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French Salmon Tagging Contribution
R/V Cryos, 20 August - 29 September 1972
(translated)

by

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In its Third Report (December 1970), the ICES/ICNAF Joint Working Party on North Atlantic Salmon considered that, in relation to determining the exploitation rate of salmon in the West Greenland fishery and obtaining more information on their home-waters destination, a larger scale tagging experiment was necessary to ensure a wide distribution of a sufficiently large number of tags throughout the exploited stock.

In its two reports (March 1971 and January 1972), the Planning Group for the International Tagging Experiment at West Greenland drew up the programme which would be carried out at sea by the research vessels of participating countries and by observers aboard commercial vessels, from the beginning of August to the end of October 1972.

Therefore, the cruise of the R/V Cryos was undertaken as the French contribution to this International Experiment, from 20 August to 29 September 1972 at West Greenland and in Labrador sea with a scientific staff from Institut Scientifique et Technique des Pêches Maritimes (ISTPM), Institut National de la Recherche Agronomique (INRA), Centre Océanologique de Bretagne (COB) and Muséum National d'Histoire Naturelle.

I.-Chronology.

The R/V Cryos, leaving St. Pierre on Sunday 20 August, called in St. John's, Nfld, to embark the scientists coming from France and a Canadian fisherman taking part in the cruise. Leaving St. John's harbour on 22 August, we began fishing at stations A and B in Labrador sea, on 25 and 26 August. Then we steamed north and started fishing off West Greenland (ICES/ICNAF standard

stations 20 and 21) on 28 August in the morning, as planned. After a short call in Faeringhavn on 31 August, we carried on fishing at standard stations 16, 21, 20, 18 and 17 up to 8 September, when we called in Godthaab. From 10 to 19 September, in addition to the standard positions 15 and 13, nets were shot four times on Lille Hellefiske bank near the commercial fishing zone. In the meantime, as the Danish research vessel Adolf Jensen was working in the same sector, we arranged to meet at sea on 11 September in the evening. On 19 September, the research vessels Cryos and Adolf Jensen decided a joint call at Sukkertoppen. From 20 to 24 September, we fished at standard stations 13 and 19. As planned, we left the West coast of Greenland on 24 September and sailed towards Labrador sea to try working again at stations A and B, exactly one month after our first fishing, but unfortunately weather conditions did not permitted. After steaming four days, we sailed in St. John's on 28 September, where the majority of the French scientists landed to fly back to France. During this call, we have had opportunity to meet the Canadian scientists aboard the R/V A.T. Cameron. The R/V Cryos reached St. Pierre on 29 September as planned.

II.- Work at sea.

The main objective of this cruise was to catch and to tag salmon in the West Greenland waters in order to provide information on the rate of return of this species from Greenland to various home waters, and on the exploitation and fishing mortality rates.

In addition, this cruise had to gather information on the distribution and density of the salmon stock inside and outside the West Greenland fishing area (stations in Labrador sea).

Besides, hydrographic and plankton investigations were carried out in this area as biometry, serological and physiological studies on salmon unsuitable for tagging.

1.- Tagging.

On 235 salmon caught, 128 were suitable for tagging during the 17 fishing stations occupied by the R/V Cryos; this gives a good tagging rate of 54.5 %.

These results (Table 1) were obtained thanks to the efficiency of the various tagging teams, to the superior properties of the rubber dinghy Zodiac Mark V and also to the long duration of patrols. Indeed, the scientific staff was numerous enough to allow us to add to the 3 planned patrols of two hours duration each, 2 other teams to patrol the nets when hauling (from three hours and half to four hours duration). Thus, a great number of salmon were tagged on board the rubber boat instead of being hauled with nets.

As shown in Table 1, the most important tagging rate were obtained in Labrador sea (14.2 % in two fishing stations) and principally on the Lille Hellefiske bank (44.5 % in four stations).

