International Council for the Exploration of the Sea

C.M.1983/Assess:6

ERRATA

REPORT OF THE WORKING GROUP ON REDFISH AND GREENLAND HALIBUT IN REGION 1

Pages 58 and 59 to be replaced by the attached.

Table 44 GREENLAND HALIBUT IN FISHING AREAS V AND XIV

VIRTUAL POPULATION ANALYSIS **** VPA ****

UNIT: Year-1
FISHING MORTALITY COEFFICIENT NATURAL MORTALITY COEEFICIENT = 0.15

	1975	1976	1977	1978	1979	1980	1981	1982	1975-79
4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5	0.004	0.001	0.000	0.001	0.001	0.002	0.001	0.000	0.001
6	0.037	0.012	0.001	0.003	0.009	0.020	0.008	0.011	0.012
7	0.120	0.032	0.032	0.014	0.068	0.083	0.027	0.071	0.053
8	0.209	0.053	0.120	0.060	0.112	0.144	0.079	0.143	0.111
9	0.277	0.068	0.265	0.110	0.239	0.211	0.103	0.238	0.192
10	0.313	0.073	0.171	0.140	0.208	0.269	0.168	0.238	0.161
11	0.123	0.058	0.168	0.160	0.200	0.322	0.224	0.238	0.142
12	0.464	0.029	0.275	0.172	0.151	0.285	0.185	0.238	0.218
13	0.579	0.057	0.071	0.225	0.189	0.324	0.219	0.238	0.224
14	0.248	0.111	0.250	0.113	0.273	0.356	0.216	0.238	0.199
15	0.363	0.024	0.127	0.376	0.098	0.323	0.337	0.238	0.198
16	1.422	0.023	0.190	0.975	0.632	0.069	0.435	0.238	0.648
17	0.300	0.100	0.200	0.200	0.300	0.350	0.200	0.238	0.220
18+	0.300	0.100	0.200	0.200	0.300	0.350	0.200	0.238	0.220
(8-13)U	0.328	0.056	0.178	0.145	0.183	0.259	0.163	0.222	
(8-13)W	0.247	0.057	0.173	0.104	0.174	0.219	0.135	0.208	

Table 45 GREENLAND HALIBUT IN FISHING AREAS V AND XIV

VIRTUAL POPULATION ANALYSIS **** VPA ****

STOCK SIZE IN NUMBERS UNIT: THOUSANDS
BIOMASS UNIT: TONNES

1 JANUARY (TOTAL AND SPAWNING STOCK)

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1975-79
4	42415	41186	32955	36982	27739	37283	37082	36255	******	36255
5	31628	36506	35448	28364	31629	23375	32084	31912	0	32755
6	23796	27111	31381	30511	24392	27369	20506	27591	27459	27438
7	16925	19741	23060	26978	26176	20812	23092	17503	23476	22576
8	10135	12925	16450	19226	22899	21044	16491	19338	14033	16327
9	5585	7076	10549	12560	15568	17624	15679	13120	14426	10272
10	3693	3644	5691	6965	9687	10561	12279	12172	8900	5936
11	4311	2324	2915	4127	5210	6772	6943	8937	8257	3777
12	1323	3281	1888	2120	3028	3671	4224	4775	6063	2328
13	679	716	2744	1234	1536	2241	2375	3021	3240	1382
14	944	328	582	2201	848	1095	1396	1642	2050	980
15	482	634	252	390	1092	555	660	968	1114	690
16	54	289	533	191	230	1321	546	406	657	260
17	8	11	243	379	62	105	1061	193	275	141
18+	182	23	83	166	37	18	166	56	169	98
TOTAL NO	142101	155793	164774	172395	170955	174347	174384	177889		
SSB NO.	21784	23863	31831	37509	45310	49756	49728	44664		
TOT.BIOM	185595	238381	253676	253081	243452	270485	260160	285666		
SSB BIOM	58659	72109	83556	100028	108198	120743	120324	118107		

International Council for the
Exploration of the Sea

C.M.1983/Assess:6

REPORT OF THE WORKING GROUP ON REDFISH AND GREENLAND HALIBUT IN REGION 1

Copenhagen, 24 February to 1 March 1983

x) General Secretary,
ICES,
Palægade 2-4,
DK-1261 Copenhagen K,
Denmark.

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REPORT OF THE WORKING GROUP ON REDFISH AND GREENLAND HALIBUT IN REGION 1

1. PARTICIPANTS AND TERMS OF REFERENCE

1.1 Participants

D B Atkinson	Canada
A Kristiansen	Faroe
K Kosswig	Federal Republic of Germany
J Magnússon	Iceland
J Møller Jensen	Denmark
C J Rørvik	Norway
H Schulz	Federal Republic of Germany
A Schumacher	Federal Republic of Germany
A Sigurdsson	Iceland
O M Smedstad	Norway
B Vaske (Chairman)	German Democratic Republic

Mr K Hoydal attended the meeting as ICES Statistician.

1.2 Terms of Reference

At the last Statutory Meeting, the Council adopted the following resolution (C.Res.1982/2:5:16):

"It was decided, that the Redfish and Greenland Halibut Working Group (Chairman: Mr B Vaske) should meet at ICES headquarters from 24 February to 1 March 1983 to:

(i) assess catch options for 1984 for redfish and Greenland halibut in Region 1,

(ii) evaluate USSR data in relation to the 'mentella box' and the present mesh size regulation,

(iii) consider which of the above stocks could be assessed at 2-year intervals, with advice being given as a 2-year forecast; if it would be meaningful to produce such a prediction now, then the Working Group should do so,

(iv) review which data are available in the Working Group files for evaluating density dependence in the parameters of the models used in fish stock assessment,

(v) specify deficiencies in data required for assessments".

2. REDFISH IN THE NORTH-EAST ARCTIC REGION (Sub-areas I and II)

2.1 Status of the Fisheries

A considerable increase in total redfish catches in the North-East Arctic was recorded in 1982 (Table 1). The preliminary catch figure in 1982 is 130 414 tonnes compared to 101 442 tonnes in 1981. This was 46 414 tonnes higher than the total redfish TAC for 1982 of 84 000 tonnes. In Sub-area I the total catch increased from 1 847 tonnes in 1981 to 2 628 tonnes in 1982 (Table 2). In Division IIa the total catch increased from 72 882 tonnes in 1981 to 78 109 tonnes in 1982 (Table 3), and in Division IIb the catch in 1982 was 49 677 tonnes in comparison with 26 713 tonnes in 1981 (Table 4).

Redfish catches were split into Sebastes mentella and Sebastes marinus on the same area basis as in earlier reports. In Sub-area I all catches except 86% of the USSR catches were assumed to be S. marinus. In Division IIa all the catch of the German Democratic Republic and 97% of the USSR catches were recorded as S. mentella, while all catches taken by other countries were assumed to be S. marinus. All catches in Division IIb were recorded as S. mentella.

Compared to 1981, the total landings in 1982 of S. marinus decreased from 20 206 tonnes to 15 477 tonnes, and those of S. mentella increased from 81 236 tonnes to 114 937 tonnes (Table 5). Thus, the TAC of 14 000 tonnes for S. marinus was exceeded by about 10%, while the TAC for S. mentella of 70 000 tonnes was exceeded by about 64%.

2.2 Catch per Unit Effort

Catch per hour trawling data were available for the USSR S. mentella fishery for the period 1965-82 (Table 6). The cpue value of 0.63 in 1982 was the same as in 1981. Using these cpue values as a standard, the total effort was derived for the period 1965-82. On this basis, the total effort in 1982 was 41% higher than in 1981.

Catch per unit effort data were also available for the German Democratic Republic S. mentella fishery for 1976-82, both for bottom trawl (OTB) and mid-water trawl (OTM) for Divisions IIa and IIb combined. These data and the corresponding total international effort in German Democratic Republic units are also given in Table 6.

2.3 Recruitment (Table 7)

From the International 0-Group Survey, which began in the Barents Sea in 1965, it is seen that only year classes 1967 and 1968 have been estimated as very poor. The other year classes are above average or strong. The 1979-82 year classes are the most abundant observed in the 0-group Surveys.

It should be noted that there is a disagreement between the results from the International 0-Group Surveys and the annual USSR Young Fish Surveys for the year classes 1973-75. In the USSR Young Fish Surveys these year classes were recorded as poor.

2.4 Age Composition (Tables 8 and 10)

For 1981, S. marinus age distribution was adjusted to the revised catch figure. The final 1981 S. mentella catch differed from the preliminary value by only 2 tonnes, so that no revision was necessary for the catch in numbers for this species.

For 1982, age composition data and age/length keys for S. marinus were available from the Federal Republic of Germany and the USSR for Division IIa. Total age composition was calculated by applying the Federal Republic of Germany age composition for Division IIa to the total catch of all countries except the USSR. Age compositions of S. mentella for 1982 were available for the catches of the German Democratic Republic and the USSR. The sum of these was raised to the total landings in 1982. The age compositions of S. mentella available for 1982 represent 99% of the total landings.

2.5 Mean Weight at Age

The different sets of mean weight at age data used in the assessment of S. mentella are given in Table 9. It was decided to use the 1981 data for 1982 and in the catch projection.

2.6 Proportion of Mature Fish at Age

No new information on the proportion of mature fish at age was available to the Working Group. To calculate the spawning stock biomass, the data from last year's report were used (Table 13).

2.7 Assessment (Sebastes marinus)

As last year, no effort data were available on which to base the terminal F for a VPA run. The method to estimate the MSY described by Csirke and Caddy (1983) was used on the existing data, but this gave no reliable results.

The Working Group agreed that an assessment of this stock and its development in recent years was not possible with any degree of realiability at present.

2.8 Assessment (Sebastes mentella)

2.8.1 Parameters used

For a trial VPA run, the terminal F in 1982 was estimated from the relationship between average F values and total effort in USSR units as given in last year's report. Using the total effort figure for 1982, the input F was estimated from this relationship as $\bar{F}_{(8-19)} = 0.34$. From this trial VPA, the linear regression between total effort and mean fishing mortality was again calculated for the period 1965-78, and the mean terminal F in 1982 was estimated as 0.34 (Figure 1).

Since this estimate corresponds with the F in the trial run, it was decided to accept an $\bar{F}_{(8-19)} = 0.34$ as the estimate of fishing mortality in 1982.

The terminal F for age groups 9 to 11 was calculated according to the average exploitation pattern in the period 1974-79. The exploitation pattern of age groups 6-8 in 1982 was determined according to an assumed average recruitment level at age 6 in 1980-82.

Natural mortality of 0.1 was used as in previous assessments.

2.8.2 Fishing mortality

Estimates of fishing mortality from VPA are given in Table 11. The mean fishing mortality on age groups 8-19 was low in the period 1965-74, fluctuating around 0.08. An increase to an average level of 0.49 was recorded for the period 1975-77, with a peak of 0.54 in 1976. From 1978 to 1981, the fishing mortality remained fairly stable at a level of 0.24. An increase up to 0.34 was observed in 1982 (Figure 2).

2.8.3 Stock size

Estimates of stock size in numbers from VPA, total stock biomass and spawning stock biomass are given in Table 12. For the biomass calculations, mean weight at age data and the proportion of mature fish at age as given in Tables 9 and 13 were used.

The results from the VPA (Figure 2) show that the total biomass increased steadily from about 300 000 tonnes in 1965 to about 1 000 000 tonnes in 1975. By 1979 it decreased to about 550 000 tonnes and remained fairly stable up to 1982.

The spawning stock biomass shows similar trends up to 1978. Since 1978, an increase from about 130 000 tonnes to 175 000 tonnes in 1982 was recorded.

2.8.4 Yield per recruit (Figure 3)

Except some small modifications in the exploitation pattern of age groups 6-8, there were no changes in the parameters used for calculating yield per recruit and spawning stock biomass per recruit curves compared to last year's report. There was, therefore, no need for a revision, since the small changes have no significant influence on the curves and the reference points.

$F_{0.1}$ and F_{max} correspond to 0.14 and 0.24, respectively. The estimated fishing mortality in 1982 of 0.34 was, therefore, above the F_{max} level.

2.8.5 Catch projections

Based on the estimated stock size at the beginning of 1983, catch projections were made for 1984, using the parameters given in Table 13. Furthermore, the average recruitment of 412 x 10^6 at age 6 was applied in the projections for 1983-85.

For 1983 it was assumed that a catch of 100 000 tonnes will be taken. This catch level corresponds to the TAC established by countries responsible for the management of S. mentella in that area.

The fishing mortality required to achieve this catch is at a level of $\bar{F}_{(8-19)} = 0.32$.

The results of the catch projections are shown in Figure 4. The catch in 1984, total biomass and spawning stock biomass at the beginning of 1985 are plotted against fishing mortality in 1984.

For the following selected values of fishing mortality in 1984, the results are summarized in the text table below.

Species: Sebastes mentella Area: ICES Sub-areas I and II

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

Weights in thousands of tonnes.
Stock biomass = fish at age 6 to 24.
Spawning stock biomass from maturity ogive.

It can be seen, that fishing at the $F_{0.1}$ or F_{max} level in 1984 would result in an increase in total stock biomass and spawning stock biomass in 1985.

3. REDFISH IN SUB-AREAS V AND XIV

3.1 Status of the Fisheries (Tables 14-17)

The total catch from the Irminger Sea redfish stock complex increased from 145 661 tonnes in 1981 to about 169 000 tonnes in 1982, i.e., by about 16%. Catches increased moderately in the order of 1 000 to 2 000 tonnes in Division Vb and Sub-area XIV, whereas in Division Va the increase was quite substantial, by about 20 000 tonnes.

In Division Va (Iceland), the Icelandic fleet increased the fishing effort in 1981 and again in 1982. This resulted in an increase in the Icelandic catch from 69 780 tonnes in 1980 to 93 349 tonnes in 1981 and to about 115 000 tonnes in 1982. The increase in fishing effort by the Icelandic fleet was partly due to an increase in the number of vessels but mainly due to restrictions in the cod fishery and reduced availability of cod in 1982. Only about 300 tonnes were taken by other nations in Division Va compared to about 2 200 tonnes in the previous year.

In Division Vb (Faroes), catches increased from 7 145 tonnes in 1981 to about 9 000 tonnes, slightly below the 1980 level in 1982; catches of the Federal Republic of Germany fleet increased by about 1 000 tonnes compared to 1981, while the catches of the Faroese fleet increased by about 800 tonnes. This level of Faroese catches is still below the 1980-81 level due to diversion of effort towards the saithe fishery.

In Sub-area XIV (East Greenland), the total catch increased from 32 609 tonnes in 1980 to 42 999 tonnes in 1981, followed by a further slight increase to about 44 200 tonnes in 1982. The catches in Sub-area XIV were taken almost exclusively by the Federal Republic of Germany fleet, which had to direct their fishing effort in East Greenland waters mainly to the redfish fishery. The trend towards catching younger age groups, particularly in S. mentella, which was observed in recent years, was discontinued in 1982.

3.2 Recruitment of Redfish in the Irminger Sea

In 1982, redfish fry were mainly observed in the western part of the Irminger Sea and off the East Greenland coast, where areas with heavy concentrations were only observed in three places on the shelf of East Greenland. In the Dohrn Bank region, where redfish fry are usually abundant, only a few were observed. In the central region of the Irminger Sea, there was a broad belt almost completely void of 0-group redfish. In the Icelandic area only a few 0-group redfish were observed.

The annual influx of redfish fry drifting into the area from south of 60°N was at the lowest level recorded this year.

The total abundance index of 0-group redfish was 2.7×10^6 fish per nautical square mile in 1982. It is the second lowest on record since 1970.

The year-to-year fluctuations in the abundance of 0-group redfish, as estimated in the surveys, are given in the text table below.

Number of 0-group redfish x 10^6/nautical square mile

Year class	Number of fish
1970	8.6
1971	12.6
1972	31.1
1973	74.0
1974	23.6
1975	12.6
1976	5.8
1977	13.0
1978	6.5
1979	1.3
1980	3.0
1981	9.0
1982	2.7

The analysis of redfish fry to species indicated that S. marinus fry in 1982 amounted to 46% compared to 47% and 43% for 1980 and 1981, respectively. But the proportions within the different regions in the Irminger Sea are very variable from year to year.

3.3 Splitting of 1982 Catches into S. marinus and S. mentella Components (Tables 18-20)

In Division Va the Icelandic catch was allocated to S. marinus and S. mentella components in the proportion 83.9% to 16.1%. These figures were derived from observations on landings. The catches of Belgium and Norway are in accordance with their fisheries allocated to S. marinus.

In Division Vb the Federal Republic of Germany catch was S. mentella according to observations on landings. A part of the Faroes catch (1 774 tonnes) was caught in the same area as fished by the Federal Republic of Germany fleet, and therefore allocated to S. mentella. The rest of the Faroese catch was allocated as reported in last year's report, i.e., 76.54% S. marinus and 23.46% S. mentella. The same proportions were used for the catch of France. The Norwegian catch was allocated to S. marinus.

In Sub-area XIV the catch of the Federal Republic of Germany was allocated in the same proportions as observed in the landings, i.e., 54.82% and 45.18% for S. marinus and S. mentella, respectively. The remainder of the catch in Sub-area XIV (600 tonnes) was not allocated to species or used in the assessment because it was from the "oceanic" stock of S. mentella (see Section 3.8).

3.4 Length and Age Compositions

Division Va: Length frequencies from the Icelandic catches in 1982 were available for both species and were used to calculate the length distribution of the catch in numbers for the respective species.

Division Vb: Length frequencies of S. marinus from the Faroese catch were available and were used to calculate the length distribution for the species. For S. mentella, frequencies from the Federal Republic of Germany landings from Division Vb were used.

Sub-area XIV: Federal Republic of Germany data on length composition of the 1982 catches were available for both species, and used to calculate the length distribution of the total catch.

Age/length keys: Age/length keys were available for both S. marinus and S. mentella in Sub-area XIV from samples of the fishery of the Federal Republic of Germany.

For S. marinus in Division Va, an Icelandic age/length key was combined with the age/length key from Sub-area XIV in 1982 for the younger and older age groups, since the first one did not cover all the length frequencies. For S. mentella in Division Va, no age/length data were available. To calculate the number at age, the age/length key of the Federal Republic of Germany from Sub-area XIV was used.

For Division Vb, the Federal Republic of Germany age/length key was applied for S. mentella, whereas for S. marinus, a combined age/length key for Division Va was used to calculate the numbers at age.

The combined age compositions of the total catches in Sub-areas V and XIV are given in Table 21 for S. marinus and in Table 25 for S. mentella.

3.5 Redfish Density-Dependent Growth

Age data are only available for the most recent years. The former use of combined age/length keys from several years and standard weight at age values assumed that there was no density-dependent growth or at least none existed within the bounds of redfish abundance noted in the years for which data were available. This does not preclude the fact that there may be density-dependent growth, but the available data do not allow conclusions.

3.6 Assessment of Sebastes marinus

3.6.1 Weight at age

No new data on mean weight at age were available at the Working Group meeting and, therefore, the data used in the previous assessments have been used. Estimates of biomasses in the VPA and the weights in the catch projection have not been corrected by SOP differences (-6%).

3.6.2 Proportions of mature fish at age

Icelandic data on proportions of mature fish at age obtained in 1982 show only minor differences compared to the data presented at the 1982 Working Group meeting, and there was no reason to revise the data used previously.

3.6.3 VPA

Catch per unit effort data from the Icelandic fishery have been used to calculate total effort in the redfish fishery in Sub-areas V and XIV (see text table below). Catch per unit effort has been allocated to species according to the proportions of S. marinus and S. mentella in the catches.

Year	kg/hr trawling[x)]	Total effort	S.marinus effort
		(1000 hrs trawling)	
1978	1 034	63.7	46.2
1979	1 148	85.3	65.4
1980	1 180	97.4	74.7
1981	1 168	124.7	86.7
1982	1 146	147.4	106.8

x) for landings containing >70% redfish.

The resulting effort figures for S. marinus have been used to estimate fishing mortality for 1982 for that species. This approach was accepted by the Working Group, as the cpue figures cover about 2/3 of the total S. marinus catch. A regression of the S. marinus effort against fishing mortality from the 1982 assessment resulted in an estimate of $\bar{F}_{(14-23)}$ of 0.43 for 1982 (see Figure 5). However, the intercept of this regression line was fairly high (0.108). A new regression based on fishing mortalities from a VPA with a terminal F of 0.43 resulted in an estimate of $\bar{F}_{(14-23)}$ of 0.33 with an intercept of -0.024, which was considered to be sufficiently close to the origin as required by the underlying theory.

