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Recent trends in catch, stock size and fishing mortality of Subarea 1 cod, and information on migration to East Greenland-Iceland of cod tagged at Greenland

by Svend Aage Horsted
Greenland Fisheries Investigations, Charlottenlund, Denmark

The present paper updates papers presented to previous meetings of ICNAF Assessment Subcommittee and basic information presented to the ICES North-Western Working Group for its meeting November-December 1970 at which meeting the Group tried to obtain a quantitative estimate of the migration of Greenland cod to the Icelandic spawning stock.

I. Catch and stock composition 1968-69.

The nominal catches per division for the years 1960-69 are given in Table 1. Data for 1969 are still incomplete but for those countries not yet having reported their statistics an estimate has been made considering that these countries follow the general downward trend from 1968 to 1969. Catches from Division 1NK have been allocated to divisions on criterias varying from country to country.

Catches broken down into age-groups III to IX+ are given for the years 1962-67 in Res.Doc. 69/74 (Redbook 1969, III, p.15). The break-down of the 1968 and 1969 catches is given in Table 2. The 1968 catch was based mainly on age-groups V and VII (year-classes 1963 and 1961 resp.) which accounted for 32% and 25% respectively of the total numbers landed. The 1963 year-class seems to be the most important also in 1969, where it may have accounted for 33% of numbers whereas the relative importance of the 1961 year-class may have decreased to 14% due in part to fishing in 1968 but also to spawning migration out of Subarea 1 (to East Greenland-Iceland) as found by the North-Western Working Group.

No evidence of any strong year-class among the new recruits has been observed in the samples of the commercial catches, but Danish Res.Report 1969 (Redbook 1970, II, p.33) and paper by E.Smidt (this meeting) point to the possibility of the 1966 year-class being of some importance, especially in Divisions 1B-1D.

II. Trends in fishing mortality rate.

In previous attempts to obtain values of F the author has used tagging experiments by plotting natural logarithm of returns (as a percentage of the releases) in the first to fourth calendar year after the year of tagging. The slope of the regression line through these plots gives value of Z. M is in all cases taken as being 0.20.

In this method only cod bigger than 50 cm total length when tagged have been regarded. It is, therefore, hoped that the Z values obtained by this method are unbiased by a possible variation in Z between length-groups.

Horsted and Garrod (Res.Doc. 69/85, Redbook 1969, III, p.18) have, however, showed that F for age-groups up to and including VII is less than for older age-groups. Considering, therefore, that many cod included in these most recent experiments were found in the 50-59 cm group when tagged the Z values may well be biased and in reality rather higher for age-groups VIII+ than found by this method.

Furthermore the fact that the Portuguese dory fishery declined both quantitatively and in relation to other nations' fishery in the period 1966 to 1969 as given below may bias the results in so far as Portuguese dories normally have a much higher reporting rate of tags than any other offshore fleet. This source of bias would in this case act in opposite direction of the source mentioned above.

Decline in Portuguese dories' catch 1966 - 1969

	1966	1967	1968	1969
Nominal catch in metric tons	73357	60474	18461	2277
" " as % of total catch	19.9	14.0	4.8	1.0

Table 3 presents up-dated results of tagging experiments for 1960-64 and 1965-67, which following the same procedure as in previous papers are thought to give indication of Z in the periods 1964/65 and 1967/68 respectively. The experiments are furthermore shown on a figure (limited distribution).

As in previous estimates the Z values for the northern divisions are found to be somewhat higher than for the southern divisions.