As previously observed during our cruise on A.T. Cameron in 1971, the proportion of fish suitable for tagging was closely connected with weather conditions; winds associated with swell clearly exerted an influence on the tagging rate.

The tagging equipment (sea-water tanks, measuring boards, needles and other instruments) was very satisfying. In addition, we must note once again the high qualities of our rubber dinghy Zodiac which, carrying two biologists, a deck-officer and a seaman for every patrol , was launched on 16 times out of 17, even with rough sea.

2.- Hydrography and plankton sampling.

At each fishing station, water temperatures were taken up to 60 m at standard depths (0-10-20-30-50 and 60 m) with YOSHINO protected reversing thermometers to provide information on the relationships between catches and environmental conditions (see the following chapter). In addition, sea-water samples were taken for the Muséum National d'Histoire Naturelle, at different depths at the rate of 30 litres at every station in order to isolate the ectocrine substances, pterines and flavines, from the sea. So, sixteen extracts of these metabolites were obtained and frozen for analysis. On the other hand, samples of sea-water (3 litres at each station) were taken in the zones where salmon was present,

absent and abundant for study by the Institut Océanographique de Monaco.

After this, measures of the clearness of sea-water were made at every station with a disk of SECCHI.

Then, when weather conditions permitted (12 stations), a vertical tow of plankton was effected with the HRNSEN net, from 100 metres depth to the surface. An horizontal tow was also effected on the surface (13 stations).

Studies on incubation of samples rich in copepods were also carried out at different temperatures.

3.- Biometry and physiology.

Particular studies were made on some alive salmon (10 females and 7 males) by the staff of the Muséum National d'Histoire Naturelle. It consisted in sampling blood (serum and plasma), branchial and intestinal mucous membranes, gonads, spleen, stomach contents, muscle, brain, epiphysis and hypophysis, kidney, thyroid, bones, etc... All these samples were frozen and sent to the Muséum in Paris. Measures of osmotic pressure were also made with an osmograph on some specimens.

Serological studies and biometry were carried out on the dead salmon. So, 45 serum samples were taken and frozen for the Salmon and Freshwater Fisheries Laboratory of MAFF, London which could not participate to the International Experiment. These samples were delivered to the representative of MAFF aboard the R/V Adolf Jensen during our common call in Sukkertoppen. On these dead salmon (107), fork length (Lc) and total length (Lt), whole weight and gutted weight, and sex were determined.

III.- Comments on fishing.

1.- Fishing gear and techniques.

When weather conditions were favourable, the R/V Cryos fished every day. So, it was possible to occupy 17 fishing stations (Table 1). In most cases, 100 standard nets were used (50

Monofilament, 130 mm mesh and 50 Monofilament, 150 mm mesh) and arranged in five units to make a fleet of 2.5 nautical miles long. However, sometimes one or two nets were too damaged for repairing quickly and we must shoot 98 nets at the two standard stations 20 and 18, on 4 and 6 September). On the other hand, when the weather conditions were bad or when the weather forecasts (radio stations of the Greenland coast or the fac-simile maps from Halifax, N.S., Canada) were unfavourable, the fleet was reduced to 60 nets (standard station 20 and two stations on the Lille Hellefiske bank) or to 40 nets (standard station 19).

Shooting, easy by the stern, took about one hour for 100 nets. It always began in order to set the whole nets one hour and half or two hours before dawn; so it started at about 02.00 local time at the beginning of the cruise, then at 03.00 on the end of September.

Hauling usually took about three or four hours but when winds became stronger between shooting and hauling, it set some problems. In these cases, the nets were hauled on the bow so that the vessel manoeuvred along the nets. Taking into account the manoeuvring properties of the R/V Cryos, this technique of hauling on the bow was very satisfying and must, in the future, serve as substitute for the hauling on the side.

2.- Catches of salmon.