Inspection of the exploitation pattern derived from the VPA showed considerable differences for age groups 13 to 21 compared to the one previously used. Therefore the exploitation pattern had to be revised according to the mean fishing mortality per age group in 1977-79 (see Figure 6). A new yield per recruit curve has been calculated, based on the revised exploitation pattern with an $F_{0.1}$ at 0.031 (Figure 8).

Furthermore, in contradiction to the results of the 0-group surveys, recruitment at age 7 in the VPA from 1979 onwards was far too low compared to the whole time series. Therefore the exploitation pattern for age groups 7 to 10 was adjusted to give about average recruitment at age 7 for the years 1979-82. The catch projection for 1984 is not very much affected by this approach; however, the total biomass estimate might be somewhat biased.

The results of the VPA (Tables 22, 23 and Figure 7) show an increasing trend in fishing mortality in recent years following the trend in catches. Total stock biomass and spawning stock biomass are relatively stable although some stability might be artificially introduced by using average recruitment from 1979 onwards.

3.6.4 Catch projection and management options

The basic data for the projection of catches in 1984 and for the stock size at the beginning of 1985 are given in Table 24. Average recruitment of 7 year old fish, i.e., 282 million, was used in the catch projection as in last year's assessment.

In the absence of any indication of the likely total catch level of S. marinus from the Irminger Sea stock complex in 1983, a catch of 120 000 tonnes was assumed to be taken in that year. Factors have been calculated to allow the results of the projections to be corrected for deviations from the actual catch level in 1983 when the results of the 1983 fishery are known (see note on the option table).

The results of the catch projections are given in Figure 9 and summarized in the following text table.

Species: Sebastes marinus Area: ICES Subareas V and XIV

1983				Management option for 1984	1984				1985	
Stock biom. (7+)	Spawn. stock biom.	$\bar{F}_{(14-23)}$	Catch (7+)		Stock biom. (7+)	Spawn. stock biom.	$\bar{F}_{(14-23)}$	Catch (7+)	Stock biom. (7+)	Spawn. stock biom.
1 056	435	0.316	120		1 022	427				
				Maintaining 1983 SSB			.245	93	1 015	435
				$F_{0.1}$			.031	13	1 098	504
				F_{max}			-			
				Slope of Y/R curve $\longrightarrow$ 0			.10	40	1 070	484
				Maintaining 1982 level of exploitation			.33	120	990	410

Weights in thousands of tonnes.

Note on the Option Table.

The options in the text table above refer to a catch level in 1983 of 120 000 tonnes. The weights given in the table (and in Figure 4) can be corrected by adding (if the 1983 catch is below 120 000 tonnes) or subtracting (if the 1983 catch is higher than 120 000 tonnes) the following percentages for each 5 000 tonnes deviation:

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

Maintaining the 1982 level of exploitation would result in a slight reduction in spawning stock biomass from the present level. Management of the fishery by all other options would increase the spawning stock biomass or at least maintain it at present levels. The options associated with reference points on the Y/R curve, i.e., $F_{0.1}$ and the point where the curve reaches its maximum (F = 0.1) are associated with unrealistically low catch levels which have never been recorded in the fishery.

3.7 Assessment of Sebastes mentella

No effort data and no other fishery-independent data were available, which could allow a realistic estimate of the fishing mortality in 1982. The Working Group was in the same position as last year, and, therefore, unable to compute a VPA and the subsequent catch projection in a situation, where none of the important parameters could be estimated with sufficient reliability.

In view of the increase in catches during the last three years (Table 17), the Working Group feels that a cautious approach is advisable in the management of this stock.

3.8 Note on the mentella Type Oceanic Stock

The existence of the oceanic stock has been known for several years, but it was not fished until 1982, and therefore not considered in the assessment work. In 1982, a big fishery was initiated on this stock by the USSR fleet. Some biological data on the oceanic mentella type are available from the years 1971-75 (Magnússon, 1977) and from 1982, but there is no information on the fishery by the USSR fleet available to the Working Group at present.

It should, therefore, be urged that all relevant data should be provided to make an assessment of this stock possible, when the information available is sufficient.

4. GREENLAND HALIBUT IN SUB-AREAS I AND II

4.1 Status of the Fisheries

The nominal catches by country for Sub-area I and Divisions IIa and IIb are given in Tables 26, 27 and 28. In Table 29 the catches are summarized for Sub-areas I and II. The total catch in 1981 was 15 018 tonnes, i.e., 25% above the TAC of 12 000 tonnes for that year. In 1982, the total catch was 16 269 tonnes according to the preliminary catch figures, i.e., 4 269 tonnes (36%) above the TAC of 12 000 tonnes.

4.2 Catch per Unit Effort and Effort Data

The only new cpue data available to this year's meeting of the Working Group were derived from Norwegian fresh fish trawlers (Table 30). This cpue value was calibrated in order to be comparable with the previous year's combined cpue data. The calibration procedure is described in last year's report (C.M.1982/Assess:5). The Norwegian cpue, which decreased by 6% from 1981 to 1982, has been highly correlated with the USSR and the German Democratic Republic data in the past (Table 30, and Doc. C.M.1981/G:7). The total effort, calculated by dividing the total catches by the calibrated cpue, increased by 17% from 1981 to 1982 (Table 30).

4.3 Density Dependence

4.3.1 Mean weights

The mean weights for age groups 4 to 10 as derived from the USSR investigations of the commercial catches are shown in Figure 10 for each of the years in the period 1965-81. This figure indicates increasing trends for all of the mean weights of age groups 4 to 10 during this period.

The cpue data (Table 30) indicate that the stock in the mid-1960s was considerably larger than at present, and the observed changes in the mean weights (Figure 10) may be a density-dependent response.

The Working Group did not, however, change the mean weights (Table 31) used in the previous assessment (C.M.1982/Assess:5), since these give SOP correction factors that are not greatly different from 1.0 (Table 32).

4.3.2 Maturity ogive

Maturity ogives, as derived from Lahn-Johannessen (1965), are given in Table 33 for males and females separately. These curves derive from investigations in the years 1962-64. The maturity ogive for females, which is considered as the more important one, suggests that the presently adopted knife-edge maturity at age 9 should be

lowered by one year. It may also be that because of apparent increases in the mean weights at age since 1965 (Figure 10), corresponding changes in the maturation process may have taken place. However, maturity ogives for the recent years were not at hand. Therefore, in view of the scanty data available and noting that the relative development of the estimated spawning stock has not been a key parameter in the assessments to date, the Working Group did not change the old definition of the spawning stock (9+) for this year's assessment, although the maturity ogives should be given more attention in the future.

4.4 VPA

4.4.1 Age compositions

The age composition for 1981 (Table 34) was adjusted to the revised catch statistics, i.e., on the average a minor increase in the numbers caught of 0.4% per age group. For 1982, only the catch composition of the Norwegian catches was available. As the Norwegian catches only make up 20% of the total (in weight), and as the age composition of the Norwegian trawl catches has been considerably different from the age compositions of the other trawl fisheries in the past, the Working Group decided that it was not worth trying to establish an age composition for the total fishery in 1982 at this year's meeting. Therefore the VPA was done for the same years (1970-81) as last year (C.M.1982/Assess:5).

4.4.2 Input parameters and results

As in previous reports, a constant natural mortality of 0.15 was used, and the unweighted average fishing mortality on the 7 to 11 year olds was selected as the standard.

The relations used in assessing the input Fs were from a regression of $\bar{F}_{(7-11)}$ against total effort, and $\bar{B}(4+)$ against cpue data. In a preliminary run, the prognosis of $\bar{B}(4+)$ (biomass of 4 years and older in mid-season) for 1982 as derived from last year's assessment and the recorded catch in 1982 were compared with the cpue for this year. This indicated that last year's prognosis for 1982 was somewhat high. Looking into the assessment done last year, the 1976 year class at age 3 (1979) was estimated to be 75.9×10^6 compared to the average of 36.6×10^6 for the same age groups in the period 1970-78. In the absence of a reliable independent recruitment index, and in view of the variance of the relative fishing pattern on the younger fish, the input fishing mortality on the 5 year olds in 1981 was increased from 0.037 as chosen in last year's assessment to 0.079. This gave an estimate of the 1976 year class of 36.7×10^6 at age 3, close to the 1970-78 average. For all the other age groups the same input fishing mortalities as chosen last year (C.M.1982/Assess:5) were adopted. Due to the very small changes in the catch at age arising in 1981, this procedure gave only minor changes in the assessment of the year classes compared to the previous assessment (except for the 1976 year class). The exploitation pattern for 1977-78 was applied for 1982. The average fishing mortality on 7-11 year olds required to give the recorded catch of 16 269 tonnes in 1982 was estimated to be 0.145. The estimate of $\bar{B}(4+)$ in 1982 became 128 000 tonnes when applying the same mean weights as for 1981 and correcting for SOP. On the basis of Figures 11 and 12, this procedure was found acceptable by the Working Group. The results of the VPA are given in Tables 35 and 36 and shown in Figure 13.

4.5 Yield per Recruit

Since there is no change in the exploitation pattern used for the prognosis from the one adopted last year, we only give the results here, i.e., an $F_{0.1}$ of 0.115, and an F_{max} of 0.196 when age 16 is not treated as a plus group (Figure 14).

The yield and the spawning stock under equilibrium conditions, using the average recruitment at age 3 in 1970-78 of 36.6 x 10^6, are shown for different values of F in the text table below.

$\bar{F}$	Y/R (kg)	Sustainable yield (tonnes)	SSB/R (kg)	Spawning stock biomass (SSB) (tonnes)
$F_{0.1}$ = 0.115	.651	23 800	3.05	112 000
F_{82} = 0.145	.680	24 900	2.70	99 000
F_{max} = 0.196	.694	25 400	2.05	75 000

4.6 Catch Projections

Catch projections for 1984 were made using the parameters given in Table 37. The estimated stock composition at the beginning of 1984 was estimated, using the average exploitation pattern for 1977-78 for all the years (1982-84), an average recruitment of 36.6 x 10^6 at age 3 in the years 1982-85, the recorded catch of 16 269 tonnes in 1982 and the TAC of 17 000 tonnes in 1983. The mean weights for 1981 were used for the whole period, and as the SOP check only indicated a weight correction of 1.7% for 1981 no weight correction was applied for 1983-85.

The catch in 1984 for five alternative fishing mortalities, the resulting stock biomass (3 years and older), and the spawning stock biomass (9 years and older) in 1985 are given in the text table below. The same parameters, as a function of the fishing mortality in 1984, are shown in Figure 15.

Species: Greenland Halibut Area: ICES Sub-areas I-II

1983				Management option for 1984	1984				1985	
Stock biom. (3+)	Spawn. stock biom. (9+)	$\bar{F}_{(7-11)}$	Catch		Stock biom. (3+)	Spawn. stock biom. (9+)	$\bar{F}_{(7-11)}$	Catch	Stock biom.	Spawn. stock biom.
164	62	.139	17	$F_{0.1}$	175	77	.115	15.5	188	88
				F_{max}			.196	25.1	177	80
				$\bar{F}_{84} = \bar{F}_{82}$			.145	19.2	184	85
				$\bar{F}_{84} = \bar{F}_{83}$			.139	18.5	185	85
				Catch = TAC 1983			.127	17.0	186	86

Weights in thousands of tonnes

Looking at both the cpue (Table 30) and the VPA results (Figure 13), the stock appears to have been decreasing from 1965 up to about 1978. Since that time, an increasing trend seems to have occurred. In all the options for 1984, given in the text table above, the total stock and the spawning stock will continue to increase up to 1985. However, the stock is still below the 1965-70 level, as indicated by the cpue data.

As stated earlier, the only new information the Working Group had this year, which could be utilized in the assessment, was the Norwegian cpue data for 1982 and a recorded catch in 1982, which was 4 269 tonnes above the quota of 12 000 tonnes. A TAC of 17 000 tonnes in 1984 would bring the fishing mortality in 1984 down to 0.127, i.e., half way between the 1983 level of 0.139 and the $F_{0.1}$ level of 0.115.

5. GRENLAND HALIBUT IN SUB-AREAS V AND XIV

5.1 Status of the Fisheries

The total nominal catch figures by country for Divisions Va and Vb, Sub-area XIV and Sub-areas V and XIV combined, are presented in Tables 38-41 for the years 1972-82. During this period, the total catch ranged from 6 045 tonnes (1976) to 36 283 tonnes (1974). After the drop in 1976, the total catches increased steadily to 31 252 tonnes in 1980, dropped to 19 239 tonnes in 1981, and went up again to 31 726 tonnes in 1982. In 1982, 89% of the total catch was taken by Icelandic vessels. The catches were almost entirely taken by otter trawl with a minor portion of the Icelandic catch taken by long-lines.

5.2 Effort and Catch per Unit Effort

Catch per unit effort data from Icelandic trawlers are available for the years 1978-82 (Table 42). The data from the main fishing season (April-May) were used. Since the composition of the fleet has been rather stable over the five years, the cpue data could be taken as being representative of this fishery.

5.3 VPA

5.3.1 Age compositions

The catch in number per age for 1981 was corrected according to the final catch data.

For the year 1982, length compositions and age/length keys were available from Division Va (Icelandic data) and Sub-area XIV (Federal Republic of Germany data). As the age/length/weight relations in both sets of data were almost identical, the Icelandic data were used to calculate the age composition for the total catch from Sub-areas V and XIV (Table 43).

5.3.2 Input parameters and results

As in previous years, the natural mortality was assumed to be 0.15.

The fishing mortality from VPA (ages 8-13) was regressed on total effort (1978-81) and gave an average fishing mortality of 0.22 on age groups 8 to 13 in 1982 (Figure 16).

The results of the VPA are given in Tables 44 and 45 and Figure 17. The total biomass increased from 185 595 tonnes in 1975 to 285 666 tonnes in 1982. The spawning stock biomass increased from 58 659 tonnes in 1975 to 120 743 tonnes in 1980, then decreased slightly to 118 107 tonnes in 1982.

5.4 Yield per Recruit (Figure 18)

The yield and spawning stock (with maturity ogive) per recruit curves are based on parameters given in Table 46.

$F_{0.1}$ equals 0.145, and there is no maximum on the yield per recruit curve within a reasonable range of fishing mortality.

5.5 Catch Projections

Catch projections for 1984 were made, using the parameters given in Table 46. For the catch projections, it was assumed that the total removals in 1983 will be 32 000 tonnes, i.e., about the same level as in 1982. Projected catches in 1984 and the corresponding total and spawning stock biomass at the beginning of 1985 are plotted against the mean F in 1984, as well as the ratio of mean F in 1984 to the mean F in 1982 (Figure 19).

For selection options of fishing mortality in 1984, the results are summarized in the text table below.

Species: Greenland Halibut Area: ICES Sub-areas V and XIV

1983				Management option for 1984	1984				1985	
Stock biom.	Spawn. stock biom.	$\bar{F}_{(8-13)}$	Catch		Stock biom.	Spawn. stock biom.	$\bar{F}_{(8-13)}$	Catch	Stock biom.	Spawn. stock biom.
289	121	0.222	32	$F_{0.1}$	291	122	0.145	21	305	130
				$\bar{F}_{84} = \bar{F}_{82}$			0.22	30	294	127
				$\bar{F}_{84} = \bar{F}_{83}$			0.22	30	294	127
				Slope of Y/R curve $\longrightarrow$ 0			0.30	42	285	114

Weights in thousands of tonnes.

6. MESH SIZE AND "MENTELLA BOX" PROBLEM

This problem could not be considered at the present meeting. Firstly, there were no representatives from USSR present, secondly, the data provided by the USSR did not arrive before the last day but one.

The problem should be on next year's agenda.

7. PROGNOSIS FOR MORE THAN TWO YEARS

At present, the prognosis is usually given for two years, the last year being the one for which a TAC is set. If the Working Group should meet every second year only, the prognosis has to be done for three years, the latter two for which TACs have to be set.

Such an extension of prognosis does not involve any technical problems, although the longer the period is for which the prognosis is given, the more uncertain it becomes. In the case of Greenland halibut in Sub-areas I and II, such an extended prognosis is essentially given this year due to the lack of sufficient age composition data for the 1982 catch.

Two of the stocks considered by the present Working Group (Sebastes marinus in Sub-areas I and II, and Sebastes mentella in Sub-areas V and XIV) cannot be assessed at the present time due to lack of cpue or effort data. For these stocks, a review every year or every second year would make little difference.

The other two redfish stocks and the two stocks of Greenland halibut have two factors in common. Firstly, they are fairly long-lived species and they include several age groups of exploitable size. Therefore, one may not expect the true stock sizes to vary much from year to year. Secondly, we do not have reliable recruitment indices for any of these four stocks. The Working Group has assumed fairly constant recruitment for the last years in making the output Fs for the younger age groups. There seems to be some justification for this on the basis of the years for which the VPAs have essentially converged.

The Group has not reviewed the relevant Working Group reports from previous years to assess deviation in their prognosis from the assessments done at the meetings in those years. This ought to be done before the next meeting of the Working Group.

The Working Group felt that if assessments should be made every second year only, the TAC ought to be set with a greater degree of caution than at present due to the inevitably increased uncertainty in longer forecasts.

8. DEFICIENCIES IN DATA REQUIREMENTS FOR ASSESSMENT PURPOSES

No major improvements have been achieved since last year's meeting. However, a Workshop on Redfish Ageing was arranged in Bremerhaven 14-18 February 1983, and the Working Group hopes that this will improve the material on age-reading in the future.

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Table 1 Nominal catch of REDFISH (in tonnes) by countries (Sub-area I, Divisions IIa and IIb combined). (As reported officially to ICES).

Country	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982[x]
Belgium	-	-	30	28	2	1	-	-	-	-	
Faroe Isl.	9	32	6	67	137	8	1	-		206	
France	-	-	1 116	-	-	660	3 608	1 142	1 297	537	13
German Dem Rep.	9 972	11 756	28 275	28 020	22 636	17 614	16 165	16 162	8 448	4 614	4 463
Germany, Fed.Rep.	1 697	3 479	6 597	5 182	7 894	7 231	11 483	11 913	7 992	4 683	3 039
Netherlands	-	-	-	-	127	-	-	-	-		
Norway	6 776	7 714	7 055	4 966	7 305	7 381	7 802	9 025	8 472	9 249	9 989
Poland	1 112	215	1 269	4 711	4 137	175	2 957	261	87	26	
Portugal	-	-	-	331	3 463	1 480	378	1 100	271	-	
Spain	-	-	-	1 194	3 398	-	-	1 375	1 965		
U.K.	4 379	4 791	3 509	2 746	4 961	6 330	3 390	1 756	1 307	470	365
USSR	22 647	31 829	48 787	230 950	263 546	144 993	78 092	70 451	72 802	81 652	112 545
Total	46 592	59 816	96 644	278 195	317 606	185 873	124 172 xx)	113 620 xx)	102 765 xx)	101 442	130 414 xx)

x) Provisional data

xx) The total figure used by the Working Group for assesments (including catches by non-members).

Table 2 Nominal catch of REDFISH (in tonnes) by countries in Sub-area I
(As reported officially to ICES).

Country	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982[x)]
Belgium	-	-	30	-	2	1	-	-	-	-	
Faroe Isl.	-	6	6	-	-	-	-	-	-	-	
France	-	-	26	-	-	149	27	7	1	16	
German Dem.Rep.	36	-	358	201	90	-	-	-	-	-	
Germany, Fed.Rep.	7	76	1 086	483	635	786	+	-	-	7	10
Netherlands	-	-	-	-	-	-	-	-	-	-	
Norway	1 000	1 917	194	482	739	1 181	1 333	1 374	736	543	873
Poland	22	-	-	93	47	-	-	-	-	-	
Portugal	-	-	-	331	478	55	8	-	170	-	
Spain	-	-	-	820	301	-	-	-	-	-	
U.K.	1 363	1 894	1 320	1 048	1 392	1 686	959	462	295	61	
USSR	4 403	4 885	9 318	30 750	12 411	13 154	2 575	639	33	1 220	1 745
Total	6 831	8 778	12 338	34 208	16 095	17 012	4 902	2 482	1 235	1 847	2 628

x)Provisional data.

Table 3 Nominal catch of REDFISH (in tonnes) by countries in Division IIa
(As reported officially to ICES).

