

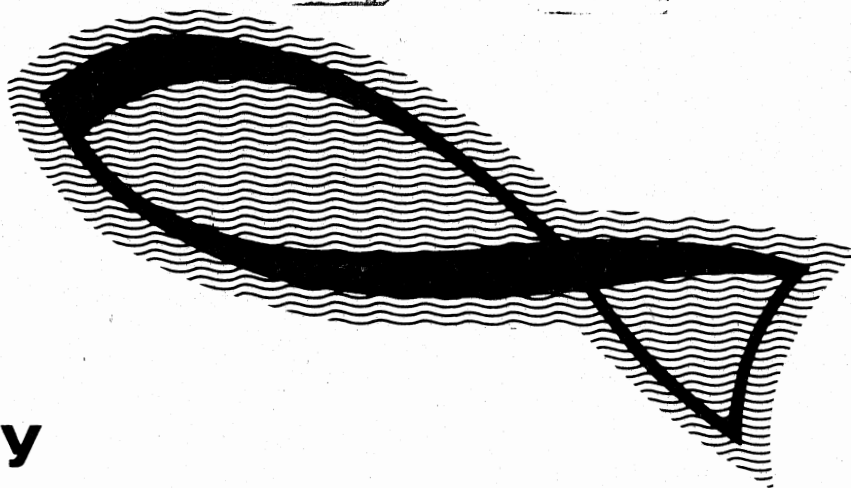


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**Herring Investigations on the
North-West and West coasts
1976**

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**by
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Herring Investigations on the North-West and West

Coasts 1976

by

J. Molloy and T. D. Kennedy

A B S T R A C T

The herring fisheries off Donegal, Mayo and Galway in 1976 are reviewed. A serious decline in catches, particularly in the Donegal fishery took place but this was compensated for by increased prices. The decline in catches is caused mainly by a decrease in stock size, because the recruitment of young herring in recent years has not compensated for the amounts removed by fishing. To minimize the dangers of poor recruitment it would be unwise to allow any fishing to develop on young immature herring in the area. The total international catch off Galway increased considerably in 1976, largely due to increased Dutch effort. International catch restrictions on the total catch are likely to be even more severe in future years.

INTRODUCTION

Previous reports of this kind, dealing with the herring fisheries off the north-west and west coasts have always been presented in two parts - one dealing with the period October to February (the main season) while the second part dealt with the off season, March to September. However herring are in fact now landed in substantial quantities throughout the whole year, and less emphasis is now placed on the seasonal aspect of the fishery. This is particularly so in the west coast fishery where most of the landings are made in the period January to April. The international regulations controlling catch are imposed on a yearly basis and quotas are fixed for the year commencing 1 January. In addition to this, biological interpretation of the data is easier if it is presented on a yearly basis.

The format of this report has therefore been changed somewhat to make it more suitable to the present fishery. Some of the tables have had to be changed while others are no longer included. All the landings are now given in tonnes and where possible ten years data is given so that comparisons may be made.

The report is now divided into three sections - viz:

- (1) The north-west coast fishery, (2) The West coast fishery and
- (3) International aspects and management of the fishery.

1. North-west coast fishery

Landings and value: The total amount (tonnes) and the value of all herring landed along the north-west coast since 1967 are shown in Table 1.

Table 1: Total landings, value and average price per tonne.

Year	Tonnes	Value	Average Price
1967	12,290	203,649	16.6
1968	13,390	256,305	19.1
1969	11,895	233,410	19.6
1970	11,716	286,556	24.5
1971	13,164	456,119	23.6
1972	17,565	708,833	41.1
1973	14,668	972,155	66.4
1974	12,557	1,206,866	96.1
1975	8,457	1,110,376	106.42
1976	7,581	1,044,297	161.64

These landings are from that section of the coast extending from Erris Head, Co. Mayo to Lough Foyle. A considerable decrease (over 50% since 1972) has taken place in the total catches in recent years but this has been somewhat offset by the dramatic rise in price which began in 1975. Within this area over 95% of all herring are landed at either Killybegs or Burtonport and up to recently the main landings were made during the autumn and winter months. However the monthly landings in Table 2 show that substantial landings are now made throughout the remainder of the year. This table also shows the monthly landings and value of herring landed at Burtonport, together with the amounts of herring withdrawn under EEC regulations and which were subsequently consigned for fishmeal.

