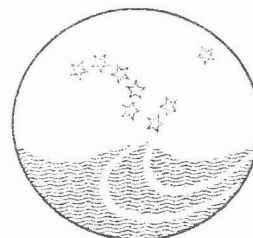


INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA
CONSEIL INTERNATIONAL POUR L'EXPLORATION DE LA MER



C.M. 1992/G:2
Ref.: J

REPORT OF
THE STUDY GROUP
ON DIVISION IIIA DEMERSAL STOCKS
COPENHAGEN, 9-13 MARCH
1992



"Plaicelse"
in Memory of
Division IIIa Demersal Stocks Working Group
(1979-1991)

b 92

This document is a report of a Working Group of the International Council for the Exploration of the Sea and does not necessarily represent the views of the Council. Therefore,

it should not be quoted without consultation with:

the General Secretary
ICES
Palægade 2-4
DK-1261 Copenhagen K
Denmark

TABLE OF CONTENTS

1	INTRODUCTION	1
1.1	Participation	1
1.2	Terms of Reference	1
2	DATA TO THE WORKING GROUP ON THE ASSESSMENT OF DEMERSAL STOCKS IN THE BALTIC	1
2.1	Cod in the Kattegat	1
2.1.1	Landings	1
2.1.2	Effort and CPUE	1
2.1.3	Catch and weight at age	1
2.1.4	Indices	2
2.2	Plaice in the Kattegat	2
2.2.1	Landings	2
2.2.2	Effort and CPUE	2
2.2.3	Catch and weight at age	2
2.2.4	Indices	2
2.3	Sole in Division IIIa	2
2.3.1	Landings	2
2.3.2	Catch and weight at age	2
2.3.3	Indices	2
3	DATA FOR THE WORKING GROUP ON THE ASSESSMENT OF DEMERSAL STOCKS IN THE NORTH SEA AND SKAGERRAK	2
3.1	Cod in the Skagerrak	2
3.1.1	Landings	2
3.1.2	Effort and CPUE	3
3.1.3	Catch and weight at age	3
3.1.4	Indices	3
3.2	Haddock in Division IIIa	3
3.2.1	Landings	3
3.2.2	Catch and weight at age	3
3.2.3	Indices	3
3.3	Whiting in Division IIIa	3
3.3.1	Landings	3
3.3.2	Indices	3
3.4	Plaice in the Skagerrak	3
3.4.1	Landings	3
3.4.2	Effort and CPUE	4
3.4.3	Catch and weight at age	4
3.4.4	Indices	4
4	REFERENCES	4
	Tables 2.1 - 3.16	5

1 INTRODUCTION

1.1 Participation

D. Danielssen	Norway
P.-O. Larsson	Sweden
E. Nielsen (Chairman)	Denmark

1.2 Terms of Reference

At the ACFM meeting in La Rochelle 1991, a reorganisation of the Working Groups was discussed. It was decided that the Division IIIa demersal stocks should be separated according to the connection with neighbouring stocks, Baltic stocks and North Sea-Skagerrak stocks. Due to problems with the data it was, however, decided to establish a Study Group (C.Res.1991/2:7:21) with the following terms of reference:

A Study Group on Demersal Stocks in Division IIIa will be established and meet at national expense at ICES Headquarters from 9-13 March 1992 to prepare the data necessary for the assessment of the stocks of plaice, sole, cod, haddock, and whiting in Division IIIa and provide them to the Working Group on the Assessment of the Demersal Stocks in the Baltic and the Working Group on the Assessment of Demersal Stocks in the North Sea and the Skagerrak.

The stocks which will be dealt with in the Working Group on the Assessment of Demersal Stocks in the Baltic are plaice and cod in the Kattegat and sole in Division IIIa. The species which will be dealt with in the Working Group on the Assessment of Demersal Stocks in the North Sea and the Skagerrak are plaice and cod in the Skagerrak and whiting and haddock in Division IIIa.

The Study Group, therefore, decided to provide a section for each of these two Working Groups.

2 DATA FOR THE WORKING GROUP ON THE ASSESSMENT OF DEMERSAL STOCKS IN THE BALTIC

2.1 Cod in the Kattegat

2.1.1 Landings

Tables 2.1 shows the landings for human consumption by country as provided by members of the Study Group. Table 2.2 shows the amount of cod taken in the Danish small-meshed fishery. The cod catches from the small-meshed fishery have not been included in the assessment because no catch-at-age data are available.

