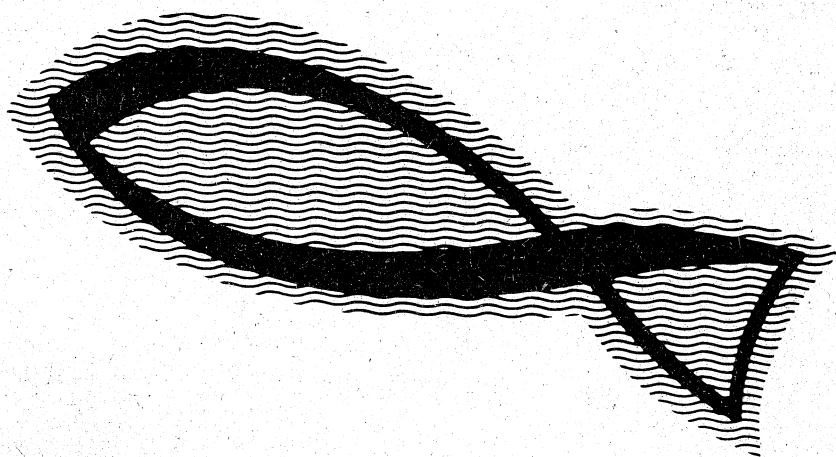




**Fishery Leaflet
Number 61.**

**an roinn
talmhaíochta
agus iascaigh**

**Herring investigations on the
north west and west coasts
1973-74.**



by

T. D. Kennedy.

**DEPARTMENT OF AGRICULTURE AND FISHERIES
FISHERIES DIVISION
DUBLIN.1.**

Herring investigations on the North-West and West coasts

1973 - 1974

by

T.D. Kennedy

While the main herring fishery off the north-west coasts covered the period October 1973 to February 1974, a considerable quantity of herrings was also landed during the period March - September 1973. The section of this report covering the north-west coast is thus divided into two sections, that concerned with the period March to September 1973 (the off season) and that with the period October 1973 to February 1974 (the main season). A further section deals with the fishery off the County Galway coast.

1. North West Coast (March to September 1973)

Herring research was continued on the north-west coast (Kennedy 1973) from March to September 1973 and samples from the catches landed at Killybegs and Burtonport were examined. The herrings sampled were taken by boats using bottom trawls mainly, who fished on a wide area ranging from Tory Island in the north to Eagle Island in the West. Most of the herrings were landed in Killybegs and Burtonport with occasional landings at Kincasslagh, Tellin and Magheroarty. Landings during this period amounted to 17,018 crans which were valued at £255,825. In addition 925 crans valued at £3181 were used for reduction to fishmeal. The small quantity which was reduced for fishmeal was non-commercial herrings which also contained amounts of sprats throughout. The landing figures for 1973 with the comparable figures for preceeding years were as follows:-

Year	For human consumption		For fishmeal	
	Crans	£	Crans	£
1973	17,018	255,825	925	3,181
1972	18,490	150,433	1,020	2,210
1971	14,919	119,840	-	-
1970	13,371	62,130	6,393	13,188
1969	7,610	37,524	248	-

During the period March - September 1973 approximately 300 fish were examined for age, length, sex, maturity and vertebral counts. In addition 5100 fish were examined for length and their ages estimated by using a raised age distribution. The percentage fat content was estimated from fillets and the numbers of fish per kilogramme of each sample noted.

Age and Recruitment: For the first time since 1966 the 1963 year class was not the dominant age group. The three year old fish (1970 year class) were dominant throughout the summer months while four year old fish (1969 year class) were also well represented. Throughout this period the 1963 year class varied from 10% - 20% of the fish examined. The monthly age distribution is shown in table 1.

Maturities: Up to the end of June the majority of fish examined were recovering spents i.e. stage VIII. From July onwards the gonads began to mature and fill (stage III) and they advanced through stages III and IV (filling) to stage V (full) in late August and September. From the fish examined there were indications that spawning would commence in late September and would continue throughout the month of October. During the sampling period quantities of immature fish (stage II) also appeared among the catches, being particularly numerous in June. Monthly maturity distribution are shown in table 2.

