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HERRING INVESTIGATIONS ON THE
NORTH-WEST AND WEST COASTS
1971-1972.

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I. NORTH-WEST COAST

Although the main herring fishery off the north-west coast in 1971/72 covered the period from October, 1971 to February, 1972, a substantial quantity of herrings was landed during the period March to September, 1971.

(i) MARCH TO SEPTEMBER, 1971.

Herring research was continued on the north-west coast (Kennedy, 1971) and samples from the catches landed at Killybegs from April to September, 1971 were examined in the Department's Laboratory. The herrings sampled were taken from boats using bottom trawls and were caught mainly off the Stags of Broadhaven and in Donegal Bay. Landings during this period amounted to 14,919 crans, and were valued at £119,840; no herrings were used for fishmeal. The comparable figures for 1970 were 19,764 crans valued at £75,318; in that year 6,393 crans were used for fishmeal.

From April to September 1,750 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

Once again the 1963 year class (eight year-old fish) was the dominant age group. This year class has dominated the catches since it first entered the fishery as three year-old fish in 1966. This is a feature of the herring fishery on the north-west coast i.e. the emergence of a year class of sufficient strength which can, by itself, sustain the fishery over a prolonged period. There was no evidence of recruitment of any other year class in sufficient strength to suggest that the 1963 year class would not again be dominant in 1972. Table 1 gives details of percentage age distribution per month.

MATURITIES.

With the exception of a small number of immature fish examined in May, all fish examined up to June were classified as recovering spents, i.e. stage VIII. From June onwards the gonads began to fill (stage III) and advanced through stages III and IV (filling) to stage V (full) in September. Samples examined in September indicated that spawning commenced after mid-September and would continue until mid-October. Table 2 shows the percentage maturity stages per month.

VERTEBRAL COUNTS

The vertebral counts from April to September were typical of an autumn spawning component and there was no evidence of a mixture of any other races at this time. However, during the main season, from October to February,

depending on areas fished, the fishery may contain a mixture of autumn and winter spring spawning herrings. The vertebral count and maturity stages are both used as characteristics in defining and identifying different races of herring.

FAT CONTENT AND NUMBERS PER KILOGRAM

After the low fat content during the winter months, the herrings began to improve in condition in April when they resumed feeding. Subsequently the fat content reached a peak in June. This high June figure coincided with the start of gonad development. As the fat content improved and the fish grew in weight the numbers per kilogram fell. Table 3 shows this in detail.

CONCLUSION

Autumn spawning herrings of good quality continue to be landed at Killybegs during the summer months and belong to the same race as those landed during the winter season.

(ii) OCTOBER 1971 TO FEBRUARY 1972

The main herring season commenced in October, 1971 and continued to late February, 1972. A total of 71,058 crans was landed during this period. This was a considerable improvement on recent years and was especially evident at Killybegs where 64,285 crans were landed. The increased landings were the result of more boats fishing at the Stags of Broadhaven, off Co. Mayo, coupled with better weather than in the previous season. It is there that the boats catch the bulk of herrings during the season. In addition, boats from Burtonport were able to fish the winter spring spawning component at Glen Head and Rosbeg off the Donegal coast. The monthly landing figures in crans for each port were as follows:-

Month	Killybegs	Burtonport	Total
October	3,500	486	3,986
November	5,743	573	6,316
December	24,147	1,412	25,559
January	20,852	2,275	23,127
February	10,043	613	10,656
		(Additional September) 1,414	1,414
Total	64,285	6,773	71,058
1970/71	46,259	2,044	48,303
1969/70	25,493	8,510	34,003
1968/69	33,503	9,341	42,844

The value of herrings landed in 1971/72 (with figures for the three previous seasons for comparison):-

Season	Killybegs	Burtonport	Total
	£	£	£
1971/72	328,879	50,582	379,461
1970/71	245,121	11,242	256,363
1969/70	111,433	35,742	147,175
1968/69	117,261	37,364	154,625

There was a strong demand throughout the season, and no difficulty was experienced in clearing herrings. The average price per cran over the past four seasons was:-

Season	Killybegs	Burtonport
	£	£
1971/72	5.12	7.47
1970/71	5.30	5.50
1969/70	4.37	4.20
1968/69	3.50	4.00

DISPOSAL OF CATCH

The greater part of the herring catch was exported (in order of importance) to Federal Republic of Germany, France, Norway, Belgium, Great Britain, Holland, and Sweden. The following methods of processing were used:- fresh and frozen fillets, rough packs, cured in spice and sugar, whole fresh, and whole frozen.