2.1.2 Effort and CPUE

The Swedish CPUE data for the Kattegat, based on logbooks, are shown in Table 2.3. Data from two commercial fleets are available. The Danish CPUE data for the Kattegat are based on logbooks from two fleets (Table 2.4).

Data on CPUE by age were also available for three independent research surveys:

1. The IBTS in February (Hagström *et al.*, 1990)
2. The "Dana" survey in November
3. The "Dana" survey in May.

The "Dana" surveys are standard trawling with a standard gear (star trawl) on fixed stations. The time series available to the Study Group meeting covers 1989-1991 (Table 2.5). Material from 1987-1988 exist and may be analyzed before the meeting in the Working Group on the Assessment of Demersal Stocks in the Baltic.

Input data for the tuning have been corrected compared to the data given in *Anon.* (1991) and the effort data for the tuning are based on the CPUE data, as proposed by ACFM, from the three commercial fleets. Since age distributions by fleet were not available, the Danish age distributions were used.

2.1.3 Catch and weight at age

The Danish age distributions were used for all landings by raising the distributions to the total landings. The weight-at-age data were also only available from the Danish landings. Effort and catch

data relevant for assessment programs have been entered into IFAP at ICES and are ready for use. The 1991 data are preliminary.

2.1.4 Indices

Indices for the 0-, 1- and 2-group cod were available from IBTS in February and the "Dana" survey in May and November (see Section 2.1.2). The indices are given in Table 2.6.

2.2 Plaice in the Kattegat

2.2.1 Landings

The landings by country provided by the Study Group members are shown in Table 2.7.

2.2.2 Effort and CPUE

Danish effort and CPUE were available from the logbooks of the Danish seiners and Danish gillnetters (Table 2.8). Swedish effort and CPUE were available from the logbooks for *Nephrops* trawlers and cod bottom trawlers (Table 2.9).

CPUE data were available from the "Dana" survey in May. The data are given in Table 2.10. The catch distributed on ages and number of hauls are given in Table 2.11.

The tuning data file given in Appendix 16 of the minutes of the May 1991 ACFM meeting was corrected.

2.2.3 Catch and weight at age

Catch-at-age data were only available for total Danish landings and were raised to the total international landing. Only weight-at-age data from the Danish landings were available. The decrease in growth of plaice in the early 1980s is discussed in *Anon.* (1986).

2.2.4 Indices

Recruitment indices were available for 1-group plaice from the Danish summer survey and 2-group plaice from the "Dana" May and November surveys (Table 2.12). No hauls were taken in Ålbæk Bay in 1991 in the Danish summer survey. As this is usually an area with a high abundance of 1-group plaice, the 1991 1-group index might be underestimated.

2.3 Sole in Division IIIa

2.3.1 Landings

The landings of sole from Division IIIa were provided by the Study Group members. The catch statistics for sole in the Skagerrak are very uncertain, and inconsistencies in the catch figures for some species in the Skagerrak suggest that misreporting has occurred. *Anon.* (1991) has adjusted the catch data for this and the estimated amount of misreporting is given in Table 2.13.

The 1990 figures do not seem to represent the catch. Due to quota restrictions a large amount of sole might have been discarded or landed illegally (*Anon.*, 1991).

2.3.2 Catch and weight at age

Catch at age and weight at age were available for the Danish landings from the Kattegat and the Skagerrak. The Danish catch in numbers for the Kattegat and the Skagerrak for 1991 is given in Table 2.14. As the Danish landings in the Kattegat constitute about 70% of the total landings, the catch-at-age data were applied to the total international catch. Catch data for the assessment have been loaded into IFAP ready for use. The 1991 data are preliminary.

2.3.3 Indices

Indices for 1-groups were available from the Danish summer survey in the Kattegat (Table 2.15).

3 DATA FOR THE WORKING GROUP ON THE ASSESSMENT OF DEMERSAL STOCKS IN THE NORTH SEA AND SKAGERRAK

3.1 Cod in the Skagerrak

3.1.1 Landings

Table 3.1 shows the landings for human consumption by country provided by the Study Group members. The cod landings from the Norwegian fjords are also shown in Table 3.1. As these cod are considered to belong to a separate stock (*Anon.*, 1991), these landings have not been included in the assessment. The cod landings taken as by-catch in the Danish small-meshed fishery are shown in Table 3.2. The cod landings from the

small-meshed fishery have not been included in the assessment because no catch-at-age data are available.

