This paper not to be cited without prior reference to the Council[x)]

International Council for the
Exploration of the Sea

C.M.1974/F:3
Demersal Fish (Northern) Committee

https://doi.org/10.17895/ices.pub.9530



# REPORT OF THE WORKING GROUP ON FISH STOCKS AT THE FAROES

11 - 15 February 1974, Charlottenlund, Denmark.

## Contents



x)
General Secretary,
ICES,
Charlottenlund Slot,
2920 Charlottenlund,
DENMARK.

## 1. PARTICIPANTS

| | |
|---|---|
| Mr N. Daan | Netherlands |
| Mr K. Hoydal (Chairman) | Faroe Islands |
| Mr B.W. Jones | U.K. (England) |
| Mr R. Jones | U.K. (Scotland) |
| Dr H.H. Reinsch | Fed. Rep. of Germany |
| Mr O. Smedstad | Norway |

Mr D. de G. Griffith, ICES Statistician, also took part in the Meeting.

## 2. TERMS OF REFERENCE

At the 61st Statutory Meeting of ICES a Resolution (C.Res.1973/2:7) was passed recommending the establishment of a Working Group on Fish Stocks at the Faroes, to meet in Charlottenlund to undertake a study of the state of the demersal fish stocks in the Faroes region. The species mainly referred to in this Report are cod, haddock, saithe, blue ling, redfish, lemon sole, halibut and plaice.

## 3. ADMINISTRATIVE MEASURES AFFECTING THE FISHERY

A three-mile limit was in operation until 1959 apart from a readjustment due to a change in the base lines 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 From 1 March 1964 non-Faroese vessels' rights to fish in any part of the six-to-twelve-mile zone were withdrawn, and a new twelve-mile limit was redrawn from base lines running from headland to headland.

This effectively has meant a ban on trawl fishing inside the twelve-mile limit with the exception that in 1971 and 1973 a licensed trawl fishery by Faroese boats under 60 GRT has been allowed in the summer period.

Through the "Arrangement Relating to Fisheries in Waters Surrounding the Faroes", certain areas are to be closed seasonally to trawl fishing. At present little can be said about how this will affect the fishing pattern and the fishing mortality in the stock.

In the early sixties, the minimum trawl mesh size (for single braided manila) was increased to 80 mm. This was increased to 100 mm with effect from 1 January 1967 and this was further increased to 110 mm with effect from 1 January 1970. With effect from 1 January 1974 the mesh size has been increased to 130 mm.

## 4. STATE OF STOCKS IN THE FAROE AREA

### 4.1. COD

#### Introduction

There are two separate stocks of cod at Faroe, the main one on Faroe Plateau and a much smaller stock on Faroe Bank. All the evidence indicates that the two stocks are self-contained with no mixing between the

stocks or with stocks outside the Faroe area. The Plateau stock is by far the more important and contributes the greater part of the catches from the Faroe area (Table 7.1.2, p.43). For this reason the assessments have been concentrated on the Plateau stock. Data for the Bank stock are less reliable and small errors in the division of catches between the two stocks result in big errors for the Bank stock but negligible errors for the Plateau stock.

Trends in Catch, Effort and Catch per Unit Effort

Since 1950 total landings from the ICES statistical Division Vb (Table 7.1.a, p.36) have fluctuated between 23 000 tons and 39 000 tons, with an average value of 30 000 tons. In earlier years, landings of up to 45 000 tons were recorded.

Fishing effort (Table 7.1.3, p. 44) tended to increase in the post-war period reaching a maximum in the years 1960 - 61. This increase in fishing effort was accompanied by a decline in catch rates which reached a minimum level in 1962. Catch rates subsequently improved as the amount of fishing was reduced.

Estimates of Mortality Rates (Plateau Stock)

Fishing mortality coefficients were estimated from Virtual Population Analysis (V.P.A.) and estimates of coefficients of total mortality were available from age composition data per unit fishing effort from English landings.

Data for the V.P.A. were based on age compositions of landings by English, Scottish and Faroese vessels. The Faroese data were not available for Plateau and Bank separately, and it was assumed that 80% of Faroese landings came from the Plateau. Numbers of fish landed in each age group for England, Scotland and Faroe were summed and then raised to the landings for all countries combined (Table 4.1.1, p. 5 ).

Analyses were made using values for the coefficient of natural mortality (M) of 0.2 and 0.3. Estimates of fishing mortality coefficients from the analyses are given in Tables 4.1.2 and 4.1.3 (p. 6 and 7), where the assumed values of F in the oldest age group of each year class are also indicated. The trend in average F for age groups 5 - 8 is what would be expected from the trend in fishing effort over the same period. Maximum values of F were obtained in 1960 and 1961 when fishing effort reached its highest level. Subsequently F values decreased with a smaller increase again in recent years.

The relationship between fishing mortality and fishing effort has been examined in more detail in Figure 1 (p. 11). The fishing mortality coefficients (for M = 0.2) have been estimated for each country separately according to the ratios of the numbers of fish in the catches. The resultant values of F were averaged for each year (age groups 4 - 7 England, 3 - 7 Scotland and 5 - 8 Faroe) and average F was then plotted against fishing effort for each country separately. The same effort units were used for English and Scottish effort and a geometric mean regression line has been fitted. The correlation is significant at the 95% level and the intercept is close to zero. The correlation for the Faroese fishery is not so good, probably due to the difficulty in estimating fishing effort in the line fishery.

A calculation of yield per recruit was made for each country's fishery separately for values of F at each age averaged for the period 1968 - 70 (Tables 4.1.4 and 4.1.5, p. 8 ). The weight at age data used was derived from the mean length of age groups in the English landings converted to weight in kg using the relationship $W = L^3 \times 10^{-5}$. With an overall yield per recruit of 1.45 kg an average recruitment of 23.9 million one-year-olds would be required to provide total average landings of 34 584 tons. From the V.P.A. the estimated average year class strength for the appropriate year classes (1962 - 66) is 21.7 million.

In Table 4.1.6 (p. 9 ) estimates of the coefficient of total mortality (Z) calculated from annual age compositions per unit effort for the English fishery can be compared with values of Z (= F+M) from the V.P.A.

Recruitment and Year Class Strength

Estimates of year class strength as the numbers of one-year-old fish are given in Table 4.1.7 (p.9 ). Year classes 1960 to 1966 showed little variation in abundance with the exception of the very poor 1963 year class. The 1958 and 1959 year classes were of lower abundance. In recent years the data suggest that year classes from 1967 onwards have been of very low abundance. It should be remembered, however, that estimates of year class strength in the most recent years will be in error if incorrect values were assumed for fishing mortality in 1972 in the V.P.A.

Growth

Von Bertalanffy growth parameters were calculated for the Plateau and Bank stocks using mean length at age data from English landings and a least squares fit of the growth curve. The calculated values are given in Table 7.1.5 (p. 46).

Yield per Recruit and Age at First Capture

Yield in weight per recruit was calculated using the Beverton and Holt constant parameter model with the growth parameters given in Table 7.1.5 (p.46) and a natural mortality coefficient of 0.2. The results plotted as yield curves are shown in Figure 2 (p. 12).

Results of the V.P.A. estimates of fishing mortality indicate that full exploitation in the fisheries of the Plateau stock may not be reached until about 7 years of age. Cod are caught first in the Scottish fishery where the full exploitation rate is reached at about 3 years old. In the English fishery the full rate of exploitation is not reached until about 4 years. The equivalent age for the Faroese fishery is about 7 years. Thus fishing mortality increases with age over the range 1 - 7 years. The equivalent mean age at first capture as used in the Beverton and Holt equation would thus be in the range of 3 - 4 years. For a mean age at first capture of 3.5 years, the maximum yield per recruit is obtained at F = 0.4 for the Plateau stock. The mean value of F in the exploited phase as estimated from V.P.A. is about 0.5 and for this level of F the theoretical yield per recruit of 1.62 kg is about 1% below maximum. (This can be compared with the value of 1.45 kg per recruit obtained by the variable F model.)

For the Bank stock, which has a faster growth rate, optimum age at first capture for any given value of F is lower than for the Plateau stock.

Mesh Change Assessment

The effect on catches of the change in trawl cod end mesh size from 110 mm to 130 mm was calculated using a modification of the Gulland method developed by Mr K.P. Andersen. The method checks the assumptions on growth parameters and selection and recruitment curves, and states if they are consistent with the catches observed. Furthermore, it gives the changes in the fishery through the transition period after a change in selectivity, until a new equilibrium has been reached. All the computations were performed by Mr K.P. Andersen. The Working Group is indebted to Mr Andersen for his keen work on the mesh assessment problem, and hopes that a full description of the method and programmes involved will be made available to all those interested. The calculation used the same selection curve for both English and Scottish trawlers. Logistic curves were used to describe the normal selection ogives, and in addition a reverse logistic curve was applied to allow for the oldest fish not being available to the trawlers.

The results of the assessment indicate that the immediate effect would be a loss of about 4% in weight for the trawl fisheries with no change for the Faroese long-liners. The long-term effect would be no change for the trawl fisheries, a 4% gain for the Faroese long-line fishery with an overall net gain of 2%. The results are consistent with what would be expected from earlier assessments (Anon., 1967). Table 4.1.8, (p.10) gives some indication of the changes in the transition period until the new stable situation is reached.

Coincident with the introduction of the larger mesh size in 1974 will be the commencement of new regulatory measures for the Faroe fisheries. In addition to limiting catches, certain areas will be closed to trawlers at certain times of year. The system of closed areas will result in a major change in pattern of trawl fishing. Trawlers will be unable to work many of their traditional grounds at the preferred times of year. Such changes in the seasonal distribution of the trawl fleets are bound to have an effect on their catches and catch composition. In these circumstances it is likely to be impossible to distinguish any mesh change effects from the effects of changes in the pattern of fishing. Over the past history of the fishery a change in the distribution of fishing of comparable magnitude was the introduction of the 12-mile limit in 1964. One of the results of this change was a reduction of fishing mortality on the younger age groups of cod and haddock and this is clearly seen in the results of the V.P.A.

With recruitment at an average level a total allowable catch (T.A.C.) of 30 000 tons, as was adopted in the "Arrangement Relating to Fisheries in Waters Surrounding the Faroes", would be consistent with the present level of exploitation. It has been mentioned in an earlier section that the year classes 1967 onwards appear to be well below average abundance. Estimates for these recent years, however, could be subject to error if the values assumed for F in 1972 used in the V.P.A. were incorrect. If in fact there is a series of poor year classes recruiting to the fishery a lower T.A.C. would be advisable.

Table 4.1.1. Faroe Plateau Cod.
Total catch by all countries (thousands of fish) in each age group used for Virtual Population Analysis.

| Year Class | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10+ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1949 | | | | | | | | | | 6 |
| 1950 | | | | | | | | | 10 | 38 |
| 1951 | | | | | | | | 50 | 61 | 40 |
| 1952 | | | | | | | 207 | 131 | 29 | 5 |
| 1953 | | | | | | 200 | 171 | 78 | 22 | 2 |
| 1954 | | | | | 1 731 | 876 | 372 | 94 | 30 | 14 |
| 1955 | | | | 858 | 513 | 232 | 93 | 48 | 41 | 7 |
| 1956 | | | 4 239 | 2 574 | 1 066 | 481 | 204 | 79 | 63 | 42 |
| 1957 | | 2 002 | 4 027 | 1 331 | 855 | 284 | 158 | 48 | 33 | 27 |
| 1958 | 331 | 4 728 | 2 686 | 1 255 | 662 | 350 | 155 | 104 | 27 | 45 |
| 1959 | 859 | 3 093 | 2 500 | 1 280 | 630 | 363 | 197 | 64 | 11 | 3 |
| 1960 | 1 223 | 4 424 | 3 958 | 2 300 | 1 416 | 606 | 309 | 105 | 92 | 40 |
| 1961 | 815 | 4 110 | 3 021 | 2 564 | 1 339 | 847 | 452 | 203 | 44 | 71 |
| 1962 | 1 181 | 2 033 | 3 230 | 2 080 | 1 706 | 1 226 | 713 | 300 | 179 | 25 |
| 1963 | 122 | 852 | 970 | 860 | 945 | 477 | 244 | 114 | 25 | |
| 1964 | 162 | 1 337 | 2 690 | 2 663 | 1 538 | 752 | 510 | 154 | | |
| 1965 | 53 | 1 609 | 3 322 | 3 300 | 1 685 | 1 451 | 596 | | | |
| 1966 | 127 | 1 529 | 3 106 | 2 172 | 1 287 | 1 021 | | | | |
| 1967 | 34 | 878 | 1 163 | 821 | 596 | | | | | |
| 1968 | 68 | 402 | 757 | 810 | | | | | | |
| 1969 | 35 | 328 | 1 176 | | | | | | | |
| 1970 | 78 | 875 | | | | | | | | |
| 1971 | 44 | | | | | | | | | |
| 1972 | | | | | | | | | | |

Derived from English, Scottish and Faroese catch in numbers.
Faroese catch on Plateau estimated as .8 x total Vb.

Table 4.1.2. Faroe Plateau Cod.
Estimates of fishing mortality coefficients from Virtual Population Analysis (M = 0.2)

| Year | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age Group | | | | | | | | | | | | | | |
| 1 | .02 | .06 | .05 | .04 | .05 | .01 | .01 | .00 | .01 | .00 | .01 | .00 | .01 | |
| 2 | .18 | .45 | .34 | .28 | .25 | .12 | .12 | .09 | .08 | .10 | .13 | .07 | .05 | .1 |
| 3 | .49 | .68 | .50 | .50 | .42 | .30 | .27 | .20 | .26 | .24 | .29 | .26 | .18 | .25 |
| 4 | .48 | .63 | .50 | .47 | .53 | .47 | .44 | .28 | .27 | .44 | .39 | .34 | .29 | .3 |
| 5 | .65 | .60 | .59 | .70 | .48 | .54 | .60 | .44 | .39 | .55 | .50 | .35 | .34 | .35 |
| 6 | .43 | .82 | .61 | .59 | .54 | .51 | .69 | .56 | .56 | .54 | .60 | .49 | .58 | .5 |
| 7 | .68 | .83 | 1.07 | .52 | .53 | .65 | .45 | 1.08 | .62 | .66 | .71 | .71 | .72 | .5 |
| 8 | .29 | 1.36 | 1.27 | .91 | .57 | .41 | .42 | .63 | 1.46 | .44 | .73 | .76 | .90 | .5 |
| 9 | .16 | .68 | 1.54 | 2.06 | .86 | 1.54 | .67 | .58 | .33 | 1.20 | .90 | .33 | 1.70 | .5 |
| 10+ * | .5 | .5 | .5 | .5 | .5 | .5 | .5 | .5 | .5 | .5 | .5 | .5 | .5 | .5 |
| Average 5-8 yr | .51 | .90 | .89 | .69 | .53 | .53 | .54 | .68 | .76 | .55 | .64 | .58 | .64 | |

* Values of F shown for 1972 and for age group 10+ are assumed values.

Table 4.1.3. Faroe Plateau Cod.
Estimates of fishing mortality coefficients from Virtual Population Analysis (M = 0.3).

| Year / Age Group | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972*) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.01 | 0.05 | 0.04 | 0.03 | 0.03 | 0.01 | 0.01 | 0.001 | 0.004 | 0.002 | 0.01 | 0.002 | 0.01 | |
| 2 | 0.14 | 0.35 | 0.27 | 0.21 | 0.19 | 0.08 | 0.08 | 0.01 | 0.01 | 0.01 | 0.01 | 0.04 | 0.03 | 0.08 |
| 3 | 0.40 | 0.56 | 0.39 | 0.41 | 0.34 | 0.23 | 0.20 | 0.15 | 0.20 | 0.17 | 0.21 | 0.19 | 0.13 | 0.2 |
| 4 | 0.40 | 0.52 | 0.41 | 0.37 | 0.44 | 0.38 | 0.35 | 0.22 | 0.22 | 0.35 | 0.30 | 0.25 | 0.22 | 0.24 |
| 5 | 0.56 | 0.50 | 0.48 | 0.58 | 0.38 | 0.46 | 0.49 | 0.36 | 0.32 | 0.46 | 0.40 | 0.27 | 0.26 | 0.28 |
| 6 | 0.38 | 0.72 | 0.51 | 0.47 | 0.43 | 0.40 | 0.62 | 0.46 | 0.46 | 0.46 | 0.50 | 0.39 | 0.46 | 0.4 |
| 7 | 0.61 | 0.75 | 0.94 | 0.44 | 0.43 | 0.52 | 0.35 | 0.98 | 0.51 | 0.54 | 0.62 | 0.60 | 0.59 | 0.4 |
| 8 | 0.23 | 1.24 | 1.17 | 0.77 | 0.50 | 0.33 | 0.33 | 0.49 | 1.31 | 0.37 | 0.57 | 0.68 | 0.74 | 0.4 |
| 9 | 0.12 | 0.55 | 1.32 | 1.81 | 0.70 | 0.13 | 0.54 | 0.46 | 0.25 | 1.01 | 0.74 | 0.26 | 1.47 | 0.4 |
| 10+*) | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| Average 5 - 8 yr | 0.45 | 0.80 | 0.78 | 0.57 | 0.44 | 0.43 | 0.45 | 0.57 | 0.65 | 0.46 | 0.52 | 0.49 | 0.51 | |

*) Values of F shown for 1972 and for age group 10+ are assumed values.