In spite of the fact that the slope of the regression lines for the 1960-64 experiments indicate that Z may have decreased somewhat since the middle 1960'ies the possible bias may well mean that Z for fully recruited age-groups is maintained in 1965 to 1968 at the level of about 0.9 - 1.0 whereas there are reasons to believe that the decrease in fishing activity from 1968 to 1969 have lead to some decrease in fishing mortality. The author has, therefore, used the following values of F for fully recruited age-groups but agrees that these may be disputed,

Year	1966	1967	1968	1969
F	0.70	0.75	0.75	0.70

and has tried to predict catches in 1970 and 1971 on the assumption that a) F in 1970 and 1971 = 0.70 b) F in 1970 and 1971 = 0.80. The actual calculations of these estimates point, in fact, to the possibility of the above estimates of F to be rather realistic.

III. Estmates of catches in 1970 and 1971.

Two methods have been used in estimating the 1970 and 1971 catches, both, of course, based on the size of catches in 1968-69 and the stock composition in these years and on F as estimated in section II.

The first method used is the same as developed by Horsted in Res.Doc. 69/74 (Redbook 1969, III, p.15). The results are given in Table 4, showing estimates of the 1970 catches to be even lower than the 1969 catches whereas the 1971 catches should improve somewhat provided F and recruitment follow the assumption. The catches in 1970 are thought to be based mainly on the

1963 and 1965 year-classes and the improvement from 1970 to 1971 is based mainly on the increase in weight of the 1965 year-class in these years. We may, however, be faced with a considerable spawning migration of the 1963 year-class to East Greenland-Iceland between 1970 and 1971 thus leading to a catch in 1971 less than here estimated. The hope is that the actual fishing mortality in 1969 is less than assumed thus leaving a stock greater than presumed for the 1970 and 1971 fishery.

The relation given at the bottom of Table 4 which reflects the partial recruitment is fairly consistant with previous figures.

The second method is based on the fact that F varies between age-groups as shown by Horsted and Garrod. Only prediction for the 1970 catch has been given by this method since it seems to require better knowledge of pre-recruits than the former method, and prediction has been given only on the assumption that F in 1970 and 1971 is of the 0.70 value. The method and the results are given in Table 5. Apart from age-group VIII (year-class 1961) there is a nearly unbelievable consistency in the year 1969 between numbers present of each age-group calculated on basis of the 1968 data and the 1969 data respectively (line 1 and 2 respectively). The inconsistency for the 1961 year-class may reflect the spawning migration out of the area. The consistency could be taken as an argument for that the F values have been estimated very close to their actual value. The method does, however, lead to an estimate for the 1970 catch rather lower than the first method, and there is some inconsistency between method 1 and 2 so far as the numbers caught of each age-group in 1970 is concerned (compare Tables 4 and 5, 1970, line 5), especially for the 1965 year-class. The author tends to believe that the catch of this year-class in 1970 is extremely underestimated in method 2.

IV. Magnitude of spawning migration from West Greenland to East Greenland-Iceland.

One method by which the magnitude of emigration of cod from Subarea 1 may be obtained is by analyses of tagging experiments. The basic data for such a study are given in Table 6. This material was presented to the ICES North Western Working Group for its meeting in 1970, but is up-dated here. This up-dating has, however, not resulted in substantial changes in the material, so that the Working Group's findings are still valid. Some of these assumptions and interpretations of the Working Group could, however, be further discussed, especially in so far as mortality rates estimated by the Group differ very much from those hitherto used by the ICNAF Assessment Subcommittee. The explanation may well be that the North Western Working Group seems to have pooled tagging experiments from group of years between which F at Greenland is known to vary considerably. Although this pooling may be reasonable when trying to obtain a first quantitative estimate of the immigration to Iceland of Greenland cod the inconsistency in mortality rates for Greenland cod between the North Western Working Group and the ICNAF Assessment Subcommittee should be either brought into consistency or explained. Also other parts of the Working Group's calculations may be further discussed at the present meeting.

Table 1. Cod. Subarea 1. Nominal catch (metric tons, round fresh).

