International Council for the Exploration of the Sea.

C.M. 1980/G:42
Demersal Fish committee

# The recent changes in fishing pattern in Icelandic waters and their effects on the yield of cod and haddock stocks.

by

Sigfús A. Schopka
Marine Research Institute
Reykjavík, Iceland.



## Abstract

In this paper changes in fishing pattern due to the increase in mesh size combined with other fishing regulations in recent years are described. The estimated increase in spawning stock biomass per recruit is 85% for cod and 46% for haddock. The estimated increase in the maximum yield per recruit is 14% for cod and 8% for haddock. In terms of catch the yearly gain using average recruitment figures is about 55 thousand tons of cod and 5 thousand tons of haddock.

## Introduction

In 1975 Iceland extended its fishing limits to 200 nautical miles. Simultanously and later on a series of strict conservation measures have been introduced. In the 1976 the mesh size in bottom trawls was increased to 135 mm and from 1 February in 1977 the mesh size in trawl codend was again increased to 155 mm. The minimum landing size for cod and saithe increased to 50 cm and

for haddock to 45 cm. This corresponded to 50% retention length for these species. Some areas off the NW-, N- and E- coasts of the island where small cod inhabit have in recent years, been closed permanently against trawling. In other areas fishing can be banned at a short notice if the numbers of small and undersized fish exceeds a certain maximum proportion of catch in that area. This amount depends on species and year class strength. Such a temporary box closure is valid for at least seven days and can if necessary been prolonged. Furthermore the fishing of the trawlers which mainly exploit cod of age groups 4-7 has been restricted heavily during the summer months. The effects on the exploitation pattern of each of the above-mentioned regulations separately are a complicated matter and no attempt have been made to evaluate it that way. Therefore this paper will only deal with the changes in fishing pattern caused by the combined regulations in force.

## Material and methods

Exploitation patterns have been calculated by using the virtual population technique. The basic data i.e. numbers of cod and haddock landed of each age are the same as presented in the last North Western Working Group Report (Anon 1976b). Data for the most recent years (1976-1979) are based on Icelandic age length measurements and have been prepared in the same manner as the older data. (Table 1 and 6). As usual natural mortality coefficient of M= 0.2 has been used.

Recent changes in fishing effort on different age groups are from the available effort data not fully known. Therefore the input fishing mortality values for 1979 are based mainly on F values which generate approximately the year class strength which are known from other sources especially the young gadoid surveys (Pálsson and Malmberg 1978, and Pálsson pers. comm.) and to some extent to 0-group survey results (Anon. 1975, 1976a) but also taking into account the known trends in fishing effort.

## Results

### Cod

As shown in table 1 the catch in numbers figures for the youngest age groups have changed after 1976. During the period 1971-1976 the average numbers of 3 years old cod landed are 21.2 million fish and for 4 years old cod 35.8 million fish. For the same age groups the numbers are 5.0 million fish and 30.2 million fish respectively during 1977-1979 period.

Numbers present in the stock at beginning of the year indicate that year classes have been rather stable with an average value of 225 million 3 year old cod. The weakest year class in the relevant period is the 1974 year class which is about one fourth of the size of the strong 1976 year class (Table 2).

The total stock biomass (Table 3) declined from 1900 thousand tons in 1960 to 1500 thousand tons in 1965. Then it increased again to 2000 thousand tons in 1969 due to the recruitment of the strong 1964 year class to the stock connected with immigrants from Greenland waters. During 1970-1975 the stock biomass showed a drastic decline even though good year classes recruited to the stock. In 1975 the total stock biomass was at the lowest level of only 1160 thousand tons. The stock is recovering and in the beginning of 1980 it is estimated to be about 1550 thousand tons.

The spawning stock has shown similar trends. In 1960 the spawning stock biomass (7+) was 750 thousand tons. It then declined to 240 thousand tons in 1967. Due to immigration of mature cod from Greenland waters, the spawning stock biomass increased again to 700 thousand tons in 1970. From 1970 it declined drastically to only 150 thousand tons in 1976 and during the following years it was at very low level below 200 thousand tons. This year (1980) the strong 1973 year class recruited to the spawning stock and the spawning stock biomass is estimated to be about 300 thousand tons at present.

Looking at the fishing mortality rates (Table 4) there has been as expected a sharp decline in fishing effort on the youngest age groups of cod in recent years. Bearing in mind that most of the fishing regulations in force at present where introduced

in 1976 and 1977 it is practical to compare the changes in the exploitation pattern by periods i.e. 1971-1975 period on the one hand to the 1977-1979 period on the other hand when the effects of the expected changes have to some extent passed through. The changes in fishing pattern are as follows:

| Age | Average fishing mortalities period 1971 - 1979 | period 1977 - 1979 | percentage reduction in F |
|---|---|---|---|
| 3 | 0.112 | 0.025 | 78 |
| 4 | 0.313 | 0.204 | 35 |
| 5 | 0.493 | 0.372 | 25 |
| 6 | 0.557 | 0.504 | 10 |
| 7+ | 1.045 | 0.986 | 6 |

As can be seen from the table the fishing mortality during the 1977-1979 period on 3 year old cod is only one fifth and on 4 years old cod two third of that of the former period in view. For these two different exploitation pattern yield per recruit curves were calculated (Fig. 1). The maximum yield for the present exploitation pattern is 1.92 kg per recruit compared with the maximum yield of 1.68 kg per recruit for the 1971-1975 exploitation pattern.

Fig. 2. shows the spawning biomass per 3 years old recruit plotted against varying fishing mortality on age groups subject to maximum exploitation for the fishing patterns of both periods. This shows that the present exploitation pattern will stabilize the spawning stock biomass at about 315 thousand tons by assuming an average recruitment compared to only 170 thousand tons for the 1971-1975 average exploitation pattern. The increase by present F is therefore 85%. If the present fishing effort would be reduced to give the maximum yield per recruit (F = 0.5) this would in the long term almost double the catch rate and give the possibility for more than doubling the spawning stock biomass (780 thousand tons).

Haddock

Comparing the numbers landed by age (Table 5) in the 1971-1975 period with the 1977-1979 period there has been a sharp reduction in landings of young haddock as expected. In the first period 1.3 millions 2 years old haddock were on the average annually landed but in the later period the average yearly catch was only 0.1 million 2 years old fish. Furthermore there has been a great reduction in the landings of 3 years old haddock from 9.6 million fish annually in the 1971-1975 period to only 1.4 million fish annually in the 1977-1979 period.

Table 6 which demonstrates the stock in numbers in beginning of the year indicates somewhat more fluctuations in the year class strength of haddock than of cod. The average year class strength during the period 1962-1978 was 66 million as 2 year old haddock. The 1969 year class which is the weakest year class in the relevant period is about one fifth of the size of the strong 1976 year class.

In 1962 the total stock biomass (Table 7) reached a maximum of 450 thousand tons. This high level of stock abundance was mainly based on two outstanding year classes from 1956 and 1957. The total stock then declined due to poorer recruitment combined with high exploitation rate on the younger age groups. In 1971 the total stock biomass had decreased to a minimum of 140 thousand tons. Since then the stock has been increasing especially in 1978 and 1979 when the good 1976 and 1977 year classes recruited to the stock.

The spawning stock biomass (4+) has shown similar trends. From the maximum of 350 thousand tons in 1962 it declined to only 70 thousand tons in 1973. In recent years the spawning stock has been increasing and is estimated to be about 230 thousand tons in the beginning of 1980.

From table 8 it is obvious that a drastic decline in fishing effort on the younger age groups of haddock has taken place in recent years as expected. Comparing the fishing pattern during the period 1971-1975 to period 1977-1979 the changes are as follows:

| Age | Average fishing mortalities period 1971 - 1975 | Average fishing mortalities period 1977 - 1979 | percentage reduction in F |
|---|---|---|---|
| 2 | 0.029 | 0.002 | 93 |
| 3 | 0.182 | 0.032 | 82 |
| 4 | 0.470 | 0.169 | 64 |
| 5 | 0.755 | 0.410 | 46 |
| 6+ | 0.860 | 0.804 | 7 |

Actually the change in the exploitation pattern on haddock corresponds approximately to an increase of age at first capture by 1.0 year. From Fig. 3 it can be seen that the maximum yield per 2 years old recruit is 1.05 kg for the present exploitation pattern whereas the maximum yield for 1971-1975 exploitation pattern is somewhat lower (0.97 kg/2 years old recruit).