Table 4.1.4. Faroe Plateau Cod.
Estimates of average fishing mortality coefficients for the period 1968 - 70, sub-divided between the main countries.

| Age Group | Average Fishing Mortality 1968-70 | | | |
|---|---|---|---|---|
| | Total | England | Scotland | Faroe |
| 1 | .00 | .00 | .00 | .00 |
| 2 | .10 | .02 | .06 | .01 |
| 3 | .26 | .05 | .13 | .05 |
| 4 | .39 | .07 | .14 | .13 |
| 5 | .47 | .07 | .11 | .24 |
| 6 | .54 | .06 | .09 | .32 |
| 7 | .69 | .09 | .14 | .35 |
| 8 | .64 | .07 | .10 | .40 |
| 9 | .81 | (.09) | (.13) | (.51) |
| 10+ | (.7) | (.08) | (.11) | (.44) |

Table 4.1.5. Faroe Plateau Cod.
Estimates of yield per recruit taken by the main countries.

| Age Group | N | Total F | $F/Z\ (1-e^{-Z})$ | $\bar{w}$ | Yield in Weight | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | E | S | F | Total |
| 1 | 1 000 | .00 | | | | | | |
| 2 | 819 | .10 | .086 | .98 | 13.8 | 41.4 | 6.9 | 69.0 |
| 3 | 607 | .26 | .208 | 1.93 | 46.3 | 121.8 | 46.3 | 243.6 |
| 4 | 383 | .39 | .295 | 3.10 | 63.1 | 126.1 | 115.6 | 350.3 |
| 5 | 212 | .47 | .343 | 4.12 | 44.9 | 68.9 | 152.8 | 297.5 |
| 6 | 109 | .54 | .382 | 5.18 | 23.7 | 36.6 | 127.1 | 215.5 |
| 7 | 52 | .69 | .457 | 6.38 | 19.7 | 30.4 | 77.4 | 151.8 |
| 8 | 21 | .64 | .433 | 7.66 | 7.7 | 11.2 | 43.9 | 69.7 |
| 9 | 9 | .81 | .510 | 8.52 | 4.3 | 6.3 | 24.7 | 39.2 |
| 10+ | 3 | .7 | .462 | 9.27 | 1.4 | 2.1 | 8.2 | 13.0 |
| Yield per Recruit kg | | | | | 0.225 | 0.445 | 0.603 | 1.450 |
| Average Landings 1968-70 (tons) | | | | | 5 840 | 10 188 | 14 909 | 34 584 |

Table 4.1.6. Faroe Plateau Cod.
Comparison of estimates of coefficients of total mortality (Z) from English catch per unit effort data and from Virtual Population Analysis.

| From Catch per Unit Effort (Average 1967/8 - 1971/2) | | From Virtual Population Analysis Average 1967-71 | | |
|---|---|---|---|---|
| Age Group | Z | Age Group | Z | |
| | | | M = 0.2 | M = 0.3 |
| | | 4 | 0.55 | 0.57 |
| 4-5 | 0.48 | | | |
| | | 5 | 0.63 | 0.64 |
| 5-6 | 0.74 | | | |
| | | 6 | 0.75 | 0.75 |
| 6-7 | 0.72 | | | |
| | | 7 | 0.88 | 0.87 |
| 7-8 | 1.03 | | | |
| | | 8 | 1.06 | 1.03 |

Table 4.1.7. Faroe Plateau Cod.
Estimates of year class strength as the numbers of one-year-old fish from Virtual Population Analysis.

| Year Class | Stock Size (Millions) | |
|---|---|---|
| | M = 0.2 | M = 0.3 |
| 1958 | 17.7 | 24.7 |
| 1959 | 15.4 | 21.0 |
| 1960 | 26.0 | 36.8 |
| 1961 | 25.6 | 37.8 |
| 1962 | 26.4 | 40.6 |
| 1963 | 10.0 | 15.7 |
| 1964 | 21.3 | 33.0 |
| 1965 | 28.2 | 45.3 |
| 1966 | 22.5 | 36.0 |
| 1967 | 9.7 | 15.5 |
| 1968 | 8.1 | 13.0 |
| 1969 | 9.2 | 14.2 |
| 1970 | 15.2 | 17.8 |

Table 4.1.8. Faroe Cod.
Effect of a change of trawl cod-end minimum mesh size from 110 mm to 130 mm.

| Years after Change | Percentage Change | | |
|---|---|---|---|
| | U.K. Trawlers | Faroese Long-Liners | Total All Gears |
| 1 | -4 | 0 | -2 |
| 5 | -1 | +2 | 0 |
| 10 | 0 | +3 | +2 |
| 15 | 0 | +4 | +2 |

Figure 1. Faroe Plateau Cod. Relationship between annual estimates of the fishing mortality coefficient (M = 0.2) and fishing effort for England, Scotland and Faroe. Lines fitted by geometric mean regression (England and Scotland) and by eye (Faroe).

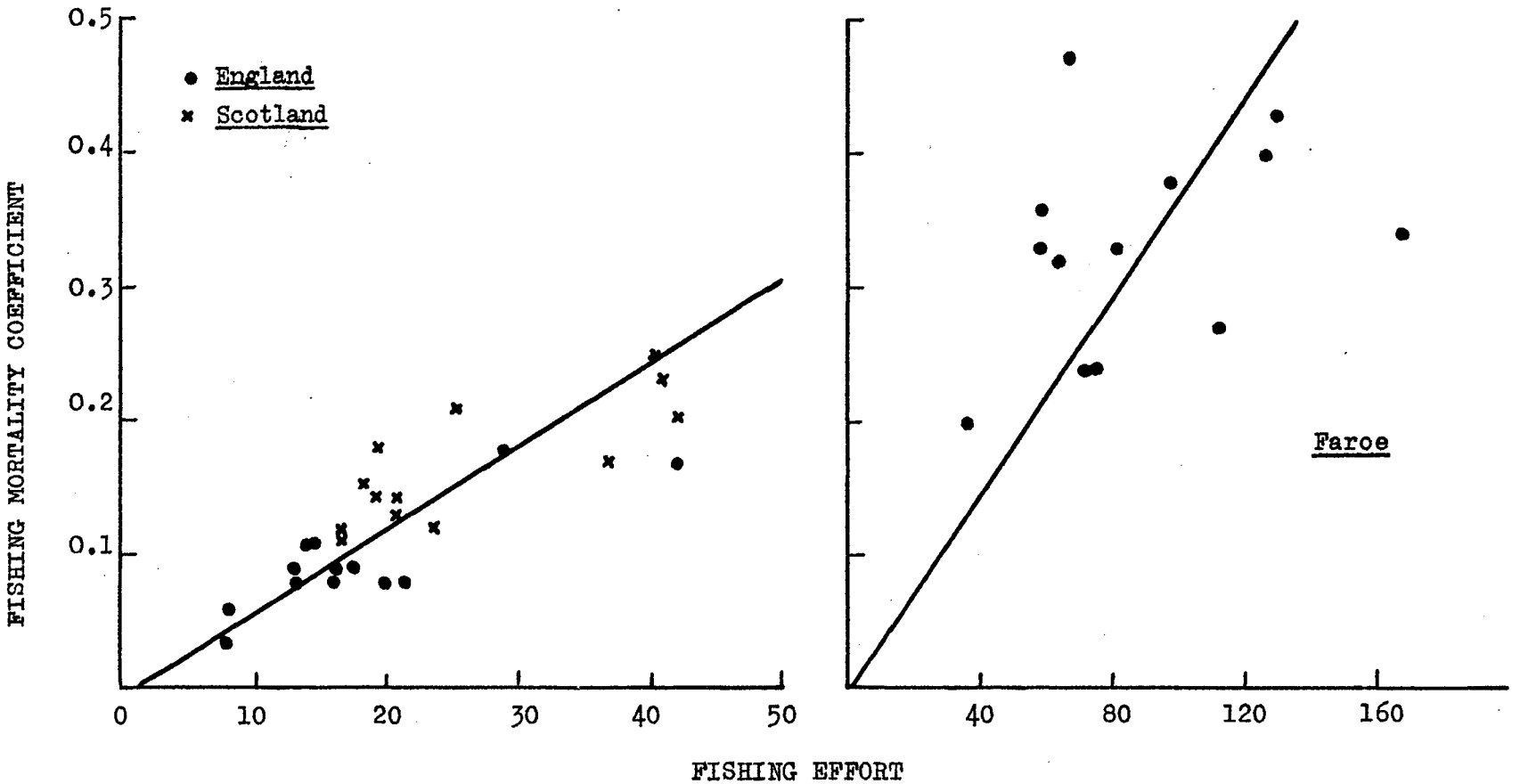
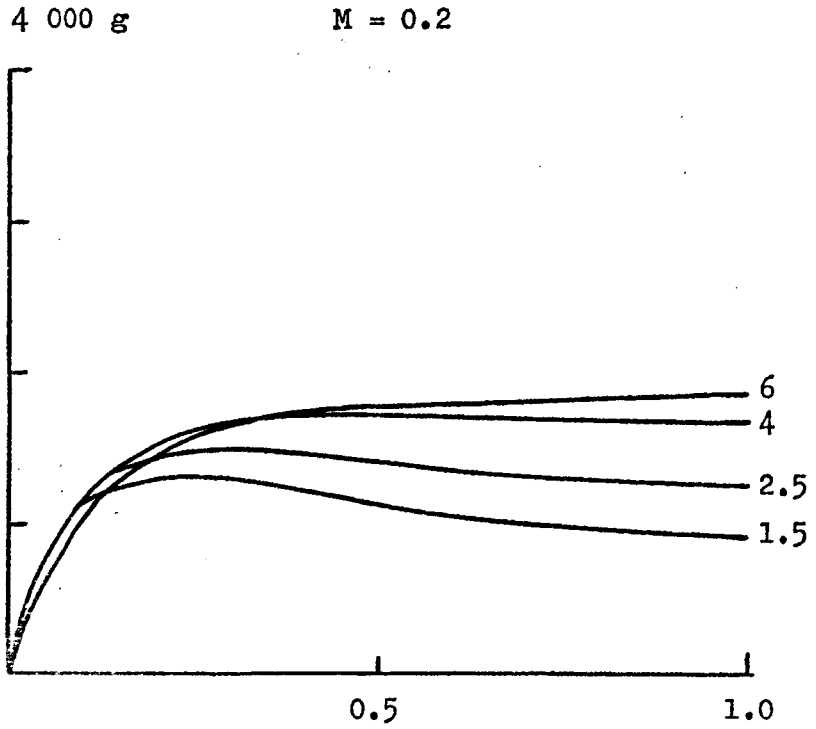
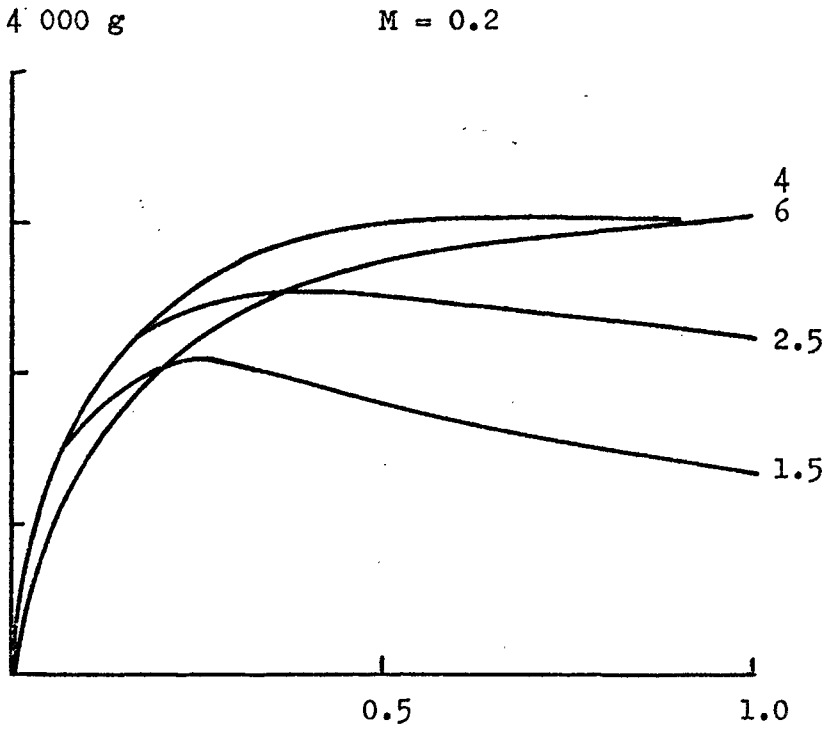


Figure 2. Yield per Recruit for different ages at first capture.
Faroe Plateau and Faroe Bank stock.




FAROE PLATEAU COD




FAROE BANK COD





F. 2

## 4.2. HADDOCK

### Introduction

As in the case of cod, there are stocks of haddock on Faroe Bank and Faroe Plateau that are believed to be independent of each other. Most haddock data have been collected from the Plateau stock and for this reason, as well as the fact that the greater part of the catches come from this area, assessments have been made for this stock only.

Total international landings of haddock have tended to increase in the long term over the period 1924-1963. During this period, landings increased from about 10 000 tons annually to about 24 000 tons annually. Since 1963, landings have decreased and in 1972 they were 16 000 tons (Table 7.1.b, p.36).

With regard to the landings by different countries, landings by Scottish vessels have followed a similar trend to the total landings, increasing to a maximum in 1962 and then declining. English landings increased from about 8 000 to 13 000 tons from 1924-1938. After the war, landings decreased from 11 000 tons to about 2 000 tons from 1946-1973.

Recorded Faroese landings were negligible before the war, but increased gradually after the war to a maximum of 12 000 tons in 1970. Since then Faroese landings have declined.

### Landings per Unit Effort (Table 7.1.3 p.44).

For haddock there have been annual fluctuations, but no significant trend in the landings per unit effort during the past 20 years. Good year classes in 1961 and 1966 accounted for the increase in landings in 1963 and 1969.

### The Virtual Population Analysis

The virtual population analysis has been based on estimates of the numbers of haddock of each age group landed each year by Scottish, English and Faroese vessels fishing at Faroe.

For Scottish vessels, samples for length and age composition have been taken monthly on Aberdeen fish market since 1950. For English vessels samples for length composition have been taken by the Lowestoft Laboratory for the years 1957-1972. Age compositions have been determined for these data using the Scottish age/length keys. For Faroese line vessels, samples for length composition have been supplied by the Fisheries Laboratory, Tórshavn in 1960, 1961 and 1969. These have been combined and converted into a single age composition using Scottish age/length keys and this has been used to derive an age composition for the Faroese landings for each year from 1957-1972.

By combining the numbers landed by Scottish, English and Faroese vessels estimates were made of the total numbers landed at each age by these nations. These are arrayed by year class and age in Table 4.2.1,(p.17). If required, these can be further raised, so as to be applicable to the landings by all nations, by increasing each number by 7%.

A V.P.A. was done for each year class separately (Tables 4.2.2 and 4.2.3, p.18 and 19). These Tables show values of F and stock numbers for each year class, arranged by year of capture.