Table 2: Monthly landings, value, and amounts withdrawn at Killybegs and Burtonport (1976)

Month	Killybegs			Burtonport		
	Tonnes	Value	Withdrawn Tonnes	Tonnes	Value	Withdrawn Tonnes
January	1588.7	159594	-	203.1	22954	-
February	400.5	40567	-	22.0	2330	-
March	721.6	68668	2.2	2.0	235	-
April	450.5	45637	0.4	17.0	1855	-
May	128.3	13592	1.0	6.0	700	-
June	150.1	16931	21.6	5.0	583	-
July	606.3	61765	102.3	14.1	1523	-
August	721.0	83289	15.6	7.8	1062	-
September	1011.2	185921	4.2	310.8	56759	-
October	525.5	75806	-	108.5	14558	-
November	767.4	124099	-	171.8	31878	-
December	1862.7	308903	3.3	206.1	39406	-
Total	8933.8	1184772	150.6	1074.6	173843	-

Location of the fishery: During 1976 fishing was carried out over a wide area extending from off the north Donegal coast to Eagle Island off the northwest Mayo coast. Generally speaking however, the major fishing took place, weather permitting, off the Stags of Broadhaven, and in the inner parts of Donegal Bay. In spring and summer most of the herring are taken as a bye catch in the whitefish fishery and are therefore taken from over a much wider area.

Boats and gear: During 1976 the number of boats which took part in herring fishing increased from 30 in the early part of the year to a maximum of 40. This was in line with the expansion of the fleet in recent years, and shows that skippers and producers are prepared to invest money to harvest the stocks of fish available off the Irish coast. However because of the poor catches throughout the year many boats did not continue to fish herring for any length of time. The number of pairs of boats engaged in the fishery for each type of gear is shown in table 3.

Table 3: Gear and vessel categories (1970-1976)

Year	Pair m.w. trawls	Pair Stern trawls	Ring nets
1970	9	-	1
1971	11	-	2
1972	15	-	2
1973	14	-	3
1974	19	-	1
1975	15	1	-
1976	20	1	1

Disposal of catch: Due to shortage of supplies, caused by poor fishing both in the Irish fisheries and in the other European fisheries, demand was very good throughout most of the year.

However quantities of small herring landed during the summer failed to reach the minimum price imposed by the EEC and were withdrawn and consigned for fishmeal. Considerable quantities of herring were frozen, either whole or filleted, while smaller amounts were cured, marinated, spiced or kippered. Small amounts were also sold fresh on the home market.

Catch per effort and effort: To assess the size of the herring stocks off the north-west coast it has been the practice to use catch per effort figures. These have been based on the catches of paired pelagic trawlers. The average number of tonnes per landing, compared over a number of years, gives an indication of fluctuations in stock size, and show how the stock is reacting to the fishing intensity to which it is subjected. Inaccuracies may arise in the use of this method, however, because of changes in efficiency of the fleet due to increased horsepower, carrying capacity, more sensitive detecting equipment and larger nets. The new method of presentation of data means in fact that the total effort for the year is based on two seasons - e.g. January to February of the 1975/76 season and October to December of the 1976/77 season. The catches, effort and catch per effort based on the landings of paired mid-water boats are shown in table 5. The catch per effort shows the increase in efficiency of the fleet up to 1971-72, and how the stock size has declined since then.

Table 5: Catches, effort and catch per effort (Paired mid- water trawls)

Year	Catch (Tonnes)	Landings	Catch/landing
1969	3,149	205	15.4
1970	4,637	229	20.2
1971	7,018	221	31.8
1972	9,586	329	29.1
1973	8,616	423	20.4
1974	8,280	350	23.7
1975	4,576	317	14.4
1976	4,923	421	11.7

If we assume that the total herring catch had been taken by paired midwater trawlers at the same rate as stated in table 5, then we can estimate the total effort required to make these catches. This has been set out in Table 6 (since 1969) for the years 1969-1976.

Table 6: Estimation of total effort based on catches of paired mid-water trawlers

Year	Total herring catch (tonnes)	Catch per effort (tonnes) landing	Effort (landings)
1969	11,895	15.4	772
1970	11,716	20.2	580
1971	12,161	31.8	382
1972	17,308	29.1	595
1973	14,668	20.4	719
1974	12,557	23.7	530
1975	10,417	14.4	723
1976	8,558	11.7	731

The total effort figures estimated in this way do not show any pronounced trend towards an increased effort, as has been the case in other Irish herring fisheries - notably the Celtic Sea. It would appear, therefore, that in spite of the addition of more boats to the fleet in general, the total effort exerted on actual herring fishing has not shown any consistent increase. Because of the existence of a good whitefish fishery, boats will not continue fishing herring unless catches are reasonably good. Weather conditions and the advent of two new stern trawlers to the fleet in recent years are two other factors that may affect the total effort generated.

