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Notes on the Salmon Long-lining Cruise  
by the R.V. 'Jens Chr. Svabo' off Faroe, April 1969

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With the kind co-operation of Mr. J.S. Joensen of Fiskirannsóknarstovan, Tórshavn, two members of the staff of the Freshwater Fisheries Laboratory, Pitlochry (D.A.F.S.) took part in this cruise, one being on board from 9th to 13th April and the other from the latter date until the cruise ended on 19th April. This preliminary report outlines the experience gained and the information recorded by them during this cruise.

The floating, salmon long-lines used were of the standard Baltic type and were made up in sets of 50-60 hooks with 2 fathom monofilament snoods mounted 8 fathoms apart on a light synthetic line. Yellow-painted cerks (2 $\frac{3}{4}$ " x 1") were positioned on the line at the mid-point between each snood. The snoods were mounted to the main line by means of a swivel; were weighted at their mid-point by a barrel lead incorporating a swivel and terminated in a hook identical to that used in Greenland last autumn (No. 3/0, hollow-point, Mustad).

The lines were shot from the port side just short of the stern, each set of hooks being separated from the next by a 'Dan' buoy. The line was baited as it was shot with sprats (brisling) about 10-12 cm. long. The line was shot at about 0100 to 0200 hours each night and hauling usually began about 0700 to 0800 hours so that there was an interval of about 6-7 hours between setting and the start of hauling. Hauling was usually completed in about five hours. The lines were shot over deep water varying, during the cruise, from 100-400 fathoms but mostly in depths of 120-250 fathoms.

The line was hauled on the starboard side just forward of the bridge with the wind on the port side. Salmon were lifted on board in a long-handled net and the hook removed by hand when possible but, if the fish was deeply hooked, a wooden disgorger had to be used. Fish which appeared suitable for tagging were held in a tank continuously supplied with sea water.

The fork length of dead fish or fish unsuitable for tagging was recorded to the nearest 0.5 cm.; scale samples were taken and the fish were opened and sexed. A number of stomachs were preserved in bulk for future examination - casual inspection of the stomachs indicated that fish were absent and that the diet consisted almost exclusively of Crustacea. It was not possible to weigh the fish accurately because of the motion of the ship and the few weighings, taken towards the end of the cruise, have not been included here.

Because of the high hooking rate and the problem of handling relatively large numbers of salmon on a small ship, it was not possible to obtain accurate details of the proportion of fish landed alive nor of the proportion suffering hook damage, but it was conservatively estimated that well over 70% of the fish were alive when landed and that probably at least 80% of these had suffered some damage during removal of the hook. One of the most important lessons learned from participation in this cruise was that, while it is easy to take great care in the removal of the hook when the hooking rate is low (as in Greenland last autumn) it is much more difficult to do so when the hooking rate is high, as it was off Faroe where there were frequently fish on several consecutive hooks.

It was also not possible to record the position of the hook in individual fish, but there was quite clearly a correlation between the size of the fish and the position of the hook, the smaller fish being hooked most frequently in the mouth while the larger fish tended to be hooked deep in the gullet. In many of the smaller fish the hook had penetrated one eye which was usually damaged when the hook was removed. There was also apparently a correlation between hook position and the strength of the wind, fish being hooked more shallowly when the wind was strong (a member of the Faroese staff with experience of long-lining in the Baltic confirmed that this is generally true).

During the early part of the cruise salmon were tagged with Faroese cod tags consisting of a small orange, oblong, plastic plate (14 x 4 mm.) bearing a three figure number and mounted on a single stainless steel wire 15 cm. long. The 7 cm. of wire nearest to the tag was covered by a polythene sleeve and in use the wire was passed through the fish just anterior to the dorsal fin by means of a double-ended needle. The polythene-covered wire was centralised on the fish and the free end threaded through the eyed attachment for the tag and wrapped round several times. Excess wire was cut off and the polythene-covered loop shaped to form a bridle so that the tag stood up just in front of the dorsal fin. The remainder of the fish were tagged below the dorsal fin with the yellow, double-plate, Scottish tags used in Greenland.

