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Further report on the analysis of age, length and weight data collected during the International Salmon Tagging Experiment, 1972[1]

by

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In Mr Munro's Progress Report on the analysis of age, length and weight data collected during the International Salmon Tagging Experiment of 1972 (Doc. 19 of 1973 Working Party Meeting),he reported that a total of 3,765 scale samples was collected, of which 1,846 were taken by the scientists on the research vessel, who, with the exception of those on the Norwegian vessel "ELDORADO" and "ULLA" took scales only from fish which were tagged.

The monthly distribution of scale samples taken on research vessels in relation to the fishing areas defined in the "Guide Book" is repeated in Table 1. From the monthly distribution of these samples it is clear that there was a rapid collapse of the offshore fishery during the second half of the season. Also the small size of the samples from the most northerly Area I suggest a relative scarcity of salmon in the Disko Bay area in 1972.

It was pointed out that the distribution of scale samples from research vessels was very uneven both in area and time and that before the samples taken by the research vessels could be safely combined with those taken by the commercial vessels, further information on the mesh sizes of the nets used by the commercial vessel should be available. Also whether the fish selected for tagging on the commercial vessels can be assumed to be representative of their total catch. The samples of fish tagged from the research vessels are reasonably representative of their total catches (Table 2) at least in terms of age composition.

In order to obtain further information on both research and commercial vessel samples, data from both were prepared for computer analysis. 3,693 separate scale samples (1,756 from research vessels and 1,937 from the commercial vessels) were entered on sheets for analysis. The commercial vessel samples included the extra scale samples taken by the Norwegian vessels "ELDORADO" and "ULLA". For the computer analysis, the four areas defined in the "Guide Book" were amended to the six ICNAF areas shown in Fig. 1, plus the Labrador Sea. Also, the monthly intervals used initially in the analysis were divided into two-weekly periods commencing on 1 August. Unfortunately, because of the various restrictions over the past weeks, all the information required from the computer is not available in time for this meeting.

Table 3 gives details of the sea age composition from both research vessels and commercial vessels taking part in the experiment. The general composition was very similar to that in previous years. For the research vessels, over 93% were one-sea-winter fish and for the commercial vessel nearly 91% belonged to this age-group. Table 4 shows that for the fish caught by both types of vessels around 80% migrated as two- or three-year-old smolts. Around 55% migrated as two-year-old smolts. The composition of the catch combining both sea age and river age is shown in Table 5. Here, it can be seen that 51% of the sampled catch were fish that had migrated as two-year-old smolts and had spent one winter in the sea.

It was shown in the earlier analysis that in the samples taken by the "A.T. CAMERON" and "CRYOS" in August in the Labrador Sea area (between 56°N and 58°N) there was an absence of two-sea-winter fish. This is also clearly shown in the analysis given in Table 6. There is also a much higher proportion of previous spawners in the samples compared with Areas I-VI. On the other hand, there is a markedly higher proportion of two-sea-winter fish present in Areas I and II. It has been suggested that as there was an apparent decrease in the proportion of older fish in these two areas during September, there could be an increasing northward migration of one-sea-winter fish as the season progresses.

Table 7 gives the distribution of the sampled fish with respect to river age and the geographical areas. The earlier analyses showed that in the Labrador Sea catch there was a much higher proportion of fish which had migrated as 3-, 4- and 5-year-old smolts and this is shown clearly in the Table. There is also a slightly higher proportion of fish which had migrated as 5-year-old smolts in Area VI.

[1] Presented to the ICES/ICNAF Joint Working Party on North Atlantic Salmon, ICES, Charlottenlund, March 1974.

Table 8 gives the distribution of the various sea age-groups in relation to weight classification. 80% of the two-sea-winter fish fall within the 2.01-4 Kgm category with over 50% within the 3.01-4 Kgm range. Around 53% of the two-sea-winter fish were within the 2.01-7 Kgm range with a negligible proportion below 4 Kgm. Although only a few previous spawners were taken, the analysis showed that nearly half of them were within the low weight range of 2.01-3 Kgm. It is possible that these fish had spawned as grilse.

Tables 9 and 10 show the distribution of the various sea age-classes with time. There is some indication that a higher proportion of two-sea-winter fish were caught in the last two weeks of September than in the other period.