The best catches of salmon were made in Labrador sea: 93 salmon i.e. 39.5 % of the total catches at two stations on 25 and 26 August (Table 1); and on the Lille Hellefiske bank were we fished during three days (11, 12 and 13 September) at a point not fixed by ICES/ICNAF but which had been very profitable on September 1971, during our observation cruise on the R/V A.T. Cameron. So, 66 salmon were caught on this bank i.e. 23.8 % of the total catch. In the other parts of the studied area at West Greenland (from 61°10' N to 65°39' N and from 49°15' W to 54°01' W), the salmon seemed to have an homogeneous distribution and the yields were mediocre (from 0 to 11 fish per day of fishing).

a.- Influence of weather conditions.

As noted in table 1, the weather conditions were particularly unfavourable at the end of the cruise because of the season and of the working area. Indeed, the majority of the atmospheric depressions moving from the Baffin Island to Iceland crossed the Southern Greenland. The fac-simile maps transmitted from Halifax were correctly received particularly at the end of the cruise.

We must note that the catches were larger with strong winds and rough sea. Unfortunately, this advantage was compensated by fish in poor condition, unsuitable for tagging: 11.3 % of tagged fish, for instance, on 26 August in the Labrador sea when it was impossible to launch the rubber dinghy.

b.- Influence of water temperature.

The 17 fishing stations are not sufficient to establish systematical relationships between the occurrence of salmon and the near-surface temperature. However, we must note (Table 2) that the two best catches (Labrador sea) were made at water temperatures higher than 6°C (6.62°C and 7.99°C). Off Greenland, the radio contacts with the research vessels Adolf Jensen and Scotãa before her return to Scotland, informed us that the best catches had been obtained in waters where temperature was equal or superior to 3°C. This information was exact since our larger yields at West Greenland were obtained at temperatures from 2.82°C to 5.40°C. However, we must note that the catches were correct at standard station 21 where we fished twice (28 August and 3 September) : 11 salmon at 1.19°C and 10 at 1.25°C.

3.- Other catches.

Large quantities of drifting seaweeds were gathered in the nets (Laminaria and Fucaceae) especially at the stations near the coast where tidal currents were stronger.

Concerning the thick-billed murre Uria lomvia, one observer of PIROP (Programme Intégré de Recherche sur les Oiseaux

Pélagiques) of the University of Moncton (N.B., Canada) was desirous to come aboard the Cryos in order to study the mortality of this sea-bird by salmon drift nets. Unfortunately, it was not possible to provide place for him during this cruise and so we have numbered and weighed the catches to communicate the results to PIROP. So, 317 Brunnich's guillemots were caught (320 kg) at the 17 fishing stations. The daily catches were about 2 to 5 birds except on 6 September at standard station 18 (63°20'6 N - 51°39'6 W) where 227 specimens were caught in 11 hours fished.

Three black guillemot Cepphus grylle were also caught.

Concerning catches of fish, many small specimens (3 to 4 cm) of lumpfish Cyclopterus lumpus were found in the nets. On the other hand, we must note that two American plaice Hippoglossoides platessoides were caught by the surface drift nets at the same station (65°36'8 N - 53°46'8 W) where depth was 118 m.

In addition, three harbour porpoises Phocaena phocaena were caught in the nets without causing any damage.

IV.- Contacts established during the cruise.

In addition to the contacts with the scientists of the FRBC Biological Station in St. John's, Nfld, during our two calls in this harbour, we maintained close radio contacts with the other research vessels participating in the tagging programme.

Firstly, we must note the friendly radio contact with the R/V Scotia before her early return to Aberdeen.

Secondly, radio communications with the R/V Adolf Jensen took place every evening. During these contacts, we reported our daily results and obtained information on commercial catches and progress of research vessels. As we were working in the same sector, the Danish research vessel and the Cryos met at sea for a short interview. Later on, a second meeting took place in Sukkertoppen to exchange the latest results.