Mean Values of F

Inspection of the values of F shows that these vary both with time and age. For the two youngest age groups sampled (i.e. the one- and two-year-old fish) values of F tend to be very small due to the fact that these age groups are only partially exploited. For fish more than 6 years of age the values are variable, and in any event unreliable, since these are dependent on the starting values adopted for F. For calculating annual values therefore, only the values for 3-6 year-old fish have been used and mean values for these four age groups are shown in Tables 4.2.2 and 4.2.3, (p.18 and 19).

To investigate the relationship between fishing mortality and fishing effort, the annual values of F were plotted against estimates of annual fishing effort. To make this comparison as meaningful as possible, the values of F were first sub-divided into estimates of F for each country separately. This was done by sub-dividing each value on the basis of the proportions of the total landings attributable to each country in each year. These annual values of F were then plotted against the respective national fishing efforts for each country separately.

Some results are shown in Figure 3 (p.23) based on values of F derived from the V.P.A. assuming M = 0.3. The relationship between F and effort (f) were found to be highly correlated. The geometric mean regressions were found to be as follows:

| | | |
|---|---|---|
| Scotland | F = .0017 | f = 0.024 |
| England | F = .0050 | f = 0.025 |
| Faroe | F = .0037 | f = 0.112 |

Similar plots were tried starting with values of F from the V.P.A. based on values of M of 0.2, 0.4 and 0.5. In each case the results appeared similar to those in Figure 3. There appeared to be no good reason for accepting the results based on any one value of M as being better than the others so that no estimate of M could be obtained by this method. It was reassuring, however, to find such good correlations between the national values of F and their respective fishing efforts.

Mortality Rates of Haddock

Total instantaneous mortality coefficients (Z) have been estimated by various methods and the results are shown in Table 4.2.4 (p.20). Values based on the landings per unit effort in successive years using Aberdeen and English trawl data, gave values of Z for fish of 3-7 years of age of about 0.6 - 0.8. Estimates based on V.P.A. were very similar, although they tended to be a little lower for the younger age groups.

Recruitment

Estimates of year class strength for Faroe haddock are given in Table 4.2.5 (p.21). These include estimates based on research vessel estimates of haddock in their second year of life. There are also estimates based on the landings per 100 hours' fishing by Aberdeen trawlers of haddock in their fourth year of life. For comparison, absolute estimates are given of year class strength based on the V.P.A.

Of particular significance in recent years has been the occurrence of a good year class in 1966, followed by a sequence of average or less than average year classes. This has contributed to the decline in total haddock landings since 1969.

Estimation of Growth Parameters

Bertalanffy parameters have been calculated for Faroe haddock based on mean lengths of fish and each age landed on Aberdeen fish market for the period 1950-1971. Parameters obtained are given in Table 7.1.5(p.46). These values for the various parameters were used in subsequent Beverton and Holt yield per recruit assessments.

First Availability and Age at First Capture

Young haddock are widely distributed over the Plateau and the Bank and are thought to become available to trawling at an average age of 1 - 1 1/2 years and a length of about 18-25 cm. With a mesh size of 130 mm, the 50% lengths and ages at first capture (i.e. the length, or age, at which 50% of the fish are retained (by the codend)) are 44.2 cm and 3.5 years for haddock. For this species, therefore, the age at first capture is mainly influenced by mesh size rather than by availability as in cod.

The Effect on Haddock Landings of an Increase in Mesh Size

Assessments of the effect of an increase in mesh size from 110 mm to 130 mm have been made using the same method as that used for cod. The results are given in Table 4.2.6 (p. 22). These show that in the first year after the change, Scottish and English trawlers could be expected to lose 32% and 28% of their catches. Faroese long-liners should benefit by 2%.

Values for intermediate years are given in the Table and it is shown that the long-term effect would be for Scottish and English trawlers to lose 20% and 16% respectively and for Faroese vessels to gain 22%.

Previous estimates (Anon., 1966) took account of the possible effect of discards on the assessments. No recent discard data are available, but it should be noted that if discarding does occur, the losses experienced by trawlers should not be as great as indicated in Table 4.2.6 (p. 22). In the absence of the necessary data for calculating this effect, the trawl losses indicated should be regarded as overestimates.

The Effect of Fishing on Haddock

Assessments have been made of the relationship between yield and fishing mortality rate for Faroe haddock. Figure 4 (p. 24) shows yield per recruit curves calculated using the Beverton and Holt constant parameter formula. For haddock, the maximum yield per recruit is expected from a fishing mortality rate of 0.3 - 0.5. The present fishing mortality rate is about 0.5. This assessment indicates, therefore, that the yield per recruit is close to its theoretical maximum. Estimates of fishing mortality rate at each age from the V.P.A. show that these are not constant with age. This suggests that a more realistic estimate could be made by using a model in which F is varied with age in the way indicated by the V.P.A. This has been done using the values of F at each age calculated for the period 1970-1971. The effect on the landings of varying F at each age by various percentages was determined by the method of Jones (1961), and the results are shown in Figure 5 (p.25). Curves are drawn for values of

M = 0.2 and 0.3 and they confirm the conclusion from the constant parameter assessment that at present the yield per recruit is close to its theoretical maximum.

The Effect of the Closure of Certain Areas to Fishing

A large proportion of the haddock stock at Faroe is taken within the 100 fathom depth contour and much of this is within 20 miles of the present base-line. For this reason the closure of areas outside the current 12-mile limit will restrict the activities of trawlers to a smaller proportion of the region within the 100 fathom line. It is not possible to assess the effect of this with any certainty. It is possible, however, that it could lead to the reduction in fishing effort on at least some age groups, and possibly, therefore, to an alteration in the way in which the fishing mortality rate varies with age.

Table 4.2.1. Landings of Faroe Haddock (thousands).
Faroe, Scotland, England combined.

| Year Class | Age | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1+ | 2+ | 3+ | 4+ | 5+ | 6+ | 7+ | 8+ | 9+ | 10+ |
| 1947 | | | | | | | | | | 57.5 |
| 1948 | | | | | | | | | 93.9 | 104.5 |
| 1949 | | | | | | | | 226.6 | 125.2 | 46.9 |
| 1950 | | | | | | | 585.2 | 293.5 | 97.8 | 27.8 |
| 1951 | | | | | | 893.9 | 817.3 | 235.7 | 85.3 | 13.1 |
| 1952 | | | | | 1 615.2 | 1 298.8 | 720.5 | 243.2 | 59.2 | 21.7 |
| 1953 | | | | 8 442.0 | 3 378.1 | 1 843.6 | 1 169.0 | 236.2 | 72.3 | 23.3 |
| 1954 | | | 7 130.2 | 5 679.4 | 2 055.8 | 1 559.0 | 838.3 | 270.1 | 74.7 | 7.3 |
| 1955 | | 4 133.3 | 8 020.7 | 4 543.6 | 2 482.4 | 1 305.1 | 867.5 | 256.8 | 49.1 | 7.7 |
| 1956 | 44.7 | 6 255.3 | 7 662.8 | 6 655.2 | 1 937.3 | 1 406.6 | 859.7 | 198.4 | 42.5 | 9.2 |
| 1957 | 116.0 | 3 970.6 | 10 659.1 | 5 134.0 | 2 361.2 | 1 539.4 | 727.7 | 1 345.0 | 53.5 | 12.6 |
| 1958 | 524.5 | 6 060.9 | 7 330.3 | 5 232.5 | 2 242.3 | 1 119.8 | 672.5 | 179.8 | 51.8 | 11.7 |
| 1959 | 853.6 | 7 932.4 | 13 976.7 | 7 403.4 | 2 259.8 | 1 208.5 | 739.7 | 197.2 | 68.1 | 20.3 |
| 1960 | 941.2 | 9 631.1 | 8 907.4 | 3 898.5 | 1 442.5 | 1 111.8 | 630.5 | 230.2 | 113.9 | 10.3 |
| 1961 | 784.2 | 13 551.8 | 7 457.0 | 5 133.1 | 2 710.0 | 1 426.2 | 922.6 | 377.9 | 68.0 | 102.2 |
| 1962 | 356.2 | 2 284.1 | 4 285.6 | 4 804.3 | 1 784.9 | 1 525.8 | 1 223.9 | 325.7 | 146.7 | 94.8 |
| 1963 | 45.5 | 1 367.8 | 3 303.5 | 2 598.8 | 1 524.3 | 1 484.9 | 1 098.5 | 222.3 | 113.1 | |
| 1964 | 39.4 | 1 080.8 | 2 405.1 | 2 812.0 | 1 564.8 | 1 383.0 | 863.5 | 179.6 | | |
| 1965 | 89.6 | 1 424.9 | 4 096.8 | 4 567.0 | 1 624.1 | 1 292.2 | 695.7 | | | |
| 1966 | 69.6 | 5 881.4 | 7 539.1 | 6 580.8 | 3 267.4 | 1 170.6 | | | | |
| 1967 | 48.8 | 2 383.8 | 4 855.4 | 4 727.0 | 2 706.4 | | | | | |
| 1968 | 94.7 | 1 728.2 | 4 392.7 | 4 179.3 | | | | | | |
| 1969 | 56.7 | 717.4 | 3 744.1 | | | | | | | |
| 1970 | 55.1 | 750.0 | | | | | | | | |
| 1971 | 42.7 | | | | | | | | | |

Table 4.2.2. Faroe Haddock M = 0.2.
Virtual Population Analysis.
Numbers alive (millions) based on individual year classes.

| Age \ Year | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 47.4 | 52.3 | 43.5 | 62.2 | 47.0 | 58.4 | 36.3 | 26.2 | 23.0 | 29.3 | 48.6 | 39.0 | 37.2 | 34.2 | 16.2 |
| 2 | 34.6 | 38.7 | 42.7 | 35.1 | 50.2 | 37.6 | 47.1 | 29.4 | 21.4 | 18.8 | 24.0 | 40.0 | 32.3 | 30.9 | 29.4 |
| 3 | 25.0 | 24.6 | 26.1 | 31.4 | 23.3 | 33.9 | 22.2 | 26.4 | 22.0 | 16.3 | 14.4 | 18.4 | 27.4 | 24.3 | 23.7 |
| 4 | 19.9 | 14.0 | 12.9 | 14.5 | 16.1 | 12.5 | 15.3 | 10.2 | 14.9 | 14.2 | 10.4 | 9.6 | 11.4 | 15.7 | 15.5 |
| 5 | 5.4 | 8.8 | 6.4 | 6.5 | 5.9 | 8.6 | 5.6 | 5.9 | 4.8 | 7.6 | 7.3 | 6.2 | 5.4 | 5.2 | 6.9 |
| 6 | | 2.9 | 4.1 | 3.4 | 3.1 | 3.1 | 4.9 | 2.5 | 2.8 | 2.7 | 3.8 | 4.4 | 3.6 | 3.0 | 2.8 |
| 7 | | | 1.2 | 1.7 | 1.4 | 1.4 | 1.3 | 2.7 | 1.1 | 1.2 | 1.2 | 1.9 | 2.2 | 1.7 | 1.2 |
| 8 | | | | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | 1.5 | 0.3 | 0.3 | 0.4 | 0.7 | 0.7 | 0.4 |
| 9 | | | | | 0.1 | 0.1 | 0.1 | 0.06 | 0.06 | 0.08 | 0.07 | 0.10 | 0.14 | 0.3 | 0.3 |
| 10 | | | | | | | | | | | | | | | |

Values of F (M = 0.2)

| Age \ Year | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972*) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.001 | 0.002 | 0.013 | 0.015 | 0.022 | 0.015 | 0.011 | 0.002 | 0.002 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | - |
| 2 | 0.14 | 0.20 | 0.11 | 0.21 | 0.19 | 0.33 | 0.38 | 0.09 | 0.073 | 0.066 | 0.068 | 0.18 | 0.085 | 0.064 | 0.027 | 0.06 |
| 3 | 0.37 | 0.44 | 0.39 | 0.46 | 0.42 | 0.60 | 0.58 | 0.37 | 0.24 | 0.25 | 0.20 | 0.28 | 0.36 | 0.25 | 0.23 | 0.20 |
| 4 | 0.62 | 0.58 | 0.49 | 0.70 | 0.43 | 0.61 | 0.75 | 0.54 | 0.47 | 0.46 | 0.32 | 0.39 | 0.58 | 0.61 | 0.41 | 0.35 |
| 5 | 0.40 | 0.55 | 0.43 | 0.54 | 0.44 | 0.36 | 0.58 | 0.54 | 0.40 | 0.49 | 0.31 | 0.32 | 0.39 | 0.42 | 0.72 | 0.44 |
| 6 | | 0.66 | 0.66 | 0.69 | 0.62 | 0.68 | 0.42 | 0.66 | 0.63 | 0.60 | 0.52 | 0.48 | 0.58 | 0.71 | 0.69 | 0.61 |
| 7 | | | 0.98 | 1.29 | 1.05 | 1.15 | 1.29 | 0.36 | 1.13 | 1.07 | 0.85 | 0.78 | 0.92 | 1.21 | 1.48 | 1.04 |
| 8 | | | | 1.17 | 1.04 | 1.29 | 1.51 | 1.37 | 2.78 | 1.15 | 0.98 | 0.91 | 0.90 | 0.67 | 0.88 | 0.8 |
| 9 | | | | | 1.08 | 1.16 | 2.10 | 1.70 | 1.45 | 1.39 | 1.42 | 1.22 | 2.17 | 0.39 | 0.74 | 0.8 |
| 10*) | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| Mean 3-6 years | | 0.56 | 0.49 | 0.60 | 0.48 | 0.56 | 0.58 | 0.53 | 0.44 | 0.45 | 0.34 | 0.37 | 0.48 | 0.50 | 0.51 | 0.40 |

*) Values of F shown for 1972 and for age group 10 are assumed values.

Table 4.2.3. Faroe Haddock M = 0.3.
Virtual Population Analysis.
Numbers alive (millions) based on individual year classes.

| Age \ Year | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 67.4 | 77.9 | 61.4 | 86.1 | 64.8 | 82.2 | 56.2 | 41.0 | 35.4 | 43.6 | 69.6 | 64.7 | 55.1 | 49.7 | 21.2 |
| 2 | 45.3 | 49.9 | 57.6 | 45.0 | 63.0 | 47.2 | 60.3 | 41.3 | 30.3 | 26.2 | 32.7 | 52.1 | 49.2 | 41.9 | 39.7 |
| 3 | 30.7 | 30.0 | 31.6 | 39.3 | 28.2 | 39.9 | 26.8 | 33.1 | 28.7 | 21.3 | 18.5 | 23.0 | 33.6 | 34.4 | 29.6 |
| 4 | 23.4 | 16.7 | 15.4 | 16.9 | 20.1 | 14.6 | 17.7 | 12.3 | 18.2 | 17.6 | 13.0 | 11.6 | 13.5 | 18.5 | 21.3 |
| 5 | 6.4 | 10.2 | 7.5 | 7.6 | 6.9 | 10.5 | 6.4 | 6.9 | 5.8 | 9.1 | 8.9 | 7.4 | 6.2 | 6.2 | 8.1 |
| 6 | | 3.3 | 4.7 | 3.8 | 3.5 | 3.5 | 5.8 | 2.9 | 3.2 | 3.1 | 4.4 | 5.1 | 4.2 | 3.3 | 3.2 |
| 7 | | | 1.4 | 1.9 | 1.5 | 1.5 | 1.4 | 3.0 | 1.2 | 1.3 | 1.3 | 2.1 | 2.5 | 1.8 | 1.3 |
| 8 | | | | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | 1.6 | 0.3 | 0.4 | 0.5 | 0.8 | 0.8 | 0.4 |
| 9 | | | | | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.3 |
| 10 | | | | | | | | | | | | | | | |

Value of F (M = 0.3)

| Age \ Year | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972*) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.001 | 0.002 | 0.010 | 0.012 | 0.017 | 0.011 | 0.007 | 0.001 | 0.001 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | - |
| 2 | 0.11 | 0.16 | 0.083 | 0.17 | 0.16 | 0.27 | 0.30 | 0.066 | 0.054 | 0.049 | 0.052 | 0.14 | 0.058 | 0.049 | 0.021 | 0.05 |
| 3 | 0.31 | 0.37 | 0.33 | 0.37 | 0.35 | 0.51 | 0.48 | 0.30 | 0.19 | 0.20 | 0.16 | 0.23 | 0.30 | 0.18 | 0.19 | 0.16 |
| 4 | 0.53 | 0.49 | 0.41 | 0.60 | 0.35 | 0.52 | 0.65 | 0.45 | 0.39 | 0.38 | 0.26 | 0.32 | 0.49 | 0.52 | 0.29 | 0.30 |
| 5 | 0.34 | 0.48 | 0.38 | 0.47 | 0.39 | 0.30 | 0.51 | 0.47 | 0.34 | 0.42 | 0.26 | 0.27 | 0.34 | 0.36 | 0.61 | 0.30 |
| 6 | | 0.59 | 0.60 | 0.62 | 0.56 | 0.62 | 0.36 | 0.59 | 0.57 | 0.54 | 0.46 | 0.42 | 0.52 | 0.65 | 0.62 | 0.53 |
| 7 | | | 0.90 | 1.18 | 0.97 | 1.07 | 1.20 | 0.33 | 1.04 | 0.98 | 0.77 | 0.70 | 0.82 | 1.12 | 1.43 | 0.96 |
| 8 | | | | 1.09 | 0.97 | 1.22 | 1.42 | 1.28 | 2.67 | 1.08 | 0.91 | 0.86 | 0.82 | 0.61 | 0.84 | 1.2 |
| 9 | | | | | 1.04 | 1.12 | 2.04 | 1.65 | 1.40 | 1.34 | 1.37 | 1.18 | 2.11 | 0.37 | 0.71 | 1.2 |
| 10*) | | | | | | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| Mean 3-6 years | | 0.48 | 0.43 | 0.52 | 0.41 | 0.49 | 0.50 | 0.45 | 0.37 | 0.38 | 0.28 | 0.31 | 0.41 | 0.43 | 0.43 | 0.32 |

*) Values of F shown for 1972 and for age group 10 are assumed values.