Mr Munro showed in his earlier analysis that some of the one-sea-winter fish from the Labrador Sea samples were noticeably smaller than those in samples taken on the Greenland coast. This is shown in Table 11.

In the values for August there appears to be a trend towards decreasing size of one-sea-winter fish from North to South and there is also an increase in size between August and September.

Average condition factors for the fish in each sea age-group in each month were calculated. The results suggest that there is probably a steady improvement in condition as the season advances.

In the research vessel catches it was shown that the ratio of females to males for the one-sea-winter fish and two-sea-winter fish was 3.0:1 and 7.0:1, respectively.

Table 12 gives the sex ratio for all the samples taken on both research and commercial vessels.

Of the 3,693 scale samples taken the sex of only 1,334 fish(36%) were known. The figures are similar with 2.8:1 for the one-sea-winter fish and 7.6:1 for the two-sea-winter fish. The previous spawners were in the ratio of 2 females to 1 male.

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 October	Research Vessels	18	486	629	555	158	1846
	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 Sample
		1 Sea Winter	2 Sea Winters	Prev. Spawners	
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

Table 3

Sea Age Composition of Tagged and Untagged Samples in Research and Commercial Vessels taking Part in the 1972 Experiment (percentages in brackets)

Sea Age	Numbers of Scales Sampled		
	Research Vessels	Commercial Vessels	Total
1 Sea winter	1638 (93.3)	1758(90.8)	3396(92.0)
2 Sea Winter	95 (5.4)	142(7.3)	237(6.4)
Previous Spawners	10 (0.6)	13(0.7)	23(0.6)
Unknown	13 (0.7)	24(1.2)	37(1.0)
Total	1756	1937	3693

Table 4

River Age Composition of Tagged and Untagged Samples in Research and Commercial Vessels taking Part in the 1972 Experiment (percentages in brackets)

River Age (Years)	Numbers of Scales Sampled		
	Research Vessels	Commercial Vessels	Total
1	105 (6.0)	175 (9.0)	280 (7.6)
2	942 (53.6)	1081 (55.8)	2023 (54.7)
3	505 (28.8)	476 (24.6)	981 (26.6)
4	85 (4.8)	67 (3.5)	152 (4.1)
5	40 (2.3)	26 (1.3)	66 (1.8)
6	3 (0.2)	11 (0.6)	14 (0.4)
7	3 (0.2)	5 (0.3)	8 (0.2)
Unknown	73 (4.2)	96 (5.0)	169 (4.6)
Total	1756	1937	3693

Table 5.

Age Composition (River and Sea) of Tagged and Untagged Samples in Research and Commercial Vessels taking Part in the 1972 Experiment. (percentages of total sampling in brackets)

River Age (Years)	Sea Age				
	1 Sea Winter	2 Sea Winter	Previous Spawners	Unknown	Total
1	262 (7.1)	17 (0.5)	1 (0.03)	0	280
2	1883 (51.0)	130 (3.5)	10 (0.3)	0	2023
3	914 (24.7)	61 (1.7)	6 (0.2)	0	981
4	134 (3.6)	15 (0.4)	3 (0.1)	0	152
5	60 (1.6)	3 (0.1)	3 (0.1)	0	66
6	13 (0.4)	1 (0.03)	0	0	14
7	7 (0.2)	1 (0.03)	0	0	8
Unknown	123 (3.3)	9 (0.2)	0	37 (1.1)	169
Total	3396	237	23	37	3693

Table 6

Sea Age Composition Of Tagged and Untagged Samples in Research and Commercial Vessels in Relation to the Seven Geographical Areas - I to VI off west Greenland (Fig 1) and the Labrador Sea. Figures given are the percentages of the various age groups in each area.

Sea Age	Area							
	I	II	III	IV	V	VI	Labrador Sea	Total No.
1 Sea Winter	83.8	86.8	92.5	95.2	97.2	96.3	93.0	3396
2 Sea Winter	14.5	11.6	5.2	3.9	1.9	3.0	0	237
Previous Spawners	1.1	0.4	0.6	0.3	0.3	0.3	3.2	23
Unknown	0.6	1.0	1.6	0.6	0.5	0.3	3.8	37
Total No.	463	684	803	715	573	297	157	3693

Table 7

River Age Composition in Relation to Areas I to VI and Labrador Sea for the 1 Sea Winter Fish. The samples include all taken by Research and Commercial Vessels taking part in the 1972 Experiment