Div.	Year	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
1A		295	1104	1332	361	371	1017	835	1036	1274	
1B		78345	102617	154834	93782	69788	106419	119821	75571	23477	
1C		34736	64487	99508	101432	69242	83992	67756	103727	118041	
1D		67468	104097	104195	126298	128395	109081	102133	163394	126724	
1E		31969	35398	44774	66342	51449	32797	47338	62330	85634	
1F		29736	37688	46015	40540	30493	33411	30323	23421	26719	
1A-1D		180844	272305	359869	321873	267796	300509	290545	343728	269516	
1E-1F		61705	73086	90789	106882	81942	66208	77661	85751	112353	estimated
Total		242549	345391	450658	428755	349738	366717	368206	429479	381869	230000

Table 2. Number $x10^{-3}$ of Subarea 1 cod landed in 1968 and 1969 per age-group and division. 1968 based on Sampling Yearbook and Stat.Bull., 1969 on Res.Reports and preliminary statistics. Break-down in divisions not yet possible for 1969.

	1968						1969
Age-group	Div.	1A+1B	1C	1D	1E	1F	Total	Total
III		157	2544	726	5	44	3476	1592
IV		295	4192	2476	1143	778	8884	11082
V		1409	12555	14036	9438	3653	41091	9487
VI		1659	7725	10232	7403	2448	29467	24225
VII		2519	7198	12237	7684	2547	32185	11437
VIII		1034	4023	2097	1885	142	9181	10087
IX+		350	2820	1151	686	38	5045	5770
Total		7423	41057	42955	28244	9650	129329	73680

Table 3. Cod tagged by Denmark in ICNAF Subarea 1 (excluding fjords) 1960-67 and recaptured in Subarea 1. Only cod ≥ 50 cm when tagged are included. Significant number of recaptures may still occur in the 1965-67 experiments' 3rd and 4th year.

Division and period of tagging		Nos. tagged	Recaptures in Subarea 1 in year of tagging (0) and first four calendar years after (0) in numbers and as percentage of numbers tagged							Regression lines of $\log_e$ (% recapt.)
				0	1	2	3	4+	Total	
1A - 1D	1960-64	10,023	Nos.	329	841	298	169	129	1766	y=2.54-0.62x
			%	3.28	8.39	2.97	1.69	1.29	17.62	
1E - 1F	1960-64	3,412	Nos.	36	227	119	49	52	483	y=2.31-0.53x
			%	1.06	6.65	3.49	1.44	1.52	14.16	
Subarea 1	1960-64	13,435	Nos.	365	1068	417	218	181	2249	y=2.49-0.60x
			%	2.72	7.95	3.10	1.62	1.35	16.74	
1A - 1D	1965-67	1,890	Nos.	64	141	44	11	4	264	y=3.21-1.21x
			%	3.39	7.46	2.33	0.58	0.21	13.97	
1E - 1F	1965-67	869	Nos.	11	42	30	14	3	100	y=2.72-0.86x
			%	1.27	4.83	3.45	1.61	0.35	11.51	
Subarea 1	1965-67	2,759	Nos.	75	183	74	25	7	364	y=3.08-1.09x
			%	2.72	6.63	2.68	0.91	0.25	13.19	

Table 4 . Simplified work-sheet for stock size and catch, Subarea 1 cod. 1966-69 with theoretical catches for 1970 and 1971.

1: Numbers $x10^{-3}$ present at the beginning of the year according to preceding year's catch (5) and F.

2: Numbers $x10^{-3}$ present at the beginning of the year according to same year's catch (5) and F.

3: Relation 2÷1.

4: Estmated numbers present at the beginning of the year based on figures in 1 and 3, the figures in 3 being mean of corresponding figures in previous four years. [i/]

5: Numbers $x10^{-3}$ landed. 1966-69 based on samples and statistics, 1970-71 based on estimated stock and assumed F.

A: Nominal catch (thousand metric tons) in Stat.Bull.

B: Nominal catch calculated from 5 and Table 2, Horsted, 1967.

+: Including older year-classes.

