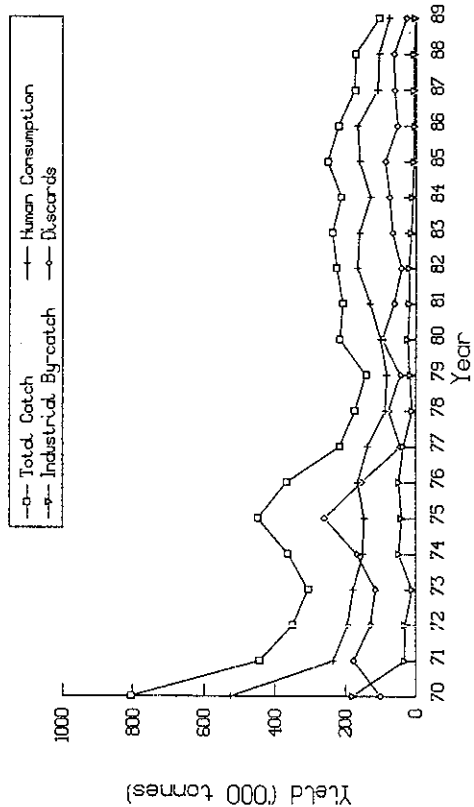
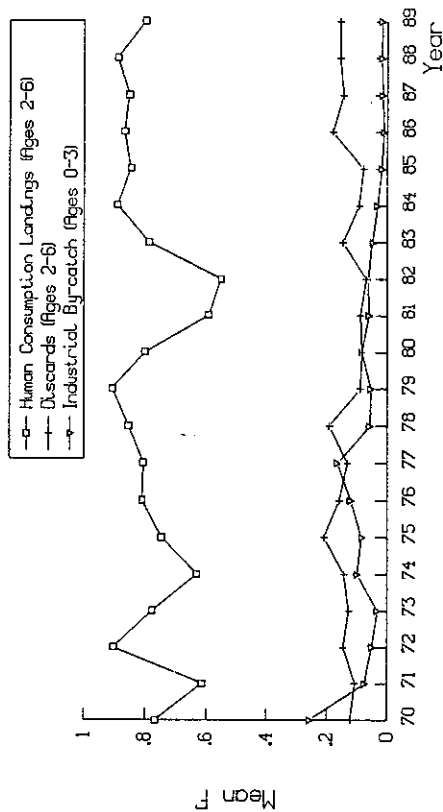


Figure 3.5.3.1

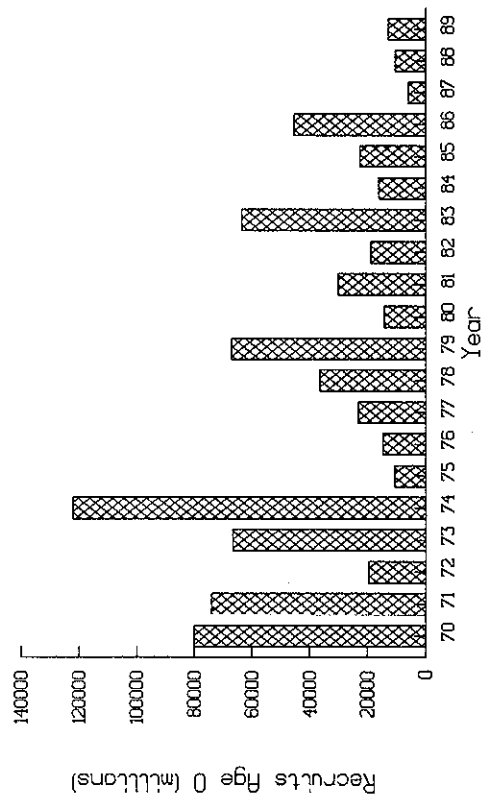
# North Sea Haddock Yield



# North Sea Haddock Mean Fishing Mortality



# North Sea Haddock Recruitment



# North Sea Haddock Biomass

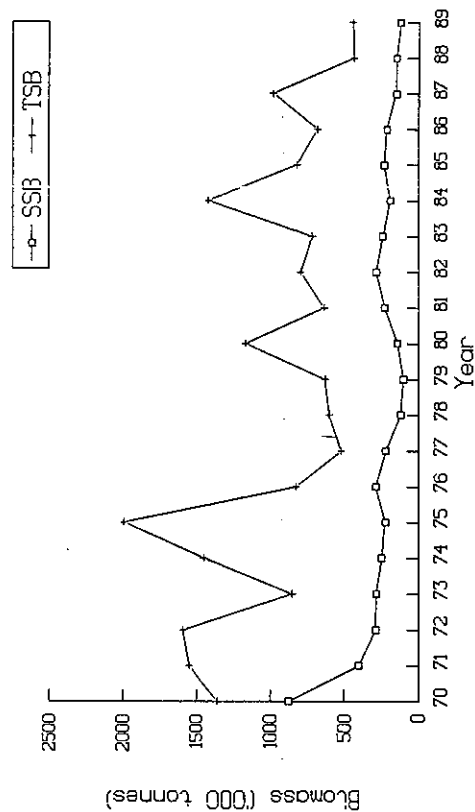
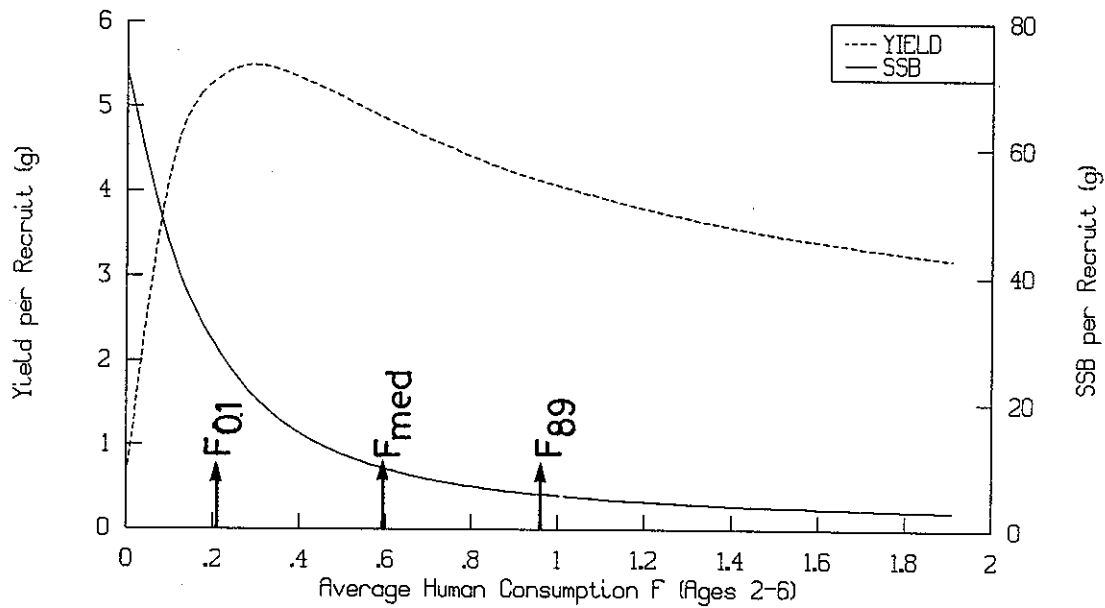


Figure 3.5.3.2 North Sea Haddock.

a) Long Term Total Landings and Spawning Biomass



b) Short Term Total Landings and Spawning Biomass

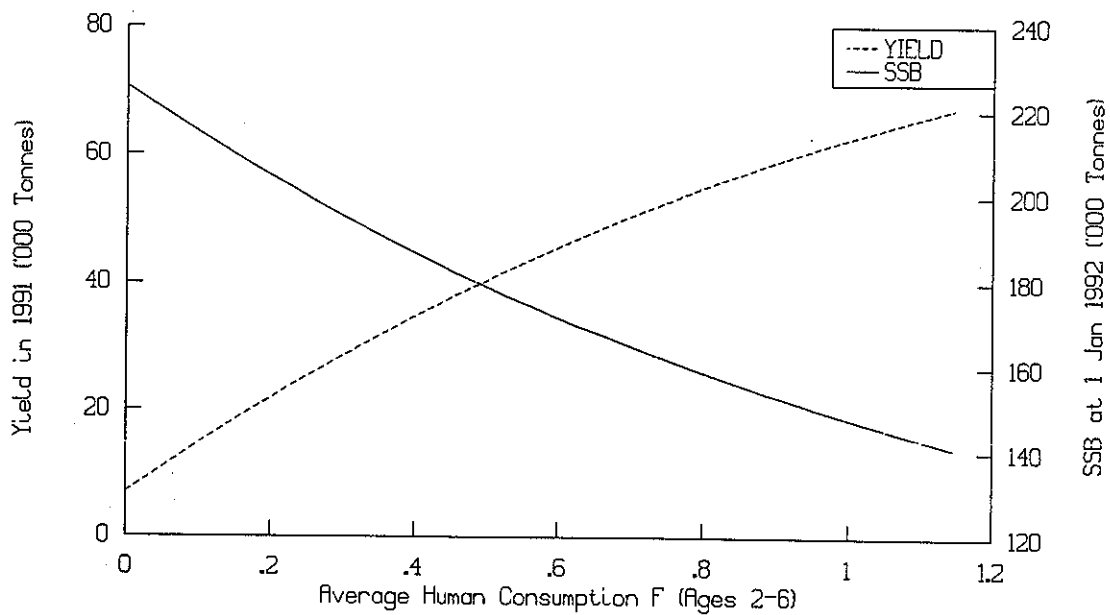
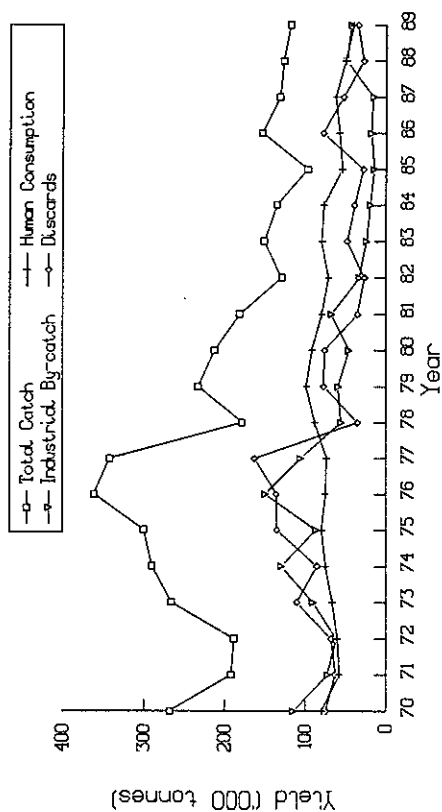
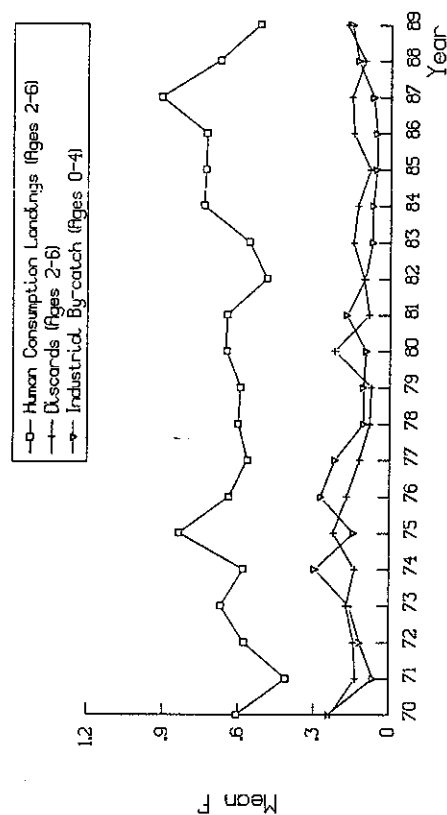


Figure 3.5.4.1

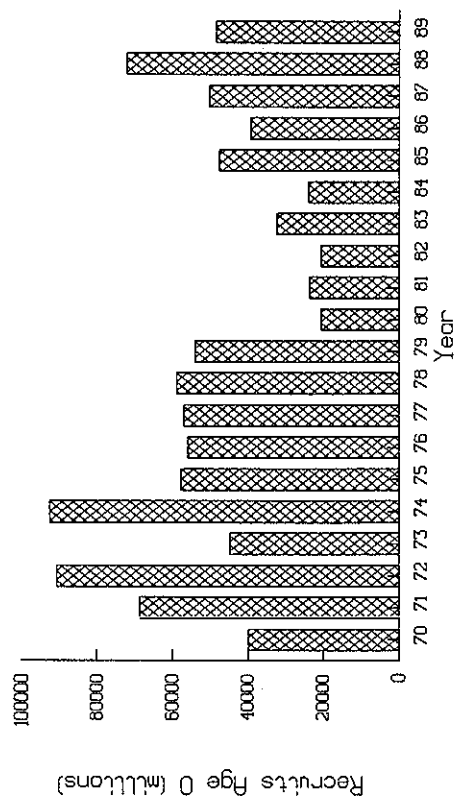
# North Sea Whiting Yield



# North Sea Whiting Mean Fishing Mortality



# North Sea Whiting Recruitment



# North Sea Whiting Biomass

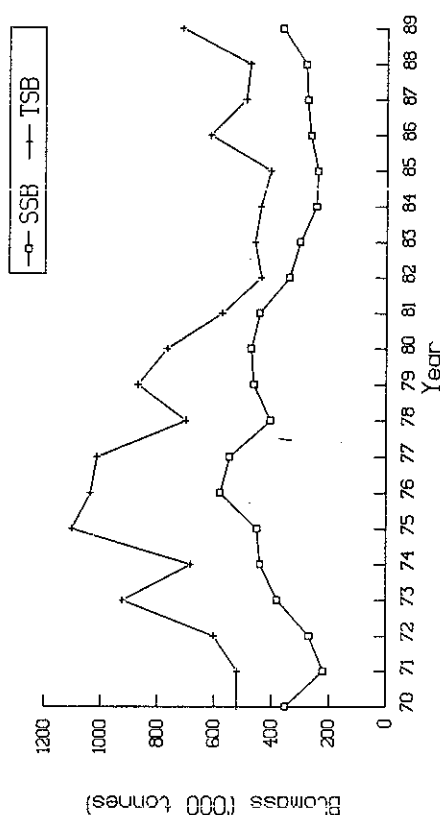
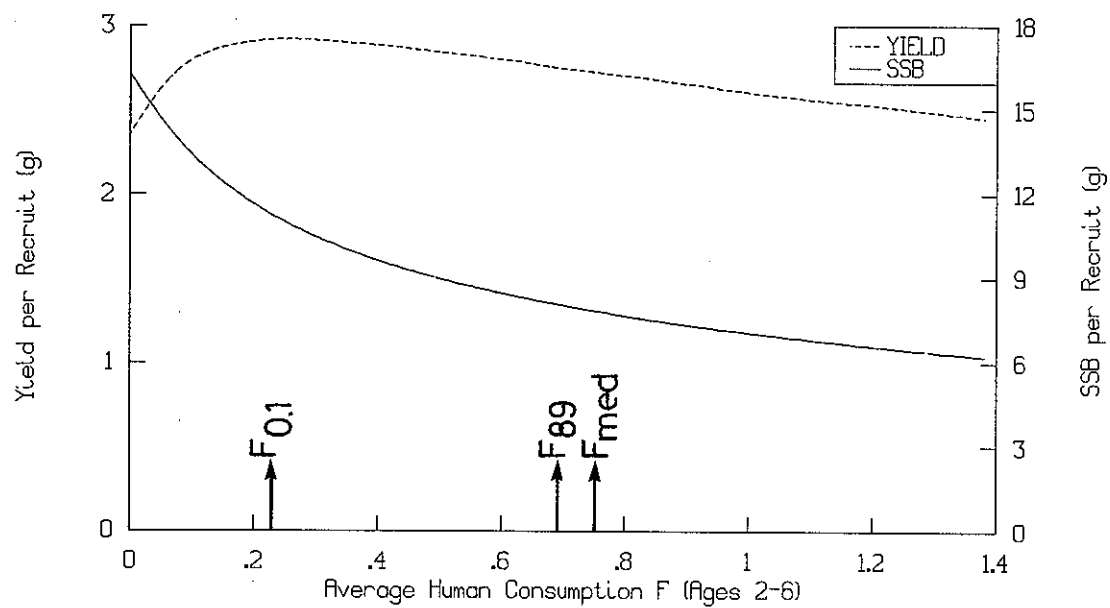


Figure 3.5.4.2 North Sea WHITING.

a) Long Term Total Landings and Spawning Biomass



b) Short Term Total Landings and Spawning Biomass

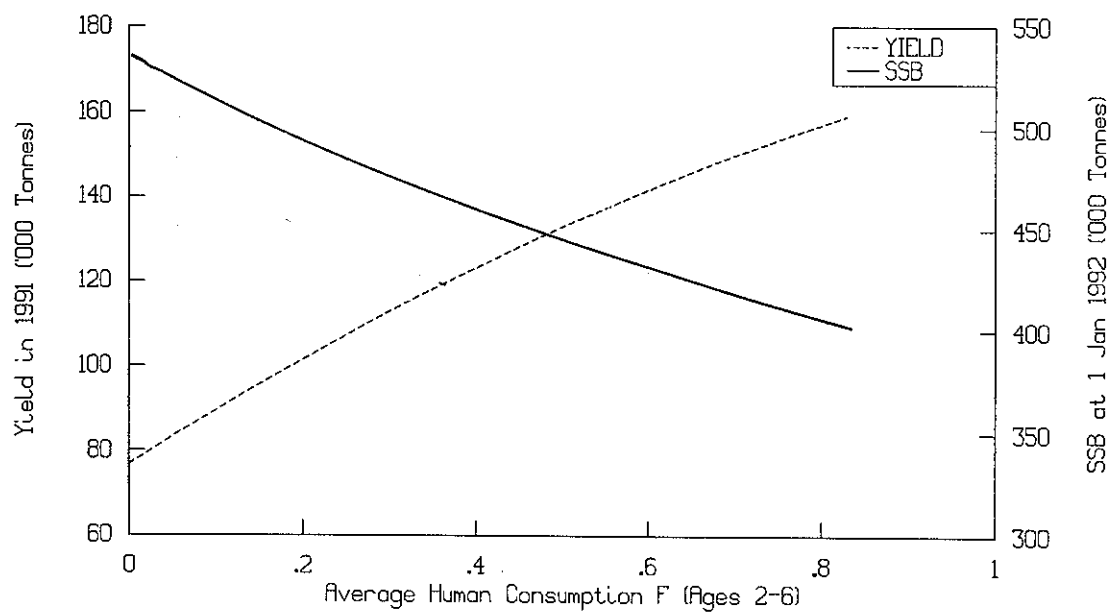
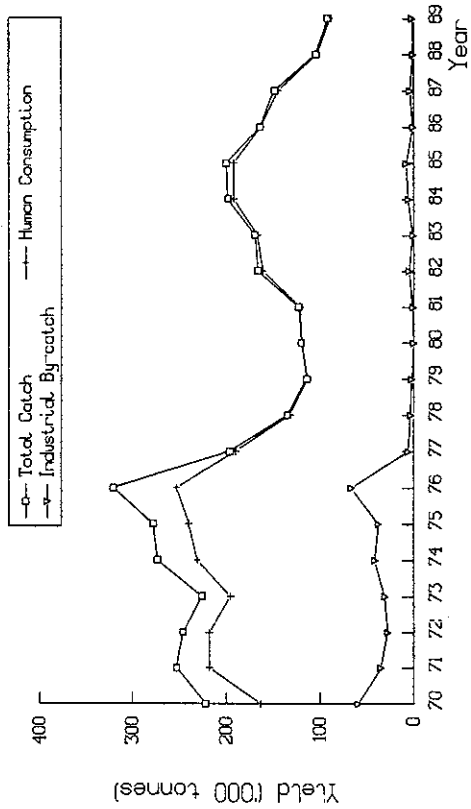
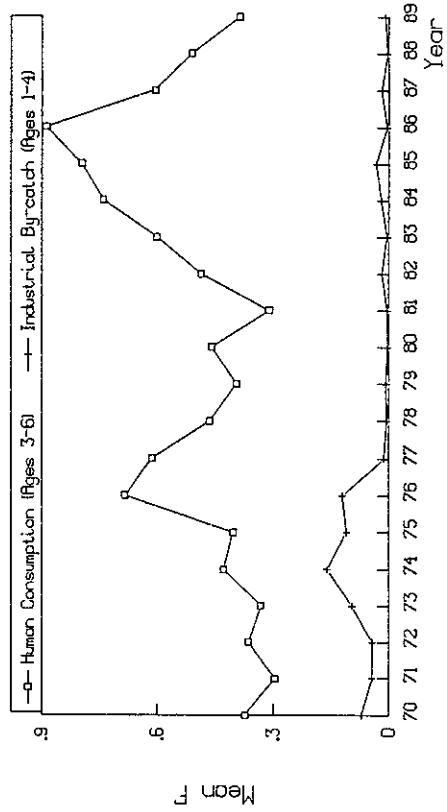


Figure 3.5.5.1

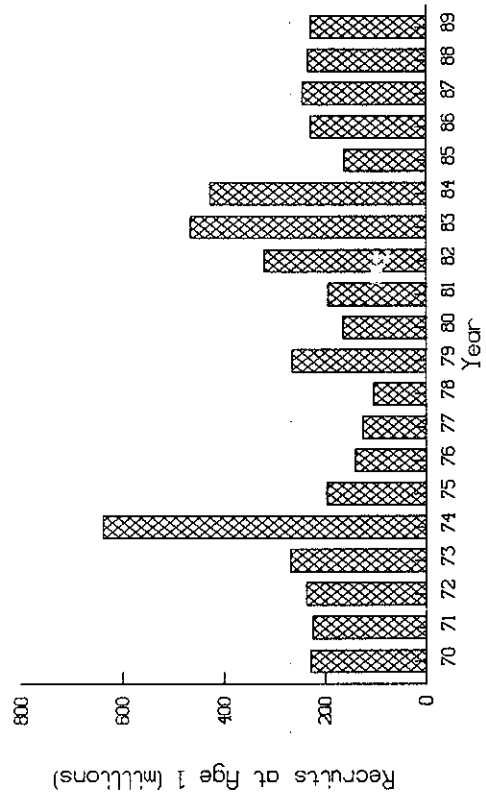
North Sea Saithe  
Yield



North Sea Saithe  
Mean Fishing Mortality



North Sea Saithe  
Recruitment



North Sea Saithe  
Biomass

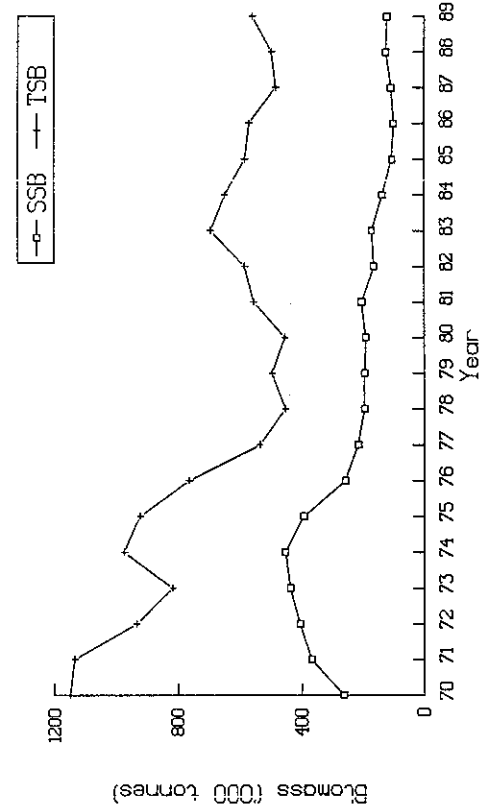
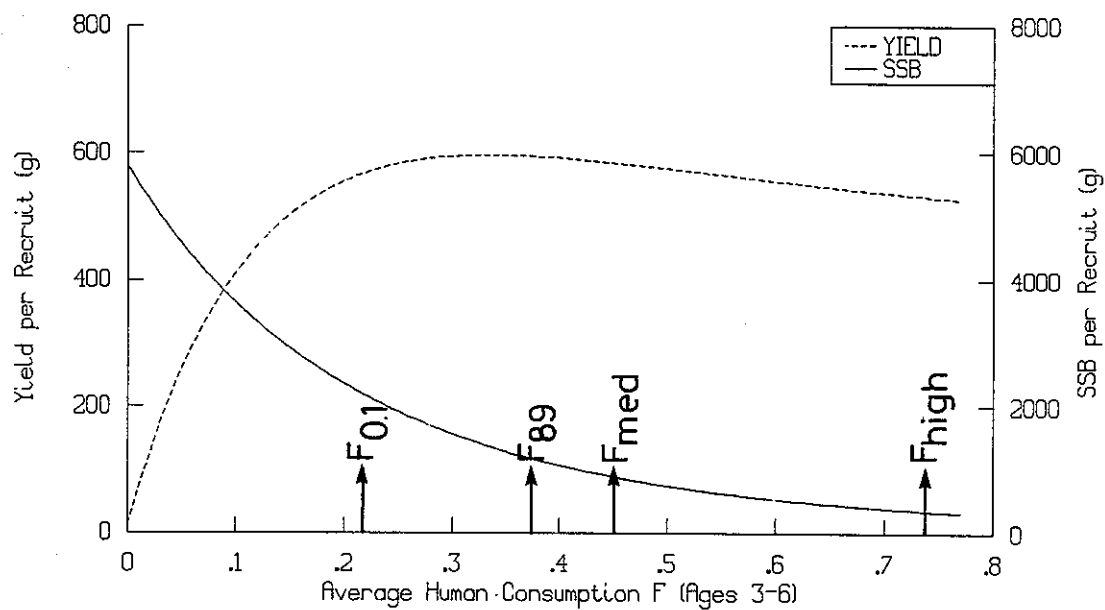


