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REPORT OF THE WORKING GROUP ON IRISH SEA WHITING

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REPORT OF THE WORKING GROUP ON IRISH SEA WHITING

Location The Laboratory of the Ministry of Agriculture, Fisheries and Food, Lowestoft.

Duration January 9 through 12, 1973.

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The Working Group reviewed the whiting fisheries of the Irish Sea (Area VIIa) during the past decade. The results of their work, together with a summary and conclusions, are contained in the document hereunder.

F A Gibson

Introduction

An assessment of the stocks of whiting in the Irish Sea was made by Garrod et al. (1963). The findings by these workers are summarised below:

(i) Annually, from October to March, the fishermen of both Northern Ireland and the Republic of Ireland were heavily dependent upon whiting catches taken from the western side of the Irish Sea off the counties Down and Dublin/Louth. The whiting population within this area was found to constitute a seasonal aggregation of juveniles, with a small proportion of adults, which provided recruits, by emigration, to adjacent whiting fisheries (mainly in the eastern Irish Sea) as the fish became older.

(ii) It was estimated that if the use of a 70 mm gear was enforced within the western area, there would be an overall increase in the yield of whiting from Region VIIa as a whole. However, the extent of this gain could not be assessed, owing to lack of knowledge about the magnitude of stocks of juvenile whiting outside the fishing area off the counties Down and Dublin/Louth. Nevertheless, they concluded that emigration from this area would be increased by about 40%.

(iii) It was suggested that the increased stock abundance would not be available to all Irish fishermen, owing to changes in the distribution of older whiting on which the stock would be based. The population would need to be fished at other times of the year, and at greater distances from the coasts - beyond the reach of Irish day boats. The predicted gains would be taken primarily by English and Continental vessels.

(iv) Regarding the fishery in the western part of the Irish Sea, it was estimated that enforcement of 70 mm gear would not result in a long-term change of more than 10% by weight, in the landed catch, with a minimum landing size of 25 cm. The immediate loss to the fishery would be some 30% of the catch landed. This loss would be less in years of good growth of the recruit year class. The fishery would restabilize at the level expected by the long-term change within 5 years.

(v) The use of 54 mm mesh was thought to have no effect upon adjacent stocks of other species and it was felt that these stocks would not benefit from the use of 70 mm gear.

The present document presents a reappraisal of the situation in the Irish Sea, in the light of more recent data.

International composition of whiting fishery in Region VIIa

Table 1 gives the total landings of whiting intended for human consumption from Region VIIa by each nation in metric tons (gutted weight). Reliable French statistics relating to Region VIIa are not available for the years before 1971.

In 1971, the only year in which the data are complete, some 85% of the total landings were made by three nations, these being France (31.2%), the Republic of Ireland (29.1%) and Northern Ireland (25.0%). Almost all the remainder of the landings (10.7%) were by England, although small quantities were landed by Belgian, Scottish and Dutch vessels.

Table 2 gives the catch rates of French, Belgian, English and Irish whitefish trawlers and Nephrops trawlers from Region VIIa in the years 1966-72. There was a spectacular decline in the catch-effort values

by southern Irish fishermen between 1967 and 1972, and a similar decline was also experienced by the northern Irish fishermen, even if not to the same degree. In 1972, only the 2+ age group whiting were present in numbers similar to their levels in former years. Research vessel data in 1972 show that 0+ whiting were more than twice as numerous as in any year from 1965 to date, and this is in sharp contrast to the situation with older fish. The catch rates by Belgian trawlers also illustrated a sharp downward trend in cwts/100 hrs fishing from 1966 to 1972 (Table 2).

Importance of whiting to Irish fishermen

Table 3 gives the landings of whiting from the Irish Sea by fishermen from Northern Ireland and the Republic of Ireland during the years 1966-71. The values of the landings are given, and these values are also expressed as a percentage of the value of the total landings of fish (including shellfish) from Region VIIa by the two countries. Annual landings and values of Nephrops are also shown.