Year-class		Year / F	1966 / 0.70	1967 / 0.75	1968 / 0.75	1969 / 0.70	1970 / 0.70	1971 / 0.70	1970 / 0.80	1971 / 0.80
	1		25045+							
	2		24209+							
1957	3		0.97							
	4									
	5		11205+							
	1		9642	13534+						
	2		9076	12772+						
1958	3		0.94	0.94						
	4									
	5		4201	6188+						
	1		8900	5856	7732					
	2		14404	7222	10419+					
1959	3		1.62	1.23						
	4									
	5		6667	3499	5045+					
	1		53291	35210	19648	11361+				
	2		86596	50810	18961	12502+				
1960	3		1.62	1.44						
	4									
	5		40081	24618	9181	5770+				
	1		51627	47131	46834	25705	13970+	6191		5602
	2		115916	121113	66472	21855				
1961	3		2.25	2.57			1.09	1.09		1.09
	4						15227+	6748	15227	6106
	5		53652	58680	32185	10087	7028+	3114	7699	3087
	1		1076	6904	23954	23534	10075	4096		3707
	2		16980	61945	60858	24780				
1962	3		15.78	8.97			1.00	1.00		1.00
	4						10075	4096	10075	3707
	5		7859	30013	29467	11437	4650	1890	5094	1874
	1			334	16467	32818	21342	11975		10835
	2			42583	84866	52488				
1963	3			127.49			1.38	1.38		1.38
	4						29452	16526	29452	14952
	5		380	20632	41091	24225	13593	7625	14891	7560
	1				2449	7095	8358	7069		6396
	2	A	366		18348	20555				
1964	3						2.08	2.08		2.08
	4	B	352				17385	14704	17385	13304
	5			3069	8884	9487	8024	6784	8790	6727
	1					2776	9763	19134		17313
	2	A	419			24011				
1965	3	B	414				4.82	4.82		4.82
	4						47058	92226	47058	83449
	5				3476	11082	21718	42553	23793	42192

Table continued.....

Table 4. (ctd.)

Year-class		Year F	1966 0.70	1967 0.75	1968 0.75	1969 0.70	1970 0.70	1971 0.70	1970 0.80	1971 0.80
	1						1403	6070		5492
	2									
1966	3				A 382		10.64	10.64		10.64
	4				B 382		14928	64584	14928	58435
	5					1592	6890	29799	7548	29545
	1									
	2									
1967	3					A 230?				
	4					B 230				
	5						3000	7000	3000	7000
	1									
	2									
1968	3						A ?		A ?	
	4						B 192		B 210	
	5							3000		3000
								A ?		A ?
								B 292		B 290

	Year	1966	1967	1968	1969	Mean	
	Age						
	9	0.97	0.94	1.35	1.10	1.09	
	8	0.94	1.23	0.97	0.85	1.00	
Relation	7	1.62	1.44	1.42	1.05	1.38	
2÷1	6	1.62	2.57	2.54	1.60	2.08	
	5	2.25	8.97	5.15	2.90	4.81	
	4	15.78	127.49	7.49	8.65	10.64	(excl.1967)

Table 5 . Work-sheet for stock size and catch, Subarea 1 cod, based on the partial recruitment + figures in Horsted and Garrod, 1969.

1: Numbers $x10^{-3}$ present at the beginning of the year according to preceding year catch (5) and F.

2: Numbers $x10^{-3}$ present at the beginning of the year according to same year's catch (5) and F.

5: Numbers $x10^{-3}$ landed. 1968 and 1969 based on samples and statistics, 1970-71 based on estimated stock and assumed F.

A: Nominal catch (thousand metric tons) in Stat.Bull.

B: Nominal catch calculated from 5 and Table 2 in Horsted, 1967.

+: Including older year-classes.