Figure 3.5.5.2 North Sea SAITHE.

a) Long Term Total Landings and Spawning Biomass



b) Short Term Total Landings and Spawning Biomass

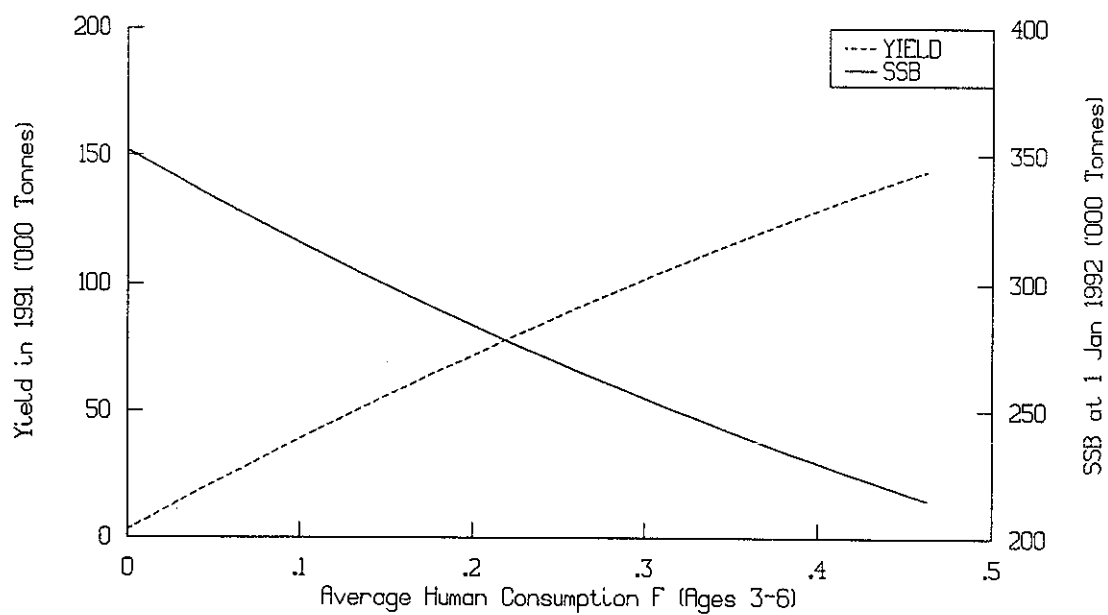


Figure 3.6.2.1

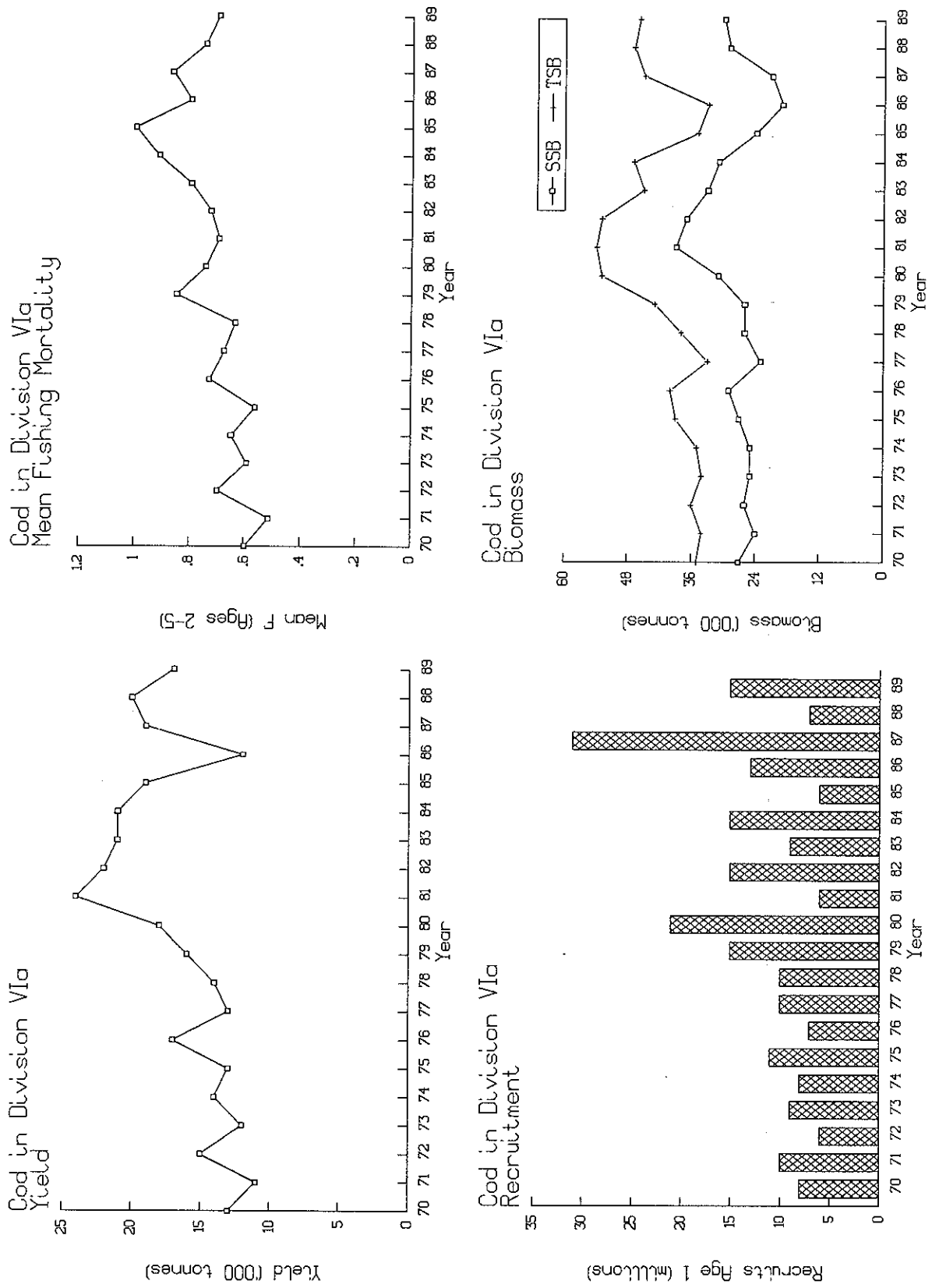
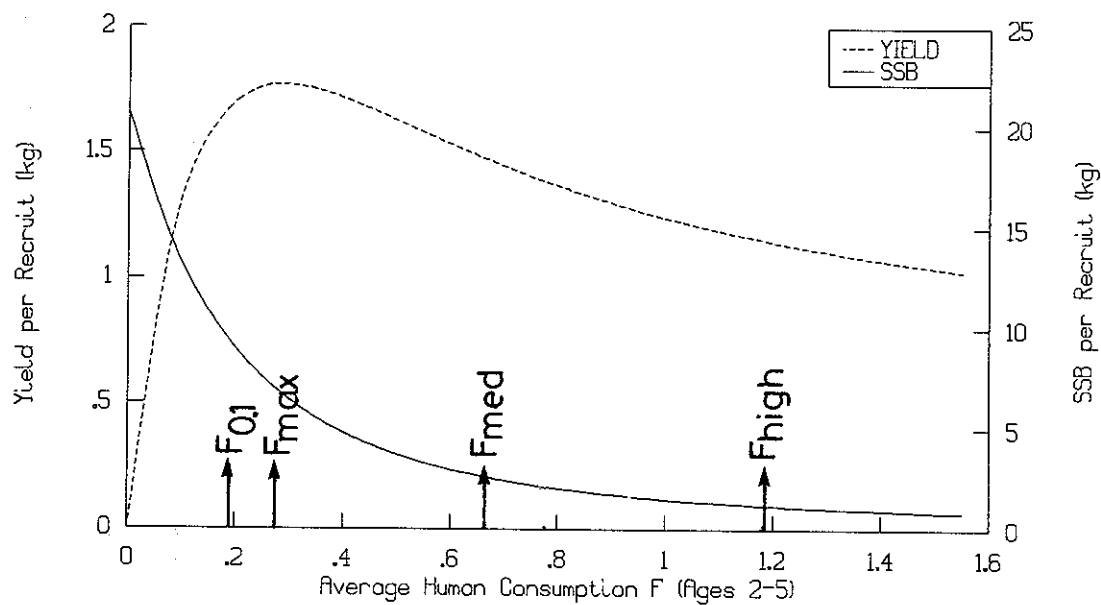




Figure 3.6.2.2 COD in Division VIa.

a) Long Term Total Landings and Spawning Biomass



b) Short Term Total Landings and Spawning Biomass

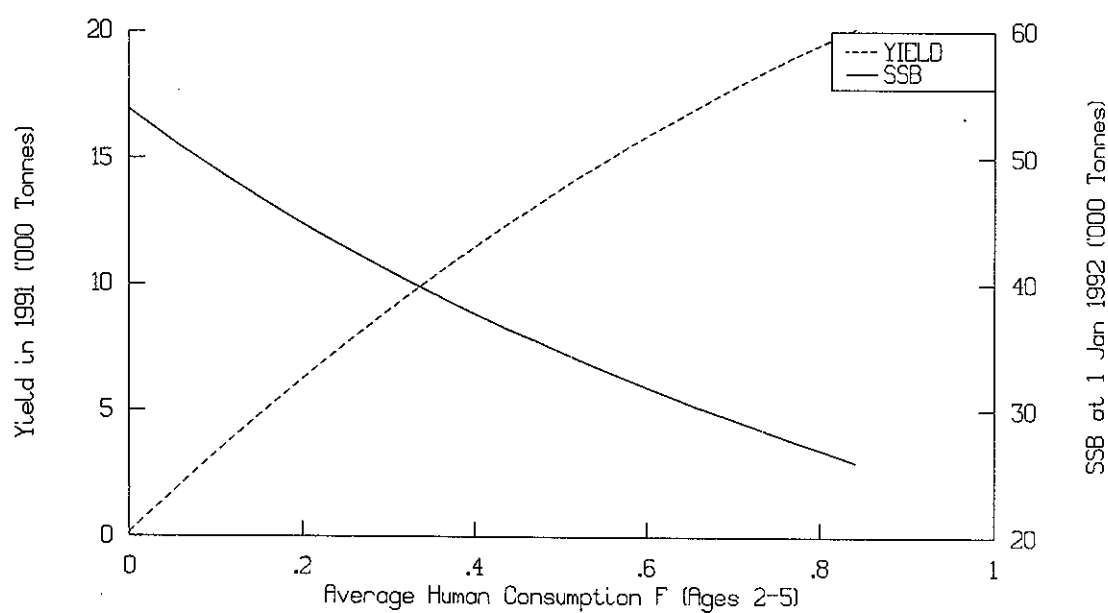


Figure 3.6.4.1

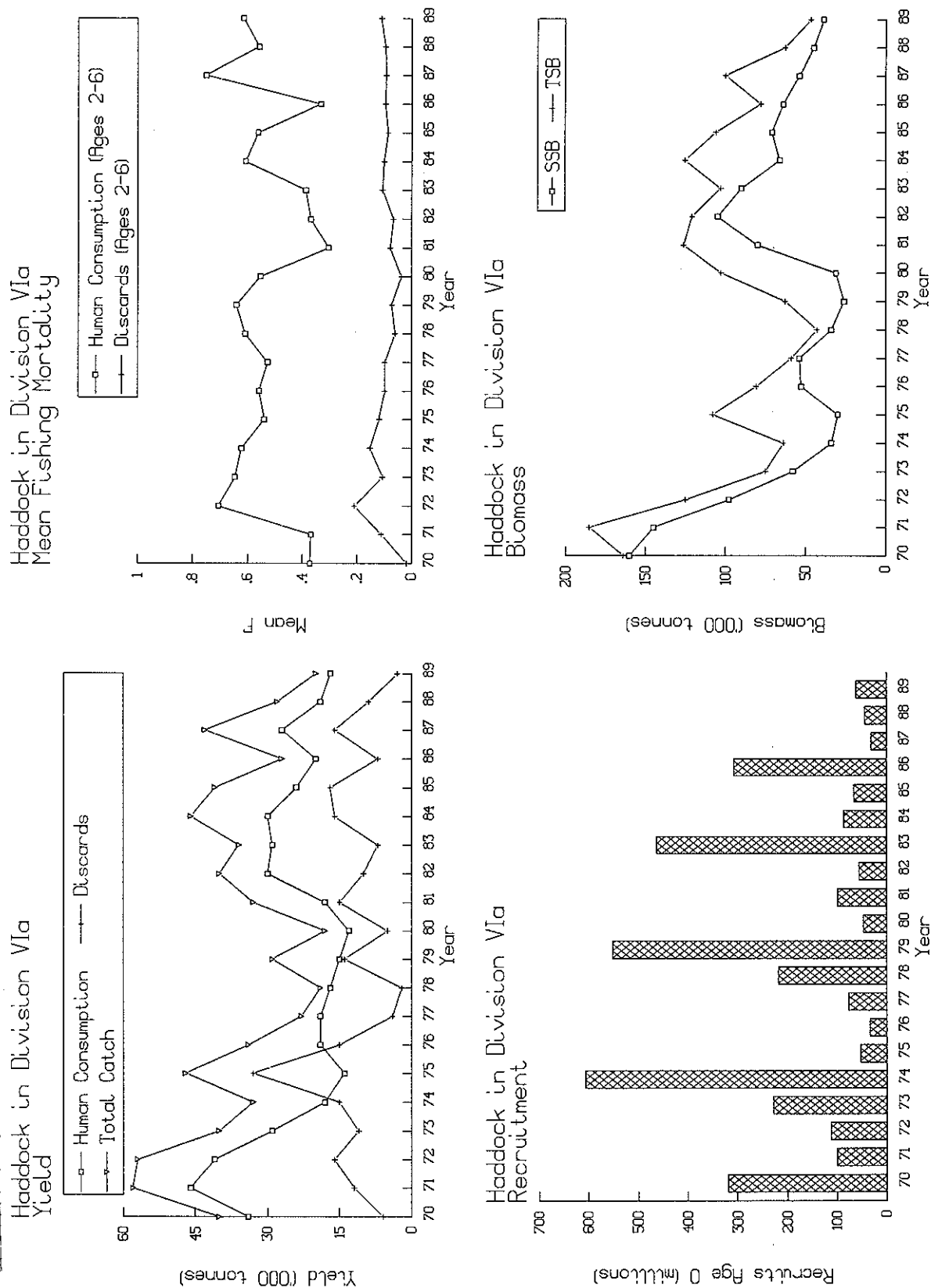
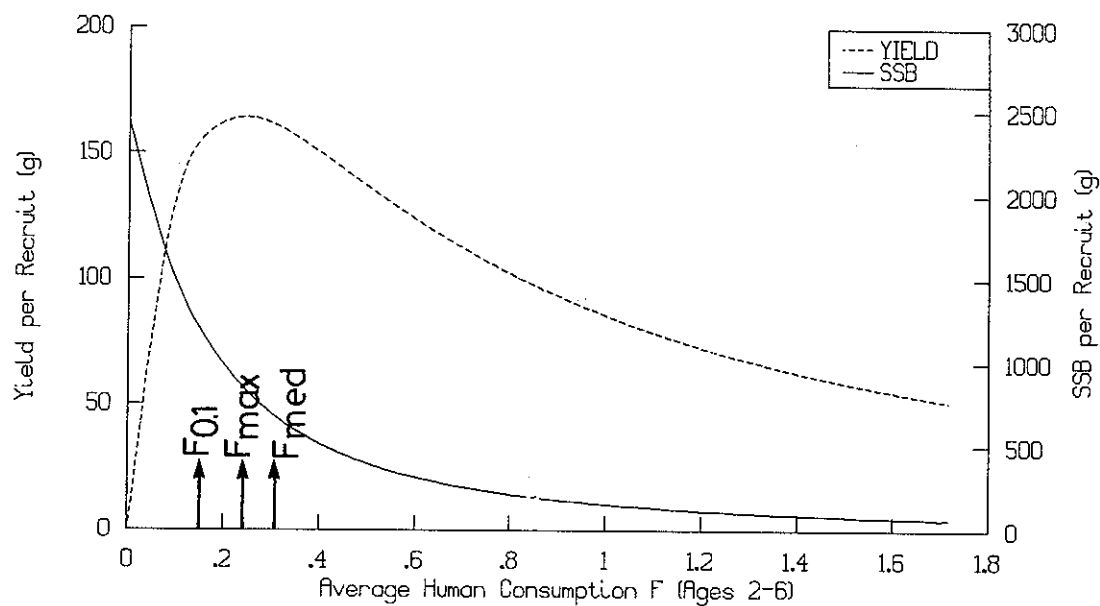


Figure 3.6.4.2 HADDOCK in Division VIa.

a) Long Term Total Landings and Spawning Biomass



b) Short Term Total Landings and Spawning Biomass

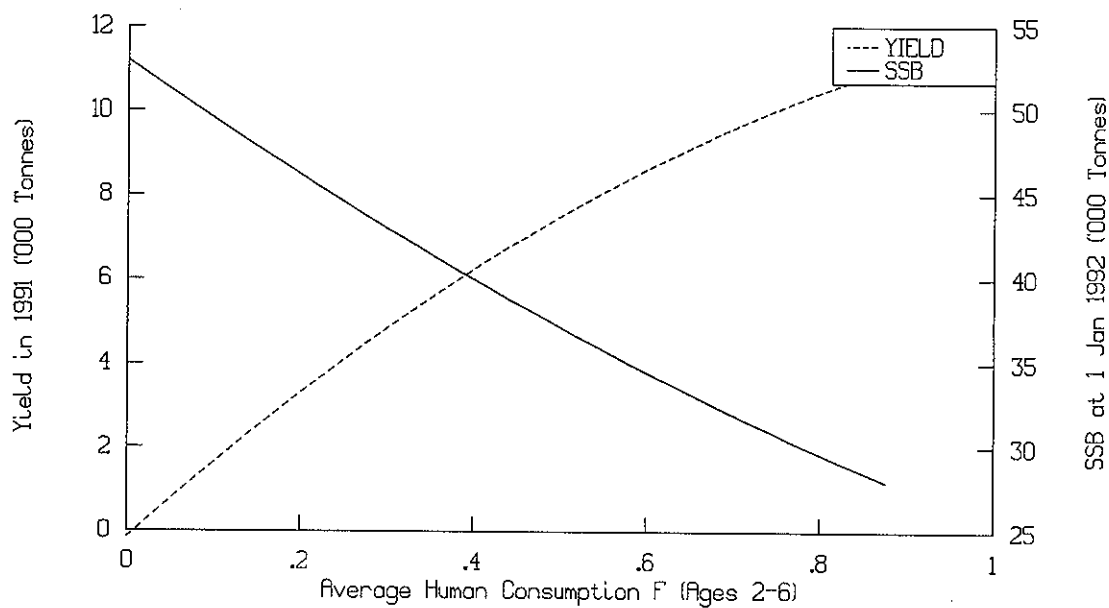


Figure 3.6.6.1

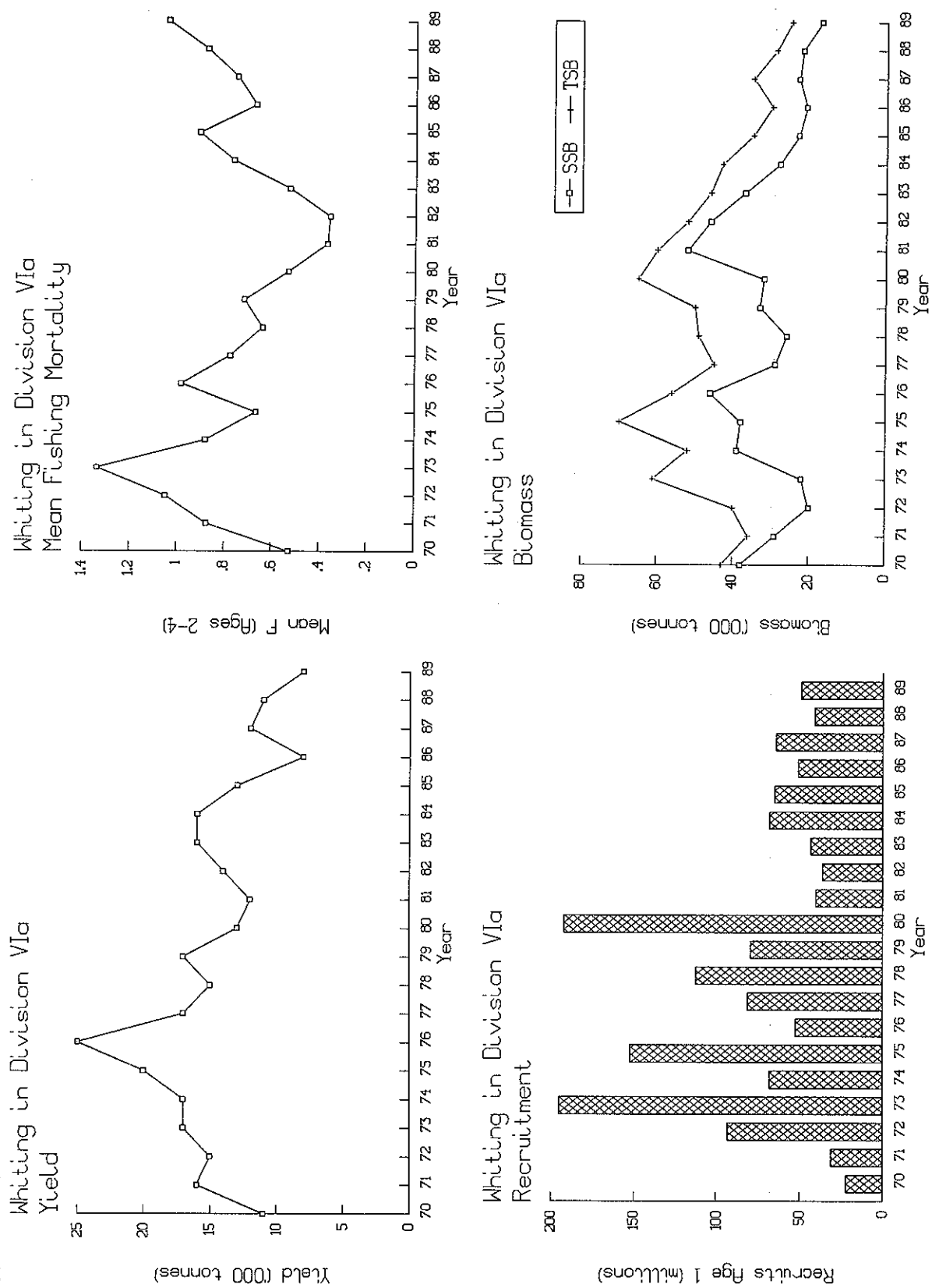
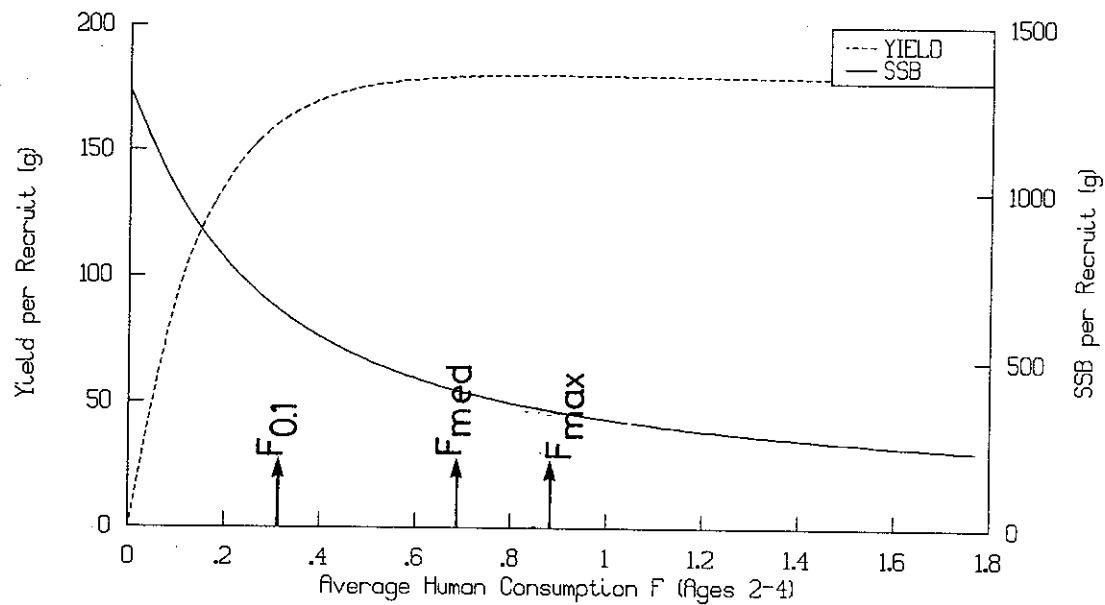


Figure 3.6.6.2 WHITING in Division VIa.