In both countries, the trend of recent years has been for whiting to constitute a considerably smaller percentage of the value of the national catch than in former years. During the years 1969-71, the average value of the whiting catch in Northern Ireland, expressed as a percentage of the total value of the catch, was 8.6% as opposed to 16.3% for the years 1965-68. In the Republic of Ireland the corresponding figures are 9.9% and 23.8% respectively. In other words, it appears that all Irish fishermen are now less dependent on whiting than in earlier years. Conversely, the Nephrops landings of both countries have risen steadily, and the values of these landings have made up an increasing percentage of the total. This is best illustrated by expressing the percentage values of Nephrops in relation to the total value.

Year	Northern Ireland (%)	Republic of Ireland (%)
1965	28.3	11.6
1966	42.0	13.3
1967	47.0	11.9
1968	45.2	11.8
1969	56.4	12.0
1970	51.7	20.1
1971	50.4	18.3

Geographical distribution of the whiting fisheries and basis for the present legislation

The majority of the whiting landed by all Irish fishermen are still taken from the western part of the Irish Sea, during the seasonal Dublin/Louth and Down fisheries, based largely upon 1+ and 2+ fish. French landings are made from two areas, mainly; south-west of the Isle of Man and in the vicinity of Morecambe and Liverpool Bays. Most landings by English vessels come from the eastern side of the Irish Sea. Belgian catches have been made mainly to the east of long. 5°W and between lat. 53° and 54°30'N. A concession was introduced in 1965 whereby Irish fishermen were permitted to fish using nets with a 60 mm mesh (cod-end), within the area bounded by longitude 5°15' W, and latitudes 53°00'N and 53°30'N, the socalled "box" area. The justification for this measure was based upon the evidence of a large-scale spring emigration of 1+ and 2+ whiting from the western grounds, which are exploited primarily by fishermen from Irish ports,to more distant parts of the Irish Sea which effectively lay beyond the fishing range of Irish east coast fishermen at that time. Furthermore, the evidence at that time suggested that very few of these emigrants returned to the western grounds. Thus, these emigrating whiting represented a total loss to the Irish fishermen, and in order to counteract this, all Irish fishermen needed to be able to catch the younger whiting before their emigration to other areas.

Present situation

From the late 1960s onwards, the character of the Irish fleets has changed and these now contain a majority of fishing boats capable of covering the entire Irish Sea. In addition, the proportion of whiting emigrating from the Irish fishing grounds in spring, which returns in late summer, now appears to be somewhat larger than was formerly thought, probably due in part to stock increase during the 1960s. Commercial data of Hillis (1968) indicate the ratio of autumn catch-effort values to those for the same age group in the previous spring to have increased between 1961 and 1965, and research vessel data (Hillis, 1971) show the absence of young adult whiting (age groups 2 and 3) in July to be followed by a return to numbers comparable with those found the previous spring, - by October. However, the returns of the British tagging experiments off Ireland in 1968 also indicate a return migration with the proportion of returns away from Irish

grounds rising in spring and falling in late summer. Thus it would appear that a considerable percentage of those fish which emigrate from the Irish east coast in spring do in fact return the following autumn. Therefore the main reasons for creating the socalled "box" have assumed a much less important role. Additionally, as shown in Tables 2 and 3, all Irish fishermen have become increasingly less dependent upon whiting fishing in the western areas of the Irish Sea, and Nephrops has assumed an increasing proportion of their income, particularly from 1965 to date.

It appears then, that there have been different significant changes in the factors on which the decision to create the concession area was based. It is necessary to reappraise the situation, in order to determine whether the use of 60 mm cod-ends is still justifiable. A reassessment of the stocks of whiting in Region VIIa has therefore been made.

Assessment of Irish Sea whiting

The growth data used in the present assessment are derived from commercial samples for Ireland and for England and Wales, supplemented for the younger ages, by research vessel samples. The parameters of the fitted von Bertalanffy growth equation are: $L_\infty = 44.218$, $K = 0.4558$, $\overline{t}_o = 0.1383$. This growth rate is higher than that found in previous studies (Garrod and Gambell, 1965) and there is considerable evidence that growth rates have increased slightly, particularly in 1972.

