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REVIEW BY THE WORKING GROUP ON REDFISH IN REGION 1

ON SOME FISH RESOURCES WITHIN THE NEAFC AREA

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## I. REDFISH

### 1. General Biology

Two species of redfish, Sebastes marinus and Sebastes mentella, are of commercial interest in the North-East Atlantic. These species are widely distributed and subject to exploitation.

The redfish is ovoviviparous, i.e. the hatching takes place within the female gonads and the brood is released as larvae. The release of fry is here referred to as spawning. The mating takes place during August - November, mainly in September, but the fertilisation of eggs inside the ovaries in February-March. The spawning time is April-June, mainly in May.

Both species of redfish are growing slowly; 5 year old fish are about 15 cm long, 10 year old fish are of about 26-30 cm in length, and at an age of 20 years they have reached about 40 cm. The age of maturity is about 10-13 years.

### 2. Redfish in Sub-areas I and II

#### 2.1 Sebastes marinus

##### 2.1.1 Spawning area

The main spawning area of S. marinus is along the continental slope west of Vesterålen (Lofoten), but there is also some spawning in the fjords of northern Norway (Figure 2).

##### 2.1.2 Larval and juvenile fish distribution

It is very difficult to distinguish between larvae of S. mentella and S. marinus. The larvae of both species drift with the Atlantic Current northwards along West-Spitsbergen and eastwards into the Barents Sea. In August-September the 0-group redfish are mainly distributed as shown in Figure 1. Immature redfish are recorded as far east as the Goose Bank.

##### 2.1.3 Migration of young fish

In the first years the young redfish are making only small migrations to deeper waters in winter, and back to shallow waters in spring, but the migrations are extended as the fish grows.

##### 2.1.4 Distribution of the adult stock

S. marinus are distributed along the continental slope up to about 79°N and in the southern parts of the Barents Sea. Few adult specimens are caught east of 35°E. They are most abundant between 100m and 350m depth.

##### 2.1.5 Migrations of adult fish (Figure 2)

The females of S. marinus migrate northwards and eastwards from the spawning grounds. They meet the males at Tromsøflaket or the Bear Island and then they migrate together to the borders of the distribution area for feeding and copulation. When the winter cooling begins, the fish start their migration towards the spawning grounds, but the males stay in the area of Bear Island-Tromsøflaket for overwintering.

#### 2.2 Sebastes mentella

##### 2.2.1 Spawning area

The main spawning area of S. mentella is in the region southwest of the Kopytov area between 70°N - 71°N and 11°E - 16°E.

#### 2.2.2 Distribution of the adult stock

S. mentella prefer deeper water than S. marinus, ranging from 200 m to 500 m. Adults are mainly distributed along the continental slope to about 80°N in the Bear Island Channel.

#### 2.2.3 Migration of adult fish (Figure 3)

Mature specimens start migration to the feeding areas in July-August. Here the copulation takes place in August-November. In January-February the females start their migration towards the spawning area while the males mainly migrate towards the Kopytov area in late March. After spawning the females mix with the males and then move towards the feeding grounds.

#### 2.3 Exploitation and management history and present state of the stock

The two species are not separated in the fisheries statistics. It is therefore necessary to deal with these species together in the following chapters.

##### 2.3.1 Description of the fishery

The redfish are exploited by vessels of U.S.S.R., United Kingdom, German Democratic Republic, Federal Republic of Germany, Norway and Poland. Except for the fishery of S. mentella in the Kopytov area by U.S.S.R. trawlers, all catches of redfish are mainly by-catch from the cod fishery. The main part of the catches is taken by bottom trawl, only small quantities are taken by long line.

##### 2.3.2 History of yields

In Tables 1-4 the nominal catches of redfish are given for the period 1965-76. Total catches in the area have had an increasing trend since 1971, but the catches in 1975 and 1976 are remarkably high. In 1976 the total catch reached about 313 000 tons, which is 7 times the long-term average over the years 1965-74. The increase in the total catches in 1975 and 1976 is mainly due to increased U.S.S.R. catches of S. mentella in the Kopytov area.

##### 2.3.3 Stock fluctuations

Very few data exist of stock fluctuations. The decrease in the landings in the period 1960-68 is, to some extent, due to reduced effort by U.S.S.R. trawlers, but it could be attributed mainly to a reduction in stock size. U.S.S.R. data on catch per unit effort show a decrease from 10 tons per hour trawling in 1956 to 2.5 tons per hour in 1967. The greater landings in recent years are partly due to an increase in stock size. The year classes 1964, 1965 and 1966 seem to be strong, while the year classes 1967 and 1968 might be poor. Since 1969 the year class strengths on the 0-group stage have not been below average and in the last 4 years the 0-group redfish have been very abundant in the Barents Sea and adjacent waters.

##### 2.3.4 Exploitation pattern

In the fishery for S. mentella up to 1972 exploitation has started at an age of about 9 years, with a maximum around age 15. Since 1973, however, the exploitation shifted toward younger ages. At present the exploitation starts at age 6-7, and the maximum lies at age 9-11. For the fishery of S. marinus data from the Federal Republic of Germany indicated a relatively stable exploitation pattern beginning at age 12 with a maximum at age 16 or even older.

3. Redfish in Sub-areas V and XIV

3.1 Spawning areas

The redfish spawns over the great ocean depths and along the continental slope to some extent. Concentrated spawning takes place in the southeastern Irminger Sea, particularly in the Reykjanes Ridge area. That spawning area lies partly within the 200 miles fishery zone of Iceland, extending into international waters. Another less important spawning area lies off East Greenland within the 200 miles zone.

3.2 Larval and juvenile fish distribution

The drift of larvae takes place from the oceanic areas to the continental shelves off Iceland, East Greenland and West Greenland. There are extensive nursery grounds for redfish both around Iceland, particularly west of Iceland, and on the East Greenland shelf, where dense accumulations of young redfish have been observed both for S. marinus and S. mentella. Thus, the East Greenland shelf area seems to be the most important nursery area for the Sub-area V and Sub-area XIV stocks of redfish. The juveniles usually inhabit shallower waters than the adult fish and are mostly found closer to the shore than the adults.

When approaching sexual maturity, they migrate to the offshore banks and to the continental slopes.

