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Growth and Population Distribution of Whiting
in a limited area of the Irish Sea 1962-'3

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INTRODUCTION

The present studies were undertaken with a view to acquiring information on the relative abundance and age composition of Whiting in that part of the Irish Sea mainly exploited by boats based on the east coast of Ireland, excluding Northern Ireland. For the ports of Clogherhead, Balbriggan, Skerries, Howth, and to a much lesser extent Dún Laoghaire, Whiting form a very large fraction by weight of the total demersal catch. (See table 1).

The area is to a certain extent demarcated by land to the west, rough ground to the north and south, and depths of more than 50 fm. to the east. In the north-eastern corner, the limits appear to be less well defined, however, and this aspect was investigated by surveying supplementary stations in July 1963. Landings are usually highest in October/November, and lowest in April/May, and examination of market samples has shown that the catch is very strongly dominated by fish of age group 1. A series of surveys (bi-monthly where possible) was accordingly conducted to examine the stock in the relevant area and observe changes through the year.

METHOD

The research vessel Cú Feasa carried out the surveys. The stations chosen formed an equilateral triangle grid. They numbered ten, although considerations of weather and availability forced a reduction to eight in December and April. The June cruise was supplementary, and mainly concerned with state of gonads.

It covered the four stations usually most productive. In addition to the ten regular stations, supplementary stations were fished at times to discover the limits of the population; in general, the catches at these were low. The positions of the stations and their designating codes are shown in table 3. In July 1962, hauls of 1 hour and $\frac{1}{2}$ hour in length were alternated and thereafter $\frac{1}{2}$ hour hauls were used. Cod-ends, whether of 70 or 50 mm mesh were covered with an exterior cover of about 8 mm mesh. It was impossible to force the smallest 0 group Whiting encountered through these meshes, hence the cod-end could be regarded as non-selective. Owing to accidents to gear, etc., three different nets were used, hence, pending determination of conversion factors, numbers of fish cannot be treated as comparable for all hauls. The main interest in the survey, therefore, must rest in (1) growth rates, and (2) distribution of fish during the different months, with its implications on spawning migrations and emigration.

Ageing:- To separate year classes, otoliths were read for all fish or a sample for several stations where all year classes were well represented. From these, aided by the appearance of the length frequency histogram, age was calculated for all fish caught during the survey. Where possible otoliths were read whole, immediately on extraction, and, except in the case of small fish (i.e. where the possible alternatives were '0' or '1', retained for section reading. For reading of cross-sections, a carrier with a plasticine bed was designed to fit on the microscope stage, and take up to 40 otoliths at once, hence increasing the amount of comparison between different types.

Note on peripheral areas:- The supplementary stations fished in shallow water show in nearly all cases a population entirely group 0 and with growth rates lower than elsewhere. Stations to the north-east in July 1963 show likewise a reduction in fish, with the exception of C4, which, lying East of the 50 fm. waters is in shallower ground than C3, and shows a slight increase in

all age groups. This area, beyond the deepest parts of the Irish Sea, however, is not really within the sphere of operations of the Irish boats and, whilst interchange of stock does take place, it would not appear to be continuous with the main Irish grounds.

Distribution and growth:- Tables 4a - e show the distribution and tables 5a - e the growth-rate of the different year classes during the period. Table 6 covers the 1963 year class

1963 year-class - The 1963 fish, seen only in July 1963, are larger and fewer than the 1962 fish a year earlier, showing an apparently earlier but poorer season.

1962 year-class - The 1962 fish appear to be in the process of recruitment up until December or February. The phenomenal haul at H1 in December, however, suggests that the smaller fish shoal more thoroughly (i.e. are less evenly distributed) than the older, and hence may be more easily missed in sampling. Very large numbers of fish are also associated with the decline in mean length of the age group between December and February, which occurred at H1, L1, and C2. At H1, large numbers are present before the decline, at L1 and C2, after it. Assuming that the very shallow water at H1 supports only poor growth, and that a large shoal was encountered there only by chance in December, one might explain the phenomenon on the basis of food-availability depressing the growth rate in very densely populated areas, so that the large numbers at L1 and C2 in February coincide with a lowered mean length. This effect of course occurs within a population where the slower growth rate of winter coincides with partial recruitment for commercial meshes commonly in use in the area, giving heavier fishing mortality among the faster growing individuals. Another interesting effect is that from July to September increase in length appears to be inversely related to increasing depth of water. Thereafter, the relationship becomes direct, growth being generally faster in deeper water, and definitely less subject to slowing down in winter. Table 7 shows

that a mean catch of more than 1,000 fish per hour was obtained at depths of less than 30 fathoms and more than 200 per hour at less than 50 fathoms, except for the C stations, where numbers were rather lower.

