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Drift Net Tagging of Atlantic Salmon

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Introduction

Because of the importance of the drift net component of the West Greenland salmon fishery, and the necessity to tag salmon at West Greenland for estimates of exploitation rate and elucidation of questions relating to return to home waters, two drift net tagging experiments were conducted in 1969. Both experiments were carried out from research vessels, and were concerned primarily with development of suitable fishing and tagging techniques.

The first experiment, at Port aux Basques, Newfoundland (Fig. 1) used a tagging technique adapted from a 1937 tagging experiment in the same area by Belding and Préfontaine (1938). Thus a direct comparison of the 1969 experiment with the successful earlier one was possible. Techniques developed at Port aux Basques were later applied in a second tagging experiment in the Labrador Sea-West Greenland area (Table 1 and Fig. 2).

Gear and Fishing

In both experiments, most of the nets used were of twisted Ulstron (polypropylene), with some nets of monofilament nylon (polyamide). At Port aux Basques nets were either 25 or 50 fathoms long and varied from 1.5 to 2.5 fathoms in depth, depending on mesh size. At West Greenland all nets were 25 fathoms in length and about 1.5 fathoms in depth (nets of different mesh sizes were made up with the appropriate number of vertical meshes to give nets of similar depths). Mesh sizes used at Port aux Basques were $4\frac{1}{2}$, $5\frac{1}{4}$, 6 and $6\frac{1}{2}$ inches (114, 133, 152 and 165 mm) and at West Greenland were $4\frac{1}{2}$, 5, $5\frac{1}{2}$ and 6 inches (114, 127, 140 and 152 mm). Mesh sizes measured wet after use by means of a hand-held rule approximated these nominal sizes closely.

At Port aux Basques the various mesh sizes were segregated in groups with smallest meshes at one end of the fleet, and largest at the other. This practice was also maintained during the first few sets off West Greenland, but was soon abandoned because of difficulty in maintaining a predetermined net order when removing nets for repair. Thus for most of the West Greenland fishing, nets were fished more or less in random order.

Nets were fitted with a footrope consisting of a braided line having a lead core, and a braided nylon headline on which were fitted 2 small hollow plastic floats for each fathom of net. Additionally, a one-half inch diameter

polypropylene rope was attached along the headline for strengthening purposes. During fishing, nets were marked with one 30 or 40-inch circumference red polyvinyl chloride float between each 50 fathoms of net, plus a bamboo high flyer with radar reflector, flag and light at each end, and additional high flyers with radar reflectors each half mile.

Nets were generally set before dawn and hauled before dark. All tagging was done during daylight hours. At Port aux Basques nets were fished at a rate of one-half to one nautical mile per set; at West Greenland at a rate of one to three miles per set, though generally three miles. Nets were set at a rate of about 3 miles per hour, and hauled (using a rail roller and hydraulic line hauler equipped with 2 rubber tires) at 1 to 1.5 miles per hour. Nets were overhauled and mended during the overnight interval between fishing sets.

Fishing at Port aux Basques was carried out by the research vessel *Marinus*, a 62-foot (19 m) wooden side trawler, and at West Greenland by the *A. T. Cameron*, a 177-foot (54 m) steel side trawler.

Tags and Tagging Procedure

Tags used were of yellow laminated plastic, serially numbered, and carried a return address and request for recapture information (Fig. 3). Tags used at Port aux Basques were 42 mm in length, had a tapered width of 5.2 declining to 3.5 mm, and a thickness of 0.8 mm. Tags applied at West Greenland measured 15 x 5 x 0.8 mm, and carried a serial number preceded by the letter "X". Reward payments for recaptures of the latter in North American waters are \$25 Canadian.

Tags were applied just below the anterior insertion of the dorsal fin using a modified Carlin attachment devised from annealed stainless steel wire of 0.012 inch (0.3 mm) diameter (Fig. 3).

