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International Council for the
Exploration of the Sea

C.M.1978/G:2 - APPENDIX

Demersal Fish Committee

REVIEW OF SOME FISH RESOURCES OF THE FAROE AREA

This Report has not yet been approved by the International Council for the Exploration of the Sea; it has therefore at present the status of an internal document and does not represent advice given on behalf of the Council. The proviso that it shall not be cited without the consent of the Council should be strictly observed.

x) General Secretary,
ICES,
Charlottenlund Slot,
DK-2920 Charlottenlund,
Denmark.

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REVIEW OF SOME FISH RESOURCES OF THE FAROE AREA

1. COD (*Gadus morhua*)

1.1 Biology and Distribution

Cod in the ICES statistical Division Vb are distributed over the whole of the continental shelf around the Faroe Islands, on Faroe Bank, and to a lesser extent on the banks to the southwest of Faroe Bank (Bill Bailey Bank and Lousy Bank). The most extensive studies have been undertaken on Faroe Plateau and Faroe Bank and comparatively little is known of the cod on the other banks.

Tagging and immunogenetic data (Jones, 1966; Jamieson and Jones, 1967) have shown that cod of Faroe Bank and Faroe Plateau constitute two separate self-contained stocks with virtually no interchange of fish between the two areas or with areas outside the Faroe Division. Faroe Bank cod have a faster growth rate than those on the Plateau.

Spawning takes place in the spring reaching a peak in March. The adults aggregate on the spawning grounds in a depth of about 100 m. The main spawning ground on Faroe Plateau is to the north of the islands (Fig.1). There is also spawning on Faroe Bank. On Faroe Plateau the eggs and young larvae are dispersed around the islands. 0-group fish surveys in the summer months have been conducted since 1972, and Figure 2 shows a typical distribution of the juveniles at this stage. Generally the highest densities of 0-group fish are observed close to the islands and, like saithe but unlike haddock, the young cod move into the inshore and littoral areas as they end the pelagic phase of their lives. Cod under two years old have a predominantly inshore distribution but from the age of one to two years old the fish move out on to the banks and become available to the trawl fisheries. Cod at Faroes reach sexual maturity at the age of about 4 years.

1.2 Exploitation and Management

Most of the fishery is concentrated on Faroe Plateau and Faroe Bank, and the bulk of the cod catch is taken by Faroese trawlers and long-liners and by British trawlers. Nominal catches from ICES Division Vb for recent years are given in Table 1.

In the post-war period there was a gradual increase in fishing effort which reached a maximum in the early 1960s by which time it had reached such a level that cod catch rates were severely depressed. Subsequently, a reduction in fishing effort allowed the stock, and consequently catch rates, to recover (see Figure 3). In addition increases in minimum trawl cod end mesh sizes have resulted in a reduced rate of fishing mortality on the younger age groups. In recent years (1978 Working Group Report) fishing effort has again been increasing and by 1976-77 the rate of fishing mortality on the fully exploited age groups of cod on the Faroe Plateau was estimated to be 0.65. This is above F_{max} which is about 0.4 for the current exploitation pattern. With $F = 0.65$ average yields per recruit are likely to be only marginally below those that would be obtained at $F = 0.4$ for fully exploited age groups, but average catch rates would be expected to be reduced to about two-thirds (Figure 4). Similarly the equilibrium spawning stock biomass at $F = 0.65$ would be only about 60% of that which would be obtained if F was maintained at 0.4. The average year class strength for year classes 1957-71 was 16 million at age two for the Plateau stock. The natural mortality rate has been assumed to be 0.2. With the average level of recruitment and the present exploitation pattern the conditional sustainable yield of cod would be 29 000 tons from Faroe Plateau with an additional 2 000 tons from Faroe Bank.

1.3 Distribution of Catches in relation to Zones of Extended Fisheries Jurisdiction

All cod caught in the Faroe statistical Division are taken within the Faroese 200 mile zone.

2. HADDOCK (*Melanogrammus aeglefinus*)

2.1 Biology and Distribution

The eggs of haddock are found practically everywhere around the Faroes. The distribution is not uniform, however, and several centres of high egg density have been noted (Figure 5). Principal centres of density were to the north of the islands, north of latitude $62^{\circ}30'N$ and between longitude $6^{\circ}30'W$ and $7^{\circ}30'W$ and also in the Nolsøy-Fugløy Bank region. Rather smaller concentrations have been noted on grounds to the west of Mykenes and in the extreme south of the islands. Eggs are also found on Faroe Bank.

Larvae are distributed all round the islands and are also found on Faroe Bank (Figure 6).

0-group haddock have been found all around the Faroes, both on the Plateau and also on the Faroe Bank, principally in depths less than 200 m (Figure 7).

Adult haddock are found all round the Faroe Islands on the Plateau and on Faroe Bank, and primarily in water of less than about 200 m. Tagging experiments suggest little, if any, interchange of fish either between the Plateau and Faroe Bank or between these areas and other parts of the North Atlantic (R.Jones, unpubl. data).

2.2 Exploitation and Management

Total international landings of haddock from Faroes have increased in the long term, from about 13 000 tons before the war to reach a peak of 28 000 tons in 1963. Since then landings have declined to fluctuate about a level of about 20 000 tons (see Table 2).

Spawning stock biomass decreased to a minimum in the middle of the 1960s and then increased to reach a peak in 1969. These changes are consistent with the changes in catch per unit effort shown in Figure 8.

There has been a tendency for the F_s at age to decline. For the 4-6 year old fish, for example, which represent a major part of the stock, the weighted mean of the F values declined from about 0.5-0.6 during the early 1960s to less than 0.5 in the early 1970s.

Virtual population analysis gives a value of F on the fully exploited age groups of 0.5 in 1977. This compares with a value of $F_{max} = 0.55$ on the theoretical yield per recruit curve (Figure 9), assuming the exploitation pattern consistent with a 135 mm mesh size.