Fig. 4. shows the spawning stock biomass per 2 years old recruit plotted against fishing mortality on age groups subject to maximum exploitation for both fishing patterns. Comparing the both exploitation patterns the present one will stabilize the spawning stock biomass at about 190 thousand tons by assuming an average recruitment whereas the 1971-1975 average fishing pattern would have stabilized the spawning stock biomass at about 130 thousand tons.

## Discussion and conclusions

Conservation measures which have been introduced in recent years in order to protect overexploitation on young fish in the waters around Iceland show that numbers of small and undersized fish caught, have been drastically reduced. Even though most of these regulations as the increase in mesh size to 155 mm in trawl codend has been put into force in 1976 and 1977 and therefore the final conservation effects are not yet fully known it is already obvious that there have been notable changes in the exploitation pattern on the young fish. Age composition data and length measurements for all gears in use show reduction in catches of young fish which can only be explained as a result of different fishing regulations because known survey estimates

suggest that year class strength in recent years is at least at or above the long-term average.

There are some difficulties in estimating the changes in fishing effort in recent years. Box closures, mesh size increase, changes in the composition of the fishing fleet and gears in use make the estimation of the true fishing effort very complicated. In order to avoid complicated calculations which would hardly give more reliable results the input F values for 1979 have been chosen after a series of runs by different input F values to generate approximately the year class strength which are known from other sources such as 0-group survey results and young gadoid surveys and known effort changes and cpue information available. Though input F's for the last year of observation are never quite reliable it is thought that the 1977-1979 average fishing pattern presented here is a fairly true estimate on the development which has taken place most recently. The present management obtions on cod has only decreased the effort on the younger agegroups and no marked change is known to have taken place on the fully exploited age groups. Since the foreign cod fishing fleet left Iceland grounds in 1976 and 1977 the effort gap has been filled up gradually to a great extent by an increase in the Iceland trawler fleet combined with introduction of more effective gill nets during the winter season fisheries which exploits mainly the spawning stock.

Comparison of the present exploitation pattern for cod and haddock shows that fish conservation measures in force bring the cod fisheries much more long term gain than haddock. The explanation for this is the mesh size in use. From codend selection experiments the 50% retention length which corresponds to the present minimum landing size of haddock (45 cm) is achieved by approximately 151 mm mesh size (Thorsteinsson 1980). It is estimated that 150 mm mesh size for haddock will give about 5% more longterm gain than the present mesh size. On the other hand the present mesh size is to small to achieve the optimal exploitation pattern for cod and mesh size of 165 mm would be more appropriate. By that mesh size the estimated immediate loss for haddock would be greater than the long term gain.

As a management solution the Marine Research Institute therefore recommended 155 mm meshsize for both species. Box closures on the nursery grounds together with regulation were therefore introduced as additional conservation measures in improving the exploitation pattern for cod.

Conservation of any kind will always result in some immediate losses depending on which kind of management measures have been introduced. The immediate loss by increasing the mesh size from 135 mm to 155 mm for the Icelandic trawlers was estimated to be 6% by weight for cod. In spite of this no such losses were detected at all. Instead cod catch (kg) per hours fishing of the Icelandic trawlers increased during 1976-1979 as follows:

| | 1976 | 1977 | 1978 | 1979 |
|---|---|---|---|---|
| Trawlers > 500 GRT | 603 | 679 | 651 | 724 |
| " < 500 GRT | 734 | 855 | 768 | 922 |

A possible explanation for this is that during the same time changes in effort took place when the majority of the foreign fishing fleet which had been fishing at Iceland left Iceland grounds in 1976 and 1977. Also at this time the very successful 1973 year class recruited to the fisheries but calculations on immediate losses and long term gains were based on average recruitments values. Effects of improved yield per recruit for cod together with better recruitment and hence stock size have in almost every year since the meshes in trawl codend were increased resulted for all gears in further increase in catch per unit effort.

The estimated increase in the maximum yield per recruit is 14% for cod and 8% for haddock. Using average recruitment figures the yearly gain is about 55 thousand tons of cod and 5 thousand tons of haddock. It is obvious from the yield per recruit curves that this gain for cod will not be fully achieved except fishing effort would be reduced about 50% of the present level.

As already have been mentioned the final conservation gain is not yet fully known. No information on discards were available prior to 1977 but it is known that discarding took place

some years ago but the magnitude could never be estimated. The present mesh size, box closures together with other fishing regulations must have reduced discarding heavily. In recent years observations of fishery inspectors onboard the fishing vessels have shown that discarding of cod and haddock is almost neglible. This increase in survival of young fish which is outside the range of VPA technique will result in better recruitment and hence stock size if the natural mortality on this age groups is within a reasonable range.

It should also be noted here that in the calculations natural mortality coefficient of M = 0.2 has been assumed. If the natural mortality is actually lower the gain in protecting young fish is considerably higher than have been presented in this paper.

References

Anon. 1975 Report on the International 0-group fish survey in Icelandic and Greenland waters, in July-August 1975.
ICES, C.M. 1975/H:35. (Mimeo)

Anon. 1976 a. Report of the North-Western Working Group.
ICES, C.M. 1976/H:39 (Mimeo).

Anon. 1976 b. Report of the North-Western Working Group.
ICES, C.M. 1976/F:6 (Mimeo)

Pálsson, Ó.K. and S.A. Malmberg 1978. Investigations on demersal juvenile cod (Age groups 0-IV) in Icelandic waters in 1977.
ICES, C.M. 1978/G:20 (Mimeo).

Thorsteinsson, G. 1980. Icelandic bottom trawl and Danish seine codend selection experiments on cod, haddock, redfish and plaice in 1972-1976. (Mimeo).