Country	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982[x)]
Faroe Isl.	9	22	-	67	137	8	1	-	-	206	
France	-	-	980	-	-	478	3 575	1 134	1 296	521	13[xx)]
German Dem.Rep.	8 963	11 474	27 153	22 778	16 921	12 688	12 933	12 439	7 460	2 205	2 760
Germany, Fed.Rep.	1 466	2 207	4 167	4 623	6 722	4 764	11 482	11 913	7 992	4 681	3 029
Netherlands	-	-	-	-	127	-	-	-	-	-	
Norway	5 720	5 564	6 837	4 444	6 515	6 050	6 369	7 637	7 734	8 704	8 942
Poland	784	156	869	920	217	47	2 477	261	78	26	
Portugal	-	-	-	-	2 849	1 249	352	1 100	89	-	
Spain	-	-	-	153	2 082	-	-	1 125	1 500		
U.K.	2 680	2 125	1 991	1 621	2 919	4 064	2 067	1 195	967	409	365[xx)]
USSR	291	131	14	39 138	20 307	94 639	31 783	29 519	46 762	56 130	63 000
Total	19 913	21 679	42 011	73 384	58 796	123 987	71 039	66 323	73 878	72 682	78 109

x) Provisional data

xx) As reported to Norwegian authorities.

Table 4. Nominal catch of REDFISH (in tonnes) by countries in Division IIb.
(As reported officially to ICES.)

Country	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982[x]
Belgium	-	-	-	28	-	-	-	-	-	-	
Faroe Isl.	-	4	-	-	-	-	+	-	-	-	
France	-	-	110	-	-	33	6	1	-		
German Dem.Rep.	973	282	764	5 041	5 625	4 926	3 232	3 723	988	2 409	1 703
Germany, Fed.Rep.	224	1 196	1 344	436	537	1 681	1	-	-	-	
Norway	56	233	24	40	51	150	100	14	2	2	174
Poland	306	59	400	3 698	3 873	128	480	-	9	-	
Portugal	-	-	-	-	136	176	18	-	12	-	
Spain	-	-	-	221	1 015	-	-	250	465	-	
U.K.	336	772	198	77	650	580	364	99	45	-	
USSR	17 953	26 813	39 455	161 062	230 828	37 200	43 734	40 293	26 007	24 302	47 800
Non-members							296[xx]	435[xx]	124[xx]		
Total	19 848	29 359	42 295	170 603	242 715	44 874	48 231	44 815	27 652	26 713	49 677

x) Provisional data.

xx) As reported to Norwegian authorities.

Table 5. Nominal catch of Sebastes marinus and Sebastes mentella in Sub-area I and Division IIa and IIb combined (in tonnes).

Year	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982[x)]
S. marinus	17 730	21 436	27 272	39 125	48 584	39 508	31 695	26 475	23 411	20 206	15 477
S. mentella	28 862	38 380	69 372	239 070	269 022	146 365	92 477	87 145	79 354	81 236	114 937
Total	46 592	59 816	96 644	278 195	317 606	185 873	124 172	113 620	102 765	101 442	130 414

x) Provisional data.

Table 6. Sebastes mentella in Divisions IIa and IIb. Catch per unit effort and calculated total international effort 1965-1982.

Year	USSR Catch/hour (tonnes)	German Dem.Rep. Catch/day (tonnes), OTM	German Dem.Rep. Catch/day (tonnes), OTB	Total effort (USSR units)	Total effort GDR units, OTM	Total effort GDR units, OTB
1965	0.38			41 216		
1966	0.39			26 008		
1967	0.37			16 862		
1968	0.45			12 029		
1969	0.48			14 242		
1970	0.46			49 817		
1971	0.38			118 587		
1972	0.38			79 953		
1973	0.45			85 289		
1974	0.69			100 539		
1975	0.95			251 653		
1976	0.99	19.16	12.52	271 739	14 041	21 487
1977	0.77	14.93	9.08	190 084	9 803	16 119
1978	0.63	20.99	10.55	147 002	4 412	8 778
1979	0.56	17.19	10.37	155 616	5 070	8 404
1980	0.70	19.65	9.64	111 931	3 987	8 128
1981	0.63	12.60	12.36	128 949	6 447	6 573
1982	0.63	15.70	10.73	182 440	7 321	10 711

Table 7 Year class strength of REDFISH in Sub-area I and Division IIa and IIb

Year class	Dragesund 1971	Surkova, 1960		Baranenkova, 1968		0-group surveys Abundance indices	USSR [x] young fish surveys
		S.marinus	S.mentella	S.marinus	S.mentella		
1956	strong		strong	strong			
1957	average	average	strong	average	average		
1958	poor	poor	poor	below average	poor		
1959	average		average	strong	strong		
1960	poor			poor	poor		
1961	poor						poor
1962	very poor						poor
1963	poor						strong
1964	strong						strong
1965	strong					159	strong
1966	strong					236	strong
1967	average					44	average
1968	average					21	average
1969	very strong					295	very strong
1970	strong					247	strong
1971	average					172	strong
1972	average					177	average
1973	strong					385	poor
1974						468	poor
1975						315	poor
1976						447	
1977						472	
1978						460	
1979						980	
1980						651	
1981						861	
1982						694	

[x] On the basis of the abundance of age groups 0+ to 5 in the cpue data of the surveys (Published in Annales Biologiques).

Table 8. SEBASTES MARINUS IN FISHING AREAS I AND IIA

VIRTUAL POPULATION ANALYSIS **** VPA ****

CATCH IN NUMBERS UNIT: THOUSANDS

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
3	0	0	0	0	86	0	0	0	0	0
4	0	0	0	0	428	0	0	0	0	0
5	0	0	0	530	1839	20	0	10	10	0
6	0	0	0	2884	1831	13	0	11	7	0
7	0	0	0	5719	1621	30	12	13	121	0
8	0	0	0	12162	4179	328	73	87	218	0
9	0	0	0	10250	4620	641	101	180	421	3
10	0	0	0	9515	4501	930	149	352	756	34
11	0	0	0	5963	2359	615	145	517	859	169
12	590	387	693	5008	3306	2003	723	768	1188	772
13	570	455	868	1686	2557	2788	914	571	924	770
14	913	1049	1638	2670	4242	5453	3422	2368	1653	1854
15	1527	2079	2984	2991	5334	6404	5276	3677	2428	2235
16	3266	5479	7397	6775	6072	5880	3554	3502	2411	2493
17	1441	2757	3563	2707	2372	2569	1726	1073	842	1261
18	2157	4164	5117	3936	3462	3669	2212	2341	2328	1881
19	1892	3528	4402	3417	3115	2719	2237	1364	1236	1110
20	342	638	775	614	964	1538	1814	1330	1414	1238
21	1420	2359	2829	2475	2408	1716	2237	1829	1351	2006
22	849	1373	1721	1529	1170	382	959	1040	712	876
23	1123	1527	1813	1814	1464	491	946	1507	977	675
24	1248	1103	1432	1672	1318	411	959	968	534	334
25	884	702	930	1106	923	241	673	519	395	122
26	729	530	817	918	772	175	630	383	265	45
27	568	369	701	822	666	155	541	341	40	17
28+	508	332	589	624	677	141	239	39	35	0
TOTAL	20027	28831	38269	87789	62286	39312	27542	24790	21125	17895

Table 9 Sebastes mentella in Divisions IIa and IIb
Mean weight at age.

Age	1965-78 $\bar{w}$ (kg)	1979-80 $\bar{w}$ (kg)	1981-82 $\bar{w}$ (kg)
6	.168	.107	.102
7	.183	.155	.138
8	.225	.200	.188
9	.311	.252	.252
10	.367	.310	.310
11	.432	.374	.364
12	.508	.472	.440
13	.611	.568	.560
14	.679	.715	.680
15	.753	.898	.828
16	.821	.934	.906
17	.872	1.024	.970
18	.910	1.050	1.050
19	.923	1.076	1.076
20	.985	1.129	1.129
21	1.056	1.150	1.150
22	1.124	1.175	1.175
23	1.193	1.200	1.200
24	1.215	1.220	1.220

Table 10.

SEBASTES MENTELLA IN FISHING AREAS IIA AND IIB

VIRTUAL POPULATION ANALYSIS **** VPA ****

CATCH IN NUMBERS UNIT: THOUSANDS

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
6	172	606	5834	18891	0	2905	3633	1065	928	5
7	1660	4847	19417	29615	2418	30158	20497	7412	2989	851
8	4865	15451	42425	59395	17175	65162	43553	26296	8587	4757
9	9729	28781	82480	78241	33454	53391	40996	44131	26614	12506
10	4636	30144	108462	110712	52102	33569	37469	40441	48106	47166
11	2633	19843	119675	112524	49617	19909	26298	27089	39057	56914
12	3148	10603	57231	93144	53938	17242	20717	19950	33267	46350
13	5208	8634	29651	49550	33287	9270	16341	11172	21097	37586
14	5606	8634	20894	26134	19095	7410	6059	6400	11808	15447
15	4578	6514	16499	13881	12605	5456	5589	5607	6015	9456
16	5389	5908	13465	9839	5796	4134	5465	6801	2687	5758
17	3777	3332	13068	6300	4874	2134	2465	3441	2164	3555
18	2747	2878	12207	7233	5499	1545	1964	3001	1339	2151
19	1316	1666	6757	3486	3155	666	1719	1406	630	1617
20	973	2121	7112	3168	3941	1061	1906	796	799	1186
21	630	757	5113	1818	2955	423	1962	145	558	689
22	114	454	2242	1715	2531	308	560	145	117	342
23	10	151	735	1641	1002	301	324	27	0	257
24+	10	151	407	211	322	158	108	27	0	76
TOTAL	57252	151475	563674	627098	303766	255202	239625	205352	206562	246469

Table 11. SEBASTES MENTELLA IN FISHING AREAS IIA AND IIB

VIRTUAL POPULATION ANALYSIS **** VPA ****

UNIT: Year-1
FISHING MORTALITY COEFFICIENT NATURAL MORTALITY COEEFICIENT = 0.10

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1974-79
6	0.000	0.001	0.011	0.035	0.000	0.008	0.029	0.008	0.013	0.003	0.014
7	0.004	0.013	0.053	0.066	0.005	0.066	0.061	0.069	0.025	0.013	0.044
8	0.010	0.037	0.130	0.204	0.044	0.165	0.115	0.093	0.096	0.045	0.116
9	0.024	0.071	0.253	0.333	0.152	0.170	0.154	0.147	0.115	0.176	0.189
10	0.021	0.086	0.365	0.554	0.343	0.200	0.155	0.173	0.212	0.273	0.284
11	0.020	0.103	0.493	0.702	0.458	0.190	0.213	0.144	0.225	0.369	0.360
12	0.039	0.095	0.424	0.797	0.774	0.253	0.275	0.222	0.235	0.401	0.436
13	0.082	0.129	0.367	0.701	0.657	0.252	0.358	0.209	0.342	0.401	0.411
14	0.113	0.171	0.456	0.565	0.567	0.261	0.232	0.207	0.317	0.401	0.375
15	0.099	0.165	0.499	0.550	0.519	0.276	0.174	0.311	0.272	0.401	0.364
16	0.160	0.160	0.527	0.555	0.414	0.264	0.253	0.505	0.215	0.401	0.365
17	0.152	0.126	0.583	0.444	0.521	0.235	0.244	0.379	0.263	0.401	0.359
18	0.136	0.149	0.783	0.621	0.772	0.274	0.313	0.464	0.221	0.401	0.485
19	0.086	0.102	0.537	0.471	0.537	0.170	0.490	0.344	0.148	0.401	0.385
20	0.128	0.174	0.705	0.460	1.375	0.307	0.870	0.392	0.298	0.401	0.650
21	0.179	0.125	0.703	0.343	0.916	0.436	1.304	0.126	0.272	0.401	0.638
22	0.117	0.169	0.569	0.476	0.983	0.191	1.572	0.250	0.128	0.401	0.660
23	0.050	0.200	0.400	0.500	0.500	0.250	0.280	0.230	0.000	0.401	0.355
24+	0.050	0.200	0.400	0.500	0.500	0.250	0.280	0.230	0.000	0.401	0.355
F(8-19)	0.078	0.116	0.451	0.541	0.480	0.228	0.248	0.266	0.222	0.339	
F(8-19)	0.055	0.083	0.344	0.496	0.295	0.189	0.171	0.161	0.201	0.308	

Table 12. SEBASTES MENTELLA IN FISHING AREAS IIA AND IIB

VIRTUAL POPULATION ANALYSIS **** VPA ****

STOCK SIZE IN NUMBERS UNIT: THOUSANDS
BIOMASS UNIT: TONNES

1 JANUARY

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1973-79
6	451227	436336	547479	571557	547229	407077	133194	143293	77486	1754	*********	441985
7	492599	408123	394237	489832	499028	495153	365576	117065	128644	69230	1582	449221
8	491903	444143	364677	338266	414885	449240	419373	311307	98861	113560	61833	417498
9	436406	440467	387191	239677	249695	359079	344616	338092	256099	81313	98232	358161
10	239616	385627	371200	272083	187920	194164	274213	267193	264069	206989	61701	275003
11	138489	212587	320288	233055	141404	129657	143821	212537	203368	193224	142546	187183
12	80340	122806	173505	177648	104501	80949	90256	105173	166585	146948	120886	119344
13	69203	75131	101946	102767	72213	43595	56885	62014	76230	119163	89039	74406
14	55549	57668	59731	63322	46145	33861	30650	35980	45508	46973	72204	49567
15	51134	44872	43983	34500	32563	23682	23608	21984	26482	29979	29674	36313
16	38179	41964	34416	24173	17697	17536	16253	17954	14574	18255	18165	27202
17	28078	29433	32360	18394	12560	10702	11940	11418	9806	10637	11061	20496
18	22752	21820	23472	16347	10675	6751	7658	8465	7070	6820	6445	15639
19	16765	17973	17010	9706	7949	4404	4643	5067	4817	5127	4132	11216
20	8501	13919	14684	8995	5481	4206	3407	2573	3252	3760	3106	8456
21	4040	6768	10581	6564	5139	1253	2800	1263	1574	2184	2278	5306
22	1035	3057	5405	4740	4215	1860	733	687	1023	1084	1524	3014
23	215	874	2335	2769	2665	1427	1291	138	0	815	657	1668
24+	215	874	1293	561	656	749	464	138	0	241	640	716
TOTAL NO	2632537	2764453	2904942	2663957	2363020	2256379	1931481	1662361	1386007	1060056		
SSB NO.	356397	412095	467899	363512	276153	220825	239261	259064	281966	292533		
TOT.BIOM	828974	922477	994577	858740	699855	647368	549062	521913	475067	424422		
SSB BIOM	231404	264319	298249	238846	173073	129844	141199	149100	157779	173653		

Table 13. Sebastes mentella in Divisions IIa and IIb.
Input parameters for catch projections.

LIST OF RECRUITMENT BY YEAR:

YEAR	RECRUITMENT
83	412000.
84	412000.
85	412000.

LIST OF INPUT VARIABLES BY AGE GROUP:

AGE	STOCK SIZE	F-PATTERN	M	MATURITY OGIVE	WEIGHT IN THE CATCH	WEIGHT IN THE STOCK
6	412000.00	0.0010	0.100	0.0000	0.1020	0.1020
7	372756.00	0.0050	0.100	0.0000	0.1380	0.1380
8	336738.00	0.0360	0.100	0.0300	0.1880	0.1880
9	299248.00	0.4250	0.100	0.0600	0.2520	0.2520
10	64080.00	0.6750	0.100	0.0800	0.3100	0.3100
11	144360.00	0.9250	0.100	0.2200	0.3640	0.3640
12	120495.00	1.0000	0.100	0.3600	0.4400	0.4400
13	89310.00	1.0000	0.100	0.5500	0.5600	0.5600
14	72423.00	1.0000	0.100	0.7200	0.6800	0.6800
15	29704.00	1.0000	0.100	0.8500	0.8280	0.8280
16	18220.00	1.0000	0.100	0.8800	0.9060	0.9060
17	11095.00	1.0000	0.100	0.9500	0.9700	0.9700
18	6465.00	1.0000	0.100	0.9700	1.0500	1.0500
19	4145.00	1.0000	0.100	1.0000	1.0760	1.0760
20	3116.00	1.0000	0.100	1.0000	1.1290	1.1290
21	2285.00	1.0000	0.100	1.0000	1.1500	1.1500
22	1328.00	1.0000	0.100	1.0000	1.1750	1.1750
23	659.00	1.0000	0.100	1.0000	1.2000	1.2000
24+	642.00	1.0000	0.100	1.0000	1.2200	1.2200

Table 14 Nominal catch of REDFISH (in tonnes) by countries in Division Va (Iceland).
(As reported officially to ICES)

Country	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982[x)]
Belgium	2 484	1 622	2 114	1 945	1 522	1 395	1 549	1 385	1 381	924	282
Faroe Isl.	9	243	254	82	211	292	242	629	1 055	1 212	-
German Dem.Rep.	135	-	11	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	43 963	38 358	36 398	33 602	32 948	31 632	-	-	-	-	-
Iceland	26 973	26 470	27 799	32 659	34 028	28 119	33 318	62 253	69 780	93 349	114 904
Norway	1	4	15	22	31	87	93	43	33	32	12
Poland	35	-	18	-	-	-	-	-	-	-	-
U.K.	3 697	2 951	2 519	2 424	1 124	+	-	-	-	-	-
USSR	28	2	-	-	-	-	-	-	-	-	-
Total	77 325	69 650	69 129	70 734	69 864	61 525	35 202	64 310	72 249	95 517	115 198

x)Provisional data.

Table 15 Nominal catches of REDFISH (in tonnes) by countries in Division Vb (Faroe Islands).
(As reported officially to ICES).

Country	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982[x)]
Faroe Isl.	-	121	28	9	33	54	1 525	5 693	5 509	3 232	3 999
France	-		300	800	-	1 368	448	862	627	59	168[xx)]
German Dem.Rep.	-	-	1	1	-	-	-	-	-	-	-
Germany, Fed.Rep.	4 034	9 490	7 328	7 628	5 255	5 854	7 767	6 108	3 891	3 841	5 417[1)]
Netherlands	-	-	-	105	-	-	+	-	-	-	-
Norway	-	-	10	7	17	10	9	11	12	13	7
U.K.	53	85	98	41	59	116	57	+	-	-	-
Total	4 087	9 696	7 765	8 591	5 364	7 402	9 806	12 674	10 039	7 145	9 591

x) Provisional data.

xx) As reported to the Faroese authorities.

1) Including 570 tonnes from Sub-area VI.

Table 16 Nominal catch of REDFISH (in tonnes) by countries in Sub-area XIV (East Greenland). (As reported officially to ICES).

Country	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982[x]
Canada	-	-	-	-	420	-	-	-	-	-	-
Greenland	-	-	-	-	129	1	3	-	-	1	+
Faroe Isl.	-	13	43	1	3	19	-	-	-	18	
France	-	-	-	-	-	-	-	490	-	-	-
German Dem.Rep.	703	841	1 275	4 490	-	-	-	-	-	-	-
Germany, Fed.Rep.	7 287	4 491	2 632	4 979	4 403	13 347	20 711[1]	20 428[1]	32 520[1]	42 980[1]	43 573[1]
Iceland	5 490	2 144	9 777	5 632	7 410	81	151	-	89	-	17
Norway	-	-	-	63	5	112	2	-	-	-	-
Poland	464	281	6	276	-	-	-	-	-	-	581
U.K.	5	65	127	56	286	622	13	-	-	-	-
USSR	21	64	118	9 830	101 000	251	-	-	-	-	
Total	13 970	7 899	13 978	25 329	113 656	14 433	20 880	20 918	32 609	42 999	44 171

x) Provisional data.

1) Catches updated for Sub-area XII included.

Table 17 Nominal catch (in tonnes) of REDFISH in Sub-area XIV, Divisions Va and Vb, by species for Sub-area XIV and Sub-area V combined.

(As reported officially to ICES.)

Year	Division Va	Division Vb	Sub-area XIV	Total	S. marinus	S. mentella
1965	114 100	5 862	36 513	156 475	97 006	59 469
1966	107 068	3 297	23 290	133 655	80 347	53 308
1967	95 083	5 013	33 198	133 294	85 249	48 045
1968	96 475	6 637	23 079	126 191	68 712	57 479
1969	87 736	1 326	30 367	119 429	79 467	39 962
1970	78 962	1 947	18 162	99 071	60 805	38 266
1971	82 370	2 352	20 436	105 158	68 374	36 784
1972	77 325	4 087	13 970	95 382	50 961	44 421
1973	69 650	9 696	7 899	87 245	41 856	45 389
1974	69 129	7 765	13 978	90 872	49 845	41 027
1975	70 734	8 591	25 329	104 654	60 980	43 674
1976	69 864	5 364	113 656	188 884	93 605	95 279
1977	61 525	7 402	14 433	83 360	52 752	30 608
1978	35 202	9 806	20 880[1]	65 888	47 791	18 097
1979	64 310	12 674	20 918[1]	97 902	75 056	22 846
1980	72 249	10 039	32 609[1]	114 897	88 085	26 812
1981	95 517	7 145	42 999[1]	145 661	101 285	44 376
1982[x]	115 198	9 591[2]	44 171[1]	168 960	122 386	46 574[3]

1) Catches updated for Sub-area XII included.
2) Catches updated for Sub-area VI included.
x) Provisional data.
3) Including 598 tonnes from the oceanic stock not included in the assessments.

