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Progress Report on the Analysis of Age, Length and Weight Data
collected during the International Salmon Tagging Experiment, 1972

by

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A total of 3765 scale samples was collected during this experiment. Of these,
1846 were taken by the staff on research vessels, from both tagged and untagged fish,
and 1919 by observers on commercial vessels who, with the exception of those on the
Norwegian vessels 'Eldorado' and 'Ulla', took scales only from fish which were tagged.
Scale impressions have now been prepared from most of these samples and preliminary
age determinations have been completed for those taken on research vessels.

The monthly distribution of these scale samples in relation to the fishing areas
defined in the 'Guide Book' is given in Table 1. The rapid collapse of the offshore
fishery during the second half of the fishing season is clearly reflected in the
monthly distribution of these samples and the small size of the samples from Area I
suggests a relative scarcity of salmon in the Disko area in 1972.

The distribution of scale samples from research vessels is very uneven, both in
terms of month and area. It would, therefore, be of considerable advantage in any
final analysis of possible seasonal or geographical differences in the age or size
composition of the Greenland stock, to be able to combine the samples taken by research
vessels with those taken by commercial vessels. However, before the samples from these
two sources can be safely combined, it will be essential to establish whether they are
strictly comparable and this may depend to a considerable extent on the mesh sizes of
the nets used by commercial vessels (this information is not yet available) and on the
extent to which the samples of fish selected for tagging on commercial vessels can be
assumed to be representative of their total catch. The samples of fish tagged from
research vessels are reasonably representative of their total catches, (Table 2),
at least in terms of age composition.

Despite the obvious limitations in the distribution of the scale samples taken by
research vessels, a preliminary and hurried analysis of the results based on the age
determinations made on this material has been made.

Table 3 gives details of the age composition of research vessel catches for each
month and for the whole period of the experiment. These results indicate that the
general age composition of the Greenland stock in 1972 was probably very similar to that
in previous years, about 95% being one sea-winter fish and about 85% having migrated as
two-or three-year-old smolts.

In Table 4, the sea age composition of research vessel catches is shown in relation
to month and area. The samples taken by the 'A.T. Cameron' and the 'Cryos' in August
in the Labrador Sea area (between $56^{\circ}$and 58°N) show an interesting absence of two sea-
winter fish and an unusually high incidence of previous spawners. The absence of two-
sea-winter fish in the samples from this area may be related to the apparent tendency
for a higher proportion of two-sea-winter fish to be present in Areas I and II, while
the apparent decrease in the proportion of these older fish in these two latter areas
in September, may perhaps reflect an increasing northward penetration of one-sea-winter
fish as the season progresses.

In view of the observed difference between the sea age composition of the Labrador
Sea samples and that for the samples taken in other areas, the smolt age composition of
the former was compared with that of the combined samples taken in all other areas in
August (Table 5). In this respect also, the Labrador Sea samples differ from those
taken on the Greenland coast, the former containing a much higher proportion of fish
which migrated as three, four or five-year-old smolts.

Some preliminary analysis of the length and weight data collected on research
vessels has also been attempted. Fork length and round, whole weight have been used in
these analyses and, because some research vessels did not measure their fish to the
nearest millimetre, as recommended, but to the nearest whole centimetre 'below', fork
lengths have been converted to the latter, where necessary.

Table 6 gives monthly averages for the length and weight of the fish in each sea
age group in research vessel catches. While the overall average lengths and average
weights for each sea age group and for the total sample are similar to those recorded
for research vessel catches in previous years, there is also evidence of increases in
average length and, particularly, in average weight between August and October.

Average condition factors (K) for the fish in each sea age group in each month
have been calculated, using the values for average length and average weight given in
Table 6, and these are given in Table 7. While it would have been more correct to
calculate average condition factors using the average lengths for only those fish which
contributed to the values for average weights, there was not sufficient time to carry out
such an analysis for this report. However, the values given in Table 7 are likely to
give a fairly close approximation to the true values, at least for those groups in which
there are adequate numbers in the samples (Table 6). The results given in this table
suggest that there is probably a steady improvement in condition as the season advances.

While reading the scales from the Labrador Sea samples taken by the 'A.T. Cameron'
and the 'Cryos', it was noted that some of the one-sea-winter fish from this area seemed
to be noticeably smaller than those in the other samples taken on the Greenland coast.
This difference is clearly reflected in Table 8, where the average lengths and weights
of one sea-winter fish taken in each area in each month, are compared. Indeed, in the
values for August in the table, there appears to be a trend towards decreasing size of
one sea-winter fish from north to south. This table also shows very clearly the increase
in size between August and September.