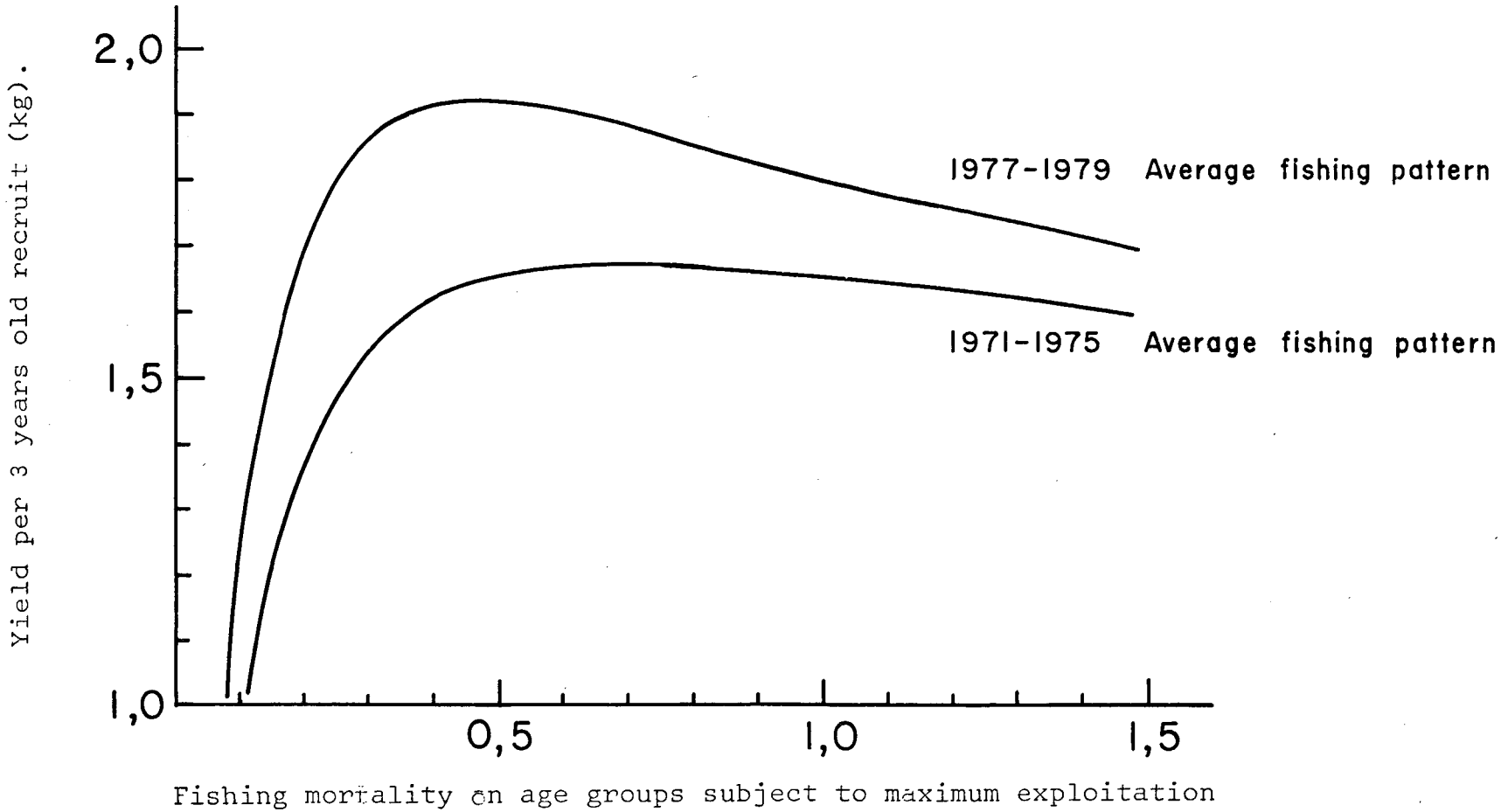


Fig. 1. Cod. Yield per recruit curves for 1971-1975 and 1977-1979 exploitation patterns.

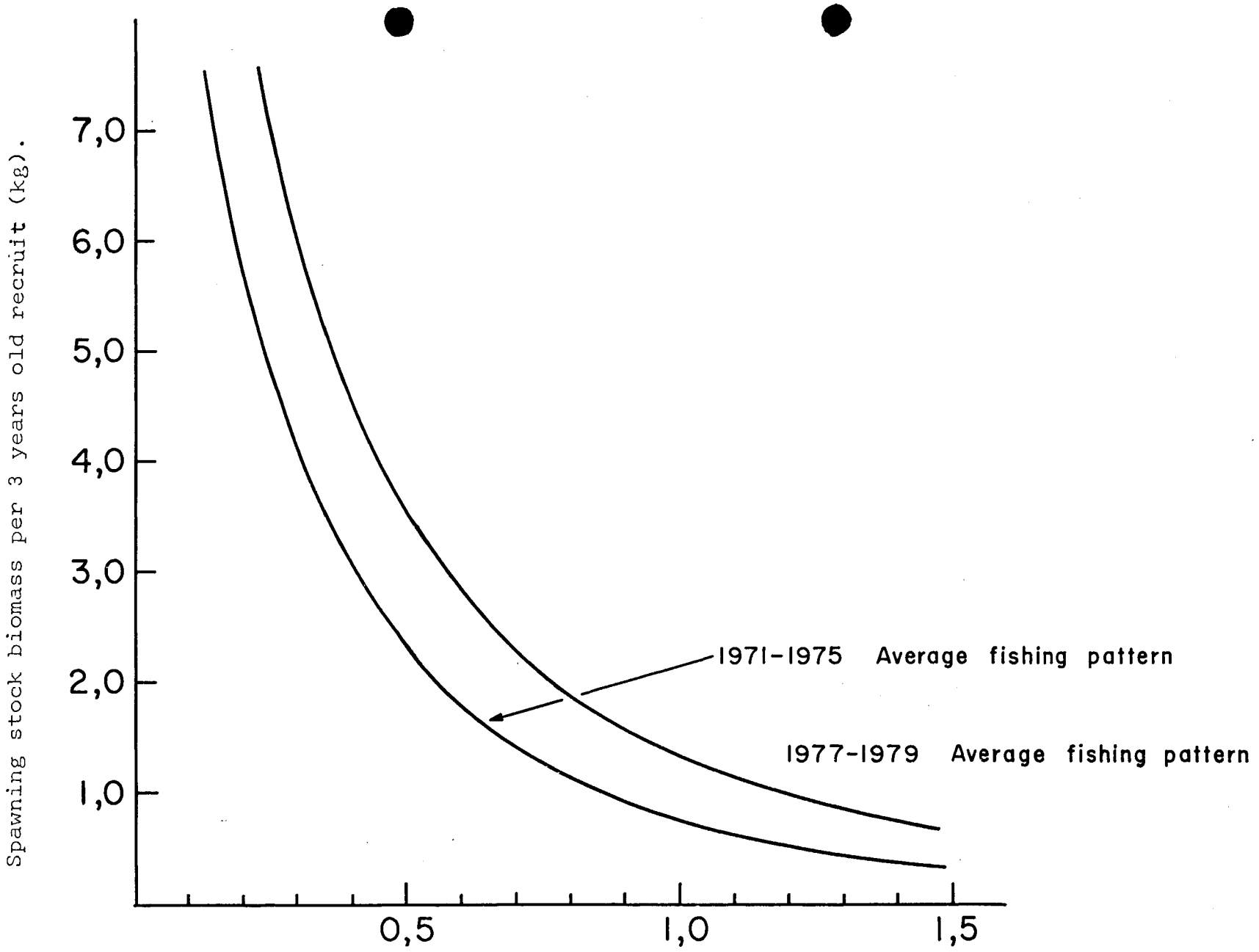


Fig. 2. Cod. Spawning stock biomass per recruit for 1971-1975 and 1977-1979 exploitation patterns.

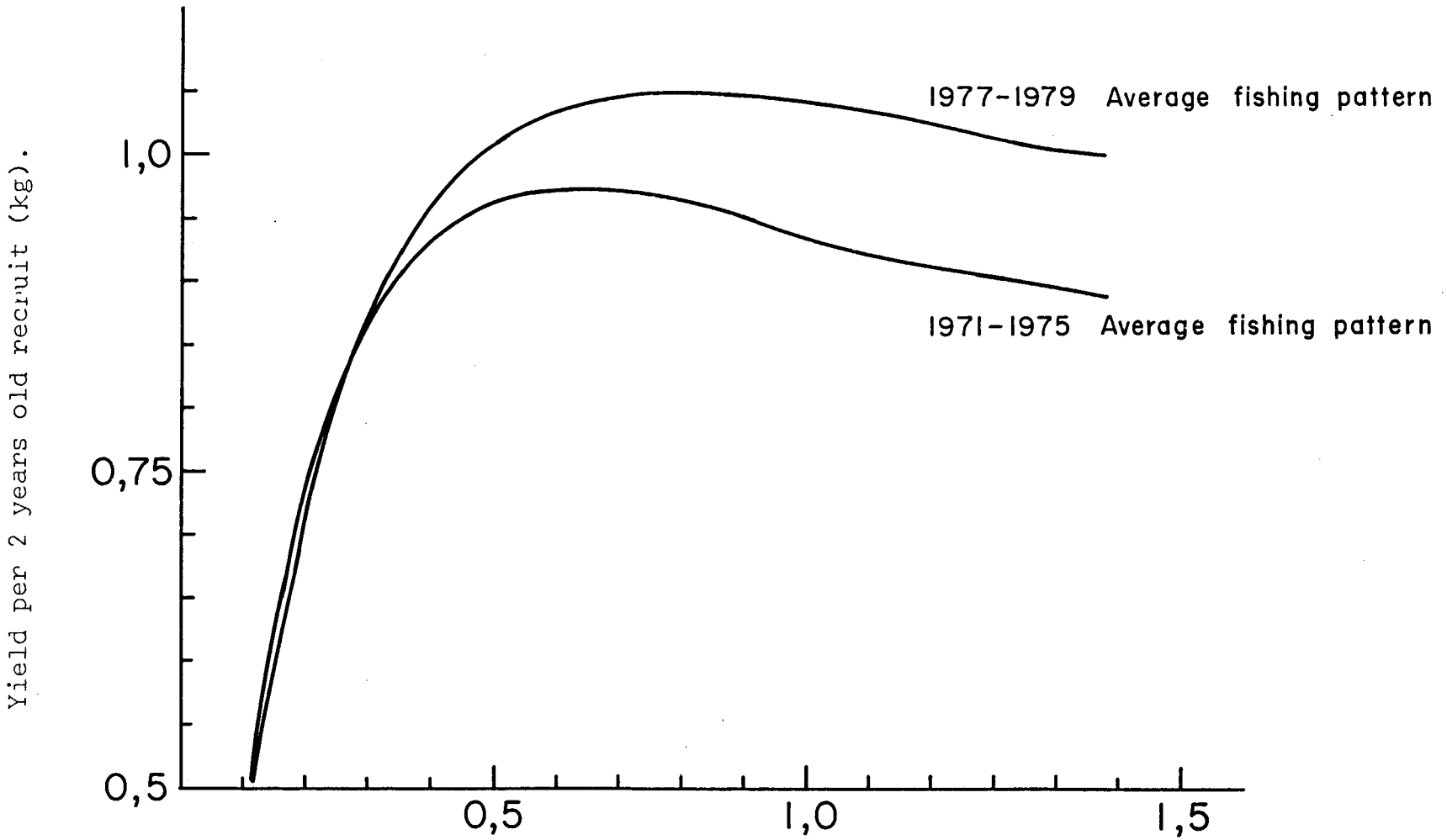


Fig. 3. Haddock. Yield per recruit curves for 1971-1975 and 1977-1979 exploitation patterns.