Table 4.2.4. Faroe Haddock.
Estimates of total instantaneous mortality coefficient (Z) by different methods.

| 1 | | | 2 | | | |
|---|---|---|---|---|---|---|
| | | | M | | | |
| Age | Aberdeen | English | 0.1 | 0.2 | 0.3 | Age |
| 3-4 | 0.62 | 0.48 | 0.56 | 0.59 | 0.62 | 3 |
| 4-5 | 0.85 | 0.81 | 0.74 | 0.74 | 0.75 | 4 |
| 5-6 | 0.74 | 0.72 | 0.66 | 0.68 | 0.71 | 5 |
| 6-7 | 0.70 | 0.64 | 0.78 | 0.80 | 0.82 | 6 |
| 7-8 | 0.89 | 0.79 | 1.10 | 1.08 | 1.07 | 7 |
| 8-9 | 1.14 | 0.93 | 0.90 | 0.91 | 0.92 | 8 |

1: Comparison of mortality estimates (Z) derived from Aberdeen and English trawler landings per unit effort for the period 1957-1968.

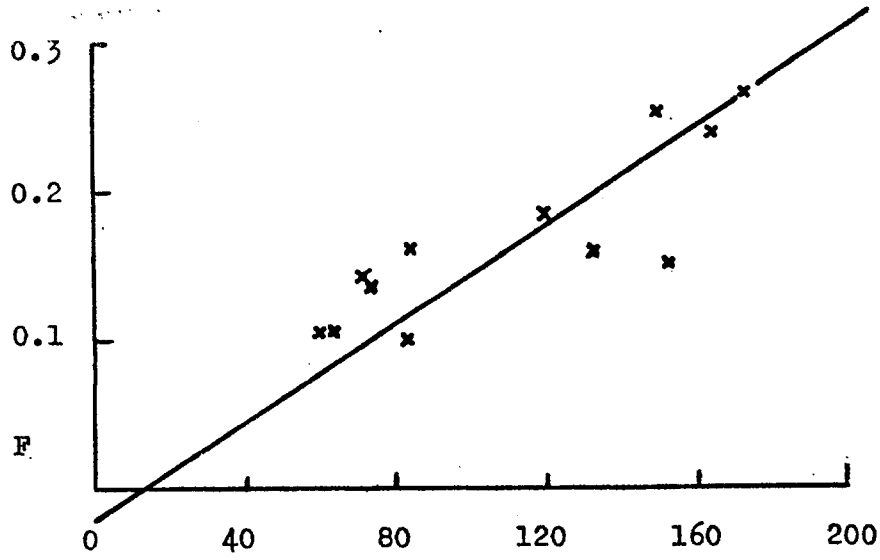
2: Total mortality estimates (Z) from a Virtual Population Analysis due to vessels of all countries during the period 1958-1963.

Table 4.2.5. Faroe Haddock.
Relative year class strengths.

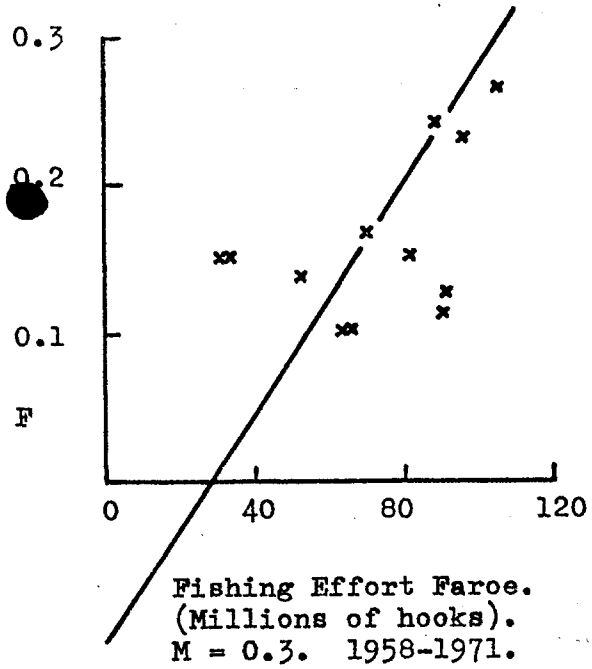
| Research Vessel Catches/10 hrs as 1 + Fish | | | | Year Class | Aberdeen Trawler 4th Year Freq-uencies/10 hrs | From V.P.A. (millions) | |
|---|---|---|---|---|---|---|---|
| Year Class | Old Explorer | Year Class | New Explorer | | | M = 0.2 | M = 0.3 |
| 1922 | 112 | 1957 | 3003 | 1947 | 170 | | |
| 1923 | 179 | 1958 | 1500 | 1948 | 360 | | |
| 1924 | | 1959 | 2300 | 1949 | 320 | | |
| 1925 | | 1960 | 3800 | 1950 | 270 | | |
| 1926 | 391 | 1961 | 6260 | 1951 | 330 | | |
| 1927 | | 1962 | 4000 | 1952 | 220 | | |
| 1928 | 1350 | 1963 | 2700 | 1953 | 890 | | |
| 1929 | | 1964 | 375 | 1954 | 430 | | |
| 1930 | 435 | 1965 | 68 | 1955 | 380 | | |
| 1931 | | 1966 | 3000 | 1956 | 450 | 47 | 67 |
| 1932 | 2240 | 1967 | 1500 | 1957 | 370 | 52 | 78 |
| 1933 | | 1968 | 3500 | 1958 | 310 | 44 | 61 |
| 1934 | 1197 | 1969 | 350 | 1959 | 600 | 62 | 86 |
| 1935 | 4815 | 1970 | 2120 | 1960 | 380 | 47 | 65 |
| 1936 | 35 | 1971 | | 1961 | 640 | 58 | 82 |
| 1937 | 647 | 1972 | 3600 (Scotia) | 1962 | 320 | 36 | 56 |
| 1938 | 2221 | | | 1963 | 200 | 26 | 41 |
| 1939 | | | | 1964 | 190 | 23 | 35 |
| | | | | 1965 | 340 | 29 | 44 |
| 1946 | 253 | | | 1966 | 590 | 49 | 70 |
| 1947 | 38 | | | 1967 | 280 | 39 | 65 |
| 1948 | 1258 | | | 1968 | 300 | 37 | 55 |
| | | | | 1969 | 110 | | |
| | | | | 1970 | | | |

Table 4.2.6. Faroe Haddock.
Effect of increase in mesh size to 130 mm (values show percentage changes).

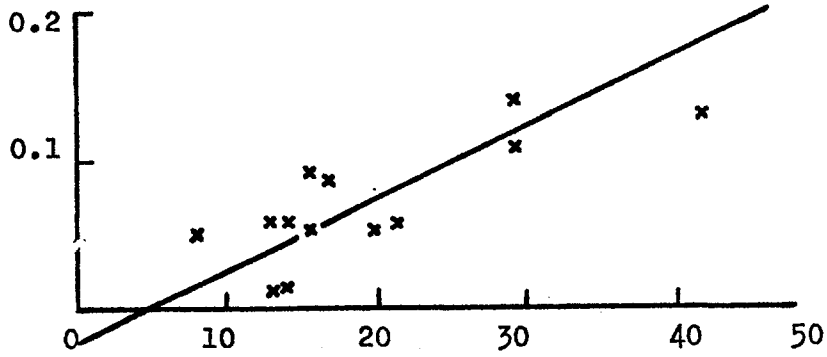
| Gear / Years after Change | English | Scottish | Faroese | Total |
|---|---|---|---|---|
| 1 | -28 | | + 2 | -14 |
| 2 | -23 | -28 | + 8 | - 9 |
| 3 | -20 | -24 | +12 | - 4 |
| 4 | -17 | -21 | +16 | - 1 |
| 5 | -16 | -20 | +18 | + 1 |
| Long Term | -16 | -20 | +22 | + 3 |




Fishing Effort Scotland. (Thousand hours ). M = 0.3. 1958-1971.



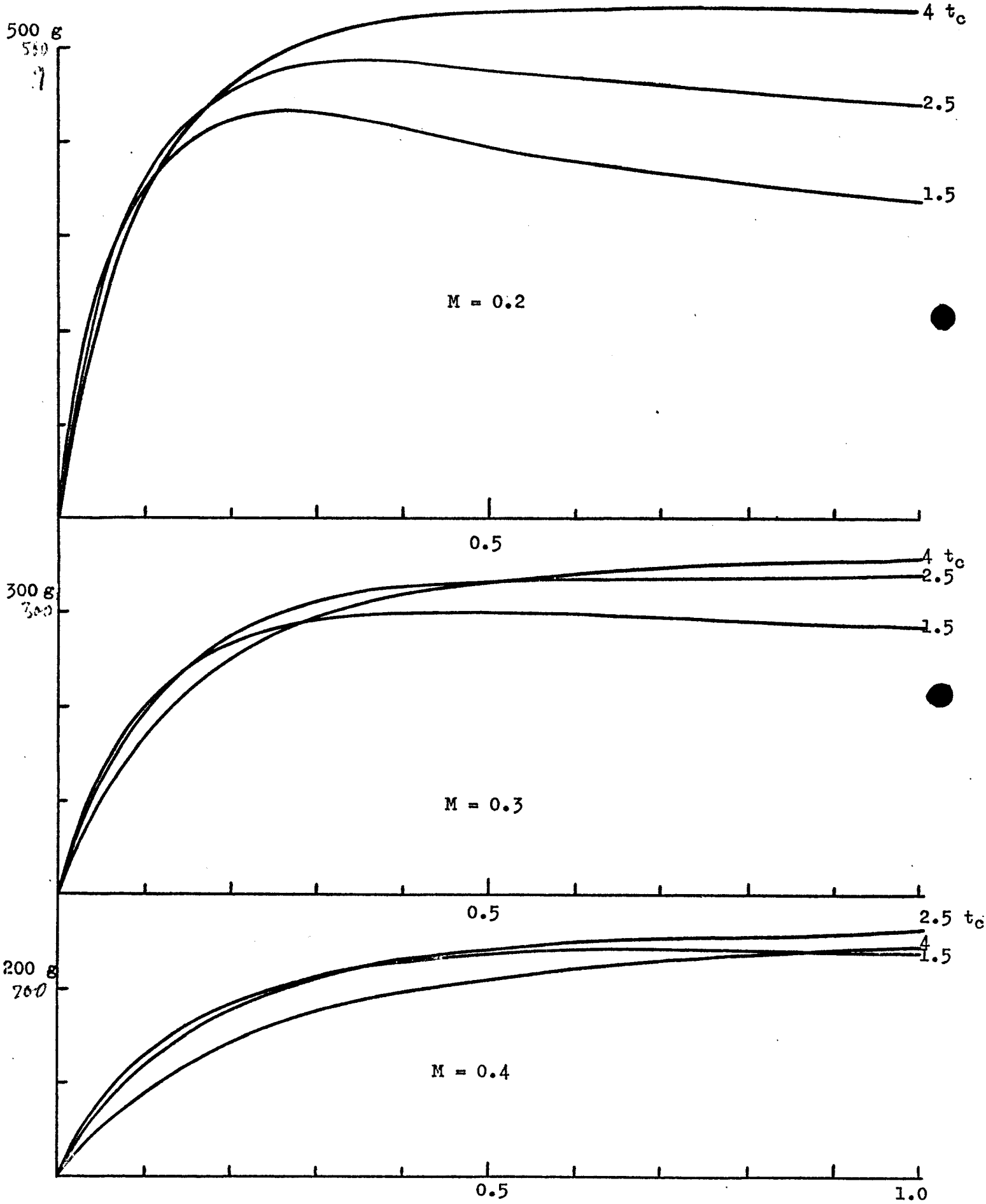

Fishing Effort Faroe. (Millions of hooks). M = 0.3. 1958-1971.




Fishing Effort England. (Million ton hours). 1958-1971.

Figure 3. Faroe Haddock. Relationship between annual estimates of the fishing mortality coefficient (M = 0.3) and fishing effort for Scotland, Faroe and England. Lines represent geometric mean regressions.

**Figure 4.** Faroe Haddock. Yields per Recruit for different ages at first capture.



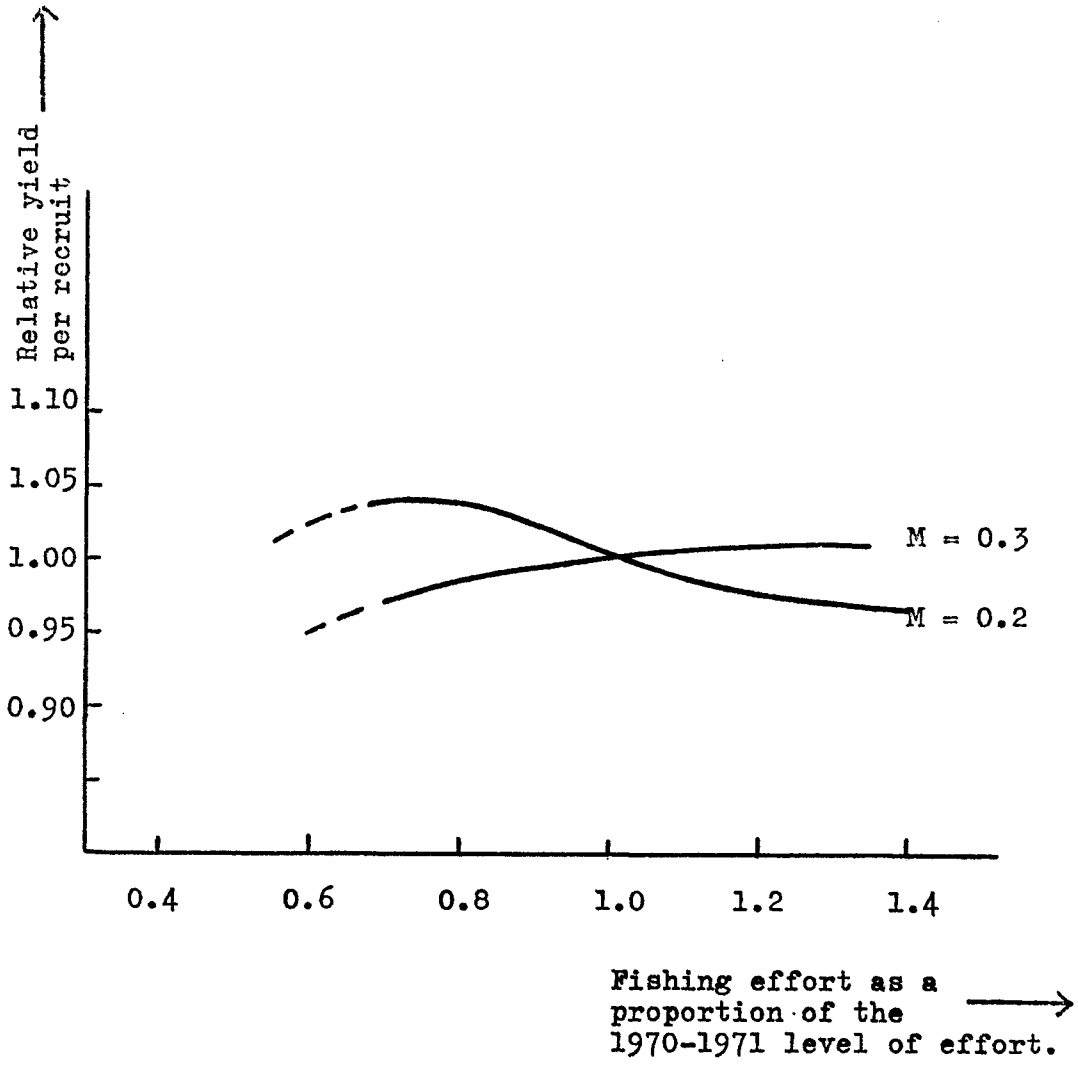



Figure 5. Faroe Haddock. Equilibrium yield curves against effort.