a) Long Term Total Landings and Spawning Biomass



b) Short Term Landings and Spawning biomass

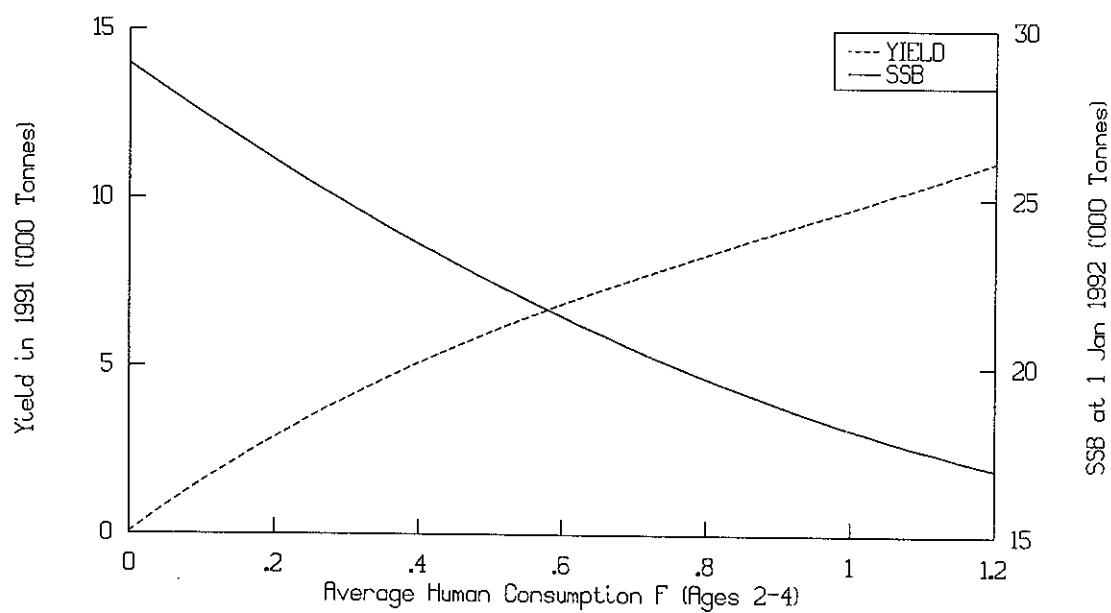
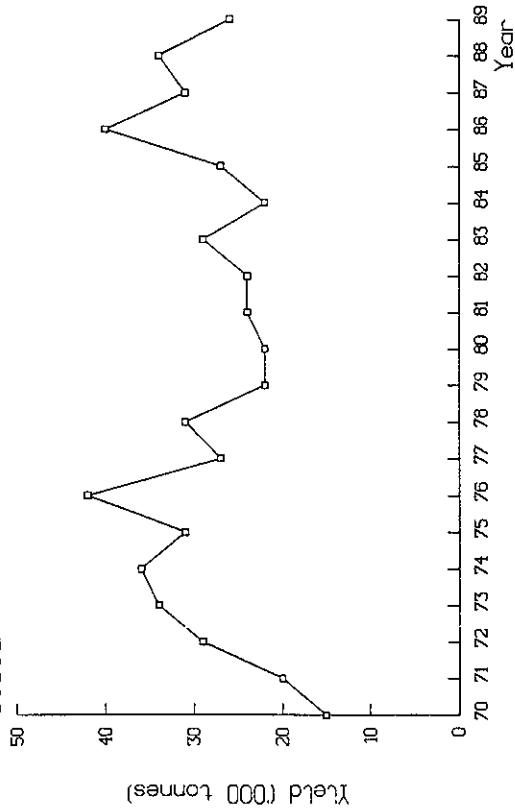
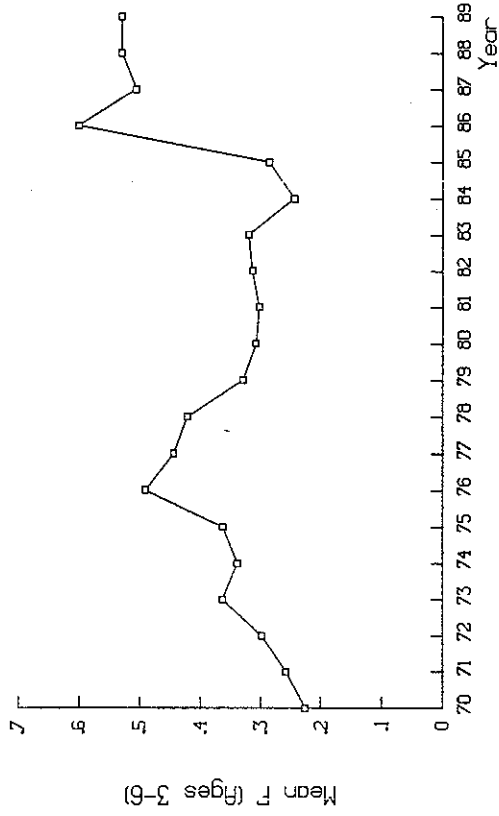


Figure 3.6.8.1

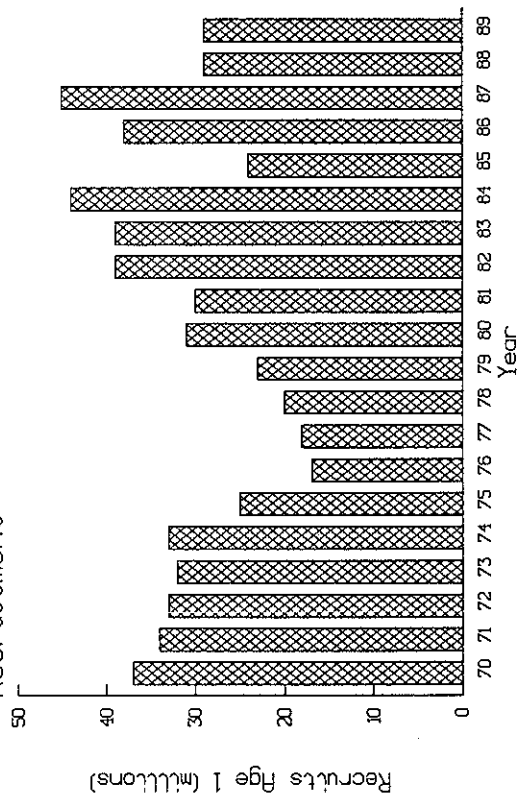
Saithe in Sub-area VI  
Yield



Saithe in Sub-area VI  
Mean Fishing Mortality



Saithe in Sub-area VI  
Recruitment



Saithe in Sub-area VI  
Biomass

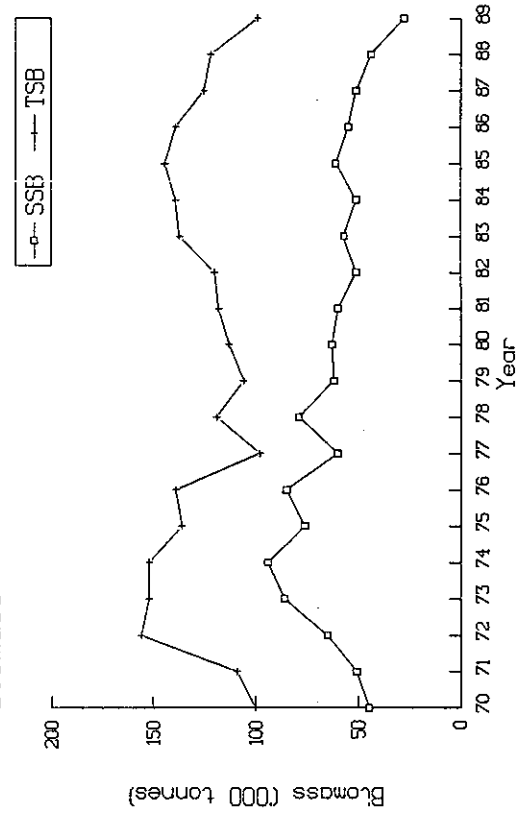
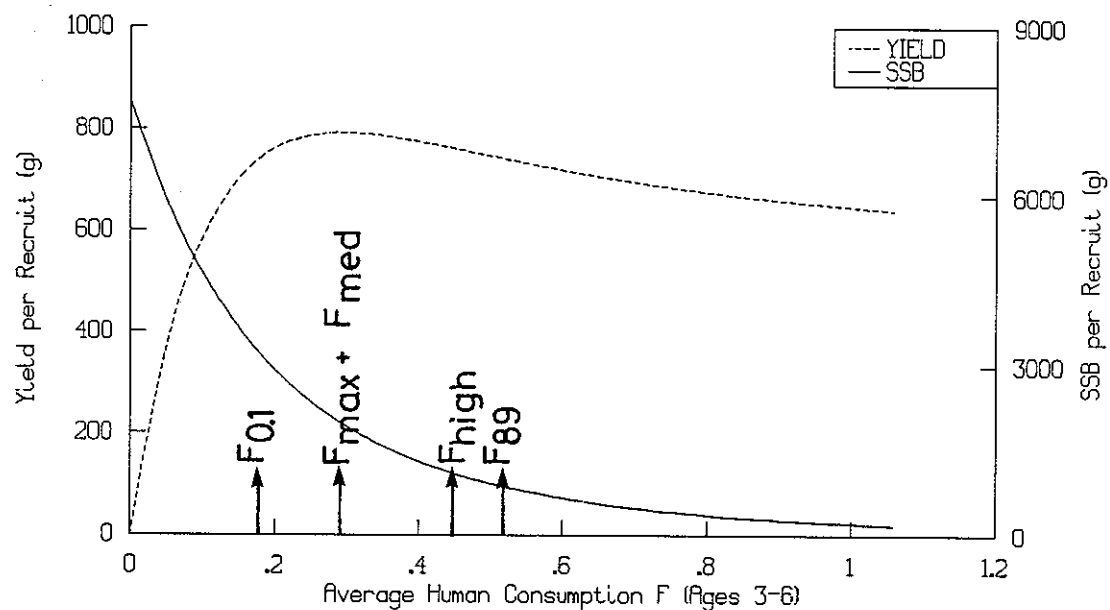


Figure 3.6.8.2 SAITHE in Sub-area VI.

a) Long Term Total Landings and Spawning Biomass



b) Short Term Total Landings and Spawning Biomass

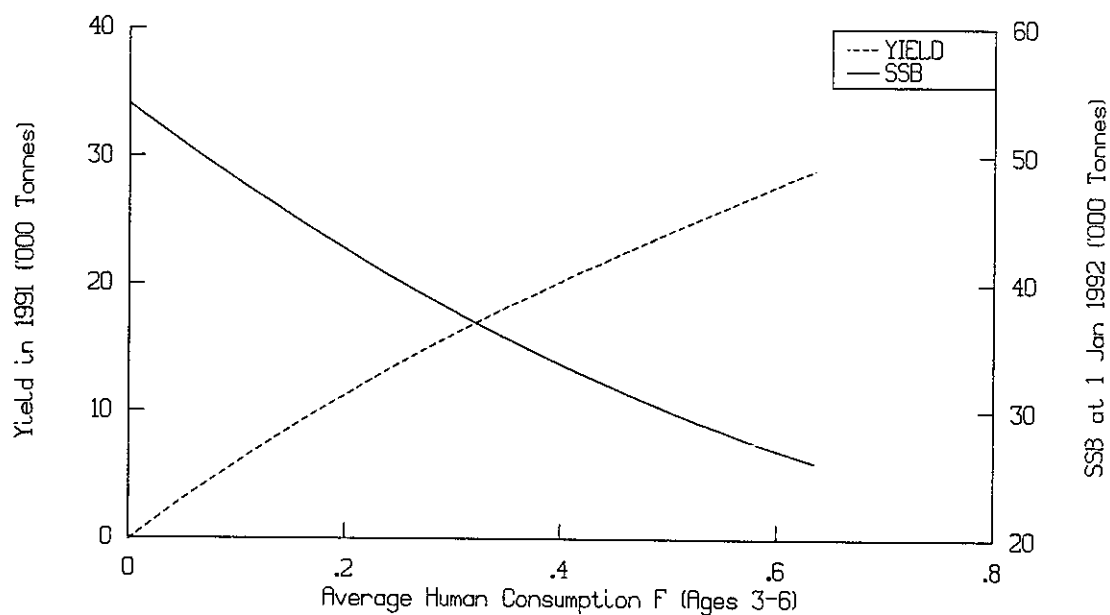
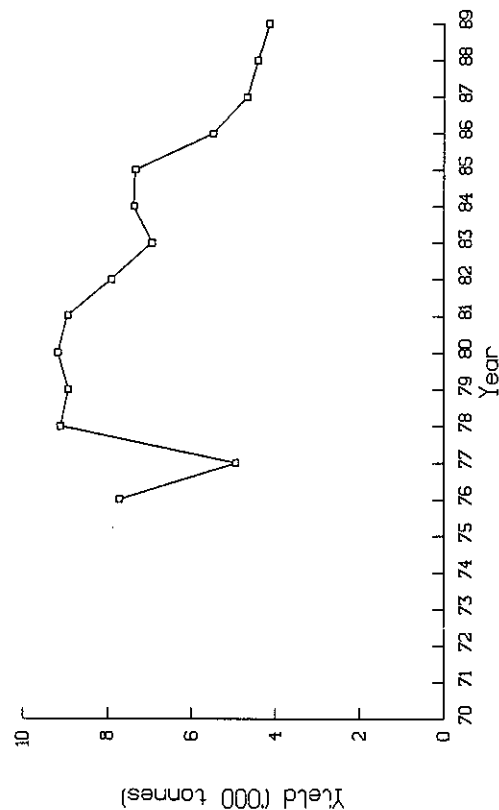


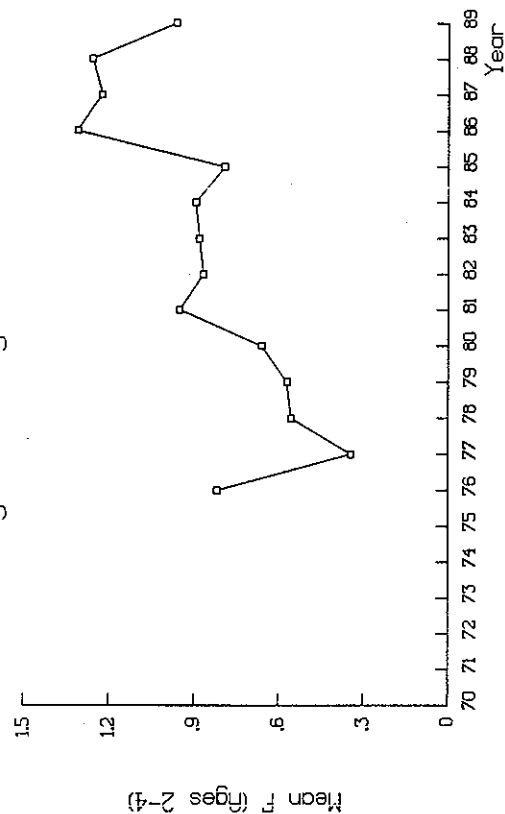
Figure 3.6.10.1

Whiting in Division VIIId

Yield



Whiting in Division VIIId  
Mean Fishing Mortality



Whiting in Division VIIId

Recruitment



Whiting in Division VIIId  
Biomass

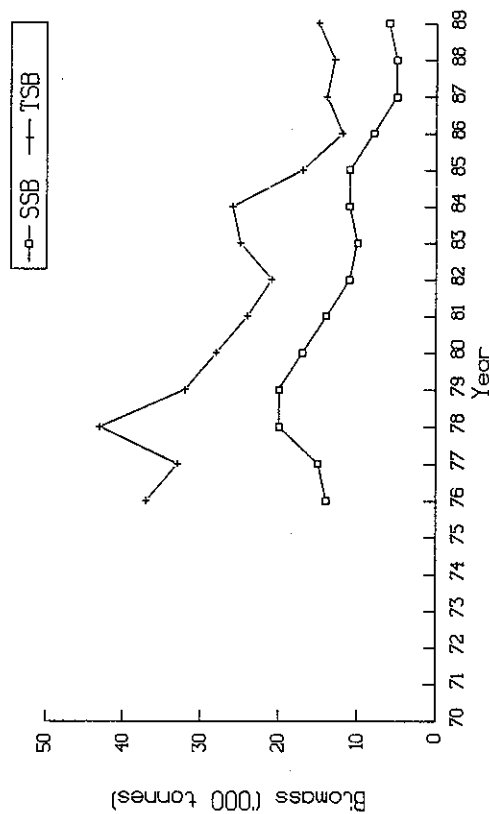
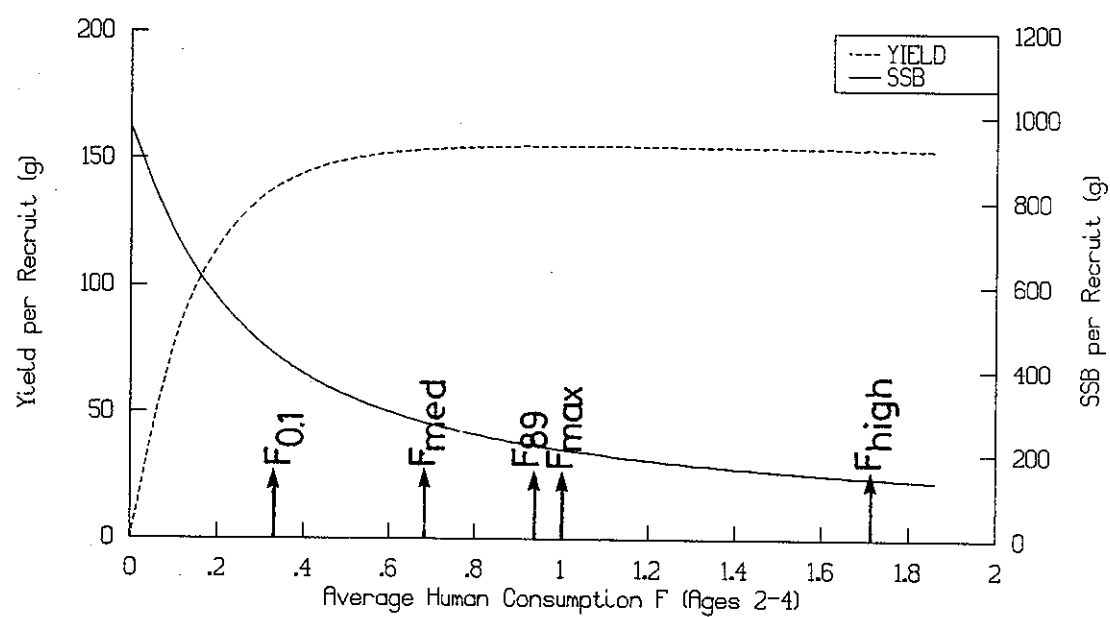




Figure 3.6.10.2 WHITING in Division VIId.

a) Long Term Total Landings and Spawning Biomass



b) Short Term Landings and Spawning biomass

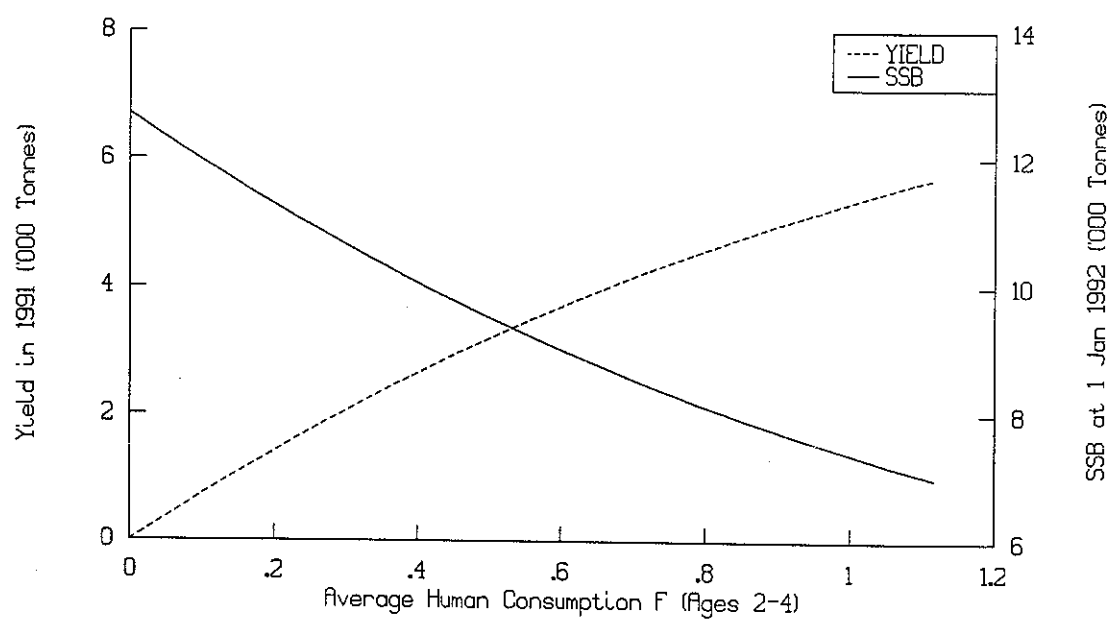


Figure 3.6.12.1

North Sea Cod  
Determination of critical spawning population size  
(after Serebryakov)

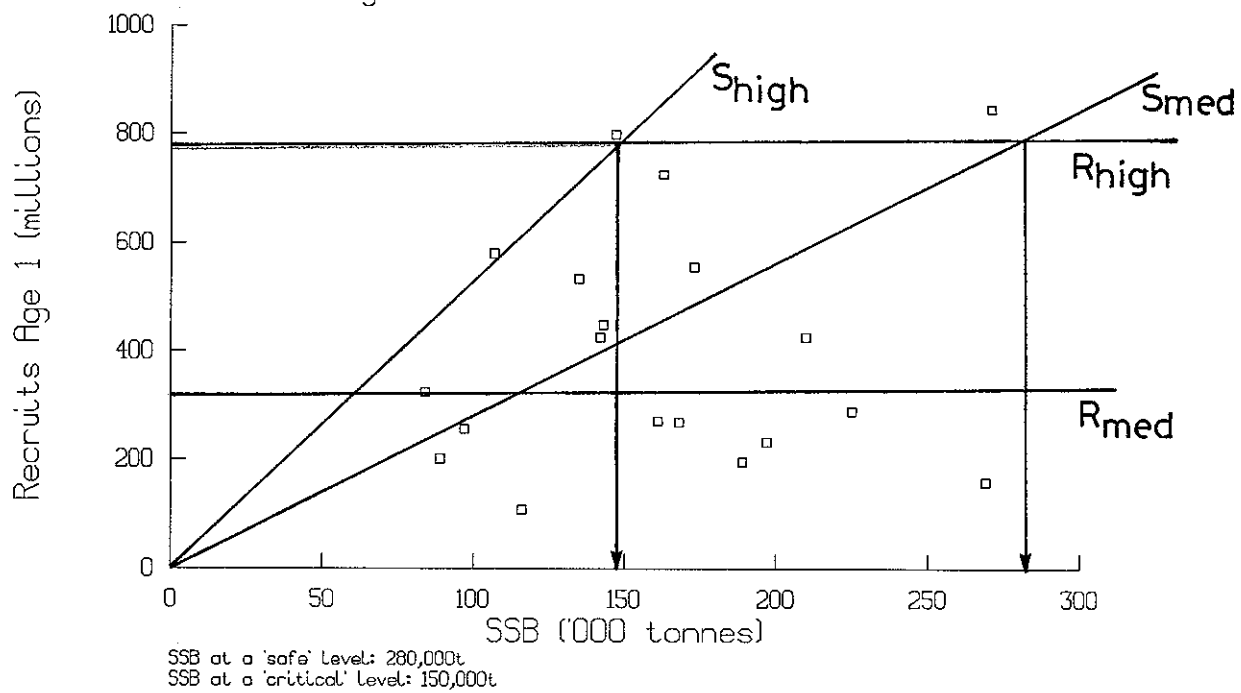


Figure 3.6.12.2 Risk diagram for North Sea COD. The risk for various values of relative effort, that the spawning stock will fall below 100,000 t in 1992.