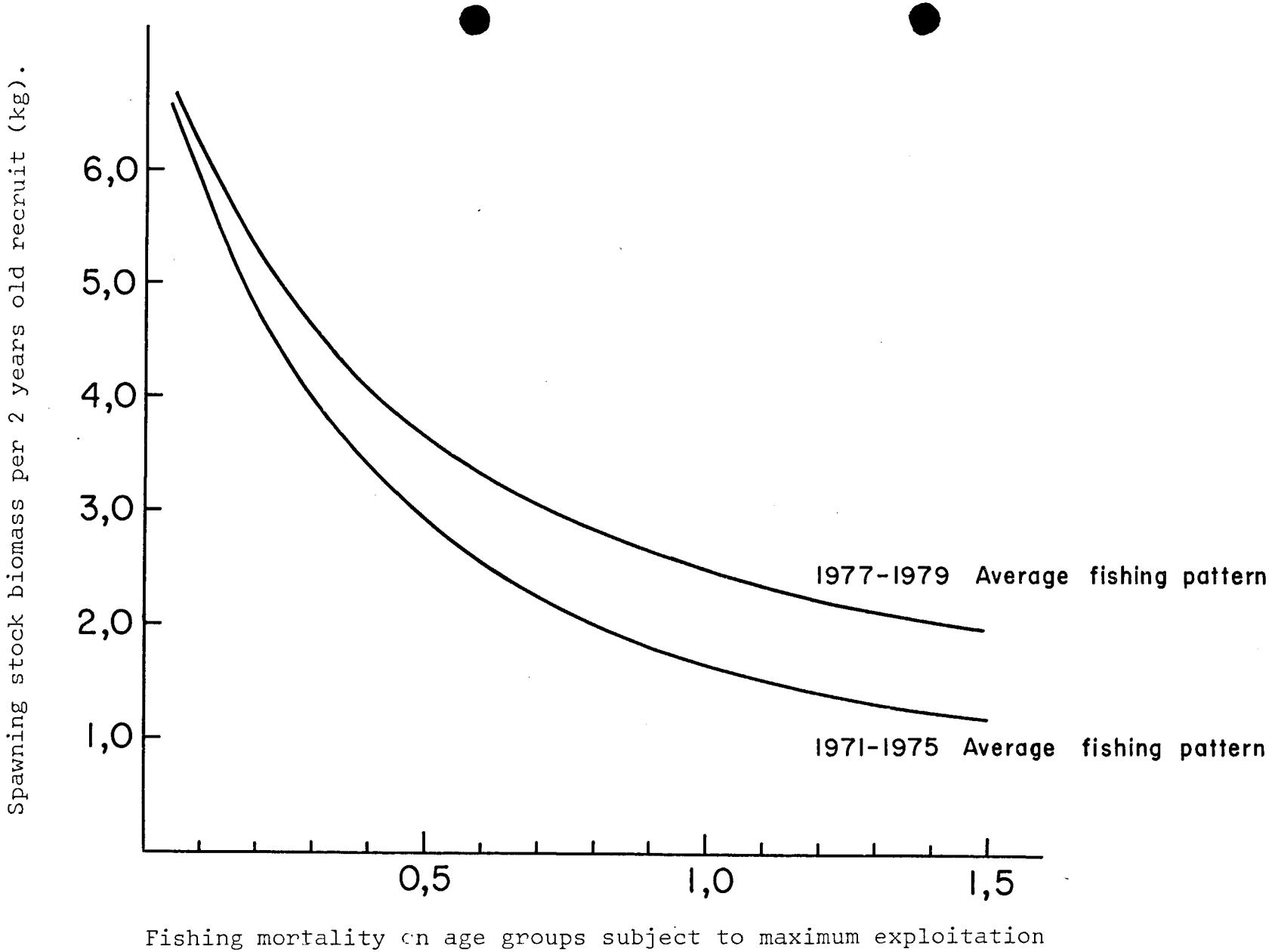


Fig.4. Haddock. Spawning stock biomass per recruit curves for 1971-1975 and 1977-1979 exploitation patterns.

Table 1. Cod. Input catch in numbers for the VPA.

| AGE | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 |
|---|---|---|---|---|---|---|---|
| 3 | 13.434 | 14.664 | 12.309 | 14.884 | 16.284 | 22.039 | 16.957 |
| 4 | 30.544 | 19.971 | 28.867 | 29.298 | 28.590 | 30.535 | 30.039 |
| 5 | 29.000 | 19.680 | 19.718 | 22.390 | 20.312 | 21.562 | 19.791 |
| 6 | 12.105 | 18.826 | 15.786 | 11.586 | 10.882 | 11.002 | 12.338 |
| 7 | 8.681 | 7.617 | 12.424 | 17.508 | 7.482 | 9.050 | 6.196 |
| 8 | 5.967 | 6.502 | 4.243 | 8.295 | 17.182 | 6.228 | 7.118 |
| 9 | 6.512 | 3.633 | 7.852 | 2.640 | 5.169 | 11.670 | 2.305 |
| 10 | 12.136 | 2.962 | 2.614 | 6.063 | 1.763 | 1.694 | 5.862 |
| 11 | 3.661 | 6.181 | 1.866 | 1.410 | 3.315 | 0.974 | 0.526 |
| 12 | 0.911 | 1.230 | 3.007 | 0.946 | 0.768 | 0.587 | 0.281 |
| 13 | 0.221 | 0.090 | 0.386 | 1.396 | 0.463 | 0.131 | 0.374 |
| 14 | 0.219 | 0.126 | 0.068 | 0.204 | 0.969 | 0.246 | 0.054 |
| SUM 3- 6 | 85.083 | 73.141 | 76.680 | 78.158 | 76.068 | 85.138 | 79.125 |
| SUM 7-14 | 38.308 | 28.341 | 32.460 | 38.462 | 37.111 | 30.580 | 22.716 |
| TOTAL | 123.391 | 101.482 | 109.140 | 116.620 | 113.179 | 115.718 | 101.841 |

| AGE | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 |
|---|---|---|---|---|---|---|---|
| 3 | 27.444 | 11.514 | 9.828 | 10.670 | 13.303 | 8.664 | 37.583 |
| 4 | 25.937 | 49.731 | 23.168 | 50.014 | 35.932 | 27.765 | 25.602 |
| 5 | 24.063 | 22.280 | 43.262 | 24.737 | 45.939 | 30.861 | 26.338 |
| 6 | 11.953 | 16.072 | 16.968 | 27.188 | 21.275 | 23.346 | 16.048 |
| 7 | 7.807 | 17.478 | 12.826 | 15.497 | 17.443 | 11.190 | 12.011 |
| 8 | 2.838 | 5.657 | 17.411 | 12.066 | 12.334 | 10.596 | 3.607 |
| 9 | 4.142 | 1.728 | 1.881 | 14.581 | 6.885 | 11.243 | 5.893 |
| 10 | 1.279 | 3.169 | 0.578 | 0.516 | 4.710 | 4.298 | 7.853 |
| 11 | 2.017 | 0.526 | 0.498 | 0.175 | 0.360 | 1.281 | 1.452 |
| 12 | 0.095 | 0.598 | 0.101 | 0.099 | 0.108 | 0.083 | 0.261 |
| 13 | 0.040 | 0.057 | 0.063 | 0.043 | 0.057 | 0.033 | 0.011 |
| 14 | 0.153 | 0.053 | 0.029 | 0.018 | 0.018 | 0.003 | 0.001 |
| SUM 3- 6 | 89.397 | 99.597 | 93.226 | 112.609 | 116.449 | 90.636 | 105.571 |
| SUM 7-14 | 18.371 | 29.266 | 33.387 | 42.995 | 41.915 | 38.727 | 31.089 |
| TOTAL | 107.768 | 128.863 | 126.613 | 155.604 | 158.364 | 129.363 | 136.660 |