Year-class		Year 1968	1969	1970
	1			
	2	10419+		
1959	F	0.75		
	5	5045+		
	1		11361	5083
	2	18961	12502	
1960	F	0.75	0.70	0.70
	5	9181+	5770	2346
	1		38378	8886
	2	82056	21855	
1961	F	0.56	0.70	0.70
	5	32185	10087	4101
	1		35136	14652
	2	75126	30405	
1962	F	0.56	0.53	0.70
	5	29467	11437	6762
	1		64815	31035
	2	124167	64401	
1963	F	0.45	0.53	0.53
	5	41091	24225	11674
	1		30912	16302
	2	47521	30306	
1964	F	0.23	0.42	0.53
	5	8884	9487	6132
	1		61191	40524
	2	78571	61681	
1965	F	0.05	0.22	0.42
	5	3476	11082	12685
	1			28026
	2	A 382	35986	
1966	F	B 382	0.05	0.22
	5		1592	5035
			A 230?	
1967			B 230	
	5			3000
				A ?
				B 164

Table 6. Recaptures from tagging experiments in Greenland offshore and coastal waters (excluding fjords) 1946-67 given as per mille of numbers tagged within each division, period and length group. Significant numbers of recaptures are still expected to occur in the 1966-67 experiments.

Period of Tagging:			1946-49			1950-54			1955-59			1960-64			1965-67		
Tagged in Division	Length group tagged	Calendar year after release	Total	Icl.	E.Grl. or Icl.	Total	Icl.	E.Grl. or Icl.	Total	Icl.	E.Grl. or Icl.	Total	Icl.	E.Grl. or Icl.	Total	Icl.	E.Grl. or Icl.
1A+1B	50-59	0	-	-	-	45	-	-	42	-	-	30	-	-	42	-	-
		1	-	-	-	86	-	-	119	-	-	52	-	-	45	-	-
		2	-	-	-	31	-	-	56	-	-	24	-	-	24	-	-
		3	-	-	-	22	-	-	17	-	-	11	-	-	10	-	-
		4+	22	11	-	24	-	-	26	-	-	13	2	-	3	-	-
		Total o/oo	22	11	0	208	0	0	260	0	0	129	2	0	126	0	0
		Nos.tagged	92			877			647			822			286		
	60-69	0	-	-	-	42	-	-	34	-	-	45	-	-	49	-	-
		1	-	-	-	76	-	-	105	-	-	98	-	-	110	-	-
		2	-	-	-	42	1	-	46	1	-	38	1	-	30	-	-
		3	9	-	-	24	1	-	17	1	-	15	-	-	8	-	-
		4+	28	9	-	17	-	-	20	1	-	15	-	-	4	-	-
		Total o/oo	37	9	0	202	2	0	222	3	0	211	1	0	201	0	0
		Nos.tagged	107			830			891			711			264		
	70-79	0	27	-	-	45	-	-	57	-	-	53	-	-	48	-	-
		1	53	-	-	43	-	-	120	-	-	92	-	-	77	-	-
		2	40	-	-	31	5	-	39	-	-	36	-	-	10	-	-
		3	13	-	-	13	-	-	14	-	-	24	-	-	19	-	-
		4+	40	-	-	10	2	-	19	-	-	36	-	-	-	-	-
		Total o/oo	173	0	0	142	7	0	249	0	0	240	0	0	154	0	0
		Nos.tagged	75			606			690			337			104		
	80-119	0	-	-	-	38	-	-	54	-	-	58	-	-	94	-	-
		1	22	-	-	40	2	-	120	-	-	100	-	-	75	-	-
		2	65	-	-	12	-	-	54	-	-	67	-	-	19	-	-
		3	11	-	-	2	-	-	48	-	-	8	-	-	-	-	-
		4+	11	-	-	16	-	-	18	-	-	33	-	-	-	-	-
		Total o/oo	108	0	0	114	2	0	295	0	0	267	0	0	189	0	0
		Nos.tagged	93			502			166			120			53		

Table continued.....

