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Salmon work in Greenland, 1968

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In 1968, members of staff from United Kingdom laboratories were once again able to take part in a programme of research in Greenland with the co-operation of the Danish Greenland Fisheries Investigations. This co-operation is much appreciated and, because it is so freely given, it is perhaps all too easy to overlook its very considerable extent. The assistance received includes exclusive use of their two research vessels, full-time help from at least one of their small team of scientists, laboratory and domestic accommodation in Greenland and, not least, the hospitality and help with arrangements which does so much to make visits to Greenland an enjoyable experience.

The programme of work in Greenland planned for 1968 differed from earlier programmes in two respects. First, in view of the poor return from the relatively large numbers of fish tagged from gill nets between 1965 and 1967, it was decided that this method would not be used as a primary means of catching fish for tagging in 1968, but that other methods of capture which might provide fish in better condition for tagging (even at the expense of a substantial reduction in the numbers of fish tagged) should be investigated. Secondly, work in previous years suggested that the working season might be extended if the early part of the programme was carried out in south Greenland where good catches were often reported in August and where weather and physical conditions might prove more suitable for other methods of catching salmon, particularly T-nets.

The 1968 programme was therefore planned to extend from late August until about the end of October and to concentrate mainly on further tests of T-nets and preliminary tests of floating long lines as methods of catching salmon in good condition for tagging. Because arrangements for this programme had to be flexible, it was considered best that a single U.K. team, comprising one representative from M.A.F.F. and one from D.A.F.S., together with an experienced T-net fisherman from Northumberland (employed by M.A.F.F.), should cover the whole period of the programme. For this programme, the Danish Greenland Fisheries Investigations provided the exclusive use of their research vessel 'Adolf Jensen' and also arranged for an experienced salmon line fisherman from Bornholm to be available for part of the programme.

In addition to this programme, their smaller research vessel 'Tornak' operated gill nets in the usual area immediately to the south of Godthåb from mid-August to mid-November. The catches from these nets provided material for parasite and scale samples and, during a period of a month when two members of staff from the Marine Laboratory, Aberdeen visited Godthåb to carry out work on blood characteristics, blood samples from freshly caught fish. A few fish, which were in suitable condition and which were surplus to these requirements, were tagged.

The 'Adolf Jensen' programme began in the south on 22nd August and the first fortnight was spent in the area around and to the south of Julianehåb. The weather was perfect and many suitable sites for T-nets were seen but it soon became evident, both from experimental settings of gill nets and T-nets and from information obtained from local fishermen, that salmon were not present in any numbers. During this period only 7 salmon were caught (all in gill nets set as indicators) and a total of 480 hooks, baited with frozen sandeels and pieces of large herring (fresh or frozen) set in the open sea and in fjords, failed to produce any salmon. The failure of salmon to appear in worthwhile numbers in south Greenland, at least during the early part of the season in 1968, was thought to be due to the unusual persistence of cold water and sea ice carried round from the east coast.

The 'Adolf Jensen' then moved northwards and information was sought about commercial catches at Arsuk, Frederikshåb and Fiskenaesset. Only at Fiskenaesset were catches reported to be at all comparable with those recorded in 1967. Suitable sites for T-net tests were found in a bay just south of Fiskenaesset and it was decided that, after a visit to Godthåb for provisioning and to exchange Danish scientists, a programme of T-net tests should be carried out in this bay (Kangerluarssunguaq). While moving up the coast to Godthåb a total of 810 hooks were fished offshore without success.

The 'Adolf Jensen' returned to Kangerluarssunguaq on 17th September and between then and 26th September four T-nets were fished, together with gill nets (to act as indicators of the presence of salmon). Although 23 salmon were caught during this period, 12 in T-nets and 11 in gill nets, it was evident that salmon were not present in numbers sufficient to provide a clear-cut indication of the value of the T-nets. However, as the area appeared to be eminently suitable for this type of test and, as local opinion suggested that salmon were likely to be present in greater numbers in the bay after mid-October, it was decided to return to this area then and, in the meantime, to carry out tests of floating long lines on the Store Hellefiske Banke, off Holsteinsborg, where drift netters were reported to be making good catches of salmon.