From 10th-12th April inclusive fish were tagged without anaesthetic because of the lack of a suitable container but thereafter they were anaesthetised in a solution of approximately 40 p.p.m. MS 222 before tagging. The criteria adopted in deciding whether fish were 'taggable' were lowered somewhat from those normally accepted in Greenland because, at this stage in the investigation of the Faroe stock, when little is known of their origins and qualitative results are as valuable as quantitative ones, it seemed important to tag as many fish as possible. Any fish which was swimming actively in the tank, which was not bleeding seriously and which had not lost too many scales, was therefore tagged even if it had suffered considerable hook damage (mainly damage to one eye among small fish).

Details of the station, the number of hooks fished and the number of fish caught and tagged daily are given in Table 1. The positions of the various stations are shown in Fig. 1 which also gives the stations fished by the 'Jens Chr. Svabo' in 1968. Two salmon bearing Norwegian Carlin-type tags were taken, one on 11th and one on 12th April. The former was released alive after the tag number had been read. With the exception of one lumpsucker, all the fish caught were salmon but, a few sea birds, mostly guillemots, were taken.

The catch per 1000 hooks was exceptionally high when it is considered that catches of 18 to 20 fish per 1000 hooks are considered commercially satisfactory in the Baltic. There was once again evidence of a correlation between wind strength and catch but even allowing for differences in wind strength it seems possible that there were more fish to the north and east of Faroe (10th, 11th, 12th, 16th and 19th April) than to the south-west (17th and 18th April).

Of the 74 fish tagged, 42 were marked with Faroese tags and the remainder with Scottish Greenland tags. The serial numbers of the Faroese tags were within the series 301-350 inclusive (emitting Nos. 302-307, 309, 310) and the Scottish tags were numbered 1800-1831 inclusive (DA 4 on reverse). Only 17.4% of the catch was tagged because of the difficulties experienced in handling adequately the relatively large numbers of fish caught, but it is probable that, in any future experiment, this proportion could be substantially increased and the average condition of the tagged fish considerably improved, if better arrangements could be made to handle, hold and anaesthetise the fish.

The recapture of one of these tagged fish has been reported from Scotland. This fish was tagged with a Faroese tag on 12th April and was recaptured, as a grilse, in a net and coble fishery in the River Halladale, Caithness on 12th June. Examination of its scales indicated that it had migrated as a smolt in the spring of 1968 at a length of about 11 cm. When tagged it had just completed its first winter in the sea and measured 47.5 cm. in length. Between tagging and recapture it had grown only a further 1.5 cm. and it weighed only 1.1 kg. when recaptured.

Table 2 gives details of length and sex for the fish examined each day, while in Fig. 2 the overall percentage length frequency distribution is compared with that of a small sample of 88 fish from which scales were collected in 1968 during the first long-lining cruise by the 'Jens Chr. Svabo' off Faroe. Allowing for the small size of the 1968 sample, there is a close similarity between these length distributions, 80% and 89% of the fish measuring 60 cm. or less in length in 1968 and 1969, respectively.

Since it was not possible to weigh the fish accurately, it was not possible to calculate condition factors but a firm impression was gained that most of the smaller fish up to about 59 cm. in length were in poorer condition than the larger fish. Rosseland has commented on a similar phenomenon in the catches made by long-line off Norway.

Scale samples were taken from 367 fish (86% of the catch). Table 3 gives the numerical and percentage age distribution in this sample while Table 4 gives details of the average observed length, average calculated lengths and average plus growth for each age class of maiden fish. The five previous spawners (Table 3), which are not included in Table 4, averaged 62.5 cm. in length. All had spawned only once previously, as grilse. Details of their age classification and lengths are given below.

<u>Age Class</u>	<u>Number</u>	<u>Average Observed Length (cm.)</u>
2.1 + SM +	3	63.7
3.1 + SM +	1	62.0
3.1 + SM	1	59.5

The figures quoted in Tables 3 and 4 may be compared with the corresponding values for the small sample of scales examined in 1968 (given in ICES/ICNAF Salmon Doc. 69/4). The percentage distribution of smolt ages was virtually identical in the two years, 82-83% of the fish having migrated as 2 or 3 year-old smolts. In both years the majority of the fish had spent one winter in the sea and, as they were caught in April, could therefore have returned to freshwater as grilse later in the same year, but the proportion of these in the sample was rather higher in 1969 (91%) than in 1968 (77%). The calculated lengths in the two samples, both for each age class and overall, were also very similar but the average plus growth made in 1969 was slightly less than that recorded in 1968.