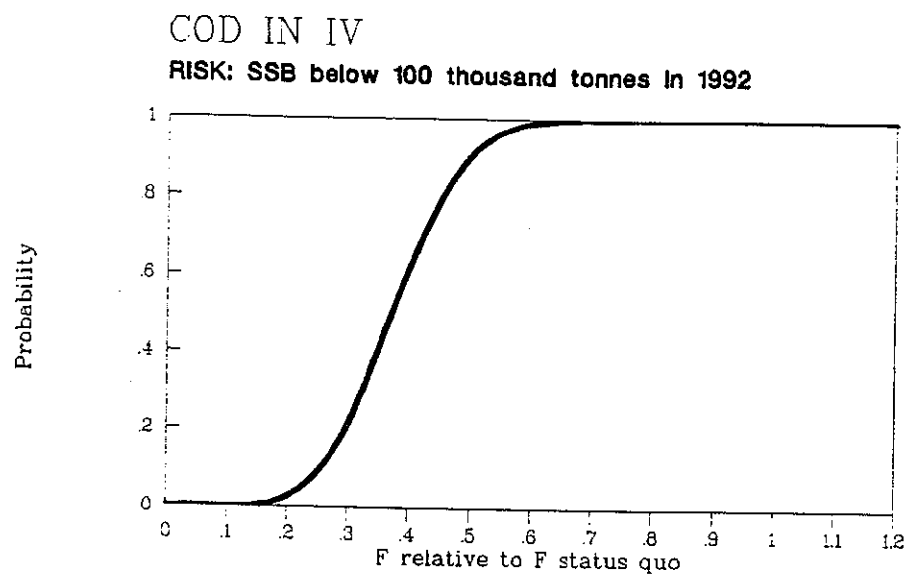
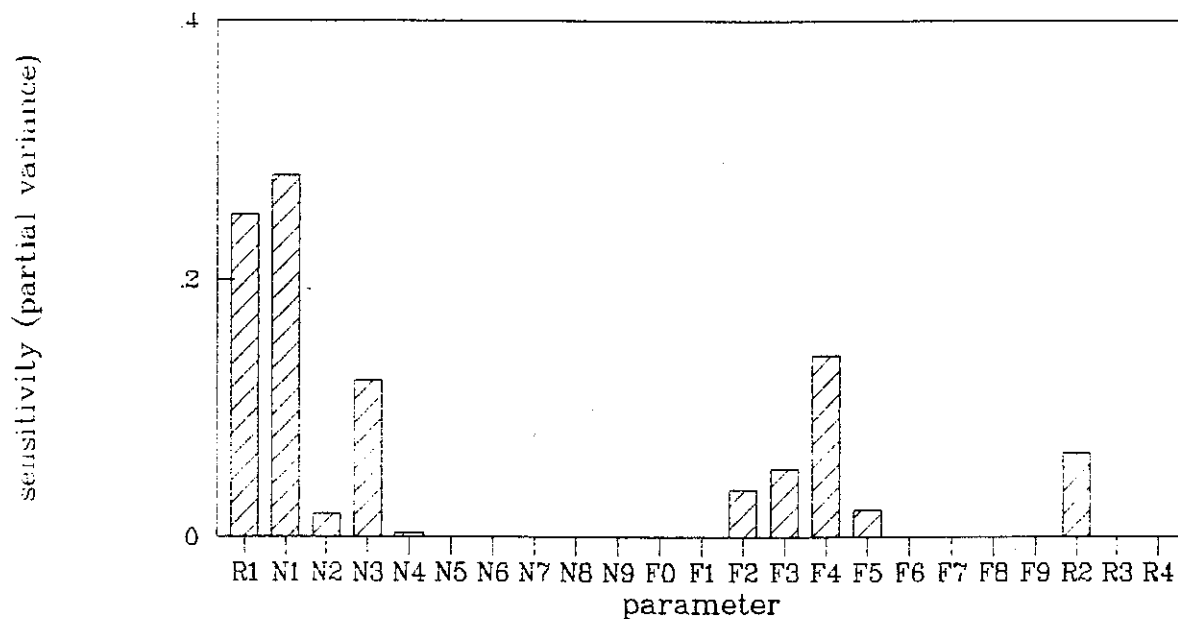


Figure 3.6.12.3

# HADDOCK IN IV Human consumption landings in 1991 **sensitivity analysis**



R1 = Recruitment at youngest age in 1989  
R2 = Recruitment at youngest age in 1990  
R3 etc.

N1 = Number at age 1 in 1989  
N2 = Number at age 2 in 1989  
N3 etc.

F1 = Fishing mortality in all years at age 1  
F2 = Fishing mortality in all years at age 2  
F3 etc.

# HADDOCK IN IV SSB at start of 1992 **sensitivity analysis**

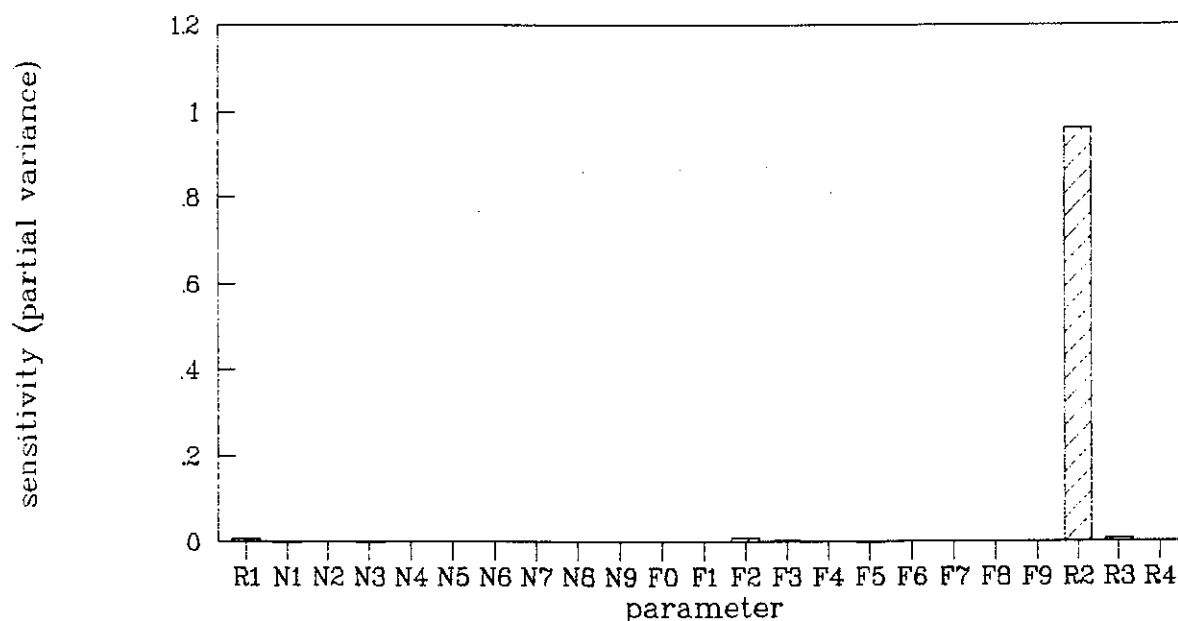
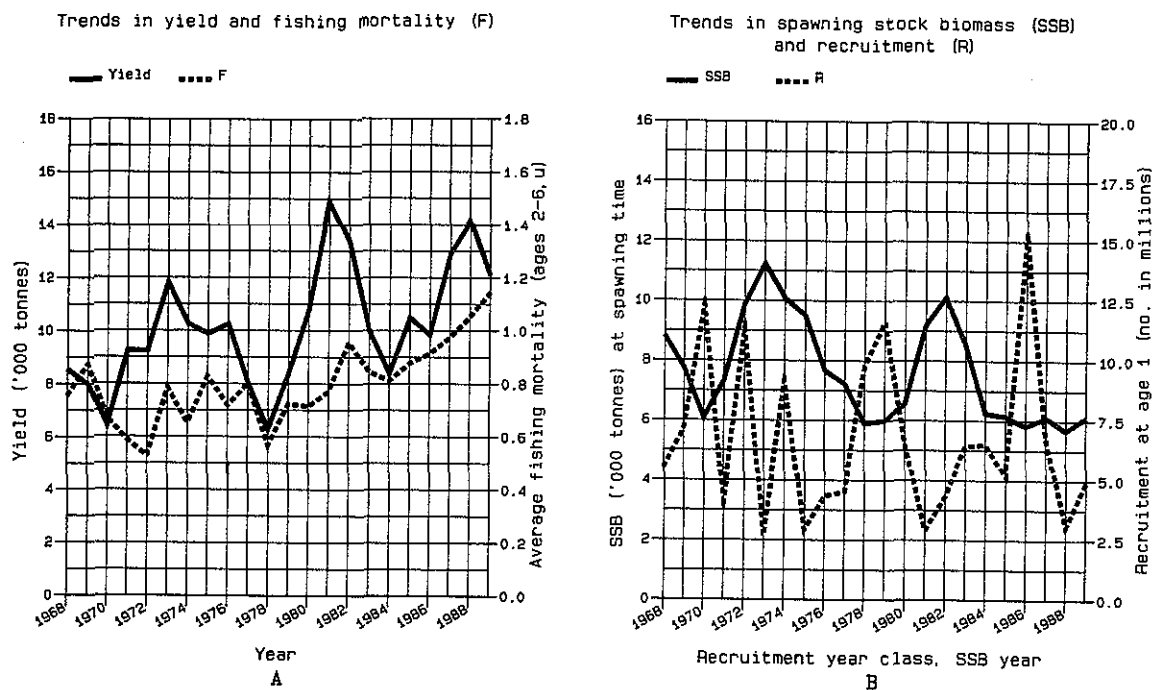


Figure 3.7.1

FISH STOCK SUMMARY  
STOCK: Irish Sea Cod  
12.09.1990



FISH STOCK SUMMARY  
STOCK: Irish Sea Cod  
12.09.1990

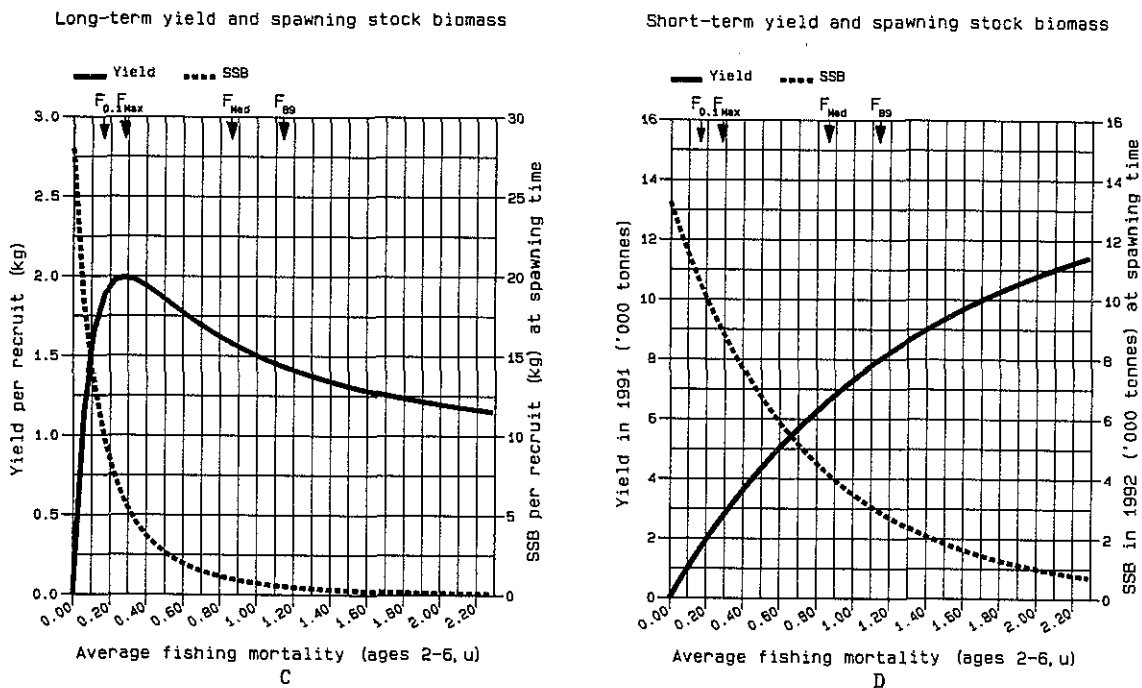
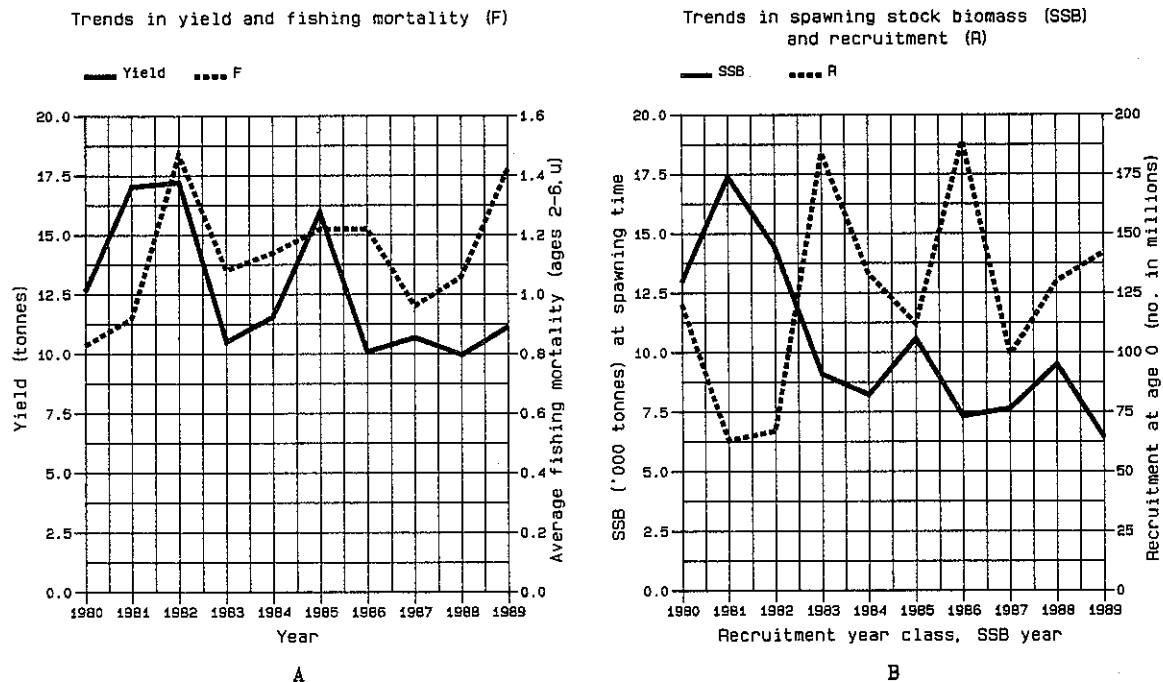


Figure 3.7.2

FISH STOCK SUMMARY  
STOCK: Irish Sea Whiting  
12-09-1990



FISH STOCK SUMMARY  
STOCK: Irish Sea Whiting  
12-09-1990

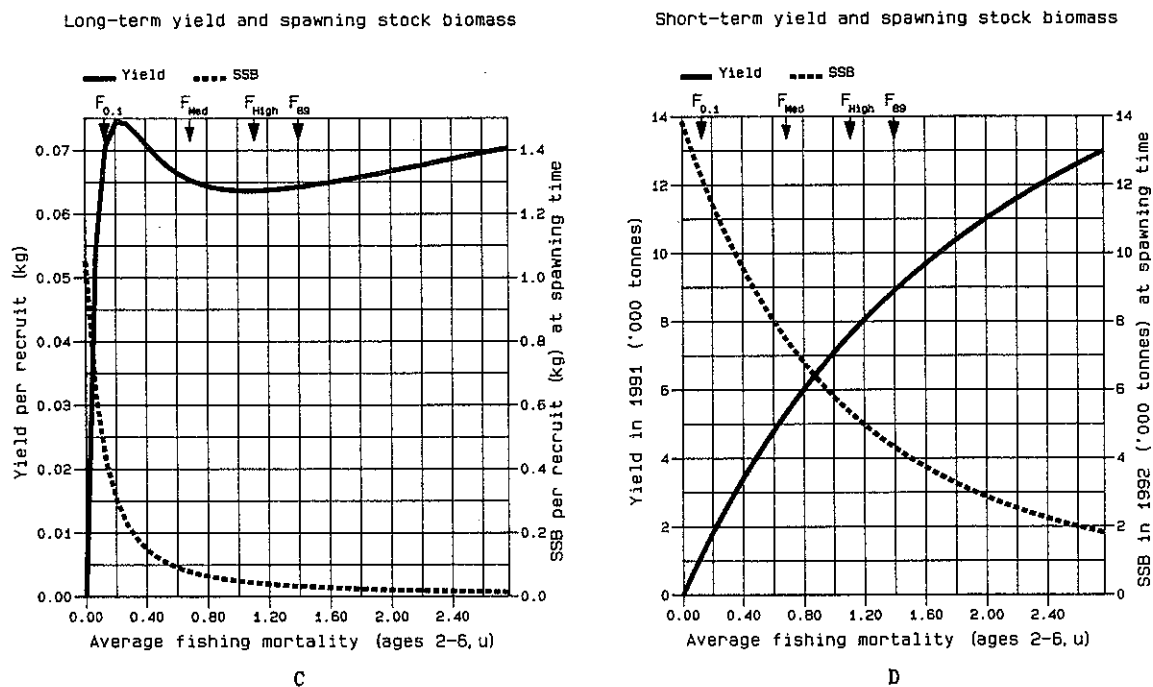
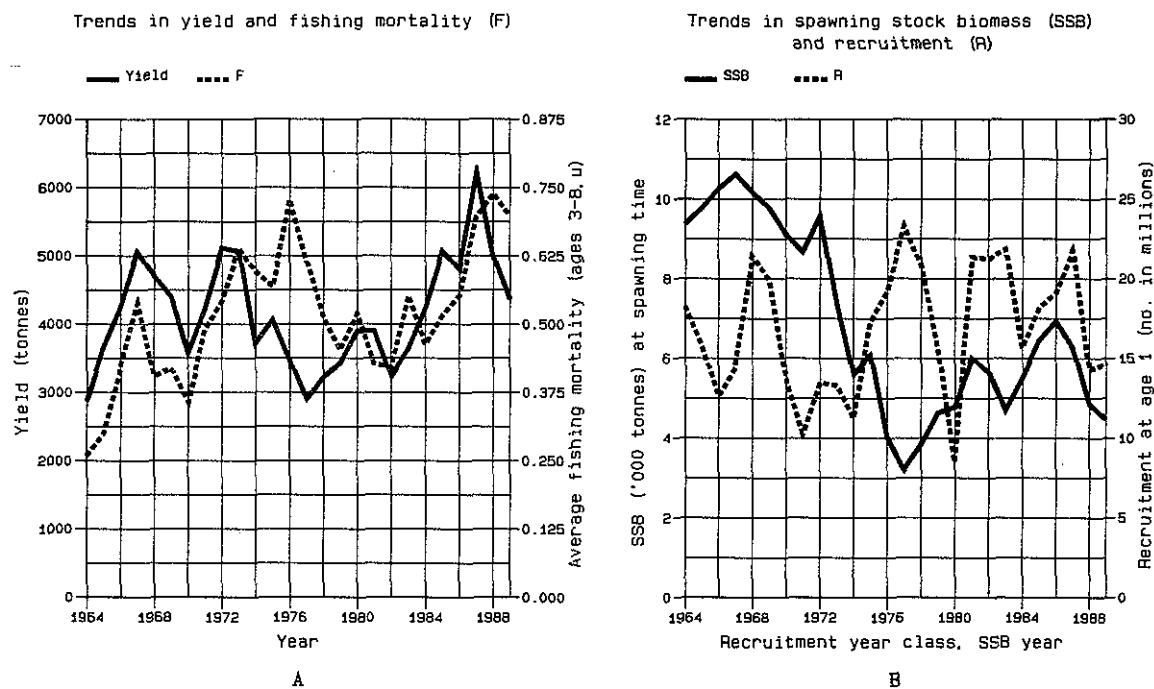


Figure 3.7.3

FISH STOCK SUMMARY  
 STOCK: Irish Sea Plaice  
 07-09-1990



FISH STOCK SUMMARY  
 STOCK: Irish Sea Plaice  
 07-09-1990

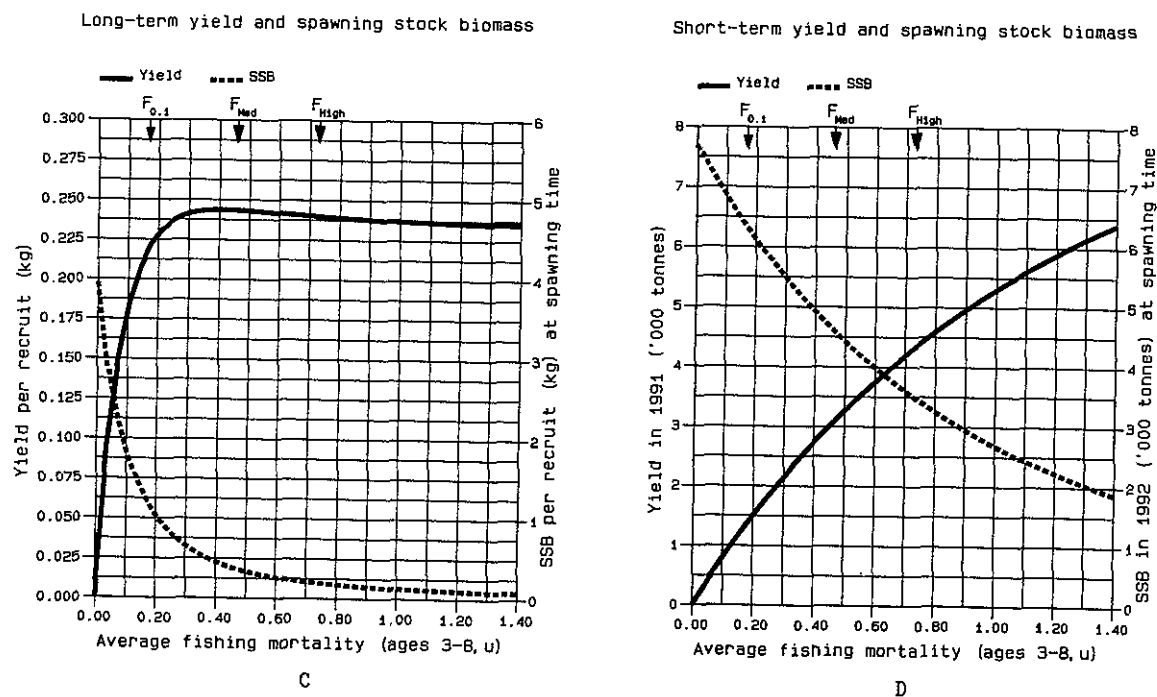
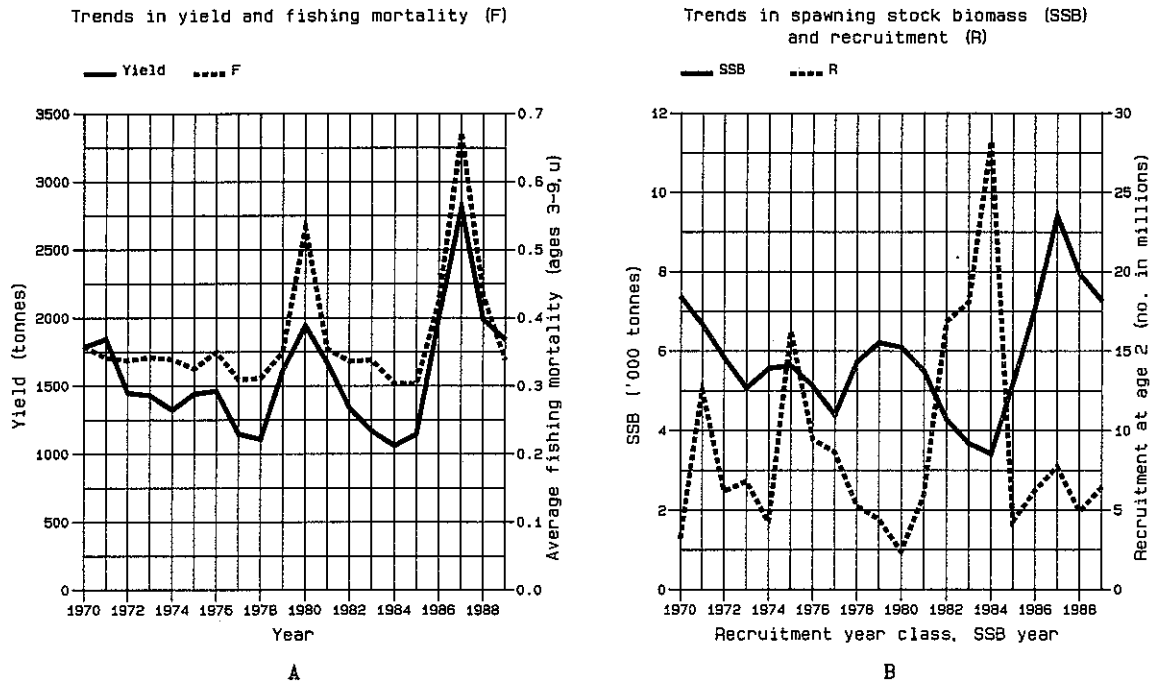