From the time that nets were set until they were hauled the gear was patrolled by a 3-man crew in an 18-ft. open boat, with a few exceptions due to unfavourable weather. Crews alternated every 2 hours. The central portion of the boat was lined with canvas to provide a small tagging tank (25 ft³ or 0.7 m³), which was frequently replenished with clean salt water. At the end of a fishing set in West Greenland, salmon taken as the nets were coming on board were tagged on the research vessel.

Most salmon were caught within the first metre of netting from the surface, and could be easily seen from the small boat at a distance of 3-5 m from the nets. When a salmon was seen, the section of netting containing it was taken on board, and the fish was cut free using scissors and placed in the canvas tank. If the salmon was capable of maintaining itself in an upright position in the tank it was tagged, returned to the tank, its condition noted, and released after a few minutes recovery time.

A salmon to be tagged was taken from the tank and placed on its belly on a tagging board consisting of two planks nailed together at right angles and attached to a thwart immediately aft of the tagging tank. A measuring strip was set into the vertical plank, and the salmon was held in place by rubber straps. The person tagging stood in the tank.

Upon release, tagged salmon were rated as excellent, good or fair condition, as follows:

Excellent - minor scale loss (generally 10% or less), fish lively and hard to handle, swims quickly away after tagging;

Good - moderate scale loss (generally 10-20%), fish swims slowly both in tagging tank and when released;

Fair - moderate scale loss (generally 10-20%), fish has difficulty maintaining its position in tagging tank, swims away sluggishly and erratically, may have fin damage.

Average estimated scale loss at West Greenland for 52 fish in fair condition was 13%, for 199 fish in good condition was 11.5% and for 134 fish in excellent condition was 8.1%. Estimates of scale loss were not made during tagging at Port aux Basques.

Results from Tagging Experiments

Port aux Basques

Tagging was carried out during the period May 2-June 10, 1969. Catches were extremely low (less than 5 fish per day) until May 22 when the maximum catch of 38 salmon in one day was obtained. Catches per mile of net per hour fished (mile-hr) averaged 0.3 during the period of low fishing, and 2.2 from May 22 to June 10, for an overall average of 1.7. All fishing was done close to the Newfoundland coast (approximately 47° 30'N, 59°W).

270 salmon were caught and 247 (91.5%) tagged. Returns to December 31, 1969 totalled 90 (36.4%), and were largely from 3 major areas: the western Gulf of St. Lawrence, the Quebec North Shore and western Newfoundland (Fig. 1). Virtually all recaptures were from the June to August period. Returns classified by condition of fish when tagged were as follows:

	<u>No. Tagged</u>	<u>No. Returned</u>	<u>% Returned</u>
Fair Condition	23	5	21.7
Good Condition	137	52	38.0
Excellent Condition	<u>87</u>	<u>33</u>	<u>37.9</u>
Total	247	90	36.4

8 salmon were recaptured and released again by the research vessel on the day of tagging. Only 1 of these was subsequently recaptured. The other 7 are not included in the tag returns.

Labrador Sea and West Greenland

Areas fished, and numbers of salmon caught and tagged are listed in Table 1. Fishing was carried out between September 6 and October 2 for a total of 17 days of the 39 day cruise. During 2 days fishing it was not possible to patrol the nets because of bad weather. In general, nets could not be patrolled by the small boat beyond wind force 5 (17-21 knots) although fishing could be carried on up to wind force 8 (34-40 knots). Winds up to 90 knots were experienced during the cruise.

Catches were relatively low in most areas except Disko Bay, and in Disko Bay were highly variable (2 to 110 fish/day; 0.1 to 3.8 fish/mile-hr). During fishing at Disko Bay nets were usually set in a northeast-southwest line and it was noted that virtually all the salmon caught had struck the nets on the southern side, they were thus presumed to have been moving in a generally northern or northwestern direction during the 10 days fishing in this area.