GEAR AND CATCH EFFORT

This season a maximum of eleven pairs using mid-water trawls and two pairs using ring nets took part in the fishery. In the season 1970/71 a maximum of nine pairs using mid-water trawls and only one pair using ring nets participated.

Because there is no way of estimating directly the total number of fish in the sea, 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 per night's fishing which is approximately the number of crans per landing. The catch per effort then, when compared over a number of years shows how a particular stock is reacting to the rate of fishing to which it is subjected, allowing for changes of efficiency of the fleet involved. The following are the figures for the last four seasons for both pair trawlers and ring netters, working from Killybegs to Burtonport:-

Paired mid-water trawlers				Ring netters		
Year	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

As can be seen, there has been considerable fluctuation in the catch per effort. However, there has been no apparent decline in stock size. The low figures for the 1969/70 season were caused by poor weather which prevented boats fishing in the Stags of Broadhaven area where the heaviest catches were usually made.

AGE AND RECRUITMENT

The fishery on the north-west coast continues to be based almost exclusively on an autumn spawning component. The 1963 year class (eight year-old) was again the largest single age group comprising 43% of the total catch. Recruitment was also poor with little evidence to suggest young fish are entering the fishery in any appreciable quantities.

FAT CONTROL AND NUMBERS PER KILOGRAM

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 12% and spent fish 8.8%. As the season progressed the fat content fell and reached its lowest figure of 4% in February. The mean monthly fat content and numbers per kilogram are shown in Table 3. This table also includes winter/spring spawning herrings landed at Burtonport and already mentioned in the text.

The winter/spring spawning component has different characteristics e.g. faster growth and higher vertebral count and the following comparison with autumn spawning fish demonstrates this, (the most frequent age groups are chosen for comparison):

		Age in years				
		4	5	6	7	8
<u>Autumn spawning component:</u>	Average length (cm):	28.26	29.18	29.40	29.44	29.58
	Average vertebral count :	56.54	56.65	56.57	56.43	56.49
<u>Winter/spring spawning component:</u>	Average length (cm):	29.59	30.48	31.03	31.06	31.41
	Average vertebral count :	56.96	56.86	57.14	57.17	56.94

CONCLUSIONS

- (1) Recruitment to the fishery continues to be poor.
- (2) The quantity of spent herring available during the October/February period, would merit an intensive effort to locate full fish during summer months.
- (3) The winter/spring spawning component re-appeared in January and February. This stock does not appear to be exploited at present.

II. WEST COAST

Herrings continued to be landed at Galway and Rossaveal during 1971/72 season. Landings showed a substantial increase on the previous seasons when the fleet was confined to local fishing boats. The increased fishing effort and the use of paired mid-water trawls by boats from other ports, e.g. Castletownbere, Killybegs, Howth and Dun Laoghaire, enabled greatly increased numbers of herrings to be landed on a more regular basis over a longer period. The monthly landings in crans were:-

	<u>November</u>	<u>December</u>	<u>January</u>	<u>February</u>	<u>March</u>	<u>Total</u>
1971/72	1,307	4,817	3,417	3,390	6,640	19,571
1970/71	2,000	5,000	850	1,250	-	9,100
1969/70						1,417

The value per cran of herrings landed (November to March) for the last three seasons was:-

	£	Average price per cran
1971/72	96,376	£4.92
1970/71	30,620	£3.36
1969/70	7,120	£5.02

DISPOSAL OF CATCH:

Almost all herrings landed were processed either as rough packs or frozen fillets. They were exported mainly to the Federal Republic of Germany, France and Norway.

Herring research started at Galway in November and continued throughout the season. A total of 1,700 fish was examined for length, sex, maturity, vertebral count, and age in samples of approximately 100 each. In addition, each sample was weighed to ascertain the numbers of fish per kilogram and the percentage fat content was estimated from fillets. All fish examined were from an autumn spawning component.

AGE, LENGTH AND WEIGHT

As with the north-west coast fishery, the 1963 year class (eight-year-olds) was the largest single age group. There was little evidence of recruitment. The average length per age group was again larger than those caught on the

north-west coast; the fat content was similar although the numbers per kilo were slightly higher on the west coast.