Figure 3.7.4.2

FISH STOCK SUMMARY  
STOCK: Irish Sea Sole  
13-09-1990



FISH STOCK SUMMARY  
STOCK: Irish Sea Sole  
13-09-1990

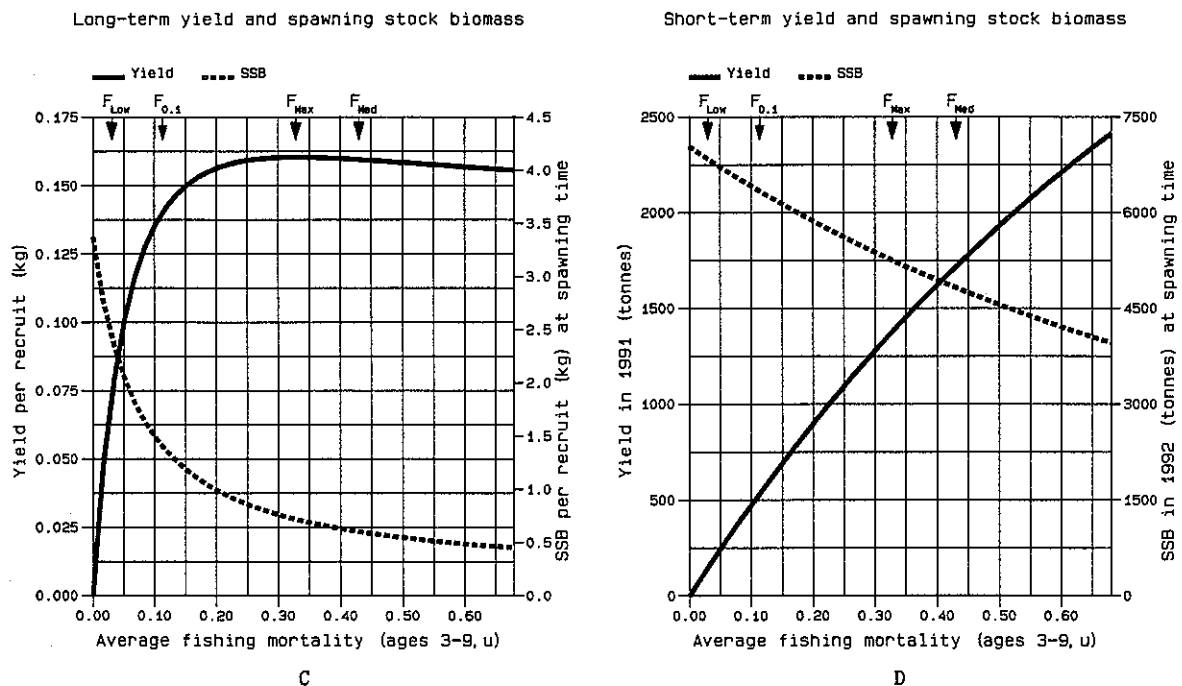


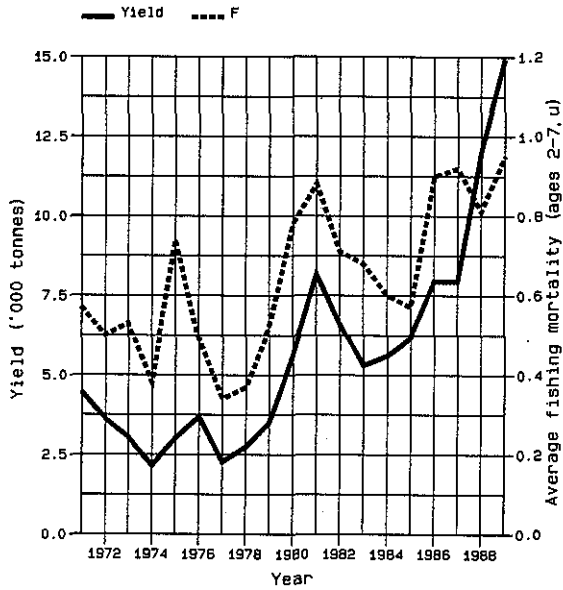


Figure 3.7.5

FISH STOCK SUMMARY  
STOCK: Celtic Sea Cod  
13-09-1990

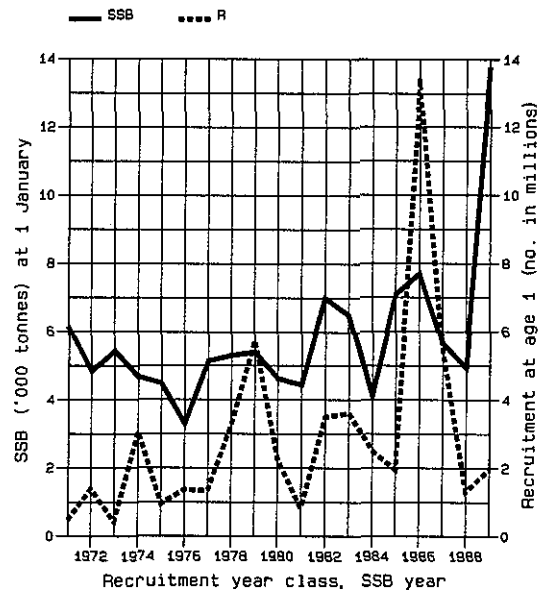
365

Trends in yield and fishing mortality (F)



A

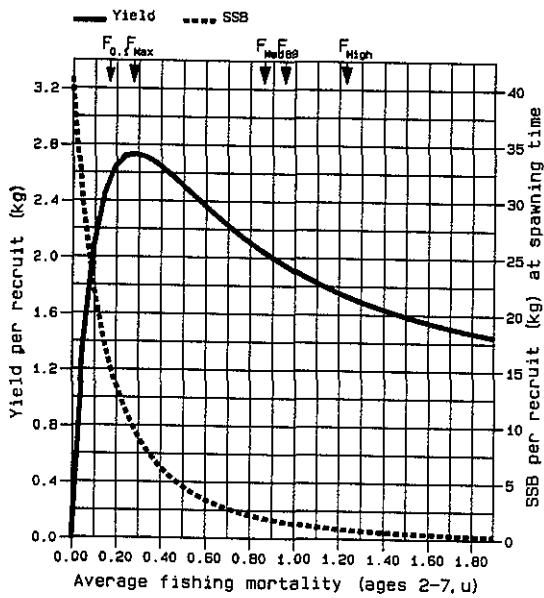
Trends in spawning stock biomass (SSB) and recruitment (R)



B

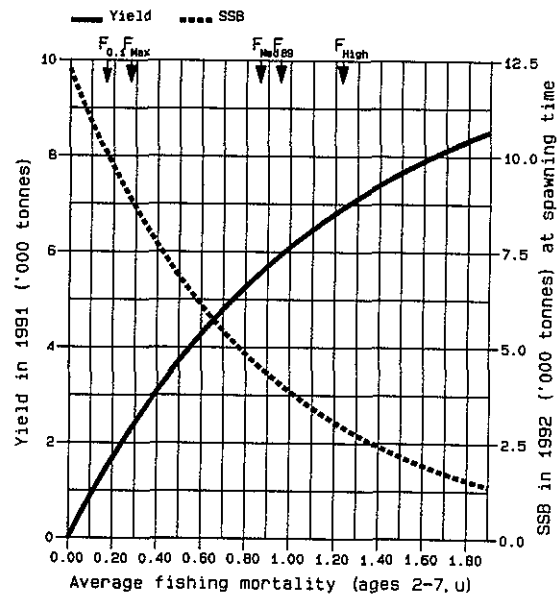
FISH STOCK SUMMARY  
STOCK: Celtic Sea Cod  
13-09-1990

Long-term yield and spawning stock biomass



C

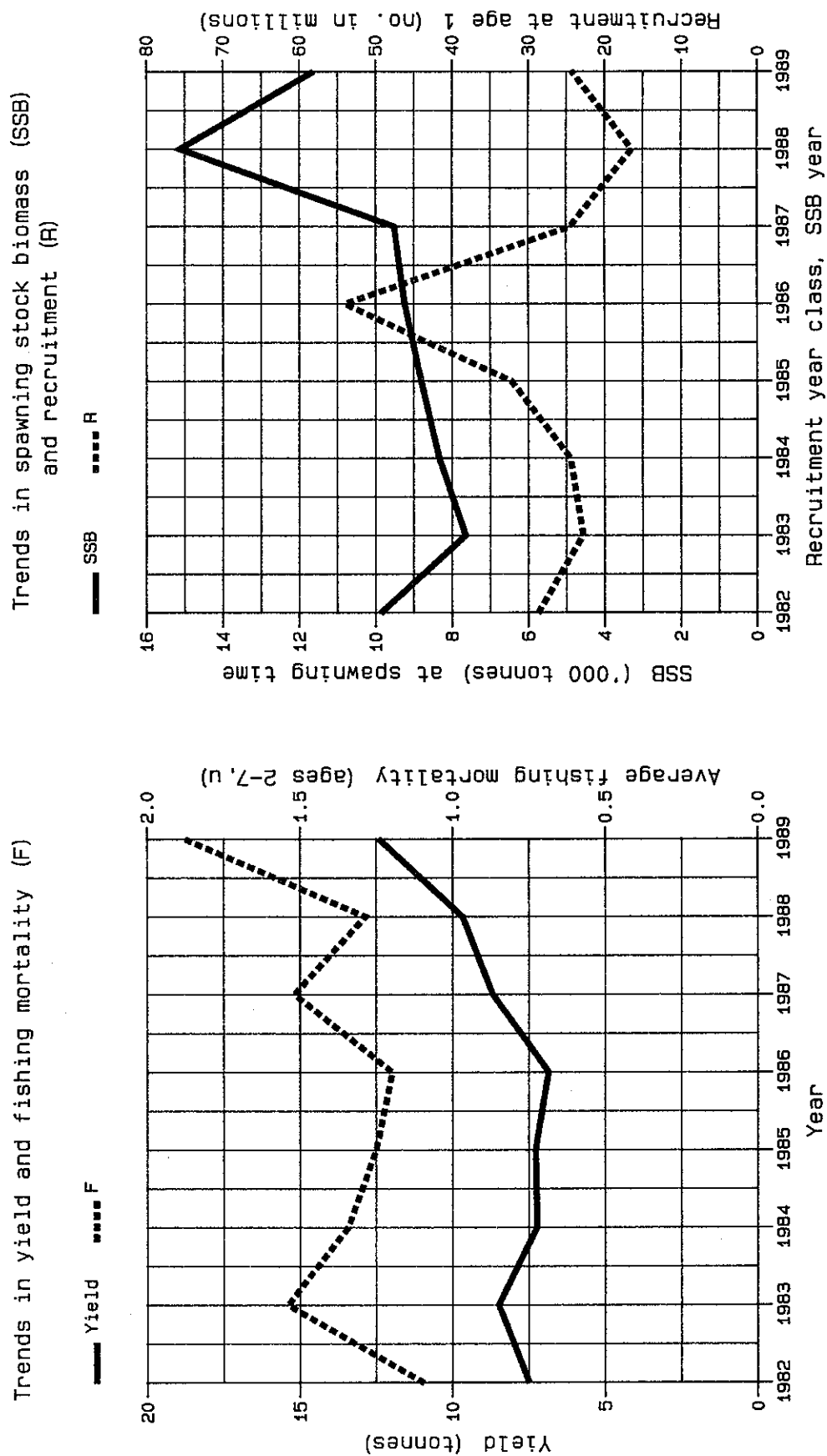
Short-term yield and spawning stock biomass



D

**FISH STOCK SUMMARY**  
**STOCK: Celtic Sea Whiting**  
**11.09.1990**

Figure 3.7.6



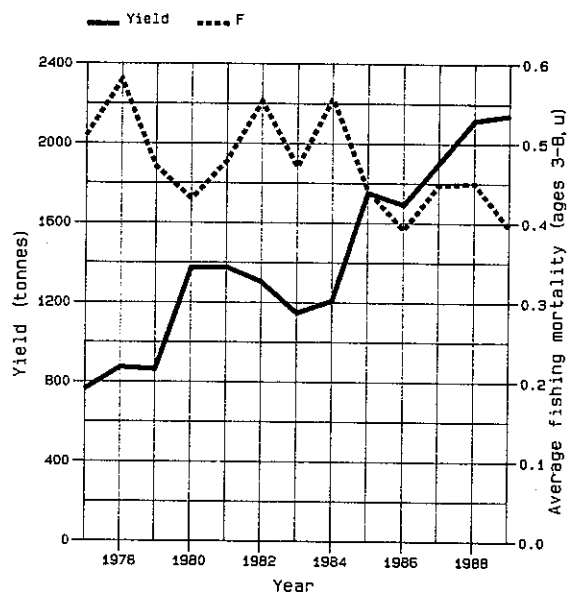
A

B

Figure 3.7.7

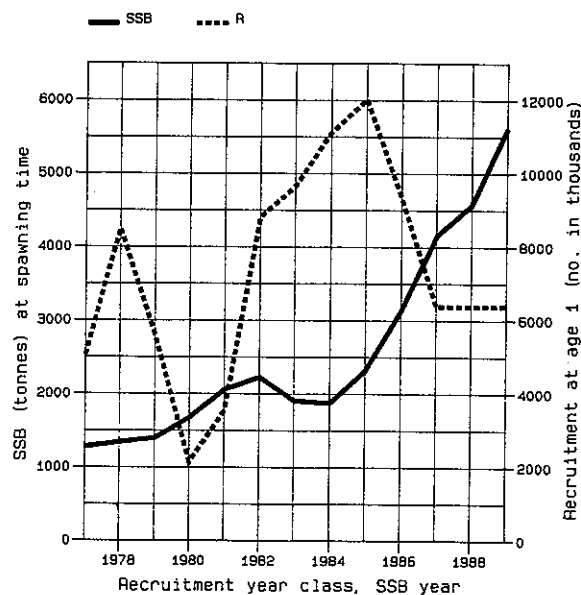
FISH STOCK SUMMARY  
STOCK: Celtic Sea Plaice  
01-10-1990

Trends in yield and fishing mortality (F)



A

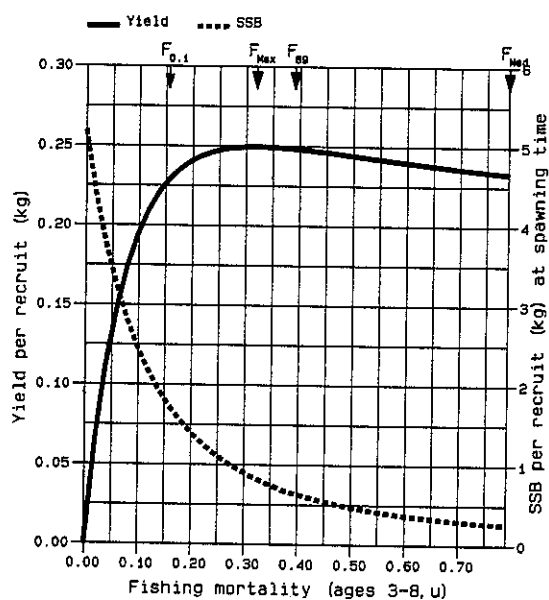
Trends in spawning stock biomass (SSB) and recruitment (R)



B

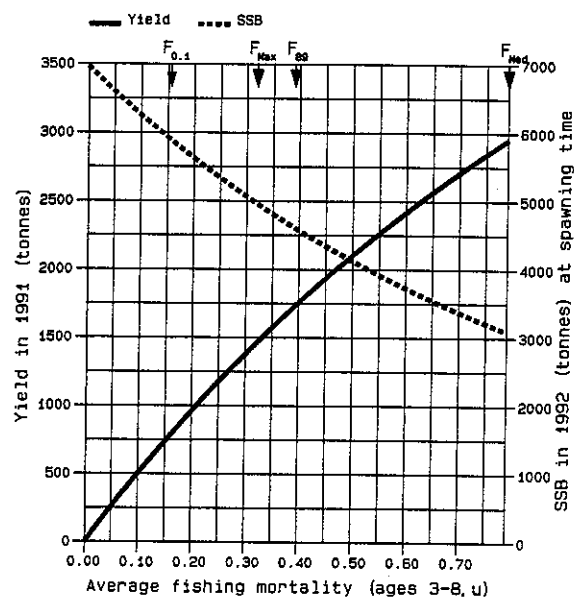
FISH STOCK SUMMARY  
STOCK: Celtic Sea Plaice  
12-09-1990

Long-term yield and spawning stock biomass



C

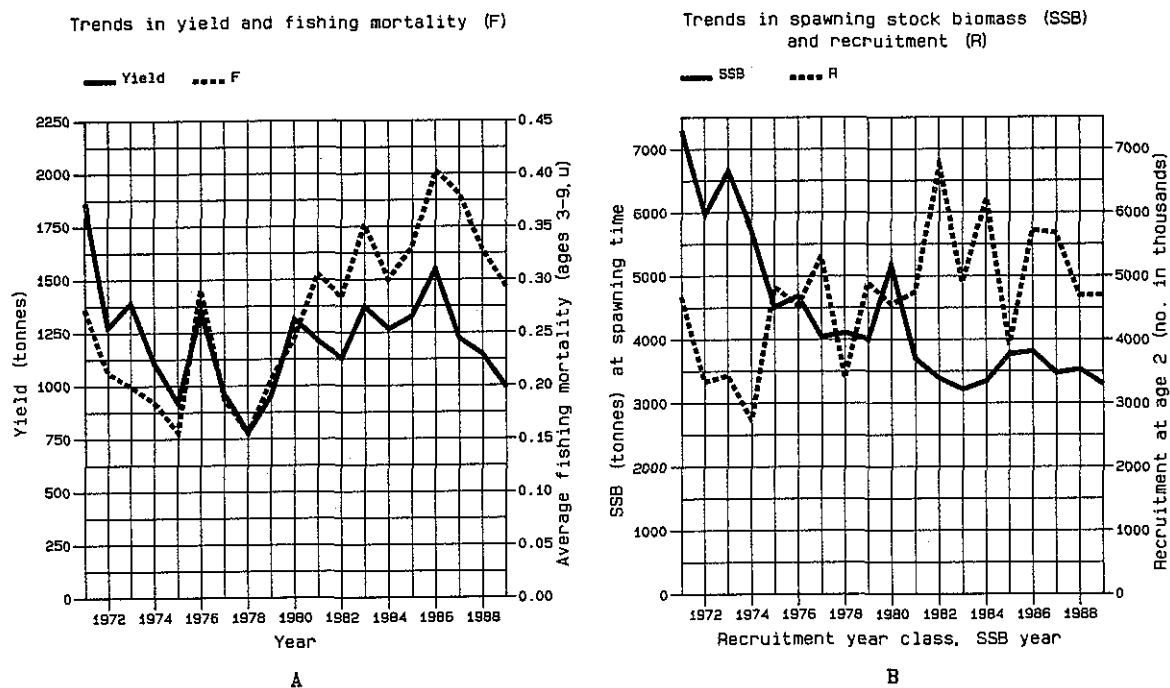
Short-term yield and spawning stock biomass



D

Figure 3.7.8

FISH STOCK SUMMARY  
STOCK: Celtic Sea Sole  
06-09-1990



FISH STOCK SUMMARY  
STOCK: Celtic Sea Sole  
06-09-1990

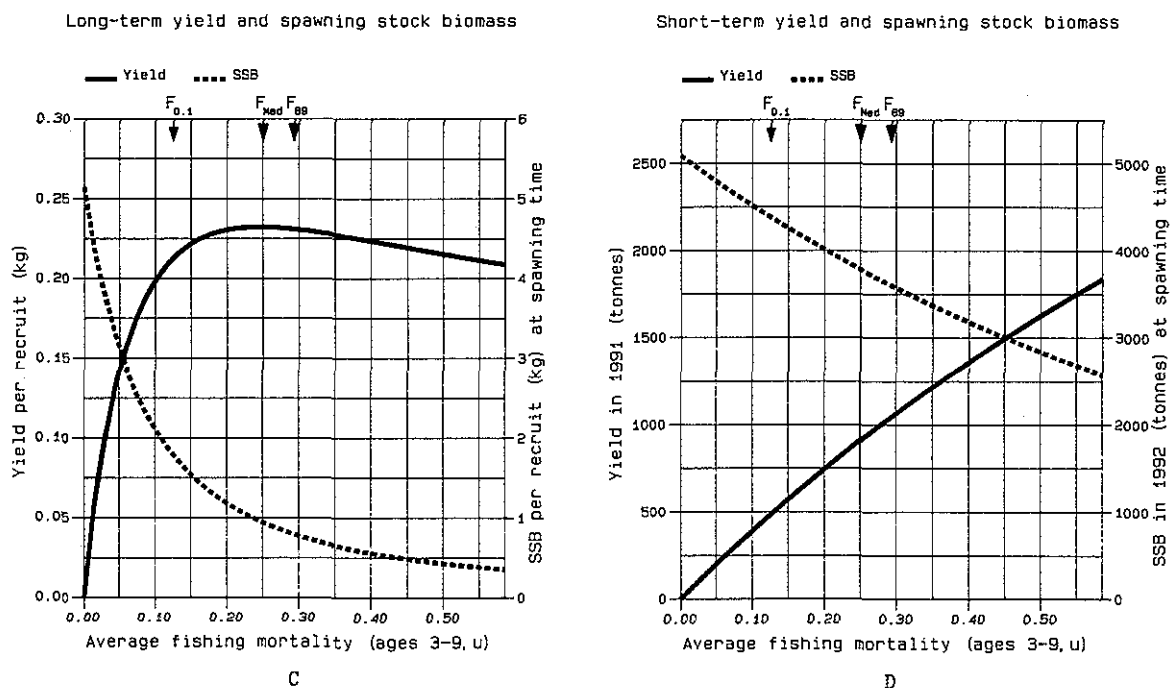
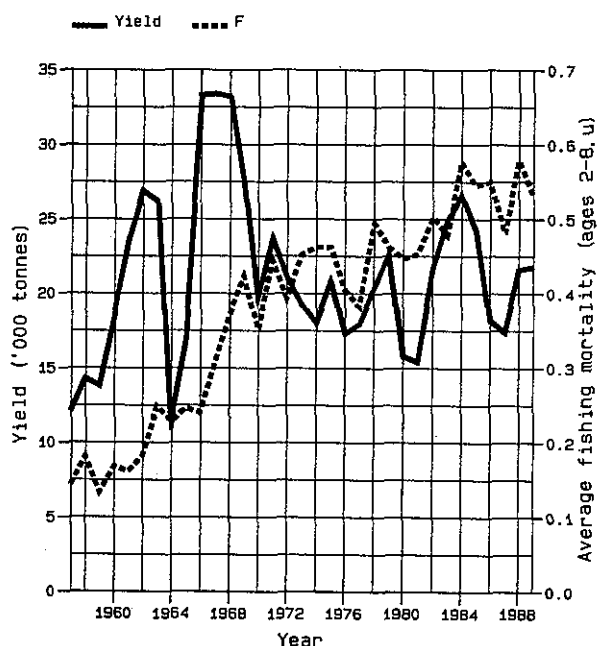


Figure 3.8.1.2

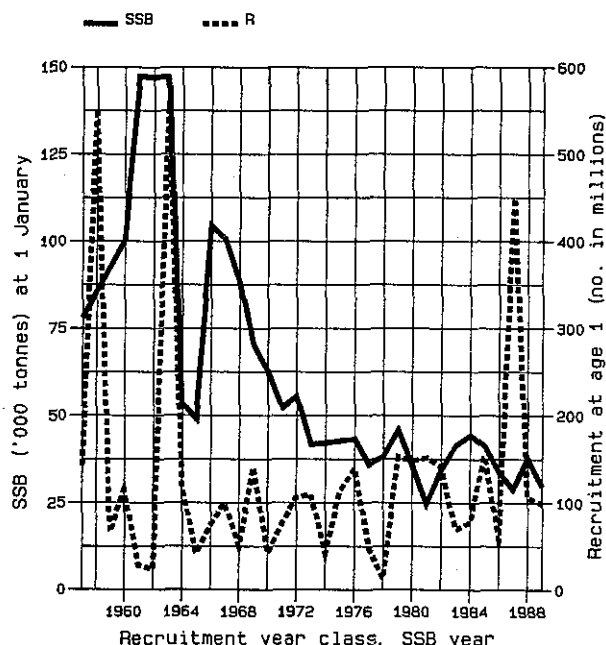
FISH STOCK SUMMARY  
STOCK: North Sea Sole  
24-10-1990

Trends in yield and fishing mortality (F)



A

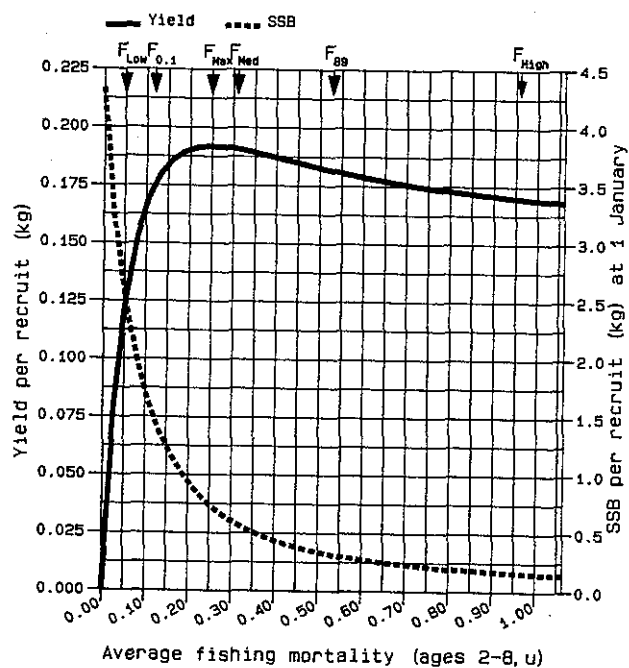
Trends in spawning stock biomass (SSB) and recruitment (R)



B

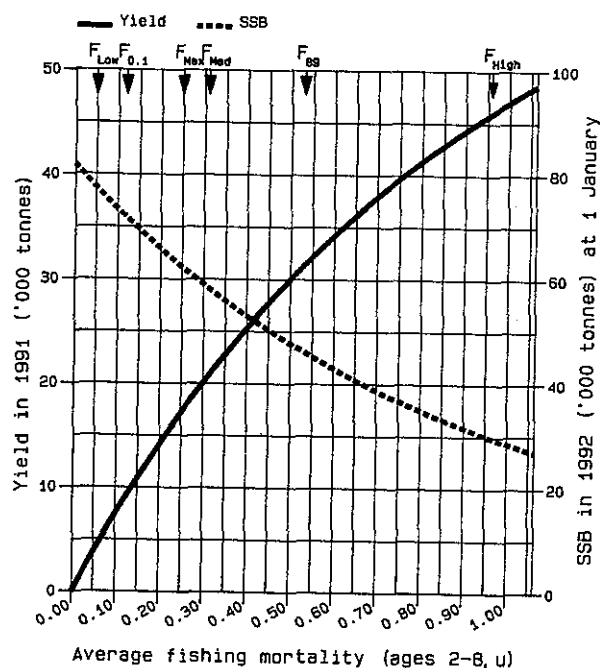
FISH STOCK SUMMARY  
STOCK: North Sea Sole  
24-10-1990