1961 year-class - Growth-rate/depth variations are less marked, but growth at the shallower stations is still slower, and with a more definite winter slow-down than elsewhere. Throughout the year, fish from 30-40 fm tended to have the highest mean length. Fish from more than 40 fm are rather scarce for generalisation, and fish from less than 20 fm usually have the lowest mean lengths, more especially at the end of winter, while at C2, the mean diminished after its length in December, not regaining that length until June/July. Mean numbers for hauls throughout the year are above 500 per hour at from 15 to 45 fm, though once more, slightly lower at the C stations. C3, however, poor in the earlier months had improved markedly by April (when the usually low yielding L3 was not sampled, due to uncontrollable circumstances). Elsewhere, except at L2, stations good in February showed a fair increase by April, and those poor in February a very great increase indeed. The reason for this may become clearer with further light on spawning movements.

1960 year-class - Numbers are becoming small but it still appears that winter retards growth less in deeper water. Mean numbers of over 10 per hour are found at 30-50 fm depth, but also at C2, which, coupled with lower numbers of younger fish suggests that on the most northerly grounds, the general features and effects of deepest water appear to extend into shallower areas. For all ages, however, C1 and C2 are usually the stations showing poorest growth for their respective depths.

1959 and older year-classes - The extremely small numbers available show a similar distribution to the 1960 year-class. In all cases, L2 is the peak station and numbers are in general highest in 35-50 fm.

Comparison with other Sea Areas - Table 8 compares Irish Sea growth rates with those of the Clyde and North Sea, using Gambell's figures from the 'Mara' cruise of 1959 for the Clyde, and the Whiting Working Group's results for the North Sea. Growth appears to commence more slowly in the Irish Sea, but it overtakes that in the North Sea during the autumn, in group 1 fish and is roughly equal to that of Clyde fish from the spring when the fish become group 3. Of the three areas, the Irish Sea appears to have the greatest scarcity of groups 4 and 5.

Summary:

The distribution and growth rates of Whiting are examined from July 1962 until July 1963 in that limited area of the Irish Sea which forms the main fishing grounds for boats from the east coast of Ireland, excluding Northern Ireland. Regarding distribution, the 1962 year-class are most numerous in less than 30 fm depth, the 1961 year-class in 15-45 fm, and 1960 and older fish in 30-50 fm. Growth rates are found to be more markedly retarded during winter in shallow water, and to be slightly lower there, overall. These effects are most marked in 0 group fish and become progressively fainter with age, but an exception is during the first July-September of life, when the reverse is true, and growth rates are in inverse proportion to depths of water. Comparison is also made with North Sea and Clyde figures recently presented at I.C.E.S. and Irish Sea growth rates are found to be similar to those in the Clyde, though lower for young fish, and, except for very young fish, higher than those in the North Sea. In fact, in many respects, the fishery in the area appears to be similar to the Clyde, although it obviously must have more exchange of stock with populations elsewhere in the Irish Sea.

Table 1

Importance of Whiting in Irish East Coast Demersal Fisheries

Month	Total Demersal	Total Whiting	Percentage Whiting	
1962	July	3,695	1,794	48.6
	August	7,211	3,918 *	54.3
	September	8,151	5,912	72.5
	October	15,837	12,582 *	79.4
	November	11,609	8,684	74.7
	December	9,323	7,396	79.4
1963	January	1,934	1,510 *	78.1
	February	1,742	1,042	59.9
	March	3,878	2,915	62.2
	April	6,216	3,995	64.2
	May	3,905	1,705 *	43.7
	June	3,450	1,809	52.4

* Months containing 5 weeks; all others contain 4

Table 2

Different nets used in Survey

Net	Type	Headline	Groundline	Months
A	Dutch Whitefish Trawl	108'		1962: July, Sept., Dec.
B	Vinge Trawl	50'	80'	1963: Feb., Apr.
C	Vinge Trawl	85'	112'	1963: June, July