Table 6. (ctd.)

Period of Tagging:			1946-49			1950-54			1955-59			1960-64			1965-67		
Tagged in Division	Length group tagged	Calendar year after release	Total	Icl.	E.Grl. or Icl.	Total	Icl.	E.Grl. or Icl.	Total	Icl.	E.Grl. or Icl.	Total	Icl.	E.Grl. or Icl.	Total	Icl.	E.Grl. or Icl.
1C	50-59	0	-	-	-	12	-	-	12	-	-	22	-	-	11	-	-
		1	-	-	-	45	-	-	91	-	-	80	-	-	96	-	-
		2	-	-	-	51	-	-	53	5	-	31	-	-	28	-	-
		3	-	-	-	18	-	-	19	-	-	18	-	-	18	7	-
		4+	-	-	-	39	9	-	31	2	-	9	-	-	4	4	-
		Total o/oo	0	0	0	166	9	0	206	7	0	160	0	0	157	11	0
		Nos.tagged	3			331			417			551			281		
	60-69	0	-	-	-	11	-	-	16	-	-	16	-	-	33	3	-
		1	-	-	-	89	-	-	104	2	-	58	-	-	82	-	-
		2	-	-	-	29	2	-	58	5	-	15	-	-	33	3	-
		3	-	-	-	27	2	-	22	4	2	12	1	-	3	-	-
		4+	-	-	-	22	-	-	26	-	-	7	-	-	3	-	-
		Total o/oo	0	0	0	179	4	0	226	11	2	109	1	0	155	7	0
		Nos.tagged	10			447			549			745			304		
	70-79	0	-	-	-	28	-	-	48	-	-	24	-	-	63	-	-
		1	28	-	-	82	3	-	114	-	-	64	2	-	71	-	-
		2	-	-	-	51	6	-	53	3	-	14	2	-	9	-	-
		3	9	-	-	26	3	3	24	2	-	14	1	-	-	-	-
		4+	9	-	-	9	-	-	13	-	-	8	-	-	-	-	-
		Total o/oo	46	0	0	196	11	3	252	5	0	123	4	0	143	0	0
		Nos.tagged	109			352			944			1232			112		
	80-119	0	24	-	-	86	-	-	82	-	-	30	-	-	60	-	-
		1	60	-	-	59	-	-	123	3	-	105	7	-	119	-	-
		2	12	-	-	32	-	-	44	-	-	12	1	-	-	-	-
		3	71	-	-	16	-	-	29	3	-	26	1	-	-	-	-
		4+	-	-	-	16	11		6	-	-	7	-	-	-	-	-
		Total o/oo	167	0	0	210	11	0	284	6	0	180	9	0	179	0	0
		Nos.tagged	84			186			341			755			67		

Table continued.....

Table 6 (ctd.)