For the present yield assessment, values of 0.2 and 0.5 have been assumed for natural mortality. Available evidence indicate that the true figure is likely to be closer to the upper of these estimates for the Irish coast, but this includes a component of emigration.

Figure 1 gives the yield in grammes per recruit at mesh sizes 45, 60 and 70 mm and for values of natural mortality of 0.2 and 0.5. Present values of fishing mortality are around 1.0 for the English and Welsh fishery and around 1.5 or slightly higher on the Irish side. Thus for the higher value of natural mortality yields are near the maximum. For areas where emigration is not an important factor, i.e. on the eastern side of the Irish Sea, it is likely that the yield per recruit would be improved by a decrease in fishing effort.

The effect of an increase in mesh size from 60 mm to 70 mm would be an immediate loss to the Irish autumn whiting fishery of 25% by weight. The long-term increase in yield with the larger mesh would be from 8 to 20%

and at constant recruitment, this level would be reached in 5 years. Adjustment of the present minimum size would not be necessary if mesh size were increased.

The effects of fisheries for Nephrops and industrial fisheries on the stocks of whiting

A. By-catch from prawn trawl

The expanding fishery for prawns (Nephrops norvegicus) in the Irish Sea is based on the use of a 40-50 mm mesh cod-end. There is, however, a considerable whitefish by-catch from this fishery consisting mainly of whiting (Table 4). Statistics from both Northern Ireland and France show that at least 7% of the total annual whiting landings are obtained as a by-catch from prawn trawling and this figure may be as much as 42% (e.g. Northern Ireland 1970, Table 5).

The catch in a prawn trawl using this small meshed cod-end contains a large proportion of undersized whiting (less than 25 cm in length). This will vary during the year, according to the age composition of the population. For example, during the fourth quarter a high percentage of 0-group whiting are present, with a resulting 96% undersized fish in the whiting by-catch (Figure 2). However, the mean figure for samples taken during 1971-72 on board Northern Irish vessels was 79% undersized whiting (Figure 2). These fish are rejected at sea, but virtually all of them are dead prior to rejection.

Measurements of length and weight frequencies of by-catch whiting were taken at sea, and from these data it is possible to estimate the numbers of undersized whiting rejected at sea, given the weight of the landed whiting catch. In both 1970 and 1971, an estimated 9 million undersized whiting were destroyed each year by prawn trawling from Northern Irish ports, which is at least equal to the estimated number of marketable whiting landed in those years in Northern Ireland (9 and 6 millions respectively). Estimates will vary greatly from year to year according to recruitment, and according to the proportion of fishing effort by prawn trawlers at the time of the year when the 0-group whiting are especially vulnerable, i.e. during the fourth quarter.

B. Industrial fishery

A further potentially important factor is the Irish industrial fishery. This commenced in 1969 to exploit commercially unimportant species such as sprat, sandeel, etc, but it has however had some effect on the stocks

of immature whiting. Table 6 shows the percentages by weight of whiting found in samples examined at Fisheries Division, Dublin, in months from April to October. The estimated total weights of whiting in the industrial landings are also given and available mean weight data have been used to estimate the numbers of whiting in the landings. The percentages (by weight) are low (under 15% of industrial catch) in the spring and early summer, but rise to a value in the region of 30% at the season, when the overall industrial catch rises to its annual peak, thus indicating a very considerable intake of juvenile whiting at this time. The data are highly variable (e.g. 10.6% and 90.3% in two samples in October 1971), but the percentage (by weight) of whiting found in samples taken in October are in the same range, from 30-50% in all three years, 1970, 1971 and 1972. During September-November (Table 7) the weight of industrial landings of industrial whiting can exceed that of marketable whiting. Since whiting in the industrial fishery are so small, the numbers caught in this way exceeded the numbers caught in the market fishery by a factor of 10 or more on occasion (e.g. September-November 1971).