Table. 3 ...
Positions of Stations

Lat. °N.	Long. °W.	6° 07.5'	6° 00'	5° 52.5'	5° 45'	5° 37.5'	5° 30'	5° 22.5'
53° 55'	(D)		(D1) J3		(D2) J3		(D3) FJ3	
53° 47.5'	(C)	C1	(C1a) D	C2	(C2a) D	C3		(C4) FJ3
53° 40'	(L)	(L0a) FJ3	L1		L2		L3	
53° 37.5'				(L1aS) J3				
53° 32.5'	(R)		(R0a) J2DFJ3	R1	(R1a) J2D	R2		
53° 25'	(H)		H1	(H1a) J3	H2			

N.B. Supplementary stations are shown in brackets with initial of month

J2 = July 1962, J3 = July 1963

Table 4a. No. of Whiting caught per hour in area, 1962-'63:
Age-group 0-1; Year-class 1962

Station	H1	C1	L1	C2	R1	H2	L2	C3	R2	L3	Total	Mean	
Depth	11	14	17	25	28	36	38	47	50	56			
1962	July	0	26	137	81	44	0	14	66	1	5	350	35.0
	Sept.	340	1,620	2,404	116	6	60	42	114	88	60	4,850	485.0
	Dec.	7,074	(1,364)	778	300	158	46	806	(64)	(82)	(42)	10,714	1,071.4
1963	Feb.	156	908	4,246	1,178	4,254	262	468	30	70	32	11,604	1,160.4
	Apr.	66	1,080	1,612	206	588	780	716	342	1,076	(19)	6,485	648.5
	June	-	-	-	146	1,160	752	34	-	-	-	(5,230)**	(523.0)
	July	178	1,336	668	80	1,270	394	38	4	0	0	3,968	396.8
Total*	7,814	6,310	9,845	1,961	6,320	1,542	2,084	620	1,317	158			
Mean #	1,302.3	1,051.7	1,640.8	326.8	1,053.3	257	347.3	103.3	219.5	26.3			

* Excluding June.

** Mean for whole area; over estimate due to sampling of beat stations only.

() Estimate from figures for preceding and succeeding months.

Table 4a. Peripheral Stations

Station	La	Ra	D1	D2	D3	C4
Depth	9	13	20	32	55	50
1962	July	-	784	-	-	-
	Sept.	-	-	-	-	-
	Dec.	-	313	-	-	-
1963	Feb.	0	0	-	-	0
	Apr.	-	-	-	-	-
	June	-	-	-	-	-
	July	557	14	217	69	1

N.B. - = No haul; 0 = No fish.

Table 4b. Number of Whiting caught per hour in area, 1962-'63
Age-group 1-2: Year-class 1961

Station Depth	H1 11	C1 14	L1 17	C2 25	R1 28	H2 36	L2 38	C3 47	R2 50	L3 56	Total	Mean
1962 July	644	252	1,344	427	1,114	486	346	512	44	77	5,246	524.6
Sept.	30	44	1,950	742	572	1,392	88	2	16	0	4,836	483.6
Dec.	10	(28)	192	212	358	222	1,320	(16)	(13)	(15)	2,386	238.6
1963 Feb.	0	4	4	12	246	558	1,914	40	8	38	2,824	282.4
Apr.	4	(9)	266	586	740	1,256	1,034	1,960	96	(16)	5,967	596.7
June	-	-	-	48	334	132	34	-	-	-	((1,370) ^{##}	(137.0)
July	0	12	16	4	152	100	52	4	2	0	342	34.2
Total*	688	349	3,772	1,983	3,182	4,014	4,754	2,534	179	146		
Mean *	114.7	58.2	628.7	330.6	530.3	685.7	792.3	422.3	29.8	24.3		

* Excluding June.

** Mean for whole area; over estimate due to sampling of best stations only.

() Estimate from figures for preceding and succeeding months.

Table 4b. Peripheral Stations

Station Depth	La 9	Ra 13	D1 20	D2 32	D3 55	C4 50
1962 July	-	0	-	-	-	-
Sept.	-	-	-	-	-	-
Dec.	-	3	-	-	-	-
1963 Feb.	0	0	-	-	0	0
Apr.	-	-	-	-	-	-
June	-	-	-	-	-	-
July	-	-	6	49	-	40

N.B. - = No haul; 0 = No fish.