The Danish landings have been restricted by boat quota (*Anon.*, 1991), and this is likely to have caused an increase in discarding.

3.1.2 Effort and CPUE

The Swedish CPUE series based on logbooks are given in Table 3.3. Data from two fleets are available. The Danish CPUE series based on logbooks are given in Table 3.4. A possible misreporting in the fishery will of course also be reflected in the CPUE.

The input data to the tuning were corrected as proposed in the Minutes of ACFM.

3.1.3 Catch and weight at age

Only the Danish age distributions were available and these were, therefore, applied to the total international catch in the open sea area of the Skagerrak. The by-catches from the small-meshed fishery are not included because no catch-at-age data were available.

The Danish data on weight at age were used for all landings.

Effort and catch data relevant for assessment programs have been loaded into IFAP ready for use. The 1991 data are preliminary.

3.1.4 Indices

Indices for 0-group cod were available from the Norwegian Skagerrak coast and for 1- and 2-group cod from the IBTS in February (Table 3.5).

3.2 Haddock in Division IIIa

3.2.1 Landings

Table 3.6 shows the total landings by countries provided by the Working Group/Study Group. Table 3.7 shows the landings split into industrial landings and human consumption landings.

3.2.2 Catch and weight at age

Catch and weight at age were available from the Danish landings (including industrial landings) for the period 1981-1986. For 1987-1990, the age distribution was not available for the industrial landings, and the age distribution in those years is only from the human consumption landings. The Danish age distributions for consumption catches were applied to the total international consumption catches (Table 3.8). Data for 1991 were not available to the Study Group but will be available for the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak in the autumn of 1992.

The weight-at-age data are given in Table 3.9. The data from 1987-1990 represent only the human consumption fishery, and 1991 data will be available for the Working Group meeting.

3.2.3 Indices

Indices for 1-groups in Division IIIa are from the IBTS in February (Table 3.5).

3.3 Whiting in Division IIIa

3.3.1 Landings

Table 3.10 shows the landings by countries provided by the Study Group. In Table 3.11, the landings are split into industrial landings and human consumption landings.

3.3.2 Indices

Indices for 1-groups are from the IBTS in February (Table 3.5).

3.4 Plaice in the Skagerrak

3.4.1 Landings

The landings by countries are given in Table 3.12. The landings for the period 1983-1988 are very uncertain due to a lack of accurate catch statistics. Information from the fishermen and inconsistencies in the catch data for cod, plaice and sole indicate that misreporting may have taken place. *Anon.* (1991), therefore, adjusted the catch data assuming that a part of the catch reported from Skagerrak was actually caught in the North Sea.

3.4.2 Effort and CPUE

Effort and CPUE data are available from the Danish gillnet and seine fisheries for the period 1983-1991 (Table 3.13). The data are based on logbooks. Because it is a mixed fishery and because there are inconsistencies in the landings statistics, the data may be uncertain.

Swedish data are available for the *Nephrops* trawl and cod bottom trawl (Table 3.14). The data are based on logbooks. Additional data are given from the "Dana" survey in May. (Standard trawlings with standard gear on fixed stations.) (Table 3.15.)

The tuning data were corrected as proposed by ACFM.

3.4.3 Catch and weight at age

Danish catch-at-age data were available and used for the total catch. Weight at age is from the Danish landings.

Effort and catch data relevant to the assessment programs have been loaded into IFAP ready for use. Data for 1991 are preliminary.

3.4.4 Indices

Indices for 2- and 3-groups were available from the "Dana" May survey. The indices are given in Table 3.16.

4 REFERENCES

- Anon. 1986. Report of Division IIIa Demersal Stocks Working Group. ICES, Doc. C.M.1986/Assess:18.
- Anon. 1991. Report of Division IIIa Demersal Stocks Working Group. ICES, Doc. C.M.1991/Assess:9.
- Hagström, O., Larsson, P.-O. and M. Ulmestrand. 1990. Swedish cod data from the international young fish survey, 1981-1990.

Table 2.1 Cod landings (in tonnes) from the Kattegat, 1971-1991.

Year	Kattegat			Total
	Denmark	Sweden	Germany ²	
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	7,056	1,483	51	8,590
1990	4,715	1,186	35	5,936
1991 ¹	4,664	2,066	104	6,834

¹Preliminary.

