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Preliminary report on local recaptures from the
International Salmon Tagging Experiment at West Greenland, 1972

by

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The International Salmon Tagging Experiment took place in August-October 1972 at West Greenland, 13 vessels took part in the experiment (8 commercial and 5 research vessels).

1. Tagging
2. Recaptures from the tagging experiment, ICES-tags.
3. Tagging categories.
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1. Tagging.

The total number of salmon tagged is 2364, Table I shows the number of salmon tagged per vessel and by categories (G=good, F=fair, P=poor). Table II gives the number of salmon tagged per week in each tagging area (as defined in ICES/ICNAF Salmon Doc. 72/75 by Ole Christensen). This table also shows that 60% of the total number tagged were obtained during the first four weeks of the experiment, and that Area III was the area with the biggest activity accounting for 25% of the total number tagged.

2. Recaptures from the tagging experiment, ICES-tags.

The total number of local recaptures (i.e. recaptures at West Greenland) by 1st March, 1973 was 141 or 6% of the salmon tagged. Table III shows the number of recaptures of salmon tagged by various vessels given by categories (number as well as percentage) and according to time span between release and recapture. The later break down is made in order to get figures which are not biased by the phenomenon that many fish were

released close to nets in the sea and thus may have entered nets immediately after release. In fact, 26% of the recaptures were reported in the first two days after release.

Only 38 salmon of the category "poor" were tagged, none of which were recaptured.

Ignoring the four fish tagged by TORNAQ the percentage of total recaptures for each vessel's tagging fluctuates between 1.6 and 8.8, with an average of 6% (Table III, Column G). There is a difference between commercial and research vessels, the percentage of total recaptures (Column G) being higher for the commercial vessels than for the research vessels. The reason for this seems to be that the commercial vessels, unlike the research vessels, often work as a fleet, and therefore the chance for recapture just after the release will be bigger. This seems clearly demonstrated in Column N, which shows the percentage of recaptures having spent two days or less in the sea. For the group of salmon that spent more than two days in sea, Column T, the percentage of recaptures is rather equal between commercial and research vessels.

3. Tagging categories.

Table I and III in total gives the number and percentage of salmon tagged and recaptured in each tagging category (G, F and P). The instructions given to the observers were only to tag salmon in the tagging category "good", whereas research vessels should tag "good" as well as "fair" conditioned fish. Two vessels have complied with these instructions BAKUR and LEIKUR, while the two Norwegian vessels, ELDORADO and ULLA, have 87.5% of tagged salmon in the category "fair", (they have seen real good fish in the Norwegian long-line fishery). The other commercial vessels are between these two groups.

The total number and percentage of recaptures, broken down in tagging categories are given in Table III, Columns A-G. The average return in percentage for tagging categories "good" and "fair" is 6.9% (\pm 2.7%) and 3.8% (\pm 2.2%) respectively. Columns H-N show recaptures of salmon, which have spent two days or less in sea. The average return in percentage for the two categories is 1.8% (\pm 1.4%) and 1.1% (\pm 1.4%) respectively. Columns R and S give the percentage of recaptures of salmon, which have spent more than two days in the sea, G: 4.7% (\pm 2.2%) and F: 1.9% (\pm 1.8%).

The difference between the tagging categories' percentages must derive from the difference in tagging mortality between the categories (see later section).

4. Migration.

Table IV shows all recaptures broken down by days in sea and distance migrated in nautical miles, northwards and southwards respectively. Generally more recaptures are taken south of than north of the tagging site.

37 salmon or 26% of the recaptures are taken just after the tagging (two days in sea). Table V shows recaptures set up in tagging area against recapture area. 71 salmon or 50% of recaptures were taken in the tagging area, 37 (26%) were taken in areas south of the tagging area, 16 (11%) were caught in areas north of the tagging area, and 17 (13%) were without any information about recapture area.

It is very difficult to get an idea about the migration between offshore and inshore areas, because the information about recapture locality is in many cases insufficient. However, the fishing gear used, may give some ideas, Table VI.

