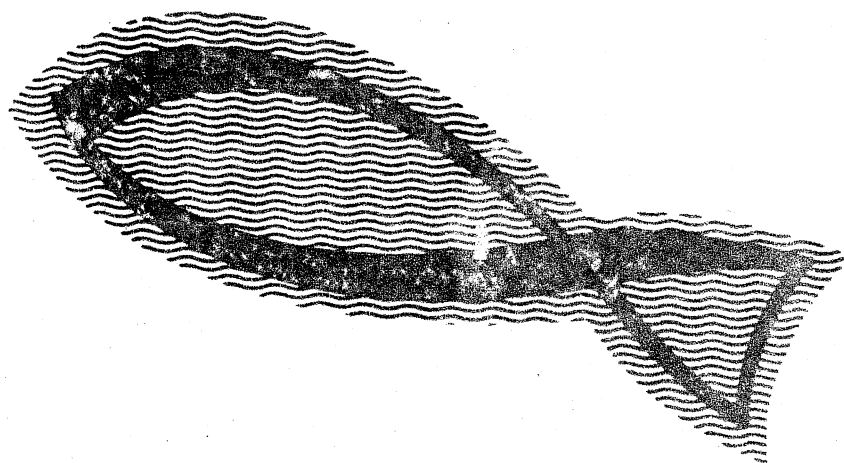




**Fishery Leaflet
Number 56
1973**

**an roinn
talmhaíochta
agus iascaigh**

**Herring investigations on the
North-west and west coasts 1972-73**



by

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HERRING INVESTIGATIONS ON THE NORTH WEST AND WEST COASTS 1972-73

by

T.D. Kennedy

Although the main herring fishery off the north west coast in 1972/73, covered the period from October 1972 to February 1973, a considerable quantity of herrings was also landed during the period March to September 1972. The section of this report covering the north west coast is thus divided into two sections, that concerned with the period March to September 1972 (the off season) and that with the period October 1972 to February 1973 (the main season). A further section deals with the fishery off the west coast, in Galway Bay.

I NORTH WEST COAST (MARCH TO SEPTEMBER 1972)

Herring research was continued on the north-west coast (Kennedy 1972) from March to September 1972 and samples from the catches landed at Killybegs, and Burtonport were examined. The herrings sampled were taken by boats using mid-water and bottom trawls. They were caught mainly off Tory Island, in Donegal Bay and off the Stags of Broadhaven. Most of the landings were made at Killybegs, Burtonport and Kincasslagh, while smaller amounts were landed at Downings and Bunbeg. Landings during this period amounted to 18,490 crans which were valued at £150,433. In addition 1,020 crans valued at £2,210 were used for reduction to fishmeal. The figures for 1972 with the comparable figures for preceding years were thus -

	Human Consumption		Fishmeal	
	crans	£	crans	£
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 1972, 1,200 herrings were examined, in samples of approximately 100 each, for length, sex, maturity, vertebral count and age. In addition each sample was weighed to ascertain the numbers of fish per kilogram and the percentage fat content was estimated from fillets.

Age and Recruitment While the 1963 year class (nine-year-old fish) was again the largest individual group to appear in the age distributions there were indications of a reasonable recruitment of the 1969 year class (three-year-old fish) entering the fishery. This was the first real indication of a reasonable recruitment to this fishery since 1966 when the 1963 year class was first caught in quantity. Table 1 gives details of percentage age distribution per month.

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 September. From the fish examined there were indications that spawning would commence in early October and would continue throughout that month. Small amounts of immature fish (stage II) were present throughout the sampling period. The distribution of the maturity stages per month is 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 Kilogram During April and May, when the majority of herrings were recovering spents and the fat content remained low (7.0%). However with the resumption of feeding in late May the fat content began to improve and reached its maximum at the end of June (19%) which coincided with the start of gonad development. The number of fish per kilogram decreased

from 5.2 in April/May to 4.0 in October, just prior to spawning.