627 salmon were caught (549 in Disko Bay) and 385 tagged (355 in Disko Bay). Overall, 61.4% of those caught were tagged. In Disko Bay, excluding September 30 when nets were not patrolled, the proportion tagged was 67.5%. Recaptures reported to December 31, 1969 totalled 14, 11 from Disko Bay in September-October, 1 from Disko Bank in October, 1 from Aeqertarmiut (about 65° 30'N) in October and 1 from northeast Newfoundland in December (Fig. 2).

6 salmon were recovered by the research vessel on the day of tagging. One of these was dead and is included in the total above; the others were released again. None of these have been recaptured to date.

Condition of fish on release, and returns classed by condition are as follows:

	<u>No. Tagged</u>	<u>No. Returned</u>	<u>% Returned</u>
Fair Condition	52	0	0
Good Condition	199	6	3.0
Excellent Condition	134	8	6.0
Total	385	14	3.6

Conclusions

A comparison of return rates of salmon tagged from drift nets in Canadian waters in 1969 with return rates from earlier tagging by various gears indicates that the drift net tagging technique can produce meaningful results (Table 2).

The lower ratio of fish tagged to fish caught at West Greenland was at least partly due to the greater amount of time required to patrol the increased amount of gear fished; but may also have been a reflection of increased susceptibility to gillnet injury of salmon at that particular period in their sea life. There is no doubt, for example, that salmon caught at West Greenland shed their scales more easily than do fish returning on the spawning migration.

At the time of writing it is too early to draw conclusions from the 1969 West Greenland tagging, though it may be noted that the rate of return (3.6% reported to December 31, 1969) is almost exactly the same as the average return rate from tagging during the 1965-68 period (3.5%).

References

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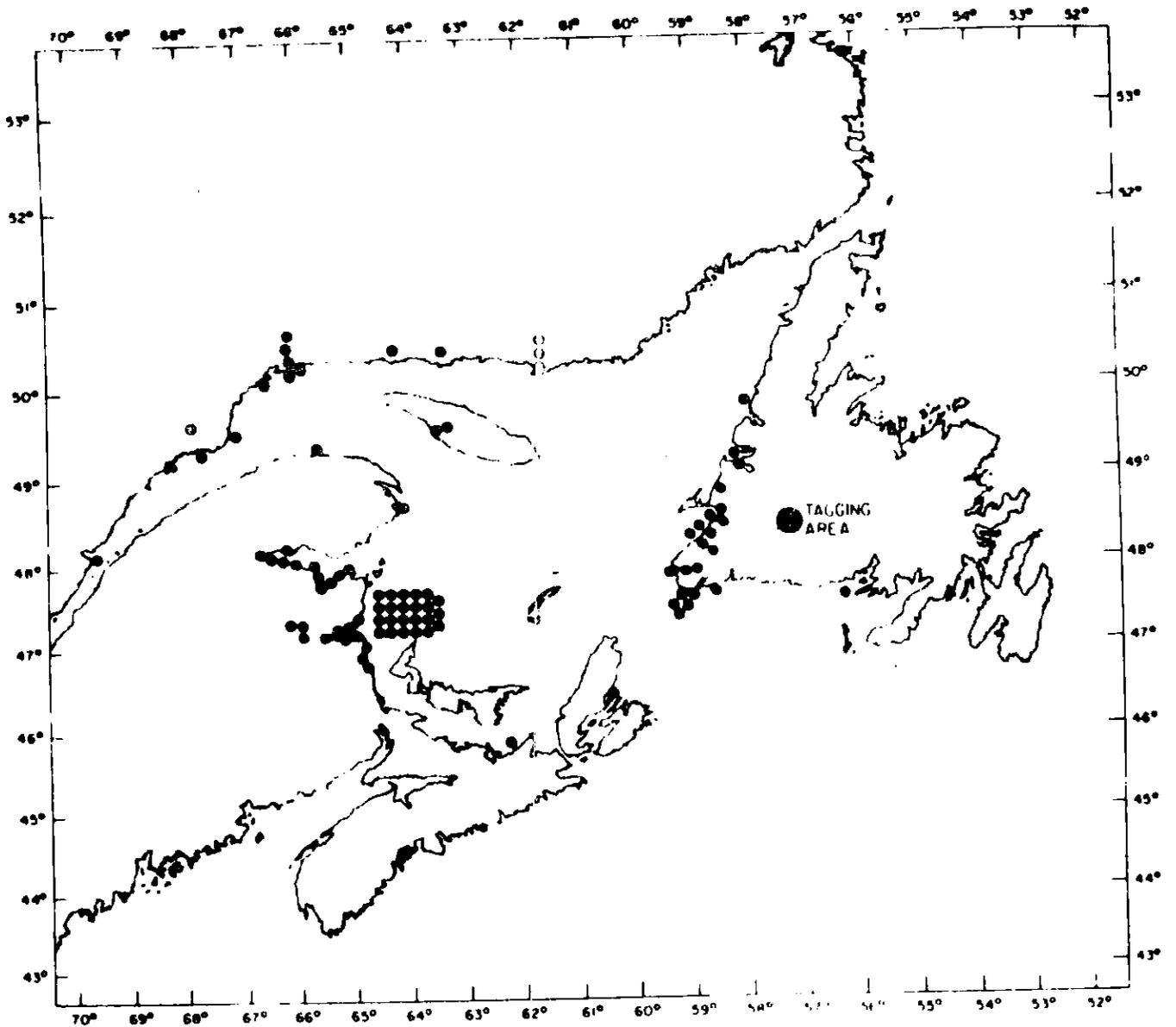