Summary

1. The largest part of the landings of marketable whiting for human consumption taken from Area VIIa are made by France, the Republic of Ireland and Northern Ireland. In 1971, these countries took some 85% of the total landings.

2. During the past four years there has been a general decline in landings and catching rates of whiting intended for human consumption from the area.

3. The French fishery is mainly in the waters to the south-west of the Isle of Man and on the eastern side of the Irish Sea. Most of the Irish landings come from west of the Isle of Man.

4. As a proportion of the Irish national catch, the whiting landings are less important than in former years, representing 8.6% of the total value of the Northern Irish catch and 9.9% of the value of landings made by the Republic of Ireland, from Area VIIa.

5. While there would be a slight increase in the yield per recruit with the use of a 70 mm instead of a 60 mm mesh, the total increased yield will be dependant on the number of recruits (to the whitefish fishery for human consumption).

6. Large quantities of undersized whiting are being taken, mostly in the autumn, as by-catch in Nephrops and industrial fisheries.

Conclusions

1. The abolition of the 60 mm box and the use of 70 mm mesh (cod-ends) throughout Area VIIa would result in a long-term improvement in the yield per recruit of whiting. Such an increase would have an immediate effect on the catch rates of Irish fishermen and they would benefit less than others in the long term.

2. Recruitment of whiting to the fishery for human consumption would be improved by a reduction in the numbers of undersized fish taken in the course of fisheries using small meshed nets. The two relevant fisheries are:

   (a) the Irish fishery for "industrial" fish, in which at certain seasons a large percentage of the landings consists of young whiting.

   (b) the fishery for Nephrops, in which considerable numbers of whiting are taken as a by-catch. In this fishery, a large proportion of this by-catch is made up of undersized whiting which are rejected at sea.

3. Any regulation of the small-meshed fisheries aimed at protecting whiting stocks by reducing the numbers of young fish caught, would be of greatest benefit if applied in the autumn, since this is the time when the young fish are most available to capture.

4. The existence of the "box" area does not appear to have had a striking adverse or beneficial effect on the stock density or composition of whiting in Area VIIa.

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Table 1. Total landings (metric tons, gutted weight) of whiting of marketable size (over 24 cm) taken from Region VIIa, for human consumption.

		1964	1965	1966	1967	1968	1969	1970	1971	1972
Belgium*	Metric tons	391	342	477	549	546	271	322	248	na
	%								3.7	
France	Metric tons	na[xx]	na	na	na	na	na	na	2087	2111
	%								31.2	
Republic of Ireland	Metric tons	1570	2561	2215	2911	3063	2422	1145	1960	1340[x]
	%								29.1	
Netherlands	Metric tons	+	+	0	+	0	0	+	0	na
England and Wales	Metric tons	1288	1028	876	1210	1353	1103	621	714	na
	%								10.7	
N. Ireland	Metric tons	2686	1848	1995	3341	3126	2107	1158	1674	1727
	%								25.0	
Scotland	Metric tons	38	82	17	14	35	107	31	19	na
	%								0.3	
	Total								6686	

* Regions VIIa + VIIf

x To September 1972 only

xx na = figures not available.

Table 2. Catch rates by trawlers and prawn trawlers from Region VIIa in the years 1966-72.

	1966	1967	1968	1969	1970	1971	1972
Ireland[1]							
October	214.2	187.5	102.7	139.0	72.1	48.4	32.0
Annual					64.7	47.3*	58.9**
Northern Ireland[2]							
Year Whitefish trawls	67.7	70.8	66.2	42.2	23.7	33.9	32.8+
Year Prawn trawls	28.8	31.3	47.7	28.7	20.2	34.7	17.1+
4th gr. Whitefish trawls	97.2	66.4	69.0	55.3	27.1	59.2	57.4+
4th gr. Prawn trawls	63.2	na++	59.4	43.2	37.5	79.2	18.2+
England and Wales[2]							
Annual	13.9	21.2	18.8	16.8	9.75	10.5	na
France[3]							
Year Whitefish trawls	na	na	na	na	na	129.5	133.1
Year Prawn trawls	na	na	na	na	na	83.9	101.9
4th gr. Whitefish trawls	na	na	na	na	na	179.9	171.9
4th gr. Prawn trawls	na	na	na	na	na	102.5	51.9
Belgium[2]	16.1	24.6	15.2	13.2	9.0	1.6	6.8

1) Cwt/hundred hours x 150 BHP, 1965-69; cwt/100 hours 1970-72.