NORTH WEST COAST (OCTOBER 1972 - FEBRUARY 1973)

The main herring fishery commenced in October 1972 and continued until late February 1973. A total of 72,848 crans valued at £578,629 was landed during this period; this represented an increase of 13% in the quantity and an increase of 76% in the value on the previous year. The greatly increased value was the result of a very keen demand by local buyers because of the decreased landings by continental fleets during the summer months. The landings would undoubtedly have been still higher, but for unsuitable winds which prevailed for long periods. The monthly landings (crans), the value and the average price per port are shown below.

	Killybegs			Burtonport			Totals	
Month	Crans	£	* £	Crans	£	* £	Crans	£
October	8,229	74,121	9.01	1,063	9,185	8.64	9,292	83,306
November	7,952	65,467	8.23	832	9,853	11.84	8,784	75,320
December	22,089	191,406	8.67	915	8,226	8.99	23,004	199,632
January	29,333	197,998	6.75	1,847	16,992	9.20	31,180	214,990
February	4,685	49,637	10.80	70	770	11.00	4,755	50,407
Total:	72,848	578,629	7.94	4,727	45,026	9.53	77,575	623,655
<u>Year</u>								
1971/72	64,285	328,879	5.12	6,773	50,582	7.47	71,058	379,461
1970/71	46,259	245,121	5.30	2,044	11,242	5.50	48,303	256,363
1969/70	25,493	111,433	4.37	8,510	35,742	4.20	34,003	147,175
1968/69	33,503	117,261	3.50	9,341	37,364	4.00	42,844	154,625

* Average price per cran.

Disposal of Catch Because of the very good demand throughout the season, no difficulty was experienced in selling herring and consequently the amounts which were reduced to fishmeal were very small. Herrings, processed in various forms, were exported to Belgium, Federal Republic of Germany, Finland, Holland, Norway, Poland and Sweden. Small amounts of fresh herrings were also exported to France and the United Kingdom. The amounts of herrings which were frozen, either whole or as fillets, again continued to increase. Further quantities were rough packed, i.e. cured with salt only, or with a mixture of salt, sugar and spices, while small quantities were marinated.

Gear and Catch Effort During the season a maximum of fifteen pairs of boats using mid-water trawls and two pairs using ring nets took part in the fishery. In the two previous seasons the following numbers participated:-

	<u>Paired mid-water trawls</u>	<u>Ring nets</u>
1971/72	11	2
1970/71	9	1

The catch per effort is used to give an estimate of stock abundance for the north-west coast herrings. The stock abundance is expressed as the number of crans caught by a pair of mid-water trawlers per night's fishing. This is approximately equal to the number of crans per landing. The catch per effort thus, when compared over a number of years shows how a particular stock is reacting to the rate of fishing to which it is subjected (taking into account that increases in efficiency, horse power, carrying capacity and improved gear will all tend to increase the catches per effort and consequently to over estimate the stock size).

The following are the catches per effort for the five seasons 1968/69 to 1972/73 for both pair trawlers and ring netters working from Killybegs to Burtonport:-

Year	Paired mid-water trawls			Ring netters		
	Catch in crans	Effort	Catch per effort	Catch in crans	Effort	Catch per effort
1968/69	30,889	192	161	1,015	10	102
1969/70	18,348	206	89	1,359	7	194
1970/71	38,846	261	149	1,224	10	122
1971/72	48,836	258	189	2,958	23	129
1972/73	61,562	355	174	1,931	11	176

As can be seen from the above figures, the catch per effort has not shown any dramatic change, in spite of the increased total catch and the increased effort. The variability in the catches per effort could in fact be caused by adverse weather conditions rather than by changes in stock size. The corresponding catch per effort figure for pair trawlers operating from Dunmore East and Cobh during the 1972/73 winter fishery was 94.3 crans, indicating that the stock off the Northwest coast is more abundant than the one inhabiting the Celtic Sea. The effort figure for 1972/73, having remained fairly static over the last four seasons, showed a considerable increase because of the influx of new boats into the fishery. Because the catches made by boats using ring nets are now very small, they can no longer be used to make accurate analyses of the fishery.