| AGE | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
|---|---|---|---|---|---|---|
| 3 | 14.211 | 29.522 | 24.140 | 2.611 | 4.879 | 7.585 |
| 4 | 58.770 | 28.786 | 38.174 | 45.602 | 13.396 | 31.642 |
| 5 | 22.632 | 44.057 | 20.797 | 31.020 | 43.426 | 15.250 |
| 6 | 15.183 | 12.421 | 24.976 | 12.270 | 19.417 | 37.839 |
| 7 | 9.640 | 11.118 | 5.606 | 15.405 | 11.114 | 13.555 |
| 8 | 6.140 | 4.202 | 6.962 | 3.129 | 5.556 | 4.254 |
| 9 | 1.705 | 2.212 | 1.160 | 1.877 | 1.067 | 1.495 |
| 10 | 3.059 | 0.867 | 0.589 | 0.406 | 0.488 | 0.419 |
| 11 | 2.162 | 1.146 | 0.240 | 0.164 | 0.149 | 0.179 |
| 12 | 0.293 | 0.466 | 0.159 | 0.025 | 0.058 | 0.042 |
| 13 | 0.108 | 0.083 | 0.064 | 0.047 | 0.003 | 0.031 |
| 14 | 0.031 | 0.019 | 0.016 | 0.001 | 0.006 | 0.004 |
| SUM 3- 6 | 110.796 | 114.786 | 108.087 | 91.503 | 81.118 | 92.316 |
| SUM 7-14 | 23.138 | 20.113 | 14.796 | 21.054 | 18.441 | 19.979 |
| TOTAL | 133.934 | 134.899 | 122.883 | 112.557 | 99.559 | 112.295 |

Table 2. Cod. Stock size in numbers from VPA.

| AGE | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 |
|---|---|---|---|---|---|---|---|
| 3 | 151.864 | 189.279 | 142.134 | 162.496 | 292.954 | 257.976 | 289.128 |
| 4 | 231.330 | 112.221 | 141.742 | 105.269 | 119.619 | 225.156 | 191.337 |
| 5 | 114.343 | 161.878 | 73.904 | 90.081 | 59.880 | 72.240 | 156.833 |
| 6 | 44.573 | 67.561 | 114.799 | 42.797 | 53.633 | 30.818 | 39.795 |
| 7 | 55.552 | 25.622 | 38.411 | 79.769 | 24.635 | 34.122 | 15.374 |
| 8 | 21.076 | 37.665 | 14.142 | 20.306 | 49.566 | 13.456 | 19.808 |
| 9 | 18.527 | 11.898 | 24.984 | 7.771 | 9.205 | 25.182 | 5.455 |
| 10 | 33.683 | 9.333 | 6.482 | 13.412 | 3.996 | 2.938 | 10.197 |
| 11 | 7.018 | 16.705 | 4.985 | 2.968 | 5.565 | 1.696 | 0.900 |
| 12 | 1.313 | 2.484 | 8.141 | 2.410 | 1.171 | 1.612 | 0.523 |
| 13 | 0.559 | 0.270 | 0.936 | 3.972 | 1.126 | 0.279 | 0.794 |
| 14 | 0.452 | 0.260 | 0.140 | 0.421 | 2.001 | 0.508 | 0.112 |
| SUM 3- 6 | 542.111 | 530.940 | 472.578 | 400.643 | 526.086 | 586.189 | 677.093 |
| SUM 7-14 | 138.180 | 104.237 | 98.221 | 131.029 | 97.265 | 79.793 | 53.162 |
| TOTAL | 680.291 | 635.177 | 570.800 | 531.672 | 623.351 | 665.982 | 730.255 |

| AGE | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 |
|---|---|---|---|---|---|---|---|
| 3 | 338.505 | 175.917 | 258.831 | 185.213 | 183.178 | 135.011 | 303.431 |
| 4 | 221.418 | 252.392 | 133.641 | 203.041 | 142.012 | 137.973 | 102.721 |
| 5 | 129.604 | 157.905 | 161.899 | 88.561 | 121.293 | 83.986 | 87.986 |
| 6 | 110.570 | 84.456 | 109.212 | 93.696 | 50.297 | 58.173 | 41.120 |
| 7 | 21.512 | 79.753 | 54.685 | 74.135 | 52.308 | 22.157 | 26.739 |
| 8 | 7.044 | 10.619 | 49.579 | 33.243 | 46.758 | 27.187 | 8.164 |
| 9 | 9.841 | 3.228 | 3.656 | 24.990 | 16.408 | 27.204 | 12.775 |
| 10 | 2.405 | 4.353 | 1.104 | 1.317 | 7.502 | 7.277 | 12.217 |
| 11 | 3.137 | 0.830 | 0.770 | 0.389 | 0.616 | 1.966 | 2.140 |
| 12 | 0.269 | 0.781 | 0.213 | 0.190 | 0.162 | 0.185 | 0.475 |
| 13 | 0.178 | 0.135 | 0.114 | 0.085 | 0.067 | 0.037 | 0.077 |
| 14 | 0.316 | 0.109 | 0.060 | 0.037 | 0.031 | 0.005 | 0.002 |
| SUM 3- 6 | 800.096 | 670.670 | 663.583 | 570.511 | 496.780 | 415.143 | 535.257 |
| SUM 7-14 | 44.702 | 99.809 | 110.182 | 134.385 | 123.853 | 86.018 | 62.588 |
| TOTAL | 844.798 | 770.479 | 773.765 | 704.897 | 620.633 | 501.161 | 597.845 |

| AGE | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
|---|---|---|---|---|---|---|
| 3 | 158.425 | 228.333 | 337.099 | 105.381 | 239.837 | 367.919 |
| 4 | 214.561 | 116.893 | 160.343 | 254.216 | 83.921 | 191.956 |
| 5 | 61.096 | 122.892 | 69.836 | 96.967 | 167.091 | 56.646 |
| 6 | 48.401 | 29.752 | 61.144 | 38.513 | 51.568 | 97.793 |
| 7 | 19.302 | 26.008 | 13.251 | 27.718 | 20.526 | 24.834 |
| 8 | 11.162 | 7.207 | 11.354 | 5.836 | 8.987 | 6.911 |
| 9 | 3.461 | 3.674 | 2.166 | 3.117 | 1.992 | 2.429 |
| 10 | 5.197 | 1.313 | 1.044 | 0.740 | 0.886 | 0.681 |
| 11 | 3.044 | 1.537 | 0.307 | 0.331 | 0.245 | 0.291 |
| 12 | 0.468 | 0.584 | 0.249 | 0.041 | 0.125 | 0.068 |
| 13 | 0.156 | 0.123 | 0.069 | 0.063 | 0.011 | 0.050 |
| 14 | 0.053 | 0.033 | 0.027 | 0.002 | 0.010 | 0.006 |
| SUM 3- 6 | 482.483 | 497.870 | 628.422 | 495.077 | 542.417 | 714.314 |
| SUM 7-14 | 42.843 | 40.478 | 28.468 | 37.849 | 32.782 | 35.270 |
| TOTAL | 525.326 | 538.348 | 656.890 | 532.926 | 575.199 | 749.583 |

Table 3. Cod. Stock biomass from VPA.