3.3 Distribution and migration of adult redfish

The redfish has a wide distribution in Sub-areas V and XIV, extending along the coasts from the Faroe Island, around Iceland and along East Greenland. The depth range in which it is found is relatively wide, from 100 to 800 meters, but it is most abundant in 200 m to 500 meters' depth. As already mentioned, the S. mentella inhabit greater depths in general than S. marinus. Thus S. marinus is mostly caught in depths from 200 m to 400 m, while S. mentella is mostly caught in 300 m to 500 m.

The migration of adult redfish is conditioned by spawning and feeding. Thus, in the Iceland-East Greenland area, the females migrate in late winter and spring from Iceland and East-Greenland to the Irminger Sea for spawning. After spawning, they return to the feeding grounds. Summer- and autumn feeding migrations along the offshore banks and slopes off Iceland and East Greenland are common for both sexes. There is also some migration of redfish from West Greenland to East Greenland.

3.4 Exploitation of Redfish in Sub-areas V and XIV

3.4.1 Fishery

The main areas of exploitation are on the offshore banks on the continental slopes off East Greenland from Cape Farewell to Dohrn Bank, off the Icelandic coast, on the Iceland-Faroe Ridge and off the Faroe Islands.

Tables 5-7 show the total catch of redfish in ICES Divisions Vb and Va, and in Sub-area XIV by year and country.

The Federal Republic of Germany has taken by far the largest catch of redfish in areas Va, Vb and XIV until 1976, when both Iceland, and particularly U.S.S.R., exceeded these catches (see Tables 5-7). The catch in Division Va has remained relatively stable since 1970, while it has fluctuated around a level of about 20 000 tons in Sub-area XIV up to 1974. The sudden rise in the catch in Sub-area XIV in 1975 and 1976 is due to a great increase in effort of U.S.S.R. vessels in that area. The U.S.S.R. has in these two years engaged a big fleet of factory trawlers in the redfish fishery off East Greenland. The redfish fishery was carried out almost exclusively with bottom trawls. During the last few years, however, midwater trawls have also been used.

During the last 10 years, the number of days fishing by trawlers from the Federal Republic of Germany has declined. The Icelandic effort has increased somewhat in the most recent years, but by far the greatest increase in effort comes from the U.S.S.R. fleet.

3.4.2 Management measure

Iceland has unilaterally imposed regulations for the fishery within the Icelandic fishery zone also affecting the redfish fishery. Thus, factory vessels, including freezers, are not allowed to fish and minimum mesh size is 135 mm since May 1976. After the introduction of 155 mm mesh size in 1977, special redfish fishery is allowed with 135 mm meshes within a limited area only. The minimum weight of redfish allowed to be landed is 500 grams, which corresponds to a minimum length of about 33 cm.

For further protection of small redfish, a certain nursery area has been closed for all trawling.

3.4.3 Partition of Sub-area XIV redfish catches into Icelandic and Greenlandic components

The midline between Iceland and East Greenland does not correspond to the ICES statistical areas, Division Va and Sub-area XIV. Thus, a part of the catches reported for Sub-area XIV was taken on the Icelandic side of the midline.

The midline crosses the Dohrn Bank and the usual fishing pattern on this particular Bank is that by far the greatest part of the redfish catch on the Bank is taken at the East Greenland side of the midline. However, catches of redfish reported from Sub-area XIV by the German Democratic Republic, Poland and U.S.S.R. up to 1974 are thought to be taken in connection with the Greenland halibut fishery, which takes place on the Icelandic side of the midline.

Table 8 is based on this assumption and indicates the quantity of redfish reported for Sub-area XIV but taken at the Icelandic side of the midline.

Table 8. Nominal catch of redfish on the Icelandic side of the midline between Iceland and East Greenland reported for Sub-area XIV (in tons).

Year	Tons	Year	Tons
1965	110	1971	994
1966	99	1972	1 188
1967	28	1973	1 186
1968	-	1974	1 399
1969	172	1975	4 822
1970	845	1976	-

According to this estimate, these catches have not exceeded 1 000 tons until 1972 and have reached a maximum in 1975 with almost 5 000 tons. The above-mentioned countries ceased fishing in the area in question in 1976.

In connection with this estimation, it should be born in mind that the trawlers of the Federal Republic of Germany have also, to some extent, fished for Greenland halibut in the area, but how much redfish was then caught as by-catch in that fishery it is not possible to estimate because of their special redfish fishery in Sub-area XIV. Also catches taken on the continental slope of Iceland west of latitude 27°W are reported as catch for Sub-area XIV. The figures in Table 8 are, therefore, likely to be underestimates.

Table 1 : Nominal catch of Redfish (in metric tons) by countries (Sub-area I, Divisions II a and II b combined)

Country	Year 1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976*
Belgium										30		
Faroe Isl.						60		9	32	6	67	
France	897									1116		
GDR	151	976	311	921	1069	7032	14786	9972	11756	28275	28020	22636
Germany, F.R.	4766	5389	5550	3258	5573	2416	3076	1697	3479	6616	5182	7357
Netherlands	345	33			20							127
Norway	6617	6931	5205	4024	3904	3832	4644	6776	7714	7055	4966	7000
Poland					5973	4631	2532	1112	215	1269	4711	4137
Portugal											331	
Spain											1194	
U.K.	4899	6546	5607	5058	5224	4554	4002	4379	4791	3509	2746	186
USSR	22300	15900	7300	5500	9100	13100	29800	22700	31800	48800	231000	271500
Total	39975	35775	23973	18761	30863	35625	58840	46645	59787	96676	278245	312943