Detailed analysis of sex ratios has not yet been carried out, but the ratio of males
to females in the total sample of untagged fish in research vessels catches was 1:3.1
and, for one-sea-winter and two-sea-winter fish separately, was 1:3.0 and 1:7.1, respect-
ively.

Finally, it should be emphasised that the results quoted in this report are prelim-
inary and, in some cases, require further checking. They are given here only to indicate
the extent and scope of the data available and to suggest some of the possible results
which may emerge from further analysis.

Table 1   Distribution of Scale Samples

Month	Source	No. of Scale Samples					
		Areas [a]					
		I	II	III	IV	Labrador Sea	Overall
August	Research Vessels	5	291	487	516[b]	158[c]	1457
	Comm. Vessels	42	394	500	292	-	1228
	Totals	47	685	987	808	158	2685
September	Research Vessels	13	134	142	35	-	324
	Comm. Vessels	315	175	16	65	-	571
	Totals	328	309	158	100		895
October	Research Vessels	-	61	-	4	-	65
	Comm. Vessels	85	4	9	22	-	120
	Totals	85	65	9	26		185
August to	Research Vessels	18	486	629	555	158	1846
October	Comm. Vessels	442	573	525	379	-	1919
	Totals	460	1059	1154	934	158	3765

[a] I - 68° to 70°N, II - 66° to 68°N, III - 64° to 66°N, IV - 61° to 64°N.

[b] Includes 42 scale samples taken by 'Scotia' at 60°24'N.

[c] 'Cameron' - 65 scale samples taken at 56°44'N 50°25'W.

'Cryos' - 40 scale samples taken at 56°46'N 50°35'W.
53 scale samples taken at 58°06'N 52°18'W.

Table 2

Sea Age Composition of Tagged and Untagged Samples in Research Vessel Catches

Vessel	Sample	Percentage Sea Age Composition			No. in
		1 Sea Winter	2 Sea Winters	Prev. Spawners	Sample
Adolf Jensen	Tagged	93.0	7.0	-	329
	Untagged	91.0	8.8	0.2	421
A.T. Cameron	Tagged	96.7	3.3	-	214
	Untagged	94.7	3.7	1.6	246
Cryos	Tagged	95.3	2.3	2.3	128
	Untagged	95.2	3.8	1.0	105
Scotia	Tagged	95.2	4.0	0.8	124
	Untagged	95.5	3.9	0.6	178
All vessels	Tagged	94.7	4.8	0.5	795
	Untagged	93.3	6.0	0.7	950

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Table 3

Age Composition of Research Vessel Catches

Month	Smolt Age(yrs)	No. of Fish (Percentage of Sample)			Overall
		Sea Age (Winters)			
		1.	2.	Prev. Spawners	
August	1	83 (6.1)	4 (0.3)	- -	87 (6.4)
	2	674 (49.5)	39 (2.9)	1 (0.07)	714 (52.5)
	3	395 (29.0)	26 (1.9)	1 (0.07)	422 (31.0)
	4	62 (4.6)	10 (0.7)	2 (0.1)	74 (5.4)
	5	29 (2.1)	-	3 (0.2)	32 (2.4)
	6	2 (0.1)	-	-	2 (0.1)
	7	4 (0.3)	2 (0.1)	1 (0.07)	7 (0.5)
	?	22 (1.6)	1 (0.07)	-	23 (1.7)
	Overall	1271 (93.4)	82 (6.0)	8 (0.6)	1361
September	1	26 (8.0)	-	-	26 (8.0)
	2	190 (58.6)	8 (2.5)	-	198 (61.1)
	3	70 (21.6)	5 (1.5)	1 (0.3)	76 (23.4)
	4	11 (3.4)	-	-	11 (3.4)
	5	4 (1.2)	-	-	4 (1.2)
	6	2 (0.6)	-	-	2 (0.6)
	7	-	-	-	- -
	?	6 (1.8)	-	1 (0.3)	7 (2.2)
	Overall	309 (95.4)	13 (4.0)	2 (0.6)	324
October	1	6 (9.8)	-	-	6 (9.8)
	2	33 (54.1)	-	1 (1.6)	34 (55.7)
	3	14 (23.0)	-	-	14 (23.0)
	4	2 (3.3)	-	-	2 (3.3)
	5	4 (6.6)	-	-	4 (6.6)
	6	-	-	-	-
	7	-	-	-	-
	?	1 (1.6)	-	-	1 (1.6)
	Overall	60 (98.4)	0 (0.0)	1 (1.6)	61
August–October	1	115 (6.6)	4 (0.2)	-	119 (6.8)
	2	897 (51.4)	47 (2.7)	2 (0.1)	946 (54.2)
	3	479 (27.4)	31 (1.8)	2 (0.1)	512 (29.3)
	4	75 (4.3)	10 (0.6)	2 (o.1)	87 (5.0)
	5	37 (2.1)	-	3 (0.2)	40 (2.3)
	6	4 (0.2)	-	-	4 (0.2)
	7	4 (0.2)	2 (0.1)	1 (0.05)	7 (0.4)
	?	29 (1.7)	1 (0.05)	1 (0.05)	31 (1.8)
	Overall	1640 (93.9)	95 (5.4)	11 (0.6)	1746