| AGE | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 |
|---|---|---|---|---|---|---|---|
| 3 | 170.088 | 211.992 | 159.190 | 181.995 | 328.108 | 288.933 | 323.824 |
| 4 | 446.468 | 216.587 | 273.561 | 203.168 | 230.864 | 434.550 | 369.280 |
| 5 | 333.883 | 472.683 | 215.799 | 263.037 | 174.850 | 210.940 | 457.951 |
| 6 | 169.376 | 256.733 | 436.237 | 162.630 | 203.807 | 117.108 | 151.220 |
| 7 | 258.315 | 119.143 | 178.611 | 370.924 | 114.551 | 158.669 | 71.490 |
| 8 | 110.647 | 197.739 | 74.244 | 106.608 | 260.220 | 70.642 | 103.994 |
| 9 | 101.527 | 65.202 | 136.914 | 42.583 | 50.444 | 137.998 | 29.895 |
| 10 | 202.438 | 56.092 | 38.955 | 80.605 | 24.014 | 17.660 | 61.284 |
| 11 | 50.386 | 119.945 | 35.789 | 21.310 | 39.955 | 12.177 | 6.461 |
| 12 | 11.725 | 22.178 | 72.703 | 21.521 | 10.461 | 14.393 | 4.667 |
| 13 | 6.232 | 3.009 | 10.431 | 44.253 | 12.549 | 3.109 | 8.843 |
| 14 | 6.848 | 3.940 | 2.126 | 6.379 | 30.302 | 7.693 | 1.689 |
| SUM 3- 6 | 1119.814 | 1157.996 | 1084.787 | 810.831 | 937.629 | 1051.530 | 1302.275 |
| SUM 7-14 | 748.119 | 587.248 | 549.773 | 694.184 | 542.495 | 422.340 | 288.321 |
| TOTAL | 1867.933 | 1745.244 | 1634.560 | 1505.015 | 1480.124 | 1473.870 | 1590.597 |

| AGE | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 |
|---|---|---|---|---|---|---|---|
| 3 | 379.125 | 197.027 | 289.891 | 207.439 | 205.160 | 151.212 | 339.842 |
| 4 | 427.336 | 487.116 | 257.927 | 391.870 | 274.083 | 266.289 | 198.251 |
| 5 | 378.443 | 461.084 | 472.745 | 258.598 | 354.175 | 245.238 | 256.919 |
| 6 | 420.167 | 320.933 | 415.006 | 356.045 | 191.129 | 221.058 | 156.256 |
| 7 | 100.032 | 370.849 | 254.285 | 344.729 | 243.230 | 103.029 | 124.337 |
| 8 | 36.979 | 55.751 | 260.292 | 174.527 | 245.482 | 142.732 | 42.860 |
| 9 | 53.927 | 17.688 | 20.036 | 136.946 | 89.919 | 149.077 | 70.005 |
| 10 | 14.456 | 26.162 | 6.634 | 7.915 | 45.089 | 43.737 | 73.422 |
| 11 | 22.524 | 5.961 | 5.531 | 2.791 | 4.426 | 14.113 | 15.364 |
| 12 | 2.405 | 6.976 | 1.906 | 1.693 | 1.446 | 1.650 | 4.240 |
| 13 | 1.979 | 1.509 | 1.269 | 0.942 | 0.746 | 0.412 | 0.859 |
| 14 | 4.784 | 1.657 | 0.907 | 0.563 | 0.468 | 0.078 | 0.026 |
| SUM 3- 6 | 1605.071 | 1466.159 | 1435.568 | 1213.951 | 1024.546 | 883.797 | 951.268 |
| SUM 7-14 | 237.088 | 486.553 | 550.859 | 670.105 | 630.806 | 454.829 | 331.114 |
| TOTAL | 1842.159 | 1952.713 | 1986.427 | 1884.057 | 1655.352 | 1338.626 | 1282.382 |

| AGE | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
|---|---|---|---|---|---|---|
| 3 | 177.436 | 255.733 | 377.551 | 118.027 | 268.617 | 412.069 |
| 4 | 414.102 | 225.603 | 309.462 | 490.638 | 161.968 | 370.475 |
| 5 | 178.400 | 358.846 | 203.921 | 283.143 | 487.906 | 165.408 |
| 6 | 183.925 | 113.057 | 232.349 | 146.349 | 195.959 | 371.612 |
| 7 | 89.755 | 120.936 | 61.615 | 128.890 | 95.447 | 115.476 |
| 8 | 58.601 | 37.835 | 59.607 | 30.640 | 47.183 | 36.282 |
| 9 | 18.965 | 20.135 | 11.870 | 17.083 | 10.916 | 13.309 |
| 10 | 31.232 | 7.889 | 6.276 | 4.450 | 5.323 | 4.091 |
| 11 | 21.853 | 11.034 | 2.206 | 2.377 | 1.758 | 2.088 |
| 12 | 4.178 | 5.212 | 2.226 | 0.364 | 1.114 | 0.609 |
| 13 | 1.743 | 1.373 | 0.773 | 0.703 | 0.125 | 0.561 |
| 14 | 0.806 | 0.494 | 0.416 | 0.026 | 0.156 | 0.098 |
| SUM 3- 6 | 953.863 | 953.238 | 1123.282 | 1038.156 | 1114.450 | 1319.563 |
| SUM 7-14 | 227.132 | 204.909 | 144.988 | 184.534 | 162.022 | 172.516 |
| TOTAL | 1180.996 | 1158.147 | 1268.271 | 1222.690 | 1276.472 | 1492.079 |

Table 4. Cod. Fishing mortalities from VPA.

| AGE | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 |
|---|---|---|---|---|---|---|---|
| 3 | 0.103 | 0.089 | 0.100 | 0.106 | 0.063 | 0.099 | 0.067 |
| 4 | 0.157 | 0.218 | 0.253 | 0.364 | 0.304 | 0.162 | 0.190 |
| 5 | 0.326 | 0.144 | 0.346 | 0.319 | 0.464 | 0.396 | 0.150 |
| 6 | 0.354 | 0.365 | 0.164 | 0.352 | 0.252 | 0.495 | 0.415 |
| 7 | 0.189 | 0.374 | 0.437 | 0.276 | 0.405 | 0.344 | 0.581 |
| 8 | 0.372 | 0.210 | 0.399 | 0.591 | 0.477 | 0.703 | 0.500 |
| 9 | 0.486 | 0.407 | 0.422 | 0.465 | 0.942 | 0.704 | 0.619 |
| 10 | 0.501 | 0.427 | 0.581 | 0.680 | 0.657 | 0.983 | 0.979 |
| 11 | 0.839 | 0.519 | 0.527 | 0.730 | 1.039 | 0.977 | 1.006 |
| 12 | 1.381 | 0.775 | 0.518 | 0.561 | 1.235 | 0.508 | 0.879 |
| 13 | 0.565 | 0.454 | 0.599 | 0.486 | 0.596 | 0.717 | 0.721 |
| 14 | 0.750 | 0.750 | 0.750 | 0.750 | 0.750 | 0.750 | 0.750 |
| AVERAGE WEIGHTED BY STOCK IN NUMBERS | | | | | | | |
| AVE 7-13 | 0.379 | 0.361 | 0.450 | 0.400 | 0.554 | 0.561 | 0.643 |
| AVE 4-12 | 0.268 | 0.247 | 0.290 | 0.363 | 0.397 | 0.306 | 0.249 |

| AGE | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 |
|---|---|---|---|---|---|---|---|
| 3 | 0.094 | 0.075 | 0.043 | 0.066 | 0.083 | 0.073 | 0.147 |
| 4 | 0.138 | 0.244 | 0.211 | 0.315 | 0.325 | 0.250 | 0.320 |
| 5 | 0.228 | 0.169 | 0.347 | 0.366 | 0.535 | 0.514 | 0.398 |
| 6 | 0.127 | 0.235 | 0.187 | 0.383 | 0.620 | 0.577 | 0.556 |
| 7 | 0.506 | 0.275 | 0.298 | 0.261 | 0.454 | 0.798 | 0.674 |
| 8 | 0.580 | 0.866 | 0.485 | 0.506 | 0.342 | 0.555 | 0.658 |
| 9 | 0.616 | 0.873 | 0.821 | 1.003 | 0.613 | 0.601 | 0.699 |
| 10 | 0.864 | 1.532 | 0.844 | 0.559 | 1.139 | 1.024 | 1.190 |
| 11 | 1.190 | 1.158 | 1.202 | 0.676 | 1.005 | 1.221 | 1.320 |
| 12 | 0.488 | 1.726 | 0.726 | 0.840 | 1.276 | 0.674 | 0.910 |
| 13 | 0.284 | 0.616 | 0.919 | 0.807 | 2.365 | 2.871 | 0.171 |
| 14 | 0.750 | 0.750 | 0.750 | 0.750 | 1.000 | 1.000 | 1.000 |
| AVERAGE WEIGHTED BY STOCK IN NUMBERS | | | | | | | |
| AVE 7-13 | 0.609 | 0.432 | 0.413 | 0.465 | 0.479 | 0.688 | 0.801 |
| AVE 4-12 | 0.200 | 0.254 | 0.292 | 0.375 | 0.461 | 0.465 | 0.478 |