Table 4c. Number of Whiting caught per hour in area, 1962-'63
Age-group 2-3; Year-class 1960

Station Depth	H1 11	C1 14	L1 17	C2 25	R1 28	H2 36	L2 38	C3 47	R2 50	L3 56	Total	Mean
1962 July Sept. Dec.	0	0	20	7	78	8	28	10	11	9	171	17.1
	2	0	0	12	24	32	6	4	4	2	66	6.6
	0	(0)	0	8	2	8	78	(6)	(2)	(4)	108	10.8
1963 Feb. Apr. June July	0	0	0	0	8	34	132	8	0	6	188	18.8
	4	(0)	8	42	2	14	40	70	2	(3)	181	18.1
	-	-	-	6	0	14	2	-	-	-	55 ^{**}	5.5
	0	0	0	0	0	0	22	18	0	0	40	4.0
Total [*]	6	0	28	69	114	96	306	116	19	24		
Mean [*]	1	0	4	11.5	19	16	51	19.33	3.17	4		

* Excluding June

** Mean for whole area; over estimate due to sampling of best stations only.

() Estimate from figure for preceding and succeeding months.

Table 4c. Peripheral Stations

Station Depth	La 9	Ra 13	D1 20	D2 32	D3 55	C4 50
1962 July Sept. Dec.	-	0	-	-	-	-
	-	-	-	-	-	-
	-	0	-	-	-	-
1963 Feb. Apr. June July	0	0	-	-	0	0
	-	-	-	-	-	-
	-	-	-	-	-	-
	0	0	0	3	0	11

N.B. - = No haul. 0 = No fish.

Table 4d-e. Number of Whiting caught per hour in area, 1962-'63
 Age-group 3-4; Year-class 1959 (+ Age-group 4-5; Year-class 1958, when present)

Station Depth	H1	C1	L1	C2	R1	H2	L2	C3	R2	L3	Total		Mean	
	11	14	17	25	28	36	38	47	50	56	1959	1958	1959	1958
1962 July Sept. Dec.	0	0	0	0	0	0	4	2+1('58)	3	2	11	1	1.1	0.1
	0	0	0	0	0	0	0+2('58)	0+2('58)	0+2('58)	0	0	6	0	0.6
	0	(0)	0	0	0	2	6	0+1('58)	(0)	(0)	8	1	0.8	0.1
1963 Feb. Apr. June July	0	0	0	0	0	8+2('58)	16+2('58)	0	0	0	24	4	2.4	0.4
	0	(0)	0	2	2	0	8	0	0	(0)	12	0	1.2	0
	-	-	-	0	0	0	0	-	-	-	0	0	0	0
	0	0	0	0	0	0	2+2('58)	4	2	0	8	2	0.8	0.2
Total *	0	0	0	2	2	10,2('58)	36,6('58)	6,4('58)	5,2('58)	2				
Mean **	0	0	0	.3	.3	1.67,3('58)	6, 1('58)	1,67('58)	.83,3('58)	.3				

* Excluding June.

() Estimate from figures for preceding and succeeding months.

Table 4d. Peripheral Stations

Station Depth	La 9	Ra 13	D1 20	D2 32	D3 55	C4 50
1962 July	-	0	-	-	-	-
Sept.	-	-	-	-	-	-
Dec.	-	0	-	-	-	-
1963 Feb.	0	-	-	-	0	0
Apr.	-	-	-	-	-	-
June	-	-	-	-	-	-
July	-	-	-	-	-	2 (1*)

N.B. - = No haul; 0 = No fish

* 1 at 6-7

Table 5a. Changes in mean lengths of Whiting, in area, 1962-'63
Age-group 0-1; Year-class 1962

Month	Station Depth	H1 11	C1 14	L1 17	C2 25	R1 28	H2 36	L2 38	C3 47	R2 50	L3 56
1962	July	-	7.30	7.0	7.36	7.42	-	(8.33)	7.76	(7.10)	(6.96)
	I: cr.			5.92	4.75	4.91		(3.67)	3.61	(4.04)	(4.31)
	Sept.	13.28	-	12.92	12.11	(12.33)	11.53	12.00	11.37	11.14	11.27
	Incr.	3.19		3.98	3.72	5.25	3.69	3.80			
1963	Dec.	16.47	-	16.90	15.83	17.57	15.22	15.80	-	-	-
	Incr.	-2.85		-2.50	-.53	-.17	2.46	2.05			
	Feb.	13.62	14.44	14.40	15.30	17.40	17.68	17.85	17.60	17.34	19.06
	Incr.	1.14		1.53	-1.02	.82	1.80	.97	.47	.67	
	Apr.	14.76	-	15.93	14.28	18.22	19.48	18.82	18.07	18.01	-
	Incr.				4.95	2.06	1.69	1.83			
June	-	-	-	19.23	20.28	21.17	20.65	-	-	-	
Incr.				1.94	1.66	2.53	1.24				
July		21.20	19.29	20.94	21.17	21.94	23.70	21.89	(26.0)	-	-
Increase for year			11.99	13.94	13.81	14.52		(13.56)	(18.24)		

- indicates decrease.