(The figures given are the percentages of the various river age groups in each area)

Area	River Age								
	1	2	3	4	5	6	7	Unknown	Total Nos.
I	9.0	64.7	19.1	1.3	0.3	0.5	0	5.2	388
II	10.9	58.6	22.7	3.2	1.0	0.3	0.2	3.0	594
III	8.5	56.1	25.6	3.6	2.0	4.0	2.0	3.4	743
IV	5.7	58.1	27.3	3.5	0.9	0.3	0.3	3.8	681
V	8.4	50.4	30.5	5.0	1.3	0.4	0.2	3.8	557
VI	2.8	53.4	32.5	3.5	3.5	0	0.3	3.8	286
Labrador Sea	3.4	25.2	44.9	14.3	10.2	0.7	0	1.4	147
Total Nos.									3396

Table 8

Sea Age Composition in Relation to Whole Weight of Samples in Research and Commercial Vessels taking part in the 1972 Experiment. (Percentages of each Sea Age Class in each Weight Group in Brackets)

Whole Weight Kg	Sea Age			
	One Sea Winter	Two Sea Winter	Previous Spawners	Unknown
1.01-2.0	38 (3.3)	0	1 (11.1)	1 (16.6)
2.01-3.0	346 (29.6)	1 (0.7)	4 (44.4)	2 (33.3)
3.01-4.0	595 (51.0)	2 (1.4)	1 (11.1)	2 (33.3)
4.01-5.0	173 (14.8)	19 (13.0)	1 (11.1)	0
5.01-6.0	12 (1.0)	43 (29.5)	1 (11.1)	0
6.01-7.0	3 (0.3)	35 (24.0)	1 (11.1)	1 (16.6)
7.01-8.0	0	27 (18.5)	0	0
8.01-9.0	0	14 (9.6)	0	0
9.01-	0	5 (3.4)	0	0
Total	1167 (100)	146 (100)	9 (100)	6 (100)

Table 9

Sea Age Composition of Tagged and Untagged Samples in Research and Commercial Vessels taking part in the 1972 Experiment in Relation to Two-Weekly Periods during the Season. (Percentages of each Sea Age Class in each Period in Brackets)

Sea Age	Time Period 1	2	3	4	5	
1 Sea winter	1274 (37.5)	1123 (33.1)	522 (15.4)	311 (9.2)	166 (4.5)	
2 Sea winter	85 (35.9)	62 (26.2)	41 (17.3)	36 (15.2)	13 (5.5)	
Previous Spawners	6 (26.1)	7 (30.4)	4 (17.4)	4 (17.4)	2 (8.7)	
Unknown	24 (64.9)	10 (27.0)	3 (8.1)	0	0	
Total	1389	1202	570	351	181	Grand Total 3693

Period 1 = 1 - 15 August
" 2 = 16 - 31 "
" 3 = 1 - 15 September
" 4 = 16 - 30 "
" 5 = 1 - 15 October

Table 10

As above but giving the Percentages of the Various Sea Age classes in each of the Five Periods

Sea Age	Time Period 1	2	3	4	5
1 Sea winter	91.7	93.4	91.6	88.6	91.7
2 Sea winter	6.1	5.2	7.2	10.3	7.2
Previous Spawners	0.4	0.6	0.7	1.1	1.1
Unknown	1.7	0.8	0.5	0	0