| AGE | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
|---|---|---|---|---|---|---|
| 3 | 0.104 | 0.153 | 0.082 | 0.028 | 0.023 | 0.023 |
| 4 | 0.357 | 0.315 | 0.303 | 0.220 | 0.193 | 0.200 |
| 5 | 0.520 | 0.498 | 0.395 | 0.431 | 0.336 | 0.350 |
| 6 | 0.421 | 0.609 | 0.591 | 0.429 | 0.531 | 0.550 |
| 7 | 0.785 | 0.629 | 0.620 | 0.926 | 0.889 | 0.900 |
| 8 | 0.911 | 1.002 | 1.093 | 0.875 | 1.108 | 1.100 |
| 9 | 0.769 | 1.058 | 0.873 | 1.058 | 0.874 | 1.100 |
| 10 | 1.018 | 1.252 | 0.949 | 0.906 | 0.914 | 1.100 |
| 11 | 1.451 | 1.619 | 1.819 | 0.776 | 1.078 | 1.100 |
| 12 | 1.134 | 1.930 | 1.173 | 1.091 | 0.707 | 1.100 |
| 13 | 1.367 | 1.301 | 3.499 | 1.613 | 0.347 | 1.100 |
| 14 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.100 |
| AVERAGE WEIGHTED BY STOCK IN NUMBERS | | | | | | |
| AVE 7-13 | 0.898 | 0.813 | 0.865 | 0.929 | 0.949 | 0.959 |
| AVE 4-12 | 0.455 | 0.480 | 0.428 | 0.349 | 0.390 | 0.382 |

Table 5. Haddock. Input catch in numbers for the VPA.

| AGE | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 |
|---|---|---|---|---|---|---|---|
| 2 | 4.282 | 3.833 | 4.170 | 2.490 | 1.380 | 3.375 | 2.681 |
| 3 | 6.683 | 18.005 | 27.409 | 25.817 | 13.802 | 18.613 | 7.153 |
| 4 | 14.920 | 5.447 | 14.125 | 17.820 | 13.192 | 16.002 | 10.239 |
| 5 | 45.797 | 10.401 | 4.133 | 17.999 | 4.885 | 4.790 | 5.079 |
| 6 | 9.975 | 25.018 | 4.097 | 1.857 | 5.308 | 1.308 | 2.522 |
| 7 | 0.840 | 5.301 | 9.517 | 1.364 | 0.696 | 1.617 | 1.571 |
| 8 | 0.067 | 0.464 | 2.198 | 2.460 | 0.488 | 0.161 | 1.173 |
| 9 | 0.193 | 0.036 | 0.234 | 0.437 | 0.547 | 0.050 | 0.237 |
| SUM 2- 3 | 10.965 | 21.838 | 31.579 | 28.307 | 15.182 | 21.988 | 9.834 |
| SUM 4- 9 | 71.792 | 46.667 | 34.304 | 41.937 | 25.116 | 23.928 | 20.821 |
| TOTAL | 82.757 | 68.505 | 65.883 | 70.244 | 40.298 | 45.916 | 30.655 |

| AGE | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 |
|---|---|---|---|---|---|---|---|
| 2 | 1.893 | 0.908 | 0.486 | 2.301 | 2.463 | 1.078 | 0.581 |
| 3 | 9.624 | 4.220 | 4.613 | 4.431 | 9.634 | 3.565 | 6.732 |
| 4 | 5.522 | 11.095 | 5.794 | 9.386 | 4.922 | 11.641 | 8.395 |
| 5 | 7.757 | 3.867 | 9.026 | 4.527 | 4.512 | 4.625 | 7.528 |
| 6 | 1.450 | 4.093 | 3.431 | 2.321 | 2.599 | 2.180 | 1.614 |
| 7 | 0.611 | 1.015 | 1.951 | 0.381 | 1.614 | 0.736 | 0.764 |
| 8 | 0.359 | 0.347 | 0.302 | 0.207 | 0.470 | 0.421 | 0.156 |
| 9 | 0.485 | 0.321 | 0.055 | 0.041 | 0.290 | 0.084 | 0.091 |
| SUM 2- 3 | 11.517 | 5.128 | 5.099 | 6.732 | 12.097 | 4.643 | 7.313 |
| SUM 4- 9 | 16.184 | 20.738 | 20.559 | 16.863 | 14.407 | 19.687 | 18.548 |
| TOTAL | 27.701 | 25.866 | 25.658 | 23.595 | 26.504 | 24.330 | 25.861 |

| AGE | 1976 | 1977 | 1978 | 1979 |
|---|---|---|---|---|
| 2 | 1.004 | 0.061 | 0.108 | 0.161 |
| 3 | 7.808 | 1.515 | 0.579 | 2.066 |
| 4 | 8.689 | 8.655 | 2.132 | 4.074 |
| 5 | 5.481 | 6.472 | 7.188 | 6.559 |
| 6 | 3.131 | 2.632 | 4.481 | 9.769 |
| 7 | 0.493 | 1.342 | 1.821 | 1.887 |
| 8 | 0.149 | 0.247 | 0.627 | 0.474 |
| 9 | 0.055 | 0.122 | 0.094 | 0.061 |
| SUM 2- 3 | 8.812 | 1.576 | 0.687 | 2.227 |
| SUM 4- 9 | 17.998 | 19.470 | 16.343 | 22.824 |
| TOTAL | 26.810 | 21.046 | 17.030 | 25.051 |

Table 6. Haddock. Stock size in numbers from VPA.

| AGE | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 |
|---|---|---|---|---|---|---|---|
| 2 | 113.903 | 91.459 | 79.637 | 65.227 | 77.613 | 41.878 | 64.597 |
| 3 | 28.931 | 89.391 | 71.421 | 61.438 | 51.155 | 62.298 | 31.243 |
| 4 | 40.950 | 17.679 | 56.990 | 33.937 | 27.215 | 29.487 | 34.302 |
| 5 | 106.108 | 20.162 | 9.587 | 33.967 | 11.910 | 10.512 | 9.896 |
| 6 | 23.214 | 45.936 | 7.238 | 4.155 | 11.778 | 5.381 | 4.328 |
| 7 | 2.294 | 10.089 | 15.339 | 2.282 | 1.743 | 4.901 | 3.230 |
| 8 | 0.168 | 1.126 | 3.538 | 4.116 | 0.657 | 0.804 | 2.563 |
| 9 | 0.418 | 0.078 | 0.507 | 0.947 | 1.185 | 0.108 | 0.513 |
| SUM 2- 3 | 142.835 | 180.850 | 151.058 | 126.665 | 128.769 | 104.177 | 95.840 |
| SUM 4- 9 | 173.153 | 95.071 | 93.200 | 79.404 | 54.488 | 51.194 | 54.833 |
| TOTAL | 315.988 | 275.921 | 244.258 | 206.069 | 183.257 | 155.370 | 150.673 |

| AGE | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 |
|---|---|---|---|---|---|---|---|
| 2 | 35.715 | 40.615 | 30.801 | 63.763 | 47.344 | 59.362 | 86.828 |
| 3 | 50.467 | 27.533 | 32.433 | 24.779 | 50.128 | 36.540 | 47.628 |
| 4 | 19.149 | 32.659 | 18.741 | 22.398 | 16.299 | 32.373 | 26.702 |
| 5 | 18.896 | 10.721 | 16.794 | 10.146 | 9.945 | 8.928 | 16.075 |
| 6 | 3.576 | 8.532 | 5.313 | 5.712 | 4.262 | 4.112 | 3.188 |
| 7 | 1.302 | 1.630 | 3.333 | 1.310 | 2.601 | 1.183 | 1.425 |
| 8 | 1.243 | 0.521 | 0.434 | 0.995 | 0.731 | 0.697 | 0.315 |
| 9 | 1.051 | 0.695 | 0.119 | 0.089 | 0.628 | 0.182 | 0.197 |
| SUM 2- 3 | 86.182 | 68.147 | 63.233 | 88.542 | 97.472 | 95.902 | 134.457 |
| SUM 4- 9 | 45.216 | 54.759 | 44.735 | 40.651 | 34.465 | 47.474 | 47.902 |
| TOTAL | 131.398 | 122.906 | 107.968 | 129.193 | 131.938 | 143.376 | 182.359 |

| AGE | 1976 | 1977 | 1978 | 1979 |
|---|---|---|---|---|
| 2 | 39.887 | 37.718 | 140.678 | 118.510 |
| 3 | 70.564 | 31.750 | 30.825 | 115.079 |
| 4 | 32.931 | 50.735 | 24.628 | 24.715 |
| 5 | 14.331 | 19.157 | 33.747 | 18.241 |
| 6 | 6.441 | 6.826 | 9.882 | 21.165 |
| 7 | 1.171 | 2.480 | 3.233 | 4.088 |
| 8 | 0.486 | 0.518 | 0.835 | 1.027 |
| 9 | 0.119 | 0.264 | 0.204 | 0.132 |
| SUM 2- 3 | 110.451 | 69.468 | 171.504 | 233.589 |
| SUM 4- 9 | 55.479 | 79.980 | 72.529 | 69.368 |
| TOTAL | 165.930 | 149.448 | 244.032 | 302.958 |