²Landing statistics incompletely split on the Kattegat and the Skagerrak.

The figures are estimated by the Study Group members.

Table 2.2 By-catch of cod in the Kattegat by the Danish industrial fishery (in tonnes) as estimated by the Study Group.

Year	By-catch
1979	-
1980	-
1981	3,236
1982	5,214
1983	2,179
1984	712
1985	448
1986	610
1987	445
1988	284
1989	398
1990	132
1991	409

Table 2.3 Catch and effort data for the Swedish cod fishery in the Kattegat by gear type.

Year	Cod Bottom Trawl			Nephrops trawl		
	Catch (t)	Effort (hr)	CPUE (kg/hr)	Catch (t)	Effort (hr)	CPUE (kg/hr)
1978	1,151	-	85.6	726	-	63.3
1979	1,771	-	144.8	1,142	-	83.2
1980	1,715	14,866	115.4	972	14,137	68.7
1981	1,750	12,454	140.5	884	13,875	63.7
1982	1,579	10,443	151.2	603	14,270	42.2
1983	2,371	17,321	137.0	485	11,739	41.3
1984	1,829	19,168	95.4	398	13,718	29.0
1985	1,193	14,112	84.5	558	13,090	42.6
1986	933	13,157	70.9	367	16,420	22.6
1987	1,082	14,448	74.9	426	19,421	21.9
1988	720	13,458	53.5	291	16,802	17.3
1989	874	13,508	64.7	355	15,565	22.8
1990	628	13,843	45.3	309	14,211	21.7
1991	1,298	20,271	64.0	261	10,209	25.6

Table 2.4 Catch and effort data for the Kattegat by seiners and gillnetters in the Danish cod fishery.

Year	Danish Seine			Nets		
	Catch (t)	Effort (days)	CPUE (kg/days)	Catch (t)	Effort (days)	CPUE (kg/days)
1983	584	1,563	374	39	216	180
1984	732	1,852	395	26	220	118
1985	458	522	877	11	25	440
1986	662	1,343	493	35	140	250
1987	451	976	462	80	181	387
1988	337	1,138	296	55	281	196
1989	328	1,320	248	123	508	242
1990	276	1,087	254	51	285	179
1991	317.7	1,316	241	48.3	379	127

Table 2.5 The total cod catch at age and number of hauls in the Kattegat in the "Dana" surveys and IBTS in February.

"Dana" survey May						
Year	Age	0	1	2	3	4+
1989			81	250	54	67
1990			423	8	23	24
1991			595	330	9	4
"Dana" survey November						
1989		1190	149	111	23	38
1990		130	832	107	34	11
1991		529	279	195	2	1
IBTS in February						
1989			3	48	13	34
1990			153	16	19	9

Table 2.6 Indices of 0-, 1- and 2-group cod in the Kattegat from the IBTS in February and "Dana" survey in May and November.

Year class	IBTS	IBTS	"Dana" May	"Dana" Nov.	"Dana" Nov.
	1-gr	2-gr	1-gr	0-gr	1-gr
1979	-	131.3	-	-	-
1980	26	32.6	-	-	-
1981	104	258	-	-	-
1982	95.5	143	-	-	-
1983	38.8	106	-	-	-
1984	9.2	71.8	-	-	-
1985	213	372	50.6	-	-
1986	11.1	27.8	1.3	-	-
1987	68.4	47.8	16.9	135	-
1988	2.8	9.7	5.4	45	9.3
1989	131	112	42.3	74.4	69.3
1990	18.6	-	45.7	10.8	25.4
1991 ¹	66	-	-	48.1	-

¹Preliminary.

Table 2.7 Plaice landings from the Kattegat (in tonnes) as supplied by the Study 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	2,468	170	+	2,638
1987	2,868	283	104	3,255
1988	1,818	210	2.8	2,031
1989	1,596	135	4.0	1,735
1990	1,831	201	2.0	2,034
1991 ¹	1,756	267	5.6	2,029

¹Preliminary.

Table 2.8 Catch and effort data for plaice in the Kattegat by seiners and gillnetters in the Danish plaice fishery (from logbook data).