Scientific investigations: Herring research was continued on the north-west coast throughout 1976 and samples were examined from landings made at Killybegs and Burtonport. A total of 1475 herring was examined for age, length, weight,

sex maturities and vertebral counts. A further 10143 were measured only and the lengths subsequently converted to age using an age/length correction factor. In addition a short but intensive sampling programme was conducted on young herring by a bursary student during July and August. A total of 350 fish of this kind were examined for age, length weight etc, while a further 3,450 fish were measured. Fat content and the numbers of herring per kilogramme were noted for all samples examined throughout the year.

Age and recruitment: Previous reports have pointed out that one of the reasons why a decline has taken place in the stock size of Donegal herring is that recruitment has in recent years been poor. No very strong year class has entered the fishery since 1966. It had been thought that the 1972 year class which recruited during the 1975 season as 2 winter ring fish might have been a strong one but unfortunately these early indications proved to be over-optimistic. The age distribution, based on all samples, is shown in Table 7. This would indicate that the 1973 year class which recruited as 2 winter ring fish in 1976 was a very poor one and will certainly not increase the stock size to any great extent.

Table 7: Age distribution. Number of fish per landing (thousands) Age (Winter Rings

Year	0	1	2	3	4	5	6	7	8	>8	Total
1969		2.0	9.0	16.1	3.2	62.4	4.1	2.3	1.1	3.0	103.2
1970		0.1	16.1	24.2	16.2	5.5	56.8	3.7	2.7	3.4	128.7
1971		1.1	14.7	15.5	25.9	21.6	9.2	92.7	5.0	4.4	190.1
1972		1.3	28.2	26.8	6.8	13.9	14.8	5.4	62.4	3.4	163.0
1973		2.0	33.6	18.6	9.6	4.3	6.3	6.3	0.9	31.4	113.0
1974		6.0	31.9	30.8	25.3	9.4	5.2	6.4	6.2	18.7	139.8
1975		6.9	31.6	9.3	12.5	11.1	3.4	1.8	2.4	7.3	86.3
1976	10	8.0	16.4	15.7	7.9	9.2	6.1	1.1	1.6	4.4	71.4

Racial Characters: Examination of racial characters throughout the year showed that nearly all herring belonged to the autumn spawning component. Winter spawners which on occasions had made up to 10%-15% of the total catch were conspicuously absent.

Fat content and numbers per kilogramme: During the time that fish were classified as recovering spents the fat content remained low (average 5%). When the herring began to feed and develop in June the fat content rose rapidly and reached a maximum of 20.5% in July. After spawning in September/October the fish continued to utilize their fat reserves and the fat content decreased during the winter, reaching a minimum figure of 3% in February. The number of herring per kilogramme varied considerably throughout the year and ranged from 4.3 to 10.2. The number was of course very dependent on whether immature herring were present in the catches, but generally speaking the number per kilogramme decreased as the fish developed and it reached a minimum prior to the onset of spawning in September.

The average fat content and numbers per kilogramme are shown per month in Table 8.

Table 8: Average percentage fat content and number per kilogramme 1976.

Month	Area	Condition	% fat content	Number per kilogramme
January	Donegal	Spent	5.0	6.4
	Galway	"	4.0	6.5
February	Galway	"	4.0	6.9
March	Donegal	Spent	3.0	6.5
	Galway	"	3.0	6.4
April	Galway	Spent & Recovering	2.0	-
May	Donegal	Recovering Spent	8.0	8.4
	Galway	" "	5.0	6.7
June	Donegal	filling	16.5	4.7
	Galway	Recovering Spent	8.0	-
July	Donegal	filling	20.5	4.5
	"	Immature	19.0	10.2
August	Donegal	filling and full	17.0	5.3
	"	Immature	19.0	8.8
September	Donegal	full	16.0	4.3
October	Donegal	Spent	11.0	6.7
	Galway	Spent & Maying	13.5	5.4
November	Donegal	Spent	8.8	6.2
December	Donegal	Spent	5.0	7.2