Table VI. Recaptures given by fishing gear used and by nations.

Nation	drift net	gill net	NK
Greenlanders	18	7	14
Danish drifters	47		
Faroese "	36		2
Norwegian "	17		
Total	118	7	16

Table VI shows that most recaptures were taken offshore by Danish, Faroese and Norwegian drifters. Generally, it seems like migration between offshore and inshore waters has been very small. It should be noted, however, that salmon must have migrated to the coastal areas, because the fishery in these areas is rather big.

5. Recaptures and reporting of other tags.

Table VII shows recaptures taken by the tagging vessels, both ICES-tags and other tags. Furthermore the table gives the number of salmon caught per vessel. The average recaptures of ICES-tags per 1000 salmon caught is 0.61 ± 0.39 and for other tags 1.17 ± 0.46 .

From the Danish drifters' total catch and journals the average weight for a salmon is calculated. It is 3.20 kg round, fresh fish, this mean weight is used in Table VIII, which shows the total catch of Denmark at West Greenland 1972, in metric tons and in number.

Table VIII. Danish salmon catches at West Greenland, 1972. Metric tons round, fresh fish and in numbers. Figures are provisional.

Denmark	Metric tons	Nos.
(G)	1306	408 125
(M)	401	125 300
(F)	155	48 450
Denmark total	1862	581 875

Table IX gives the number of tags, other than ICES-tags, reported and the estimated number of recaptures caught. The factor 1.17 per 1000 salmon caught, derived from Table VII has been used.

Table IX. Number of other tags, than ICES-tags, reported from the West Greenland fishery, 1972, and estimated number of recaptures actually caught.

Denmark	Tags reported	Nos. of recaptures estimated
(G)	268	478
(M)	131	147
(F)	92	57
no information	4	
Denmark total	495	682

If the salmon which carry tags, other than ICES-tags, are evenly distributed in the total stock of salmon at West Greenland, and if vessels listed in Table VII have a 100% reporting rate, the reporting rate in the fishery as a whole is $\frac{495}{682} \times 100$ or about 73%. Since the vessels listed in Table VII account for about 15% of total catch the reporting by the remainder of the fishery is about 67%. The percentage is underestimated to the same degree as further reporting of tags occurs. From previous years we know that we may expect further tags from Greenland from time to time in one or two years after fishery. The percentage is believed to increase to at least 80%.

6. Tagging mortality.

The survival experiments with salmon were very limited in 1972. For present analyses these experiments have, therefore, been combined with experiments from 1969 and 1970.

The experiments were carried out in the following way: After tagging the salmon were held in a keep net (8x8x6 meters depth) in 24 hours or more before the release, the number of alive and dead salmon was counted.

The result of the survival experiments from 1969, 1970 and 1972 are shown in Table X.

Table X. Survival of tagged salmon in keep net.

Year	No. examined	Released from keep net	dead in keep net
1969	20	11	9
1970	41	29	12
1972	26	15	11
Total	87	55	32

The overall survival rate S_T is $\frac{55}{87} = 0.63$ equal to a tagging mortality of 37%.

The recaptures from commercial and research vessels by tagging categories are given in Table XI (taken from Table III).

Table XI. Percentage of recaptures of the tagging categories "good" and "fair", and the rate between these.

Vessels	G	F	$\frac{G}{F}$
Commercial	7.69	4.88	1.58
Research	4.72	2.90	1.63
Total	6.91	3.80	1.82

The ratio between recaptures for the two categories varies very little between the two groups of vessels (1.58 and 1.63 respectively).

The number of salmon tagged by the two groups of vessels (taken from Table I) is shown in Table XII.

Table XII. Number of salmon tagged by tagging categories "good", "fair", and "poor".