Fishing for haddock occurs all round the Faroe Islands on the Plateau and at Faroe Bank, in depths mainly less than 200 m.

2.3 Distribution of Catches in Relation to Zones of Extended Fisheries Jurisdiction

All haddock caught in the Faroe statistical Division come from within waters now under the Faroese jurisdiction.

3. HALIBUT (*Hippoglossus hippoglossus*)

3.1 Biology and Distribution

Halibut spawn in depths from about 200 m down to at least 1 000 m, west and southwest of the Faroe Islands. Spawning takes place from late winter till June. The eggs are bathypelagic and have been recorded at 200-700 m depth. Post-larval stages occur generally closer to the surface with maximal abundance at 15-25 m depths, and have been recorded even over a depth of 2 500 m. The drift is not well known, but it is assumed that most of the juveniles are carried by the currents towards the Faroe Islands.

In Faroese waters halibut tend to seek the bottom when they are on the average 2-3 years old, at a length of 35-40 cm. Important nursery areas are fjords, bays and coastal banks. Young halibut are also common on the Faroe Bank, Bailey Bank and Lousy Bank. At 3-4 years of age halibut migrate from the fjords and bays. Maturity appears to be reached at an age of about 8-10 years which means a length of 95-140 cm for females and 85-115 cm for males.

Mature individuals migrate to deeper water and are sparsely represented in commercial catches. Tagging experiments in Faroese waters have demonstrated a considerable migration of halibut from the Faroe Islands to Icelandic waters. Recaptures have also been made in the North Sea. The experiments indicated that it is mainly the larger individuals which leave the area. The rate of migration from other areas to Faroese waters is not known.

From the available data it cannot be concluded if halibut in the Faroe region is sufficiently self-contained to be treated as a stock unit. There are no topographical boundaries between halibut in British, Faroese and Icelandic waters, and it is possible that there is only one population in this general area. It has also been suggested that there may be two populations and that halibut in the Faroe region belong partly to an Icelandic-Faroese stock and partly to a British-Faroese stock.

3.2 Exploitation and Management

Most of the catches of halibut are taken on Faroe Plateau and in Faroese coastal waters including fjords and bays, but there are also some catches on the western banks. There are directed long-line fisheries for halibut by vessels from the Faroes, Norway and United Kingdom, but landings by trawlers are taken mainly as a by-catch.

Catches have decreased considerably during the last 15 years and are at present at a level of about 800 tons per year, whereas the catches around 1960 exceeded 2 000 tons (Table 3). The reduction is caused chiefly by declining United Kingdom catches.

Catch per unit effort by English trawlers increased sharply after the pauses in the fisheries enforced by the wars, but was rapidly reduced to pre-war level. The reduction was in both cases in the order of 50% after 4-5 years of fishing, and this indicates that the stock is vulnerable to exploitation, but apart from this, nothing is known about the state of the stock. There are no conservation measures that apply directly to halibut, but regulations in the trawl fishery, especially the prohibition of fishing inside the 12 n.m. limit introduced in 1964, should give some protection to the younger age groups.

4. LEMON SOLE (Microstomus kitt)

4.1 Biology and Distribution

According to Rae (1965), spawning takes place on all coastal banks at Faroe and on Faroe Bank and is most intense at points within these areas where lemon sole are most numerous. Spawning occurs between May and August, attaining its greatest intensity in June and July. Nothing is known about the drift of larval lemon soles at Faroe but they would be expected to be predominantly retained within the eddy current system which surrounds the islands.

The existence of nursery areas for lemon sole has never been demonstrated. Young lemon sole are thought to adopt a demersal life at a length of about 2-3 cm and to inhabit the same areas as the adults. The main concentrations of adults are on the banks east of the islands.

There seems to be a migration into areas inside the 12 mile limit in May-June and out again in September-October. Lemon sole also occur on Faroe Bank in relatively low abundance.

Taggings in the Faroe area have shown that lemon sole do not make extensive migrations as a rule. The migration seems always to be against the main direction of the current system around Faroes.

4.2 Exploitation and Management

Quantities of lemon sole landed from Faroese waters since 1960 are given in Table 4. Lemon sole are principally taken as a by-catch in the cod and haddock fisheries by trawlers at Faroe. Up to 1970, exploitation was almost exclusively carried out by the United Kingdom trawler fleet. Since 1971, when a licensed trawl fishery inside the 12 mile limit was permitted, Faroese trawlers have also landed considerable quantities of lemon sole. The average age of the fish in Faroese landings is less than that in the United Kingdom landings.

The only attempt to assess the status of the Faroese lemon sole stock was carried out by an ICES Assessment Working Group (Anon., 1975). The exploitation rate on the stock is low and there is no evidence of over-fishing. However, little long-term increase in yield per recruit would be achieved by increasing fishing effort.

No TACs or other regulatory measures have been recommended for Faroese lemon sole other than the minimum landing size of 25 cm and minimum mesh sizes adopted in the interests of other demersal species.

4.3 Distribution of Catches in Relation to Zones of Extended Fisheries

Jurisdiction

All lemon sole caught on the Faroese grounds originate from within the Faroese 200 mile zone and there is no evidence of any appreciable transport of reproductive products to other areas.

5. CONSERVATION MEASURES AT FAROE

Fishing at Faroe in the post-war years has been subject to area and trawl cod-end mesh size restrictions. A three-mile limit was in force until 1959 apart from a re-adjustment due to a change in the baselines established by agreement with effect from 1 July 1955. From 27 April 1959 non-Faroese vessels were excluded from a six-mile zone and in addition, during certain seasons of the year, from three areas between six and twelve miles which were reserved for line fishing only. From 1 March 1964 non-Faroese vessels' rights to fish in any part of the six-to-twelve-mile zone were withdrawn, and a new twelve-mile limit was redrawn from baselines running from headland to headland. This

effectively meant a ban on trawl fishing inside the twelve-mile limit with the exception that since 1971 a licensed trawl fishery by Faroese boats under 60 GRT has been allowed in the summer.