## 4.3. CATCH PREDICTIONS FOR VARIOUS ASSUMPTIONS FOR COD AND HADDOCK

The predictions have been made using a programme developed at the Danish Fisheries and Marine Research Institute. The programme demands estimates of:-

1. Values of F for each age group, as proportions of the maximum F;
2. Weight at age;
3. Numbers caught at each age in the initial year chosen;
4. Age of recruitment and the natural mortality rate (M).

It is also necessary to make assumptions about the fishing mortality and the numbers of recruits for each year.

In Table 4.3.1 (p.27) the input values for cod and haddock are given.

The values of F at each age have been estimated from the V.P.A. for the years 1968-1970 for cod and for the years 1970-1971 for haddock. Weights at age have been calculated using the Bertalanffy parameters referred to in the sections on cod and haddock. Age at recruitment has been taken as 1 year for haddock and 2 years for cod.

A run has been made for haddock using natural mortality of 0.2. A value of $F_{max}$ of 1.0 has been assumed together with an average number of recruits from the V.P.A. of 43 million. The results are shown in Table 4.3.2 (p.28). Three runs have been made for cod. Values of M = 0.2 and $F_{max}$ of 0.7 have been assumed on all three occasions, but the number of recruits has been varied - about an average value of 10 million fish, this being the average number of recruits for the period 1968-1971. According to the V.P.A. 20 million fish is about the average for the period before 1968. The results are given in Table 4.3.2 (p.28).

The predictions show that with the present pattern of fishery and recruitment there should be a reasonably stable fishery for haddock with average catches of about 16 000 tons.

For the cod stock the catches will also depend on recruitment and there are some indications of low recruitment since 1969. With low recruitment (10 million fish annually) the catches can be expected to decline. With an annual recruitment of 15 million fish, the fishery should remain at the current level. With an annual recruitment of 20 million fish, catches should improve and reach a higher level.

Both predictions suggest that the quotas set in the "Arrangement Relating to Fisheries in Waters Surrounding the Faroes", allowing a total catch of 30 000 tons of cod and 22 000 tons of haddock are too high for application to 1976.

Table 4.3.1. Input values for prognosis of catches of haddock and cod.

| Age | Proportions of Maximal F on Age Groups M = 0.2 | Weight at Age in kg | Catches in Numbers in Initial Year 1971 |
|---|---|---|---|
| | COD | | |
| 1 | 0.0 | 0.551 | 1 223 |
| 2 | 0.14 | 1.05 | 3 093 |
| 3 | 0.37 | 1.88 | 2 686 |
| 4 | 0.56 | 2.897 | 1 331 |
| 5 | 0.67 | 4.046 | 1 066 |
| 6 | 0.77 | 5.277 | 232 |
| 7 | 1.0 | 6.542 | 372 |
| 8 | 1.0 | 7.805 | 78 |
| 9 | 1.0 | 9.042 | 29 |
| | HADDOCK M = 0.2 | | |
| 1 | 0.01 | 0.249 | 55 |
| 2 | 0.046 | 0.475 | 717 |
| 3 | 0.24 | 0.795 | 4 392 |
| 4 | 0.51 | 1.069 | 4 727 |
| 5 | 0.57 | 1.403 | 3 267 |
| 6 | 0.7 | 1.740 | 1 292 |
| 7 | 1.0 | 2.070 | 864 |
| 8 | 0.78 | 2.386 | 222 |
| 9 | 0.7 | 2.582 | 146 |

Table 4.3.2. Catch predictions.
Prognosis for the cod and haddock fishery under various assumptions. Initial year 1971.

Predicted catches in tons

COD

| Year | 1st run | 2nd run | 3rd run |
|---|---|---|---|
| 1972 | 17 515 | 17 960 | 18 405 |
| 1973 | 14 895 | 16 789 | 18 683 |
| 1974 | 14 248 | 18 152 | 22 056 |
| 1975 | 14 560 | 20 259 | 25 959 |
| 1976 | 15 529 | 22 565 | 29 600 |

1st run recruitment 10 000 000 fishes
2nd run recruitment 15 000 000 fishes
3rd run recruitment 20 000 000 fishes

HADDOCK

| Year | 1st run |
|---|---|
| 1972 | 16 716 |
| 1973 | 13 665 |
| 1974 | 13 198 |
| 1975 | 16 401 |
| 1976 | 18 735 |

1st run M = 0.2

## 4.4. SAITHE

No new assessments on saithe were made by the present Working Group as the Faroe saithe had been included in the assessments of the Saithe Working Group which met in the previous week. A summary of the results are included here for convenience.

1. Provisional estimates of saithe landings in 1973 indicate that the catches have doubled since 1970-1971, the main increase being in the reported landings by French vessels.

2. From V.P.A. the recent level of fishing mortality on saithe is believed to be within the range 0.2 - 0.5, indicating that the stock is moderately exploited.

3. Average age at first capture is consistent with that required to give maximum yield at the estimated present rate of fishing mortality.

4. Under the "Arrangement Relating to Fisheries in Waters Surrounding the Faroes" future catches of saithe will be restricted but, because of the terms of the Arrangement, it is not possible to define the maximum catch which may be taken. However, it is expected that the overall catch in the near future will not increase by more than about 10%. For non-Faroese vessels the greater part of the fishery takes place outside the shallower areas of the Continental Shelf where the youngest age groups are generally not available. Thus any increase in fishing mortality due to trawl fishing would be expected to be confined to the older age groups and in these circumstances a moderate increase in fishing mortality would not be expected to be detrimental to the stock.

## 4.5. FLATFISH

### Halibut

Total catches (Table 7.1.i.(p.40)) show a declining trend since the late fifties and early sixties when landings were between 2 000 and 3 000 tons. Faroese catches, however, have remained fairly stable during the whole period. Therefore, the reduced catches are considered to reflect a decrease in fishing effort in line fishery of all countries except those of Faroe, rather than a decrease in abundance. English tagging experiments of small halibut indicate that at first these fish spread over both the Faroe Plateau and the Bank, but at an older age halibut tagged on the Plateau tend to be returned from as far as Iceland, whereas halibut tagged on the Bank disperse mainly to the southwest (Bill Bailey Bank, Lowry Bank and Outer Bill Bailey Bank).

### Plaice, Lemon Sole

Total catches of plaice have slightly increased over the period (Table 7.1.h, p.39). Lemon soles (Table 7.1.g, p.39) in contrast seem to be less exploited than in the early sixties. Since these species are taken only as a by-catch of the demersal fishery, biological information is limited and data on length and age composition are available only for some recent years.

Von Bertalanffy growth curves were fitted to Faroese and Scottish length at age data (Table 7.1.5 p.46). Faroese data were often inconsistent with the theoretical curve which may perhaps be due to the fishing pattern, because only the younger age groups are present in the catches. The Scottish data presented more realistic estimates of L-infinity as compared with the length range observed in the catches. Therefore, these have been selected for yield per recruit calculations for different values of fishing mortality and age at first capture (Figures 6 and 7, p.32 and 33).

Catch curves from Scottish data for recent years are plotted in Figures 8 and 9 (page 34), indicating the value of total mortality for plaice and lemon sole to be of the order of 0.3 and 0.4 respectively, and indicating low rates of exploitation. According to the catch curve, recruitment to the Scottish fishery is not complete until 6 years of age. Considering that the Faroese tend to fish the somewhat younger age groups, the mean age at recruitment can be estimated at 4 to 5 years old. The corresponding points on the yield per recruit curves are indicated in the figures. Although exploitation of the stock is very low, apparently not much gain can be expected from an increase in fishing effort on these species.

## 4.6 BLUE LING

This stock is exploited mainly by German trawlers and Norwegian long-liners. Catches have been reported by Germany since 1963 and by Norway since 1964. Varying amounts of blue ling have probably been included with common ling in earlier years. According to preliminary figures, the catches have been increasing since the mid-sixties. In Table 4.6.1 (p.31) total catches, catches per fishing day and estimates of total effort have been tabulated. Catch per unit effort has increased in 1971 and 1972 to almost twice the mean for the period 1963-1972 (mean CPUE = 1.1 ton/fishing day). It is not certain if this reflects a real increase in abundance or if it is the effect of a change in the fishing pattern due to effort being directed more towards blue ling.

The lack of sampling for biostatistical data in the blue ling fishery in the Faroe area has made it impossible for the Working Group to proceed any further in an analysis of the state of this stock.

It is not known if there is an interchange of the blue ling between the Faroe and other areas.

## 4.7 REDFISH

There is a German trawl fishery for redfish in the deeper waters around the Faroes. Germany is the only country catching any substantial quantities of this species in the area. Preliminary catch figures for 1973 indicate a catch of about 9 400 tons, which is about 600 tons less than the maximum catch which was recorded in 1955. Estimates of CPUE and total fishing effort given in Table 4.6.1 (p.31) do not show any clear trends, the CPUE's for 1971 and 1972 being about the average for the period 1963-1972 (mean CPUE = 3.3 tons/fishing day).

No age and length data were available to the Working Group and nothing is known about possible connections between this stock and the redfish stocks in the open sea in the North Atlantic.

Table 4.6.1. Blue Ling and Redfish catches off Faroe Islands 1963 - 1972, and total effort from German catches per fishing day.

| Year | German total catch in tons | | German catch (in tons) per fishing day | | Total effort for all countries | |
|---|---|---|---|---|---|---|
| | Blue Ling | Redfish | Blue Ling | Redfish | Blue Ling | Redfish |
| 1963 | 478 | 2 493 | 1.0 | 4.1 | - | 608.05 |
| 1964 | 2 675 | 7 908 | 1.5 | 4.3 | 1 783.33 | 1 839.07 |
| 1965 | 2 732 | 5 512 | 1.2 | 3.5 | 2 276.67 | 1 574.85 |
| 1966 | 1 280 | 3 228 | 0.7 | 2.7 | 1 828.57 | 1 195.56 |
| 1967 | 1 371 | 4 899 | 0.8 | 3.3 | 1 713.75 | 1 484.55 |
| 1968 | 2 646 | 6 667 | 1.0 | 3.5 | 2 646.00 | 1 904.86 |
| 1969 | 1 047 | 1 258 | 0.4 | 1.8 | 2 617.50 | 698.89 |
| 1970 | 2 947 | 2 053 | 0.6 | 3.7 | 4 911.67 | 554.86 |
| 1971 | 2 032 | 2 503 | 1.9 | 3.1 | 1 069.47 | 807.42 |
| 1972 | 3 982 | 4 080 | 2.2 | 3.2 | 1 810.00 | 1 275.00 |

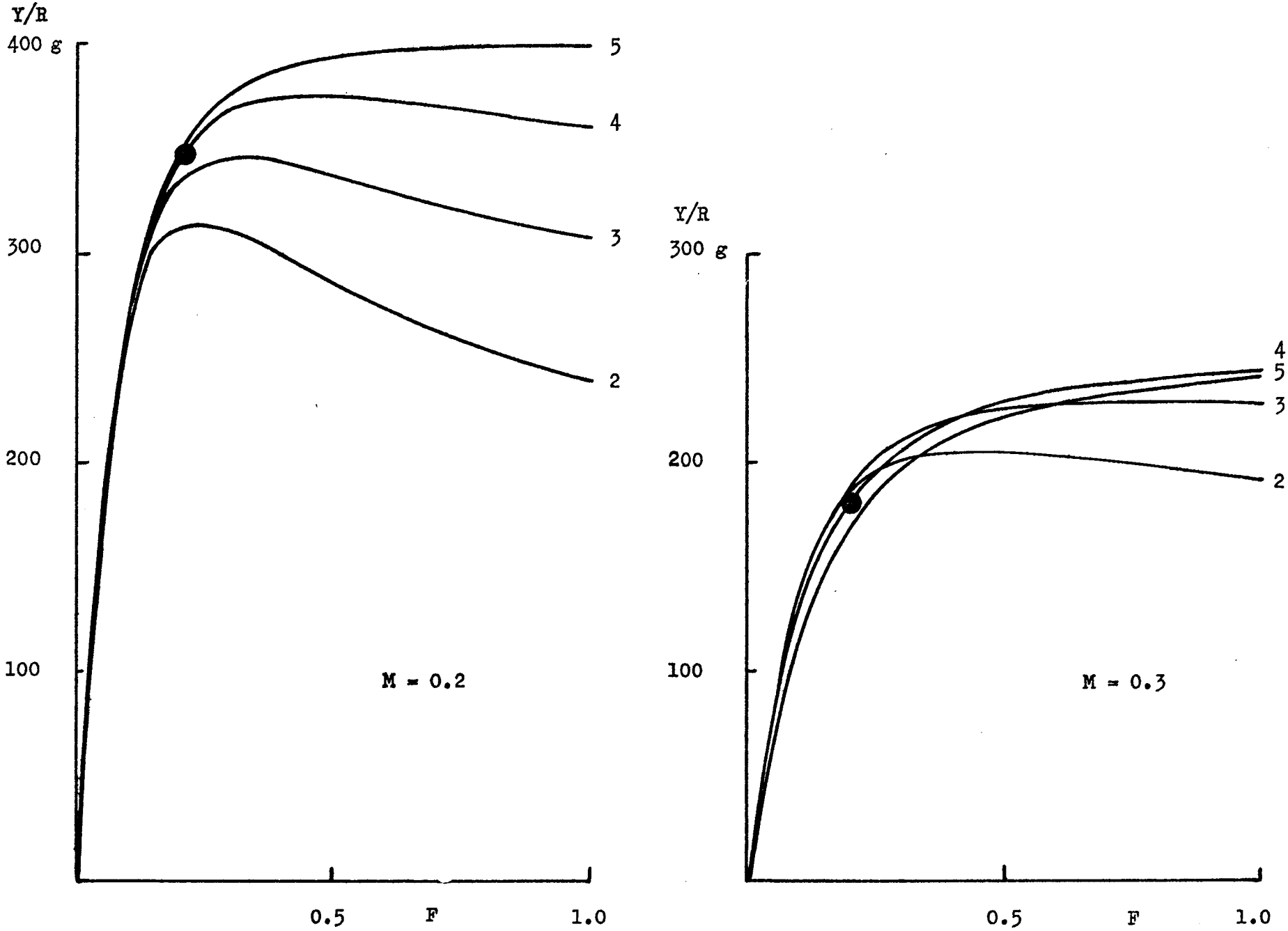
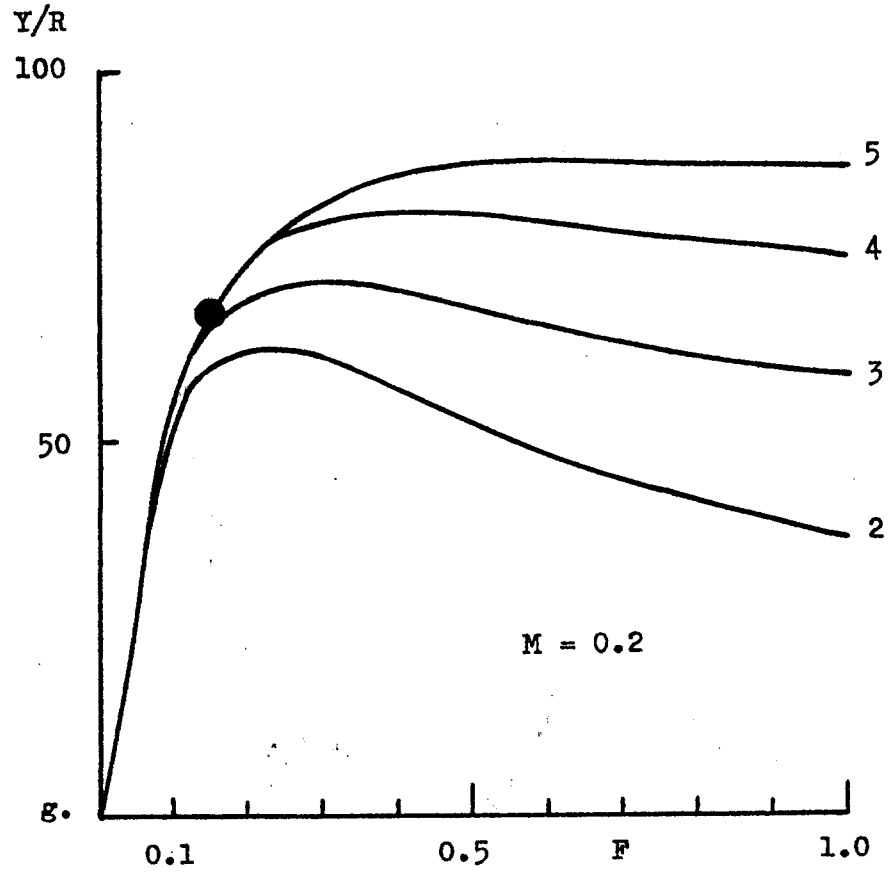



Figure 6. Yield per Recruit of Faroe Plaice. (Bertalanffy parameter derived from Scottish data 1972.) $W = .011\ L^3$. Dots indicate present level on the yield curve.