\*) provisional data

Table 2 : Nominal catch of Redfish (in metric tons) by countries in Sub-area I

Country	Year 1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976*
Belgium										30		
Faroe Isl.									6	6		
France										26		
GDR			81	25	23		78	36		358	201	90
Germany, F.R.		7	354			133	148	7	76	1086	483	476
Netherlands												
Norway	333	159	242	464	365	141	316	1000	1917	194	482	
Poland					5973	6	1	22			93	47
Portugal											331	
Spain											820	
U.K.	1016	1706	1419	1163	1385	1384	1406	1363	1894	1320	1048	29
USSR	4974	4511	1640	1076	3647	2281	3743	4403	4885	9318	30750	12411
Total	6323	6383	3736	2728	11393	3945	5692	6831	8778	12338	34208	13053

a) I and IIb included in IIa

\*) provisional figures



Table 3: Nominal catch of Redfish (in metric tons) by countries in Division II a

Country	Year											
	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976*
Belgium												
Faroe Isl.						60		9	22		67	
France	897									980		
GDR	34	285	26	69	812	2243	12339	8963	11474	27153	22778	16921
Germany, F.R.	4766	5382	5196	3258	5573	2165	1188	1466	2207	4167	4263	6379
Netherlands	345	33			20							127
Norway	6129	6772	4961	3518	3510	3679	4277	5720	5564	6837	4444	7000
Poland						269	1605	784	156	869	920	217
Portugal												
Spain											153	
U.K.	2927	4373	3781	3820	3578	2741	2463	2680	2125	1991	1621	141
USSR	13991	8565	4715	3779	14	142	209	291	131	14	39138	23192
<b>Total</b>	<b>29089</b>	<b>25410</b>	<b>18679</b>	<b>14444</b>	<b>13507</b>	<b>11299</b>	<b>22081</b>	<b>19913</b>	<b>21679</b>	<b>42011</b>	<b>73384</b>	<b>53977</b>

\*) provisional figures

Table 4: : Nominal catch of Redfish (in metric tons) by countries in Division II b

Country	Year	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976*
Belgium												28	
Faroe Isl.										4			
France	b)										110		
GDR		117	691	204	827	234	4789	2369	973	282	764	5041	5625
Germany, F.R.							118	1740	224	1196	1344	436	502
Netherlands													
Norway		155		2	42	29	12	51	56	233	24	40	...
Poland							4356	926	306	59	400	3698	3873
Portugal													
Spain												221	
U.K.		956	467	407	75	261	429	133	336	772	198	77	16
USSR		3356	2813	914	622	5483	10668	25887	17953	26813	39455	161062	235903
Total		4584	3971	1527	1566	6007	20372	31106	19848	29359	42295	170631	245919

a) I and II b included in II a

b) II a includes II b

\*) provisional figures

Table 5: Nominal catch of Redfish (in metric tons) by countries in Division Va (Iceland)

Countries	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976*
Belgium	3841	3800	3788	4117	3360	2204	2798	2484	1622	2114	1945	1447
Fareo Isl.	16		3	2	8		35	9	243	254	82	211
GDR	274	441	341	419	656	827	238	135		11		
Germany, F.R.	73982	73974	66638	62521	55831	48907	46580	43963	38358	36398	33602	33047
Iceland	23663	16607	17857	24716	24321	23807	29118	26973	26470	27799	32659	35022
Netherlands	1528	36			2							
Norway		50		20			1	1	4	15	22	37
Poland						259	17	35		18		
Scotland	619	249	279	144	128	138	116	89	28	37	56	18
UK	9764	5913	5742	3727	2174	2810	3436	3608	2923	2482	2368	2000
USSR	413	5998	435	809	1256	10	31	28	2			
Total	114100	107068	95083	96475	87736	78962	82370	77325	69650	69129	70734	71782

\*) provisional data

Table 6: Nominal catches of Redfish (in metric tons) by countries in Division Vb (Faroe Islands)

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976*
Faroe Isl.	1			1	5				121	28	9	33
France	582							300		800		
GDR	55	6	18	45				1			1	
Germany, F.R.	5159	3243	4949	6538	1293	1914	2328	4034	9490	7328	7628	4939
Netherlands											105	
Norway									10	7		19
U.K.	65	48	46	53	28	33	24	53	85	98	41	43
<b>Total</b>	<b>5862</b>	<b>3297</b>	<b>5013</b>	<b>6637</b>	<b>1326</b>	<b>1947</b>	<b>2352</b>	<b>4087</b>	<b>9696</b>	<b>7765</b>	<b>8591</b>	<b>5043</b>

\*) provisional data

Table 7: Nominal catch of Redfish (metric tons) by countries in Sub-area XIV (East Greenland) total nom.catch in ICNAF Sub-area I (West Greenland)

Country	Year	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976*
Denmark													129
Faroe Isl.										13	43	1	+
GDR	110	99	28	154	409	611	703	841	1275	4490			
Germany, F.R.	33253	19845	23225	17552	26289	16316	17062	7287	2632	4979	3944		
Iceland	3082	3342	9935	5527	3906	1001	2380	5490	9777	5632	7367		
Norway											63		
Poland							436	312	464	281	6	276	
U.K.	68	4	10				+	+	5	65	127	56	
USSR				18				71	21	64	118	9830	102297
<hr/>													
Total XIVb (East Greenland)	36513	23290	33198	23079	30367	18162	20436	13970	7899	13978	25329	113737	
<hr/>													
Total ICNAF Sub-area I (West-Greenland)	19052	16758	13210	9606	4252	4101	2756	2988	3319	3324	8629	2928	