The "Arrangement Relating to Fisheries in Waters Surrounding the Faroes" came into effect at the beginning of 1974. This arrangement restricted trawling by countries party to the Agreement to certain areas at certain times of year, set maximum national catch quotas for cod and haddock and placed restrictions on the amount by which catches of other demersal species could be increased.

In the early 1960s, the minimum trawl mesh size (for manila) was increased to 80 mm. This was further increased to 100 mm with effect from 1 January 1967 and then to 110 mm with effect from 1 January 1970. From 1 January 1974 the mesh size was 130 mm, and was again increased to 135 mm (irrespective of material) with effect from 1 January 1978.

The Faroese Government has extended its fisheries jurisdiction to 200 miles from 1977 and since then was responsible for fisheries' regulations within the 200 mile zone.

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Table 1. Nominal catch (metric tons) of Cod in Division Vb, 1967-77.

(Data for 1967-76 from Bulletin Statistique)

Country	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977*
Belgium	-	-	-	-	-	-	-	-	-	9	-
Faroe Islands	7 835	13 763	15 718	15 245	12 754	12 143	13 276	13 237	22 986	28 959	29 042
France	871	2 519	2 557	2 616	820	224	1 472	567	1 612	1 607	1 271
German Dem.Rep.	63	-	-	-	-	-	-	-	-	-	-
Germany, Fed. Rep.	845	1 562 ^{a)}	403 ^{a)}	443 ^{a)}	580	451	310	292	458	247	285
Netherlands	-	-	-	-	2	-	-	-	60	36	2
Norway	650	686	483	238	881	266	115	446	1 353	1 283	967
Poland	-	-	-	-	-	-	419	320	432	496	-
Spain	-	-	-	-	-	51	55	60	85	33	-
U.K. (Engl.&Wales)	7 996	7 096	6 717	3 707	3 485	3 019	5 079	3 708	3 287	3 056	965
U.K. (Scotland)	8 546	8 524	12 249	9 790	9 102	6 483	6 756	8 019	8 619	6 403	3 500
Total	26 806	34 150	38 127	32 039	27 624	22 637	27 482	26 649	38 892	42 129	36 032

* Preliminary

a) Includes miscellaneous products

Table 2. Nominal catch (metric tons) of Haddock in Division Vb, 1967-77.

(Data for 1967-76 from Bulletin Statistique)

Country	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977*
Belgium	-	-	-	-	-	-	-	-	-	6	-
Denmark	8	-	-	-	-	-	-	-	-	-	-
Faroe Islands	5 246	6 751	11 122	11 791	10 488	8 314	6 018	4 811	8 757	12 714	19 938
France	1 091	2 286	3 314	2 006	815	1 496	3 535	1 461	2 298	2 542	921
German Dem.Rep.	3	-	-	-	-	-	-	-	-	-	-
Germany, Fed. Rep.	24	36	73	14	19	25	46	70	173	22	41
Netherlands	-	-	-	-	29	-	-	-	383	175	32
Norway	-	-	-	-	-	-	-	5	56	20	53
Poland	-	-	-	-	-	-	1 190	685	544	448	...
Spain	-	-	-	-	-	-	32	52	-	-	-
U.K. (Engl. & Wales)	2 347	2 445	1 976	1 137	2 323	1 371	2 426	1 617	2 426	2 284	911
U.K. (Scotland)	4 656	6 339	6 815	6 421	5 762	4 109	4 788	6 072	6 078	8 000	3 500
Total	13 372	17 857	23 300	21 369	19 436	15 315	18 035	14 773	20 715	26 211	25 396

* Preliminary

Table 3. Nominal catch (metric tons) of Halibut in Division Vb, 1967-1977.
 (Data for 1967-1976 from Bulletin Statistique)

Country	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977*
Faroe Islands	245	267	205	296	234	212	256	141	162	300	312
France	-	-	-	-	-	-	-	150	65	-	-
Germany, Fed. Rep.	48	73	19	14	19	38	53	54	73	37	2
Norway	180	90	151	182	197	155	78	56	75	164	122
Poland	-	-	-	-	-	-	5	4	-	-	-
U.K. (England & Wales)	178	130	124	74	92	60	144	105	93	88	-
U.K. (Scotland)	749	698	558	514	371	256	359	218	207	248	-
Total	1 400	1 258	1 057	1 080	913	721	895	728	675	837	-

* Preliminary

Table 4. Nominal catch (metric tons) of Lemon sole in Division Vb, 1960-1976.

(Data from Bulletin Statistique)

Year	Faroe Islands	France	UK England	UK Scotland	Others	Total
1960	-	-	351	1 026	-	1 377
1961	-	-	156	1 009	-	1 165
1962	-	-	187	910	-	1 097
1963	-	-	142	706	-	848
1964	-	27	112	305	-	444
1965	-	42	110	393	-	545
1966	-	49	99	297	-	445
1967	-	14	104	321	-	439
1968	-	20	84	404	-	508
1969	-	-	77	362	2	441
1970	-	-	68	424	-	492
1971	590	-	76	303	-	969
1972	300	-	35	244	-	579
1973	1 190	-	126	393	-	1 709
1974	607	-	137	503	-	1 247
1975	971	-	103	369	1	1 444
1976	813	-	120	312	-	1 245