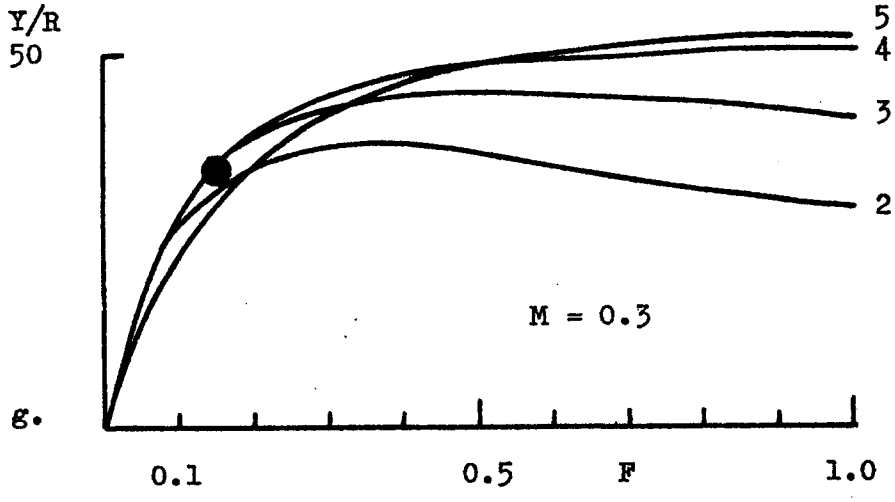
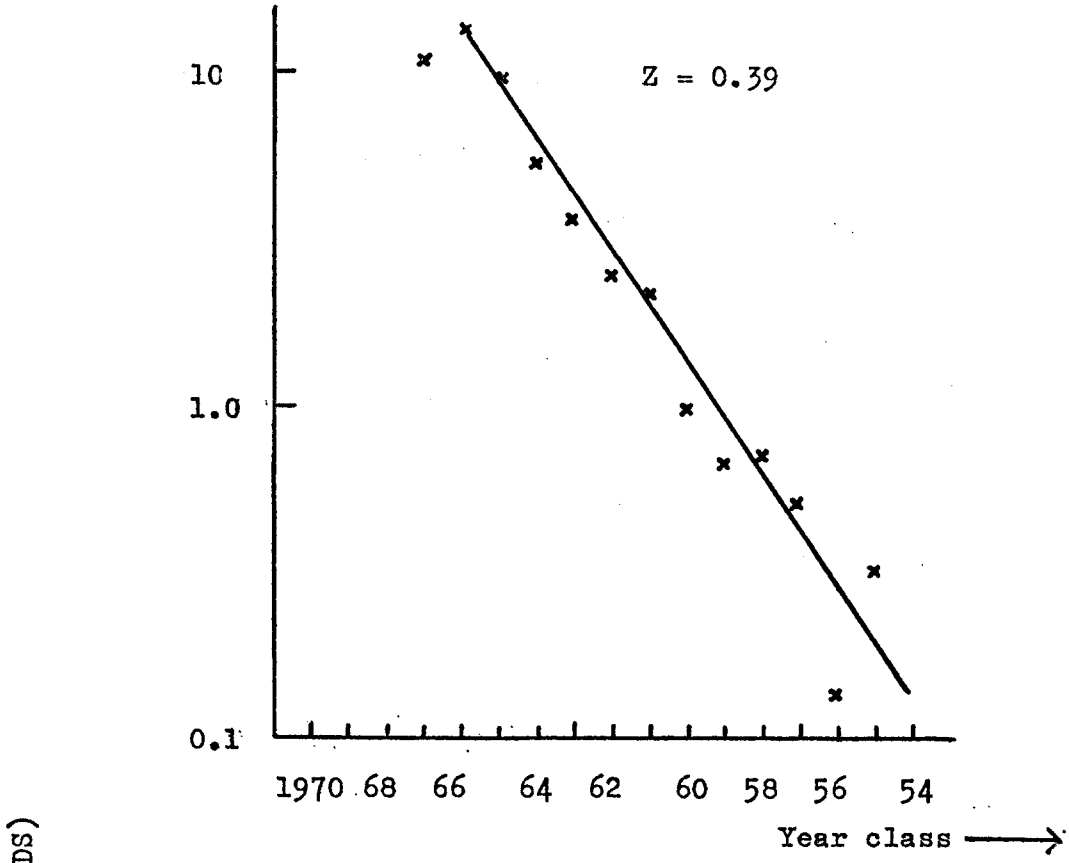




Figure 7. Yields per Recruit of Faroe Lemon Sole. (Bertalanffy parameters derived from Scottish data 1972.) $W = 0.0107\ L^3$. Dots indicate present level on the yield curve.

Figure 8. Catch curve. Faroe Plaice 1972.



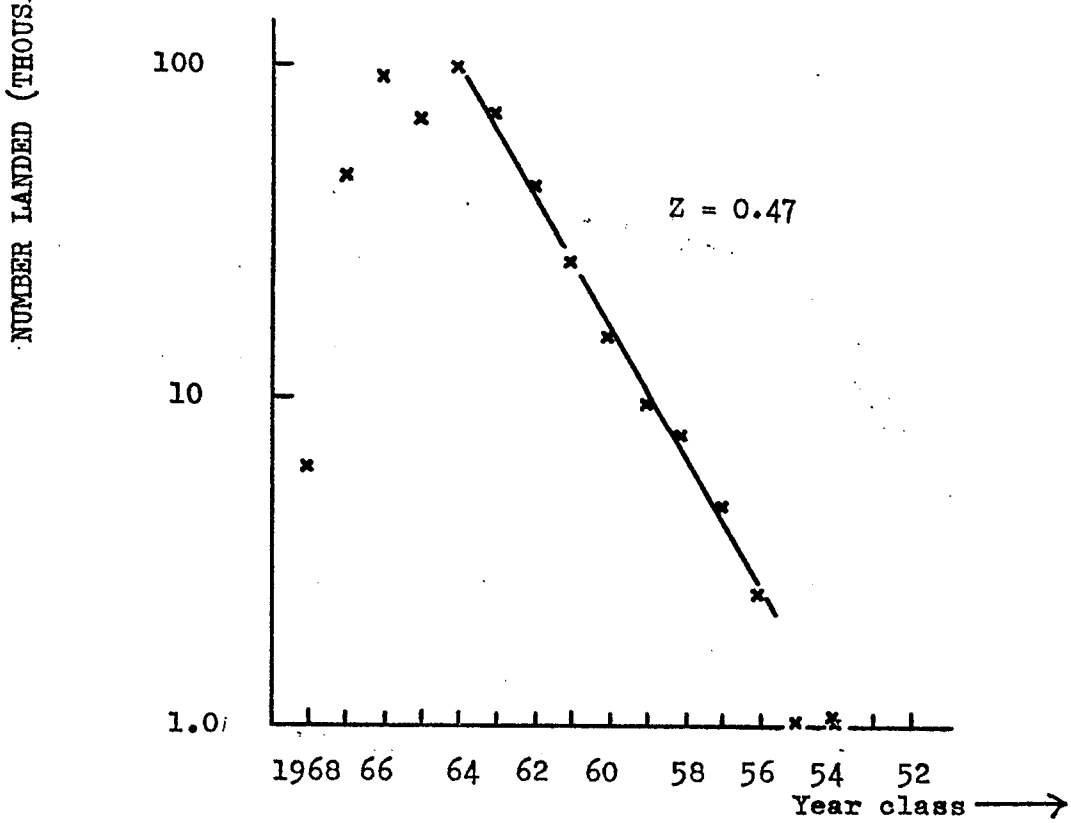




Figure 9. Catch curve. Faroe Lemon Sole 1972.

## 4.8. OTHER SPECIES

In Table 7.1.m. (p.42) catches for several species are given, including tusk, ling, angler, rays and skates, dogfishes, several species of flatfishes, catfishes and others. No data other than of catch were available to the Working Group, and thus no attempt was made to analyse the state of these stocks.

## 5. ADEQUACY OF DATA

Time has not allowed the Working Group to make any detailed study of the adequacy of data and sampling. From the Report it will be seen that for several species catch statistics only are to hand.

For redfish and blue ling German effort data are available, but no sampling of age and length composition. For the lemon sole and plaice stocks some Scottish and Faroese data for the most recent years were available for the length and age distribution, allowing estimation of growth parameters and yield/recruit curves. The most complete data were available for cod, haddock and saithe allowing estimates of mortalities, stock numbers, effects of changes in fishing effort and mesh size and predictions of catches. The agreement between independent estimates of mortality gave confidence in the results. However, it should be noted that the Faroese cod data in the former years have been taken from the spring long-line fishery for spawning cod only and are therefore not representative for the long-line fishery as a whole. Also, Faroese haddock sampling has been very scanty in former years.

To be able to assess the state of stocks other than those of cod, haddock and saithe in more detail and for continuing work on these three species, it will be necessary for all countries to sample their catches in order to estimate the numbers of fish of each size landed each year. In addition, age/length keys will be required for all years.

## 6. REFERENCES

Anon., 1967 Coop.Res.Rep. B, 1967.

Jones, R., 1961 Marine Research 1961, No.2.

Table 7.1.a. Catches in ICES Division Vb by country and species 1952-1972, metric tons, round fresh.

COD

| Year | Faroe Islands | France | Germany | Norway | U.K. England | U.K. Scotland | Others | Total |
|---|---|---|---|---|---|---|---|---|
| 1952 | 4 550 | 175 | - | - | 12 365 | 13 283 | - | 30 373 |
| 1953 | 4 137 | - | - | - | 12 469 | 10 535 | - | 27 052 |
| 1954 | 5 190 | 600 | 37 | 125 | 16 017 | 14 238 | - | 36 164 |
| 1955 | 7 902 | 700 | 216 | - | 17 223 | 12 380 | - | 38 421 |
| 1956 | 7 938 | - | 689 | - | 8 337 | 10 610 | - | 27 574 |
| 1957 | 6 920 | - | 1 085 | - | 10 067 | 13 413 | - | 31 485 |
| 1958 | 6 535 | - | 1 011 | - | 9 828 | 10 523 | - | 27 897 |
| 1959 | 4 676 | - | 697 | - | 10 087 | 10 522 | - | 25 982 |
| 1960 | 8 723 | - | 451 | - | 13 746 | 16 300 | - | 39 220 |
| 1961 | 9 521 | - | 417 | 168 | 3 891 | 12 954 | - | 26 951 |
| 1962 | 6 751 | 100 | 301 | 505 | 5 521 | 11 052 | - | 24 230 |
| 1963 | 7 428 | 720 | 376 | 147 | 4 558 | 10 875 | - | 24 104 |
| 1964 | 8 888 | 989 | 1 162 | 333 | 5 845 | 7 791 | - | 25 008 |
| 1965 | 9 948 | 1 538 | 854 | 419 | 5 470 | 7 868 | - | 26 097 |
| 1966 | 7 957 | 1 120 | 669 | 314 | 4 871 | 7 855 | 130[xx]) | 22 916 |
| 1967 | 7 835 | 871 | 815 | 650 | 7 996 | 8 546 | - | 26 603 |
| 1968 | 13 763 | 2 519 | 1 180 | 686 | 7 096 | 8 524 | - | 33 768 |
| 1969 | 15 718 | 2 557 | 447 | 476 | 6 717 | 12 249 | - | 38 164 |
| 1970 | 15 245 | 2 616 | 225 | 238 | 3 707 | 9 790 | - | 31 821 |
| 1971 | 12 754 | 1 426 | 337 | 881 | 3 485 | 9 102 | - | 27 985 |
| 1972[*]) | 12 143 | 1 462 | 262 | 266 | 3 019 | 6 483 | - | 23 635 |
| 1973[*]) | | | | | 5 167 | | | |

Table 7.1.b. HADDOCK

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1952 | 3 225 | - | - | - | 7 714 | 6 653 | - | 17 592 |
| 1953 | 2 788 | - | - | - | 5 965 | 6 404 | - | 15 157 |
| 1954 | 2 645 | - | 1 | - | 6 069 | 6 832 | - | 15 547 |
| 1955 | 3 865 | - | 33 | - | 5 148 | 7 667 | - | 16 713 |
| 1956 | 4 221 | - | 20 | - | 5 937 | 7 512 | - | 17 690 |
| 1957 | 4 453 | - | 38 | - | 7 105 | 9 602 | - | 21 198 |
| 1958 | 6 850 | - | 19 | - | 7 637 | 9 573 | - | 24 076 |
| 1959 | 5 670 | - | 10 | - | 5 536 | 9 220 | - | 20 436 |
| 1960 | 7 772 | - | 6 | - | 7 298 | 10 943 | - | 26 019 |
| 1961 | 8 454 | - | 22 | - | 2 765 | 9 590 | - | 20 831 |
| 1962 | 7 042 | 166 | 18 | - | 3 766 | 16 159 | - | 27 149 |
| 1963 | 6 336 | 792 | 22 | - | 4 655 | 15 766 | - | 27 571 |
| 1964 | 6 952 | 1 866 | 32 | 111 | 3 442 | 7 087 | - | 19 490 |
| 1965 | 6 673 | 1 939 | 8 | 119 | 3 385 | 6 355 | - | 18 479 |
| 1966 | 6 902 | 2 717 | 40 | - | 2 867 | 6 240 | - | 18 766 |
| 1967 | 5 246 | 1 091 | 30 | - | 2 347 | 4 656 | 8 | 13 378 |
| 1968 | 6 751 | 2 286 | 31 | - | 2 445 | 6 339 | - | 17 852 |
| 1969 | 11 122 | 3 314 | 45 | - | 1 976 | 6 815 | - | 23 272 |
| 1970 | 11 791 | 2 006 | 6 | - | 1 137 | 6 421 | - | 21 361 |
| 1971 | 10 488 | 790 | 1 | - | 2 323 | 5 762 | - | 19 393 |
| 1972[*]) | 8 314 | 2 666 | 25 | - | 1 371 | 4 109 | - | 16 485 |
| 1973[*]) | | | 46 | | 2 464 | | | |

[*]) Preliminary estimates.
[**]) USSR.