Table 18 Nominal catch of REDFISH (1 000 tonnes) in Division Va by countries. Separation into the species components according to the method used by the Redfish Working Group.

Div. Va Year		Belgium	Faroe Islands	German Dem. Republic	Germany, Fed.Rep.	Iceland	Norway	Poland	United Kingdom	USSR	Total
1970	Total	2.2	-	0.8	48.9	23.8	-	0.3	2.9	+	78.9
	S.mar.	2.2		0.8	13.1	23.3		0.3	2.9		42.6
	S.ment.	-		-	35.8	0.5		-	-		36.3
1971	Total	2.8	+	0.2	46.6	29.1	+	+	3.6	+	82.3
	S.mar.	2.8		0.2	12.2	28.6			3.6		47.4
	S.ment.	-		-	34.4	0.5			-		34.9
1972	Total	2.5	+	0.1	44.0	27.0	+	+	3.7	+	77.3
	S.mar.	2.5		0.1	4.1	26.4			3.7		36.8
	S.ment.	-		-	39.9	0.6			-		40.5
1973	Total	1.6	0.2	-	38.4	26.5	+	-	3.0	+	69.7
	S.mar.	1.6	0.2		3.1	25.7			3.0		33.6
	S.ment.	-	-		35.3	0.8			-		36.1
1974	Total	2.1	0.3	+	36.4	27.8	+	+	2.5	-	69.1
	S.mar.	2.1	0.3		4.3	27.0			2.5		36.2
	S.ment.	-	-		32.1	0.8			-		32.9
1975	Total	1.9	0.1	-	33.6	32.7	+	-	2.4	-	70.7
	S.mar.	1.9	0.1		4.3	31.3			2.4		40.0
	S.ment.	-	-		29.3	1.4			-		30.7
1976	Total	1.5	0.2	-	32.9	34.0	+	-	1.1	-	69.7
	S.mar.	1.5	0.2		4.3	33.3			1.1		40.4
	S.ment.	-	-		28.6	0.7			-		29.3
1977	Total	1.4	0.3	-	31.6	28.1	0.1	-	+	-	61.5
	S.mar.	1.4	0.3		9.2	27.5	0.1				38.5
	S.ment.	-	-		22.4	0.6	-				23.0
1978	Total	1.5	0.2	-	-	33.3	0.1	-	-	-	35.1
	S.mar.	1.5	0.2			29.4	0.1				31.2
	S.ment.	-	-			3.9	-				3.9
1979	Total	1.4	0.6	-	-	62.3	0.1	-	-	-	64.4
	S.mar.	1.4	0.6			54.6	0.1				56.7
	S.ment.	-	-			7.7	-				7.7
1980	Total	1.4	1.1	-	-	69.8	+	-	-	-	72.3
	S.mar.	1.4	1.1			59.6					62.1
	S.ment.	-	-			10.2					10.2
1981	Total	.9	1.2	-	-	93.4	+	-	-	-	95.5
	S.mar.	.9	1.2			73.7					75.8
	S.ment.	-	-			19.7					19.7
1982[x]	Total	.3	-	-	-	114.9	+	-	-	-	115.2
	S.mar.	.3				96.4	+				96.7
	S.ment.	-				18.5					18.5

x) Provisional figures

Table 19 Nominal catch (1 000 t) of REDFISH in Division Vb by Countries. Separation into the species components according to the method used by the Redfish Working Group.

Div. Vb Year		Faroe Islands	France	German Dem. Republic	Germany, Fed.Rep.	Netherlands	Norway	United Kingdom	Total
1970	Total	-	-	-	1.9	-	-	+	1.9
	S.mar.				-				-
	S.ment.				1.9				1.9
1971	Total	-	-	-	2.3	-	-	+	2.3
	S.mar.				-				-
	S.ment.				2.3				2.3
1972	Total	-	-	-	4.0			0.1	4.1
	S.mar.				-	-	-	0.1	0.1
	S.ment.				-			-	4.0
1973	Total	0.1	-	-	9.5	-	-	0.1	9.7
	S.mar.	0.1			-			0.1	0.2
	S.ment.	-			9.5			-	9.5
1974	Total	+	0.3	+	7.3	-	-	0.1	7.7
	S.mar.		0.3		-			0.1	0.4
	S.ment.		-		7.3			-	7.3
1975	Total	+	0.8	+	7.6	0.1	+	+	8.5
	S.mar.		0.8		-	0.1			0.9
	S.ment.		-		7.6	-			7.6
1976	Total	+	-	-	5.3	-	+	0.1	5.4
	S.mar.				-			0.1	0.1
	S.ment.				5.3			-	5.3
1977	Total	0.1	1.4	-	5.9	-	+	0.1	7.5
	S.mar.	0.1	0.6		-			0.1	0.8
	S.ment.	-	0.8		5.9			-	6.7
1978	Total	1.5	0.4	-	7.8	-	+	0.1	9.8
	S.mar.	1.5	0.4		-			0.1	2.0
	S.ment.	-	-		7.8			-	6.7
1979	Total	5.7	0.9	-	6.1	-	+	-	12.7
	S.mar.	4.8	-		-				4.8
	S.ment.	0.9	0.9		6.1				7.9
1980	Total	5.5	0.6	-	3.9	-	+	-	10.0
	S.mar.	4.9	-		-		+		4.9
	S.ment.	0.6	0.6		3.9		-		5.1
1981	Total	3.2	+	-	3.9	-	+	-	7.1
	S.mar.	2.5	-		-		+		2.5
	S.ment.	0.7	+		3.9		-		4.6
1982[x]	Total	4.0	0.2	-	5.4	-	+	-	9.6
	S.mar.	1.7	0.2		-		+		1.9
	S.ment.	2.3	+		5.4		-		7.7

x) Provisional

Table 20 Nominal catch (1 000 t) of REDFISH in Sub-area XIV by countries.
Separation into the species components according to the method used by the Redfish Working Group.

Sub-area XIV Year		Canada	Denmark (G)	Faroe Islands	German Dem. Republic	Germany Fed.Rep.	Iceland	Norway	Poland	United Kingdom	USSR	Total
1970	Total	-	-	-	0.4	16.3	1.0	-	0.4	+	-	18.1
	S.mar.				0.4	16.3	1.0		0.4			18.1
	S.ment.				-	-	-		-			-
1971	Total	-	-	-	0.6	17.1	2.4	-	0.3	+	0.1	20.5
	S.mar.				0.6	17.1	2.4		0.3	+	0.1	20.5
	S.ment.				-	-	-		-			-
1972	Total	-	-	-	0.7	7.3	5.5	-	0.5	+	+	14.0
	S.mar.				0.7	7.3	5.5	-	0.5	+	+	14.0
	S.ment.				-	-	-					-
1973	Total	-	-	+	0.8	4.5	2.1	-	0.3	0.1	0.1	7.9
	S.mar.				0.8	4.5	2.1		0.3	0.1	0.1	7.9
	S.ment.				-	-	-		-	-	-	-
1974	Total	-	-	+	1.3	2.6	9.8	-	+	0.1	0.1	13.9
	S.mar.				1.3	2.6	9.8			0.1	0.1	13.9
	S.ment.				-	-	-			-	-	-
1975	Total	-	-	+	4.5	5.0	5.6	0.1	0.3	0.1	9.8	25.4
	S.mar.				4.5	5.0	5.6	0.1	0.3	0.1	5.4	21.0
	S.ment.				-	-	-	-	-	-	4.4	4.4
1976	Total	0.4	0.1	+	-	4.4	7.4	+	-	0.3	101.0	113.6
	S.mar.	0.4	0.1			4.4	7.4			0.3	41.3	53.9
	S.ment.	-	-			-	-			-	59.7	59.7
1977	Total	-	+	+	-	13.3	0.1	0.1	-	0.6	0.3	14.4
	S.mar.					13.3	0.1	0.1		0.6	0.3	14.4
	S.ment.					-	-	-		-	-	-
1978	Total	-	+	-	-	20.7	0.2	+	-	+	-	20.9
	S.mar.					15.3	0.2					15.5
	S.ment.					5.4	-					5.4
1979	Total	-	-	+	-	21.1	-	-	-	-	-	21.1
	S.mar.					15.8						15.8
	S.ment.					5.3						5.3
1980	Total	-	-	-	-	32.5	0.1	-	-	-	-	32.6
	S.mar.					22.1	0.1					22.2
	S.ment.					10.4	-					10.4
1981	Total	-	-	+	-	43.0	-	-	-	-	-	43.0
	S.mar.					23.6						23.6
	S.ment.					19.4						19.4
1982[x]	Total	-	-	-	-	43.6	+	-	0.6[1]	-		44.2
	S.mar.					23.9			-		?	23.9
	S.ment.					19.7			0.6			20.3

x) Provisional

1) Catches from the oceanic stock not included in the assessments

Table 21. SEBASTES MARINUS IN FISHING AREAS V AND XIV

VIRTUAL POPULATION ANALYSIS **** VPA ****

CATCH IN NUMBERS UNIT: THOUSANDS

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
7	0	0	0	0	0	0	7	13	8	1
8	0	0	0	0	0	0	5	30	101	13
9	21	48	273	2023	50	89	64	297	1230	57
10	28	68	374	2715	71	170	311	837	1568	507
11	402	533	878	6229	556	1039	1049	1723	2284	2122
12	2624	3292	3009	19819	3539	5957	2607	7306	9562	8246
13	4017	4937	3320	19604	5398	5667	2639	9238	8422	9905
14	5652	7437	4282	15776	7820	8023	6192	14052	10313	13965
15	4106	5261	3620	8689	5327	6451	6260	18617	15916	17767
16	4873	6152	5536	9193	5393	5702	10174	13521	10299	14439
17	2074	2513	2704	3780	2392	2188	9134	4620	11042	11088
18	4287	5159	6545	8440	5108	3173	10300	9586	9019	15157
19	2863	3322	4744	5596	3512	2959	5635	5563	7807	10271
20	934	1028	1570	1844	1213	3186	4777	2123	5145	13859
21	2766	3096	4799	5552	3753	3401	5672	5516	9010	9689
22	1798	1956	2973	3389	2434	1511	3216	2297	4113	5058
23	2349	2537	3724	4343	3323	1746	3912	1943	2625	4766
24	2536	2549	3763	3817	2352	1474	2368	2395	3702	2734
25	1239	1229	1740	1751	1170	827	2212	1430	1929	986
26	783	845	1160	1283	798	611	2125	750	1079	446
27	360	407	558	587	364	378	1272	461	518	208
28	255	306	425	429	271	156	747	249	156	17
29	84	118	197	173	112	99	452	33	41	1
30+	11	12	110	73	69	37	263	68	7	77
TOTAL	44102	52860	56304	125310	56060	54844	81596	102668	116196	141379

Table 22.

SEBASTES MARINUS IN FISHING AREAS V AND XIV

VIRTUAL POPULATION ANALYSIS **** VPA ****

UNIT: Year-1

FISHING MORTALITY COEFFICIENT

NATURAL MORTALITY COEEFICIENT = 0.10

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1979-80
7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
9	0.000	0.000	0.001	0.006	0.000	0.000	0.000	0.001	0.006	0.000	0.001
10	0.000	0.000	0.002	0.011	0.000	0.001	0.001	0.003	0.008	0.003	0.002
11	0.002	0.003	0.004	0.034	0.002	0.004	0.004	0.008	0.010	0.012	0.006
12	0.019	0.018	0.019	0.100	0.022	0.030	0.010	0.032	0.050	0.042	0.021
13	0.041	0.041	0.020	0.150	0.052	0.040	0.016	0.042	0.043	0.060	0.029
14	0.067	0.090	0.040	0.115	0.074	0.055	0.051	0.092	0.054	0.083	0.072
15	0.062	0.074	0.052	0.099	0.046	0.073	0.050	0.191	0.129	0.112	0.121
16	0.098	0.111	0.093	0.161	0.079	0.058	0.141	0.132	0.138	0.148	0.136
17	0.051	0.060	0.059	0.077	0.052	0.034	0.111	0.079	0.136	0.193	0.095
18	0.134	0.155	0.197	0.234	0.127	0.081	0.201	0.147	0.195	0.249	0.174
19	0.107	0.131	0.186	0.230	0.129	0.090	0.181	0.143	0.154	0.315	0.162
20	0.039	0.045	0.076	0.092	0.064	0.149	0.185	0.086	0.170	0.393	0.135
21	0.147	0.157	0.273	0.368	0.245	0.229	0.379	0.299	0.545	0.487	0.339
22	0.129	0.131	0.199	0.281	0.248	0.132	0.313	0.231	0.339	0.596	0.272
23	0.220	0.242	0.350	0.439	0.433	0.247	0.513	0.282	0.436	0.724	0.397
24	0.390	0.349	0.595	0.640	0.505	0.309	0.543	0.605	1.174	0.872	0.574
25	0.298	0.295	0.378	0.541	0.363	0.239	0.912	0.656	1.328	1.043	0.784
26	0.240	0.304	0.443	0.469	0.450	0.292	1.423	0.817	1.464	1.235	1.120
27	0.145	0.170	0.300	0.374	0.208	0.353	1.479	1.407	3.012	1.235	1.443
28	0.214	0.158	0.240	0.352	0.264	0.116	2.414	1.323	4.462	1.235	1.868
29	0.130	0.130	0.130	0.130	0.130	0.130	0.500	0.700	0.700	1.235	0.600
30+	0.130	0.130	0.130	0.130	0.130	0.130	0.500	0.700	0.700	1.235	0.600
F(14-23)	0.105	0.120	0.153	0.210	0.150	0.115	0.213	0.168	0.229	0.330	
F(14-23)	0.087	0.103	0.103	0.151	0.091	0.074	0.125	0.137	0.139	0.188	

Table 23. SEBASTES MARINUS IN FISHING AREAS V AND XIV

VIRTUAL POPULATION ANALYSIS **** VPA ****

STOCK SIZE IN NUMBERS UNIT: THOUSANDS
BIOMASS UNIT: TONNES

1 JANUARY

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1973-80
7	358667	440129	401491	345323	352075	281468	281915	281617	281162	283244	********	342836
8	262991	324535	398245	363285	312461	318571	254682	255081	254805	254398	256289	311231
9	295391	237964	293651	360347	328713	282726	288255	230439	230778	230404	230177	289686
10	203978	267261	215273	265447	324132	297385	255737	260763	208227	207647	208424	261247
11	214920	184540	241763	194432	237605	293219	268923	231105	235152	186921	187405	233313
12	147826	194086	166472	217921	170008	214466	264328	242334	207474	210603	167115	202180
13	104972	131263	172486	147770	178354	150465	188394	236695	212328	178642	182723	163800
14	91759	91165	114032	152916	115091	156250	130760	167767	205390	184117	152229	127467
15	72200	77656	75423	99110	123378	96707	133756	112431	138450	176043	153327	98833
16	54990	61427	65266	64805	81233	106574	81374	115078	84058	110158	142412	78843
17	43915	45128	49737	53796	49909	67899	91013	63968	91284	66278	85963	58170
18	35892	37765	38440	42434	45084	42886	59358	73675	53491	72110	49445	46942
19	29927	28404	29272	28569	30386	35942	35790	43932	57560	39839	50866	32778
20	25678	24340	22546	21983	20540	24159	29710	27034	34408	44669	26307	24499
21	21347	22347	21047	18909	18139	17452	18834	22348	22444	26303	27283	20050
22	15548	16670	17280	14491	11346	12852	12546	11666	14990	11780	14624	14112
23	12485	12361	13226	12813	9897	8362	10193	8302	8376	9663	5873	10955
24	8223	9067	8777	8436	7475	5807	5910	5520	5669	4902	4239	7402
25	5038	5037	5788	4381	4023	4082	3857	3106	2729	1536	1355	4414
26	3648	3383	3592	3588	2307	2531	2909	1402	1458	654	506	2920
27	2805	2739	2260	1970	2031	1332	1711	634	560	305	172	1935
28	1390	2196	2092	1515	1226	1492	846	353	141	25	80	1389
29	723	1016	1696	1490	964	852	1202	68	85	1	7	1002
30+	95	103	947	629	594	319	699	141	15	113	30	441
TOTAL NO	2014608	2220582	2360604	2426360	2427474	2423778	2422702	2395457	2351093	2300406		
SSB NO.	309518	325806	342253	359862	362833	396694	446033	458463	480621	493482		
TOT.BIOM	835420	900636	963213	1007529	1008267	1054047	1105083	1111353	1117274	1101629		
SSB BIOM	316936	330762	346297	350681	344655	370760	412478	416598	439551	448190		

Table 24. Sebastes marinus in Sub-areas V + XIV.
Parameters used in catch projection.

LIST OF RECRUITMENT BY YEAR:

YEAR	RECRUITMENT
83	282000.
84	282000.
85	282000.
86	282000.

LIST OF INPUT VARIABLES BY AGE GROUP:

AGE	STOCK SIZE	F-PATTERN	M	MATURITY OGIVE	WEIGHT IN THE CATCH	WEIGHT IN THE STOCK
7	282000.00	0.00001	0.100	0.0000	0.3280	0.1200
8	255168.00	0.0001	0.100	0.0000	0.3610	0.1820
9	230865.00	0.0002	0.100	0.0000	0.3990	0.2360
10	208424.00	0.0022	0.100	0.0000	0.4400	0.3010
11	187332.00	0.0100	0.100	0.0000	0.4860	0.3810
12	167115.00	0.0350	0.100	0.0600	0.5360	0.4710
13	182723.00	0.0500	0.100	0.1300	0.5910	0.5410
14	152229.00	0.0690	0.100	0.2600	0.6520	0.6520
15	153327.00	0.0930	0.100	0.4400	0.7200	0.7200
16	142412.00	0.1230	0.100	0.6900	0.7940	0.7940
17	85963.00	0.1610	0.100	0.8400	0.8760	0.8760
18	49445.00	0.2070	0.100	0.9000	0.9660	0.9660
19	50866.00	0.2620	0.100	0.9300	1.0660	1.0660
20	26307.00	0.3270	0.100	0.9700	1.1760	1.1760
21	27283.00	0.4050	0.100	1.0000	1.2970	1.2970
22	14624.00	0.4960	0.100	1.0000	1.4310	1.4310
23	5873.00	0.6030	0.100	1.0000	1.5790	1.5790
24	4239.00	0.7260	0.100	1.0000	1.7420	1.7420
25	1855.00	0.8680	0.100	1.0000	1.9220	1.9220
26	506.00	1.0000	0.100	1.0000	2.1200	2.1200
27	172.00	1.0000	0.100	1.0000	2.3390	2.3390
28	80.00	1.0000	0.100	1.0000	2.5800	2.5800
29	7.00	1.0000	0.100	1.0000	2.8460	2.8460
30+	30.00	1.0000	0.100	1.0000	3.9050	3.9050

Table 25. SEBASTES MENTELLA IN FISHING AREAS V AND XIV

VIRTUAL POPULATION ANALYSIS **** VPA ****

CATCH IN NUMBERS UNIT: THOUSANDS

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
8	0	0	0	0	0	0	216	22	1548	0
9	0	0	0	3202	2	321	136	74	3202	65
10	1	0	0	2948	2	656	485	394	5226	183
11	2	0	1	6533	3	908	647	1359	5651	588
12	122	71	87	22608	142	1521	1517	7256	10626	3152
13	269	196	262	21121	362	604	1373	5989	5051	3166
14	549	802	1331	14107	1438	816	2622	3811	3045	3618
15	408	677	1161	5547	1354	1206	2726	3685	6513	4848
16	1068	1591	2364	4431	3411	1577	1960	2422	4812	5896
17	1107	1445	1797	2619	2897	882	1035	1344	1873	3165
18	1874	2242	2265	2641	3722	1561	1565	1405	2856	3692
19	2586	2790	2202	2229	3454	1371	2022	1256	2445	4473
20	779	795	605	541	802	1069	915	1252	1539	4722
21	5741	5467	4474	3625	4884	1688	3133	3398	3003	6207
22	2379	2029	1785	1192	1514	1264	1937	2070	2215	3484
23	9044	7398	6357	4050	3953	2070	1741	2024	2162	4368
24	5862	4602	4093	2403	2172	1388	1449	1419	2151	2441
25	3063	2306	2147	1232	1089	823	842	590	1238	986
26	2551	1935	1862	1061	928	506	297	225	472	98
27	1158	900	913	544	480	104	54	121	110	133
28+	565	439	581	331	377	0	0	0	272	0
TOTAL	39128	35735	34327	103165	32771	20435	26742	40116	65990	55285

Table 26 GREENLAND HALIBUT. Nominal catch (tonnes) in Sub-area I.
(As officially reported to ICES)

Country	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982[x]
German Dem.Rep.	1[1]	-	-	5	-	-	-	-	-	-	-
Germany, Fed.Rep.	-	25	22	6	2	1	-	-	-	19	-
Norway	3 116	2 947	2 167	2 160	1 203	1 371	1 148	727	490	641	581[1]
Poland	117	-	1	-	9	-	-	-	-	-	-
U.K. (Engl. and Wales)	949	995	732	550	665	541	232	36	12	5	-
USSR	4 366	1 700	2 329	3 774	600	360	211	182	100	564	200
Others	-	-	-	-	-	-	-	-	-	1	-
Total	8 549	5 667	5 251	6 495	2 479	2 273	1 591	945	602	1 230	781

[x] Provisional data
[1] From national statistics

Table 27 GREENLAND HALIBUT. Nominal catch (tonnes) in Division IIa.
(As reported officially to ICES).