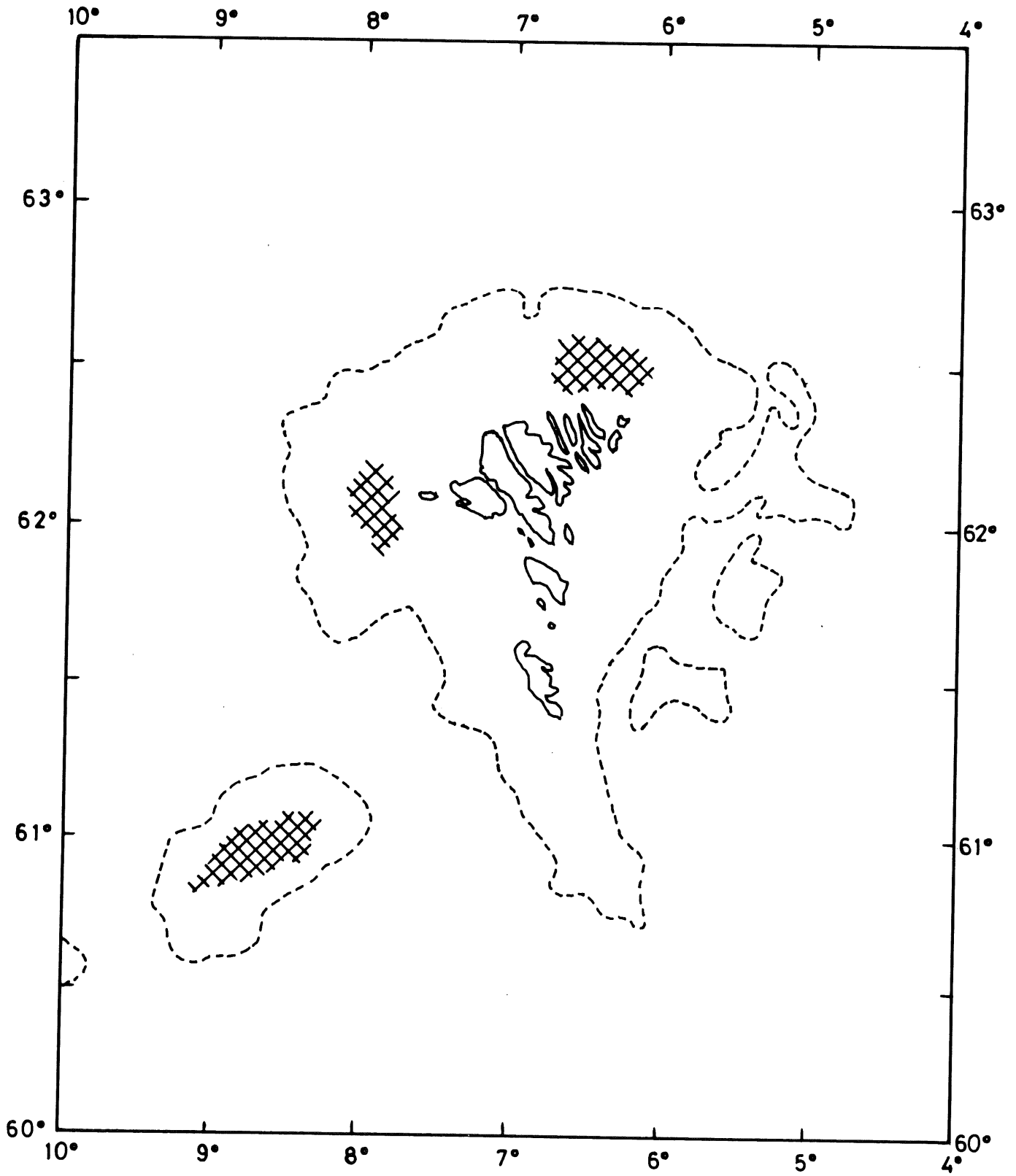


Figure 1. Main spawning grounds of cod at Faroe.
(Source: Data from national laboratories)