() indicate less than 20 fish per hour.

Table 5b. Changes in mean lengths of Whiting, in area, 1962-'63
Age-group 1-2; Year-class 1961

Month	Station Depth	H1 11	C1 14	L1 17	C2 25	R1 28	H2 36	L2 38	C3 47	R2 50	L3 56
1962	July	21.7	17.8	20.0	21.3	19.4	21.8	20.05	21.7	21.0	20.6
	Incr.	1.3	5.94	3.68	2.90	5.34	2.66	4.32	(.3)	3.62	-
	Sept.	23.0	23.74	23.68	24.22	24.74	24.46	24.37	(22.0)	24.62	-
	Incr.	(1.4)	-	.84	2.84	-	2.41	1.08	-	-	-
1963	Dec.	(24.4)	-	24.52	27.06	25.63	26.87	25.45	-	-	-
	Incr.	-	-	(1.48)	-2.56	-.10	-.20	.79	-	-	-
	Feb.	-	23.0	(26.00)	(24.50)	25.53	26.67	26.24	27.0	(25.75)	27.0
	Incr.	-	-	(-.41)	(1.22)	1.42	.39	1.07	-.79	(.31)	-
1963	Apr.	(23.5)	-	25.59	25.72	26.95	27.06	27.31	26.21	26.06	-
	Incr.	-	-	-	.90	.39	.86	-.84	-	-	-
	June	-	-	-	26.62	27.34	27.92	26.47	-	-	-
	Incr.	-	-	-	(.88)	-1.56	1.82	2.93	-	-	-
July	-	(27.5)	28.6	(27.5)	25.78	29.74	29.4	(26.0)	(34.0)	-	
Increase for year -			(9.7)	8.6	(6.2)	6.38	7.94	9.35	(4.3)	(13.0)	

- indicates decrease.

() indicate less than 20 fish per hour.

Table 5c. Changes in Mean lengths of Whiting, in area, 1962-'63
Age-group 2-3; Year-class 1960

Month	Station Depth	H1	C1	L1	C2	R1	H2	L2	C3	R2	L3
		11	14	17	25	28	36	38	47	50	56
1962	July	-	-	29.4	(30.6)	31.23	(30.0)	34.14	(34.6)	(32.81)	(29.55)
	Incr.	-	-	-	(.6)	2.57	(1.6)	(-2.44)	(.4)	(.69)	(7.45)
	Sept.	(28)	-	-	(31.2)	33.8	31.6	(31.7)	(35.0)	(33.5)	(37.0)
	Incr.	-	-	-	(2.8)	(1.8)	(3.4)	(1.0)	-	-	-
1963	Dec.	-	-	-	34.0	(35.6)	(35.0)	32.7	-	-	-
	Incr.	-	-	-	-	(3.4)	(-3.1) [*]	(1.9)	-	-	-
	Feb.	-	-	-	-	(39.0)	(31.9)	34.6	(32.0)	-	(38.67)
	Incr.	-	-	-	-	(-3.4)	(8.5)	(2.4)	-	-	-
	Apr.	-	-	(36.8)	34.5	35.6	(40.4)	37.8	34.4	(38)	-
	Incr.	-	-	-	(-1.5)	(-.1)	(-3.4)	(-6.8)	-	-	-
	June	-	-	-	(33.0)	(35.5)	(37.0)	(31)	-	-	-
Incr.	-	-	-	-	(2.5)	-	(-3.35)	-	-	-	
July	-	-	-	-	(38.0)	-	34.35	(38.5)	-	-	
Increase for year		-	-	-	-	(6.77)	-	(.21)	(3.9)	-	-

* indicates decrease.

() indicate less than 20 fish per hour.