Country	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982[x)]
Faroe Isl.	-	-	-	-	2	21	-	3	-	8	
German Dem.Rep.	1 069[1)]	52	656	172	354	1 641	1 398	787	570	18	73
Germany, Fed.Rep.	3	+	49	41	17	22	321	481	303	109	17
Norway	11 715	7 861	6 593	2 265	3 490	1 446	2 084	2 051	2 529	3 077	2 406
Poland	2 643	137	499	66	31	95	197	4	-	-	
U.K.(England and Wales)	182	118	55	107	48	211	82	11	9	4	
USSR	21	22	-	515	43	6 960	8 809	6 929	2 014	2 031	2 200
Others	-	-	-	-	-	-	1	21	48	37	
Total	15 633	8 190	7 852	3 166	3 985	10 396	12 892	10 287	5 473	5 284	4 696

x)Provisional data

1)From national statistics

Table 28 GREENLAND HALIBUT. Nominal catch (tonnes) in Division IIb.
(As reported officially to ICES)

Country	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982[x)]
German Dem.Rep.	563[1)]	3 902	5 258	8 295	8 601	6 535	3 213	2 701	1 510	1 340	1 080
Germany, Fed.Rep.	-	34	17	47	12	125	-	-	-	-	
Norway	1 152	3 181	31	433	1 312	1 400	850	65	138	483	213
Poland	5 221	2 003	4 646	3 579	3 526	129	347	102	-	-	
U.K.(England and Wales)	131	122	79	74	222	307	93	12	5	-	
USSR	11 806	6 839	14 629	16 083	15 937	7 725	5 631	3 200	5 556	6 681	9 500
Total	18 873	16 081	24 660	28 511	29 610	16 221	10 134	6 080	7 209	8 504	10 793

x) Provisional data.
1) From national statistics

Table 29 GREENLAND HALIBUT. Nominal catch (tonnes) in Sub-areas I and II, 1972-1982
(Data for 1972 to 1981 from Bulletin Statistique)

Country	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 x)
Faroe Isl.	-	-	-	-	2	21	-	24	-	8	-
German Dem.Rep.	1 633 1)	3 954	5 914	8 472	8 955	8 176	4 611	3 488	2 080	1 358	1 153
Germany, Fed.Rep.	3	59	88	94	31	148	321	481	303	128	17
Norway: trawl catch 1)	9 656	10 217	4 656	1 686	4 030	2 564	2 302	921	1 559	2 949	1 812
long-line catch and gill net 1)	6 327	3 772	4 135	3 172	1 975	1 653	1 780	1 992	1 598	1 252	1 387
Poland	7 981	2 140	5 146	3 645	3 566	224	544	106	-	-	-
U.K.(England and Wales)	1 262	1 235	866	731	935	1 059	407	59	26	9	
USSR	16 193	8 561	16 958	20 372	16 580	15 045	14 651	10 311	7 670	9 276	11 900
Others	-	-	-	-	-	-	1	5	48	38	
Total	43 055	29 938	37 763	38 172	36 074	28 890	24 617	17 312	13 284	15 018	16 269

x) Provisional data

1) From national statistics

Table 30 GREENLAND HALIBUT in Sub-areas I and II.
Catch per unit effort and total effort.

Year	USSR Catch/hour trawling (tonnes)	German Dem.Rep. Catch/day trawling (tonnes)	Norway Catch/hour trawling (tonnes)	Calibrated catch per unit effort CPUE	Total effort x 10^{-3} (CPUE units)	CPUE 7+
1965	.80			2.55	13.7	
1966	.77			2.45	10.7	
1967	.70			2.23	10.8	
1968	.65			2.07	12.6	
1969	.53			1.69	25.9	
1970	.53			1.69	52.9	1.59
1971	.46			1.47	53.8	1.38
1972	.37			1.18	36.5	1.05
1973	.37	8.6	.506	1.26	23.8	1.22
1974	.40	8.4	.432	1.22	31.0	1.14
1975	.39	8.9	.479	1.28	29.8	1.22
1976	.40	7.1	.452	1.17	30.8	1.09
1977	.27	5.0	.361	.85	33.9	.73
1978	.21	4.6	.223	.65	37.9	.53
1979	.23	4.8	.298	.74	23.4	.53
1980	.24	6.6	.271	.82	16.2	.71
1981	.37		.443	1.18	12.7	.86
1982			.415	1.10	14.8	

Table 31 The four sets of mean weight at age data, one used for the period 1970-78, one used for 1979, another for 1980, and the last for 1981 in the predictions.

Age	$\bar{w}$ (kg) 1970-78	$\bar{w}$ (kg) 1979	$\bar{w}$ (kg) 1980	$\bar{w}$ (kg) 1981
3	0.200	0.3	0.200	.20
4	0.441	0.6	0.482	.50
5	0.567	0.9	0.702	.66
6	0.737	1.2	0.872	.84
7	1.079	1.5	1.141	1.15
8	1.421	1.8	1.468	1.56
9	1.848	2.2	1.778	2.04
10	2.281	2.6	2.302	2.57
11	2.887	3.0	2.664	2.98
12	3.247	3.5	3.046	3.43
13	4.303	4.1	3.368	4.13
14	4.931	4.8	4.285	4.68
15	5.765	5.6	5.025	5.81
16	6.308	7.0	6.589	6.59

Table 32 The estimated catch (sum of products) compared with the observed catch using the age compositions (Table 34) and the mean weights in Table 31.

Year	Observed catch	Sum of products	Weight correction factor
1970	89 484	94 846	0.943
1971	79 034	75 749	1.043
1972	43 055	44 353	0.971
1973	29 938	32 440	0.923
1974	37 763	38 557	0.979
1975	38 172	43 505	0.877
1976	36 074	39 022	0.924
1977	28 827	28 902	0.997
1978	24 617	23 728	1.037
1979	17 312	17 263	1.003
1980	13 284	12 339	1.077
1981	14 956	14 709	1.017

Table 33 Greenland HALIBUT in Sub-areas I and II. Maturation ogives from 1962-1964 (Lahn-Johannessen 1965).

AGE	MALES	FEMALES
5	0.00	0.00
6	0.32	0.00
7	0.89	0.11
8	0.96	0.54
9	1.00	0.89
10	1.00	0.97
11	1.00	0.99
12	1.00	1.00
13	1.00	1.00

Table 34.- GREENLAND HALIBUT IN FISHING AREAS I AND II

VIRTUAL POPULATION ANALYSIS **** VPA ****

CATCH IN NUMBERS UNIT: THOUSANDS

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
3	1	1	1	22	1	62	78	86	64	664
4	461	19	276	334	98	755	532	687	275	1146
5	1109	212	917	840	830	2037	1897	2218	751	1896
6	3521	1117	2519	2337	2982	3255	3589	3155	1138	1917
7	9605	3923	6204	6520	5824	4200	4118	2727	1065	1919
8	6438	3515	3638	4118	5002	2524	2365	1234	1341	933
9	2775	2551	1834	2265	3000	1610	1509	495	944	434
10	1734	1919	1942	1654	1350	1104	946	319	473	448
11	1368	1536	1622	1857	915	1062	954	296	511	482
12	1234	1127	1338	1536	1212	858	436	243	275	380
13	675	716	734	1122	698	595	349	103	242	384
14	200	251	531	660	526	384	147	45	145	156
15	40	79	137	270	254	93	35	30	62	47
16+	40	56	79	98	104	87	29	21	16	15
TOTAL	29201	17013	21972	23573	22796	18626	17014	11861	7882	10865

Table 35. GREENLAND HALIBUT IN FISHING AREAS I AND II

VIRTUAL POPULATION ANALYSIS **** VPA ****

UNIT: Year-1
FISHING MORTALITY COEFFICIENT NATURAL MORTALITY Coefficient = 0.15

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1975-77
3	0.000	0.000	0.000	0.001	0.000	0.002	0.002	0.003	0.002	0.020	0.001
4	0.013	0.001	0.011	0.013	0.004	0.032	0.019	0.026	0.009	0.040	0.016
5	0.037	0.007	0.037	0.039	0.037	0.107	0.100	0.097	0.025	0.079	0.061
6	0.159	0.045	0.101	0.118	0.180	0.190	0.263	0.227	0.063	0.081	0.163
7	0.515	0.252	0.351	0.384	0.449	0.388	0.366	0.309	0.170	0.135	0.407
8	0.413	0.338	0.394	0.391	0.558	0.337	0.371	0.168	0.232	0.129	0.422
9	0.263	0.269	0.280	0.401	0.519	0.311	0.326	0.116	0.177	0.116	0.410
10	0.234	0.276	0.319	0.412	0.418	0.344	0.286	0.100	0.147	0.113	0.392
11	0.299	0.316	0.374	0.536	0.597	0.641	0.516	0.128	0.217	0.207	0.526
12	0.447	0.405	0.470	0.689	0.774	0.754	0.564	0.229	0.160	0.235	0.739
13	0.741	0.478	0.473	0.871	0.741	1.092	0.758	0.233	0.353	0.330	0.901
14	0.821	0.645	0.747	0.850	1.393	1.195	0.844	0.138	0.559	0.364	1.146
15	0.860	0.730	0.850	1.060	1.070	0.980	0.870	0.380	0.400	0.332	1.037
16+	0.860	0.730	0.850	1.060	1.070	0.980	0.870	0.380	0.400	0.332	1.037
F(7-11)	0.345	0.290	0.343	0.425	0.464	0.404	0.373	0.164	0.169	0.140	
F(7-11)	0.391	0.285	0.348	0.405	0.430	0.373	0.362	0.199	0.187	0.134	

Table 36. GREENLAND HALIBUT IN FISHING AREAS I AND II

VIRTUAL POPULATION ANALYSIS **** VPA ****

STOCK SIZE IN NUMBERS UNIT: THOUSANDS
BIOMASS UNIT: TONNES

1 JANUARY

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1972-79
3	36691	32115	33539	29212	29819	35640	43624	36686	36618	36102	********	34666
4	33823	31579	27641	28695	25122	25665	30618	37648	31495	31458	30458	30724
5	32944	32988	27163	23535	24388	21552	21390	25860	31582	26853	26014	26225
6	25744	27328	28197	22530	19478	20222	16647	16655	20205	26505	21357	22100
7	25540	18901	22487	21937	17229	14007	14395	11013	11419	16337	21038	18189
8	20375	13137	12643	13629	12867	9461	8182	8591	6961	8288	12285	12361
9	12885	11601	8063	7542	7932	6469	5813	4861	6253	4752	6270	8121
10	8935	8526	7028	5246	4230	4064	4082	3611	3725	4509	3642	5790
11	5683	6088	5566	4773	2990	2396	2479	2639	2812	2769	3466	4077
12	3666	3628	3822	3294	2398	1729	1086	1274	1998	1948	1938	2612
13	1376	2018	2083	2056	1424	952	701	532	872	1465	1326	1393
14	381	564	1077	1117	741	584	275	282	362	527	907	628
15	74	144	255	439	411	158	152	102	202	178	315	217
16+	74	115	147	159	108	148	53	71	52	57	145	117
TOTAL NO	213190	188732	180110	163963	149198	143029	149699	149824	154555	161748		
SSB NO.	33072	32684	28041	24426	20294	16502	14641	13371	16276	16205		
TOT.BIOM	199813	181521	174718	159384	136038	116700	110144	145897	124655	140798		
SSB BIOM	81190	83265	77449	67902	53937	42583	36320	37060	39115	46144		

Table 37. GREENLAND HALIBUT in Fishing areas I-II.
List of input variables for the ICES prediction program.

FIRST YEAR: 82
LAST YEAR: 85

FIRST AGE GROUP: 3
LAST AGE GROUP: 16

THE LAST AGE GROUP IS A PLUS GROUP

LIST OF F-FACTORS AND RECRUITMENT BY YEAR:

YEAR	RECRUITMENT
83	36600.00
84	36600.00
85	36600.00

LIST OF INPUT VARIABLES BY AGE GROUP:

AGE	STOCK SIZE	F-PATTERN	M	MATURITY OGIVE	WEIGHT IN THE CATCH	WEIGHT IN THE STOCK
3	36600.00	0.0050	0.150	0.0000	0.2000	0.2000
4	30458.00	0.0650	0.150	0.0000	0.5000	0.5000
5	26014.00	0.2640	0.150	0.0000	0.6600	0.6600
6	21357.00	0.5790	0.150	0.0000	0.8400	0.8400
7	21038.00	0.9690	0.150	0.0000	1.1500	1.1500
8	12285.00	0.9210	0.150	0.0000	1.5600	1.5600
9	6270.00	0.8290	0.150	1.0000	2.0400	2.0400
10	3642.00	0.8070	0.150	1.0000	2.5700	2.5700
11	3406.00	1.4790	0.150	1.0000	2.9800	2.9800
12	1958.00	1.6790	0.150	1.0000	3.4300	3.4300
13	1326.00	2.3570	0.150	1.0000	4.1300	4.1300
14	907.00	2.6000	0.150	1.0000	4.6800	4.6800
15	315.00	2.3710	0.150	1.0000	5.8100	5.8100
16+	145.00	2.3710	0.150	1.0000	6.5900	6.5900

Table 38 GREENLAND HALIBUT. Nominal catch (tonnes) in Division Va.
(As reported officially to ICES)

Country	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 x)
Faroe Isl.	1 180	188	41	2	373	947	256	42	91	325	-
German Dem.Rep.	159 1)	320	388	-	-	-	-	-	-	-	-
Germany, Fed.Rep.	1 119	826	1 786	887	1 719	4 642	-	-	-	-	-
Iceland	4 640	2 115	2 842	1 212	1 687	10 090	11 319	16 934	27 836	15 455	28 322
Norway	186	-	-	-	-	+	13	+	-	+	-
Poland	31	-	485	-	-	-	-	-	-	-	-
U.K.(Engl. & Wales)	2 223	3 648	2 314	1 207	1 669	-	-	-	-	-	-
USSR	1 128	289	10	-	-	-	-	-	-	-	-
Total	10 666	7 386	7 866	3 308	5 448	15 679	11 588	16 976	27 927	15 780	28 322

x) Provisional data
1) From national statistics

Table 39. GREENLAND HALIBUT. Nominal catch (tonnes) in Division Vb.
(As reported officially to ICES)

Country	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982[x]
Faroe Isl.	-	-	7	6	2	304	2	108	951	442	863
France	-	-	-	-	-	-	12	66	51	8	-
German Dem.Rep.	-	-	147	91	-	-	-	-	-	-	-
Germany, Fed.Rep.	405	287	163	437	309	341	570	234	172	114	137
Norway	-	-	-	7	7	5[1]	3	1	3	2	-
Poland	-	9	-	18	-	-	-	-	-	-	-
U.K.(Engl. & Wales)	12	61	8	+	6	8	8	-	-	-	-
USSR	-	1	-	-	-	-	-	-	-	-	-
Total	417	358	325	559	324	658	595	409	1 177	566	1 000

x) Provisional data
1) From national statistics

Table 40 GREENLAND HALIBUT. Nominal catch (tonnes) in Sub-area XIV.
(As reported officially to ICES)

Country	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982[x]
France	-	-	-	-	-	-	-	4	-	-	-
German Dem.Rep.	7 328[1]	8 806	25 266	16 872	-	-	-	-	-	-	-
Germany, Fed.Rep.	5	7	+	64	191	224	2 156	6 227	2 146	2 893	2 395
Greenland	3	4	2	1	1	1	6	-	-	+	9
Iceland	-	3	1	+	2	-	-	-	2	-	-
Norway	-	-	-	-	-	2[1]	3	-	-	-	-
Poland	7 847	3 122	1 057	1 054	-	-	-	-	-	-	-
U.K.(Engl. & Wales)	1	1	1	2	5	11	1	-	-	-	-
USSR	205	776	1 762	1 634	74	-	-	-	-	-	-
Total	15 389	12 719	28 089	19 627	273	241	2 166	6 231	2 148	2 893	2 404

[x] Provisional data
[1] From national statistics

Table 41. GREENLAND HALIBUT. Nominal catch (tonnes) in Sub-areas V and XIV, 1972-1982.
(Data for 1972 to 1981 from Bulletin Statistique)

Country	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982[x)]
Faroe Isl.	1 180	188	48	8	375	1 251	258	150	1 042	767	863
France	-	-	-	-	-	-	12	70	51	8	-
German Dem.Rep.	7 487[1)]	9 126	25 801	16 963	-	-	-	-	-	-	-
Germany, Fed.Rep.	1 529	1 120	1 949	1 388	2 219	5 207	2 726	6 461	2 318	3 007	2 532
Greenland	3	4	2	1	1	4	6	-	-	+	9
Iceland	4 640	2 118	2 843	1 212	1 689	10 090	11 319	16 934	27 838	15 455	28 322
Norway	186	-	-	7	7	7	19	1	3	2	-
Poland	7 878	3 131	1 542	1 072	-	-	-	-	-	-	-
U.K. (Engl. & Wales)	2 236	3 710	2 323	1 209	1 680	19	9	-	-	-	-
USSR	1 333	1 066	1 772	1 634	74	-	-	-	-	-	-
Total	26 472	20 463	36 280	23 494	6 045	16 578	14 349	23 616	31 252	19 239	31 726

x)Provisional data
1)From national statistics

Table 42 Greenland HALIBUT in Division Va. Catch, CPUE and effort from Icelandic trawler reports.