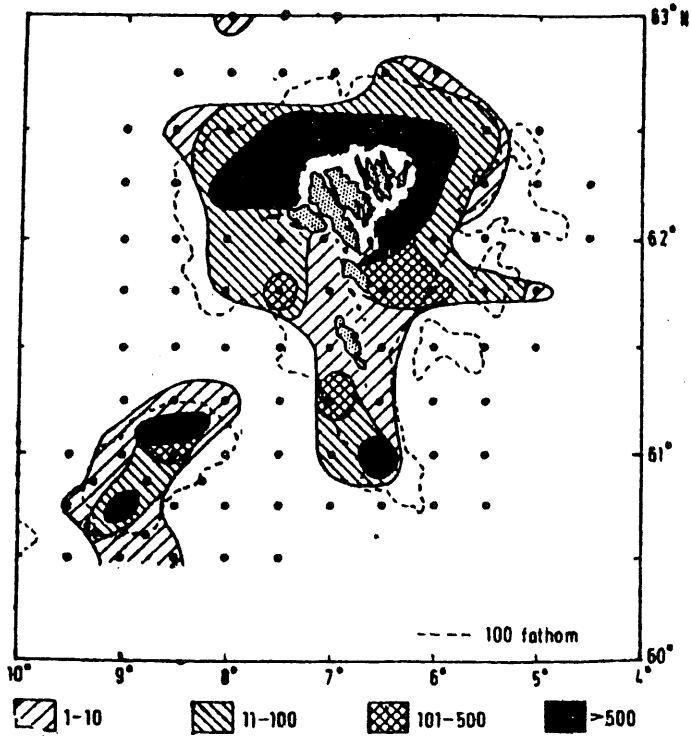
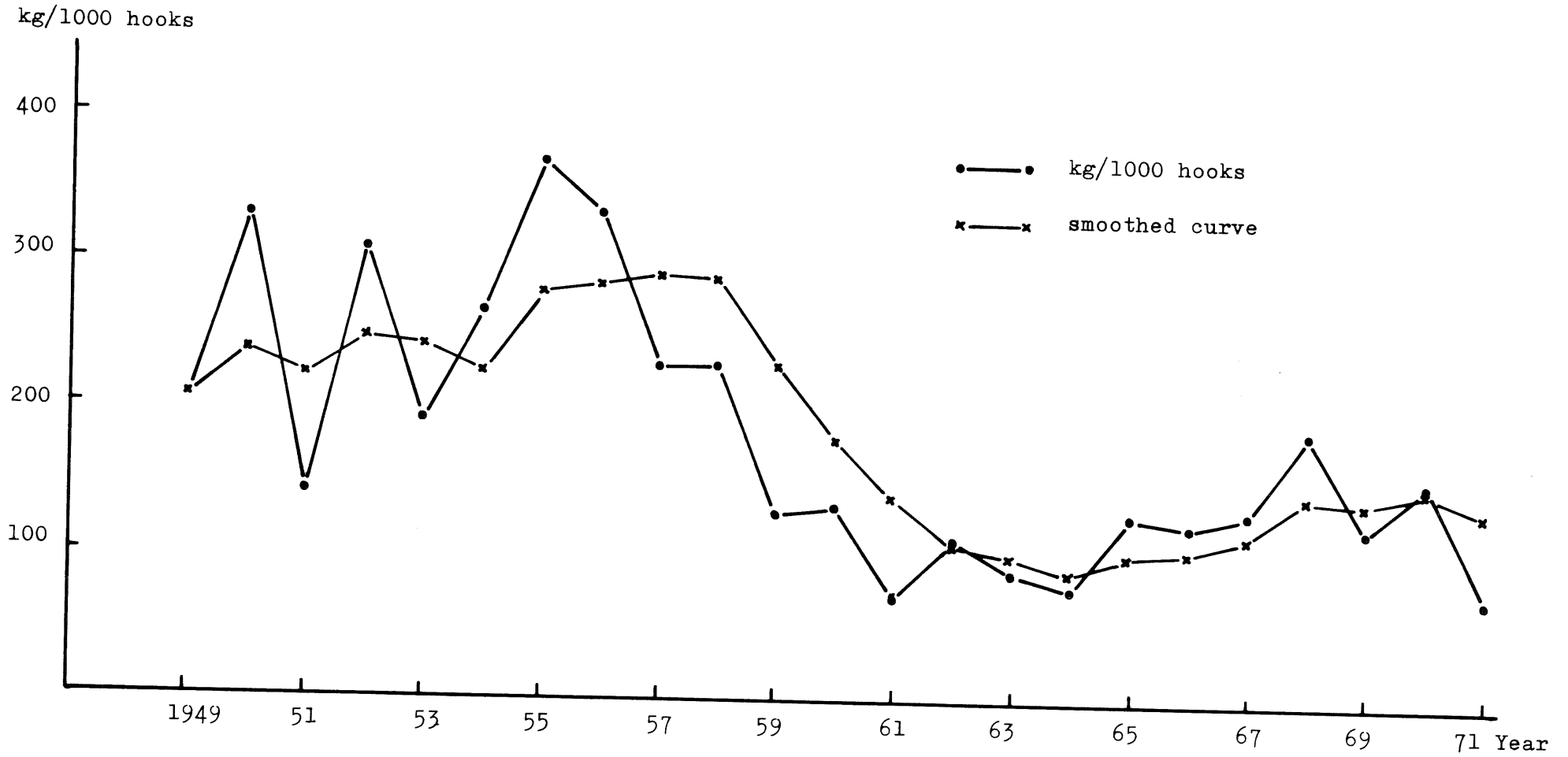


Figure 2. Distribution of 0-group cod.
(Numbers per half-hour tow).
(Source: ICES C.M.1976/F:23)

Figure 3. Cod.
Faroese long-line catch per unit effort.
(Source: K Hoydal, unpubl.)