Vertebral Counts: The vertebral count, together with the maturity stages, are both used as characteristics in defining and identifying different races of herring. The counts throughout the summer months were typical of an autumn spawning component and there was no evidence of a mixture of any other race during this time.

Fat Content and numbers per Kilogramme During the months April, May and early June the fish examined were classified as stage II (immature) or stage VIII (recovering spent). During this time the fat content remained on (4% - 9.5%). As the fish began to feed and develop in early June the fat content increased rapidly and reached a maximum of 21% in early July. On the other hand the numbers per kilo decreased as the fish fattened and improved in quality. Average fat contents and numbers per kilogramme are shown in table 3.

North West coast (October 1973 - February 1974)

The main herring fishing commenced in October 1973 and continued until Mid-February 1974. A total of 66,401 crans valued at £1,077,024 was landed at Killybegs during this period. While the total landing figure decreased by approximately 6000 crans from the 1972/73 figure, the value of the catch increased substantially (by 54%) and reached a record level, exceeding £1,000,000 for the first time. Once again this was due to a very keen demand by local buyers who were supplying continental markets. Severe gales over an extended period were not inducive to a steady supply of fish with resulting keen demand when fish became available. The monthly landings in crans, the value and the average price per cran are shown below.

Killybegs 1973/74				Burtonport			Totals		
Month	Crans	Value £	Av. Price £	Crans	Value £	Av. Price £	Crans	Value £	Av. Price £
Oct.	3,852	60,949	15.82	824	15,656	19.00	4,676	76,605	16.38
Nov.	7,876	134,407	17.08	473	8,787	18.58	8,349	143,194	17.15
Dec.	14,458	208,558	14.42	155	2,403	15.50	14,613	210,961	14.44
Jan.	27,448	455,969	16.61	561	11,220	20.00	28,009	467,189	16.68
Feb.	12,767	217,141	17.01	201	3,970	19.75	12,968	221,111	17.05
Total	66,401	1,077,024	16.22	2,214	42,036	18.99	68,615	1,119,060	16.31
Season									
1972/73	72,848	578,629	7.94	4,727	45,026	9.53	77,575	623,655	8.03
1971/72	64,285	328,879	5.12	6,773	50,582	7.47	71,058	379,461	5.34
1970/71	46,259	245,121	5.30	2,044	11,242	5.50	48,303	256,363	5.30
1969/70	25,493	111,433	4.37	8,510	35,742	4.20	34,003	147,175	4.32
1968/69	33,503	117,261	3.50	9,341	37,364	4.00	42,844	154,625	3.60

Gear and catch efforts

During the season fourteen pairs of midwater trawlers and three boats using ring nets took part in the fishery. The numbers partaking in the fishery in previous years were:-

	Paired midwater trawlers	Ringnetters
1972/73	15	2
1971/72	11	2
1970/71	9	1

An estimate of stock abundance for herrings from the northwest coast is obtained by studying the variations that occur in the catches per effort. The index used for this estimate is the average catch per landing per paired midwater trawler for the season. This is approximately the same as the number of crans per night's fishing. Although a number of factors influence the catch per effort, such as changes in efficiency, larger nets, increased horse-power and carrying capacity, general trends in the population can be observed by studying the figures which for the six seasons were as follows:

Season	Catch (Crans) (midwater trawls)	Effort (no. of fishing nights)	Catch per effort crans per landing
1968/69	30899	192	161
1969/70	18348	206	89
1970/71	38846	261	149
1971/72	48836	258	189
1972/73	61562	355	174
1973/74	52837	375	141

The figures for 1973/74 do not include landings made in October which contained considerable quantities of mackerel. If the 1969/70 figure is disregarded, as it was unusually low because of very severe weather conditions, the figures for the remaining seasons do not show any particular trend, indicating that the stock has remained fairly stable. The catches each year have been balanced by the recruitment, although the disappearance of the 1963 year class may lead to a slight drop in stock size until another very heavy year class enters the fishery. If the total catch for the fishery is divided by the catch per effort of midwater trawlers, the resultant figure will be the theoretical effort figure exploited on the whole fishery in number of nights fishing.