Table 7.1.c. SAITHE

| Year | Faroe Islands | France | Germany | Norway | U.K. England | U.K. Scotland | Others | Total |
|---|---|---|---|---|---|---|---|---|
| 1952 | 47 | - | - | - | 5 663 | 1 188 | - | 6 898 |
| 1953 | 9 | - | - | - | 6 087 | 1 088 | - | 7 184 |
| 1954 | 4 | - | 13 | - | 5 543 | 652 | - | 6 212 |
| 1955 | 89 | - | 484 | - | 5 643 | 1 018 | - | 7 234 |
| 1956 | 37 | - | 4 998 | - | 4 673 | 1 176 | - | 10 884 |
| 1957 | 979 | - | 21 082 | - | 3 869 | 928 | - | 26 858 |
| 1958 | 339 | - | 4 299 | - | 6 880 | 1 460 | - | 19 978 |
| 1959 | 536 | - | 6 781 | - | 5 688 | 1 540 | - | 14 545 |
| 1960 | 685 | - | 2 583 | - | 6 437 | 2 140 | - | 11 845 |
| 1961 | 929 | - | 2 219 | - | 4 230 | 2 214 | - | 9 592 |
| 1962 | 2 494 | 620 | 985 | - | 3 724 | 2 631 | - | 10 454 |
| 1963 | 2 431 | 2 207 | 1 471 | - | 3 178 | 3 463 | - | 12 750 |
| 1964 | 1 338 | 6 458 | 6 294 | + | 4 329 | 3 309 | - | 21 728 |
| 1965 | 1 000 | 8 565 | 3 611 | - | 5 265 | 3 794 | - | 22 235 |
| 1966 | 1 167 | 9 967 | 4 772 | 2 498 | 3 321 | 3 581 | - | 25 306 |
| 1967 | 2 242 | 5 555 | 6 119 | - | 4 536 | 3 996 | - | 22 448 |
| 1968 | 2 629 | 424 | 7 532 | - | 5 123 | 4 778 | - | 20 486 |
| 1969 | 4 835 | 7 899 | 4 775 | 378 | 4 303 | 5 346 | - | 27 536 |
| 1970 | 2 694 | 11 036 | 2 249 | 1 495 | 3 066 | 8 608 | - | 29 148 |
| 1971 | 5 653 | 10 621 | 2 251 | 1 839 | 3 305 | 7 198 | 63 | 30 930 |
| 1972 | 5 646 | 28 346 | 3 613 | 470 | 2 453 | 6 225 | - | 46 753 |
| 1973*) | | | 8 602 | ca 200 | 7 460 | | | |

Table 7.1.d. WHITING

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1952 | - | - | - | - | 332 | 1 300 | - | 1 632 |
| 1953 | - | - | - | - | 563 | 1 167 | - | 1 730 |
| 1954 | - | - | - | - | 522 | 716 | - | 1 238 |
| 1955 | - | - | 1 | - | 298 | 581 | - | 880 |
| 1956 | - | - | + | - | 213 | 415 | - | 628 |
| 1957 | - | - | + | - | 157 | 554 | - | 711 |
| 1958 | - | - | + | - | 167 | 333 | - | 500 |
| 1959 | - | - | + | - | 249 | 246 | - | 495 |
| 1960 | - | - | - | - | 70 | 403 | - | 473 |
| 1961 | 222 | 1 200 | - | - | 50 | 257 | - | 1 729 |
| 1962 | - | - | - | - | 26 | 197 | - | 223 |
| 1963 | - | - | + | - | 33 | 285 | - | 318 |
| 1964 | - | - | + | - | 25 | 117 | - | 142 |
| 1965 | - | 1 421 a) | + | - | 29 | 97 | - | 1 547 |
| 1966 | - | 225 | - | - | 28 | 139 | - | 392 |
| 1967 | - | 254 | 1 | - | 31 | 138 | 3 xx) | 427 |
| 1968 | - | 80 | 1 | - | 46 | 172 | - | 299 |
| 1969 | - | 16 991 | + | - | 46 | 515 | - | 17 552 |
| 1970 | - | 73 | - | - | 35 | 251 | - | 359 |
| 1971 | 150 | 195 | 1 | - | 26 | 166 | - | 542 |
| 1972 | - | 194 | - | - | 137 | 139 | - | 470 |
| 1973*) | | | 7 | | | | | |

*) Preliminary estimates.
xx) Denmark.
a) Includes Iceland grounds.

Table 7.1.e. TUSK

| Year | Faroe Islands | France | Germany | Norway | U.K. England | U.K. Scotland | Others | Total |
|---|---|---|---|---|---|---|---|---|
| 1952 | 187 | - | - | 1 007 | 92 | 387 | - | 1 673 |
| 1953 | 593 | - | - | 711 | 93 | 483 | - | 1 880 |
| 1954 | 560 | - | 7 | 511 | 95 | 401 | - | 1 574 |
| 1955 | 1 005 | - | 40 | 384 | 114 | 472 | - | 2 015 |
| 1956 | 818 | - | 58 | 484 | 83 | 586 | - | 2 029 |
| 1957 | 845 | - | 99 | 199 | 80 | 694 | - | 1 917 |
| 1958 | 812 | - | 48 | 1 068 | 106 | 1 066 | - | 3 100 |
| 1959 | 984 | - | 87 | 637 | 69 | 1 275 | - | 3 052 |
| 1960 | 1 306 | - | 32 | 734 | 135 | 1 260 | - | 3 467 |
| 1961 | 1 301 | - | 29 | 1 401 | 67 | 1 062 | - | 3 860 |
| 1962 | 1 902 | - | 21 | 1 134 | 54 | 1 405 | - | 4 516 |
| 1963 | 2 007 | - | 29 | 802 | 28 | 695 | - | 3 561 |
| 1964 | 2 775 | - | 137 | 875 | 30 | 799 | - | 4 616 |
| 1965 | 1 645 | - | 115 | 1 565 | 32 | 924 | - | 4 281 |
| 1966 | 1 488 | - | 87 | 1 221 | 21 | 482 | - | 3 299 |
| 1967 | 2 070 | - | 109 | 2 729 | 18 | 432 | - | 5 358 |
| 1968 | 2 798 | - | 91 | 2 906 | 23 | 549 | - | 6 367 |
| 1969 | 1 454 | - | 21 | 1 338 | 16 | 412 | - | 3 241 |
| 1970 | 1 028 | - | 19 | 1 475 | 11 | 515 | - | 3 048 |
| 1971 | 1 489 | - | 44 | 1 872 | 13 | 419 | - | 3 837 |
| 1972 | 1 918 | - | 139 | 2 421 | 16 | 386 | - | 4 880 |
| 1973*) | | | 134 | ca.2 800 | | | | |

Table 7.1.f. LING AND BLUE LING

| Year | Faroe Islands | France | Germany**) | | Norway | | U.K. England | U.K. Scotland | Others | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| 1952 | 56 | - | - | | 679 | | 489 | 540 | - | 1 764 |
| 1953 | 144 | - | - | | 486 | | 476 | 935 | - | 2 041 |
| 1954 | 122 | - | 1 247 | | 414 | | 474 | 479 | - | 2 736 |
| 1955 | 235 | - | 2 799 | | 711 | | 751 | 560 | - | 5 056 |
| 1956 | 277 | - | 2 025 | | 1 036 | | 533 | 749 | - | 4 620 |
| 1957 | 259 | - | 1 882 | | 626 | | 579 | 879 | - | 4 225 |
| 1958 | 616 | - | 2 115 | | 795 | | 589 | 823 | - | 4 938 |
| 1959 | 394 | - | 1 758 | | 917 | | 379 | 691 | - | 4 139 |
| 1960 | 520 | - | 895 | | 400 | | 629 | 855 | - | 3 299 |
| 1961 | 603 | - | 11 | | 521 | | 241 | 829 | - | 2 205 |
| 1962 | 450 | 387 | 9 | B.Ling | 326 | | 247 | 572 | - | 1 991 |
| 1963 | 365 | 1 512 | 17 | 478 | 496 | B.Ling | 183 | 396 | - | 3 447 |
| 1964 | 480 | 2 844 | 48 | 2 493 | 736 | 182 | 322 | 632 | - | 7 737 |
| 1965 | 416 | 2 618 | 30 | 1 612 | 832 | 1 120 | 184 | 388 | - | 7 200 |
| 1966 | 416 | 1 827 | 39 | 850 | 2 115 | 430 | 276 | 496 | - | 6 449 |
| 1967 | 736 | 23 | 60 | 1 133 | 3 203 | 238 | 172 | 364 | - | 5 929 |
| 1968 | 1 209 | 177 | 68 | 1 858 | 3 340 | 788 | 152 | 679 | - | 8 271 |
| 1969 | 486 | 195 | 45 | 249 | 1 952 | 798 | 225 | 602 | - | 4 552 |
| 1970 | 699 | 578 | 42 | 335 | 1 737 | 2 612 | 164 | 883 | - | 7 050 |
| 1971 | 752 | 728 | 46 | 1 475 | 2 898 | 557 | 152 | 879 | - | 7 487 |
| 1972 | 1 572 | 866 | 74 | 2 779 | 3 958 | 1 203 | 146 | 772 | - | 11 370 |
| 1973*) | | | 157 | 2 929 | ca.3 000 | ca.4 000 | | | | |

*) Preliminary estimates.
**) 1954 - 1962 Ling and Blue Ling not separated.

Table 7.1.g. LEMON SOLE

| Year | Faroe Islands | France | U.K. England | U.K. Scotland | Total |
|---|---|---|---|---|---|
| 1952 | - | - | 373 | 753 | 1 126 |
| 1953 | - | - | 361 | 462 | 823 |
| 1954 | - | - | 365 | 580 | 945 |
| 1955 | - | - | 307 | 480 | 787 |
| 1956 | - | - | 192 | 548 | 740 |
| 1957 | - | - | 343 | 678 | 1 021 |
| 1958 | - | - | 292 | 670 | 962 |
| 1959 | - | - | 358 | 752 | 1 110 |
| 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 | 441 |
| 1970 | - | - | 68 | 424 | 492 |
| 1971 | 590 | - | 76 | 303 | 969 |
| 1972 | 300 | - | 35 | 244 | 579 |
| 1973 | - | - | | | |

Table 7.1.h. PLAICE

| | | | | | |
|---|---|---|---|---|---|
| 1952 | 115 | - | 79 | 140 | 334 |
| 1953 | 13 | - | 53 | 113 | 179 |
| 1954 | 27 | - | 78 | 142 | 247 |
| 1955 | 81 | - | 57 | 129 | 267 |
| 1956 | 19 | - | 57 | 145 | 221 |
| 1957 | + | - | 75 | 189 | 264 |
| 1958 | 4 | - | 75 | 157 | 236 |
| 1959 | 5 | - | 83 | 149 | 237 |
| 1960 | 64 | - | 62 | 209 | 335 |
| 1961 | 83 | - | 38 | 194 | 315 |
| 1962 | 26 | - | 73 | 164 | 263 |
| 1963 | 4 | 226 | 39 | 130 | 399 |
| 1964 | 11 | 131 | 64 | 99 | 305 |
| 1965 | 6 | 92 | 79 | 143 | 320 |
| 1966 | 1 | 108 | 106 | 161 | 376 |
| 1967 | 7 | 54 | 120 | 172 | 345 |
| 1968 | 102 | 28 | 158 | 170 | 458 |
| 1969 | 192 | 31 | 82 | 181 | 486 |
| 1970 | 288 | - | 59 | 205 | 552 |
| 1971 | 143 | - | 45 | 173 | 361 |
| 1972 | 130 | + | 50 | 111 | 291 |
| 1973 | | | | | |

Table 7.1.i. HALIBUT

| Year | Faroe Islands | France | Germany | Norway | U.K. England | U.K. Scotland | Total |
|---|---|---|---|---|---|---|---|
| 1952 | 243 | - | - | 420 | 467 | 720 | 1 850 |
| 1953 | 149 | - | - | 437 | 414 | 663 | 1 663 |
| 1954 | 226 | - | 13 | 561 | 433 | 735 | 1 968 |
| 1955 | 335 | - | 428 | 560 | 554 | 866 | 2 743 |
| 1956 | 390 | - | 57 | 187 | 407 | 901 | 1 942 |
| 1957 | 374 | - | 125 | 366 | 557 | 1 165 | 2 587 |
| 1958 | 616 | - | 112 | 390 | 580 | 1 165 | 2 863 |
| 1959 | 404 | - | 125 | 180 | 593 | 1 261 | 2 563 |
| 1960 | 218 | - | 58 | 439 | 686 | 1 397 | 2 798 |
| 1961 | 222 | - | 165 | 327 | 287 | 1 237 | 2 238 |
| 1962 | 137 | - | 11 | 299 | 325 | 1 126 | 1 898 |
| 1963 | 161 | - | 10 | 128 | 241 | 887 | 1 427 |
| 1964 | 174 | - | 63 | 110 | 239 | 792 | 1 378 |
| 1965 | 276 | - | 35 | 124 | 292 | 725 | 1 452 |
| 1966 | 169 | - | 36 | 120 | 248 | 636 | 1 209 |
| 1967 | 245 | - | 57 | 180 | 178 | 749 | 1 409 |
| 1968 | 267 | - | 64 | 90 | 130 | 698 | 1 249 |
| 1969 | 205 | - | 18 | 151 | 124 | 558 | 1 056 |
| 1970 | 296 | - | 10 | 182 | 74 | 514 | 1 076 |
| 1971 | 234 | - | 14 | 197 | 92 | 371 | 908 |
| 1972 | 212 | - | 35 | 155 | 60 | 256 | 718 |
| 1973*) | | | 52 | ca. 70 | | | |

Table 7.1.j. MEGRIM

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1952 | - | - | - | - | 5 | 12 | 17 |
| 1953 | - | - | - | - | 4 | 19 | 23 |
| 1954 | - | - | - | - | 5 | 11 | 16 |
| 1955 | - | - | - | - | 5 | 21 | 26 |
| 1956 | - | - | 1 | - | 2 | 13 | 16 |
| 1957 | - | - | 3 | - | 3 | 12 | 18 |
| 1958 | - | - | 1 | - | 4 | 10 | 15 |
| 1959 | - | - | 1 | - | 5 | 6 | 12 |
| 1960 | - | - | - | - | 9 | 21 | 30 |
| 1961 | - | - | - | - | 8 | 17 | 25 |
| 1962 | - | - | - | - | 6 | 19 | 25 |
| 1963 | - | - | - | - | 5 | 26 | 31 |
| 1964 | - | 50 | - | - | 5 | 20 | 75 |
| 1965 | - | 47 | - | - | 5 | 17 | 69 |
| 1966 | - | 237 | - | - | 5 | 14 | 256 |
| 1967 | - | 212 | - | - | 1 | 6 | 219 |
| 1968 | - | 250 | - | - | 3 | 6 | 259 |
| 1969 | - | 312 | - | - | 3 | 8 | 324 |
| 1970 | - | 99 | - | - | 1 | 9 | 109 |
| 1971 | - | 37 | - | - | 2 | 9 | 48 |
| 1972 | - | 38 | - | - | 3 | 10 | 51 |
| 1973 | | | | | | | |

*) Preliminary estimates.