Between the 2nd and 12th October a total of 2,400 hooks was fished off Holsteinsborg and 11 salmon were caught, approximately one per 200 hooks fished. All the fish caught were in extremely good condition externally but only 5 were suitable for tagging, the remainder showing signs of serious bleeding as a result of hook damage. Of the 5 fish tagged, 3 were deeply hooked in the oesophagus and the hook was left in.

While the 'Adolf Jensen' was operating in the Holsteinsborg area with only the Scottish representative on board, the remainder of the U.K. team ran a short test at Kigdlut Iluat with two T-nets operated from the 'Tornak'. During these tests 4 salmon were caught in T-nets and 116 in four gill nets fished as indicators.

The 'Adolf Jensen' returned to Kangerdluarssunguaq on 17th October and between then and 28th October carried out T-net tests, with gill nets once again acting as indicators. A total of 59 salmon was caught, 51 in gill nets and 8 in three T-nets. When the 'Adolf Jensen' arrived, prospects looked promising as commercial catches within the bay were good but, within two days of her arrival, salmon became scarce both in the commercial nets and in the experimental nets. Just as this series of tests had to be terminated there were signs, from the catches made in the 'Adolf Jensen's' gill nets, that salmon were once again entering the bay in substantial numbers.

Details of the numbers of salmon caught and tagged in Greenland during 1968 are summarised in Table 1 below.

Table 1 — Numbers of Salmon Caught and Tagged during 1968

Research Vessel	Method	Number Caught	Number Tagged	Percentage Tagged
	Pound nets[a]	2	2	100.0
'Adolf Jensen'	Gill nets	70	9	12.9
	T-nets	19	11	57.9
	Long lines	11	5	45.4
'Tornak'	Gill nets	457	18	3.9
	T-nets	4	2	50.0
Combined	Pound Nets	2	2	100.0
	Gill nets	527	27	5.1
	T-nets	23	13	56.5
	Long lines	11	5	45.4
	Totals	563	47	

[a] Two salmon bought from a Greenland pound net in Amerdloq Fjord on 2nd August and tagged with Danish cod tags.

As in previous years, the double-plate yellow tag was used but this year, for the first time, the un-numbered plate bore instructions for the return of the tag. In addition a magnetic rubber strip, supplied by M.A.F.F., was fitted behind each tag as part of their plan to detect returning fish in their home waters by magnetic detectors at some sites.

Also for the first time, a proportion of the tagged fish was anaesthetised before tagging in a solution of approximately 40 p.p.m. MS 222. Because of the use of anaesthetic and, because it seemed less important to tag as many fish as possible from gill nets, the salmon tagged were probably in considerably better average condition than in earlier years. This may be related to the rather higher recapture rate of 8.5% (4 fish) recorded from the local Greenland fishery in 1968.

Despite every attempt to make the best use of the time and facilities available, the results of the very considerable effort expended in 1968 can only be described as extremely disappointing. The very small number of salmon tagged is unlikely to make a worthwhile contribution to any mathematical assessment of the effects of the Greenland fishery and, although the U.K. team gained very considerable experience and proficiency in setting T-nets under Greenland conditions, a really clear-cut decision on the value of these nets was frustrated by a lack of salmon at the sites and during the periods chosen for T-net tests. The results obtained confirmed the earlier indication, that over 50% of the salmon caught in T-nets are suitable for tagging but, once again, the T-nets failed to provide worthwhile numbers of fish.

The number of fish caught on floating long lines and particularly the hooking rate was also disappointingly low. However, the results of these preliminary tests confirm that line caught fish are basically in good condition for tagging and the method could hold promise if the hooking rate could be improved off Greenland.

Although from a tagging point of view, the results were disappointing, sufficient salmon were caught to provide a worthwhile comparison of the general characteristics of the salmon in the research catch in 1968 with those in previous years. Details of the main characteristics of the 1968 research catches are given in Tables 2 and 3.

Table 2 Average Lengths, Research Catches, 1968

Research Vessel	Method	No. of Fish	Fork Length (cms.) Average	Range
Tornak	Gill nets	455	62.5	53-85
	T-nets	4	56.0	55-68
Adolf Jensen	Gill nets	70	63.0	52-90
	T-nets	19	60.3	42-79
	Long lines	11	68.6	56-87

Table 3 Average Weights and Sex Ratios, Research Catches, 1968

Research Vessel	Method	No. of Fish	Whole Wt.(kg.) Average	Range	Sex Ratio Male:	Female
Tornak	Gill nets	438	2.9	1.6-7.8)	1	3.3
	T-nets	2	2.0	1.6-2.5)		
Adolf Jensen	Gill nets	61	2.9	1.7-4.0)	1	2.1
	T-nets	8	1.8	0.8-5.0)		
	Long lines	6	3.8	2.1-6.0)		

The values given for T-nets and gill nets in Table 2 indicate that, as noted in the 1967 report (ICES/ICNAF Salmon Doc. 68/2), there is a marked tendency for the average length of the fish caught in T-nets in Greenland to be less than that for gill nets fished in the same area.