Year	Catch (tonnes)	Effort (days)	CPUE (kg/day)	Catch (tonnes)	Effort (days)	CPUE (kg/day)
1983	331,882	1,811	183.3	22,146	202	109.6
1984	528,702	2,379	222.2	15,577	197	79.1
1985	240,855	885	272.2	8,203	42	195.3
1986	404,093	1,773	227.0	48,897	186	262.9
1987	393,777	1,546	254.7	95,365	291	327.7
1988	235,357	1,370	171.8	64,632	243	265.9
1989	211,646	1,577	134.2	60,236	336	179.3
1990	288,907	1,585	182.3	48,461	230	210.7
1991	337,199	1,793	188.1	37,706	312	120.9

Table 2.9 Mean catch (kg) per fishing hour for gears in the Kattegat (Swedish data).

Year	Catch (t)	Effort (hrs)	CPUE (kg/hr)	Catch (t)	Effort (hrs)	CPUE (kg/hr)
	<i>Nephrops</i> trawl			Cod bottom trawl		
1980	48.1	14,137	3.40	91.0	14,866	6.12
1981	56.0	13,875	4.04	95.8	12,454	7.69
1982	41.6	14,270	2.92	94.5	10,443	9.05
1983	44.0	11,739	3.75	177.6	17,321	10.25
1984	67.7	13,718	4.94	145.6	19,168	7.60
1985	103.8	13,090	7.93	133.7	14,112	9.47
1986	45.6	16,420	2.78	66.4	13,157	5.05
1987	82.9	19,421	4.27	108.3	14,448	7.50
1988	66.5	16,802	3.96	102.9	13,458	7.65
1989	39.2	15,565	2.52	63.7	13,508	4.72
1990	47.1	14,211	3.31	86.8	13,843	6.27
1991	39.0	10,209	3.82	127.0	20,271	6.27

Table 2.10 The catch rates of plaice in the Kattegat in the "Dana" May survey.

Year	Catch (kg/hr)
1984	5.83
1985	17.84
1986	6.12
1987	5.65
1988	1.08
1989	2.18
1990	2.66
1991	7.17

Table 2.11 The total catch at age of plaice in the Kattegat and numbers of hauls in the "Dana" surveys in May and November.

Year	Age	"Dana" survey-May							No. hauls
		1	2	3	4	5	6	7	
1984			39	151	57	10		6	10
1985			603	808	131	49	13	9	19
1986	8		215	159	97	16	10	8	18
1987			73	134	63	11	4	13	15
1988			10	29	29	4	1	3	16
1989	2		18	43	32	34	5	19	17
1990			75	65	8	5	3	2	12
1991			89	269	49	8	6	10	13
"Dana" survey-November									
1987		9	180	84	35	9	1	8	11
1988		6	156	60	19	3	1	2	11
1989		6	113	434	63	4	4	2	17
1990			93	196	48	1		2	13
1991									

Table 2.12 Plaice in the Kattegat. Indices.

Year class	Summer survey	"Dana" May	"Dana" May	"Dana" Nov.	"Dana" Nov.
	gr-1	gr-2	gr-3	gr-2	gr-3
1983	5,4	31,7	8,8		
1984	2,2	11,9	8,9		7,6
1985	1,3	4,9	1,8	16,2	5,45
1986	3,5	0,6	2,5	14,2	25,5
1987	1,8	1,1	5,4	6,6	15
1988	3,5	6,3	20,7	7,1	
1989	3	6,8			
1990 ¹	0,2				

¹No hauls from the Ålbæk Bay.

Table 2.13 Catch (in tonnes) of Sole from Division IIIa provided by Study Group members.

Year	Denmark		Netherlands	Sweden	Germany	Belgium ²	WG corrections	Total
	Skagerrak	Kattegat	Skagerrak	Kattegat	Kattegat	Skagerrak		
1970	25	158	-	-	-	-	-	183
1971	32	242	-	-	9	-	-	283
1972	31	327	-	-	12	-	-	370
1973	52	260	-	-	12	-	-	325
1974	39	388	-	-	9	-	-	436
1975	55	381	9	16	16	-	-9	468
1976	34	367	155	11	21	2	-155	435
1977	91	400	276	13	8	1	-276	513
1978	141	336	141	9	9	-	-141	495
1979	57	301	84	8	6	1	-84	373
1980	73	228	5	9	12	2	-5	324
1981	59	199	-	7	16	1	-	282
1982	52	147	1	4	8	1	-1	212
1983	70	180	31	11	15	-	-31	276
1984	76	235	54	13	13	-	-54	337
1985	102	275	132	19	1	+	-132	397
1986	158	456	109	26	1	2	-109	643
1987	137	564	70	19	-	2	-70	722
1988	138	540	-	24	-	4	-	706
1989	217	578	-	21	7	1	-	824
1990	128 ²	464 ²	-	29	8	2	-	629
1991 ¹	216	746		38	11 ³			1,011

¹Preliminary.