These figures are shown below

Season	Total Catch	Catch per effort	Total effort
1968/69	33503	161	208
1969/70	25493	89	286
1970/71	46259	149	310
1971/72	64285	189	340
1972/73	72848	174	419
1973/74	66401	141	471

As can be seen there has been a gradual increase in the effort which has doubled in the last six seasons. As the total catch has also increased and the catch per effort has shown no apparent decrease the indications are that the stock is able to maintain the present rate of fishing.

Scientific investigations: Sampling was continued during the main season on herrings landed on the north west coast. Herrings were examined for length, sex, maturity and racial characters. Fat content and the numbers of herrings per kilogramme was also noted.

Age and recruitment: As with the summer fishery the 1963 year class failed to dominate the autumn spawning component. For the first time since the influx of the 1963 year class into the fishery in 1966, there was evidence that recruitment of three year old fish was above the average of the last six seasons. The age distribution of the winter spawning component (although this component does not contribute much to the overall landings) is much less varied than that of the autumn component and the same variations do not occur in the strength of the recruitment. It is likely that the forthcoming years fishery will be based mainly on four and five year old fish together with the remainder of 1963 year class. The age distributions for the last seven seasons for both autumn and winter spawning components are shown in table 4.

Fat content and number per kilogramme: As explained in Kennedy (1970) the fat content is related to the development of the gonads. In October the fat content of full fish was 10% and spent fish 8%. After spawning was completed and as the fish continued to utilise its fat reserves, the fat content gradually decreased and reached a minimum figure of 5.5% in late February when herring fishing on the North-West coast virtually ended. However herring continued to be landed on the west coast and these figures have been recorded. The average fat content (based on fillets) and the numbers of fish per kilogramme are shown in table 3.

II West Coast

Herrings were landed at Galway and Rossaveal in small quantities throughout the summer months. Examination of these herrings showed that they belonged to the same race as that on which the autumn spawning fishery is based. The shoals were first located in the usual area, south of Cashla Bay but in February/March fishing was being carried out north of Slyne Head, off the Cleggan area. The major portion

of the landings were made by boats using paired midwater trawls. Approximately twenty pairs from Dublin, Wexford, Waterford, Cork, Kerry, Donegal and Galway took part in the fishery and the biggest landings were made in February and March when boats arrived from other fisheries. The monthly landings of herrings, the total value and the average price since the fishery started in 1969/70 are shown below. While the quantity landed was higher than the 1972/73 total, the value due to the exceptionally high prices was approximately 90% higher than the previous season.

Season	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total Crans	Value £	Av. Price
1969/70								1417	7120	5.02
1970/71		2000	5000	850	1250	-	-	9100	30670	3.36
1971/72		1307	4817	3417	3390	6640	-	19571	96376	4.92
1972/73		-	1204	45	6703	8434	2965	19351	223119	11.53
1973/74	2703	2453	2742	1701	8159	3895	217	23811	426069	17.89

Scientific Examinations: Samples of herrings were examined in the usual way during the year. The average fat contents and numbers per kilogramme are shown in table 1. The percentage age distribution for each season, shown below, is similar to that found in the north western fishery with the 1963 year class (non 10 year olds) no longer the dominant year class.

Age in years

Seasons	1	2	3	4	5	6	7	8	9	10	+10
1973/74	0.2	20.7	15.1	10.5	3.6	5.3	5.6	7.3	2.1	18.4	0.2
1972/73		0.7	5.3	4.4	7.2	6.5	7.9	3.5	61.4	2.8	0.3
1971/72		2.6	1.3	5.4	6.1	6.4	4.5	66.8	4.1	0.3	2.5
1970/71		0.4	3.5	6.1	6.7	3.5	66.5	8.2	3.1	0.3	1.7

Recruitment of two and three year old fish appeared to be above average strength. An examination of the maturity data showed that these fish spawned sometime in October although the exact whereabouts of the spawning beds is not yet known. The main lengths per age class were again consistently higher than those from the northwest coast.