Table 5d. Changes in Mean lengths of Whiting, in area, 1962-'63
Age-group 3-4; Year-class 1959

Month	Station Depth	H1 11	C1 14	L1 17	C2 25	R1 28	H2 36	L2 38	C3 47	R2 50	L3 56
1962	July	-	-	-	-	-	-	(42.0)	(37.0)	(40.0)	(36.5)
	Incr.										
	Sept.	-	-	-	-	-	-	-	-	-	-
1963	Incr.										
	Dec.	-	-	-	(44.75)	-	(41.0)	(39.3)	-	-	-
	Incr.							(-2.5)			
	Feb.	-	-	-	-	-	-	(36.8)	-	-	-
	Incr.							(11.0)			
	Apr.	-	-	-	(49)	(45)	-	(47.8)	-	-	-
	Incr.										
June	-	-	-	-	-	-	-	-	-	-	
Incr.											
July	-	-	-	-	-	-	-	(49.0)	(44.0)	(50.0)	-
Increase for year								(7.0)	(7.0)	(10.0)	

- indicates decrease

() indicate less than 20 fish per hour.

Table 5e. Changes in Mean lengths of Whiting, in area, 1962-'63
 Age-group 4-5; Year-class 1958

Month	Station Depth	H1 11	C1 14	L1 17	C2 25	R1 28	H2 36	L2 38	C3 47	R2 50	L3 56
1962	July	-	-	-	-	-	-	-	-	-	46
	Incr.	-	-	-	-	-	-	(45)	(52)	(42)	-
	Sept.	-	-	-	-	-	-	(6)	-	-	-
1963	Dec.	-	-	-	-	-	-	(51)	-	-	-
	Incr.	-	-	-	-	-	-	-	-	-	-
	Feb.	-	-	-	-	-	-	-	-	-	-
	Incr.	-	-	-	-	-	-	-	-	-	-
	Apr.	-	-	-	-	-	-	-	-	-	-
	Incr.	-	-	-	-	-	-	-	-	-	-
	June	-	-	-	-	-	-	-	-	-	-
Incr.	-	-	-	-	(57)	-	(58)	-	-	-	

() indicate less than 20 fish per hour.

Table 6. Details of 1963 year-class

July 1963.

Station	H1	C1	L1	C2	R1	H2	L2	C3	R2	L3
Depth	11	14	17	25	28	36	38	47	50	56
Nos.	0	4	8	26	28	0	22	0	10	8
Mean length	-	7	9.25	7.84	7.84	-	8.6	-	4.8	7.5

July 1963 Peripheral Stations

Station	La	Ra	D1	D2	D3	C4
Depth	9	13	20	32	55	50
Nos.	4	2	62	44	0	0
Mean length	8.0	8.0	9.25	8.31	-	-

Table 7a

Diagrammatical table of mean catch of fish per hour during the year at the ten regular stations ...
Age-group 0-1; Year-class 1962

Station	1	2	3
C	1051.7	326.8	103.3
L	1640.8	347.3	26.3
R	1053.3	219.5	-
H	1302.3	257.0	-

Table 7b

Diagrammatical table of mean catch of fish per hour during the year at the ten regular stations ...
Age-group 1-2; Year-class 1961

Station	1	2	3
C	58.2	330.6	422.3
L	628.7	792.3	24.3
R	530.3	29.8	-
H	114.7	685.7	-

Table 7c

Diagrammatical table of mean catch of fish per hour during the year at the ten regular stations ...
Age-group 2-3; Year-class 1960

Station	1	2	3
C	0	11.5	19.33
L	4	51	4
R	19	3.17	-
H	1	16	-

Table 7d

Diagrammatical table of mean catch of fish per hour during the year at the ten regular stations ...
Age-group 3-4; Year-class 1959

Station	1	2	3
C	0	.3	1
L	0	6	.3
R	.3	.83	-
H	0	1.67	-

Table 7e

Diagrammatical table of mean catch of fish per hour during the year at the ten regular stations ...
Age-group 4-5; Year-class 1958

Station	1	2	3
C	0	0	.67
L	0	1	0
R	0	.3	-
H	0	.3	-

Table 8

Comparison of mean lengths at different stations in April and September with similar measurements in spring and autumn elsewhere

Age Group	Season	Irish Sea (Present Work)	Clyde (Gambell, 1961)	North Sea (Gambell et al., 1961)
1	Spring	14.3-19.5	21.5	16.3-22.2
	Autumn	(22.0)-24.7	-	21.1-(25.3)
2	Spring	23.5-27.3	32.0	22.1-26.4
	Autumn	28.0-37.0	-	25.2-28.7
3	Spr	34.4-(40.4)	35.2	25.7-31.7
	Aut.	- -	-	28.7-30.8
4	Spring	(45 - 49)	39.5	29.8-(35.5)
	Autumn	(42 - 52)	-	(31.0)-33.4
5	Spring	- -	47.0	34.4-36.6
	Autumn	- -	-	34.7