Year	April		May		April - May			Total catch	Total effort
	Hours	Tonnes	Hours	Tonnes	Hours	Tonnes	CPUE		
1978	278	663	285	701	563	1 364	2 423	14 349	5 922
1979	70	131	318	805	388	936	2 412	23 622	9 794
1980	254	595	1 477	5 039	1 731	5 634	3 255	31 252	9 601
1981	24	26	351	926	375	952	2 539	19 239	7 577
1982	431	1 271	1 174	3 961	1 605	5 232	3 260	31 726	9 732

Table 43. GREENLAND HALIBUT IN FISHING AREAS V AND XIV

VIRTUAL POPULATION ANALYSIS **** VPA ****

CATCH IN NUMBERS UNIT: THOUSANDS

	1975	1976	1977	1978	1979	1980	1981	1982
4	1	1	0	1	0	0	0	0
5	120	43	0	25	29	47	26	8
6	800	296	34	91	197	562	158	293
7	1775	534	671	347	1005	1536	580	1115
8	1782	621	1727	1037	2253	2630	1100	2397
9	1259	431	2289	1214	3090	3126	1430	2588
10	926	240	854	648	1693	2324	1704	2401
11	404	121	420	567	880	1739	1299	1763
12	459	86	423	312	394	849	664	942
13	279	37	174	232	246	578	435	596
14	193	32	120	218	189	306	252	324
15	137	14	28	114	147	143	176	191
16	39	6	86	112	101	82	114	80
17	2	1	41	64	15	29	179	38
18+	44	2	14	28	9	5	28	11
TOTAL	8280	2515	6861	5208	10848	13902	8271	12747

Table 44. GREENLAND HALIBUT IN FISHING AREAS V AND XIV

VIRTUAL POPULATION ANALYSIS **** VPA ****

UNIT: Year-1
FISHING MORTALITY COEFFICIENT NATURAL MORTALITY COEEFICIENT = 0.15

	1975	1976	1977	1978	1979	1980	1981	1982	1975-79
4	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
5	0.004	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001
6	0.036	0.011	0.001	0.003	0.008	0.017	0.004	0.009	0.012
7	0.117	0.031	0.031	0.013	0.065	0.078	0.023	0.030	0.051
8	0.205	0.052	0.116	0.058	0.107	0.136	0.074	0.117	0.108
9	0.272	0.066	0.258	0.106	0.230	0.200	0.097	0.220	0.187
10	0.309	0.072	0.167	0.136	0.200	0.256	0.157	0.220	0.177
11	0.123	0.057	0.164	0.155	0.193	0.306	0.211	0.220	0.138
12	0.464	0.029	0.270	0.167	0.145	0.271	0.174	0.220	0.215
13	0.579	0.057	0.071	0.220	0.183	0.308	0.206	0.220	0.222
14	0.248	0.111	0.250	0.113	0.265	0.341	0.202	0.220	0.197
15	0.363	0.024	0.127	0.376	0.098	0.311	0.317	0.220	0.198
16	1.422	0.023	0.190	0.975	0.632	0.069	0.411	0.220	0.648
17	0.300	0.100	0.200	0.200	0.300	0.350	0.200	0.220	0.220
18+	0.300	0.100	0.200	0.200	0.300	0.350	0.200	0.220	0.220
F(8-13)	0.325	0.055	0.174	0.140	0.176	0.246	0.153	0.203	
F(8-13)	0.244	0.056	0.168	0.101	0.167	0.207	0.126	0.185	

Table 45. GREENLAND HALIBUT IN FISHING AREAS V AND XIV

VIRTUAL POPULATION ANALYSIS **** VPA ****

STOCK SIZE IN NUMBERS UNIT: THOUSANDS
BIOMASS UNIT: TONNES

1 JANUARY

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1975-79
4	44274	43365	34975	44281	63981	47571	10021	0	********	46175
5	32622	38106	37323	30103	38112	55069	40939	8619	0	35253
6	24426	27967	32759	32124	25889	32777	47355	35212	7411	28633
7	17267	20282	23797	28164	27565	22100	27746	40612	30036	23415
8	10337	13219	16916	19861	23920	22239	17599	23344	33922	16851
9	5670	7249	10803	12962	16134	18502	16708	14074	17874	10564
10	3734	3717	5841	7183	10032	11031	13035	13057	9721	6101
11	4311	2358	2977	4256	5398	7070	7347	9587	9019	3860
12	1323	3281	1918	2174	3138	3832	4479	5123	6622	2367
13	679	710	2744	1260	1583	2337	2514	3241	3538	1396
14	944	328	582	2201	870	1135	1477	1762	2239	985
15	482	634	252	390	1692	574	694	1039	1217	690
16	54	289	533	191	230	1321	362	435	717	260
17	8	11	243	379	62	105	1061	207	301	141
18+	182	23	83	166	37	18	166	60	184	98
TOTAL NO	146314	161546	171746	185695	218644	225680	191503	156371		
SSB NO.	22011	24284	32540	38624	46970	52205	53835	53403		
TOT.BIOM	189851	245467	241823	266708	284063	328911	300564	302790		
SSB BIOM	59110	73153	85124	102617	111825	126167	128661	135757		

Table 46. GREENLAND HALIBUT in Sub-areas V and XIV.
List of input variables for the ICES prediction program.

FIRST YEAR: 83
LAST YEAR: 85

THE LAST AGE GROUP IS A PLUS GROUP

LIST OF RECRUITMENT BY YEAR:

YEAR	RECRUITMENT
83	37082.
84	37082.
85	37082.

LIST OF INPUT VARIABLES BY AGE GROUP:

AGE	STOCK SIZE	F-PATTERN	M	MATURITY OGIVE	WEIGHT IN THE CATCH	WEIGHT IN THE STOCK
4	37082.00	0.0000	0.150	0.0000	0.6620	0.6620
5	31912.00	0.0003	0.150	0.0000	1.0100	1.0100
6	27459.00	0.0115	0.150	0.0473	1.3680	1.3680
7	23476.00	0.0710	0.150	0.2004	1.6180	1.6180
8	14033.00	0.1430	0.150	0.3264	1.9050	1.9050
9	14426.00	0.2380	0.150	0.5028	2.1870	2.1870
10	8900.00	0.2380	0.150	0.7017	2.5160	2.5160
11	8257.00	0.2380	0.150	0.8519	2.7610	2.7610
12	6063.00	0.2380	0.150	0.9429	3.1290	3.1290
13	3240.00	0.2380	0.150	1.0000	3.7850	3.7850
14	2050.00	0.2380	0.150	1.0000	4.4750	4.4750
15	1114.00	0.2380	0.150	1.0000	4.9850	4.9850
16	657.00	0.2380	0.150	1.0000	5.6100	5.6100
17	275.00	0.2380	0.150	1.0000	6.6320	6.6320
18+	169.00	0.2380	0.150	1.0000	7.7280	7.7280

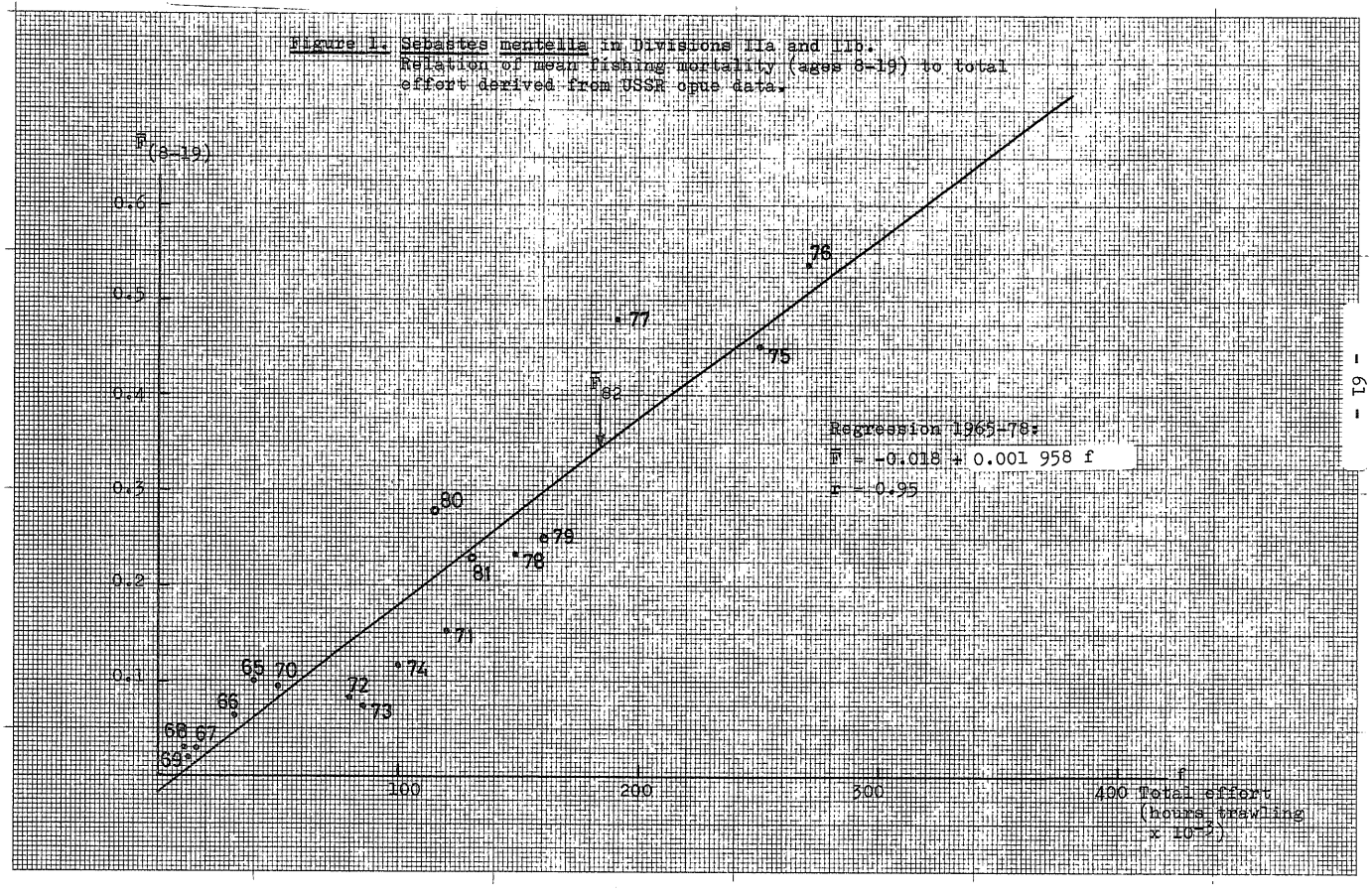


Figure 1. Sebastes mentella in Divisions IIa and IIb.
Relation of mean fishing mortality (ages 8-19) to total effort derived from USSR cpue data.

Figure 2. Sebastes mentella in Divisions IIa and IIb.

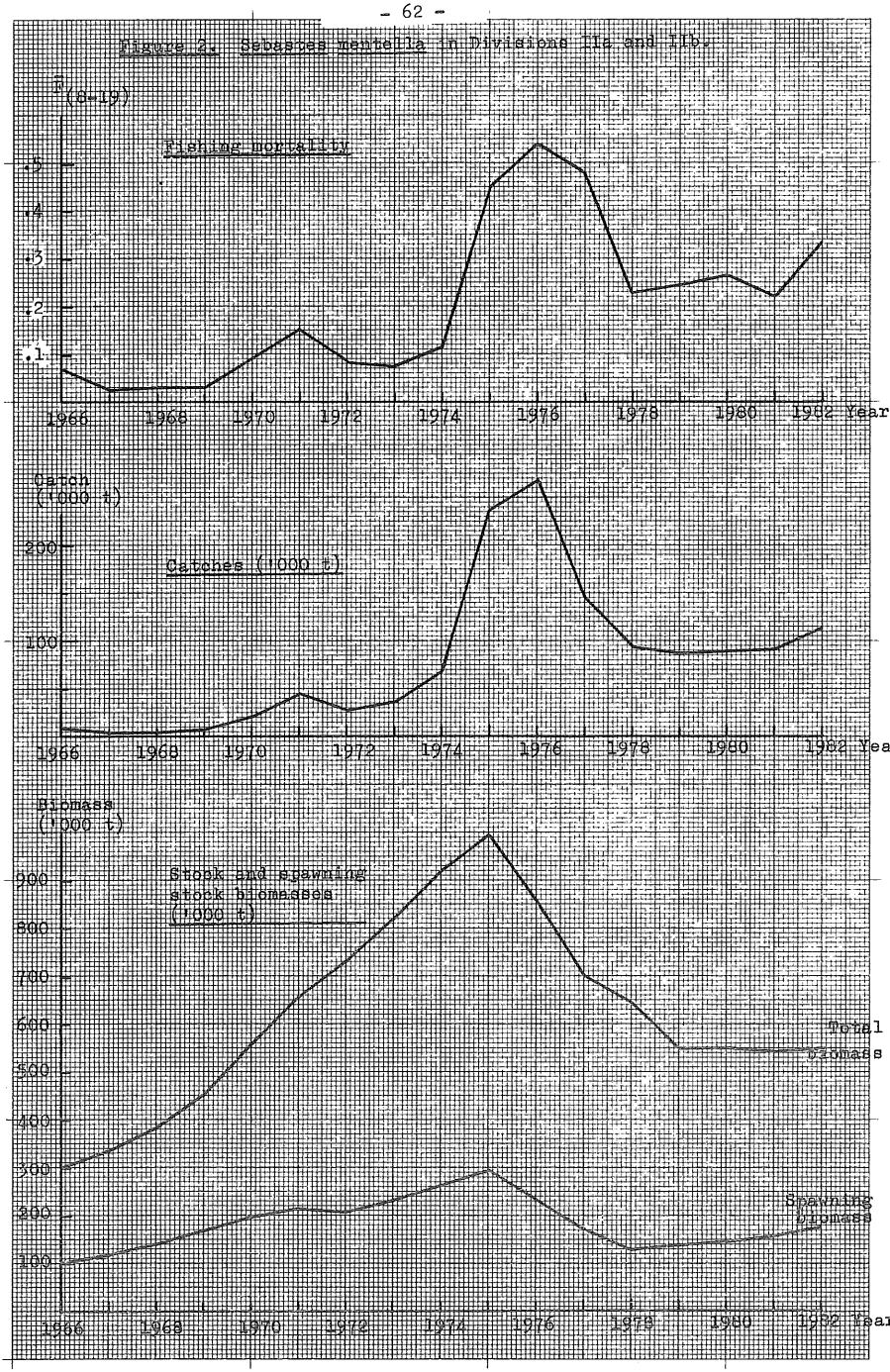


Figure 3. Sebastes mentella in Divisions IIa and IIb.
Yield and spawning stock biomass per 6-year old recruit curves for the present exploitation pattern (M = 0.1)

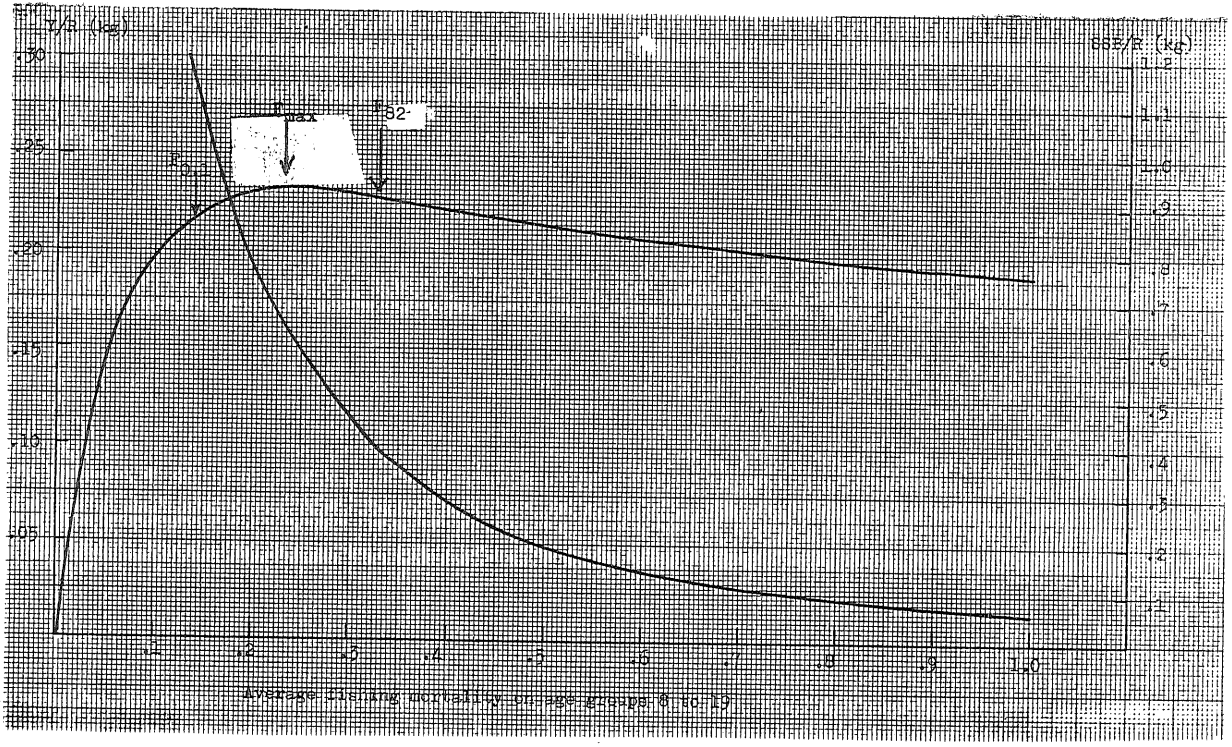


Figure 4. Sebastes mentella in Divisions IIa and IIb. Projection for catch in 1984, total biomass and spawning stock biomass at the beginning of 1985 at different levels of fishing mortality in 1984.

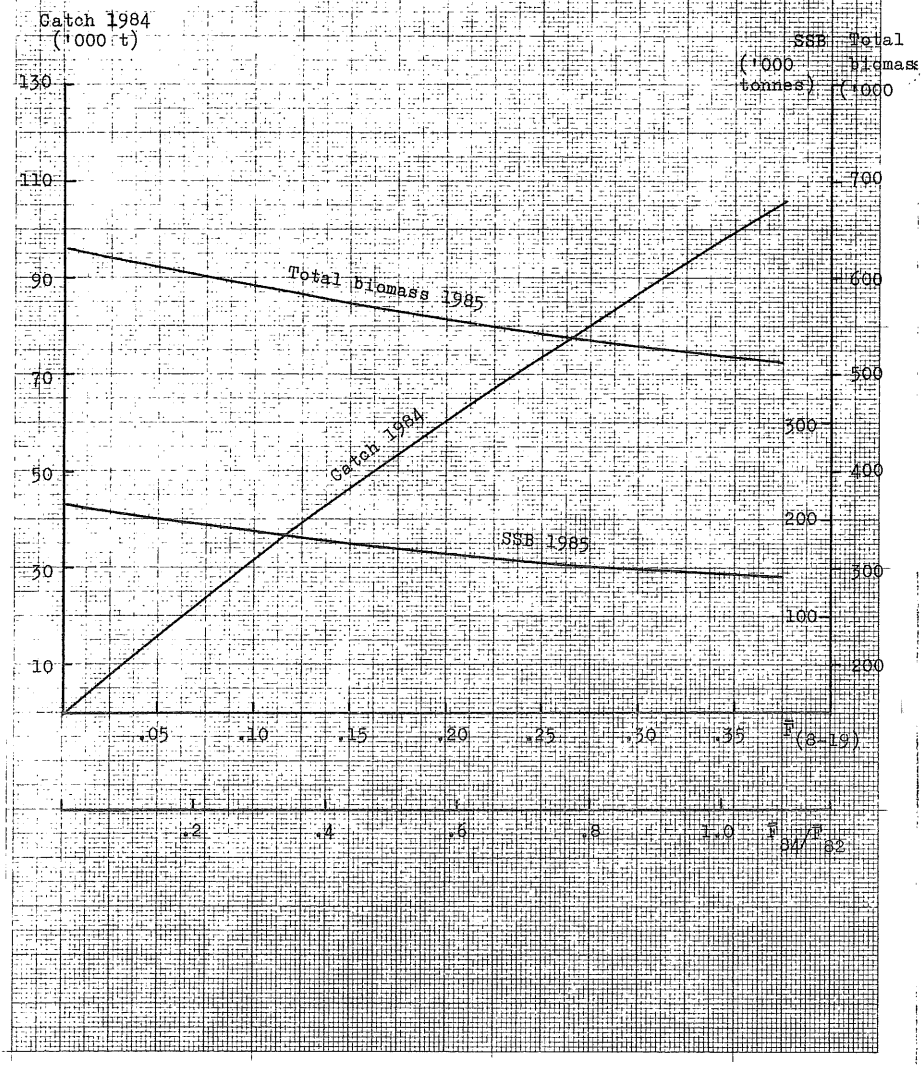
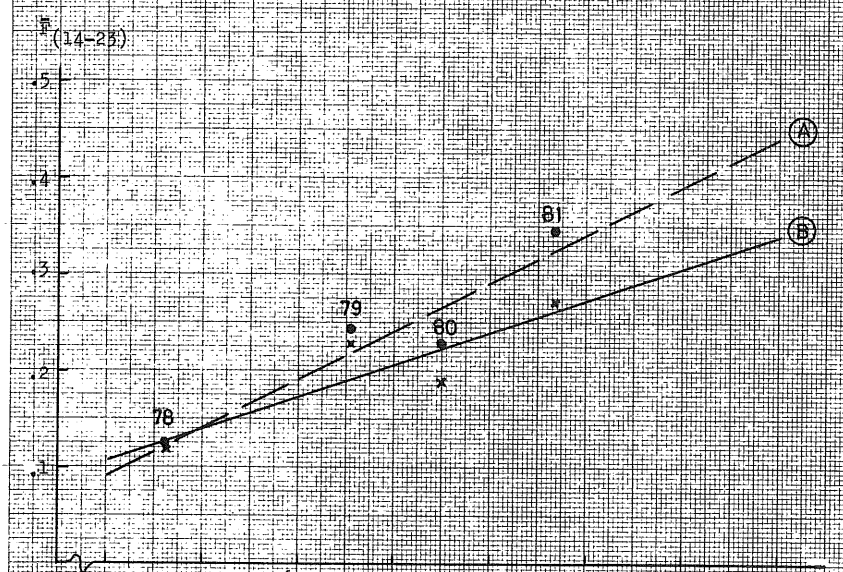
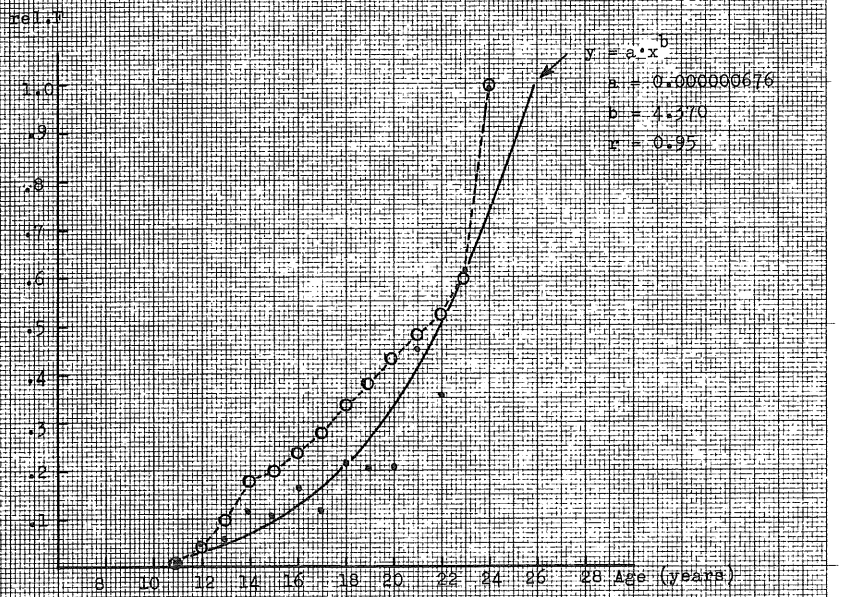


Figure 5. Sebastes marinus in Sub-areas V and XIV.