²Data as officially reported to ICES.

³1 tonnes in the Skagerrak.

Table 2.14 Sole in Division IIIa. Danish catch in numbers in 1991.

Age	Kattegat	Skagerrak	Total
2	470	34	504
3	1072	166	1238
4	696	187	883
5	240	78	318
6	275	55	330
7	258	30	288
8	141	30	171
9	28	17	45
10	9	3	12
11	3	3	6
12	2		2
13	3		3
14	1		1
15	1		1
16	2		2

Table 2.15 Sole in Division IIIa. Recruitment index.
Danish summer survey in the Kattegat.

Year class	Index of 1-group
1983	9.52
1984	16.9
1985	2.04
1986	1.81
1987	1.2
1988	5.83
1989	7.6
1990	12.02

Table 3.1 The landings of cod by countries in the Skagerrak.

Year	Open Skagerrak						Norwegian Fjords
	Denmark	Sweden	Norway	Others	Germany	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	16,634	1,902	115	34	12	18,697	888
1990	15,788	1,694	143	65	110	17,800	846
1991 ¹	10,396	1,579	72	12	12	12,059	854

¹Preliminary.

²Landings statistics incompletely split on the Kattegat and the Skagerrak.
The figures are estimated by the Study Group.

Table 3.2 By-catch of cod in the Skagerrak by the Danish industrial fishery (in tonnes) as estimated by the Study Group.

Year	By-catch
1979	4,009
1980	4,036
1981	5,376
1982	9,119
1983	4,384
1984	1,084
1985	1,751
1986	997
1987	491
1988	1,103
1989	428
1990	687
1991	953

Table 3.3 Catch and effort data for the Swedish cod fishery in the Skagerrak by gear type.

Year	Bottom trawl			<i>Nephrops</i> trawl		
	Catch (t)	Effort	CPUE	Catch (t)	Effort	CPUE
1978	86	-	24.5	572	-	18.2
1979	104	-	28.4	936	-	27.2
1980	263	6,651	39.6	1,287	42,987	29.9
1981	318	7,297	43.6	1,619	43,785	37.0
1982	462	8,178	56.5	1,384	40,815	33.9
1983	329	8,478	38.8	1,239	52,536	23.6
1984	371	11,991	30.9	1,077	69,779	15.4
1985	392	13,168	29.8	1,149	70,864	16.2
1986	347	11,977	29.0	736	74,913	9.8
1987	503	13,527	37.7	1,062	91,875	11.5
1988	344	14,405	23.9	1,002	109,337	9.2
1989	178	11,310	28.2	1,243	85,833	12.8
1990	323	11,815	27.3	803	71,715	12.8
1991	249	9,561	26.6	508	71,854	8.1

Table 3.4 Catch and effort data for the Skagerrak by seiners and gillnetters in the Danish cod fishery.

Year	Danish seine			Nets		
	Catch (t)	Effort (days)	CPUE (kg/day)	Catch (t)	Effort (days)	CPUE (kg/day)
1983	177	520	340	148	188	787
1984	659	1,996	330	358	701	511
1985	310	716	433	206	449	459
1986	2,184	3,784	577	2,418	2,560	944
1987	919	2,170	423	384	971	396
1988	964	2,528	381	347	999	347
1989	970	3,316	293	132	480	275
1990	719	3,028	237	202	650	311
1991 ¹	420.4	2,825	149	275.7	956	288

¹Preliminary.

Table 3.5 Indices of 0-group Cod from the Norwegian Skagerrak coast and indices of 1- and 2-groups from the IBTS in February and 1-group of whiting and haddock from IBTS in February.