Fig. 1. Returns to December 31, 1969 of tagged salmon from Port aux Basques drift net tagging, May 2-June 10, 1969.

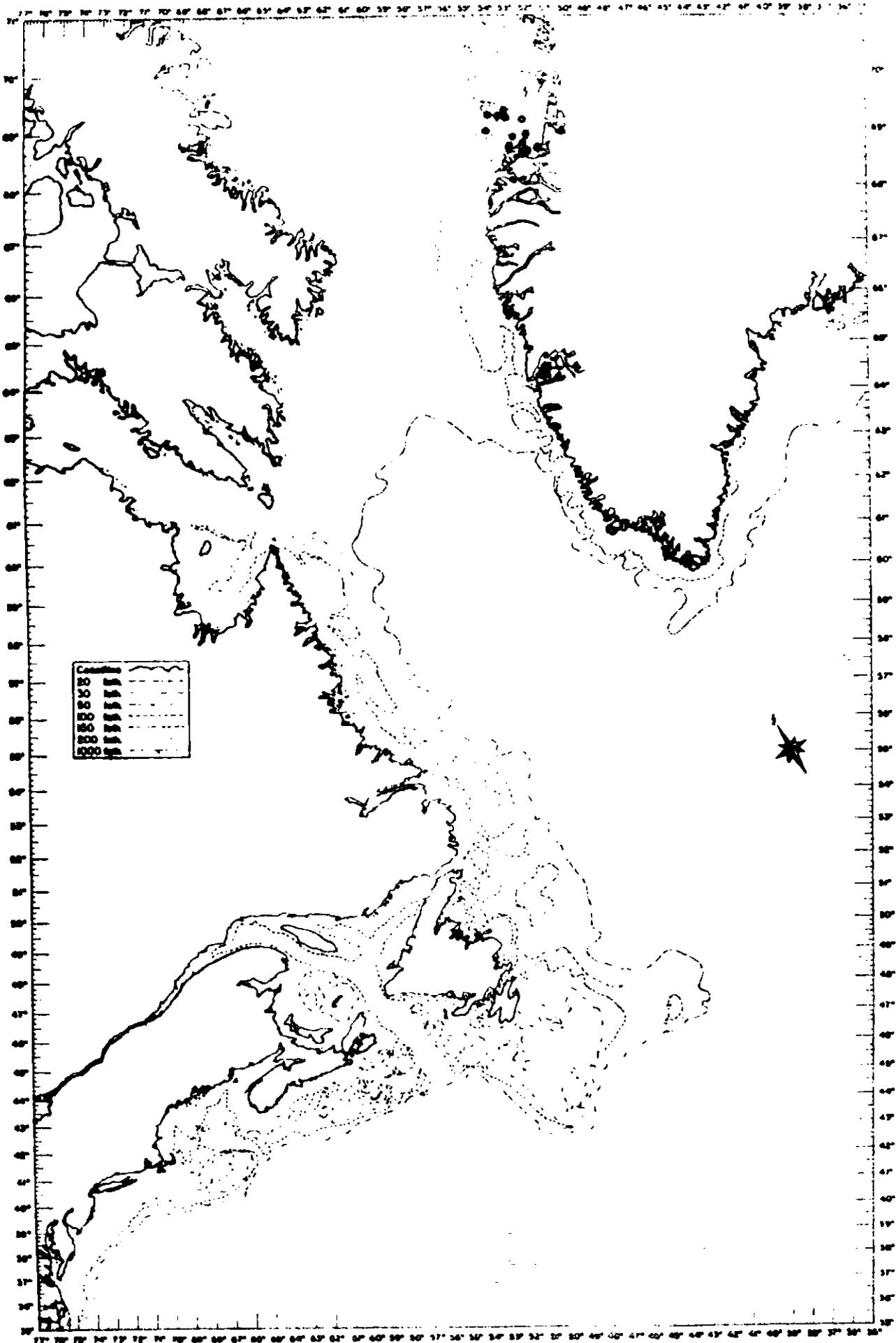


Fig. 2. Returns to December 31, 1959 of tagged salmon from Labrador Sea-West Greenland drift net tagging, September 6-October 2, 1969. All returns to date are from salmon tagged in Disko Bay (approximately 69° 10'N, 52° 30'W).