Age and Recruitment As was anticipated the 1963 year class (nine-year-old fish) again dominated the catches during the main season. The 1969 year class (three-year-old fish) which appeared in reasonable numbers in the samples of the previous summer, were again present during the main season, but not to the expected amount. This would suggest that they had not fully recruited to the adult shoals during the summer months, and the boats, at that time, possibly fished the young shoals before they joined the adults. There was no evidence that recruitment of any other age class took place, and the 1963 year class has now formed the mainstay of the fishery for

seven seasons. Mortality studies using the age distributions have also demonstrated that the present rate of fishing has little effect on this stock.

Although the presence of a winter/spring spawning race in this area has been previously noted, the quantities of this race which are landed, depend on the areas fished, which in turn, are dependent on the weather. This component appears in the catches as full fish (stage V) in December and January and are taken mainly in the Rosbeg-Glen Head area. The age distribution shows them to be an older run of fish, while their growth rate and vertebral counts are also both higher than in the autumn spawning components. A comparison between the most frequently occurring age groups in both races, shown below, demonstrates the differences that exist between the two components.

Age (years)

	3	4	6	9
Mean lengths - Autumn	26.8	28.5	29.8	30.0
Winter Spring	28.1	29.5	30.7	31.7
Mean vertebral Autumn counts	56.54	56.56	56.56	56.42
Winter Spring	57.03	57.04	57.10	56.87

Recruitment of young fish to this winter/spring spawning stock again appears to be rather low.

Fat Content and number per kilogramme As explained by Kennedy (1970)

the fat content is related to the development of the gonads. At the beginning of the season in October, the fat content of full herring was 14% and spent herring 9.5%. However after all spawning had taken place and

as the fish utilised its fat reserves, the fat content gradually decreased and reached a minimum of 5% in February. The average fat content (based on fillets) and the numbers of fish per kilogramme are shown in Table 3.

CONCLUSIONS

- (1) Autumn spawning herrings of good quality continue to be landed on the northwest coast during the summer months. These herrings belong to the same race as that which forms the major winter fishery.
- (2) The fishery is still dominated by the 1963 year class, although indications were that the 1969 year class may have been above the average for the last seven years.
- (3) While the winter/spring spawning race again appeared in the catches during the season, it is not presently exploited to any extent.
- (4) Young herring surveys initiated in the area revealed the presence of pre-recruit herrings belonging to the autumn spawners.
- (5) Mortality and catch per effort studies again indicate that the present catches have little effect on this stock.

II WEST COAST

The herring fishery in Galway Bay commenced in December and continued until April. The major portion of the fish were landed at Galway. The catches during December and January were very poor because of lack of effort, although there were indications that herrings were present in Galway Bay on a number of occasions. Unsuitable winds at this time may also have driven the shoals into unfishable areas. After January, the arrival of boats from Killybegs, Castletownbere and Dun Laoire produced better landings and because of high prices the value of the total catch exceeded that of the previous years. Monthly landings, the total value and the average price for herrings landed at Galway and Rossaveal, since 1969/70 (when

this fishery was first exploited) are as follows:-

Season	November	December	January	February	March	April	Total crans	Value £	Per Cran A.P.
1969/70							1,417	7,120	5.02
1970/71	2,000	5,000	850	1,250	-	-	9,100	30,670	3.36
1971/72	1,307	4,817	3,417	3,390	6,640	-	19,571	96,376	4.92
1972/73	-	1,204	45	6,703	8,434	2,965	19,351	223,119	11.53

Because of the keen demand most of the catches were either exported direct or filleted and frozen before export.

Shoals were located in similar areas to previous seasons i.e. off the north coast of Galway Bay and outside of the Aran Islands.

Scientific Investigations Samples landed at Galway were again examined throughout the main season. As in previous years the herrings belonged to an autumn spawning race which was, like those off the northwest coast, dominated by the 1963 year class. A comparison between the percentage age distributions from both places is shown below:-

Age in years

Area	2	3	4	5	6	7	8	9	10	10+
Northwest coast	1.6	16.6	13.4	4.8	8.9	6.8	1.8	44.5	1.2	0.4
Galway Bay	0.7	5.3	4.4	7.2	6.5	7.9	3.5	61.4	2.8	0.3

Once again the Galway Bay herrings were also slightly larger per age class than those from Donegal.