Year class	Cod			Whiting	Haddock
	IBTS	IBTS			
	1-gr.	2-gr.	0-gr. ¹	1-gr.	1-gr.
1974				499	
1975			6.1	236	
1976			11.4	99	
1977			3.4	392	
1978			6	561	
1979		85	21.4	722	40.4
1980	15	31	7.1	968	4.3
1981	36	30.4	5	690	47.7
1982	28.4	18.6	12.4	262	33.8
1983	23.4	51.8	1.9	500	71.7
1984	13.5	10.5	4.2	940	160.8
1985	77.9	113	20.3	1,379	57
1986	5.4	18.1	4.5	2,178	250.6
1987	77	23.8	10.1	2,978	125.2
1988	56	9.6	0.2	478	20.2
1989	30.9	25.3	15.9	2,255	8
1990	9.3		1.9	1,636	74
1991 ¹	106		5.7	1,672	258

¹Norwegian survey.

Table 3.6 Nominal landings (in tonnes) of Haddock from Division IIIa as supplied by the Study Group.

Year	Denmark	Norway	Sweden	Others	Total
1975	5,015	122	921	57	6,115
1976	7,488	191	1,075	301	9,055
1977	6,907	156	2,485	215	9,763
1978	4,978	168	1,435 ²	56	6,637
1979	4,120	248	361	56	4,785
1980	7,172	288	373	57	7,890
1981	9,568	271	391	120	10,350
1982	11,151	196	396	329	12,072
1983	13,650	756	608	221	15,235
1984	8,223	321	499	30	9,073
1985	7,476	279	351	15	8,121
1986	4,947	226	151	5	5,329
1987	5,033	148	71	36	5,288
1988	4,023	245	64	48	4,380
1989	4,249	84	66	5	4,399
1990	5,853	84	102	27	6,039
1991 ¹	4,551	111	80	1.4	4,743

¹Preliminary.²Includes Divisions IVa and IVb.**Table 3.7** Landings of haddock in Division IIIa (in tonnes) as supplied by the Study Group members.

Year	Denmark		Norway	Sweden	Others	Total Consumption	Total industrial & consumption
	Consumption	Industrial	Consumption				
1983	6,425	7,225	756	608	221	8,010	15,235
1984	5,516	2,707	321	499	30	6,366	9,073
1985	6,522	954	279	351	15	7,167	8,121
1986	3,265	1,682	226	151	5	3,647	5,329
1987	3,584	1,449	148	71	36	3,803	5,288
1988	2,543	1,480	245	64	48	2,852	4,380
1989	3,889	360	84	66	-	4,039	4,399
1990	3,885	1,968	84	102	-	4,071	6,039
1991	2,362	2,189	111	80	1	2,554	4,743

Table 3.8 Catch in numbers of Haddock in Division IIIa for 1982-1990 ('000).

Age	1982	1983	1984	1985	1986	1987 ¹	1988 ¹	1989 ¹	1990 ¹
1	314	1,113	18	-	51	381	375	32	1,040
2	2,299	4,624	6,554	8,279	904	3,282	1,683	1,540	1,347
3	12,055	2,728	4,481	3,687	3,725	866	1,863	2,951	1,578
4	1,113	4,004	713	1,049	686	734	303	510	931
5	209	525	524	78	230	122	158	91	144
6	22	63	91	176	33	42	43	45	43
7	11	11	6	29	27	10	14	12	31
8+	6	6	16	6	28	6	16	6	20
Total	16,029	13,074	12,403	13,304	5,684	5,444	4,455	5,187	5,134

¹Data from human consumption fishery only.**Table 3.9** Haddock in Division IIIa (Kattegat and Skagerrak). Mean weight at age of the catch. (Kilogram).

Age	1982	1983	1984	1985	1986	1987 ¹	1988 ¹	1989 ¹	1990 ¹
1	0.200	0.200	0.200	0.200	0.350	0.432	0.412	0.452	0.435
2	0.470	0.470	0.470	0.470	0.530	0.530	0.542	0.533	0.606
3	0.679	0.679	0.679	0.679	0.760	0.810	0.678	0.741	0.923
4	0.932	0.932	0.932	0.932	1.096	1.122	1.047	1.125	1.061
5	1.593	1.593	1.593	1.593	1.518	1.531	1.394	1.783	1.253
6	2.180	2.180	2.180	2.180	1.828	1.917	1.670	1.916	1.563
7	2.600	2.600	2.600	2.600	2.400	1.853	2.324	2.050	1.898
8+	2.770	2.770	2.770	2.770	2.700	2.155	2.742	2.967	2.300

¹Data from human consumption fishery only.