Since the 'Adolf Jensen's' catch was spread over a wide area of the coast and was taken by various methods, the 'Tornak's' gill net catch in 1968 provides the most appropriate figures for comparison with the research gill net catches in earlier years. This comparison indicates that the average length and weight of the fish in 1968 was noticeably less than in previous years when the values for 1965, 1966 and 1967 were 64.8 cm. (3.4 kg.), 64.7 cm. (3.5 kg.) and 66.5 cm. (3.7 kg.) respectively.

The sex ratios (Table 3) are again biased in favour of females and are of the same order as those recorded in previous years when the corresponding values for 1965, 1966 and 1967 were 1:3.9, 1:3.1 and 1:2.9 respectively.

Table 4 — Percentage Length Frequency Distribution

Length Groups (cm.)	1965	1966	1967	1968
30-34	-	-	-	-
35-39	-	-	0.05	-
40-44	-	-	0.05	-
45-49	-	0.1	-	-
50-54	0.1	0.6	0.5	1.5
55-59	8.0	7.1	4.6	28.4
60-64	40.0	40.0	28.5	39.8
65-69	40.2	41.7	44.0	23.1
70-74	9.8	8.8	17.9	5.5
75-79	0.9	1.0	2.4	0.4
80-84	0.4	0.5	1.2	1.1
85-89	0.4	0.2	0.6	0.2
90-94	0.2	-	0.2	-
No. in sample	809	2096	1850	455

In Table 4, which compares the percentage length frequency distribution of the 'Tornak's' gill net catch in 1968 with those for the gill net catches in previous years, the change in average length is seen to be due mainly to an increase in the proportion of fish below 60 cm. and a decrease in the proportion in the 65-69 cm. group. This is probably a reflection of a slower growth rate, at some stage in their life, among fish which were in their second year in the sea.

Examination of the stomach contents again showed that fish were the major item in the diet but, in contrast to previous years when capelin have been the main item in the diet, sandeels predominated in 1968, occurring in 51% of the stomachs from the 'Tornak's' catch and 87% of that from the 'Adolf Jensen'. The corresponding figures for capelin in 1968 were 46% and 18% respectively. Crustacea were the only other food organisms present, occurring in about 5% of the stomachs. The proportion of empty stomachs in 1968 (6.8%) was rather lower than 1967 (12%).

Analysis of the scale material collected during 1968 has begun and will include not only material from the research vessel catches but also small samples of the commercial catch taken from two freezer ships (the 'Hertha' based in Borg's Havn near Arsuk and the 'Svaerdfiske' based at Fiskenaesset) and from the private factory at Frederikshab. It is regretted that it has not proved possible to prepare a report on the results from 1965 to 1967 but analysis of the 1967 scale material has been completed and the results are given in Table 5 below where they are compared with those for previous years.

Table 5 Comparisons of Age Composition, 1965-196/

(a) Smolt Age, Percentage Composition

Age (years)	1965	1966	1967
1	3.0	3.4	2.9
2	49.3	42.4	52.4
3	31.5	41.4	28.0
4	11.4	9.0	11.5
5	3.8	3.2	4.0
6	0.8	0.7	1.0
7	0.2	-	0.2

(b) Sea Age, Percentage Composition

Age (years)	1965	1966	1967
0+	-	-	0.2
1+	98.0	97.9	95.6
2+	0.8	1.0	2.0
Previous spawners	1.3	1.1	2.3

This table shows that, for the three years for which comparable data is available, there is little marked difference in the age characteristics of the stocks, i.e., in each year about 80% of the fish had migrated as two or three year old smolts (although there are minor differences in the proportion of two- and three-year old smolts which are within the annual fluctuations seen in individual smolt populations) and that over 90% of the fish were in their second year in the sea.

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