As far as could be ascertained no commercial boats had fished for salmon off Faroe this year before the 'Jens Chr. Svabe' cruise began but, perhaps encouraged by her success, two Faroese commercial boats, the 'Holmasund' and the 'Hvessingur', were reported as fishing on 19th April, the former E.N.E. of Fugle and the latter N.E. of Vidoy. Both fished 900 hooks on the night of 19th April, the 'Holmasund' catching 30 salmon and the 'Hvessingur' 24 salmon.

It was not possible to obtain a complete picture of the commercial fishery for salmon off the Faroes in 1968 but Mr. Jeensen kindly provided details of the catches made by one of the commercial Faroese boats, the 'Fimma Systkin', which fished at intervals from 17th May to 5th August. These are given in Appendix A and indicate that salmon were still present in the area at least until July 1968 and that worthwhile catches were made until at least the end of June. It is also interesting to note that the overall average weight of salmon in this catch was 3.3 kg., suggesting that the smaller fish in the length category 40-59 cm. and probably averaging 1-2 kg. were no longer available, at least by the end of June when daily total weights are given and probably throughout, as the average weight of the fish caught between 17th May and 26th June (by subtraction) was 3.4 kg.

The opportunity to participate in this cruise was greatly appreciated and a great deal of valuable experience was gained which should be particularly useful both in appreciating the problems of tagging from long-lines and in planning any further ventures in long-lining as a means of obtaining fish for tagging.

Table 1

<u>Date</u>	<u>Position</u> <sup>a</sup>	<u>Wind</u>	<u>No. of Hooks</u>	<u>No. of salmon Caught</u>	<u>No. of salmon Tagged</u>	<u>Catch per 1,000 hooks</u>
April 10	62° 45' N 5° 59' W 26 n.m. N.E. of Fugloy	SW 4-5	600	92	14	153
11	62° 46' N 5° 10' W 37 n.m. N.E. of Fugloy	W to N 5-6	900	102	24	113
12	62° 20' N 4° 20' W 54 n.m. E. of Fugloy	N 6-7+	600	84	11	140
16	61° 11' N 6° 10' W 19 n.m. S.E. of Suduroy	NW 5-6	600	66	10	110
17	61° 32' N 7° 43' W 18 n.m. W. of Suduroy	NNE 1	900	11	-	12
18	61° 30' N 8° 15' W 40 n.m. W. of Suduroy	SSE 4-5	900	6	-	7
19	62° 43' N 6° 04' W 23 n.m. N.E. of Fugloy	SE 2-3	900	65	15	72
Overall			5,400	426	74	79

<sup>a</sup> Bearings and distances only approximate.

Table 2

<u>Date</u>	<u>No. Examined</u>	<u>Sex</u>		<u>No. Measured</u>	<u>Average Length (cm.)</u>	<u>Length Range (cm.)</u>
		<u>M</u>	<u>F</u>			
April 10	77	38	39	92	55.1	43.5-81.0
11	78	45	33	102	54.4	45.0-93.0
12	28	17	11	39	54.6	44.5-79.5
16	56	30	26	66	53.9	38.5-80.0
17	10	7	3	10	57.0	48.6-83.0
18	6	6	-	6	61.7	48.5-88.5
19	49	23	26	64	56.1	48.5-88.0
Overall	304	166	138	379	54.9	38.5-93.0