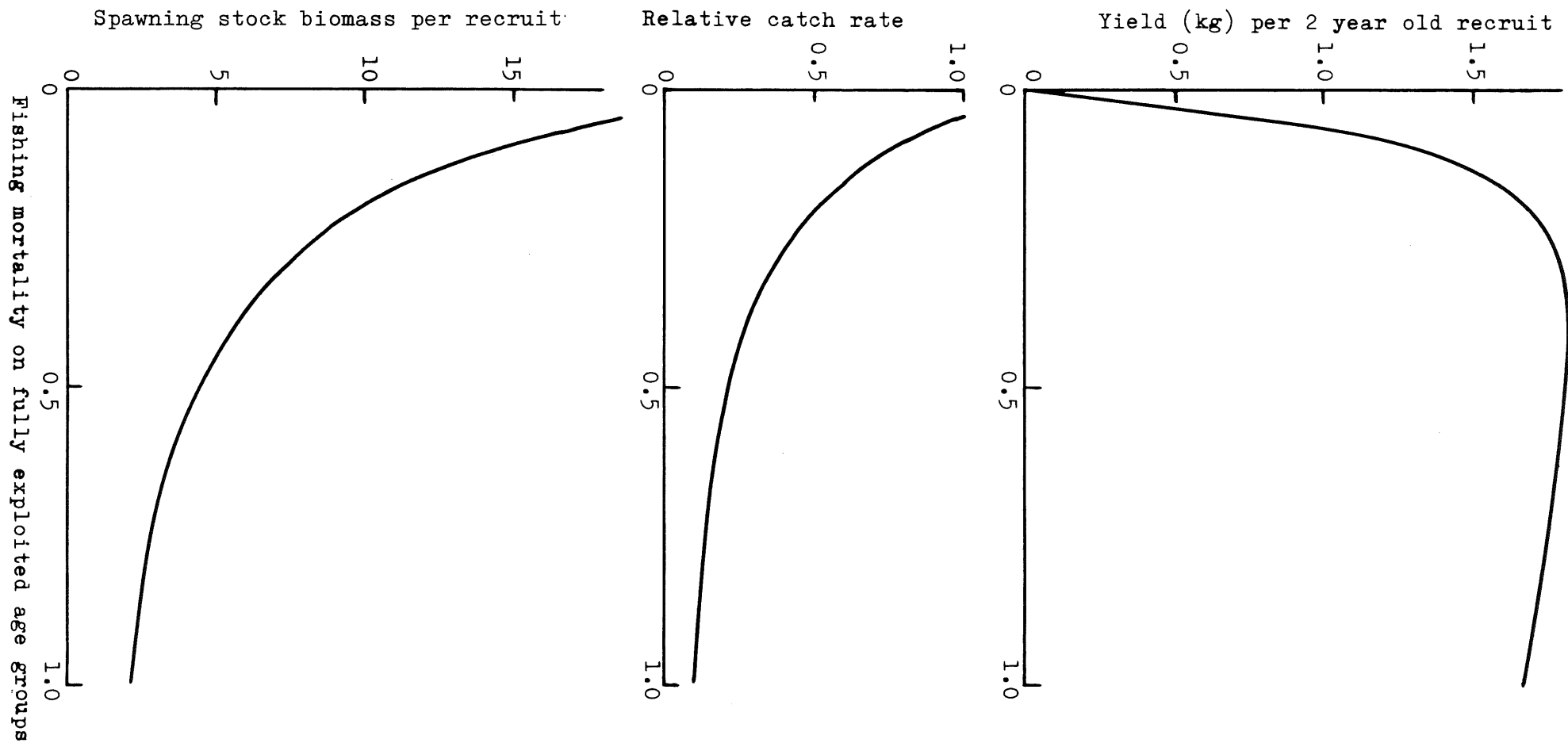
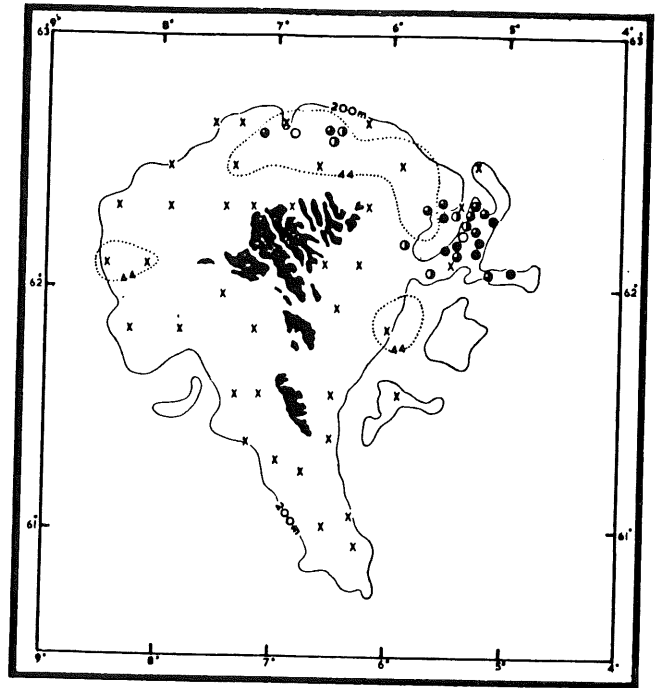
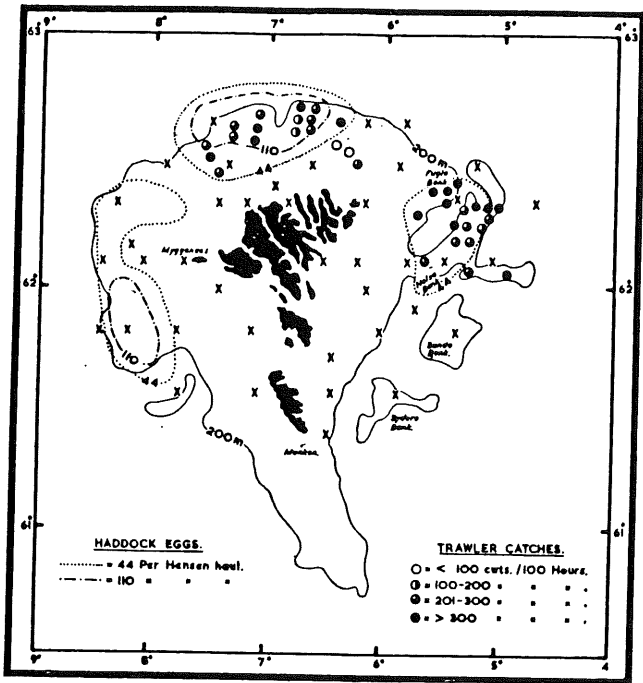
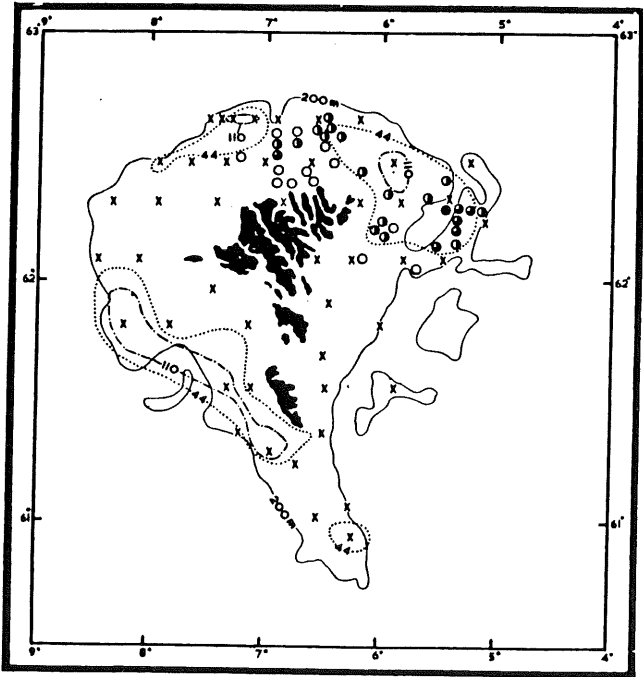


Figure 4. Faroe Plateau Cod.
 Yield per recruit, relative catch rate, and spawning stock biomass per recruit for current exploitation pattern.
 (Source: WG on Fish Stocks at the Faroes - 1978 Report).