Examination of young Herring: During the summer of 1977 approximately 240 tonnes of small herring were landed from Donegal Bay. Much of this failed to reach the minimum EEC price and was therefore withdrawn and later reduced to fish meal. These young herring were mainly 2-year old, (i.e. spawned in 1974) with an average size of 24 cm. and were immature. (Most herring do not spawn until they are three years old). This quantity of small herring does not seem a very large amount in comparison with the total landing of 8,300 tonnes of marketable herring and in fact represents only about 3%. In terms of numbers it represents about 5% of the total landed throughout the year. But if however, these small herring had survived for another year they would have in fact doubled in weight and completed one spawning. Fishermen are aware of the existence of areas (e.g. Broadhaven Bay and around St John's Point) where these small herring congregate for considerable lengths of time. Because of the decreased recruitment that has taken place in the Donegal fishery in recent years it is extremely undesirable that any fishery would be allowed to develop that would exploit this type of herring. There is a N.E.A.F.C. recommendation, which became law in 1976 prohibiting the landing of herring below 20cm in that part of Division VIA that lies above 54°30'. (5.1, No. 169). However this minimum size is too small for the type of herring taken in Donegal Bay and it would be better to increase it to approximately 25cm.

2. West Coast

Landings and Value: The total landing of herring along the west coast during 1976 decreased slightly compared with the corresponding figure for 1975. However there has been a decline of over 43% in the total landings since 1973 and unlike the north-west coast there has been no dramatic price rise. The total value of herring landed has therefore also fallen appreciably at the same time.

Table 9: Total landings (tonnes) and value of herring landed off west coast - 1967-1976

Year	Tonnes	Value	Average Price
1967	108	1595	14.8
1968	30	1125	37.5
1969	145	4235	29.2
1970	1518	40090	26.4
1971	1485	39815	26.8
1972	3070	90851	29.6
1973	5000	359730	71.9
1974	4412	442582	100.3
1975	3098	313762	101.3
1976	5535	690518	124.8

The main landings are made at Galway and Rossaveal and have in recent years been made during the January to April period. In effect, the fishery is now, a spring based one conducted on the over-winter population of an autumn spawning stock.

Location: As in former years most of the catches were made along the northern coast of Galway Bay and off the Aran Islands.

Effort and catch per effort: Catch per effort figures are available for this fishery since 1971. These are, again in the form of catches of paired midwater trawlers per night's fishing. After the revival of this fishery in 1969 catches were dominated by boats using single midwater trawls, but this type of fishing no longer contributes substantially to the total catch. The total catch, total effort, and catch per effort are shown in Table 10.

Table 10: West Coast fishery, Total catch, effort and catch per effort by pr. midwater boats.

Year	Total Catch (Tonnes)	Effort (Landings)	Catch per Effort
1971	1761	66	26.5
1972	3596	107	33.5
1973	5241	318	16.5
1974	4341	319	13.6
1975	3050	215	14.2
1976	1580	170	15.2

As can be seen the total effort decreased again in 1976. The Galway fishery depends greatly on boats from other ports along the west coast (e.g. Killybegs and Castletownbere). The decrease in effort in 1975 and 1976 can therefore be attributed to a smaller fleet participating in the fishery because of poor catches in the initial stages of the fishery. The catch per effort figures would suggest that the actual stock present has remained fairly stable in the area and has not shown any dramatic decrease like that experienced in the Celtic Sea.

Scientific investigations: Scientific investigations continued throughout 1976 on herring landed at Galway and Rossaveal. A total of 400 were aged and a further 890 measured and subsequently converted for age.

Age and recruitment: The age distribution for the fishery since 1971 is shown in Table 11. This is expressed in similar form to that of the northwest coast - i.e. in numbers of fish per age class of the average paired midwater trawler landing.

Table 11: Age distribution. Number of fish per landing (thousands)

Winter Rings											
Year	0	1	2	3	4	5	6	7	8	>8	Total
1971		5.8	1.8	6.3	7.9	8.9	6.0	90.1	9.0	4.6	140.5
1972		3.1	40.1	2.3	9.0	9.7	9.7	5.3	100.7	10.9	191.0
1973	0.1	18.1	19.2	13.7	7.0	4.0	3.2	2.9	2.7	51.2	122.1
1974		0.8	170.5	20.2	8.4	4.2	3.2	4.0	8.6	17.3	84.3
1975	0.9	8.4	12.6	20.2	14.1	9.3	3.2	4.2	4.2	12.4	89.5
1976	0.2	5.8	2.7	20.7	20.7	12.3	2.9	2.3	2.8	5.8	95.8

As can be seen there is no evidence of any worthwhile recruitment having taken place in 1976. The age distribution is dominated by 2, 3 and 4, winter-ring fish - i.e. herring that were spawned in the years 1971 to 1973.

Fat content and numbers per kilogramme: The average fat content and numbers of herring per kilogramme per month are shown in Table 8. They are very similar to the values obtained for the north-east coast fishery.