Table 4   Research Vessel Catches - Sea Age Composition by Month and Area

Month	Area	No. in Sample	Percentage Sea Age Composition		
			1 Sea Winter	2 Sea Winters	Prev. Spawners
August	I	4	75.0	25.0	0.0
	II	288	85.1	14.6	0.3
	III	482	95.8	3.9	0.2
	IV	434	95.4	4.6	0.0
	Labrador Sea	153	96.1	0.0	3.9
September	I	13	92.3	7.7	0.0
	II	120	94.2	5.0	0.8
	III	142	96.5	2.8	0.7
	IV	49	95.9	4.1	0.0
October	I	-	-	-	-
	II	-	-	-	-
	III	-	-	-	-
	IV	61	98.4	0.0	1.6

Table 5   Comparison of Smolt Age Composition of One-Sea-Winter Fish from Labrador Sea and from all other Areas in August.

Sample	Percentage Smolt Age Composition								No. in Sample
	Smolt Age								
	1	2	3	4	5	6	7	?	
Labrador Sea	3.4	25.2	45.6	14.3	10.2	0.7	0.7	0.0	147
All other Areas (August)	6.9	56.7	29.2	3.6	1.2	0.1	0.3	2.0	1124

Table 6   Monthly Average Lengths and Weights of Salmon in Research Vessel Catches

Month	Sea Age								
	1 Sea Winter		2 Sea Winters		Prev. Spawners		Overall		
	Av. Fork Length (cm)	Av. Wt. (kg)	Av. Fork Length (cm)	Av. Wt. (kg)	Av. Fork Length (cm)	Av. Wt. (kg)	Av. Fork Length (cm)	Av. Wt. (kg)	
August	65.4 (1271)	3.10 (732)	80.9 (82)	5.61 (49)	61.5 (8)	2.26 (5)	66.3 (1361)	3.25 (786)	
September	67.4 (309)	3.65 (105)	83.4 (13)	6.58 (8)	66.0 (2)	2.60 (1)	68.0 (324)	3.84 (114)	
October	67.2 (59)	3.78 (42)	-	-	69.0 (1)	4.00 (1)	67.2 (60)	3.78 (43)	
August to October	65.9 (1639)	3.20 (879)	81.3 (95)	5.75 (57)	63.0 (11)	2.56 (7)	66.7 (1745)	3.35 (943)	

a Figures in brackets are the numbers of fish involved.

Table 7   Monthly Average Condition Factor for each Sea Age Group

Month	Condition Factor (K)[a]		
	1 Sea Winter	2 Sea Winters	Prev. Spawners
August	1.11	1.06	0.97
September	1.18	1.13	0.90
October	1.25	-	1.22
August to October	1.12	1.07	1.02

a $K = \dfrac{100 \times W}{L^3}$, where W is the weight in grammes and L the fork length in centimetres.

Table 8   Monthly Average Length and Average Weight of One Sea-Winter Fish in each Area

Area	August		September		October	
	Av. Fork Length (cm)	Av. Wt. (kg)	Av. Fork Length (cm)	Av. Wt. (kg)	Av. Fork Length (cm)	Av. Wt. (kg)
I	65.7 (3)[a]	3.60 (1)	66.9 (12)	3.73 (7)	-	-
II	66.1 (245)	3.19 (136)	67.5 (127)	3.75 (47)	67.2 (59)	3.78 (42)
III	65.9 (464)	3.20 (255)	67.3 (137)	3.53 (35)	-	-
IV	65.4 (412)	3.09 (226)	67.4 (33)	3.60 (16)	-	-
Labrador Sea	62.9 (147)	2.73 (115)	-	-	-	-

a Figures in brackets are the numbers of fish involved.