A. Distribution of haddock eggs and the catches of haddock by Aberdeen trawlers at Faroe in April 1950.

B. Distribution of haddock eggs and the catches of haddock by Aberdeen trawlers at Faroe in April 1951 (Symbols as in A).



C. Distribution of haddock eggs and the catches of haddock by Aberdeen trawlers at Faroe in April 1952 (Symbols as in A).

D. Distribution of haddock eggs and the catches of haddock by Aberdeen trawlers at Faroe in April 1953 (Symbols as in A).

Figure 5. Distribution of haddock eggs and the catches of haddock in April 1950, 1951, 1952 and 1953. (Source: Saville, 1956).

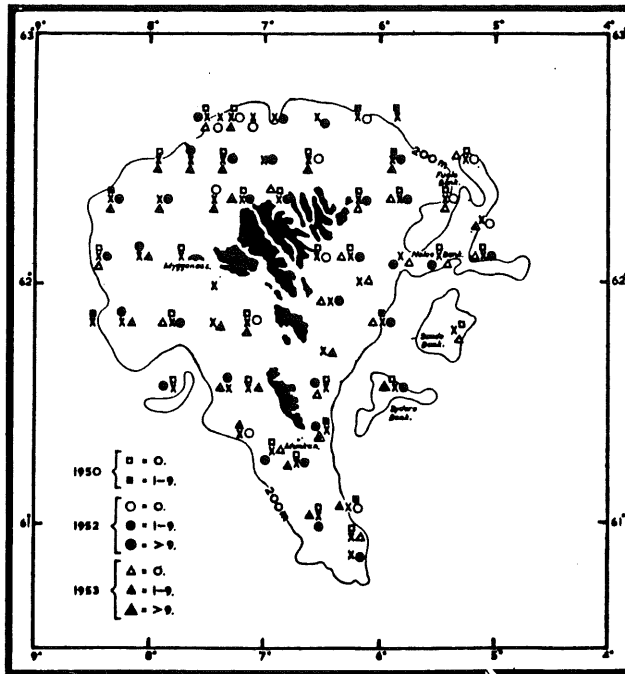


Figure 6. Distribution of haddock larvae at Faroe in June 1950-53. The symbols represent the catches of a 2-metre ring net hauled vertically from bottom to surface.

(Source: Saville, 1956).

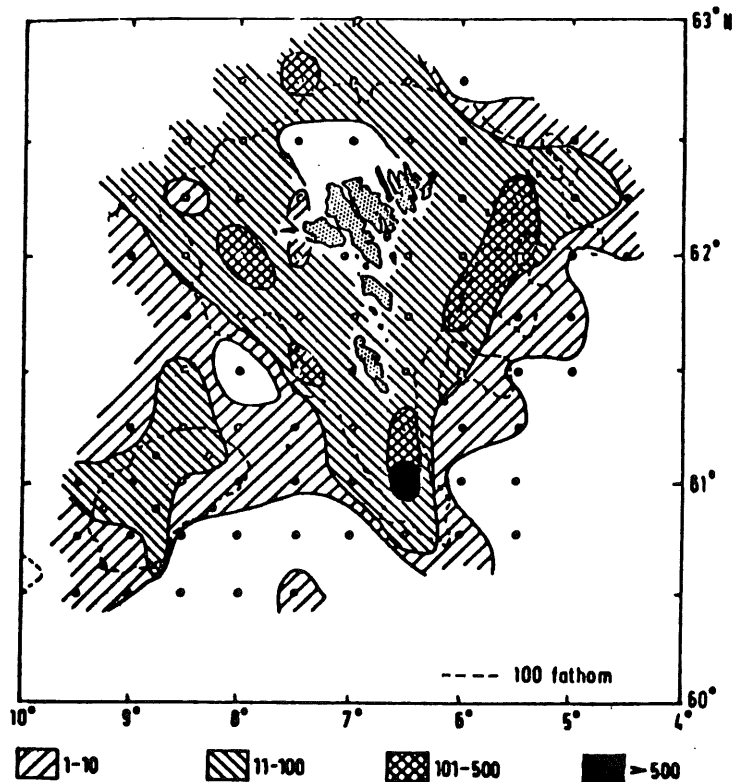
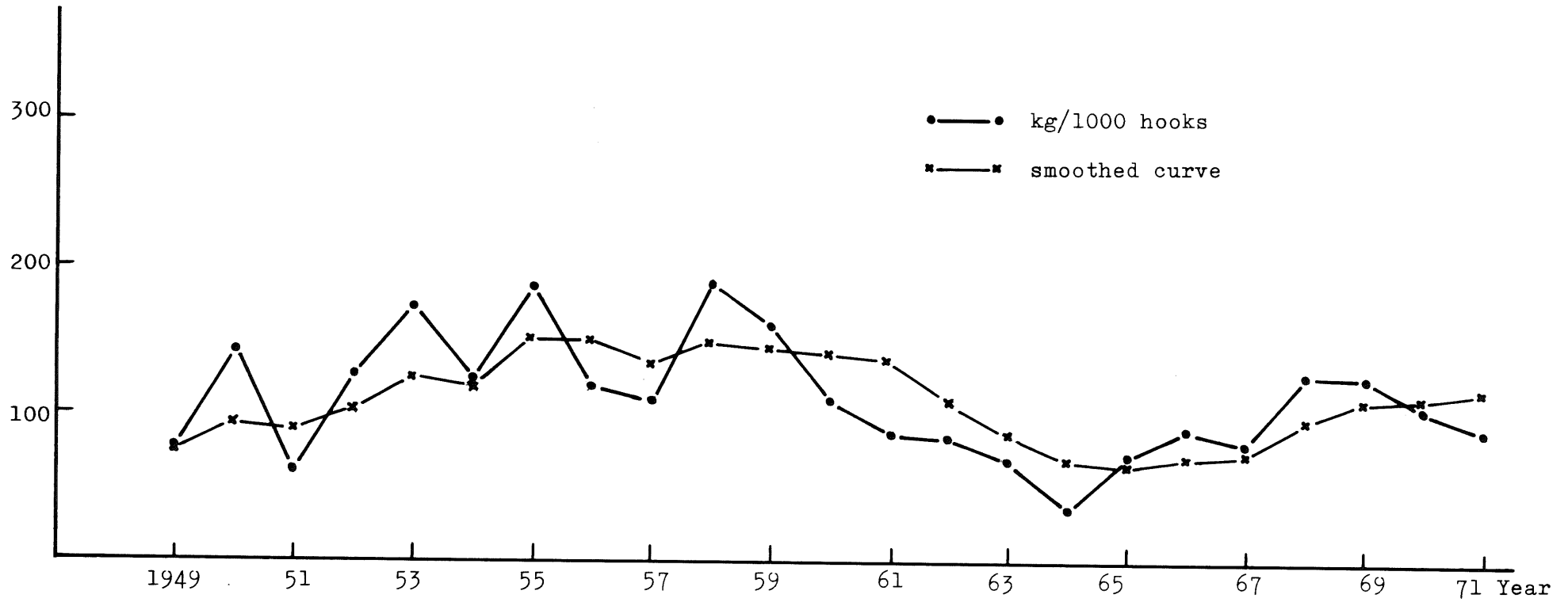