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass

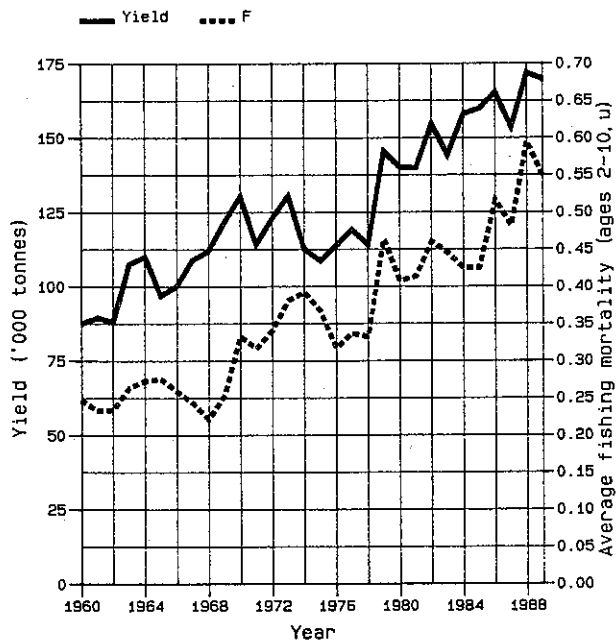


D

FISH STOCK SUMMARY  
STOCK:North Sea Plaice  
24-10-1990

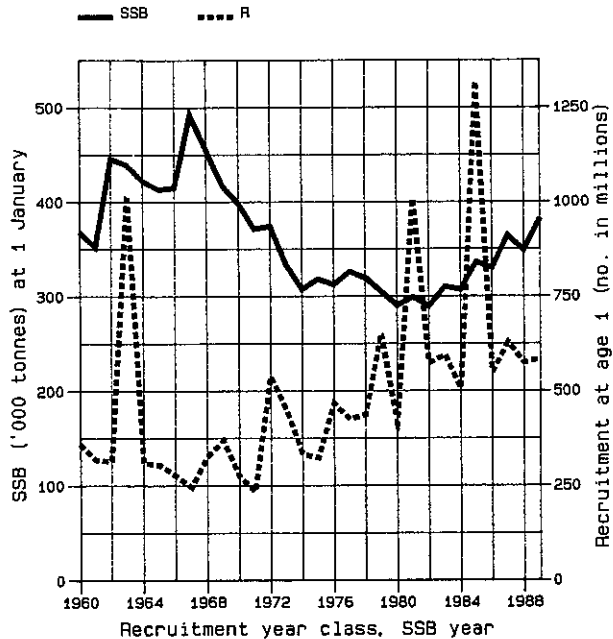
Figure 3.8.2

Trends in yield and fishing mortality (F)



A

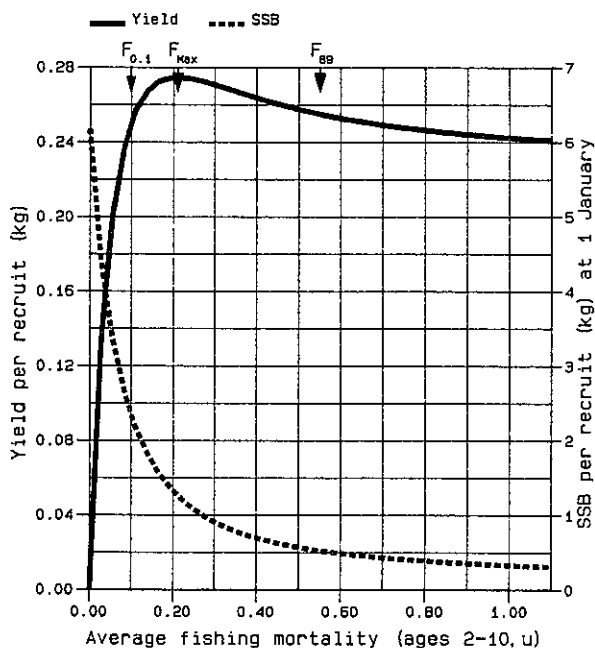
Trends in spawning stock biomass (SSB) and recruitment (R)



B

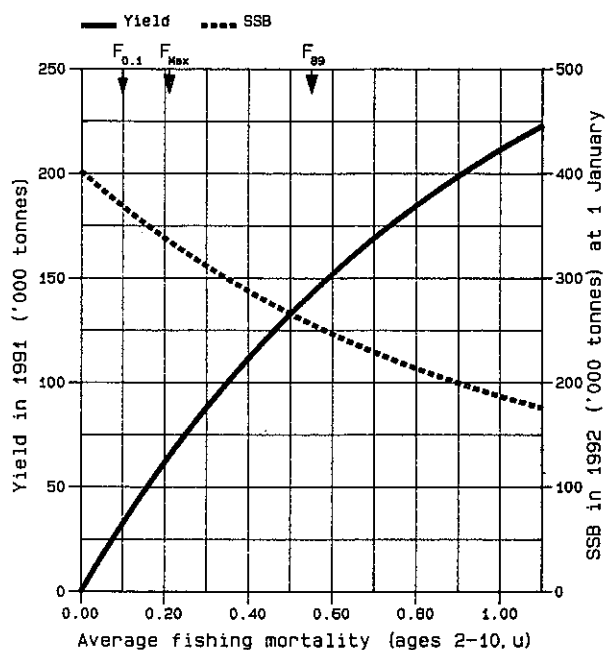
FISH STOCK SUMMARY  
STOCK:North Sea Plaice  
24-10-1990

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass



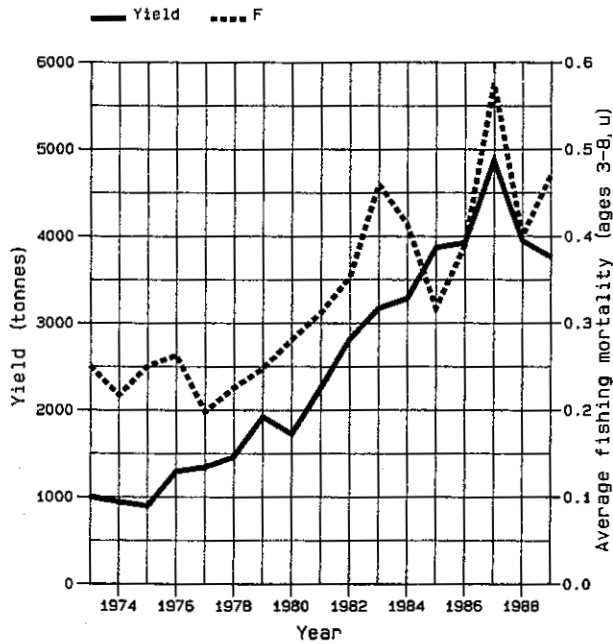
D

FISH STOCK SUMMARY  
STOCK: Division VIId Sole  
23-10-1990

371

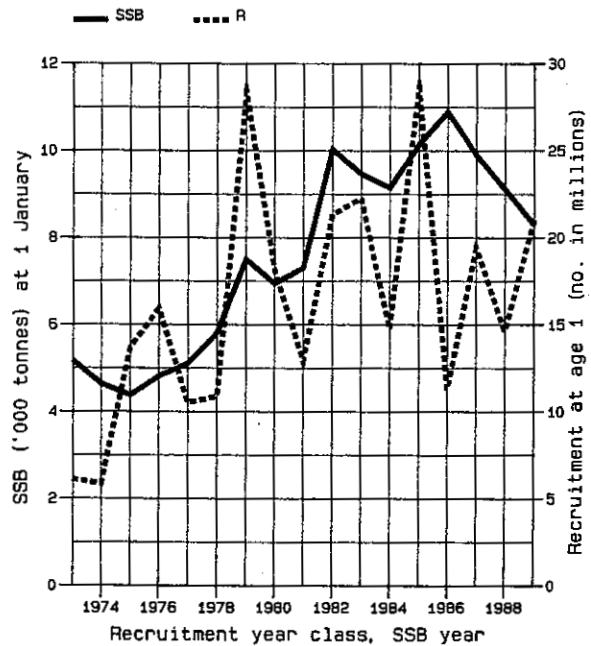
Figure 3.8.3

Trends in yield and fishing mortality (F)



A

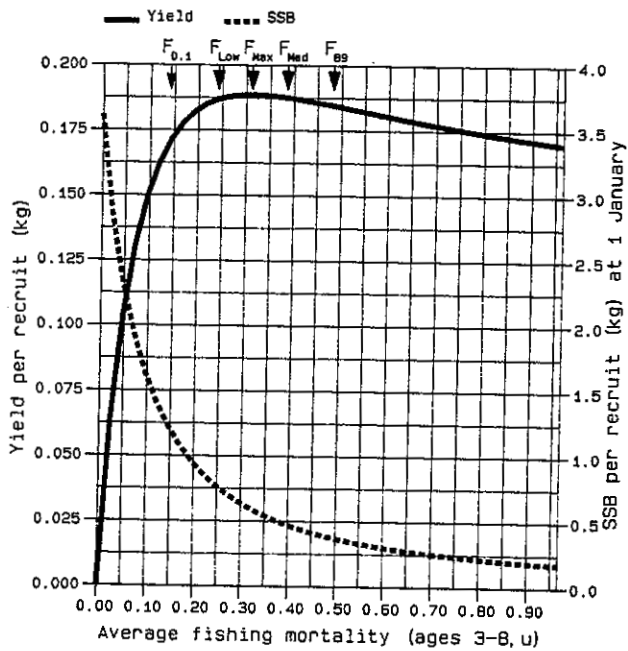
Trends in spawning stock biomass (SSB) and recruitment (R)



B

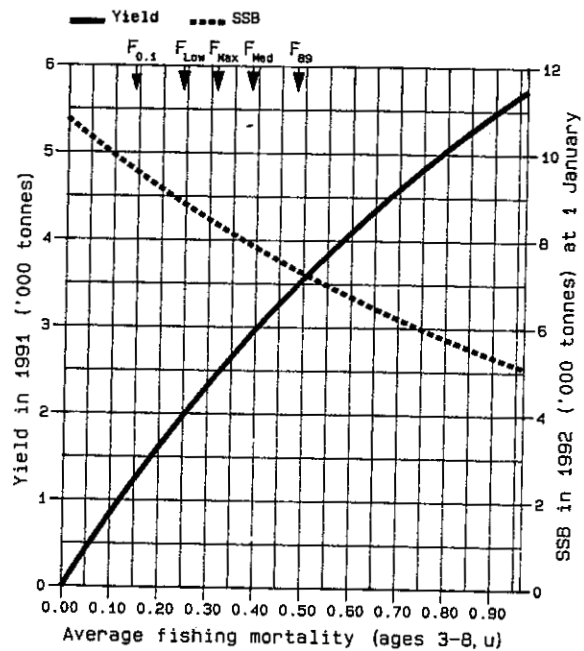
FISH STOCK SUMMARY  
STOCK: Division VIId Sole  
23-10-1990

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass

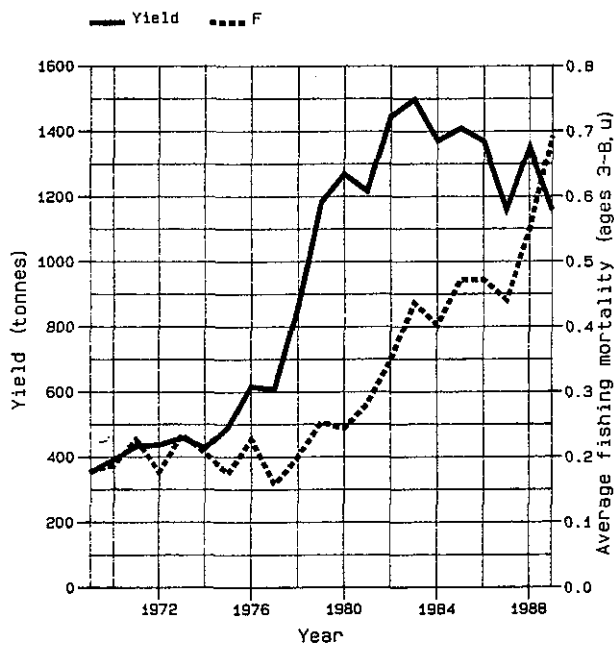


D

FISH STOCK SUMMARY  
STOCK: Division VIIe Sole  
23-10-1990

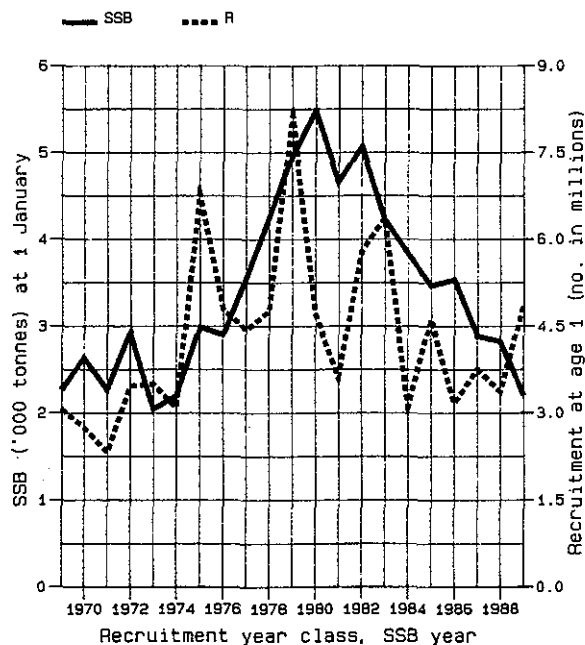
Figure 3.8.4

Trends in yield and fishing mortality (F)



A

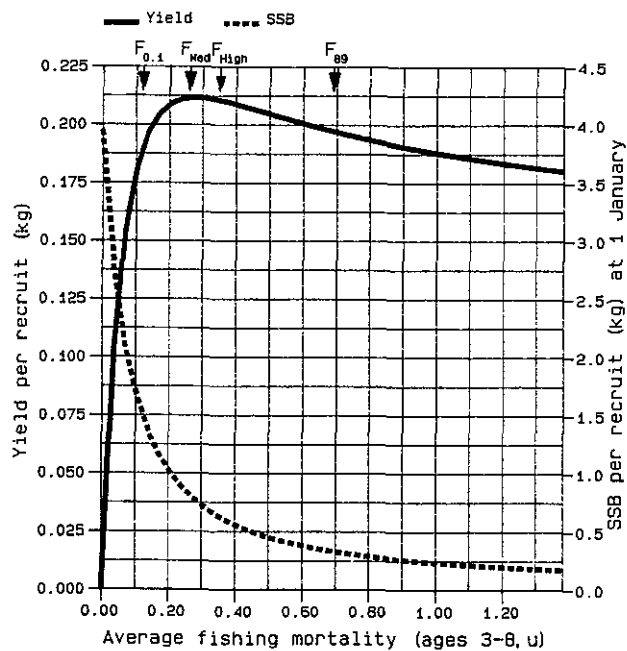
Trends in spawning stock biomass (SSB) and recruitment (R)



B

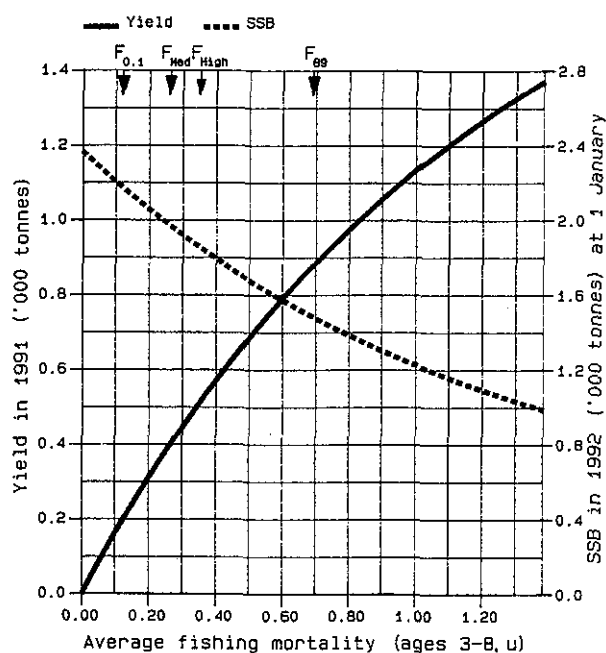
FISH STOCK SUMMARY  
STOCK: Division VIIe Sole  
23-10-1990

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass



D



Figure 4.1.1

FISH STOCK SUMMARY  
 STOCK: Hake - Northern Stock  
 19-06-1990

Long-term yield and spawning stock biomass

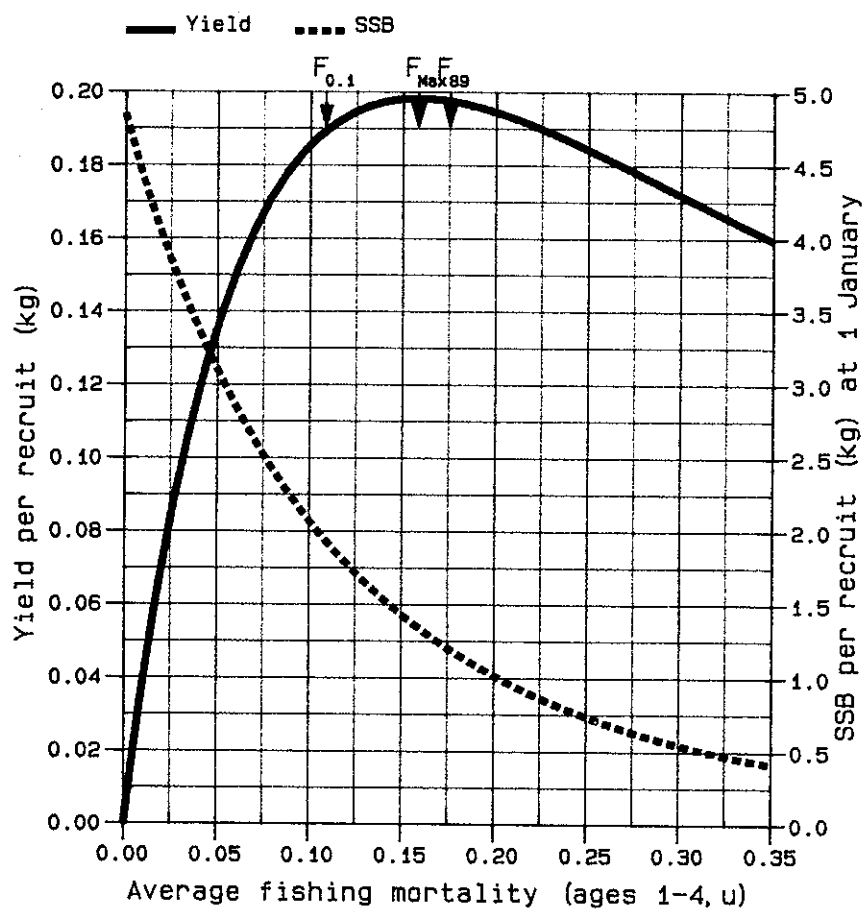


Figure 4.1.2.1 Hake - Southern stock.  
 Proposed areas for closure to bottom  
 trawling from 1 October - 31 March.

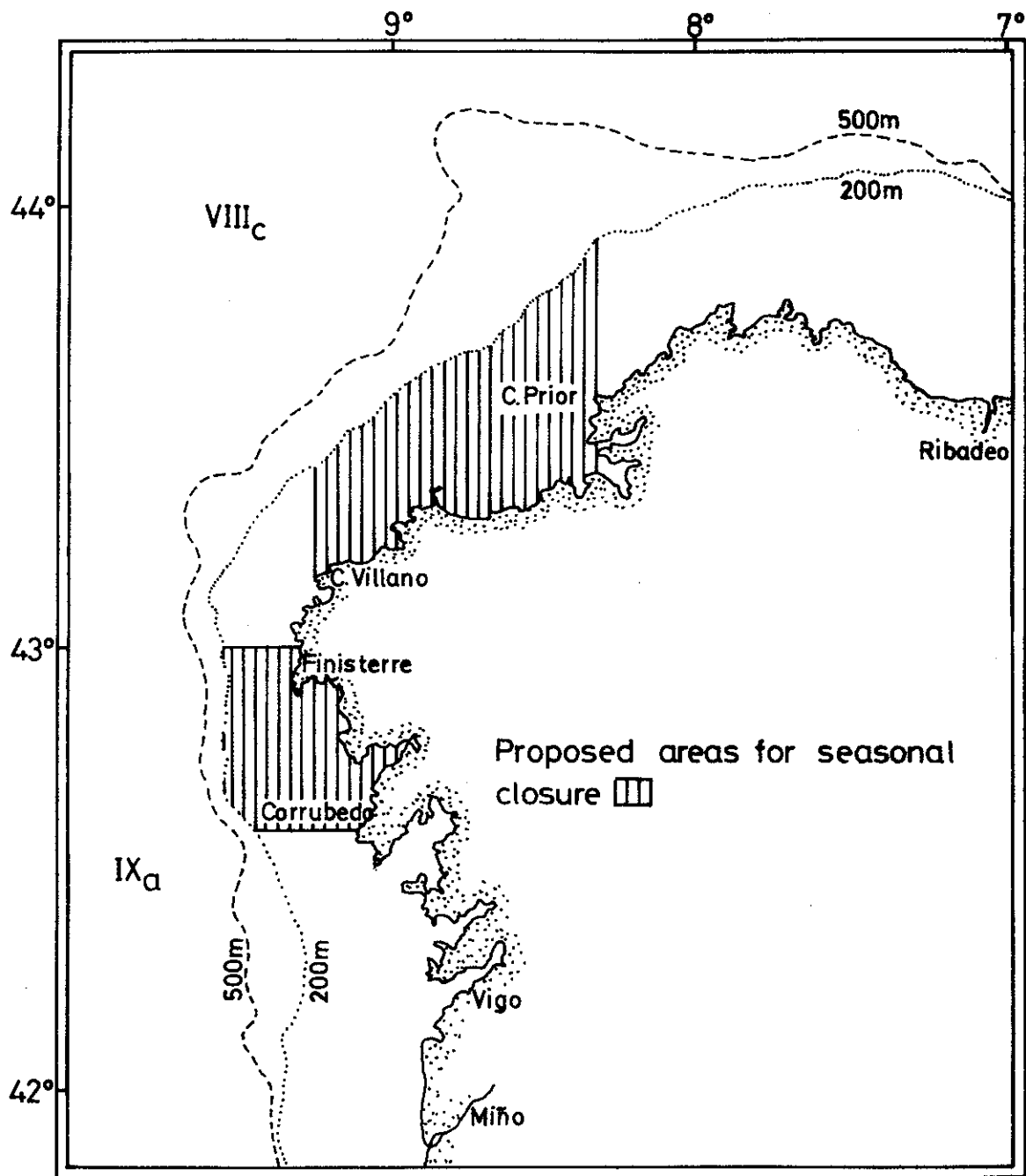
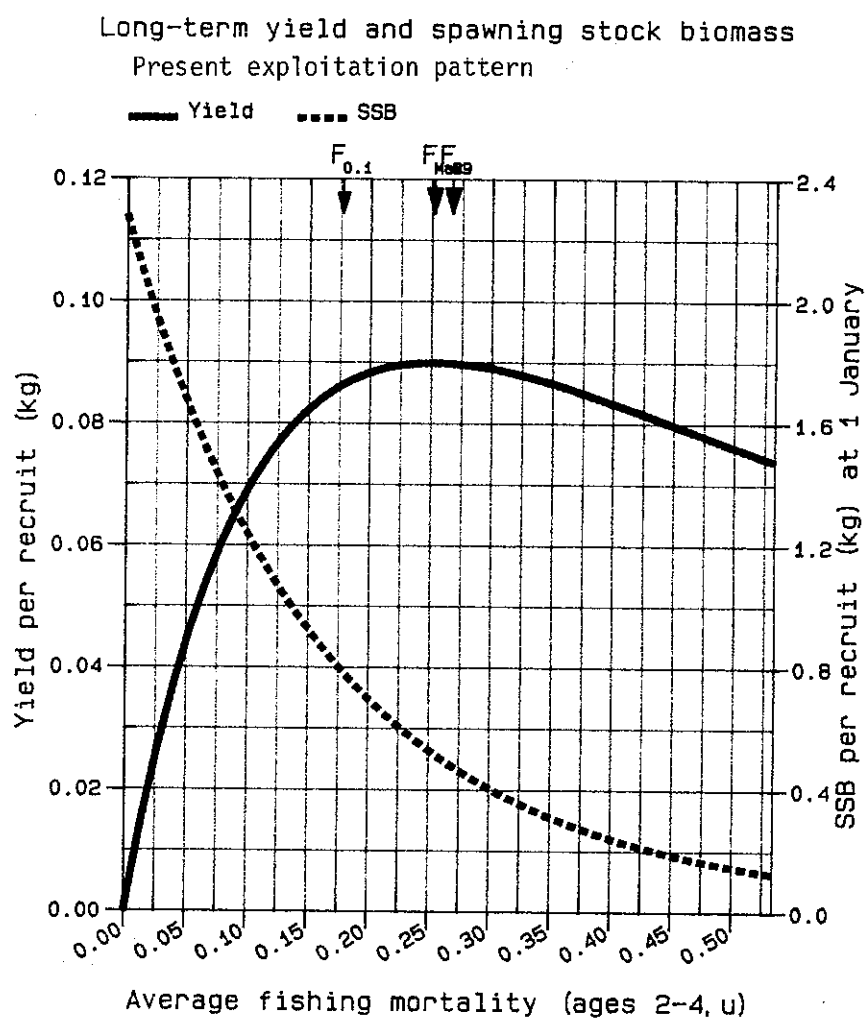


Figure 4.1.2.2

FISH STOCK SUMMARY  
 STOCK: Hake – Southern Stock  
 19-06-1990



A

Figure 4.2.2 Yield and stock biomass per recruit.