Table 7. Haddock. Stock biomass from VPA.

| AGE | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 |
|---|---|---|---|---|---|---|---|
| 2 | 70.620 | 56.705 | 49.375 | 40.441 | 48.120 | 25.965 | 40.050 |
| 3 | 27.774 | 85.815 | 68.564 | 58.981 | 49.109 | 59.806 | 29.993 |
| 4 | 57.739 | 24.928 | 80.356 | 47.851 | 38.374 | 41.577 | 48.366 |
| 5 | 215.399 | 40.929 | 19.463 | 68.953 | 24.177 | 21.339 | 20.090 |
| 6 | 67.554 | 133.675 | 21.063 | 12.091 | 34.274 | 15.659 | 12.594 |
| 7 | 8.719 | 38.339 | 58.289 | 8.673 | 6.623 | 18.625 | 12.275 |
| 8 | 0.768 | 5.135 | 16.133 | 18.769 | 2.997 | 3.667 | 11.687 |
| 9 | 1.974 | 0.368 | 2.393 | 4.469 | 5.594 | 0.511 | 2.424 |
| SUM 2- 3 | 98.394 | 142.520 | 117.939 | 99.421 | 97.230 | 85.771 | 70.043 |
| SUM 4- 9 | 352.153 | 243.374 | 197.696 | 160.805 | 112.038 | 101.377 | 107.436 |
| TOTAL | 450.547 | 385.894 | 315.635 | 260.227 | 209.267 | 187.148 | 177.479 |

| AGE | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 |
|---|---|---|---|---|---|---|---|
| 2 | 22.143 | 25.181 | 19.096 | 39.533 | 29.354 | 36.805 | 53.834 |
| 3 | 48.449 | 26.431 | 31.135 | 23.787 | 48.123 | 35.078 | 45.723 |
| 4 | 27.000 | 46.050 | 26.425 | 31.581 | 22.981 | 45.645 | 37.650 |
| 5 | 38.358 | 21.764 | 34.091 | 20.596 | 20.188 | 18.123 | 32.633 |
| 6 | 10.405 | 24.827 | 15.462 | 16.623 | 12.403 | 11.965 | 9.277 |
| 7 | 4.948 | 6.195 | 12.664 | 4.980 | 9.882 | 4.494 | 5.414 |
| 8 | 5.668 | 2.374 | 1.981 | 4.536 | 3.333 | 3.180 | 1.439 |
| 9 | 4.960 | 3.283 | 0.562 | 0.419 | 2.966 | 0.859 | 0.931 |
| SUM 2- 3 | 70.592 | 51.612 | 50.232 | 63.321 | 77.476 | 71.883 | 99.557 |
| SUM 4- 9 | 91.339 | 104.492 | 91.185 | 78.737 | 71.753 | 84.267 | 87.343 |
| TOTAL | 161.931 | 156.105 | 141.417 | 142.057 | 149.229 | 156.150 | 186.899 |

| AGE | 1976 | 1977 | 1978 | 1979 |
|---|---|---|---|---|
| 2 | 24.730 | 23.385 | 87.221 | 73.476 |
| 3 | 67.742 | 30.480 | 29.592 | 110.476 |
| 4 | 46.432 | 71.537 | 34.725 | 34.848 |
| 5 | 29.092 | 38.888 | 68.507 | 37.028 |
| 6 | 18.742 | 19.864 | 28.757 | 61.591 |
| 7 | 4.450 | 9.423 | 12.284 | 15.536 |
| 8 | 2.217 | 2.362 | 3.810 | 4.683 |
| 9 | 0.562 | 1.248 | 0.961 | 0.624 |
| SUM 2- 3 | 92.472 | 53.865 | 116.813 | 183.952 |
| SUM 4- 9 | 101.496 | 143.321 | 149.044 | 154.310 |
| TOTAL | 193.967 | 197.186 | 265.857 | 338.262 |

Table 8. Haddock. Fishing mortalities from VPA.

| AGE | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 |
|---|---|---|---|---|---|---|---|
| 2 | 0.042 | 0.047 | 0.059 | 0.043 | 0.020 | 0.093 | 0.047 |
| 3 | 0.293 | 0.250 | 0.544 | 0.614 | 0.351 | 0.397 | 0.290 |
| 4 | 0.509 | 0.412 | 0.317 | 0.847 | 0.751 | 0.892 | 0.396 |
| 5 | 0.637 | 0.824 | 0.636 | 0.859 | 0.594 | 0.687 | 0.818 |
| 6 | 0.633 | 0.897 | 0.954 | 0.669 | 0.677 | 0.310 | 1.001 |
| 7 | 0.512 | 0.848 | 1.116 | 1.045 | 0.574 | 0.448 | 0.755 |
| 8 | 0.570 | 0.598 | 1.118 | 1.045 | 1.603 | 0.248 | 0.692 |
| 9 | 0.700 | 0.700 | 0.700 | 0.700 | 0.700 | 0.700 | 0.700 |
| AVERAGE WEIGHTED BY STOCK IN NUMBERS | | | | | | | |
| AVE 4- 8 | 0.604 | 0.782 | 0.563 | 0.859 | 0.704 | 0.736 | 0.557 |
| AVE 3- 8 | 0.560 | 0.524 | 0.555 | 0.752 | 0.531 | 0.550 | 0.459 |

| AGE | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 |
|---|---|---|---|---|---|---|---|
| 2 | 0.060 | 0.025 | 0.018 | 0.041 | 0.059 | 0.020 | 0.007 |
| 3 | 0.235 | 0.185 | 0.170 | 0.219 | 0.237 | 0.114 | 0.169 |
| 4 | 0.380 | 0.465 | 0.414 | 0.612 | 0.402 | 0.500 | 0.422 |
| 5 | 0.595 | 0.502 | 0.878 | 0.667 | 0.683 | 0.830 | 0.715 |
| 6 | 0.585 | 0.740 | 1.200 | 0.587 | 1.082 | 0.860 | 0.801 |
| 7 | 0.717 | 1.123 | 1.009 | 0.384 | 1.116 | 1.121 | 0.875 |
| 8 | 0.381 | 1.275 | 1.387 | 0.260 | 1.190 | 1.063 | 0.774 |
| 9 | 0.700 | 0.700 | 0.700 | 0.700 | 0.700 | 0.700 | 0.700 |
| AVERAGE WEIGHTED BY STOCK IN NUMBERS | | | | | | | |
| AVE 4- 8 | 0.499 | 0.543 | 0.736 | 0.606 | 0.642 | 0.617 | 0.562 |
| AVE 3- 8 | 0.358 | 0.422 | 0.498 | 0.459 | 0.400 | 0.398 | 0.366 |

| AGE | 1976 | 1977 | 1978 | 1979 |
|---|---|---|---|---|
| 2 | 0.028 | 0.002 | 0.001 | 0.002 |
| 3 | 0.130 | 0.054 | 0.021 | 0.020 |
| 4 | 0.342 | 0.208 | 0.100 | 0.200 |
| 5 | 0.542 | 0.462 | 0.267 | 0.500 |
| 6 | 0.754 | 0.547 | 0.683 | 0.700 |
| 7 | 0.616 | 0.888 | 0.947 | 0.700 |
| 8 | 0.409 | 0.734 | 1.644 | 0.700 |
| 9 | 0.700 | 0.700 | 0.700 | 0.700 |
| AVERAGE WEIGHTED BY STOCK IN NUMBERS | | | | |
| AVE 4- 8 | 0.448 | 0.322 | 0.313 | 0.469 |
| AVE 3- 8 | 0.270 | 0.246 | 0.226 | 0.189 |