Figure 7. Distribution of 0-group haddock (numbers per half-hour tow). ("Cirolana", 1975).

(Source: ICES C.M.1975/H:51).

Figure 8. Haddock.
Faroese long-line catch per unit effort.
(Source: K Hoydal, unpubl.)

kg/1000 hooks



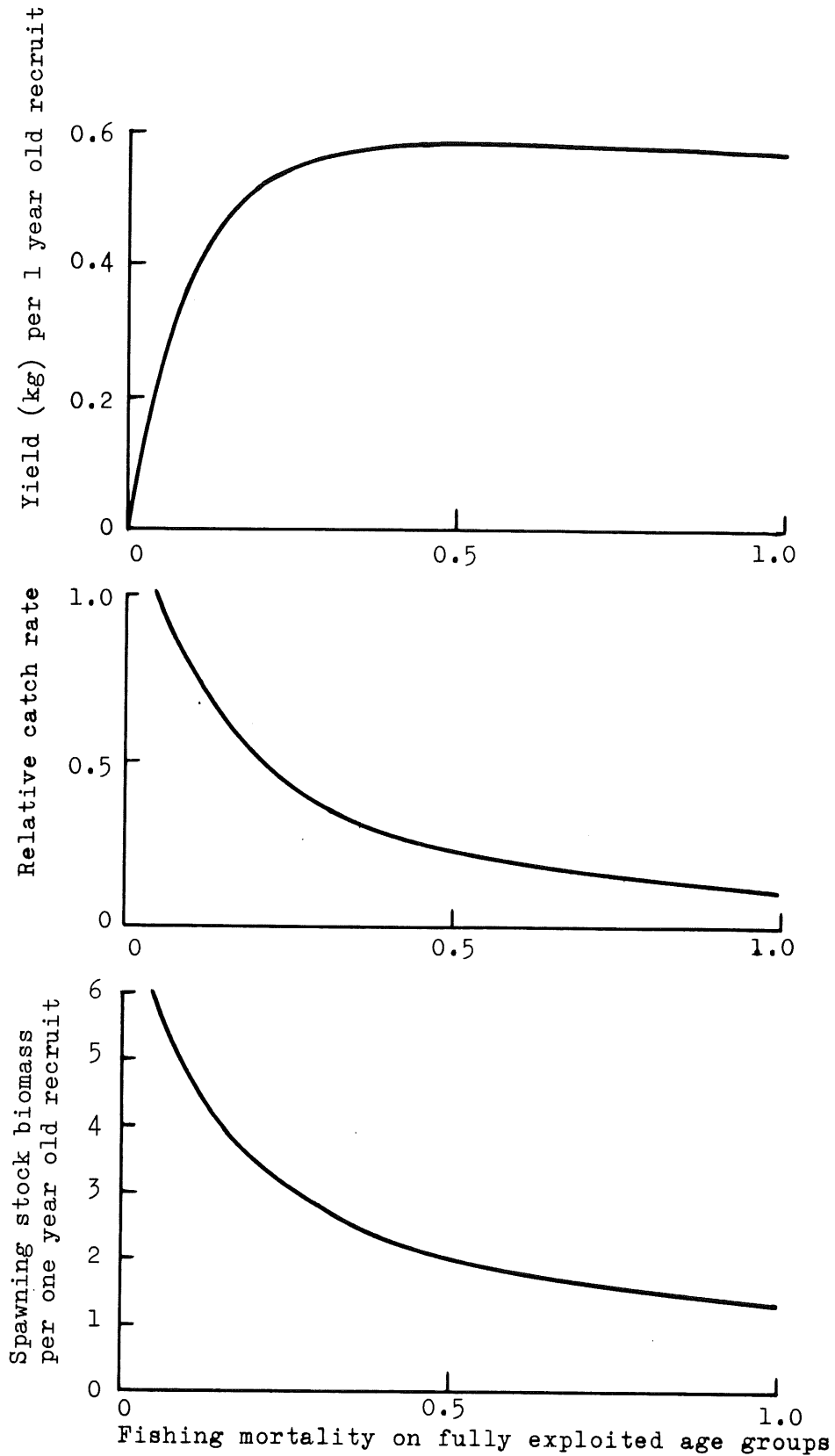


Figure 9. Faroe Haddock. Yield per recruit, relative catch rate and spawning stock biomass per recruit for the current (1978) exploitation pattern. (Source: WG on Fish Stocks at the Faroes - 1978 Report)