\* ) provisional data

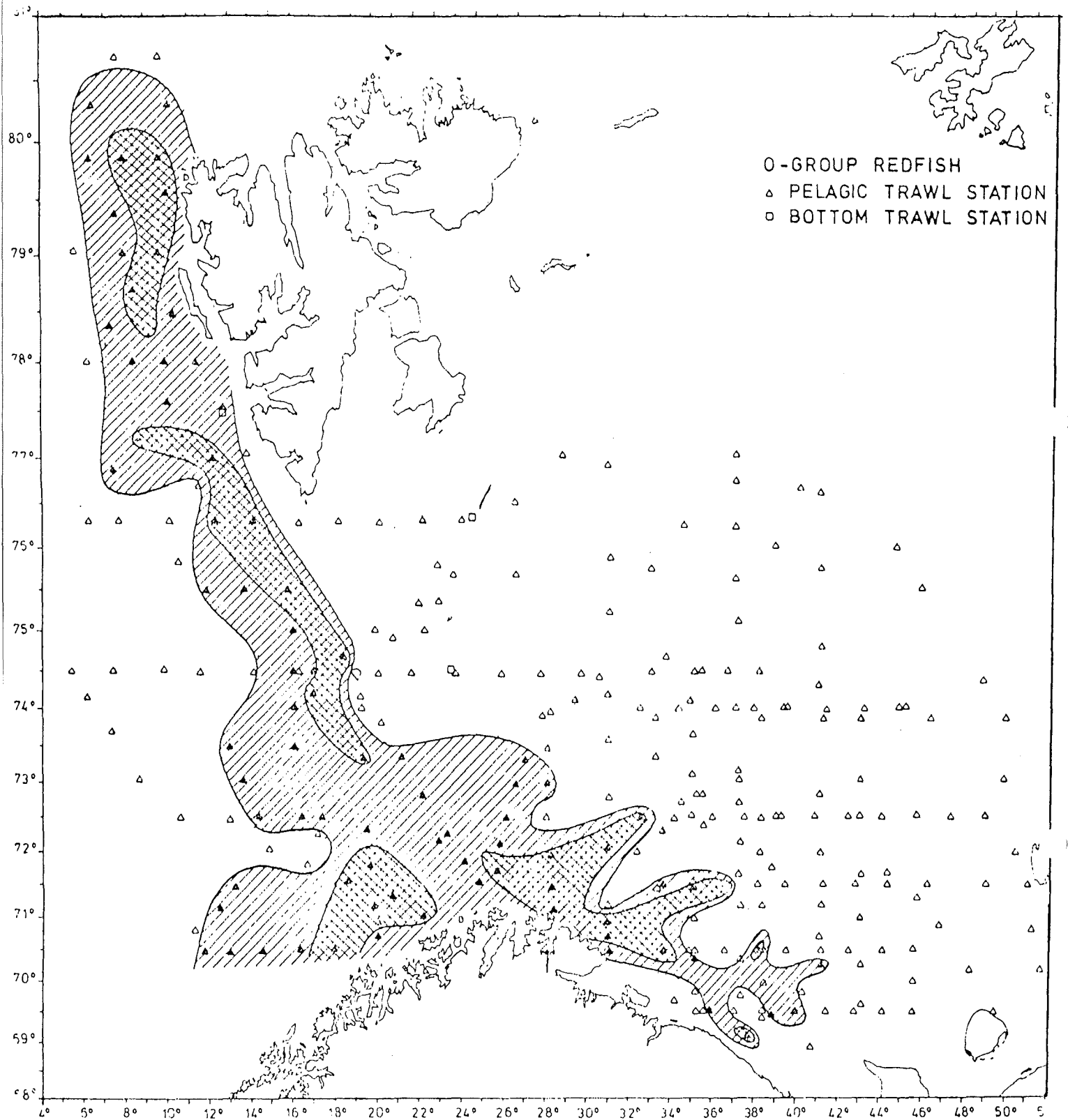


Fig. 1. Distribution of 0-group redfish in the Barents Sea and adjacent waters in August - September 1975.

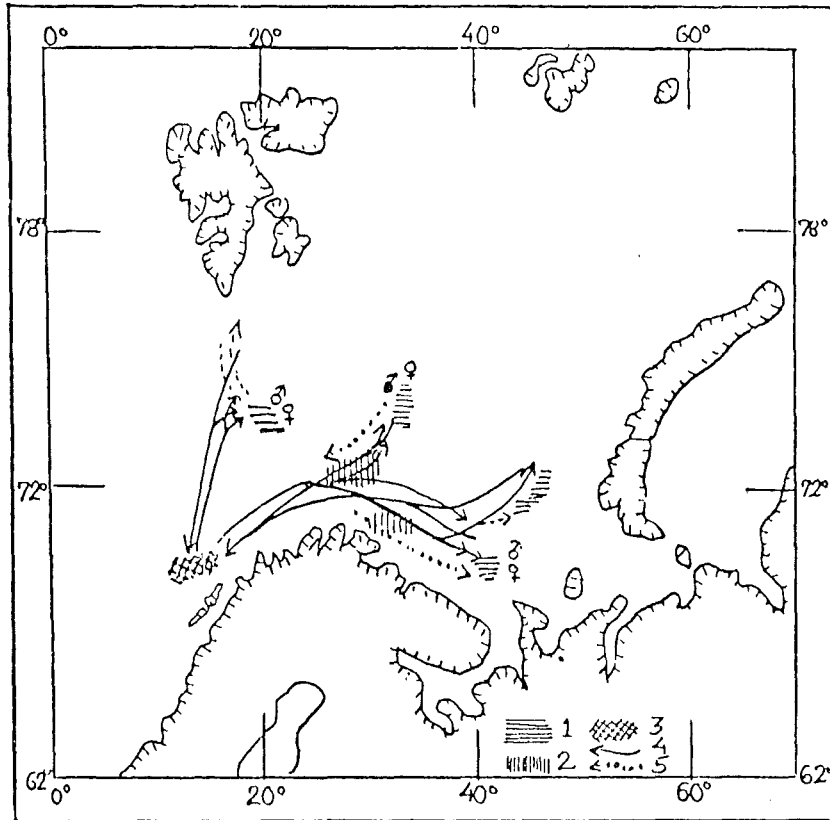


Figure 2. Migrations of Sebastes marinus according to N. A. Maslov.

1. Areas of autumn-winter concentrations of males and females.
2. Areas of spring concentrations of males.
3. Spawning areas.
4. Migrations of females.
5. Migrations of males.