Period of Tagging:			1946-49			1950-54			1955-59			1960-64			1965-67		
Tagged in Division	Length group tagged	Calendar year after release	Total	Icl.	E.Grl. or Icl.	Total	Icl.	E.Grl. or Icl.	Total	Icl.	E.Grl. or Icl.	Total	Icl.	E.Grl. or Icl.	Total	Icl.	E.Grl. or Icl.
1D	50-59	0	-	-	-	39	-	-	13	-	-	17	-	-	-	-	-
		1	21	-	-	55	-	-	97	3	-	72	-	-	24	6	-
		2	21	-	-	36	-	-	47	3	-	40	-	-	24	-	-
		3	21	-	-	16	-	-	27	4	-	21	1	-	-	-	-
		4+	85	-	-	23	3	-	29	4	3	18	1	1	6	-	-
		Total o/oo	149	0	0	169	3	0	212	10	3	168	1	1	54	6	0
		Nos.tagged	47			308			829			1507			166		
	60-69	0	-	-	-	35	-	-	36	-	-	43	-	-	14	-	-
		1	15	-	-	64	1	-	122	3	-	114	1	-	56	-	-
		2	36	-	-	60	1	-	45	5	1	59	3	-	21	-	-
		3	15	5	-	36	2	-	27	4	-	22	2	-	-	-	-
		4+	41	5	-	24	-	-	14	-	-	24	3	-	-	-	-
		Total o/oo	107	10	0	218	5	0	245	12	1	262	9	0	91	0	0
		Nos.tagged	197			840			1348			1269			143		
	70-79	0	-	-	-	33	-	-	63	-	-	49	-	-	16	-	-
		1	58	-	-	67	7	-	103	5	-	125	6	-	98	-	-
		2	40	-	-	41	7	-	47	4	-	43	10	-	-	-	-
		3	36	-	-	19	-	-	16	1	-	19	1	-	-	-	-
		4+	71	-	-	21	-	-	14	1	-	15	3	-	-	-	-
		Total o/oo	204	0	0	181	14	0	245	13	0	251	21	0	115	0	0
		Nos.tagged	225			579			1385			1057			61		
	80-119	0	-	-	-	38	-	-	57	-	-	45	1	-	61	-	-
		1	119	-	-	48	10	-	104	4	-	80	5	-	82	41	-
		2	68	-	-	38	5	-	45	2	-	21	4	-	61	20	-
		3	34	-	-	-	-	-	12	-	-	14	2	-	-	-	-
		4+	51	-	-	5	-	-	4	-	-	5	3	-	-	-	-
		Total o/oo	271	0	0	129	14	0	221	6	0	165	16	0	204	61	0
		Nos.tagged	59			209			511			917			49		

Table continued.....

Table 6. (ctd.)

Period of Tagging:			1950-54			1960-64			1965-67		
Tagged in Division	Length group tagged	Calendar year after release	Total	Icl.	E.Grl. or Icl.	Total	Icl.	E.Grl. or Icl.	Total	Icl.	E.Grl. or Icl.
1E+)	50-59	0	-	-	-	-	-	-	-	-	-
		1	36	-	-	96	-	-	6	-	-
		2	18	18	-	26	-	9	58	-	-
		3	18	-	-	35	-	9	13	-	-
		4+	-	-	-	9	-	-	13	-	6
		Total o/oo	71	18	0	193	0	18	91	0	6
		Nos.tagged	56			114			154		
	60-69	0	29	-	-	5	-	-	14	-	-
		1	44	-	-	87	5	-	56	-	-
		2	29	-	-	64	14	-	42	14	-
		3	-	-	-	37	27	-	14	14	-
		4+	15	-	-	32	18	-	28	14	-
		Total o/oo	118	0	0	224	63	0	153	42	0
		Nos.tagged	68			219			72		
	70-79	0	42	-	-	17	-	-	23	-	-
		1	42	14	-	140	34	6	45	-	11
		2	28	-	-	78	39	-	22	-	-
		3	14	-	-	50	28	-	11	-	-
		4+	42	14	-	45	22	-	22	11	-
		Total o/oo	169	28	0	330	123	6	125	11	11
		Nos.tagged	71			179			88		
	80-119	0	69	-	-	64	-	-	-	-	-
		1	69	34	-	213	21	-	-	-	-
		2	-	-	-	43	-	-	-	-	-
		3	-	-	-	21	21	-	-	-	-
		4+	-	-	-	21	-	-	-	-	-
		Total o/oo	138	34	0	361	43	0	0	0	0
		Nos.tagged	29			47			34		

+) No experiments in 1946-49 and 1955-59.

Table continued....

Table 6. (ctd.)