Disposal of catch As with the northwest coast a keen demand for herrings by buyers enabled all herrings to be cleared without difficulty and no herrings were used for reduction to fishmeal. Herrings were exported to the following countries, France, Federal Republic of Germany, Denmark, Greece, Norway and United Kingdom. The majority of herrings were exported as frozen fillets, and other types of process used included headless spiced, salting, marinating, whole frozen and a small quantity exported fresh. In addition small quantities were consumed on the home market as fresh herrings or kippers.

Gear and Catch Effort

During the season a maximum of twenty pairs of boats using midwater trawls took part in the fishery. This was a considerable increase on previous years and reflected the demand and prevailing prices for herrings. Because of the number of boats participating this year an analysis of the catch effort figures was made for comparisons elsewhere. The quantity of herrings landed by boats using pair midwater trawls was approximately 19,000 crans and the catch effort figure was 94 crans. While this figure was higher than that on the south coast it was not as high as the northwest coast. It is likely that the catch effort figure would improve as the skippers become more familiar with the fishing grounds off the west coast.

Conclusions

1. Autumn spawning herrings of good quality continue to be taken on the northwest coast during the Summer months. These herrings belong to the same race as those taken during the main winter fishery.
2. The 1963 year class, which has dominated this fishery since it first appeared in 1966, has now considerably diminished. The fishery during 1973/74 was based to a large extent on three and four year old fish.

3. Recruitment of three year old fish was above average.
4. The total stock from this area appesrs to be rather stable and able to maintain the present rate of fishing which is continuing to increase.
5. The winter spring spawning race is still present in the area but is not taken in any quantity.
6. The fishery off the Galway coast could be further developed if shoals were located prior to spawning in October.

Young Herring Survey

A young herring survey was undertaken by the research vessel Cu Feasa during August. This was a continuance of the programme started last year and it is hoped to continue the programme in future years. The object of these cruises is to study the abundance of young herrings not normally caught by trawlers. By estimating the abundance of young herrings before they recruit to the adult stocks, it will eventually be possible to forecast the arrival of good year classes and then make more accurate prediction of the fishery possible. The gear used during the survey was a bottom trawl fitted with a herring bag. The duration of each haul was a half hour and herring were examined for length, sex, maturity and vertebral count. By examining the vertebral counts it was possible to classify the herring into their races, e.g. autumn spawning or spring spawning. However all herrings examined had a vertebral count which indicated that they belonged to an autumn spawning component. All herrings examined were two year olds and the greatest number were caught east of Spiddal in Galway Bay. By contrast few herrings were taken from off St John's Point in Donegal Bay at this time, with sprats dominant in the catches. However there were reports of immature fish in this area at a later stage.

Acknowledgements:

The author acknowledges with thanks the assistance of skippers and others who supplied data for this paper. He also wishes to thank Messrs Killybegs Sea Foods Ltd, Killybegs Coop, Campbells Sea Foods Ltd, Galway Bay Sea Foods Ltd, and M P Hanlon, Dublin for the facilities kindly afforded him at their premises.

References

Kennedy, T.D. (1970) The Herring Fisheries on the North-West and West coast 1970 and 1971. Fishery Leaflet No. 29.

Table 1 % age monthly distribution Age in years Autumn Spawn

	1	2	3	4	5	6	7	8	9	10	10+
May* 1973	0.4	23.8	28.2	11.3	3.4	3.0	8.3	-	21.6	-	-
June 1973	-	5.6	50.1	16.9	6.1	2.0	1.9	4.8	-	12.6	-
July 1973	-	0.5	51.3	24.1	7.0	1.5	1.5	4.0	-	10.1	-
Aug. "	-	0.8	43.0	25.3	7.0	2.3	2.0	5.3	-	14.3	-
Sept. "	no samples available										
Oct. "	-	0.7	19.3	7.3	6.0	4.7	7.3	6.0	2.7	45.3	0.7
Nov. "	-	5.6	51.2	15.7	7.0	4.8	4.2	2.8	1.4	7.3	0.3
Dec. "	-	2.4	21.9	8.5	12.2	3.7	12.2	4.9	-	34.2	-
Jan 1974	-	3.2	22.9	18.9	10.4	4.3	6.4	7.1	2.9	23.2	0.7
Feb. "	-	5.5	24.7	17.0	8.9	5.5	11.0	6.2	4.1	16.4	0.7

* By the end of May 1973 the summer growth on the edge of the otolith was sufficient to enable the winter ring to be clearly seen indicating that each fish had at this time moved to the next age group.