Vessels	G	F	P	Total
Commercial	1248	287	16	1553 (incl. 2 NK)
Research	444	345	22	811
Total	1692	632	38	2364

Estimation of tagging mortalities for the two tagging categories, G and F can be made as follows:

Given: S_T = overall survival rate = 0.63

S_G = survival rate for the tagging category G

S_F = survival rate for the tagging category F

$S_F = \frac{S_G}{1.82}$ according to Table XI.

$$1692 \times S_G + 632 \times \frac{S_G}{1.82} \approx 2324 \times S_T$$

From this it is found that $S_G = 0.72$ and $S_F = 0.39$.

The number of survivals from tagging categories G and F is therefore 1218 and 246 respectively, and the percentage of recaptures 9.6 and 9.7% respectively (total 9.6%).

In the future it will be necessary to continue the survival experiments at West Greenland, if a better estimation of the tagging mortalities is wanted.

Table I. Number of salmon tagged per vessel and by tagging category.

Commercial vessels	Nos. tagged			Relation between categories (%)			Total
	G	F	P	G	F	P	
POLARLAKS (Den.)	145	96	8	58.0	38.4	3.2	250 ⁺)
SILPHA "	92	9	-	91.1	8.9	-	101
SUSI-ANN "	179	35	-	83.6	16.4	-	215 ⁺)
BAKUR (Far.)	286	1	1	99.3	0.3	0.3	288
HVITANES "	114	27	-	80.9	19.1	-	141
LEIKUR "	422	-	-	100.0	-	-	422
ELDORADO (Nor.)	1	32	-	3.0	97.0	-	33
ULLA "	9	87	7	8.7	84.5	6.8	103
Total	1248	287	16	80.4	18.5	1.0	1553⁺⁺)

Research vessels	G	F	P	G	F	P	Total
A.T. CAMERON (Can.)	120	94	5	54.8	42.9	2.3	219
ADOLF JENSEN (Den.)	159	164	10	47.7	49.2	3.0	333
CRYOS (France)	98	30	-	76.6	23.4	-	128
SCOTIA (Scotl.)	64	56	7	50.4	44.1	5.5	127
TORNAQ (Den.)	3	1	-	75.0	25.0	-	4
Total	444	345	22	54.7	42.5	2.7	811

Total all vessels	1692	632	38	71.6	26.7	1.6	2364⁺⁺)
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⁺) Including 1 not given by category.

⁺⁺) " 2 " " " "

Tagged by vessel	R E C A P T U R E S																										
	Number tagged		Total number of recaptures										2 days or less in sea after tagging										More than 2 days in sea after tagging				NK
	G	F	No.		% of nos. in each category		No.		% of nos. each cat.		No.		% of nos. in each cat.		No.		% of nos. in each cat.		G	R	S	T	U	V			
			F	P	F	Tot.	F	Tot.	H	J	K	L	M	N	F	Tot.	G	F							Tot.	F	Tot.
A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T	U	V							
Polarlaks	145	96	8	250 ^{x)}	12.4	4.2	8.8	7	2	9	4.8	2.1	3.6	8	0	8	5.5	0	3.2	5	2.0						
Silpha	92	9	-	101 ^{x)}	5.4	11.1	5.9	1	0	1	1.1	0	0.99	4	1	5	4.3	11.1	5.0	1	0.47						
Susi-Ann	179	35	-	215 ^{x)}	6.7	5.7	6.5	5	1	6	2.8	2.9	2.8	6	1	7	3.4	2.9	3.3	1	0.47						
Bakur	286	1	1	288	8.4	0	8.3	4	0	4	1.4	0	1.4	20	0	20	7.0	0	6.9	1	0.71						
Hvitanes	114	27	-	141	6.1	0	5.0	1	0	1	0.9	0	0.7	5	0	5	4.4	0	3.5	1	0.71						
Leikur	422	-	-	422	6.6	-	6.6	11	-	11	2.6	-	2.6	14	-	14	3.3	-	3.3	1	3.03						
Eldorado	1	32	-	33	0	2	6.1	0	1	1	0	3.1	3.0	0	0	0	0	0	0	0	0	0					
Ulla	9	87	7	103	22.2	5.7	6.8	0	3	3	0	3.4	2.9	2	2	4	22.3	2.3	3.9	1	3.03						
A.T.Cameron	120	94	5	219	2.5	1.1	1.8	0	0	0	0	0	0	3	1	4	2.5	1.1	1.8	2	0.6						
Ad.Jensen	159	164	10	333	7.5	4.9	6.0	1	0	1	0.6	0	0.3	11	6	17	6.9	3.6	5.1	2	0.6						
Cryos	98	30	-	128	2.0	0	1.6	0	0	0	0	0	0	2	0	2	2.0	0	1.6	1	0.6						
Scotia	64	56	7	127	6.3	1.8	3.9	0	0	0	0	0	0	4	1	5	6.3	1.8	3.9	1	0.6						
Tornag	3	1	-	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
Total	1692	632	38	2364 ^{xx)}	6.9	3.8	6.0	30	7	37	1.8	1.1	1.5	79	12	91	4.7	1.9	3.8	13	0.55						