Table 11

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

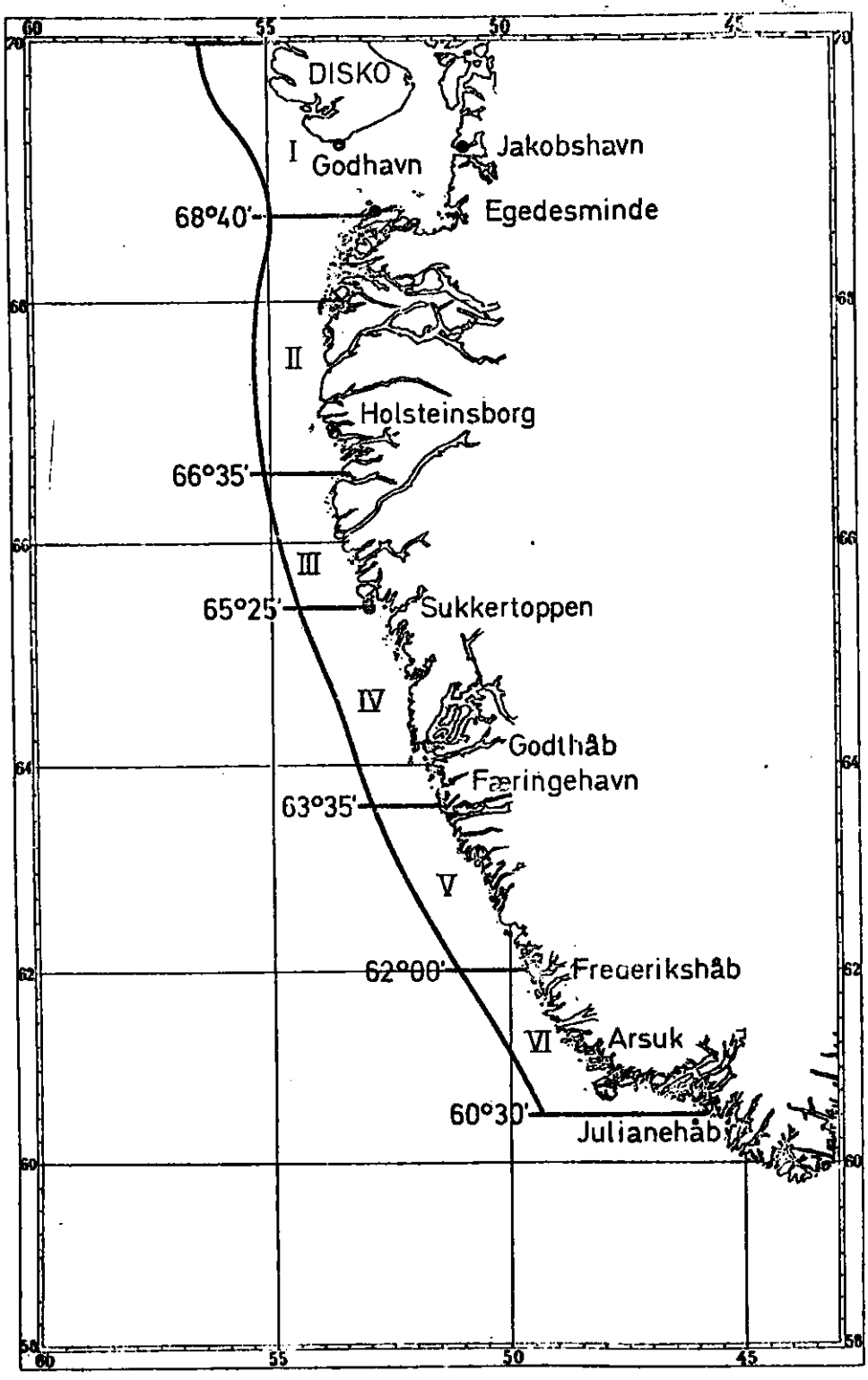
Area	August		September		October	
	Av. Fork Length (cm)	Av. Wt. (kg)	Av. Fork Length (cm)	Av. Wt. (kg)	Av. Fork Length (cm)	Av. Wt. (kg)
I	65.7 (3)[a]	3.60 (1)	66.9 (12)	3.73 (7)	-	-
II	66.1 (245)	3.19 (136)	67.5 (127)	3.75 (47)	67.2 (59)	3.78 (42)
III	65.9 (464)	3.20 (255)	67.3 (137)	3.53 (35)	-	-
IV	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.

Table 12

Sea Age Composition of Untagged Samples in Research and Commercial Vessels taking part in the 1972 Experiment in Relation to Sex Ratios

Sea Age	Sex				
	Female		Male	Not Sexed (all live fish)	Total
1 Sea Winter	863	2.8 to 1	310	2223	3396
2 Sea Winter	129	7.6 to 1	17	91	237
Previous Spawners	6	2.0 to 1	3	14	23
Unknown	3	1.0 to 1	3	31	37
Total	1001	3.0 to 1	333	2359	3693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Jakobshavn
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Egedesminde
II
Holsteinsborg
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III
65°25'
Sukkertoppen
IV
Godthåb
Færingehavn
63°35'
V
62°00'
Frederikshåb
VI
Arsuk
60°30'
Julianehåb

Figure 1