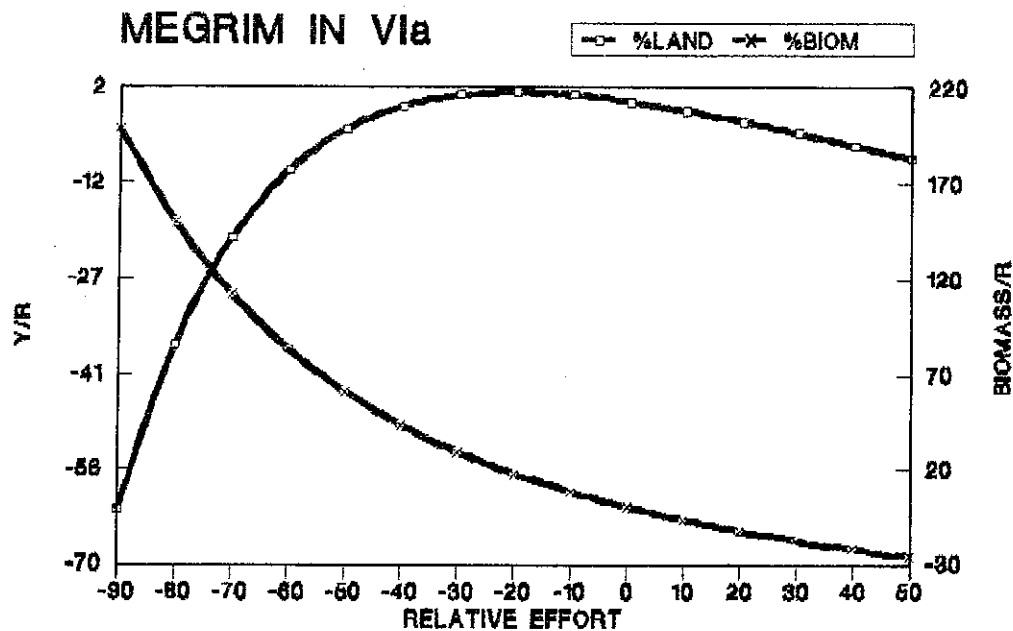
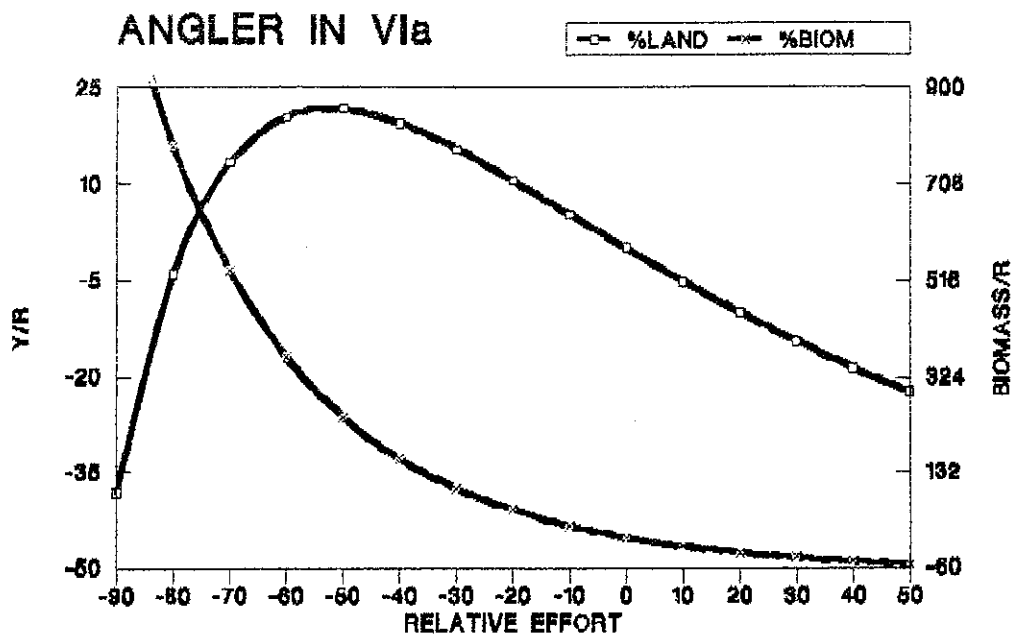
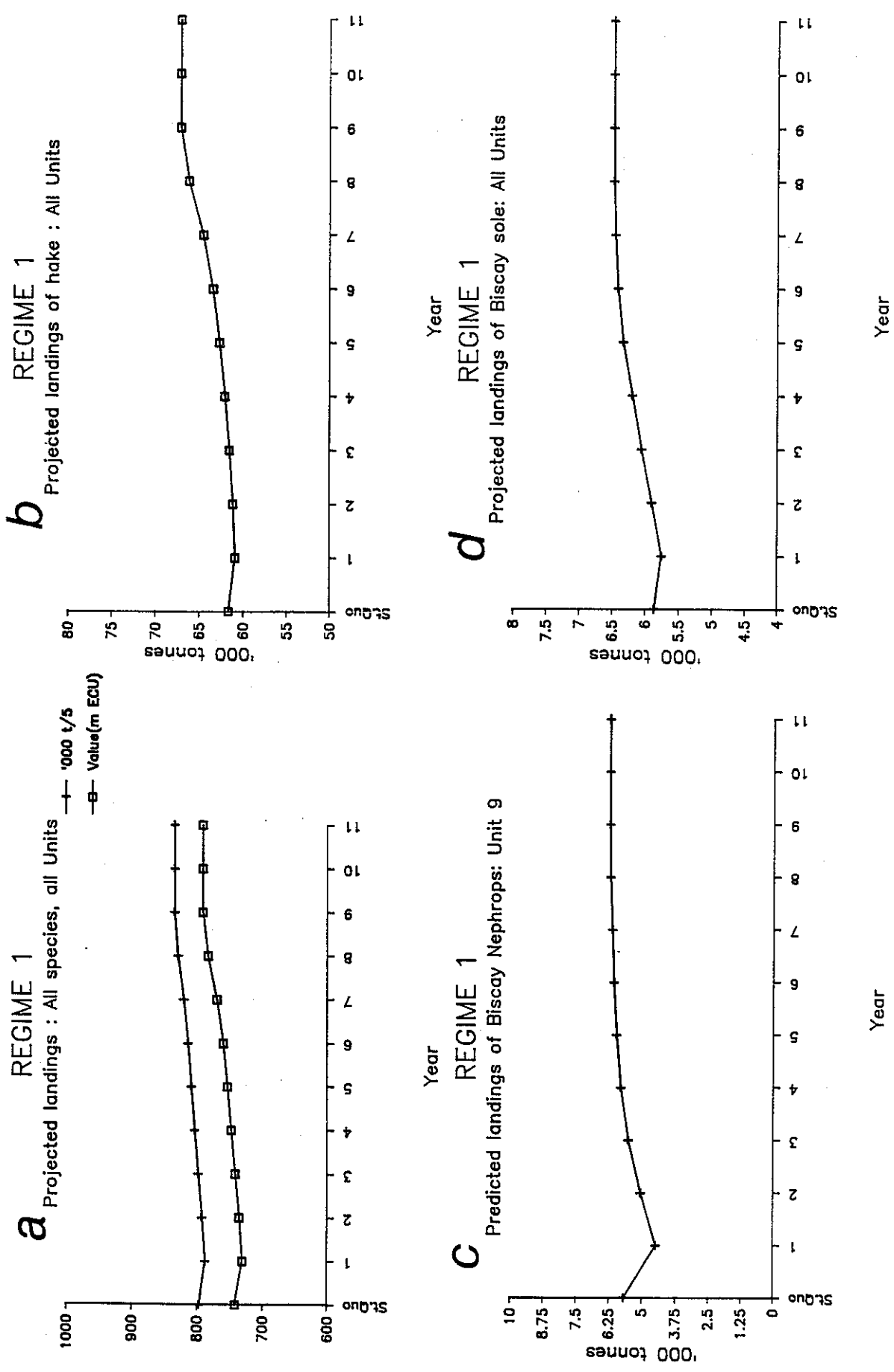
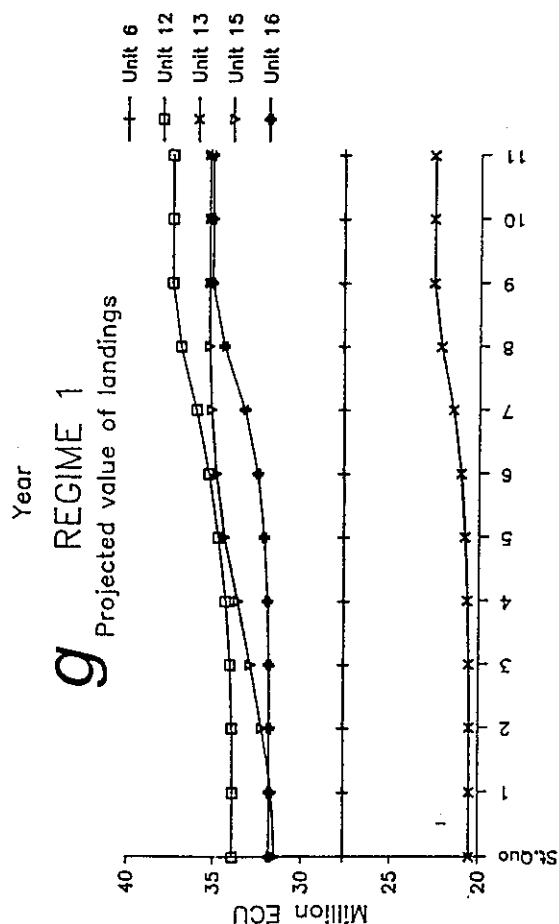
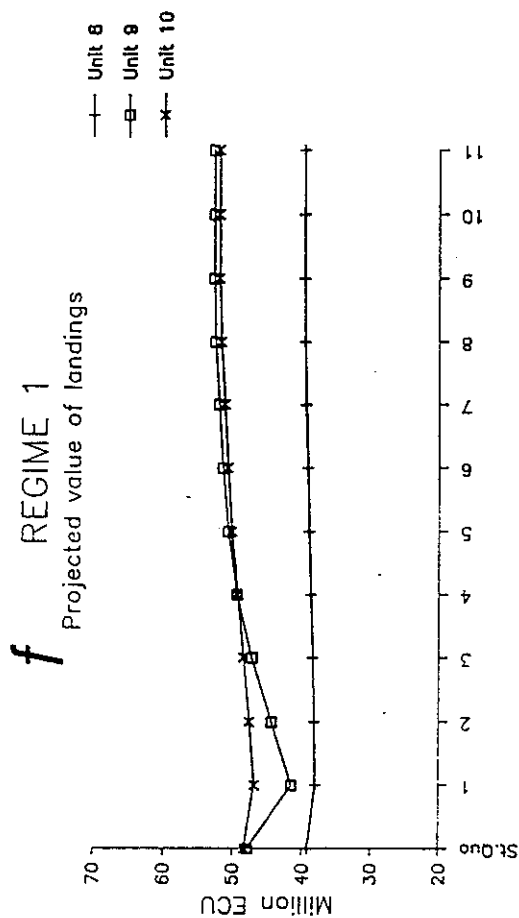
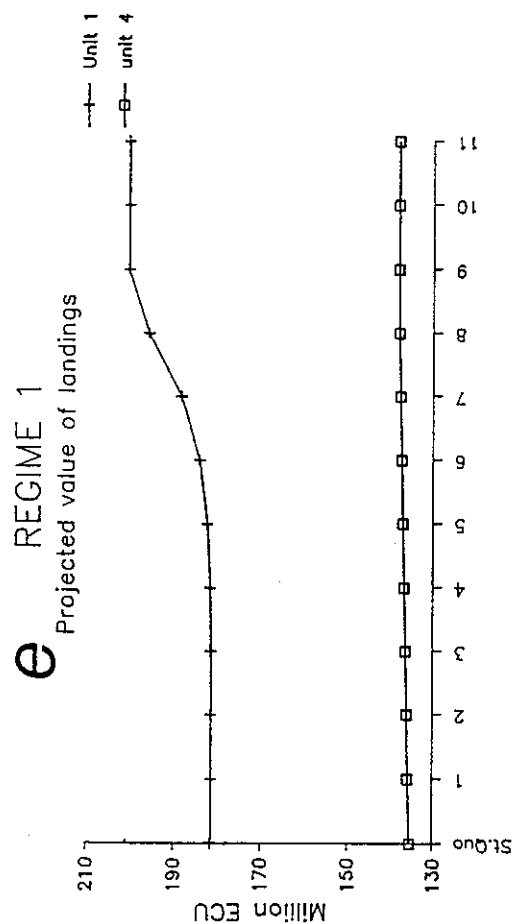
Figure 4.3.2 Anglerfish in Sub-area VI.  
Yield per recruit and biomass per recruit.

Figure 4.4.1a-d Medium term effects of enforcement of legal minimum mesh sizes in Divisions VIIIa,b and change of the landing size of megrim from 24 to 20 cm.

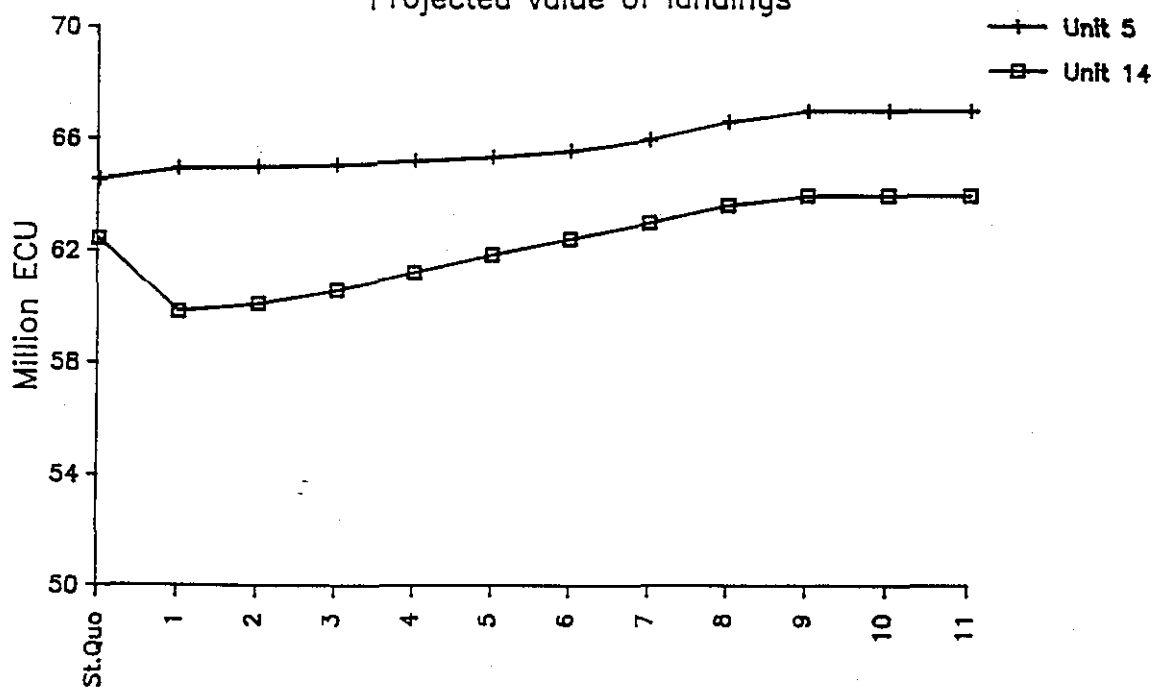


Figures 4.4.1 e-g Medium term effects of enforcement of legal minimum mesh sizes in Divisions VIIIab and change of the landing size of megrim from 24 to 20 cm.



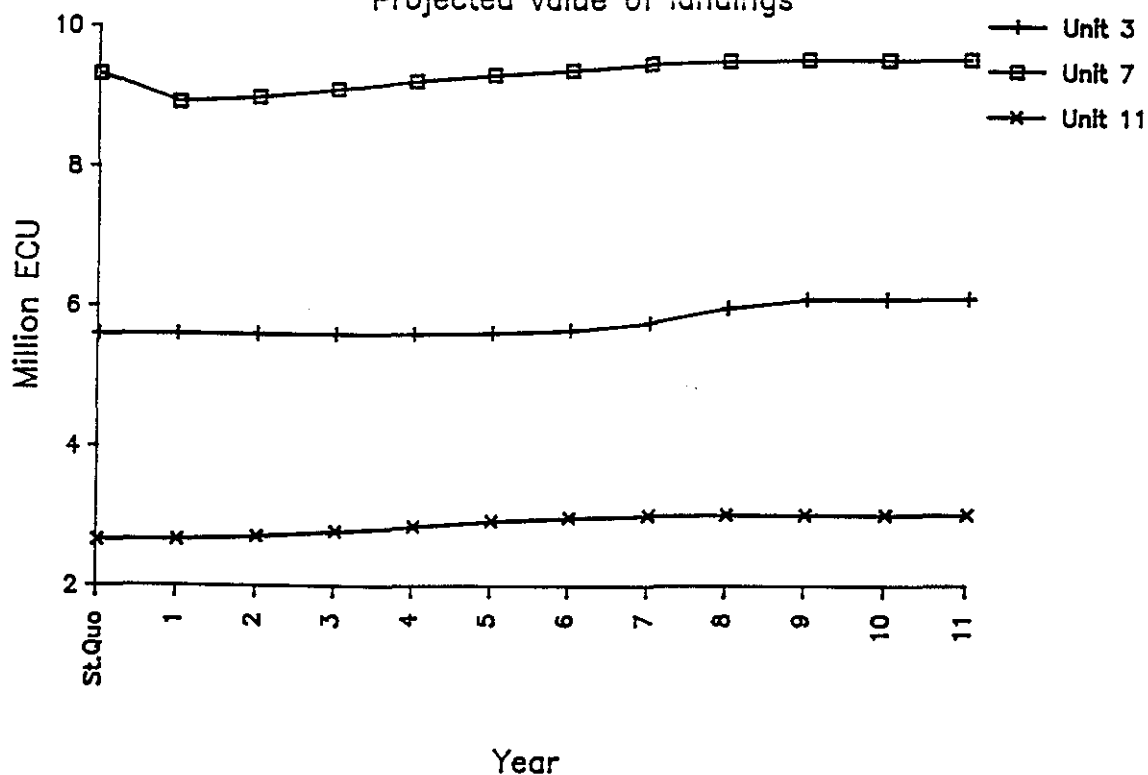
# h REGIME 1

Projected value of landings



# i REGIME 1

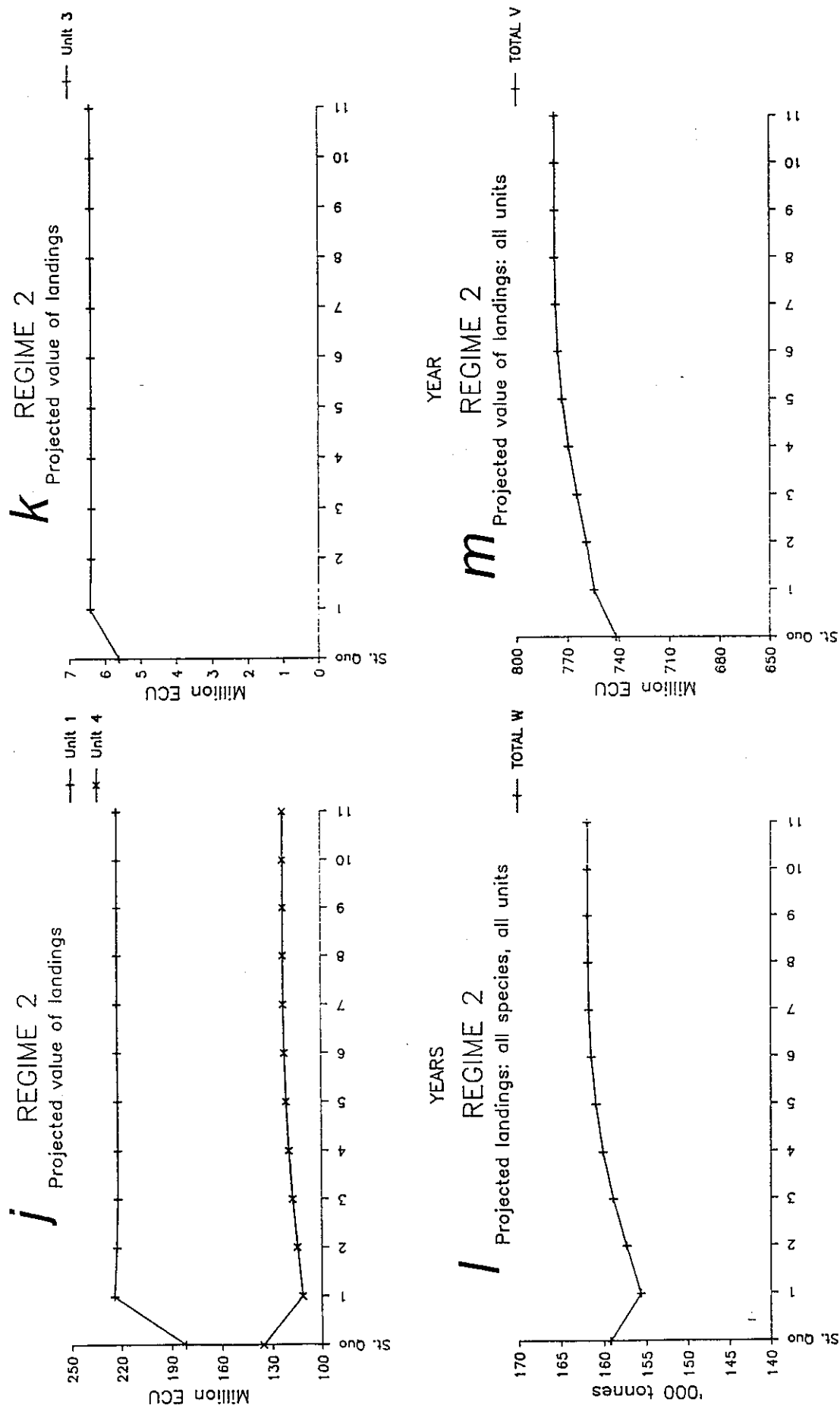
Projected value of landings



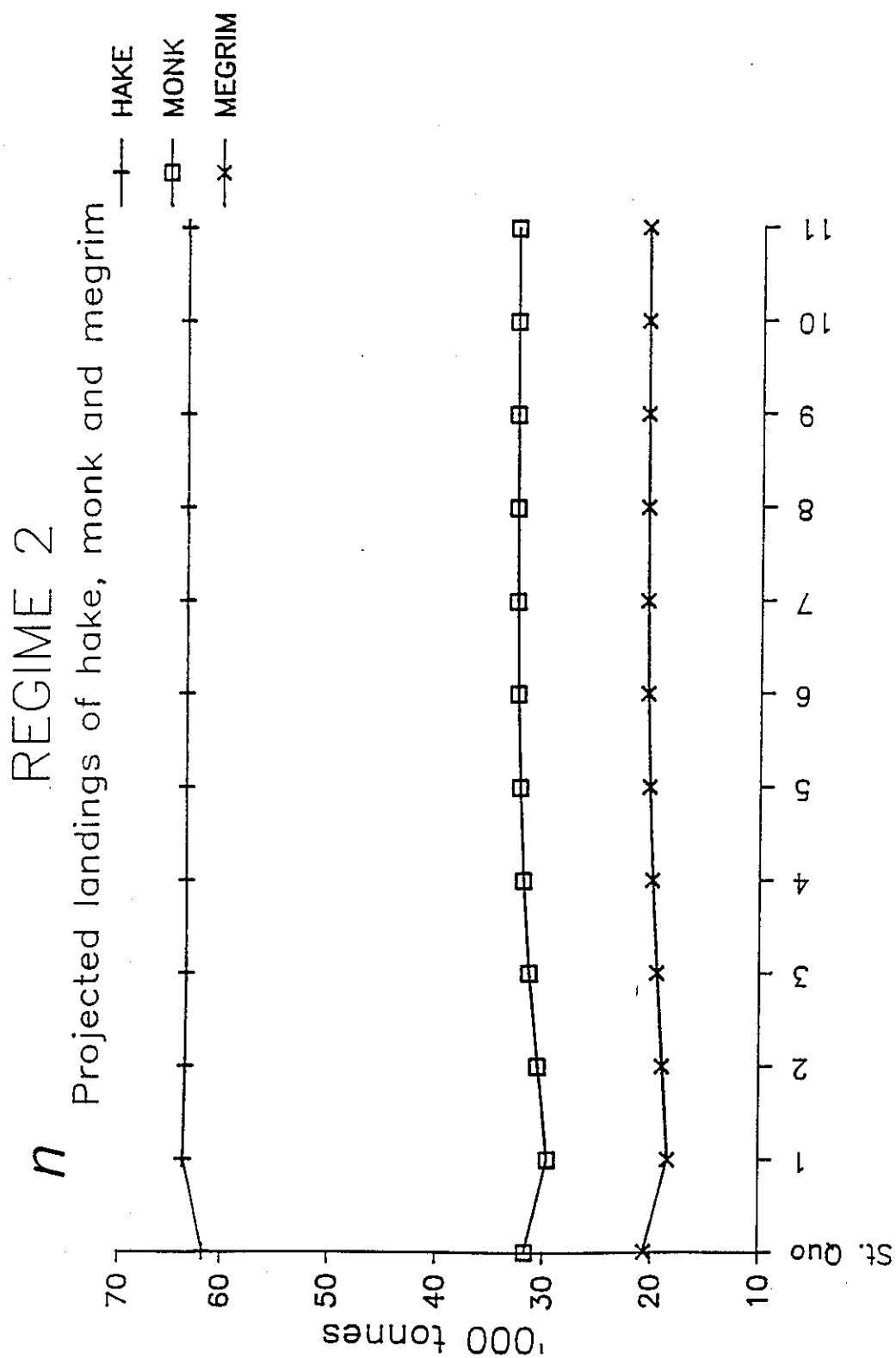
Figures 4.4.1 h-i

Medium term effects of enforcement of legal minimum mesh sizes in Divisions VIIIab and change of the landing size of megrim from 24 to 20 cm.