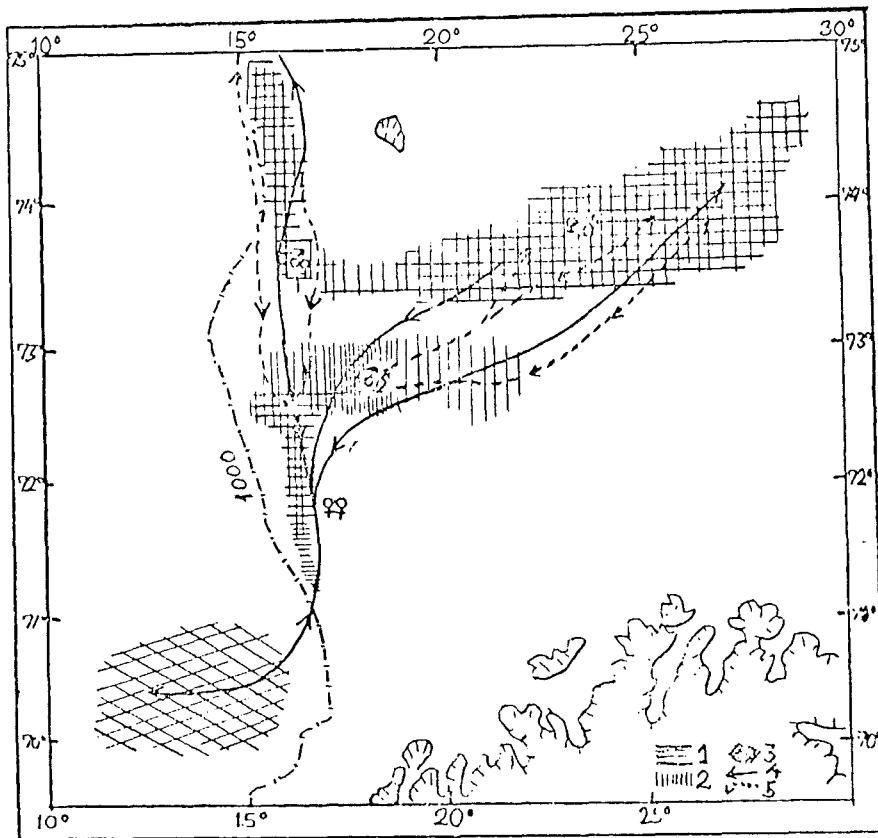


Figure 3. Migrations of Sebastes mentella.

1. Females.
2. Males.
3. Spawning area.
4. Migrations of females.
5. Migrations of males.

## II. COD

### 1. Sub-area XIV

#### 1.2 Life history

The spawning grounds of the East Greenland cod are situated along the east coast of Greenland between Wallie Bank (60°N) and Dohrn Bank (65°30'N). After spawning the cod migrate back to the feeding areas off the southeast and southwest coasts of Greenland.

The fry also drifts into the feeding areas and here the fish stay until the first maturation begins at an age of about years. The spawning migration starts in late autumn and spawning takes place in spring. On average, 25% of the adult East Greenland cod migrate to spawn on the southwest coast of Iceland together with Icelandic cod.

#### 1.3 The fishery

The cod fishery off East Greenland is almost entirely a trawl fishery in the feeding areas as well as on the spawning grounds.

In the period 1962-72 the total nominal catch in Sub-area XIV has fluctuated without trend between 13 000 tons and 36 000 tons. A drastic decline in catches occurred after 1972 mainly due to a decline in stock size.

#### 1.4 Distribution of the fishery in relation to the 200 miles fishery zone

Since the catches in Sub-area XIV are not reported on smaller area units it is not possible at present, to split the total catches into a Greenlandic and an Icelandic component. Analysis of the cod fishery of the Federal Republic of Germany for the years 1975 and 1976 indicates that about 9% (140 tons) in 1975 and 1% (70 tons) in 1976 are taken in the Icelandic part of Sub-area XIV.

## 2. Division Va

### 2.1 Biology and migration

Cod is found all around the coast of Iceland from shallow waters to depths up to 500 m in some areas. The main spawning ground is off the SW-corner of Iceland (Selvogsbank) but spawning takes also place in and off Faxaby and east of Selvogsbank. The eggs and larvae drift clockwise with currents to the colder waters off the north and east coast of Iceland where the 0-group fish seeks bottom in early autumn. The young immature cod are rather



stationary in these main nursery grounds until they reach maturity at the age of 6-8 years, when they migrate back to warmer waters to spawn.

Cod grown up off the east coast migrate the shortest way, i.e. southwards along the east coast to spawning grounds, but cod grown up off the north coast migrate westwards and south to the spawning areas. The spawning starts in March, reaches a peak in mid-April and is over in the beginning of May. The main part of the mature cod then migrates westwards to the summer feeding grounds off the NW-coast but a small part of mature fish migrates eastwards to the southeast and east of the island. During late autumn and early winter, the mature cod starts migrating to the spawning area.

From tagging experiments at Iceland no migration of cod from Iceland to Greenland has been observed during the last decades, but in some years eggs and particularly fry have drifted westwards with the current to East-Greenland waters.

On the other hand, migration of adult cod from West-Greenland to East Greenland and Iceland is a well known fact. This migration fluctuates between years and year classes and is also affected by changes in the environment at East Greenland but generally it takes place from an age 7-8 years onwards. Various estimates on the strength of this migration (Anon. 1971, 1972 and 1976) have shown that on the average 25% of the mature cod at East Greenland migrate to Iceland and admix the Icelandic spawning population there.

#### Fishery, status of the stock and regulation

All fishery on cod in Icelandic waters takes place on the grounds around the island within the 200 mile fisheries jurisdiction. During the last two decades, the average catch of cod at Iceland has been about 400 000 tons yearly. Within the period, there have been a number of fluctuations due to changes in the stock size and increase in fishing effort. Catches decreased from 1955 until 1961 but increased to a maximum in 1964. Again the catch decreased to a minimum in 1967 followed by another recovery reaching a maximum in 1970. Since then the catches have declined to 340 000 tons in 1976.

In the period 1955-1976 the stock biomass of cod 3 years and older was at the highest level of 2.6 million tons in 1955. The increase in fishing effort combined with poorer or average re-

cruitment resulted in a decline to 1.5 million tons in 1965. From 1966 to 1969 stock size increased again following an increase in year class strength at Iceland and due to immigration of the abundant 1961-1963 East Greenland year classes. Since 1970 there has been a rapid decline in the total biomass. In 1976 the total stock biomass is at the lowest level in the whole period of about one million tons.

The spawning stock biomass has changed in a similar way but the fluctuations there have been much more pronounced. The spawning stock was at a maximum of 1.2 million tons in 1957, but declined from year to year to 237 000 tons in 1967. Due to immigration of mature cod from Greenland waters the spawning stock increased again to a peak of 673 000 tons in 1970. Since then, the spawning stock has declined very rapidly and in 1976 it was estimated as only 180 000 tons, the lowest level ever recorded.