Table 7.1.k. REDFISH

| Year | Faroe Islands | France | Germany | U.K. England | U.K. Scotland | Total |
|---|---|---|---|---|---|---|
| 1952 | - | - | - | 20 | 10 | 30 |
| 1953 | - | - | - | 139 | 16 | 155 |
| 1954 | - | - | 2 114 | 87 | 2 | 2 203 |
| 1955 | - | - | 10 020 | 151 | 2 | 10 173 |
| 1956 | - | - | 5 018 | 25 | 7 | 5 050 |
| 1957 | - | - | 5 217 | 27 | 7 | 5 251 |
| 1958 | - | - | 4 451 | 58 | 13 | 4 522 |
| 1959 | - | - | 3 440 | 38 | 11 | 3 489 |
| 1960 | - | - | 2 295 | 276 | 60 | 2 631 |
| 1961 | - | - | 3 577 | 50 | 38 | 3 665 |
| 1962 | - | - | 2 237 | 52 | 49 | 2 338 |
| 1963 | 1 | 366 | 2 035 | 31 | 60 | 2 493 |
| 1964 | - | 705 | 7 119 | 41 | 43 | 7 908 |
| 1965 | 1 | 582 | 4 864 | 38 | 27 | 5 512 |
| 1966 | - | - | 3 180 | 8 | 40 | 3 228 |
| 1967 | - | - | 4 853 | 24 | 22 | 4 899 |
| 1968 | 1 | - | 6 613 | 43 | 10 | 6 667 |
| 1969 | 5 | - | 1 225 | 13 | 15 | 1 258 |
| 1970 | - | - | 2 020 | 13 | 20 | 2 053 |
| 1971 | - | - | 2 479 | 12 | 12 | 2 503 |
| 1972 | - | - | 4 027 | 40 | 13 | 4 080 |
| 1973 | | | | | | |

Table 7.1.l. ANGLER (MONK)

| | | | | | | |
|---|---|---|---|---|---|---|
| 1952 | - | - | - | 86 | 376 | 462 |
| 1953 | - | - | - | 69 | 320 | 389 |
| 1954 | - | - | - | 85 | 344 | 429 |
| 1955 | - | - | 3 | 157 | 338 | 498 |
| 1956 | - | - | 3 | 157 | 429 | 589 |
| 1957 | - | - | 3 | 214 | 631 | 848 |
| 1958 | - | - | + | 263 | 580 | 843 |
| 1959 | - | - | 13 | 269 | 629 | 911 |
| 1960 | - | - | 7 | 314 | 811 | 1 132 |
| 1961 | - | - | 11 | 167 | 695 | 873 |
| 1962 | - | - | 4 | 179 | 641 | 824 |
| 1963 | - | - | - | 160 | 618 | 780 |
| 1964 | - | - | 3 | 218 | 347 | 568 |
| 1965 | - | - | - | 212 | 326 | 538 |
| 1966 | - | - | - | 164 | 349 | 513 |
| 1967 | - | - | - | 118 | 308 | 426 |
| 1968 | - | - | 3 | 159 | 335 | 497 |
| 1969 | 1 | 26 | 1 | 175 | 429 | 632 |
| 1970 | - | 10 | - | 127 | 542 | 679 |
| 1971 | - | - | - | 132 | 532 | 664 |
| 1972 | | 3 | 2 | 99 | 388 | 490 |
| 1973 x) | | | 6 | | | |

x) Preliminary estimate.

Table 7.1.m. Other Species.

| Year | Dab | Turbot | Witch | Various Pleuro-necti-forms | Hake | Pollack | Various Gadiforms | Cat-fishes | Conger Eel | Gurnards | Dogfishes | Rays and Skates | Non-teleost fishes | Various Unidenti-fied Fishes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1952 | 114 | 2 | 4 | | 74 | 53 | | 133 | 4 | 63 | 898 | 397 | | 146 |
| 1953 | 198 | 3 | 4 | | 90 | 12 | | 113 | 5 | 42 | 686 | 508 | | 137 |
| 1954 | 259 | 1 | 1 | | 62 | 4 | | 136 | 2 | 18 | 662 | 348 | | 293 |
| 1955 | 192 | 4 | 3 | | 26 | 7 | | 174 | 2 | 21 | 579 | 485 | | 802 |
| 1956 | 129 | 2 | 2 | | 15 | 2 | | 242 | 2 | 10 | 526 | 518 | | 568 |
| 1957 | 126 | 1 | 3 | | 18 | 3 | | 259 | 3 | 13 | 524 | 485 | | 552 |
| 1958 | 107 | 2 | 3 | | 20 | 3 | | 217 | 1 | 24 | 754 | 450 | | 326 |
| 1959 | 114 | 3 | 1 | | 26 | 5 | | 222 | 2 | 17 | 738 | 471 | | 645 |
| 1960 | 261 | 3 | 6 | | 41 | 8 | | 348 | 9 | 29 | 1 089 | 659 | | 499 |
| 1961 | 119 | 2 | 6 | 8 771 | 39 | 4 | 679 | 231 | 2 | 22 | 720 | 564 | 3 | 190 |
| 1962 | 121 | 2 | 51 | 341 | 167 | 5 | 345 | 202 | 4 | 18 | 663 | 475 | 12 | 1 209 |
| 1963 | 108 | + | 50 | 379 | 270 | 6 | 605 | 364 | 2 | 9 | 1 166 | 473 | 30 | 838 |
| 1964 | 56 | 18 | 27 | 264 | 144 | 4 | 2 365 | 145 | 2 | 15 | 1 070 | 616 | 2 | 615 |
| 1965 | 68 | 13 | 27 | 660 | 123 | 8 | 1 711 | 97 | 4 | 10 | 1 140 | 657 | 1 | 554 |
| 1966 | 54 | 7 | 10 | 537 | 103 | 5 | 1 269 | 67 | 10 | 7 | 376 | 537 | 591 | 1 501 |
| 1967 | 68 | 3 | 12 | 227 | 48 | 2 | 1 298 | 86 | 8 | 9 | 359 | 481 | 393 | 98 |
| 1968 | 105 | + | 1 | 580 | 311 | 12 | 2 850 | 89 | 15 | 30 | 330 | 551 | 1 | 2 007 |
| 1969 | 203 | 1 | 2 | 51 | 361 | 20 | 1 101 | 56 | 18 | 21 | 400 | 621 | 946 | 2 160 |
| 1970 | 56 | 1 | 4 | 48 | 36 | 6 | 3 132 | 92 | 13 | 2 | 174 | 534 | 94 | 127 |
| 1971 | 49 | 1 | 1 | 11 | 28 | 5 | 1 937 | 100 | 5 | 5 | 153 | 400 | 129 | 176 |
| 1972 | 45 | + | 2 | 417 | 56 | 3 | 3 975 | 209 | 16 | 324 | 97 | 380 | 541 | 823 |

Table 7.1.2. Quantity of Cod, Haddock and Saithe landed ('000 cwt) from the Faroe Plateau and the Faroe Bank by British trawlers landing in Scotland.

| Year | COD | | HADDOCK | | SAITHE | |
|---|---|---|---|---|---|---|
| | Plateau | Bank | Plateau | Bank | Plateau | Bank |
| 1961 | 187.6 | 3.3 | 162.6 | 3.2 | 35.3 | 1.1 |
| 1962 | 162.6 | 6.4 | 274.6 | 7.4 | 42.3 | 1.6 |
| 1963 | 159.8 | 6.3 | 263.1 | 12.1 | 54.0 | 2.8 |
| 1964 | 106.4 | 6.2 | 118.8 | 4.6 | 51.8 | 2.4 |
| 1965 | 110.9 | 4.0 | 107.0 | 3.3 | 60.1 | 2.0 |
| 1966 | 115.3 | 6.3 | 102.0 | 6.7 | 54.2 | 4.4 |
| 1967 | 122.1 | 8.2 | 76.1 | 4.9 | 58.8 | 6.7 |
| 1968 | 115.2 | 11.8 | 101.0 | 8.8 | 68.4 | 9.9 |
| 1969 | 180.9 | 8.3 | 103.6 | 6.2 | 81.9 | 4.3 |
| 1970 | 132.6 | 15.1 | 94.8 | 16.4 | 123.1 | 18.1 |
| 1971 | 120.5 | 11.4 | 86.2 | 12.9 | 103.7 | 14.3 |
| 1972 | 82.3 | 10.8 | 49.5 | 18.7 | 88.0 | 14.0 |

Table 7.1.3. Faroe Division Vb. Fishing Effort and Landings per Unit Effort.

| Year | Estimated Total Effort | | | Landings per Unit Effort | | |
|---|---|---|---|---|---|---|
| | Cod (1) | Haddock (1) | Saithe (2) | Cod (3) | Haddock (3) | Saithe (4) |
| 1950 | 54 | 45 | 34 | 666 | 303 | 160 |
| 1951 | 65 | 54 | 41 | 544 | 272 | 212 |
| 1952 | 65 | 59 | 32 | 511 | 298 | 216 |
| 1953 | 53 | 53 | 28 | 511 | 286 | 260 |
| 1954 | 56 | 55 | 27 | 641 | 283 | 227 |
| 1955 | 59 | 56 | 30 | 654 | 299 | 245 |
| 1956 | 58 | 49 | 42 | 474 | 363 | 259 |
| 1957 | 64 | 58 | 146 | 494 | 367 | 182 |
| 1958 | 76 | 79 | 53 | 368 | 304 | 243 |
| 1959 | 74 | 82 | 71 | 352 | 248 | 203 |
| 1960 | 118 | 141 | 74 | 331 | 199 | 161 |
| 1961 | 108 | 106 | 42 | 250 | 196 | 230 |
| 1962 | 101 | 92 | 56 | 239 | 295 | 186 |
| 1963 | 90 | 80 | 60 | 267 | 343 | 214 |
| 1964 | 80 | 78 | 80 | 315 | 250 | 267 |
| 1965 | 81 | 75 | 64 | 336 | 246 | 344 |
| 1966 | 63 | 70 | 91 | 363 | 268 | 279 |
| 1967 | 52 | 61 | 76 | 510 | 218 | 277 |
| 1968 | 74 | 71 | 51 | 464 | 252 | 399 |
| 1969 | 71 | 87 | 76 | 537 | 269 | 359 |
| 1970 | 79 | 85 | 68 | 405 | 252 | 427 |
| 1971 | 65 | 61 | 68 | 435 | 316 | 454 |
| 1972 | 72 | 79 | 189 | 328 | 209 | 247 |

(1) British Units = Million Ton-hours

(2) English Units = Million Ton-hours steam + motor trawl

(3) Tons per Million Ton-hours, British Trawlers

(4) Tons per Million Ton-hours, English Trawlers

Table 7.1.4. TOTAL DEMERSAL. Faroes[1]. Total Landings.

Round fresh weights in '000 metric tons.

| Year | England | Scotland | Faroes | Others | Total |
|---|---|---|---|---|---|
| 1924 | 55.3 | 13.7 | 4.9 | - | 73.9 |
| 1925 | 45.5 | 9.5 | 7.9 | 0.7 | 63.7 |
| 1926 | 44.2 | 16.7 | 6.4 | 1.1 | 68.3 |
| 1927 | 46.9 | 18.0 | 8.2 | 1.0 | 74.0 |
| 1928 | 40.9 | 12.7 | 5.0 | 3.0 | 61.6 |
| 1929 | 38.3 | 9.2 | 2.2 | 1.2 | 51.0 |
| 1930 | 42.3 | 12.8 | 2.6 | 3.2 | 61.2 |
| 1931 | 58.6 | 17.3 | 1.8 | 1.4 | 79.1 |
| 1932 | 61.6 | 17.6 | 5.3 | 1.0 | 85.4 |
| 1933 | 55.6 | 15.8 | 2.6 | 0.8 | 74.9 |
| 1934 | 53.0 | 15.0 | 2.3 | 0.1 | 70.4 |
| 1935 | 53.8 | 15.2 | 2.0 | 0.1 | 71.2 |
| 1936 | 54.1 | 18.7 | 1.6 | 1.0 | 75.4 |
| 1937 | 39.0 | 15.2 | 3.7 | 1.3 | 59.3 |
| 1938 | 40.6 | 14.8 | 3.5 | 0.4 | 59.2 |
| 1946 | 32.8 | 19.7 | - | - | 52.4 |
| 1947 | 31.7 | 22.7 | - | 0.1 | 54.5 |
| 1948 | 15.0 | 21.5 | - | - | 36.5 |
| 1949 | 21.6 | 26.5 | - | - | 48.1 |
| 1950 | 27.2 | 32.4 | - | 0.4 | 60.1 |
| 1951 | 32.8 | 31.3 | - | 1.9 | 65.9 |
| 1952 | 28.8 | 25.9 | 8.4 | 1.3 | 64.4 |
| 1953 | 27.6 | 22.9 | 7.9 | 1.6 | 59.9 |
| 1954 | 30.5 | 25.7 | 8.9 | 5.8 | 70.9 |
| 1955 | 31.2 | 25.2 | 13.5 | 17.2 | 87.1 |
| 1956 | 21.2 | 23.8 | 13.7 | 15.2 | 73.9 |
| 1957 | 23.5 | 29.5 | 13.8 | 31.3 | 98.1 |
| 1958 | 26.9 | 27.0 | 15.8 | 14.7 | 84.5 |
| 1959 | 23.9 | 27.0 | 13.1 | 14.9 | 78.9 |
| 1960 | 31.0 | 36.6 | 19.6 | 8.0 | 95.3 |
| 1961 | 12.5 | 31.1 | 21.3 | 19.8 | 84.7 |
| 1962 | 14.7 | 35.6 | 19.2 | 9.1 | 78.6 |
| 1963 | 13.6 | 34.5 | 19.1 | 14.4 | 81.6 |
| 1964 | 15.1 | 21.9 | 20.8 | 34.5 | 92.3 |
| 1965 | 15.6 | 21.9 | 20.2 | 35.9 | 93.6 |
| 1966 | 12.4 | 20.6 | 18.3 | 36.2 | 87.5 |
| 1967 | 15.1 | 20.5 | 18.5 | 29.1 | 83.2 |
| 1968 | 15.8 | 23.1 | 27.7 | 33.9 | 100.5 |
| 1969 | 14.2 | 28.1 | 34.2 | 47.1 | 123.6 |
| 1970 | 8.7 | 28.7 | 32.1 | 29.7 | 99.2 |
| 1971 | 9.9 | 25.4 | 32.1 | 29.2 | 96.6 |
| 1972 | | | | | |

1) Plateau and Bank combined.

Table 7.1.5. Estimates of Bertalanffy Growth Parameters[1].

| Species | Source | Year | $L_\infty$ | $s^2_{L_\infty}$ | K | $s^2_K$ | $t_o$ | $s^2_{t_o}$ | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Haddock[xx] | Scotland | 1950 - 1972 | 82.7 | 13.5 | .149 | .00039 | -1.55 | .119 | ♂ + ♀ 1+ excluded |
| Cod[xx], Bank stock | England | 1959 - 1972 | 111.7 | 1.6 | .354 | .00042 | 0.46 | .00114 | ♂ + ♀ 1+ excluded |
| Cod[xx], Plateau stock | England | 1959 - 1972 | 129.9 | 68.3 | .131 | .00043 | -1.21 | .12 | ♂ + ♀ 1+ excluded |
| Plaice | Faroe | 1967 | 56.5 | 8.6 | .476 | .043 | 0.45 | .422 | ♂ |
| Plaice | Faroe | 1967 | 69.8 | 7.9 | .248 | .0020 | -0.24 | .248 | ♀ |
| Plaice | Scotland | 1972 | 83.4 | 7.1 | .113 | .00014 | -1.18 | .155 | ♂ + ♀ 3+ included |
| Plaice[xx] | Scotland | 1972 | 84.8 | 14.1 | .105 | .00026 | -1.55 | .485 | ♂ + ♀ 3+ excluded |
| Lemon Sole | Faroe | 1967 | 36.7 | 53.6 | .222 | .138 | -2.55 | 84.21 | |
| Lemon Sole[xx] | Scotland | 1972 | 44.0 | 0.67 | .175 | .00043 | 0.05 | .368 | ♂ + ♀ 4+ excluded |
| Lemon Sole | Scotland | 1972 | 44.6 | 0.70 | .159 | .00026 | -0.54 | .242 | ♂ + ♀ 4+ included |
| Lemon Sole | Faroe | 1961 | 36.9 | | .223 | | -2.32 | | ♂ x) |
| Lemon Sole | Faroe | 1965 | 33.3 | | .591 | | 1.20 | | ♂ x) |
| Lemon Sole | Faroe | 1966 | 41.9 | | .253 | | -0.55 | | ♂ x) |
| Lemon Sole | Faroe | 1961 | 38.7 | | .372 | | -0.15 | | ♀ x) |
| Lemon Sole | Faroe | 1965 | 50.9 | | .072 | | -8.67 | | ♀ x) |
| Lemon Sole | Faroe | 1966 | 40.4 | | .359 | | -0.14 | | ♀ x) |

x) From mean variance data. xx) Estimates used for yield calculation.

1) The estimation is done according to a programme running at the Danish Institute of Marine Research, Charlottenlund. By an iterative process a least square fit of the growth curve to the observed data is found.