	1978	1979	1980	1981	1982
Hours fishing ('000)	46.2	65.4	74.7	86.7	106.8
$\bar{F}_{(14-23)}$					
(A) From 1982 Assessm.	.124	.244	.228	.345	Terminal $\bar{F}$ estimated from regression
$y' = -0.108 + 0.005x$ $r = 0.95$					.43
(B) From VPA with terminal $\bar{F}_{(14-23)}$=.43	.121	.228	.190	.271	
(and revised exploitation pattern) $y = -0.024 + 0.0033x$ $r = 0.69$					.33

Figure 6. Sebastes marinus in Sub-areas V and XIV. Exploitation pattern.



O From previous assessment.

• 1983 assessment (average 1977-79).

Figure 7. Sebastes marinus in Sub-areas V and XIV.

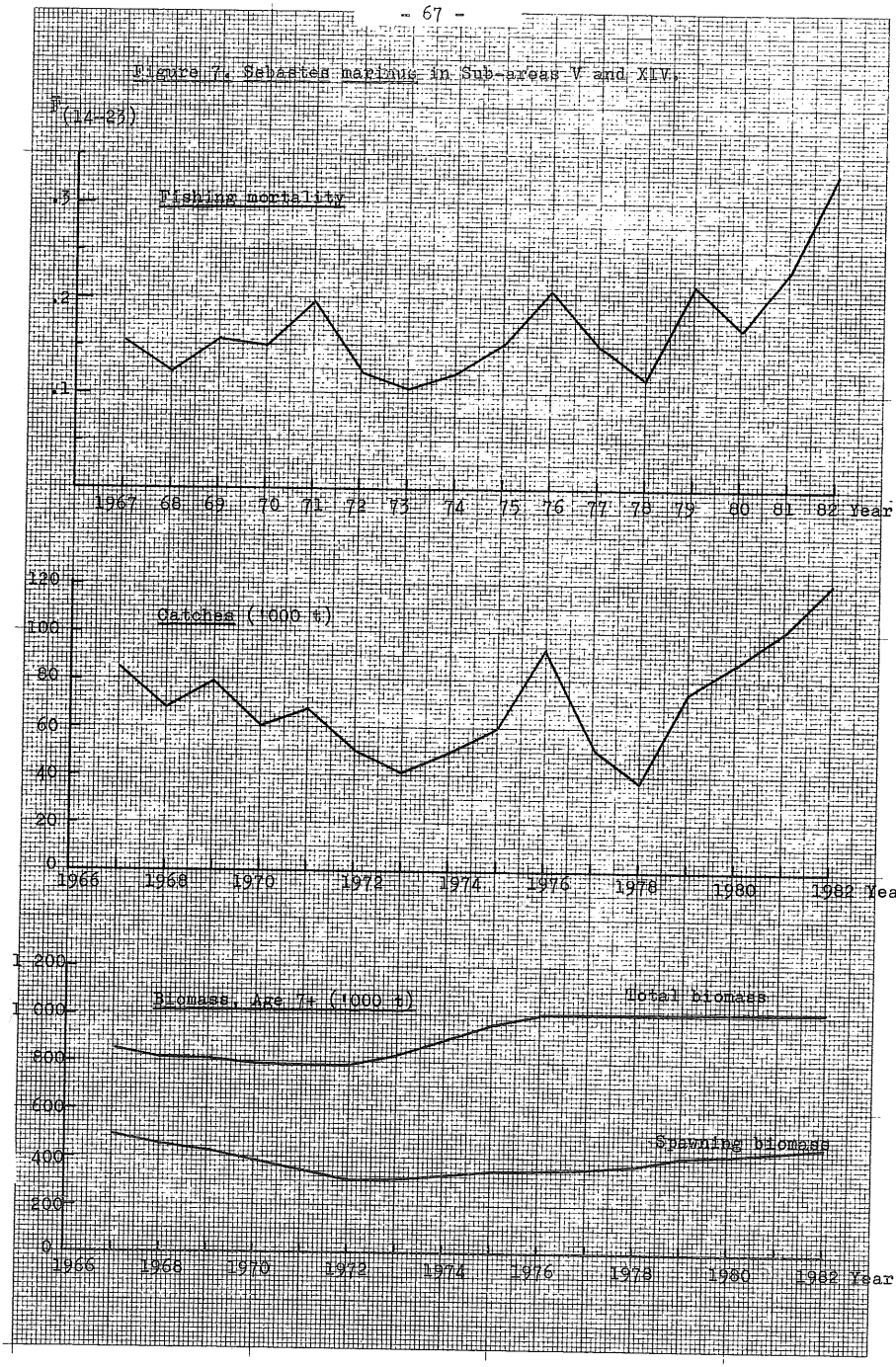


Figure 8. Sebastes marinus in Sub-areas V and XIV. Yield per recruit and spawning stock biomass per recruit.

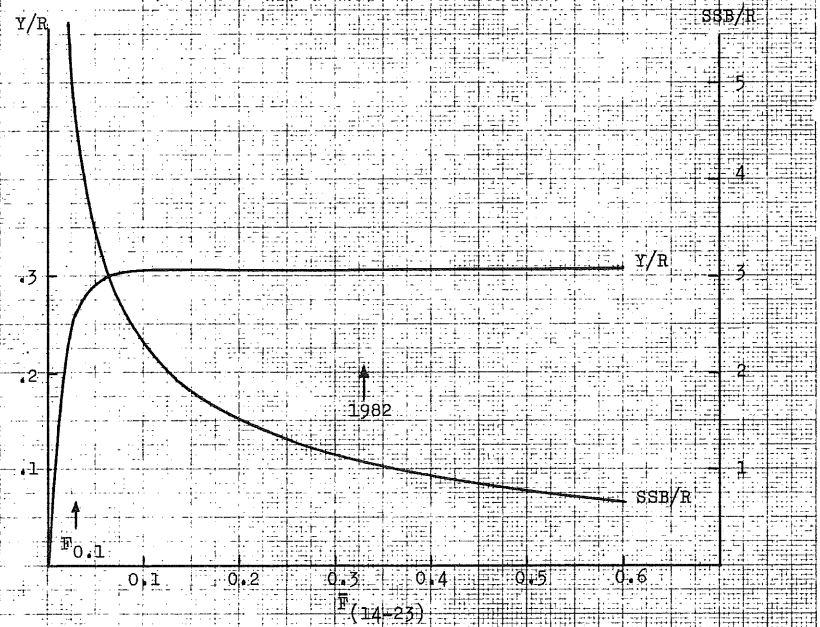
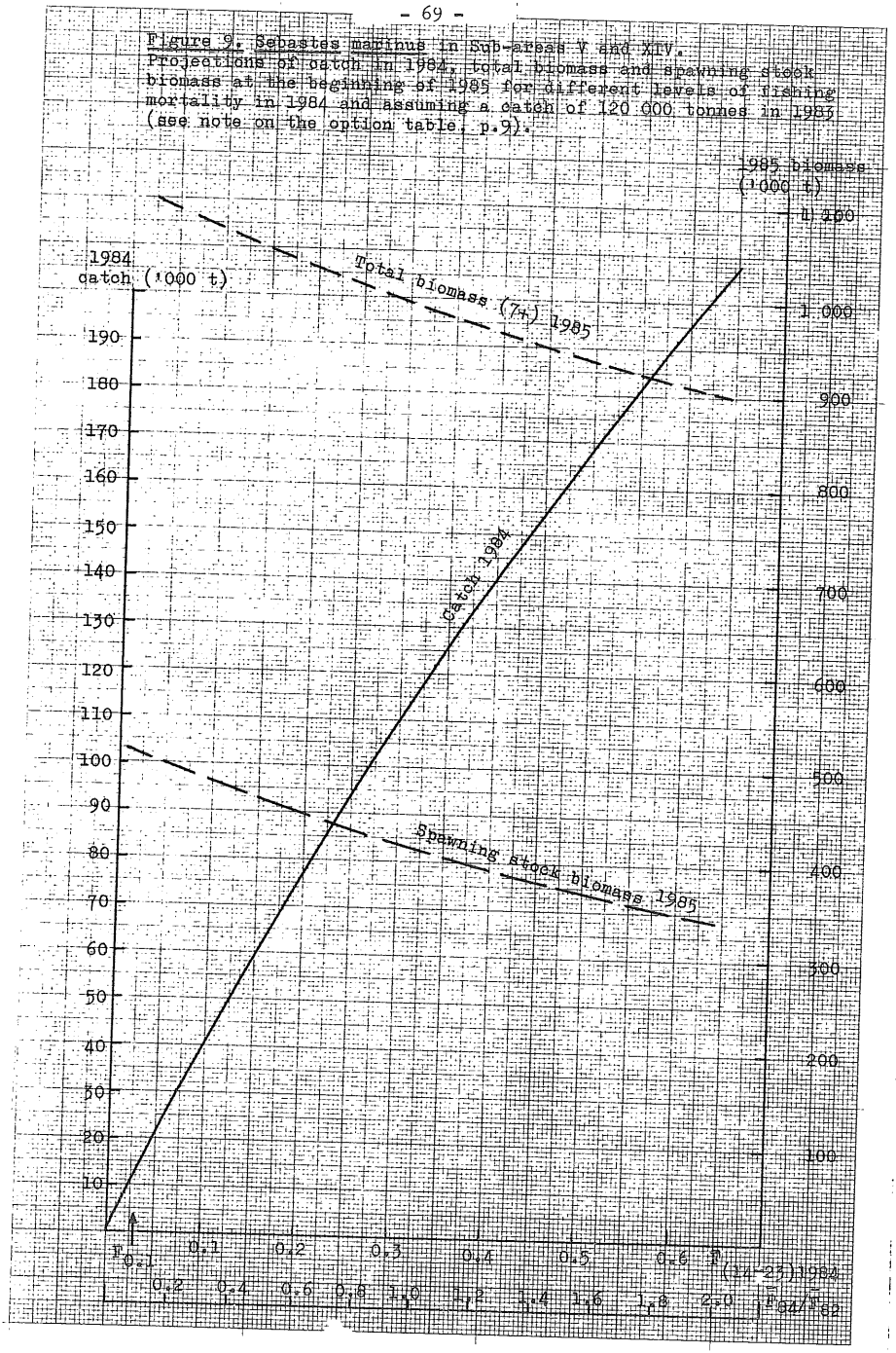


Figure 9. Sebastes marinus in Sub-areas V and XIV. Projections of catch in 1984, total biomass and spawning stock biomass at the beginning of 1985 for different levels of fishing mortality in 1984 and assuming a catch of 120 000 tonnes in 1983 (see note on the option table, p.7).



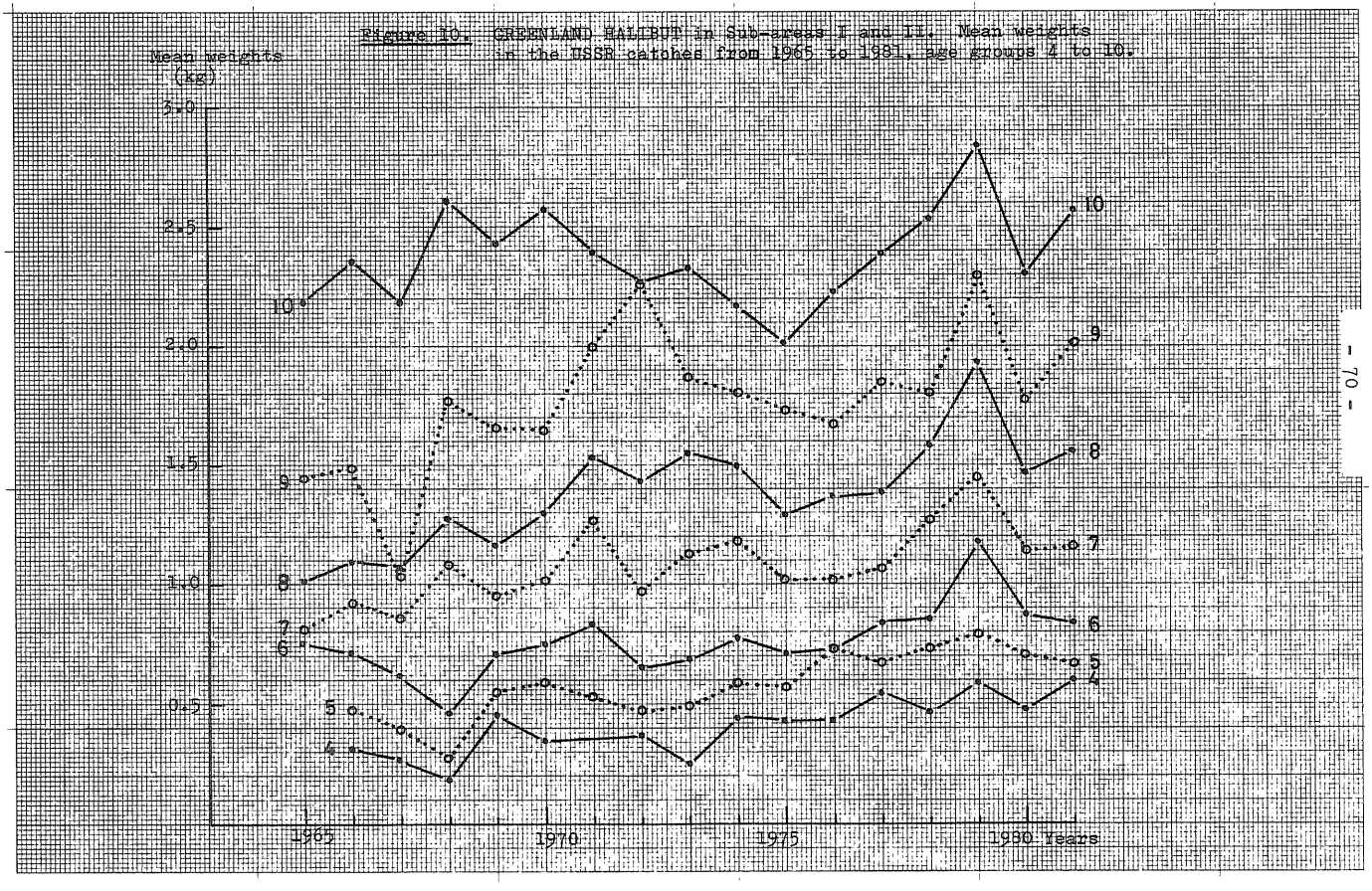


Figure 10. GREENLAND HALIBUT in Sub-areas I and II. Mean weights in the USSR catches from 1965 to 1981, age groups 4 to 10.

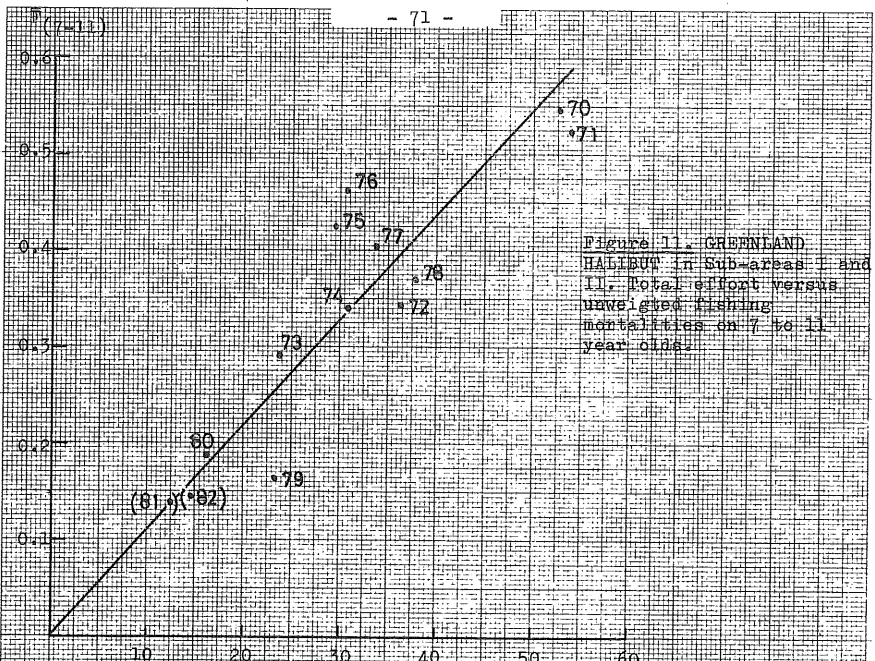


Figure 11. GREENLAND HALIBUT in Sub-areas I and II. Total effort versus unweighted fishing mortalities on 7 to 11 year olds.

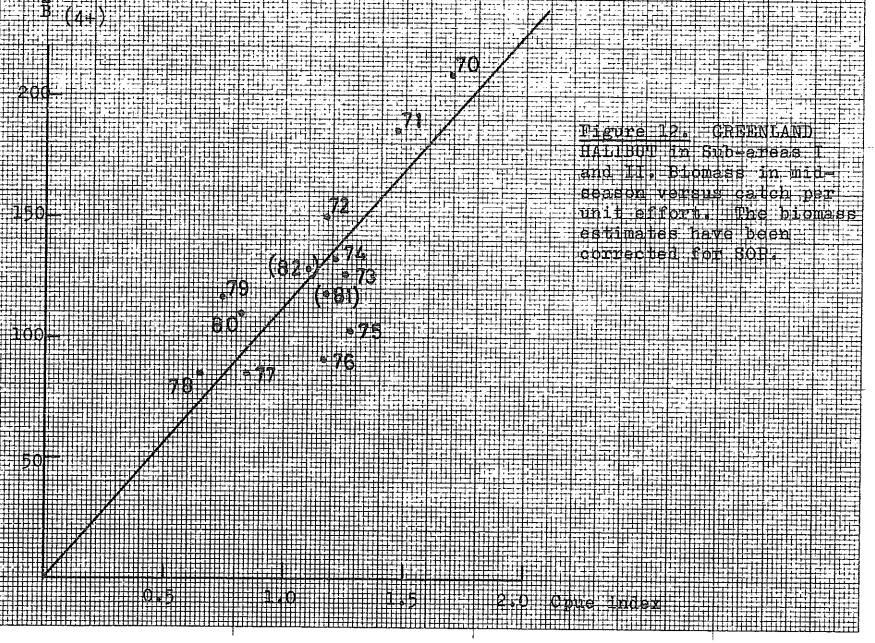


Figure 12. GREENLAND HALIBUT in Sub-areas I and II. Biomass in mid-season versus catch per unit effort. The biomass estimates have been corrected for SOP.

Figure 13. GREENLAND HALIBUT in Sub-areas I and II. The fishing mortality, catch and development of the stock from 1970-82.