The fishing mortality has been increasing over the whole period and was at the highest level in 1975  $F = 1.05$  in the fully exploited age groups which is far above the level needed to give maximum sustainable yield per recruit with the 1976 exploitation pattern ( $F_{\max} = 0.6$ ).

Fishing mortality decreased somewhat mainly on the younger age groups in 1976 due to closure of some important nursery areas for trawling off the north coast of Iceland and an increase in Danish mesh size to 170 mm.

In order to change the fishing pattern on cod, to reach the maximum sustainable yield per recruit and to rebuild the spawning stock, further steps have been undertaken to decrease the fishing mortality on the Icelandic cod: Since 1 February 1977 a new trawl cod end mesh size of 155 mm is in force inside the Icelandic 200 mile fisheries zone. The minimum landing size for cod has been increased to 50 cm.

According to the new law on fishing inside the Icelandic 200 mile fisheries zone, it is possible to close an area immediately and temporarily, if the number of small and undersized fish exceeds a certain minimum amount in the catches (depending on species) in that area in order to protect the young fish.

For the year 1977 the recommended TAC is 275 000 tons. The estimated equilibrium yield for cod is 450 000 tons.

### III. HADDOCK

#### I. Division Va

##### Biology and Migration

The Icelandic stock of haddock is an isolated population distributed in shallow waters mainly within the 200 m depth contour all around the coast. The spawning grounds are in the warm water area along the south and west coasts of the island, with the main spawning area between the Westman Islands and the Reykjanes peninsula. Spawning takes place in spring with the peak in April. The 0-group haddock is mainly distributed along the west and north coasts. The main nursery grounds (1-2 years old) are in shallow waters, bays and fjords along the south and west coasts, but older haddock are also in this area. Haddock reach maturity at age 3-5 years. The main feeding area of the adult haddock is in shallow waters off the south and west coasts, and haddock in that area does not undertake long migrations.

Tagging experiments on haddock have failed to show any connection between the stock at Iceland and in other areas.

In some years haddock is caught sporadically at East Greenland, but it is thought that this haddock has originally drifted as fry from Iceland grounds to the East Greenland waters, because no information on spawning there is known.

##### Fishery, Status of the Stock and Regulation

The catches of haddock reached a maximum of about 120 000 tons in 1962. Since then the landings have declined to a level of about 41 000 tons in 1976 which represents a decrease of 40% from the 20 year average of about 68 000 tons. There has been a significant decline for both total stock and spawning stock biomass.

The new 155 mm mesh size in force inside the Icelandic 200 mile fishing zone will increase the long-term yield per recruit by about 15%. Faxabay, one of the haddock nursery areas, has been closed to trawling and Danish seining since 1970. Minimum landing size of haddock at Iceland is 45 cm.

IV. WHITING

1. Sub-area XIV and Division Va

According to catch statistics (Bull. Stat.) the whiting is not very abundant in division Va and is scarce in SA XIV.

There is a separate Icelandic stock of whiting. It is found all around the country but is most common off the South and Southwest coasts. It spawns off the South and Southwest coasts at an age of 3-4 years.

The whiting seems to be rather stationary around Iceland, and there is no evidence of relationship to the whiting stocks in other areas. One could, however, assume that the whiting caught in SA XIV might originate from the spawning in div. Va.

The nominal catch of whiting in div. Va and SA XIV (according to Bull.Stat.) is shown in table 1 for the years 1965-1976.

The highest catches of 2.230 tons were reported for 1966, but followed by a decreasing trend.

There has not been a special fishery for whiting at Iceland, but it has some importance as by-catch in some areas. The decrease in catches during the last years is most probably due to increased regulations of the fishery for other species (increased mesh size, closure of areas for certain fisheries etc.).

There is also a minimum landing size regulation in Iceland of 40 cm.

## V. LUMPSUCKER

### 1. Division Va

Lumpsucker is to be found all around Iceland. The spawning takes place on a rocky bottom in the littoral and sub-littoral zone along the west, north and east coasts of the island.

It starts in late March, reaches a peak in May and ends at the beginning of August. The fry and the 0-group fish is stationary during its first winter, but the 1-year old lumpsucker leave the inshore waters and start pelagic life scatterly spread in waters all around the island. Little is known about the biology in this immature phase, but at the age 3 - 4, when the lumpsucker reach maturity, they seek the bottom and migrate during early winter to the shore in order to spawn.

After spawning, they migrate again to deeper waters where they stay pelagically distributed in late summer and autumn, feeding mainly on pelagic evertibrates like crustaceans and medusae.

Although lumpsucker have been found pelagically spread in Irminger as well as the Norwegian Sea, tagging at Iceland has not shown any connection to Greenland or the Norwegian stocks.

### Fishery and Regulation

At Iceland mainly the female lumpsucker is exploited. No catch statistics of male lumpsucker are available, but catches of female lumpsucker have increased in recent years. The lumpsucker fishery is restricted to a period of 75 days in a year and to boats below 12 BRT size. In the female lumpsucker fisheries the minimum mesh size of gill nets of 267 mm will go into force at 1 January 1978.

### References

- Anon. 1971: Report of the North-Western Working Group. C.M.1971/F:2
- Anon. 1972: Report of the ICES/ICNAF Working Group on Cod Stocks in the North Atlantic. C.M.1972/F:4.
- Anon. 1976: Report of the North-Western Working Group. C.M.1976/F:6.

VI. ROUNDNOSE GRENADIER (Coryphaenoides rupestris gunnerus)

The species are distributed in the east and west parts of the North Atlantic. They are fished off Hatteras Cape in the south to Cumberland peninsula in the north, off Greenland, Iceland, off Scandian coasts to the south to the Iceland Sea and Skagerrak, near some underwater elevations far from continental slopes. They inhabit the depths ranging from 180 to over 2000m mainly from 400 to 1200m. They are bathypelagic and stay in schools. They prefer waters with the temperature of 2.5°C to 8°C. The spawning season is extended and spawning takes place beyond the continental slope in the bathypelagic or off bottom layer over depth greater than 1000m.

Immature specimens are fished off Baffin Land, Labrador, the North Newfoundland bank and off Southwest Iceland.

The maximum length is observed to be over 1m and maximum weight to be over 2 kg. Specimens at age 9-14 years 60-70cm in length and 500-700g in weight occur most frequently in catches. Larger-sized specimens are caught in the East Atlantic. The fecundity is estimated to be 12 000-35 000 eggs.