x) Including 1 not given by category; xx) Including 2 not given by categories.

Table III: Recaptures of ICES-tags at Greenland, 1972 in numbers and in percentage of numbers tagged inside each category.

Days in Sea	Number	Southwards distance migrated						Northwards distance migrated					
		< 10	11-30	31-50	51-100	101-300	> 301	< 10	11-30	31-50	51-100	101-300	> 301
≤ 2 days	37	3	1	4	1			2	6	3			
3-5 "	10	2	1	2	1			2	2				
6-10 "	16	2	1	3	4					2	1		3
11-20 "	23		4	1	5	1		2			3	1	3
21-30 "	14	1	2		1			1				1	3
31-40 "	10		2	1		3		1	2		1		
41-50 "	11		1		1				4	2			
> 51 "	7				1	1						3	
NK	13							1	3				
Total	141	8	12	11	14	13	5	9	17	7	4	6	35

Table IV: Recaptures of ICES-tags by days in sea, and by distance migrated (Nautical miles).
a) 15 of these had migrated less than 10 nautical miles taken nearly at the same position as releases.

Table V. Number of recaptures of ICES-tags, set up in area of tagging against area of recapture.

Area of Recap.	Area of Tagg.	I	II	III	IV	V	VI	Total
I		14	2	2				18
II			8	1				9
III		2	11	19	5	1		38
IV		1	1	14	8	3		27
V			5		3	17	2	27
VI							5	5
NK		1	4	4	1	7		17
Total		18	31	40	17	28	7	141

Table VII. Recaptures from the tagging vessels, ICES-tags and other tags.

Vessels	ICES-tags			Other tags			Nos. of salm. caught	Other tags per 1000 salm.	ICES tags per 1000 salm.
	≤2 days in sea	>2 days in sea	Total	Rep. on board	Rep. later	Total			
POLARLAKS	5	3	10 ^{+))}	13	9	22	16 344	1.35	0.61
SILPHA	3	5	8	8	0	8	10 878	0.74	0.74
SUSI-ANN	3	3	6	13	1	14	15 609	0.90	0.38
BAKUR	2	3	5	20	0	20	13 512	1.48	0.37
HVITANES	1	9	10	14	0	14	7 173	1.95	1.39
LEIKUR	6	2	8	16	0	16	12 870	1.24	0.62
ELDORADO	1	4	5	0	0	0	2 585	0	1.93
ULLA	1	0	1	4	2	6	8 012	0.75	0.12
A.T.CAMERON	-	-	-	1	0	1	464	2.16	-
ADOLF JENSEN	1	-	1	2	0	2	756	2.65	1.32
CRYOS	-	-	-	1	0	1	235	4.26	-
SCOTIA	-	-	-	0	0	0	306	0	-
TORNAQ	0	0	0	0	0	0	88	0	-
TOTAL	23	29	54^{+))}	92	12	104	88 832	1.17 ±0.46	0.61 ±0.39

^{+))}incl. two without knowledge of time in sea.