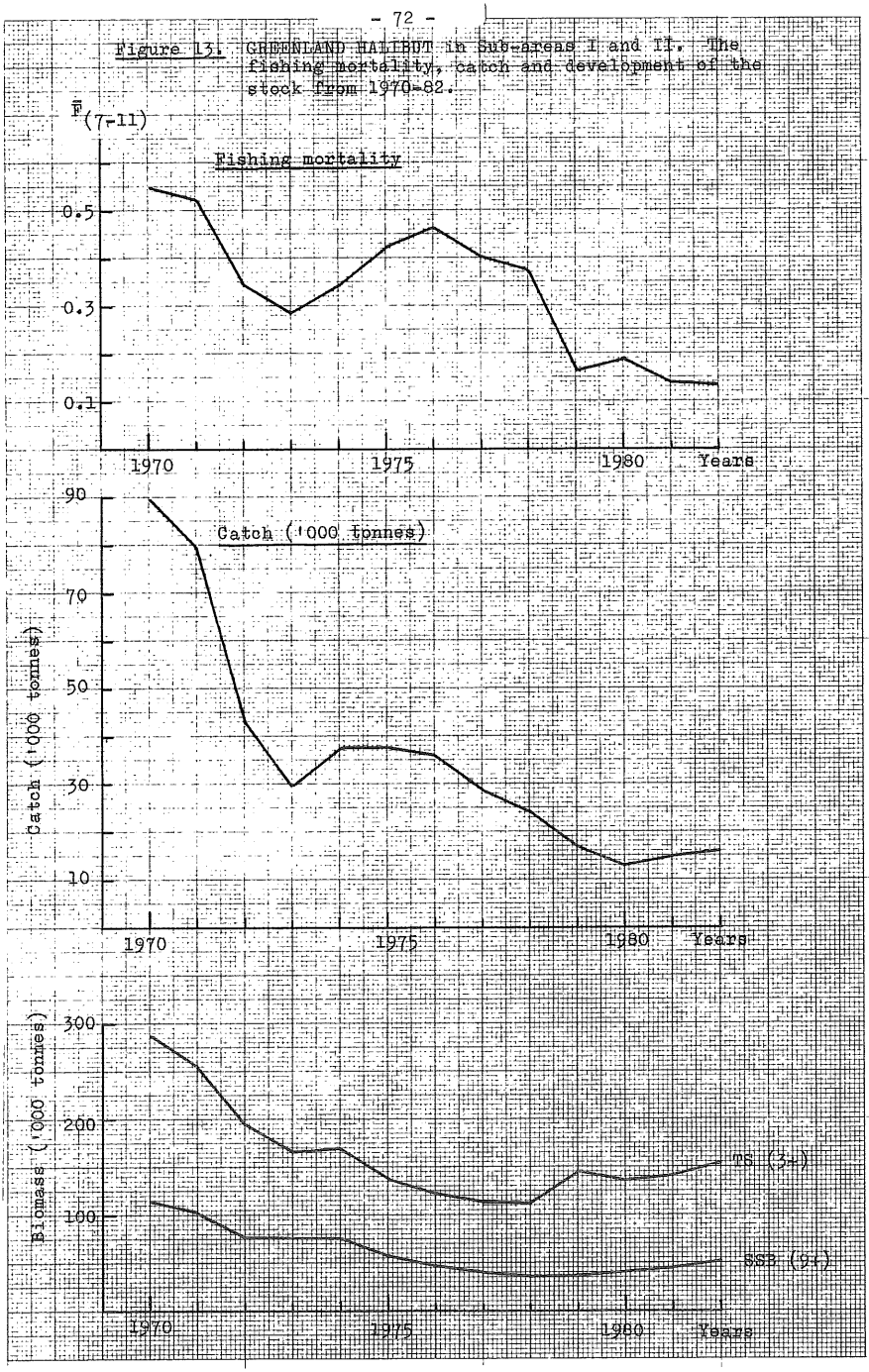


Figure 14. Greenland HALIBUT in Sub-areas I and II. Yield per recruit and spawning stock biomass per recruit.

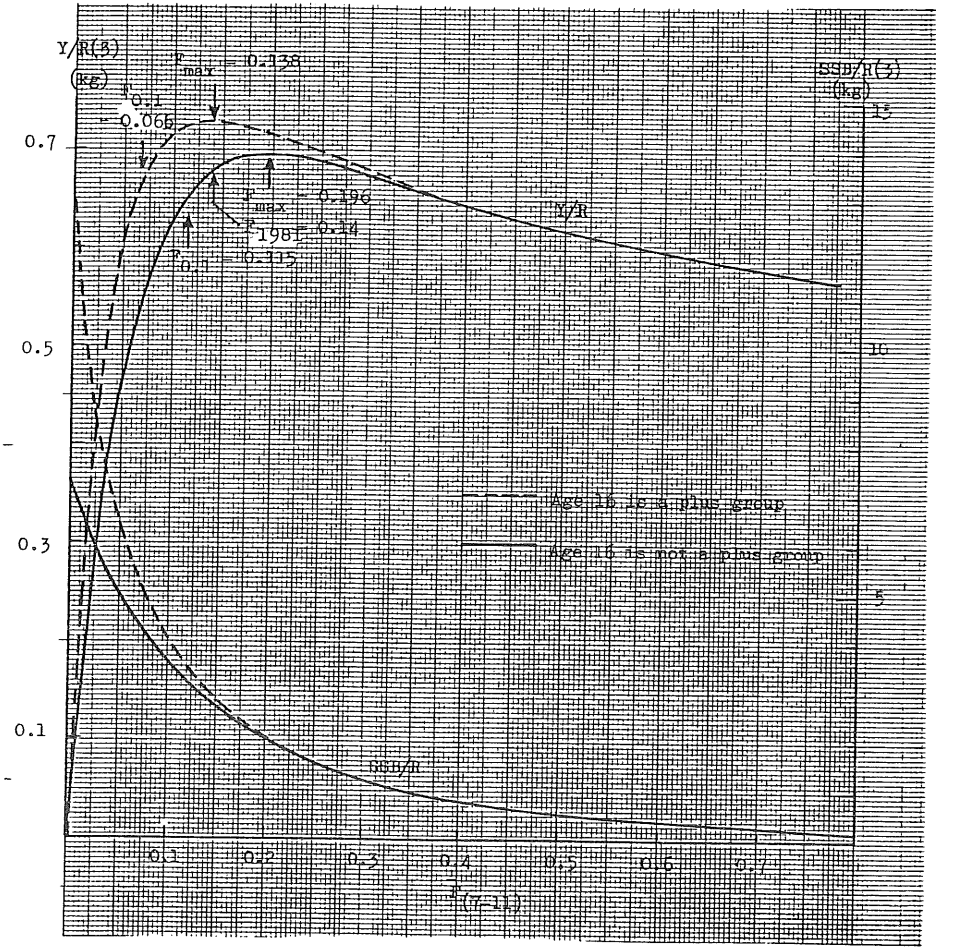


Figure 15. GREENLAND HALIBUT in Sub-areas I and II. Predictions for catch in 1984, and the biomass of the spawning stock (SSB), and the biomass of the total stock (TSB) at the beginning of 1985.

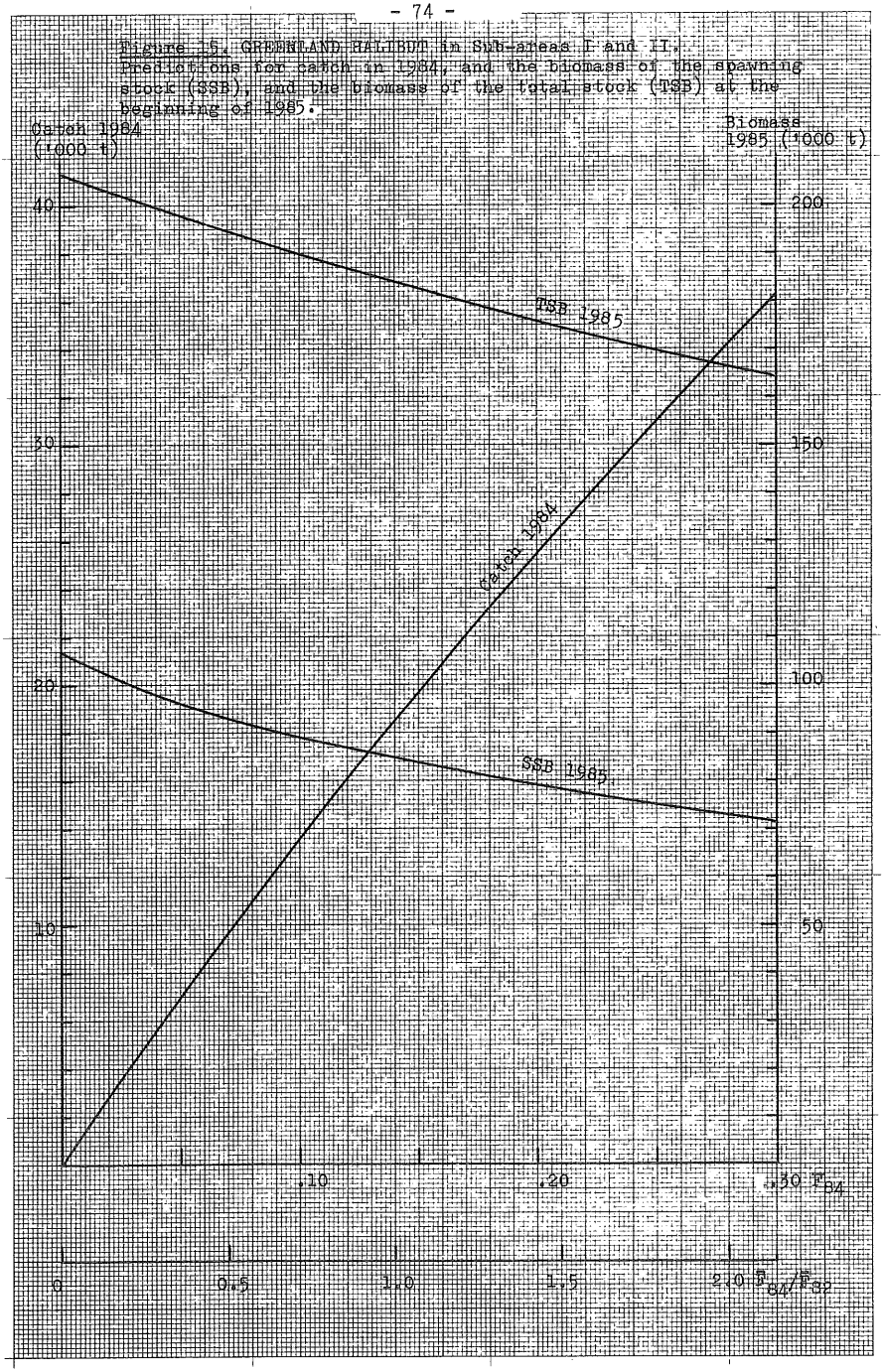


Figure 10. GREENLAND HALIBUT in Sub-areas V and XIV. Relation of mean fishing mortality (ages 8-13) to total effort.

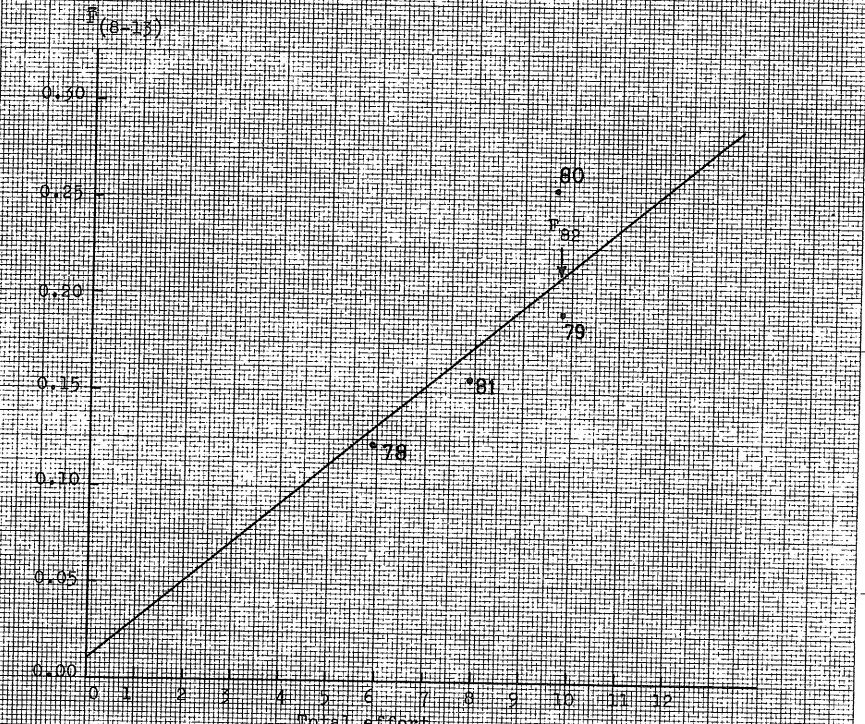
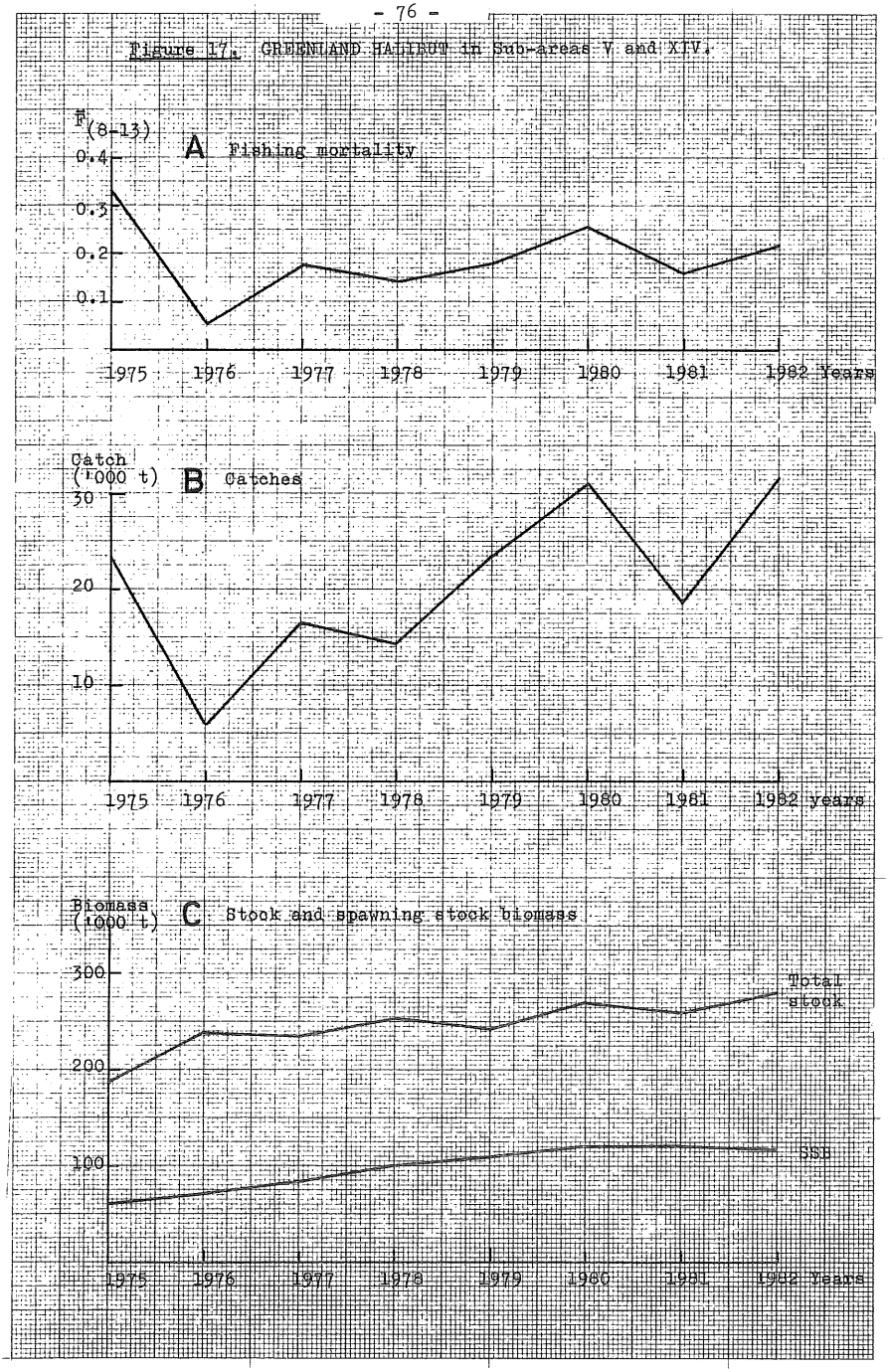


Figure 17. GREENLAND HALIBUT in Sub-areas V and XIV.



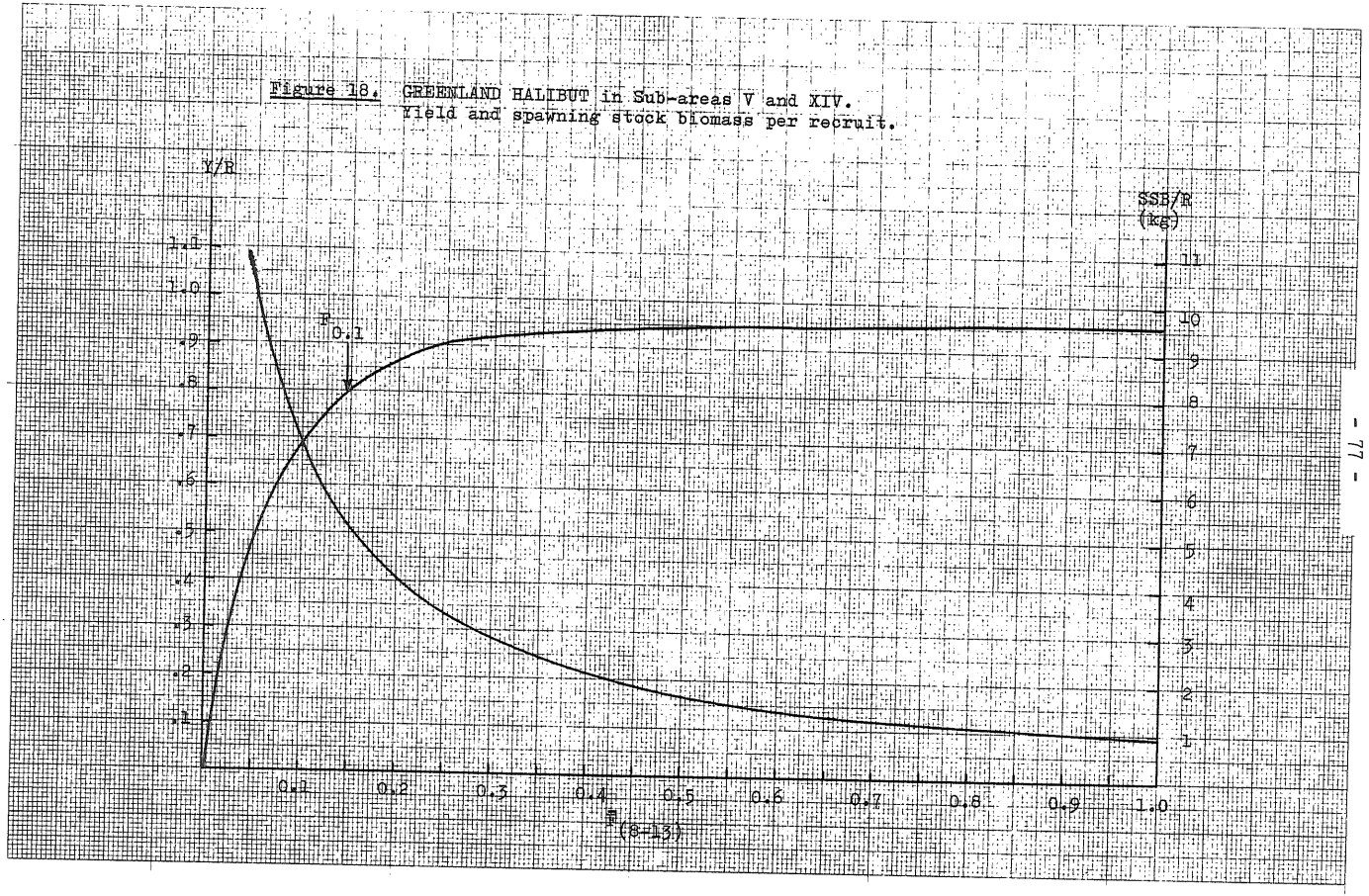


Figure 18. GREENLAND HALIBUT in Sub-areas V and XIV.
Yield and spawning stock biomass per recruit.

Figure 19. GREENLAND HALIBUT in Sub-areas V and XIV.
Predictions for catch in 1984, and the biomass of the spawning stock (SSB), and the biomass of the total stock (TSB) at the beginning of 1985.