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Salmon Studies in Greenland - 1967

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For the third successive year United Kingdom scientists co-operated with Danish scientists in a programme of research on salmon caught in inshore waters near Godthåb in Greenland. The main objectives of this programme were:

- (1) To investigate the use of some form of trap net as a means of obtaining live salmon in better condition for tagging.
- (2) To tag such salmon as were caught in suitable condition in gill nets and in trap nets.
- (3) To examine freshly dead salmon for parasites as a continuation of the work on the possible use of parasites as indicators of the countries of origin of the Greenland stock.
- (4) To continue the examination of the blood characteristics of Greenland salmon as part of an investigation into possible serological and biochemical methods of identifying the origins of these fish.

The United Kingdom's contribution to this programme consisted of the provision of two members of staff from the Freshwater Laboratory of the Ministry of Agriculture, Fisheries and Food and an inshore fisherman hired by them to operate the trap nets, two members of staff from the Freshwater Fisheries Laboratory at Pitlochry (Department of Agriculture and Fisheries for Scotland) and three members of the staff of the Department's Marine Laboratory at Aberdeen. In addition, M.A.F.F. and D.A.F.S. jointly provided five trap nets and their ancillary gear. The Danish contribution included the provision of two scientists, who were responsible for local arrangements; laboratory accommodation for the work on parasites and blood; living accommodation for the U.K. scientists and the exclusive use of their research ships over the period of the programme.

The testing of the trap nets and the tagging was carried out by two teams (each consisting of a Danish scientist and one representative each from M.A.F.F. and D.A.F.S.), which operated consecutively over the period 14th September to 6th November. The parasitologist and the two blood workers from Aberdeen spent periods varying from $3\frac{1}{2}$ to 5 weeks in Godthåb during the course of the tagging programme.

The small wooden research vessel 'Tornak' was available throughout the period of the tagging programme. It had been hoped that the newly-commissioned, and much larger, 'Adolf Jensen' would also be available throughout but minor modifications to its 'ice-fins' delayed its departure from Denmark until 12th September and it was not available for work off Greenland until 6th October. To bridge part of this gap the Danes hired their wooden, ex-research ship, formerly the 'Adolf Jensen' but now re-named 'Aglantha', for the period 15th September to 25th September. Unfortunately, bad weather over this period prevented full value being obtained from this arrangement.

After detailed consideration, the Northumberland T-net had been selected as the most suitable type of trap net for use in the working conditions likely to be encountered on the Greenland coast. This net is very similar to the Norwegian kilenot and operates on the same basic principle as Scottish bag-nets and fly nets but, because of the unusual arrangements governing the allocation of fishing stations on the Northumberland coast, which entail setting the nets at different sites each day, it is much more lightly constructed and therefore much more easily handled.

T-nets were set from the 'Tornak' at five sites to the south of Godthåb, in depths of water varying from about 6 to 20 fathoms. They proved easy to work with the limited manpower available and after some practice it was usually possible to set one in about two to three hours. The 'Tornak' also operated some gill nets along the coast near the T-net sites, while the 'Adolf Jensen', after her arrival, operated gill nets in Praegtefjord, Ameralikfjord and, for a short period, off three islands nearer Godthåb.

The Danes had begun fishing gill nets from the 'Tornak' well in advance of the arrival of the first U.K. party. They caught 55 salmon during August, the first being recorded on the 22nd of that month and, by the time that the first party arrived, they had caught 301 fish and tagged 88.

As soon as the first U.K. party arrived they began installing T-nets but were severely hampered in this work by the weather over the first fortnight of their stay when strong gales, occurring every third or fourth day, prevented sailing and often undid much of the work which had been done when sailing was possible. After the first fortnight the weather improved and by 4th October four T-nets were in operation, the fifth being held in reserve and, when necessary exchanged with one of those in use, when it had become too dirty with weed to be cleaned while in position. Varying numbers of T-nets were fished from that date until 3rd November, when the last T-net was lifted.

After the departure of the second U.K. party, the Danes continued fishing gill nets until 14th November and caught a further 334 salmon, of which 28 (8.4%) were tagged.

Details of the numbers of salmon caught and tagged on the Greenland coast during 1967 are given below.