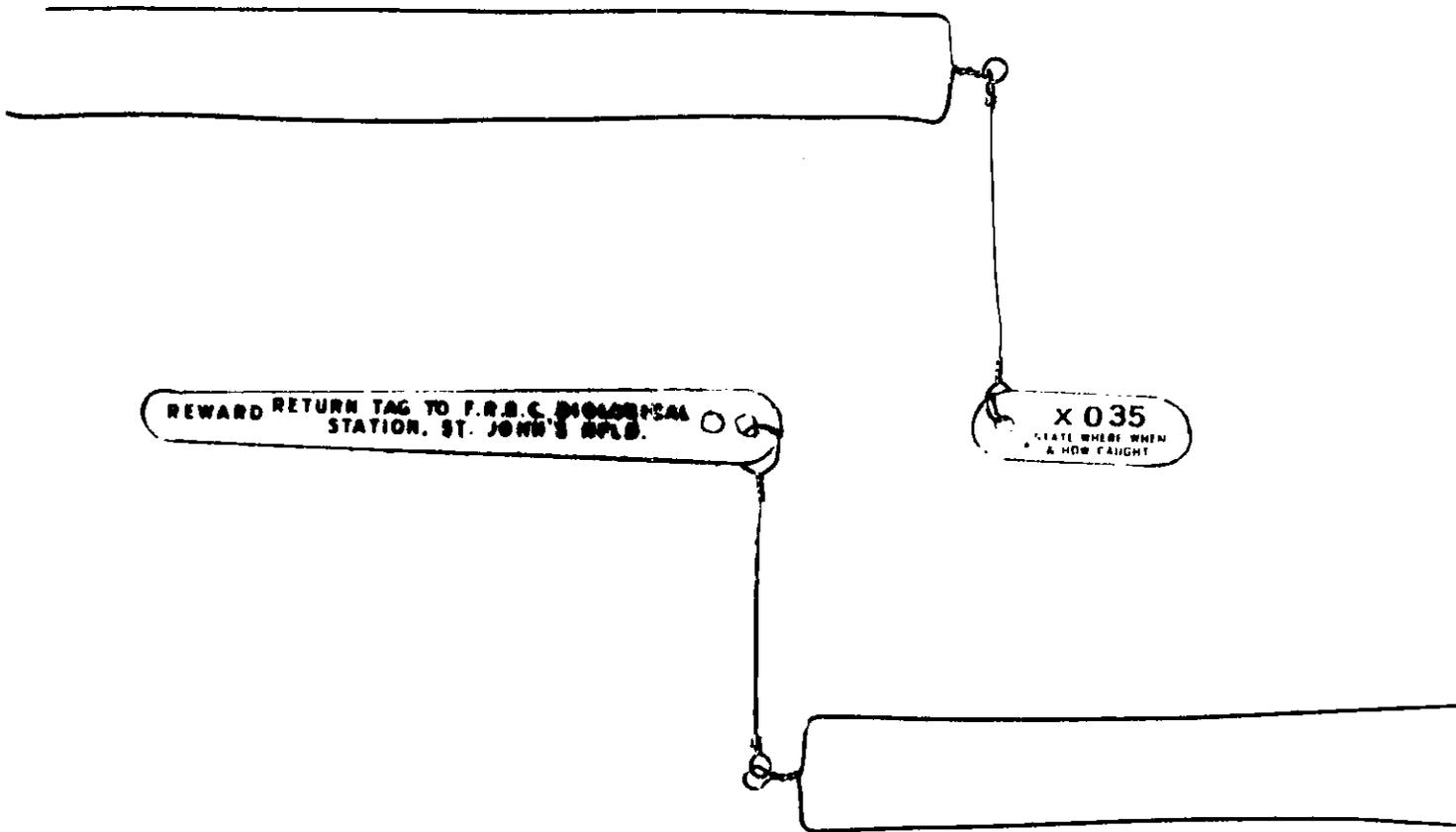


Fig. 3. Salmon tags applied at Port aux Basques (42 mm long) and West Greenland (15 mm long), 1969.

Table 1. Dates and areas fished and numbers of salmon caught and tagged by the research vessel A. T. Cameron, 1969.

Area	Lat. N.	Long. W.	Date	No. Caught	No. Tagged
Labrador Sea	56-45	50-12	Sept. 6	22	5*
South Greenland	60-04	49-48	Sept. 10	7	3
	65-01	53-58	" 15	6	0
	66-16	54-11	" 16	6	6
	66-32	53-07	" 17	0	0
	66-58	54-23	" 18	31	11
	66-58	54-43	" 19	6	5
Disko Bay	69-09	52-33	Sept. 22	37	34
	69-09	52-24	" 23	103	47
	69-08	52-32	" 24	107	59
	69-11	52-34	" 25	17	17
	69-08	52-22	" 26	110	69
	69-08	52-30	" 27	44	40
	69-12	52-19	" 29	33	30
	69-10	52-30	" 30	26	2**
	69-07	52-32	Oct. 1	70	55
	69-07	52-37	" 2	2	2
			Totals	627	385

* Nets tended 2 hrs only (bad weather).

** Nets not tended (bad weather).

Table 2. Numbers of salmon (including grilse) tagged and recaptured from some Canadian tagging experiments.

Year of Tagging	Area	Gear	No. Released	No. Recaptured	% Recaptured	Reference
1937-39	Seven Islands, P.Q.	Gillnets	275	39	14.2	Belding & Préfontaine (1961)
1938	St. Anthony, Nfld.	Gillnets	195	41	21.0	Belding & Préfontaine (1961)
1950	Francis Hr. Bight, Labrador	Gillnets	115	14	12.2	Blair (1957a)
1948	Cape Charles, Labrador	Gillnets	59	8	13.6	Blair (1957b)
1940	Bonavista, Nfld.	Trap Nets	454	180	39.6	Blair (1956)
1937	Miramichi Bay	Drift Nets	411	72	17.5	Belding & Préfontaine (1939)
1937	Port aux Basques, Nfld.	Drift Nets	599	81	13.5	Belding & Préfontaine (1938)
1969	Port aux Basques	Drift Nets	247	90	36.4	