Roundnose grenadiers feed mainly on crustaceans. Bottom animals are rarely observed in the stomach content. The locality of groups or populations is not properly studied yet. Some scientists believe that the roundnose grenadier make extensive spawning migrations to the South Iceland area and feeding migrations to the continental slope of Canada whereas there is a different opinion that they do not make extensive migrations and spawn near the continental slopes at great depths.

The main fishery for roundnose grenadier is established off Baffin Land, North Labrador and North Newfoundland Bank. Besides, they are fished in the North central and Northeast Atlantic. Fishing vessels of USSR, GDR and Poland participate in the fishery using bottom and pelagic trawls. The best results are achieved in spring and summer.

## VII. CATFISH

### 1. Division Va

At Iceland there are 3 species of catfish but they are not separated on catch statistics. Only one species (A. lupus) is of any commercial value.

The Icelandic stock of catfish is an isolated population distributed in shallow water mainly within the 200 m depth contour all around the coast. The spawning grounds are off the west and northwest coasts of the island with the main spawning area on Látragrunn. Spawning takes place in autumn and early winter with the peak in October. The 0-group catfish is mainly distributed along the west and north-west coasts. The main nursery grounds (1-2 years old) are off the west and north-west coasts but older catfish are also in this area. Catfish reach maturity at age 6-8 years. The main feeding area of the adult catfish is in shallow water off the north-west coast.

Tagging experiments on catfish have failed to show any connection between the stock at Iceland and in other areas.

The peak of the catfish catch was in 1963 with catches amounting to 29 000 tons which then decreased to a minimum of 10 000 tons in 1970, but increased again up to 15 000 tons in 1974. The main part of the Icelandic catches are caught during the first half of the year in the long-line fishery off the west coast. Some fishing on catfish takes place along the East Greenland coast. The minimum landing size for catfish at Iceland is 40 cm.

VIII. MONK

1. Division Va

Monk is found all around Iceland, but is most numerous off the south and south-west coast in a great range of depths. Very little is known about its biology and migration. Spawning grounds are not known, but probably far out in the open sea, e.g., south of Iceland.

The monk fishery is a typical by-catch fishery where occasionally few specimens appear in the nets. In Table 1, the nominal catch in Division Va is shown (according to Bulletin Statistique) for the period of 1965-1975. The highest catch was reached in 1968 with 1 376 tons, the lowest in 1974 amounting to 384 tons. Iceland has taken the majority of monk in Division Va.

The decrease in catch during the last years is probably due to a changed fishing pattern.

Nothing is known about the migration and whether there are possible connections with other stocks of monk.

There are no regulations on the monk fishery in particular.



Table 1. Nominal catch of Cod.  
ICES Sub-Area XIV in thousand tons 1962 - 1975 (Bulletin Statistique).

COD	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976 <sup>1)</sup>
Faroe Islands									0.9	0.2	0.7	0.2	0.7	0.6	0.5
German Dem.Rep.										+	+	+	+	0.3	
Germany, F.R.	14.3	13.9	30.6	11.0	7.8	12.1	8.3	12.6	13.9	25.6	21.6	9.3	2.3	1.6	6.5
Greenland	0.9	0.9	1.1	0.9	0.9	0.7	0.6	0.6	0.5	0.5	0.3	0.2	+	0.2	
Iceland	0.3	1.8	2.9	4.7	4.0	10.5	6.7	4.5	5.5	4.6	3.2	1.4	3.0	0.8	3.1
Norway														1.9	
Poland									0.8	0.4	0.3	+	+	+	
U.K.	1.8	0.8	1.0	0.9	0.2	1.4	+	+	0.1	+	0.2	0.7	0.5	0.6	+
U.S.S.R.		5.7				+		+		0.3	0.1				0.2
Total	17.3	23.1	35.6	17.5	12.9	24.7	15.7	17.8	20.9	31.5	26.6	11.8	6.6	6.0	10.3

1) Preliminary figures

Table 2. Nominal catch of Cod. ICES Division Va in thousand tons. 1965-76. (Bull.Statistique)

Country	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976*
Belgium	3.7	3.0	2.3	3.4	2.7	3.0	3.0	2.5	1.1	1.1	1.3	0.8
Denmark	+											
Faroe Isl.	5.2	3.4	2.8	4.3	2.6	4.3	8.6	11.1	14.2	12.1	9.4	8.7
France	0.1	0.1	0.4	0.1	0.1	1.9	1.5			0.2		
German.Dem.Rep. <sup>2)</sup>	0.5	0.3	0.4	0.9	0.5	2.7	0.7	0.7				
Germany,F.R. <sup>1)</sup>	15.3	9.9	15.4	29.6	19.4	24.7	27.3	11.7	6.6	5.5	2.2	3.0
Iceland	233.5	224.0	193.4	227.6	281.7	302.9	250.3	225.4	234.9	238.3	265.0	275.0
Netherlands	0.5	0.1			+							
Norway	0.4	0.5	0.2	0.3	0.4	0.4	0.3	0.6	0.1	0.2	0.1	0.2
Poland <sup>2)</sup>						1.6	0.3	0.2				
U.K.	134.9	113.8	130.2	114.4	99.4	130.5	161.8	147.2	122.3	117.5	92.9	55.0
U.S.S.R. <sup>2)</sup>	0.2	2.0	0.3	1.4	0.2	+	0.1	+				
Total	394.2	357.1	345.0	382.0	407.0	472.0	453.9	399.4	379.2	374.9	371.0	342.7
Bull.Stat.Total	393.6	357.4	344.0	379.5	405.2	470.8	453.0	398.5	379.9	375.0		

The national statistics used in the table (See footnotes 1 and 2) differ slightly from those given in Bulletin Statistique. The order of magnitude of these discrepancies is shown by comparison of the total catches at the bottom of the table.

\*)provisional

1)From national statistics from Bundesforschungsanstalt f. Fischerei, Hamburg

2)From national statistics

+) = less than 0.1 thousand tons.