2) Cwt/hundred hours.

3) Kg/day fishing x 100 BHP.

na++ = no figures available.

* January to October only.

** January to March only.

\+ December 1972 has been taken into account.

Table 3. Comparison of the values and weights of whiting and Nephrops fisheries in relation to the total value of all fisheries (including shellfish) in the western Irish Sea.

Country/Year	Total value of all fish including shellfish	Nephrops landings	Nephrops value	Whiting landings	Whiting value	Whiting value as % of total
	£	cwt	£	cwt	£	%
Ireland						
1965	347 834	10 971	40 334	50 649	97 767	28.1
1966	394 810	17 444	52 657	43 585	94 580	24.0
1967	473 281	14 723	56 446	57 292	111 720	23.6
1968	576 216	16 721	67 954	60 273	112 107	19.5
1969	757 540	18 530	90 559	47 673	103 930	13.7
1970	853 512	27 425	172 308	22 525	57 440	6.7
1971	929 891	27 225	170 191	38 573	86 163	9.3
Northern Ireland						
1965	263 961	18 319	74 674	36 656	32 007	12.1
1966	305 737	27 419	128 397	39 588	41 868	13.7
1967	470 093	39 935	220 897	66 283	88 529	18.8
1968	457 339	37 701	206 816	62 027	93 146	20.4
1969	585 466	52 420	330 378	41 795	70 483	12.0
1970	776 580	55 301	401 549	22 967	48 318	6.2
1971	823 470	57 474	414 743	33 212	62 765	7.6

Table 4. Mean landed catch of whiting and other by-catch species in Northern Irish prawn trawl samples from the Irish Sea, VIIa, for the years 1971 and 1972.

Mesh size range (cod-end in mm)	42-50
Mean weight of prawn tails landed (st)	12.3
Mean weight of landed whiting by-catch (st)	30.4
No of whiting sampled	2 256
% of whiting in catch rejected at sea	79.2
Mean weight of other by-catch species (st):	
Cod	7
Monk	5
Coalfish	3
Hake	1½
Haddock	1

Table 5. Landed whiting divided into catches from "whitefish" trawls and by-catches from "prawn" trawls.

Year	Northern Ireland			France (Lorient and La Rochelle)		
	Landed whiting (cwt)		Whiting from prawn trawl as % of total	Landed whiting (cwt)		Whiting from prawn trawl as % of total
	Whitefish trawl	Prawn trawl		Whiting trawl	Prawn trawl	
1972	27 541*	5 506*	16.7*	38 772	3 104	7.4
1971	23 034	9 450	29.1	36 426	3 389	8.5
1970	12 344	8 850	41.8	-	-	-
1969	21 763	13 980	39.1	-	-	-
1968	34 213	15 426	31.1	-	-	-
1967	44 559	3 042	6.4	-	-	-
1966	19 116	6 281	24.7	-	-	-

* Not including December 1972.

Table 6. Mean percentages and weights of samples of whiting landed in the Irish industrial fishery, and estimated number of whiting in the total industrial fish catch. Number of whiting per cwt for each sample used where available (i.e. 1971 and 1972), otherwise a mean figure of 1902/cwt used.