Sex Ratio 1.2:1

Table 3 Age Distribution in Sample

<u>Smolt Age</u>	<u>Sea Winters</u>			<u>Previous Spawners</u>	<u>Overall</u>
	<u>1</u>	<u>2</u>	<u>3</u>		
1	11 (3.0) <sup>a</sup>	2 (0.5)	-	-	13 (3.5)
2	190 (51.8)	7 (1.9)	-	3 (0.8)	200 (54.8)
3	94 (25.6)	8 (2.2)	2 (0.5)	2 (0.5)	106 (28.9)
4	24 (6.5)	7 (1.9)	-	-	31 (8.4)
5 <sup>b</sup>	3 (0.8)	-	-	-	3 (0.8)
?	12 (3.3)	2 (0.5)	-	-	14 (3.8)
Overall	334 (91.0)	26 (7.1)	2 (0.5)	5 (1.4)	367

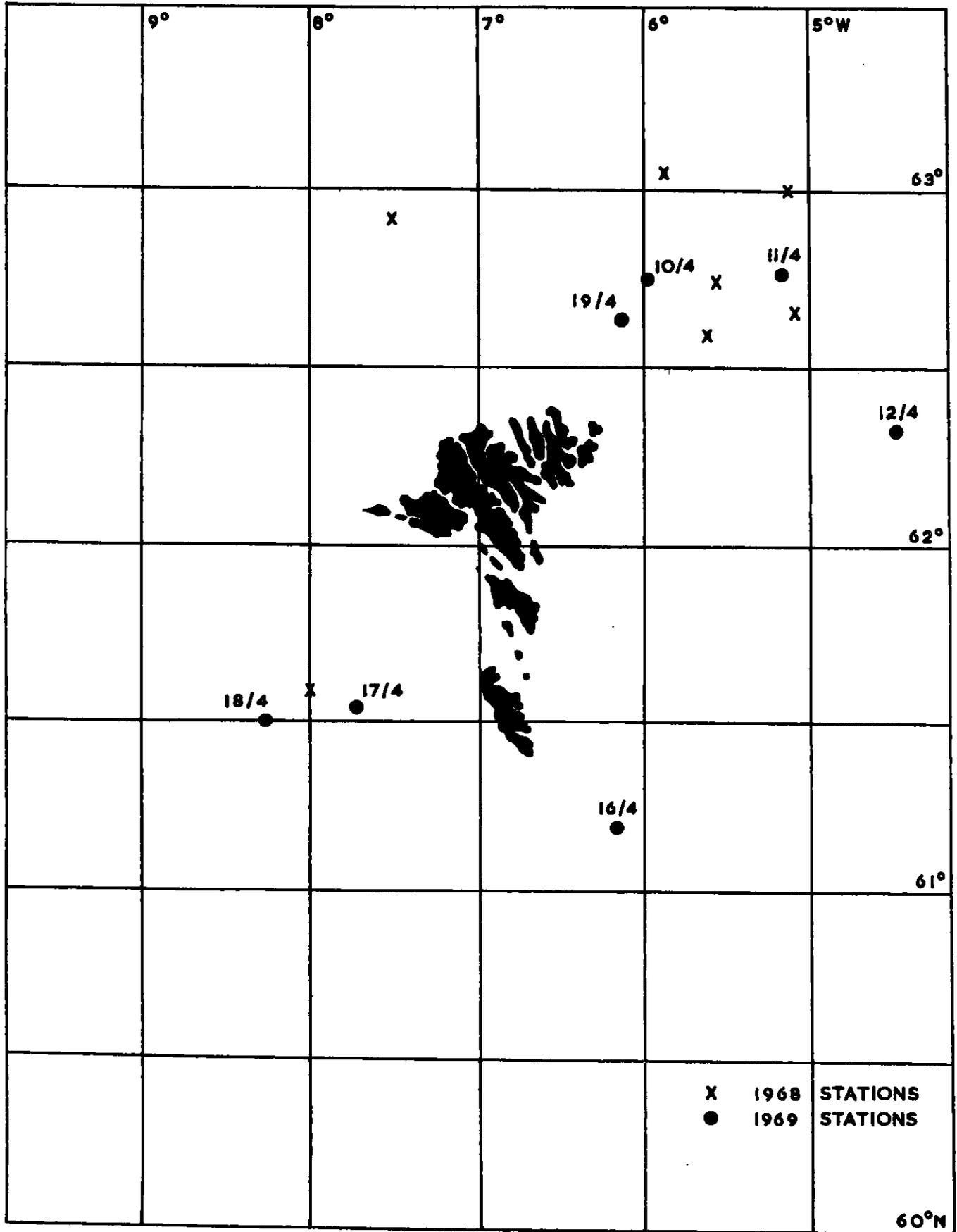
<sup>a</sup> Numbers in brackets are percentages of the total sample.  
<sup>b</sup> Unreadable.