Table 2 Nominal catch of Haddock. ICES Division Va in thousand tons. 1965-76 (Bulletin Statistique)

Country	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976*
Belgium	1.2	0.7	0.9	1.1	1.0	1.1	1.3	0.8	0.9	0.9	1.0	1.0
Danmark												
Faroe Isl.	1.0	1.0	0.5	0.3	+	0.6	0.7	0.6	0.8	1.0	1.2	0.9
France		+	0.9	+		0.1	1.2		0.6			
German Dem. Rep. <sup>2)</sup>			0.1	+	0.4		+					
Germany, F.R. <sup>1)</sup>	1.8	1.1	1.5	2.6	1.6	1.7	2.0	0.7	1.8	1.2	1.2	1.1
Iceland	53.5	36.0	39.0	34.0	35.0	31.8	32.4	29.3	34.6	34.4	36.7	33.0
Netherlands	0.1	+										
Norway								+				
Poland <sup>2)</sup>												0.4
U.K. <sup>2)</sup>	41.4	21.2	18.4	13.3	8.9	9.1	8.5	8.1	7.1	5.1	5.7	4.6 <sup>3)</sup>
U.S.S.R. <sup>2)</sup>		0.1	0.2									
Total	99.0	60.2	60.4	51.7	46.5	44.4	46.1	39.5	45.8	42.6	45.7	41.0
Bull.Stat.Total	99.0	60.1	60.5	51.2	46.6	44.5	46.1	39.3	45.7	42.6		

The national statistics used in the table (see footnotes 1 and 2) differ slightly from those given in Bulletin Statistique. The order of magnitude is shown by comparison of the total catches at the bottom of the table.

\* ) Provisional

1) From national statistics from Bundesforschungsanstalt f. Fischerei, Hamburg

2) From national statistics

+ = less than 0.1 thousand tons.

3) Estimated

Table 4 Whiting Nominal catch (in metric tons) in Division Va for the period 1965-1976

Country	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976*
Belgium	1362	1359	1186	1520	1097	775	542	306	193	155	166	116
Faroe Islds.									4	4	6	5
France		660	254			48	130	196				
Germany, F.R.	50	14	33	63	29	18	1	1	2	2	9	3
Iceland	116	158	501	362	368	232	332	307	276	147	192	108
Netherlands	6											
U.K.	157	39	28	25	27	39	57	17	49	42	38	5
U.S.S.R.				238								
Total	1691	2230	2002	2208	1521	1112	1062	827	524	350	411	237
Subarea XIV (East Greenland)												

France	2											
Germany, F.R.			+		9	+			32	+		
U.K.	1							+	1	1	+	+
Total	3		+		9	+		+	33	1	+	+

\*) preliminary

Table 5. Nominal catch (metric tons) of Lump sucker in Division Va, 1966 - 1976.  
(As reported on Statlant 27 A)

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976*
Iceland (Total)	-	-	2 064	3 012	3 762	3 543	3 330	5 830	3 123	5 706	7 008

\*) preliminary

Table 6. Nominal catches of female lump sucker (metric tons)  
in Division Va, 1965-1976 (Iceland, national data)

<u>Year</u>	<u>Catch</u>
1965	2 628
1966	1 632
1967	2 091
1968	2 388
1969	3 012
1970	3 762
1971	3 543
1972	3 330
1973	5 830
1974	3 223
1975	5 706
1976	7 008

Table 7. Nominal catch (metric tons) of Roundnose Grenadier in Division Va, 1966 - 1976.  
(As reported on Statlant 27 A)

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976*
Germany, Fed. Rep.	-	-	-	-	-	-	-	167	45	-	-
Iceland	-	-	-	-	-	-	-	7	1	-	-
Poland	-	-	-	-	-	-	1	-	-	-	-
U.S.S.R.	-	627	3	3	-	-	-	820	12 561	-	-
Total	-	627	3	3	-	-	1	994	12 601	-	-

Table 8. Nominal catch (metric tons) of Roundnose Grenadier in Sub-area XIV, 1966 - 1976.  
(As reported on Statlant 27 A)

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976*
Faroe Islands	-	-	-	-	-	-	-	14	-	-	-
German Dem. Rep.	-	-	-	-	-	-	-	55	5	702	-
Germany, Fed. Rep.	-	-	-	-	-	-	-	57	14	6	-
Poland	-	-	-	-	-	-	17	-	-	-	-
U.S.S.R.	-	-	-	-	-	-	-	1	-	-	-
Total	-	-	-	-	-	-	17	127	19	708	-

Table 9. Nominal catches of Catfish in Division Va, 1965-1975

Country	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Belgium	264	163	171	122	103	128	111	37	22	40	31
Faroe Islands	8	-	18	7	1	-	-	57	48	46	91
German Dem. Rep.	-	10	6	5	26	3	-	-	-	-	-
Germany, Fed. Rep.	3 047	1 990	1 782	2 020	2 083	1 589	1 583	920	836	639	357
Iceland	7 491	7 891	10 268	8 972	7 674	5 706	5 286	9 036	10 578	11 973	11 042
Netherlands	36	5	-	-	-	-	-	-	-	-	-
Norway	-	-	-	-	-	-	-	-	-	-	40
U.K.	6 706	4 744	4 708	3 771	2 608	3 126	4 304	4 049	2 510	2 591	2 281
U.S.S.R.	3	6	-	-	1	-	-	-	-	-	-
Total	17 555	14 809	16 953	14 897	12 496	10 552	11 284	14 099	13 996	15 289	13 842

Table 10. Nominal catches of Monk (in metric tons) in Division Va, 1965-1975

Country	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Belgium	307	270	283	348	289	217	104	60	36	57	38
Faroe Islands	-	-	-	-	-	-	-	-	6	4	7
Germany, Fed. Rep.	45	26	50	43	36	22	15	15	10	1	4
Iceland	510	519	796	926	957	601	606	496	329	290	386
Netherlands	3	-	-	-	-	-	-	-	-	-	-
U.K.	50	53	34	33	30	28	33	25	26	26	10
Scotland	64	33	24	26	29	45	26	7	3	6	7
Total	979	901	1 187	1 376	1 341	913	784	603	410	384	452

Sub-area XIV (East Greenland)

Germany, Fed. Rep.	+		+		+			+	+	+	+
U.K.											
Total	+	-	+	-	+	-	-	+	+	+	+