<u>Vessel</u>	<u>Period</u>	<u>Method</u>	<u>Number Caught</u>	<u>Number Tagged</u>	<u>Percentage Tagged</u>
Tornak	22 Aug. - 14 Sept.	Gill nets	301	88	29.3
Tornak	16 Sept. - 14 Nov.	Gill nets	845	192	22.7
		T-nets	28	15	53.5
Adolf Jensen	6 Oct. - 14 Nov.	Gill nets	706	80	11.3
Overall			1880	375	19.9

Both the numbers caught and the numbers tagged were lower than in 1966 when, from 19th September to 11th November, 2137 salmon were caught, of which 728 were tagged. Among the reasons for this difference were, (a) less consistently good catches in the gill nets, (b) bad weather, which resulted in a higher death rate in the gill nets because they had often to be left unexamined for several days, (c) the limited period during which the new 'Adolf Jensen' was available, and (d) the fact that the operation of the T-nets, which unfortunately caught few fish, consumed time which could otherwise have been devoted to gill-netting.

The most disappointing feature of this year's experiments was that, although T-nets proved easy to operate and produced a much higher proportion of taggable fish than did the gill nets, they failed to catch salmon in worthwhile numbers. Although this result may mean that trap nets of any type, which depend on the fish 'leading' for their catches, are not likely to be effective in Greenland because of some difference between the behaviour of the fish in Greenland and home waters, there are reasons for giving T-nets another chance next year before finally condemning them.

In the area around Godthåb, the sites which were physically suitable for T-nets, were either already occupied by commercial nets or were known to be unproductive from the previous use of commercial and research gill nets. The areas in which salmon were known to be concentrated were either too deep, had too strong tidal flows or were too exposed to the weather. If further tests of T-nets are made in Greenland in 1968, it is hoped that it will be possible to select sites which are both physically suitable and which are known to be productive. Danish scientists are still hopeful that such sites can be found, perhaps further south, e.g., in the Julianhåb area.

Very full use was made of those salmon which were not suitable for tagging. Lengths and weights were recorded, a sample of scales was taken from each for age determination and stomach contents were noted. In addition, blood samples were taken from 197 fish, eye lenses from 413 and liver samples from 142 fish. Twenty fish were examined for parasites in Greenland and 137 were deep-frozen and sent back to the United Kingdom for subsequent biochemical and parasitological examination.

Details of the average lengths and weights of the fish in the 1967 research catches are given below.

	<u>No. of Fish</u>	<u>Fork Length (cm)</u>		<u>No. of Fish</u>	<u>Weight (kg)</u>	
		<u>Average</u>	<u>Range</u>		<u>Average</u>	<u>Range</u>
Gill nets	1850	66.5	35.0-92.0	1449	3.7	0.5-12.0
T-nets	27	63.3	33.0-73.0	11	2.9	0.4-4.7

The values for the average length and average weight of gill net caught fish in 1967 were almost 2 cm. and 0.2-0.3 kg greater, respectively, than the corresponding values in 1965 and 1966, while the average size of the small number of fish caught in the T-nets was quite markedly less than that of gill-netted fish.

In 1965 and 1966, no fish smaller than 45 cm. were caught but in 1967, four smaller fish were caught, two in gill nets (35 and 43 cm.) and two in T-nets (33 and 35 cm.). Examination of scales from these four fish indicated that they had not yet spent a winter in the sea and were therefore pre-grilse, the first to be caught during three years sampling on the Greenland coast.

The sex ratio in the research catch, based on 1,357 fish which were examined internally, was 1♂: 2.6♀♀, there being a rather smaller proportion of females than in 1965 and 1966, when the corresponding values were 1: 3.9 and 1: 3.1, respectively.

Examination of the stomach contents again showed that capelin was the most important food, predominating in 86% of the stomachs, the only other food of any significance being euphausiids, which were recorded in 1.6% of the stomachs. Twelve percent of the stomachs examined were empty.

Analysis of the scale samples collected during 1966 has now been completed and well over half the scales collected during 1967 have been read. It is hoped that it will be possible to prepare a full report, covering all the results for 1965, 1966 and 1967, in time for the next meeting of the Working Party. In the meantime, the following table gives the general outline of the percentage age distribution for the 1966 research catches, which is very similar to that for 1965.

<u>Smolt Age</u>	<u>Years in Sea</u>		<u>Previous Spawners</u>	<u>Overall</u>
	<u>1+</u>	<u>2+</u>		
1	3.4	-	-	3.4
2	41.6	0.5	0.3	42.4
3	40.4	0.4	0.5	41.3
4	8.8	-	0.2	9.0
5	3.0	0.1	0.1	3.2
6	0.7	-	-	0.7
Overall	97.9	1.0	1.1	