3. The International aspects of the herring fisheries off the Northwest and West coasts:

International catches: The total international catch recorded by those countries fishing herring in Division VIA (Donegal) and VIIb-c (Galway) are shown in Table 12 and Table 13. The preliminary figures for VIA for 1976 indicate that a considerable decrease in catch has taken place, mainly because of very poor fishing by Scottish boats. On the other hand the total catch from Division VII-b-c (Galway) has shown a substantial rise - due mainly to a large increase in the catches by Dutch vessels operating in the area. The Dutch fleet also increased their catches substantially in VIA.

Management: The recommended catch for Division VIA, by the ICES scientific working group, for 1977 was 83,000 tonnes. However this advice was based on an estimate of recruitment which later turned out to be far too high with a resulting overestimate of stock size. In common with most other stocks around Ireland,

this stock size is now dangerously low, and severe restrictions are necessary if it is to be built up to its former level. To achieve this the total allowable catch for 1977 should be reduced from 83,000 tonnes to approximately 48,000 tonnes, and the recommended T.A.C. for 1978 would then be around 53,000 tonnes. It is not at present known how this T.A.C. would be divided per country, under EEC regulations or under a revised North East Atlantic Fisheries Commission (N.E.A.F.C.). However it will certainly mean that Ireland's quota, which was 12,700 tonnes in 1976, will be further substantially reduced. Although there is as yet no conservation measures in operation in Division VIIb-c, there is a recommendation that the total catch should be stabilized at around 10,000 tonnes, to prevent any further increase in effort.

It would therefore seem advisable that herring fishing should be concentrated off the Galway and Mayo coasts rather than in the Northern part of Donegal Bay. It would also seem advisable that the effort should be stabilized at about the present level until such time as another big year class recruits to the adult stock when increased catches could be taken.

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Table 12: Total catches of herring (tonnes) in Division VIA, 1967-1976

	1967	1968	1969	1970	1971	1972	1973	1974	+ 1975	1976 *
Belgium	-	-	-	-	-	-	-	-	-	11
England (incl. N. Ireland and Wales)	-	7	3	1	-	-	-	45	131	20
Faroes & Denmark	-	-	-	15,100	8,100	8,094	10,003	-	4,269	1,565
Finland	-	-	-	-	-	-	-	-	1,100	-
France	379	1,124	966	1,293	2,055	680	2,441	-	-	1,643
German Dem. Rep.	177	3	416	207	330	935	2,507	2,037	1,994	929
Germany Red. Rep.	17,318	14,874	15,805	16,548	7,700	4,108	17,443	14,354	9,099	4,860
Iceland	-	-	-	5,595	5,416	2,066	2,532	9,566	2,660	3,273
Ireland	12,290	13,390	11,895	11,716	13,164	17,565	14,668	12,557	8,457	7,582
Netherlands	4,576	2,957	1,514	1,102	9,252	23,370	32,715	19,635	17,418	21,039
Norway	-	-	-	20,199	76,720	17,400	36,302	26,218	512	5,307
Poland	727	2,791	3,188	3,709	-	-	5,685	6,368	2,934	3,085
Scotland	67,404	65,180	90,222	103,530	99,537	107,638	120,800	107,475	89,298	53,351
USSR	-	-	-	3	-	-	2,052	5,388	3,232	2,987
Total	102,871	100,326	124,009	179,003	221,271	174,873	247,148	209,561	141,104	106,504
Moray Firth Fishery	6,507	4,985	3,100	1,385	5,666	10,242	7,219	13,003	2,454	313

+ Revised Catches for 1975.
* 1976 figures are provisional.

Table 13: Total catches of herring (Tonnes) in Division VIIb-c 1967-1976.

	1967	1968	1969	1970	1971	1972	1973	1974	1975+	1976*
Ireland	108	30	145	1,518	1,646	3,154	5,036	4,412	3,098	2,832
Netherlands	-	525	355	179	61	71	200	50	9,815	13,626
France	-	713	-	733	42	312	-	10	20	1
Germany Fed. Rep.	-	-	71	180	52	23	5	1	914	-
Germany	-	-	-	-	-	-	-	-	-	240
Poland	-	-	-	-	-	-	-	-	-	83
United Kingdom	-	-	-	-	-	-	-	25	-	-
U. S. S. R.	-	-	-	2	-	347	-	1,266	646	118
Total	108	1,268	571	2,612	1,801	3,907	5,241	5,764	14,493	16,900

+ Revised catches for 1975.

* Provisional catches for 1976.