Table 4

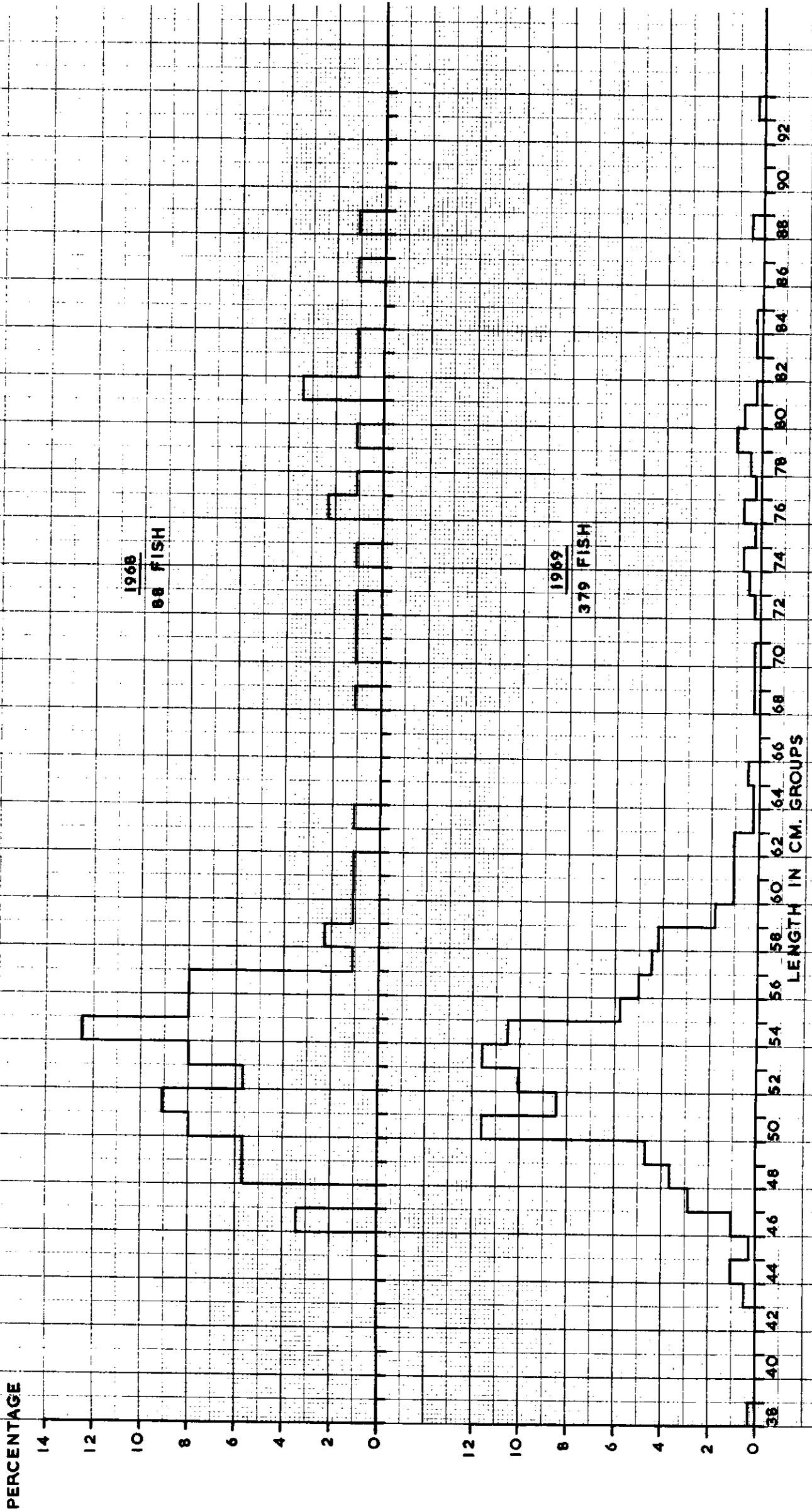
Age Class	No. in Sample	Average Observed Length (cm.)	Average Calculated Lengths (cm.)									Plus Growth (cm.)
			Freshwater Winters					Sea Winters				
			1	2	3	4	5	1	2	3		
1.1 +	11	52.7	7.6					48.7			4.0	
2.1 +	190	53.1	4.6	12.0				49.7			3.4	
3.1 +	94 <sup>a</sup>	52.4	3.1	7.0	11.3			48.7			3.7	
4.1 +	24	52.5	2.6	5.6	8.7	12.5		49.0			3.5	
5.1 +	3	49.5	2.5	4.8	7.3	10.2	12.8	47.7			1.8	
? 1 +	12	52.3	-	-	-	-	-	-			-	
Overall	334	52.8						49.3 <sup>b</sup>			3.5 <sup>b</sup>	
1.2 +	2	69.5	7.5					44.8	67.2		2.2	
2.2 +	7	75.8	4.6	10.9				44.8	72.6		3.1	
3.2 +	8	76.2	3.1	7.2	11.8			46.0	74.4		1.8	
4.2 +	7	78.6	2.6	5.4	8.3	12.7		46.4	76.4		2.2	
? 2 +	2	80.8	-	-	-	-		-	-		-	
Overall	26	76.6						45.6 <sup>c</sup>	73.8 <sup>c</sup>		2.4 <sup>c</sup>	
3.3 +	2	88.5	3.2	6.5	9.8			42.0	68.0	87.5	1.0	