Period of tagging:			1946-49			1950-54			1955-59			1960-64			1965-67		
Tagged in Division	Length group tagged	Calendar year after release	Total	Icl.	E.Grl. or Icl.	Total	Icl.	E.Grl. or Icl.	Total	Icl.	E.Grl. or Icl.	Total	Icl.	E.Grl. or Icl.	Total	Icl.	E.Grl. or Icl.
1F	50-59	0	3	-	-	3	-	-	7	-	-	7	-	-	42	-	-
		1	14	-	-	8	1	-	38	-	-	32	-	-	17	-	-
		2	-	-	-	14	1	3	23	1	-	32	3	1	34	-	-
		3	10	3	-	15	3	-	20	2	-	11	1	-	8	-	-
		4+	14	3	-	38	11	-	33	16	-	27	10	1	-	-	-
		Total o/oo	42	7	0	77	16	3	122	19	0	110	14	3	102	0	0
		Nos. tagged	286			740			837			710			118		
	60-69	0	4	-	-	4	-	-	9	-	-	8	-	-	-	-	-
		1	11	-	-	20	4	-	37	2	-	59	1	-	66	-	-
		2	15	2	-	19	9	-	30	6	1	40	8	-	49	-	-
		3	15	4	-	17	4	-	38	12	-	24	9	-	49	16	-
		4+	22	15	-	18	8	-	22	11	-	28	16	-	-	-	-
		Total o/oo	68	22	0	79	25	0	135	31	1	159	35	0	164	16	0
		Nos. tagged	454			1360			949			1186			61		
	70-79	0	24	-	-	14	-	-	16	-	-	12	-	-	10	-	-
		1	32	4	-	54	12	-	46	3	-	75	8	-	110	-	10
		2	16	3	-	22	10	-	30	3	-	52	21	3	40	-	-
		3	27	4	-	17	12	-	22	5	-	24	13	-	40	10	
		4+	9	3	-	14	5	-	19	11	-	20	5	-	-	-	-
		Total o/oo	107	13	0	121	39	0	133	22	0	183	48	3	200	10	10
		Nos. tagged	792			766			368			748			100		
	80-119	0	54	-	-	19	-	-	-	-	-	29	-	-	14	-	-
		1	64	3	-	56	9	-	21	-	-	201	62	-	70	28	14
		2	30	1	-	19	7	-	42	21	-	148	62	-	28	28	-
		3	21	-	-	12	-	-	-	-	-	72	33	-	14	14	-
		4+	13	4	-	5	2	-	21	-	-	38	5	-	-	-	-
		Total o/oo	182	8	0	111	19	0	83	21	0	488	163	0	127	70	14
		Nos. tagged	762			425			48			209			71		

Table continued.....

Table 6. (ctd.)

Period of tagging:			1955-59			1960-63		
Tagged in Division	Length group tagged	Calendar year after release	Total	Icl.	E.Grl. or Icl.	Total	Icl.	E.Grl. or Icl.
East+) Grl.	50-59	0	-	-	-	-	-	-
		1	4	-	-	-	-	-
		2	18	7	4	41	14	14
		3	28	7	-	14	14	-
		4+	39	25	-	-	-	-
		Total o/oo	89	39	4	55	27	14
		Nos.tagged	282			73		
	60-69	0	2	-	-	-	-	-
		1	24	9	-	24	16	-
		2	22	12	2	24	16	8
		3	19	12	-	56	48	-
		4+	24	19	-	-	-	-
		Total o/oo	91	52	2	104	80	8
		Nos.tagged	580			125		
	70-79	0	3	-	-	-	-	-
		1	50	25	2	23	17	-
		2	36	33	-	57	40	-
		3	20	17	-	6	6	-
		4+	9	5	-	-	-	-
		Total o/oo	118	79	2	86	63	0
		Nos.tagged	645			174		
	80-119	0	8	-	-	-	-	-
		1	53	38	-	68	54	-
		2	15	8	-	27	27	-
		3	-	-	-	14	7	-
		4+	4	-	-	7	7	-
		Total o/oo	79	45	0	115	95	0
		Nos.tagged	265			148		

+) No experiments from 1946-54 and since 1963.