YOUNG HERRING SURVEY

A young herring survey was undertaken by the research vessel Cú Feasa during August-September. The area covered extended from north Donegal to the Clare coast. This survey was the first of a series which it is hoped will take place at the same time and in the same areas each year. 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 thus make more accurate predictions of the fishery possible. The gear used during the survey was a bottom trawl fitted with a herring bag. This however was not ideal for some areas, where unsuitable grounds prevented tows being made. The duration of each tow was a half hour and the number of herrings taken and positions were noted. Herrings were examined for length, age and vertebral count. By examining the vertebral counts it was possible to classify the herrings into their races, e.g. autumn spawning or spring spawning. All herrings examined however had a vertebral count which indicated that they belonged to an autumn spawning component. Herrings examined from the Donegal area were all two-year-olds while those from the West coast (Galway area) were a mixture of both one and two-year-olds. The number of herrings taken per half hour trawl varied from nil to 3,300. The maximum number of herrings taken per $\frac{1}{2}$ hour haul was in Galway Bay. These herrings would therefore appear to be the potential recruits to the main autumn spawning fishery now exploited on the West and North West coasts.

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., Marinpro Ltd., Burtonport, and Galway Bay Sea Foods Ltd., for the facilities kindly afforded him at their premises.

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Table 1 % Age Distribution per month. North West coast autumn spawners

Age in years

		1	2	3	4	5	6	7	8	9	10	10+
May *	1972	2.3	14.7	21.7	2.3	9.3	11.6	5.4	30.4	-	-	2.3
June	"	-	-	24.0	22.0	5.0	7.0	9.3	7.0	24.7	-	1.0
July	"	-	-	14.0	15.0	2.0	9.0	13.0	3.0	44.0	-	-
August	"	-	1.3	26.7	14.0	4.8	11.4	7.4	1.2	31.7	0.7	0.8
September	"	No samples available										
October	"	-	1.0	20.6	10.1	4.0	5.5	4.0	1.5	51.8	0.5	1.0
November	"	-	0.9	18.6	17.8	5.5	9.2	6.0	1.9	38.3	1.3	0.5
December	"	-	1.5	22.9	10.7	2.4	9.5	7.6	3.1	41.7	0.6	-
January	1973	0.1	1.2	13.7	13.5	5.3	9.0	7.9	1.3	46.3	1.5	0.2
February	"	-	6.5	8.5	6.0	5.5	9.5	6.0	1.5	54.0	1.5	1.0

* By the end of May 1972 the summers 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 Percentage maturity stage per month

Maturity Stage	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Immature II	3.1	4.3		2.5	No fish sampled	1.5	2.0	1.8	2.2	5.0
filling III	0.8	24.0	29.0	5.0		0.5	0.8	0.3		
IV		6.3	22.0	23.2		13.1	0.5	0.3		
Full V		1.0	44.0	67.6		65.3	9.2	3.4		
Maizy VI				0.2		1.0	0.2	-		
Spent VII	18.6			0.8		18.6	87.3	94.2	97.8	95.0
Recovering spent VIII	77.5	64.4	5.0	0.7						

TABLE 3 Mean percentage fat content and numbers per kilogram per month

Month	Area	Condition	Fat Content	No per Kilo
May	North Donegal Bay	Recovering spent	7.0	5.2
	Galway	" "	10.5	5.3
June	Tory	filling	17.7	4.6
July	Tory	filling	19.0	4.0
	Galway	filling	18.0	5.9
August	Stags of Broadhaven	filling	17.0	4.0
September	No fish sampled	-	-	-
October	Broadhaven	full	14.0	4.1
	Broadhaven	spent	9.5	5.4
November	East of Stags	spent	10.0	5.4
	Rosbeg	spent	10.5	5.0
December	Stags of Broadhaven	spent	7.0	5.7
	Galway	spent	10.0	5.0
	Glen Head	full	12.0	4.5
January	Broadhaven	spent	5.1	5.8
	Glen Head	full	13.0	5.2
February	Galway	spent	5.0	5.6
	Donegal Bay	spent	5.0	6.2