Year	Month	No. samples	Mean % whiting	Mean weight whiting (cwt)	Total industr.fish landings (cwt)	Estimated no. whiting in total industr. fish landings ('000)
1969	Apr	4	7.6	760	10 000	1 446
	May	5	8.7	987	11 340	1 877
	Jun	4	10.7	265	2 480	504
	Jul	1	9.3	564	6 064	1 073
1970	May	1	6.3	254	4 041	483
	Aug	3	4.4	191	4 344	363
	Sep	3	48.0	9 912	20 649	18 853
	Oct	1	29.6	9 957	33 640	18 938
1971	May	1	2.2	503	22 843	957
	Jul	2	8.6	701	8 146	1 333
	Sep	3	30.8	5 158	16 748	14 700
	Oct	2	50.4	8 912	17 683	24 044
	Nov	1	29.0	8 450	29 137	14 787
1972	Apr	1	5.6	357	6 375	679
	May	2	2.1	90	4 295	216
	Jun	1	9.0	855	9 459	1 626
	Jul	1	32.7	5 347	16 352	10 170
	Aug	3	21.7	2 165	9 975	4 118
	Sep	3	42.4	7 375	17 393	14 027

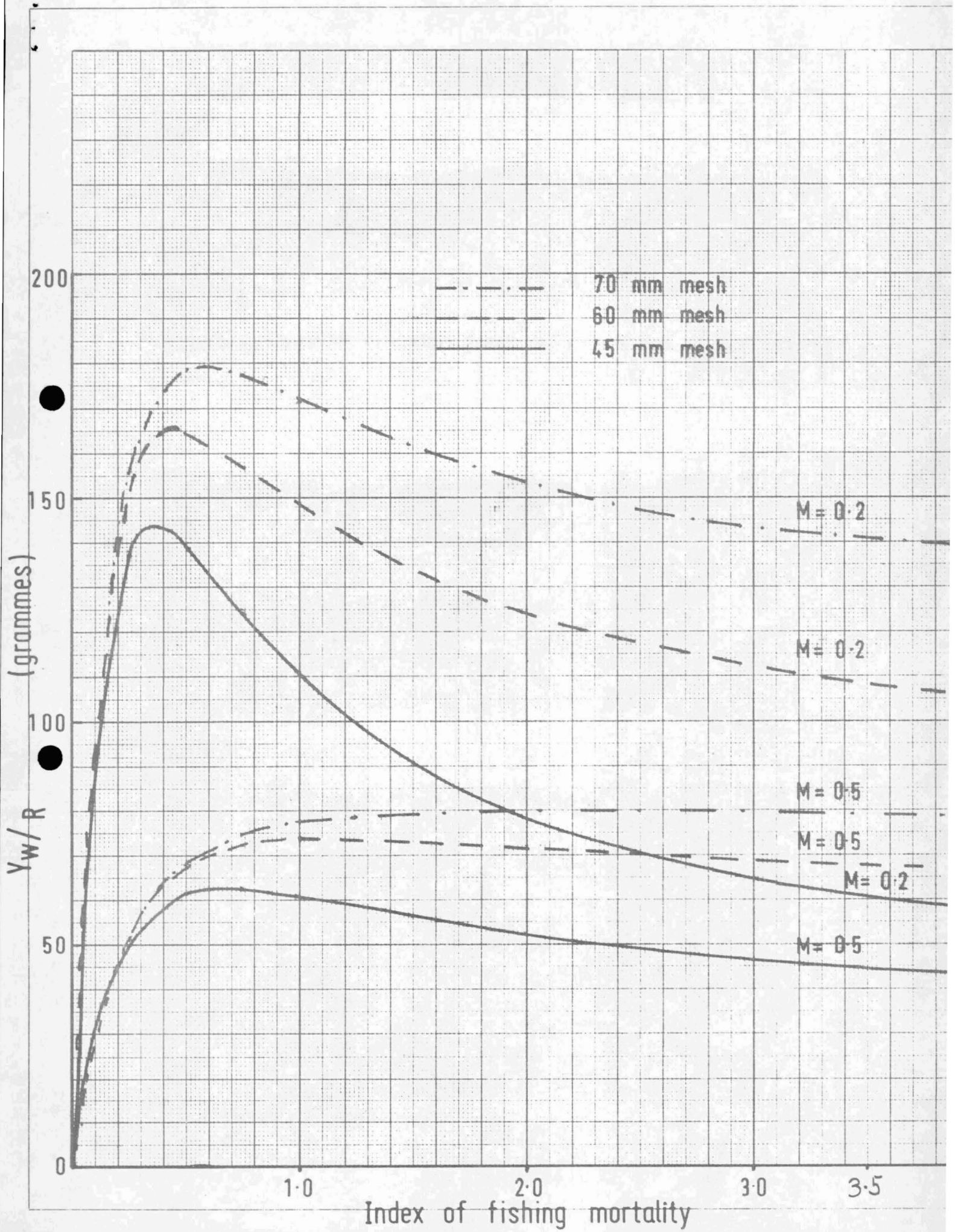
Table 7. Comparison of weights and estimated nos. of whiting landed from Irish fisheries for market and for industrial use, 1969 to 1972. (N/cwt factor for market fish = 250 per cwt, and for industrial fish = 1 902 per cwt. Data in brackets refer to samples with lowest percentage).