Table 2 % maturity stage monthly Autumn Spawn

Maturity Stage	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
II (Imm)	5.5	34.5	0.5	2.5			6.2		0.7	3.4
III)filling		5.5	68.8	9.3						
IV }			15.6	11.1		4.7				
V (full)			2.0	77.1		82.7				
VII (Spent)			0.5			12.6	93.8	100	95.0	88.4
VIII (Recovering Spent)	94.5	60.0	12.6						4.3	8.2

Table 3. Percentage Fat content and number per kilogramme

Month	Area	Condition	% Fat Content	No kilogramme
May 1973	Donegal Bay	Spents & recovering spents	4.0	5.5
	Rosbeg	recovering spents	7.0	5.8
	Galway Bay - north sound	recovering spents	9.5	5.2
June	Donegal Bay - Glen Head	recovering spents	14.0	5.9
	Galway Bay - north sound	recovering spents	17.0	4.5
	Galway Bay - north sound	immatures	17.0	7.0
July	Galway Bay - north sound	filling	21.0	5.9
	Tory Island	filling	20.0	5.5
	Donegal Bay	Immatures and filling	21.0	7.0
August	Eagle Island - stags of Broadhaven	filling	16.0	4.7
October	Tory Island	full	10.0	4.4
	Galway Bay - north sound	full	13.0	4.6
November	Galway Bay - north sound	spent	9.0	
	Donegal Bay (north)	spent	10	5.9
	Rosbeg area	full	15.0	4.6
	Rosbeg area	spents	11.0	
December	Donegal Bay - north	spent	8.0	5.4
	Galway Bay - north sound	spent	8.0	5.9
January 1974	Stags of Broadhaven	spent	7.0	6.2
	Carripen Hd - Malinbeg	full	11.0	5.3
	Carripen Hd - Malinbeg	spent	8.0	
February	Stags of Broadhaven	spent	5.5	6.5
	Glen Head - Malinbeg	spent	5.0	6.3
	Galway Bay - north sound	spent	4.0	6.0
March	North of Slyne Head	spent	4.0	6.1

Table 4. Percentage age distributions (Autumn spawners)

Age in years

	2	3	4	5	6	7	8	9	10	10 ⁺
1973/74	3.9	32.4	15.0	8.5	4.6	6.9	5.1	2.3	20.8	0.5
1972/73	1.6	16.6	13.4	4.8	8.9	6.8	1.8	14.6	1.2	0.4
1971/72	2.5	15.4	6.5	12.1	11.4	3.7	43.5	2.4	0.5	2.2
1970/71	0.5	9.5	12.3	10.7	4.1	55.6	4.0	2.1	0.4	0.9
1969/70	0.9	11.1	11.3	2.9	59.1	6.6	3.1	1.6	0.6	2.8
1968/69	0.8	12.5	3.7	71.8	4.1	2.0	1.1	1.0	2.1	0.9
1967/68	1.3	1.7	80.6	5.7	4.3	2.5	1.1	1.8	0.6	0.4

Age in years (winter spring spawners)

1973/74	-	11.91	20.70	10.48	11.21	17.9	10.4	4.5	9.7	3.7
1972/73	0.4	15.4	18.5	10.2	19.7	12.6	4.7	15.4	2.4	0.8
1971/72	0.5	4.6	6.1	21.9	22.2	13.3	15.8	8.2	0.8	6.6
1970/71	-	10.7	30.0	21.9	8.2	10.0	5.9	5.6	0.4	7.4
1969/70	0.4	13.1	13.8	11.1	20.7	7.5	15.9	6.1	1.3	10.2
1968/69	-	20.1	6.3	46.6	2.3	7.5	0.6	0.6	14.4	1.7
1967/68		1.7	18.2	15.4	25.3	8.2	9.3	14.7	4.5	2.7