Table 3.10 Nominal landings (in tonnes) of WHITING from Division IIIa as supplied by the Study Group.

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	70	1,054	7	26,073
1982	40,941	40	670	13	41,664
1983	24,816	48	1,061	8	25,933
1984	13,138	51	1,168	60	14,417
1985	12,524	45	654	2	13,225
1986	12,463	64	477	1	13,005
1987	16,323	29	262	43	16,657
1988	11,262	42	435	24	11,764
1989	12,511	29	675	-	13,215
1990	18,845	46	435	73	19,333
1991 ¹	14,085	56	557	44	14,742

¹Preliminary.

Table 3.11 Danish landings of Whiting in Skagerrak and Kattegat 1981-1991 as supplied by the Study Group.

Year	Kattegat		Skagerrak		Division IIIa		Total
	Consumption	Industrial	Consumption	Industrial	Total Consumption	Total Industrial	
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	633	7,708	777	11,662	12,439
1990	117	5,290	899	12,539	1,016	17,829	18,845
1991	185	4,251	696	8,953	881	13,204	14,085

Table 3.12 Plaice landings from the Skagerrak (tonnes) as provided by the Study Group.

Year	Denmark	Sweden	Netherlands	Germany	Belgium	Norway	Correction	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	-594	7,145
1984	7,560	356	1,580		27	22	-1,580	7,965
1985	9,646	296	2,225		136	18	-2,225	10,096
1986	10,653	215	4,024		505	24	-4,024	11,397
1987	11,370	222	2,209		907	25	-2,209	12,519
1988	9,781	281	2,087		716	41	-2,087	10,819
1989	5,387	320	-	0.1	230	33	-	5,939
1990	8,726	777	-	0.7	471	69	-	10,044
1991 ¹	5,849	472	-	3.9	-	68	-	6,393

¹Preliminary.**Table 3.13** Catch (kg) and effort (days) for Plaice in the Skagerrak (Danish data).

Year	Seiners			Gillnet		
	Catch	Effort	CPUE	Catch	Effort	CPUE
1983	-	-	-	4,278	31	138.0
1984	-	-	-	69,118	235	294.1
1985	749,096	1,231	608.5	50,118	163	307.5
1986	3,440,056	5,330	645.4	404,182	945	427.7
1987	2,373,372	3,977	596.8	638,297	1,037	615.5
1988	2,077,242	3,856	538.7	355,811	911	390.6
1989	1,437,169	4,015	357.9	90,336	340	265.7
1990	1,898,213	4,080	465.2	61,363	218	281.5
1991	1,563,150	4,734	330.2	50,342	267	188.5

Table 3.14 Catch (t), effort (hr), and CPUE (kg/hr) for PLAICE in the Skagerrak (Swedish data).

Year	<i>Nephrops</i> trawl			Cod bottom trawl		
	Catch	Effort	CPUE	Catch	Effort	CPUE
1980	74.4	42,987	1.73	16.6	6,651	2.50
1981	76.1	43,785	1.74	12.7	7,297	1.74
1982	79.9	40,815	1.95	18.3	8,178	2.24
1983	104.1	52,536	1.98	22.3	8,478	2.63
1984	215.4	69,779	3.09	54.4	11,991	4.54
1985	219.6	70,864	3.10	46.7	13,168	3.55
1986	135.3	74,913	1.81	34.4	11,977	2.87
1987	127.7	91,875	1.39	25.7	13,526	1.90
1988	184.4	109,337	1.66	38.3	14,405	2.66
1989	202.2	85,833	2.36	38.3	11,310	3.39
1990	208.8	71,715	2.91	66.4	11,815	5.62
1991	98.0	71,854	1.36	32.0	9,561	3.42

Table 3.15 The mean catches of Plaice in kg per hour in the Skagerrak ("Dana" May survey).

Year	Catch in kg per hour
1984	6.94
1985	45.80
1986	24.15
1987	22.53
1988	3.56
1989	2.93
1990	7.42
1991	15.0

Table 3.16. Indices of 2- and 3-group Plaice in the Skagerrak from the "Dana" May survey.

Skagerrak		
Year class	"Dana" survey age 2	"Dana" survey age 3
1983	49.87	36.28
1984	7.25	34.25
1985	2.86	7.13
1986	0.63	7.50
1987	2.00	21.00
1988	1.40	55.00
1989	0.00	-