Figures 4.4.1 j-m Medium term effects of transfers in fishing effort of 10% from unit 4 to unit 1 and 10% from unit 4 to unit 3.



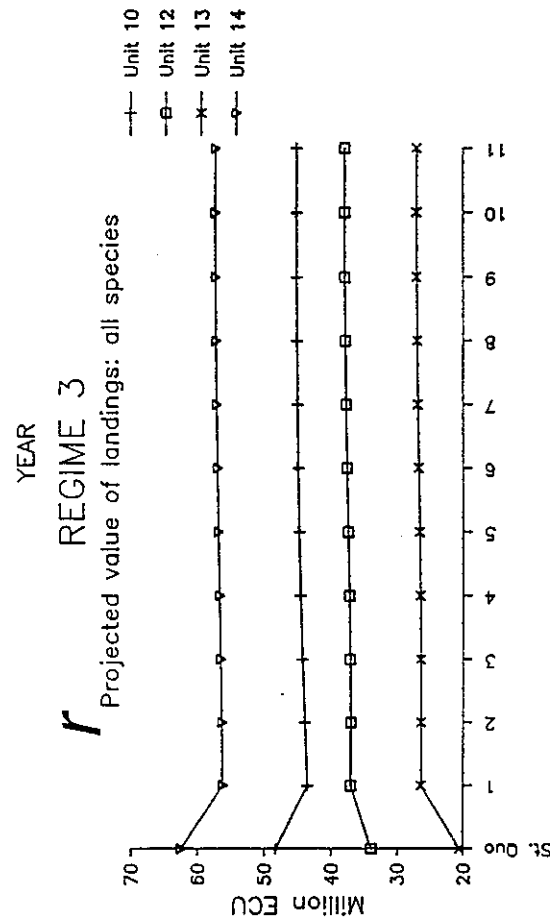
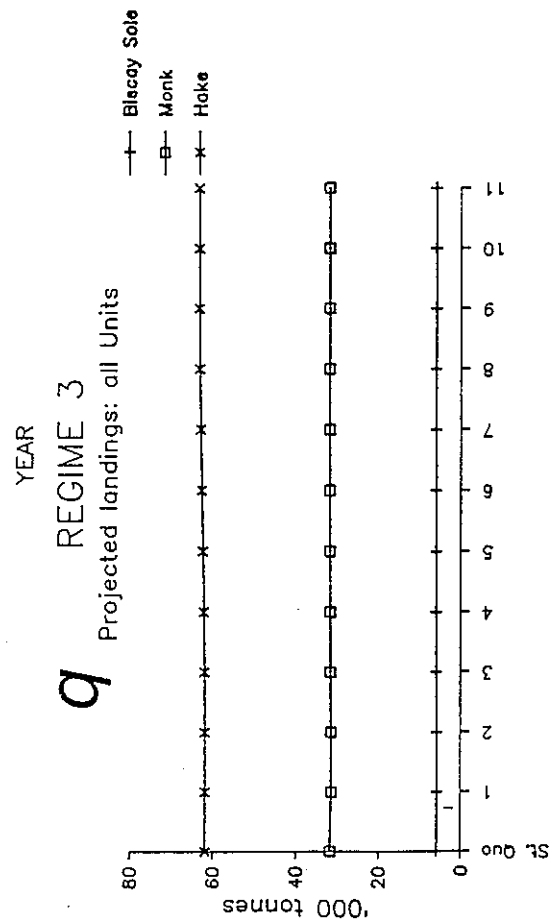
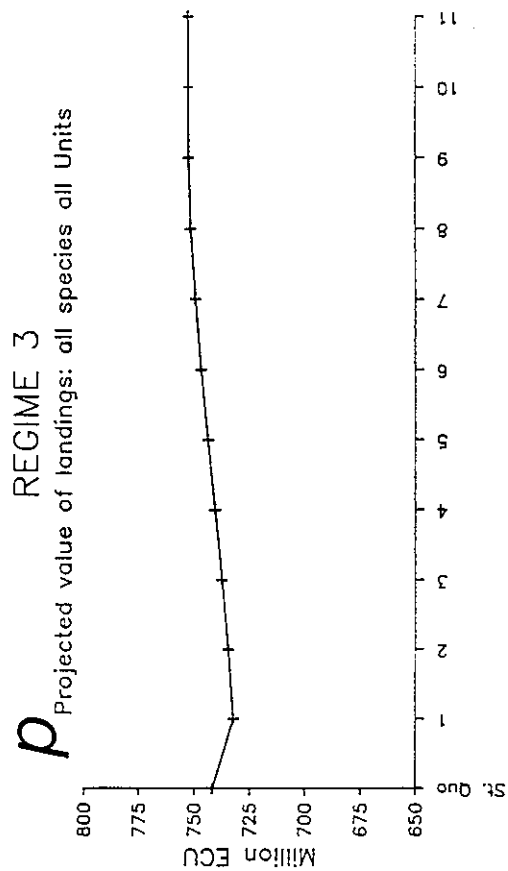
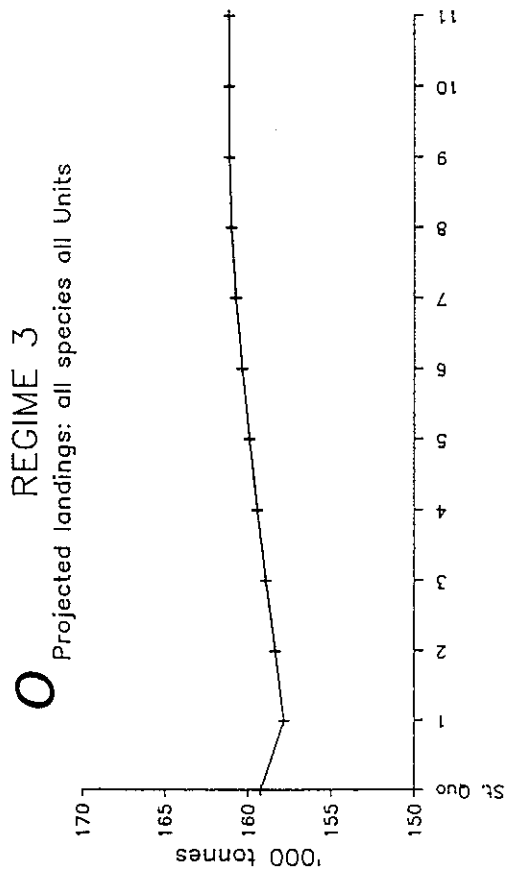




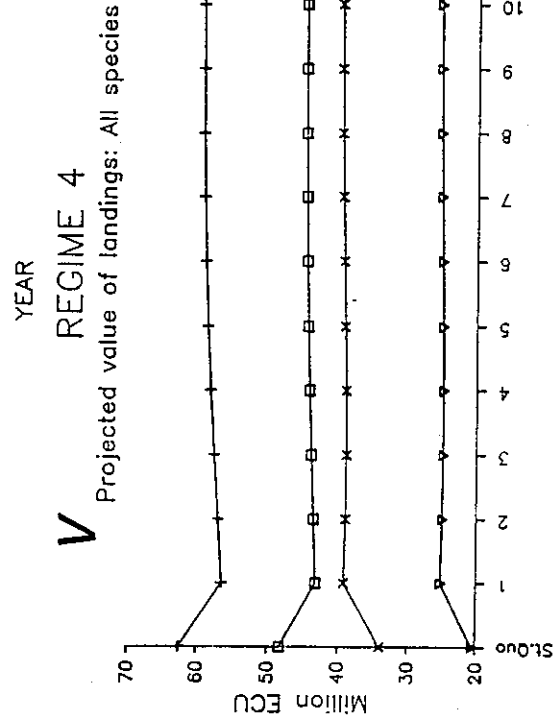
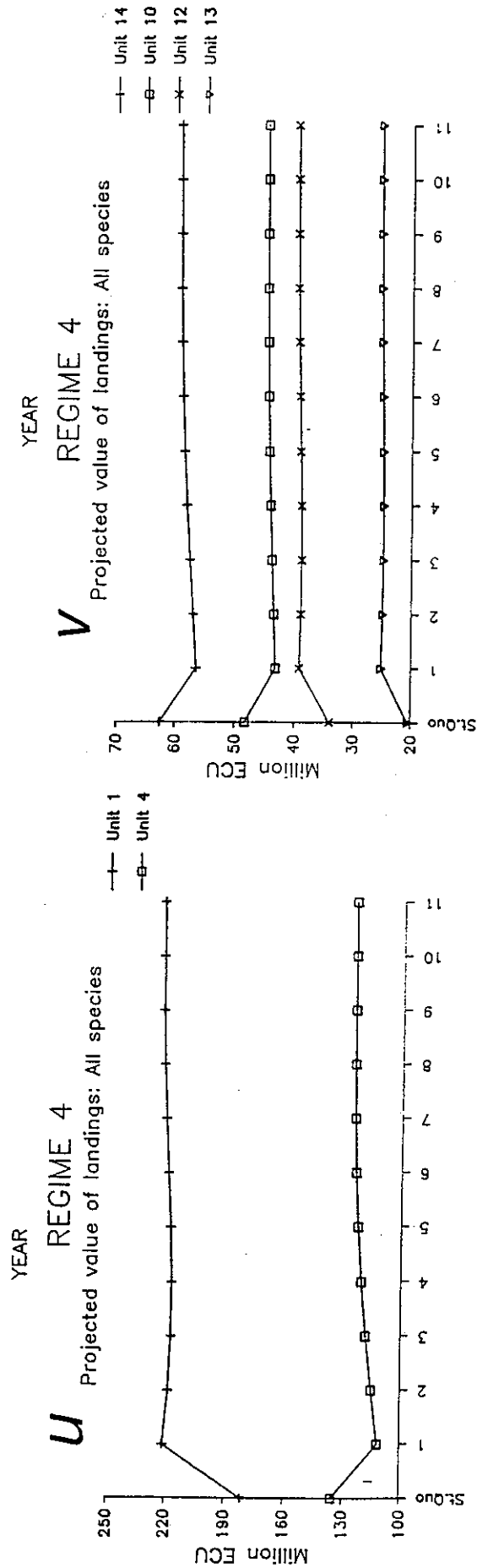
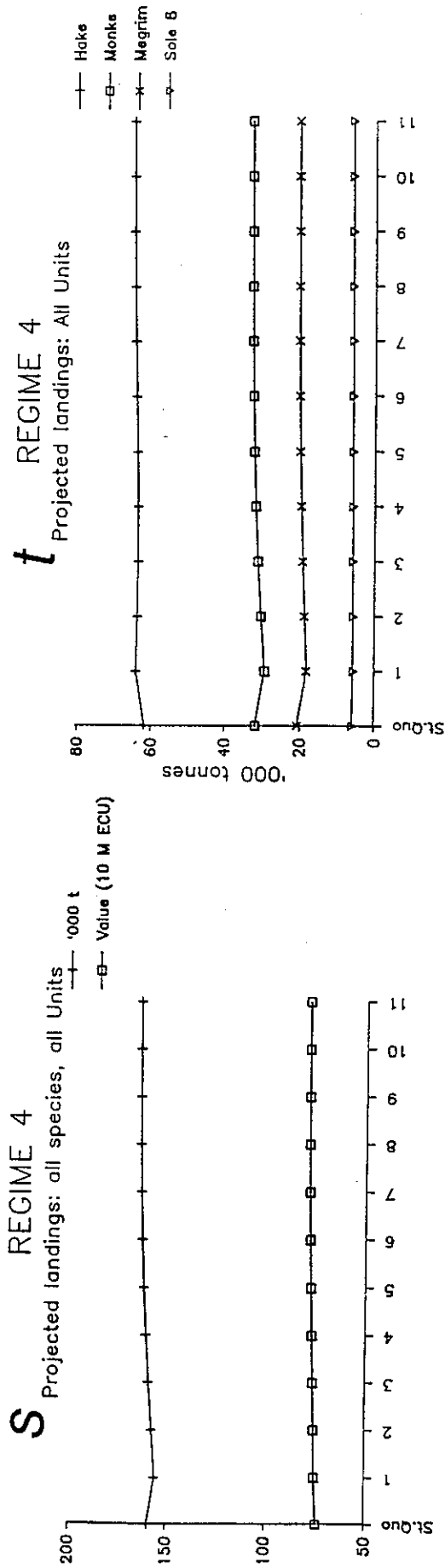
**YEAR**

**Figure 4.4.1.n** Medium term effects of transfers in fishing effort of 10% from unit 4 to unit 1 and 10% from unit 4 to unit 3.

Figures 4.4.1 o-r Medium term effects of transfers of fishing effort of 10% from unit 14 to unit 12 and 10% from unit 10 to unit 13.

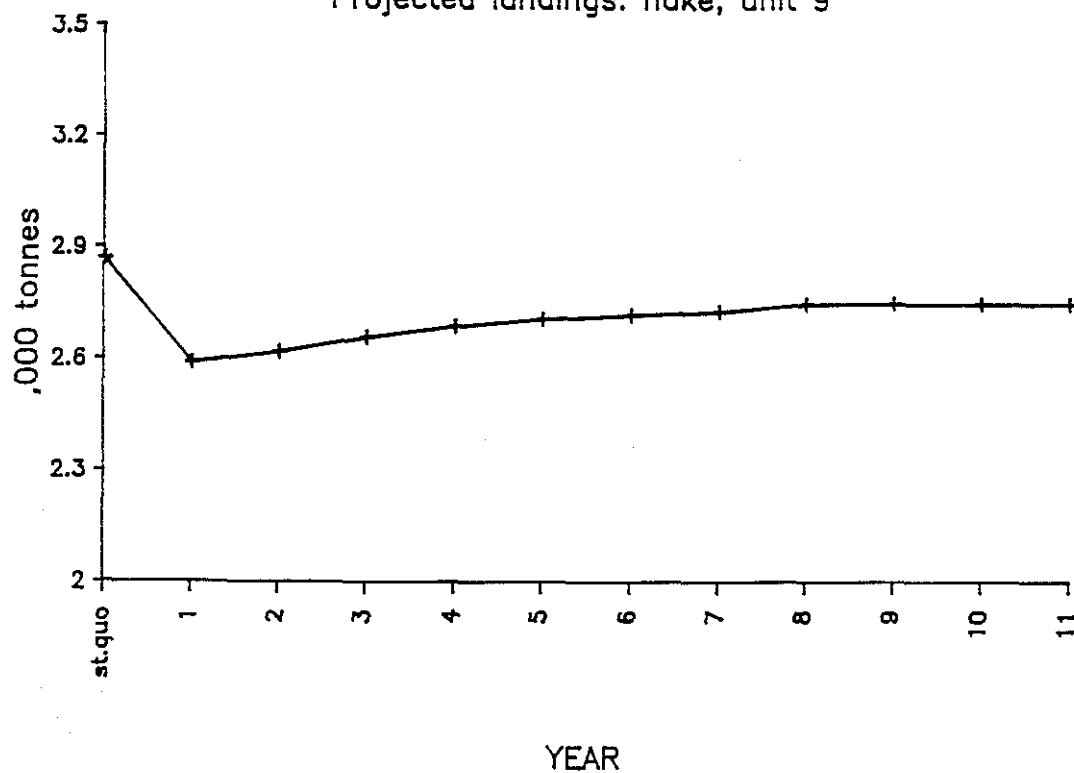


Figures 4.4.1 s-v Medium term effects of transfers in fishing effort defined as combination of regimes 2 and 3.



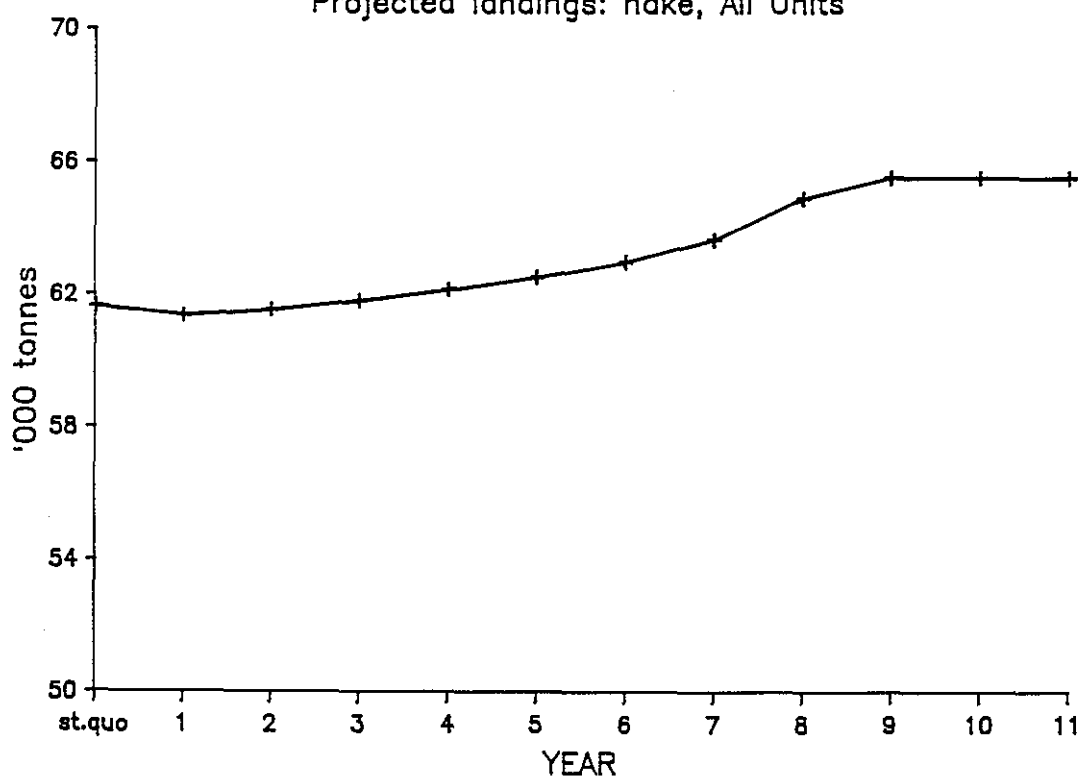
# *a* SELECTIVE GEAR IN UNIT 9

Projected landings: hake, unit 9



# *b* SELECTIVE GEAR IN UNIT 9

Projected landings: hake, All Units



Figures 4.4.2 a-b

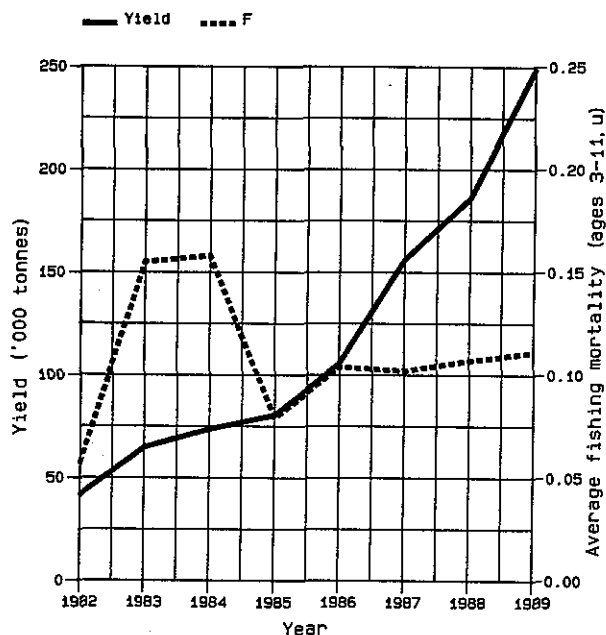
Medium term effects on landings of hake of use of selective gear in Bay of Biscay Nephrops fishery.

**FISH STOCK SUMMARY**  
**STOCK: Western Horse Mackerel**  
**19-07-1990**

385

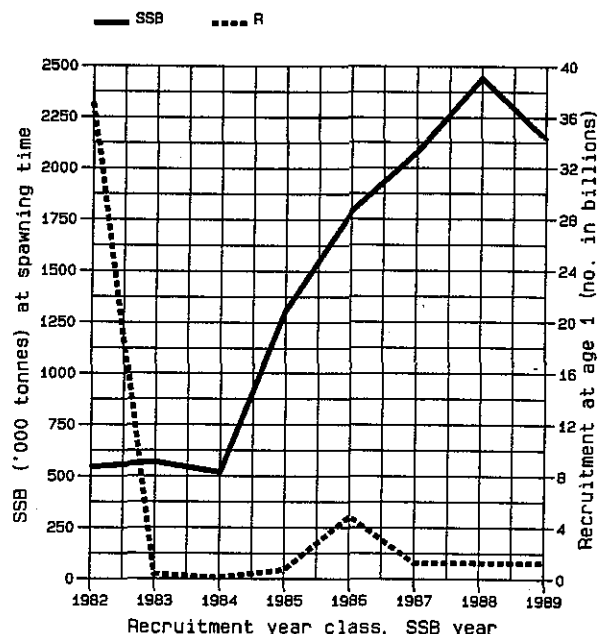
Figure 4.5.3.1

Trends in yield and fishing mortality (F)



A

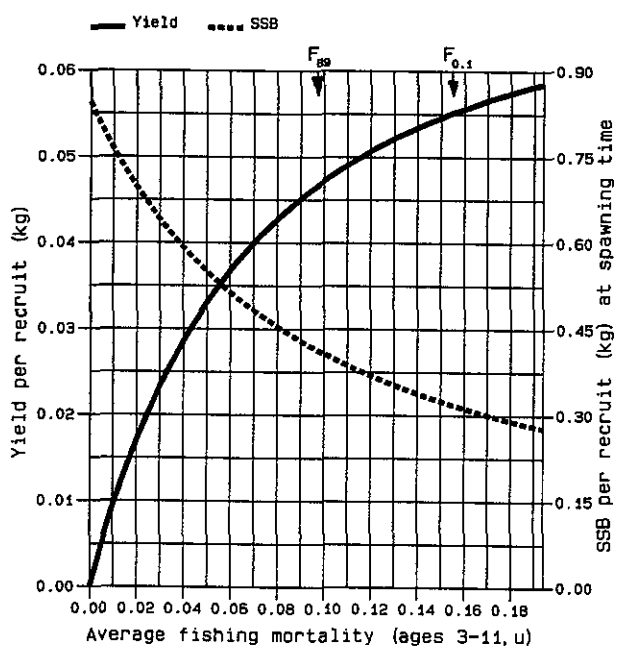
Trends in spawning stock biomass (SSB) and recruitment (R)



B

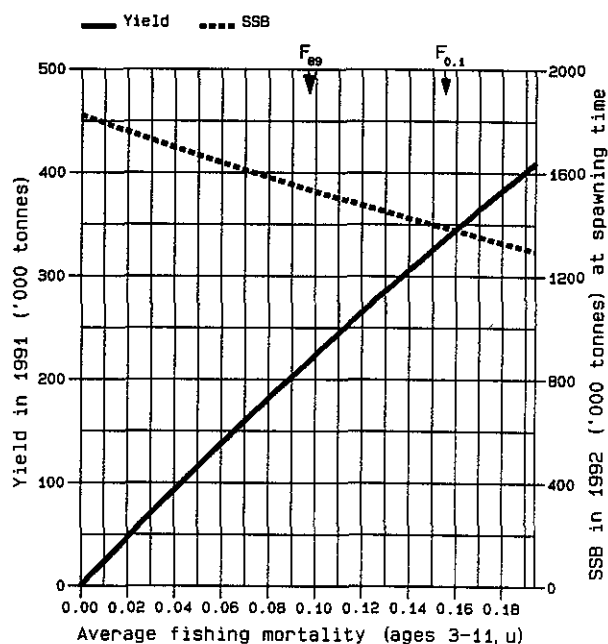
**FISH STOCK SUMMARY**  
**STOCK: Western Horse Mackerel**  
**19-07-1990**

Long-term yield and spawning stock biomass



C

Short-term yield and spawning stock biomass



D

## Western Horse Mackerel

Figure 4.5.3.2