As mentioned in Kennedy (1971), paired mid-water trawling is a more efficient method of catching herring than single mid-water trawling. During the 1971/72 season with the advent to the fishery of boats from Castletownbere, Killybegs, Howth and Dun Laoghaire, a comparison can be made between the catch effort of single mid-water and paired mid-water trawls, as follows:-

	<u>Number of Landings</u>	<u>Crans landed</u>	<u>Average landing</u>
Single mid-water trawl	90	5013	56
Paired mid-water trawl	53	9721	183

While accepting that the boats engaged in paired mid-water trawling were larger and had greater horsepower, the above figures would suggest that consideration should be given by the local fleet to the use of paired mid-water trawling in future herring fishing at Galway.

CONCLUSIONS

- (i) Herrings were located off Galway in November and landings continued until April. These were autumn spawning herrings similar to those landed on the north-west coast.
- (ii) During the summer months these herrings will be full and filling, with a high fat content, and would merit an intensive effort to locate the shoals at that time.
- (iii) Based on the landings this season at Galway, the use of paired mid-water trawls would appear to be more successful than the single mid-water trawl.

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TABLE 1. Percentage age distribution per month (North Coast)
(Autumn Spawners)

	Age in years										
	1	2	3	4	5	6	7	8	9	10	10+
April 1971			3.0	18.0	14.0	4.0	59.0	1.0	1.0		
May* "	5.2	20.5	14.8	11.0	7.8	4.8	32.5	2.2	0.2		
June "		0.6	4.8	9.2	18.8	10.4	14.8	40.6	0.8		
July "			9.5	8.3	15.8	11.6	9.5	44.8	0.5		
August "			6.3	10.5	8.3	11.8	2.8	54.4	2.3	0.1	3.5
Sept. "			7.0	9.0	14.0	11.0	1.0	50.0	4.0	1.0	3.0
Oct. "			4.0	7.3	13.5	10.3	5.3	56.3	1.5	0.3	1.5
Nov. "		0.3	17.8	8.5	13.4	11.7	3.4	41.9	1.9	0.1	0.1
Dec. "		0.5	14.0	4.8	10.7	12.5	4.2	44.7	3.3	0.5	4.8
Jan. 1972		4.5	20.3	6.0	11.9	10.8	3.2	37.6	2.9	0.7	2.1
Feb. 1972		8.8	15.5	4.8	10.5	11.5	2.8	42.1	1.8	0.8	1.4

*

By the end of May 1971 the Summer's 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 (North Coast)

Maturity Stage	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Immature II		21.5	1.7	0.7				1.3	0.3	1.4	5.5
Filling (III			31.4	54.5	8.3			0.7		0.1	0.5
(IV			1.4	29.9	31.6	6.0	1.5	1.1	0.8	0.6	
Full V				4.8	58.9	48.0	48.9	12.1	7.7	1.3	1.0
Mazy VI								0.3			
Spent VII	83.0	14.5			1.2	46.0	49.6	84.2	91.2	96.6	93.0
Recovering VIII	17.0	64.0									
Spent			65.5	10.1				0.3			

TABLE 3. Mean percentage fat content and numbers per Kg per month.

Month	Area	Condition	Fat Content	No. per kilo
April	Donegal Bay	Spent	5.0	5.9
		Recovering spent	8.0	
May	Donegal Bay	R. Spent	11.0	6.2
June	Broadhaven and Donegal Bay	Filling	19.0	4.8
July	" " " "	"	18.0	4.3
August	" " " "	Filling and full	16.0	4.2
September	Broadhaven	Full	14.0	4.6
		Spent	9.0	
October	Donegal Bay	Full	12.0	4.6
		Spent	8.8	
November	Broadhaven and Donegal Bay Galway	Spent	8.4	5.8
		"	9.5	5.1
December	Broadhaven and Donegal Bay Galway	Spent	7.0	5.6
		"	8.0	5.3
January	Broadhaven and Donegal Bay Glen Head and Rosbeg Galway	"	6.0	6.3
		Full	13.0	4.5
		Spent	10.0	
February	Broadhaven Glen Head and Rosbeg Galway	Spent	4.6	5.5
		"	4.0	6.7
		Full	12.0	3.6
		Spent	4.0	5.9