a 93 fish measured  
 b 321 fish  
 c 24 fish

**FIG. 1**



**FIG. 2** PERCENTAGE LENGTH FREQUENCY DISTRIBUTION



Appendix A

M/s "Finn Systkin". Catch of salmon,  
17th May - 5th August 1968.

<u>Month and date</u>	<u>Number of hooks</u>	<u>Number of Salmon</u>	<u>Weight (kg)</u>	<u>Position</u>
May 17 - 18	1000	25	- <sup>a</sup>	62°45'N 05°18'W
21 - 22	"	3	-	66°30'N 05°10'E
22 - 23	"	21	-	66 30 06 10
23 - 24	"	13	-	66 28 06 40
24 - 25	"	30	-	66 35 06 30
25 - 26	"	2	-	66 00 05 00
27 - 28	"	0	-	66 30'N 01 30'W
28 - 29	"	5	-	63 04 05 10
29 - 30	"	3	-	62 52 05 41
30 - 31	"	3	-	62 50 06 14
June 8 - 9	"	6	-	62 36 05 31
9 - 10	"	25	-	62 40 05 23
14 - 15	"	1	-	62 00 05 03
15 - 16	1200	15	-	62 44 04 50
16 - 17	"	17	-	62 50 05 05
17 - 18	1000	15	-	62 48 05 11
18 - 19	"	16	-	62 48 05 40
19 - 20	"	13	-	62 52 05 24
20 - 21	750	40	-	62 52 05 44
23	250	10	-	62 19 05 48
25 - 26	500	24	-	62 50 05 30
27 - 28	1000	59	204	62 47 05 15
28 - 29	"	31	121	62 38 05 07
29 - 30	"	30	98	62 36 04 59
30	"	32	99	62 33 04 58
July 1	"			
2 - 3	"	15	50	62 17 04 37
3 - 4	"	6	13	62 17 04 37
4 - 5	"	17	53	62 42 04 56
5 - 6	"	9	30	62 27 04 37
6 - 7	"	12	28	62 34 04 53
Aug. 1 - 2	"	0	-	62 50 05 29
2 - 3	"	0	-	62 29 05 52
3 - 4	"	0	-	61 50 01 25
5	180	0	-	61 50 05 30

<sup>a</sup> Not recorded

A total of 498 salmon which weighed 1,659 kg. Av. Wt 3.3 kg.