In addition, radio contacts were established at the end of our participation with the Canadian research vessel A.T. Cameron which was fishing in the same area at this period.

These different contacts were very important for the issue of the tagging experiment since we could exchange the preliminary results and obtain information on the salmon commercial catches at West Greenland.

Table 1. - Fishing and tagging.

Date	Position	No. of nets	length of nets (fathoms)	Duration (Hrs)		No. of Salmon		Percent. tagged
				fishing	Patrolling	caught	tagged	
Aug. 25	56°46'5 N - 50°35' W	100	2 500	14.0	6.5	40	13	32.5
26	58°06'2 N - 52°18' W	100	2 500	7.8	0	53	6	11.3
27	Steaming North							
28	61°11'9 N - 49°15'2 W	100	2 500	13.8	11.3	11	9	81.8
29	61°18'2 N - 51°12'8 W	100	2 500	14.0	11.4	28	19	67.9
30	Storm - no fishing							
31	Port call Faeringuavn							
Sept. 1	63°20'9 N - 54°01'3 W	100	2 500	11.5	5.0	3	1	33.3
2	Storm - no fishing							
3	61°10'3 N - 49°13'5 W	100	2 500	14.5	11.0	10	6	60.0
4	61°11'9 N - 51°02'10W	98	2 450	13.0	10.0	11	5	45.5
5	Steaming North							
6	63°20'6 N - 51°39'6 W	98	2 450	14.5	11.8	3	3	100.0
7	63°21'2 N - 52°25'7 W	60	1 500	8.0	5.5	0	0	/
8	Port call Godthaab							
9	" " "							
10	64°09'9 N - 52°42'5 W	100	2 500	13.1	10.0	5	5	100.0
11	65°36'8 N - 53°46'8 W	100	2 500	15.0	12.5	22	18	81.8
12	65°39'2 N - 53°50'1 W	100	2 500	12.8	10.2	23	19	82.6
13	65°39'1 N - 53°46'7 W	60	1 500	7.2	4.0	7	7	100.0
14	Storm - no fishing							
15	" "							
16	65°08'6 N - 53°03'9 W	100	2 500	13.8	10.8	14	13	92.9
17	Storm - no fishing							
18	64°55'5 N - 52°52'2 W	60	1 500	13.2	10.8	2	1	50.0
19	Port call Sukkertoppen							
20	" " "							
21	Storm - no fishing							
22	65°10'5 N - 53°00'0 W	100	2 500	11.8	4.0	3	3	100.0
23	62°09'7 N - 50°08'0 W	40	1 000	5.5	3.8	0	0	/
Overall						235	128	54.5

Table 2. - Fishing and water temperatures.

Date	Position	No. of Salmon caught	Surface temperature (°C)
25/VIII	55°46'5 N - 54°35'5 W	40	1.99
26/VIII	58°00'2 N - 52°18'2 W	53	6.62
28/VIII	61°11'9 N - 49°15'2 W	11	1.19
29/VIII	61°18'8 N - 51°12'8 W	28	4.78
1/IX	63°20'9 N - 54°01'3 W	3	3.30
3/IX	61°10'3 N - 49°13'5 W	10	1.25
4/IX	61°11'9 N - 51°02'0 W	11	5.40
6/IX	63°20'6 N - 51°39'6 W	3	2.92
7/IX	63°21'2 N - 52°25'7 W	0	1.83
10/IX	64°09'0 N - 52°42'5 W	5	2.00
11/IX	65°36'8 N - 53°46'8 W	22	1.16
12/IX	65°39'2 N - 53°50'1 W	23	3.27
13/IX	65°39'1 N - 53°46'7 W	7	/
16/IX	65°08'6 N - 53°03'9 W	14	2.82
18/IX	64°55'5 N - 52°52'2 W	2	2.55
22/IX	65°10'5 N - 53°00'0 W	3	2.62
23/IX	62°09'7 N - 50°08'0 W	0	2.14