Month	1969				1970			
	Market Whiting		Industrial Whiting		Market Whiting		Industrial Whiting	
	W (cwt)	N('000)	Wt(cwt)	N('000)	Wt(cwt)	N('000)	Wt(cwt)	N('000)
Jan	2 236	559	-	-	2 394	598	-	-
Feb	904	226	-	-	3 187	797	-	-
Mar	3 589	897	-	-	2 742	686	-	-
Apr	5 514	1 378	760 (310)	1 446 (590)	1 622	406	-	-
May	2 120	530	987 (102)	1 877 (194)	650	162	254	483
Jun	1 936	484	265 (60)	504 (114)	778	195	-	-
Jul	4 474	1 119	564	1 073	1 218	304	-	-
Aug	3 520	880	-	-	1 777	444	191 (52)	363 (99)
Sep	5 532	1 383	-	-	3 090	772	9 912 (640)	18 853 (1 217)
Oct	7 303	1 826	-	-	1 900	475	9 957	18 938
N	5 701	1 425	-	-	1 744	436	-	-
Dec	4 844	1 211	-	-	1 423	356	-	-

(ctd)...

Table 7 (ctd)

Month	1971				1972			
	Market Whiting		Industrial Whiting		Market Whiting		Industrial Whiting	
	Wt(cwt)	N('000)	Wt(cwt)	N('000)	Wt(cwt)	N('000)	Wt(cwt)	N('000)
Jan	771	193	-	-	2 445	611	-	-
Feb	2 089	522	-	-	2 883	721	-	-
Mar	3 013	753	-	-	4 587	1 147	-	-
Apr	1 565	391	-	-	2 184	546	357	679
May	958	239	503	957	1 997	499	90 (9)	216 (22)
Jun	2 042	511	-	-	2 517	629	855	1 626
Jul	1 795	449	701 (253)	1 333 (481)	3 171	793	5 347	10 170
Aug	3 486	871	-	-	4 394	1 099	2 165 (1 486)	4 118 (2 826)
Sep	6 127	1 532	5 158 (4 187)	14 700 (11 933)	3 168	792	7 375 (2 748)	14 027 (5 227)
Oct	4 958	1 239	8 912 (1 874)	24 044 (8 639)	2 870	717	1 080 (80)	2 054 (152)
Nov	6 016	1 504	8 450	14 787	-	-	2 142 (1 797)	4 070 (3 418)
Dec	5 141	1 283	-	-	-	-	-	-


70 mm mesh
60 mm mesh
45 mm mesh
M = 0·2
M = 0·2
M = 0·5
M = 0·5
M = 0·2
M = 0·5
200
150
100
50
0
1·0
2·0
3·0
3·5
Y_w/R (grammes)
Index of fishing mortality

Percentage length frequency of whiting caught in North Irish prawn trawls 1971 / 1972